



# *Lighten Up!*

## An Engineer's Introduction To Lightweight Backpacking ...And Great Places To Go

Dennis Horwitz

[dennishorwitz@gmail.com](mailto:dennishorwitz@gmail.com)

[www.dennishorwitz.com](http://www.dennishorwitz.com)

IEEE-BV  
9/16/2020

# Recording

- Recording at the following link:
- <https://ieeemeetings.webex.com/webappng/sites/ieeemeetings/recording/play/2e781048ad2a427ebdbff417b7371ee3>

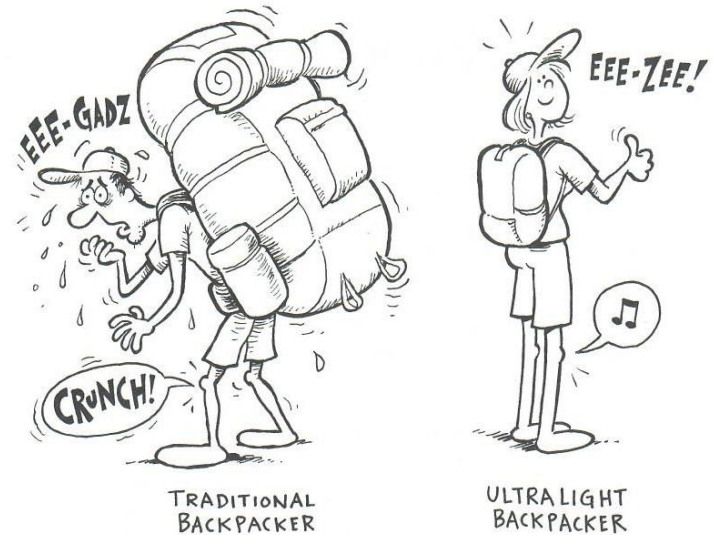
# Does It Get Any Better Than This?



Inspiration Point, Anacapa Island, Channel Islands NP

# Introduction to Lightweight Backpacking

1. Principles of Lightweight Backpacking
2. How Technology Has Transformed Backpacking Gear
3. What to Pack - Packing Categories
4. Investment Priorities-Beginner or Experienced BP'er
5. My Favorite Gear
6. LW Gear Manufacturers
7. Packs
8. Shelter
9. Sleeping Bags
10. Sleeping Pads
11. Cooking Gear and Meal Planning
12. Local Hikes and Backpacking Destinations
13. Wrap-Up and Resources





# Which Backpacker Do You Want to Be?

## CATEGORIES of PACK WEIGHT



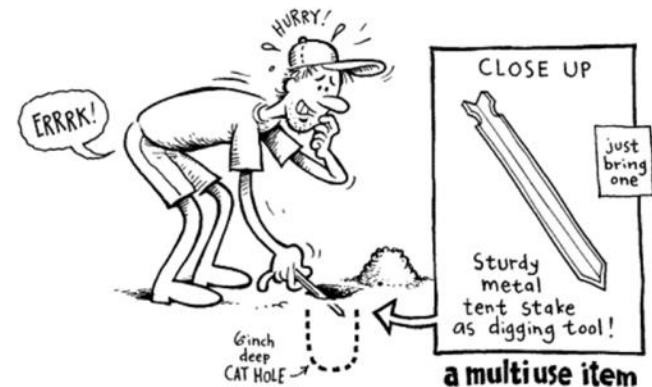
↑  
Adult Leader  
in Boy Scouts

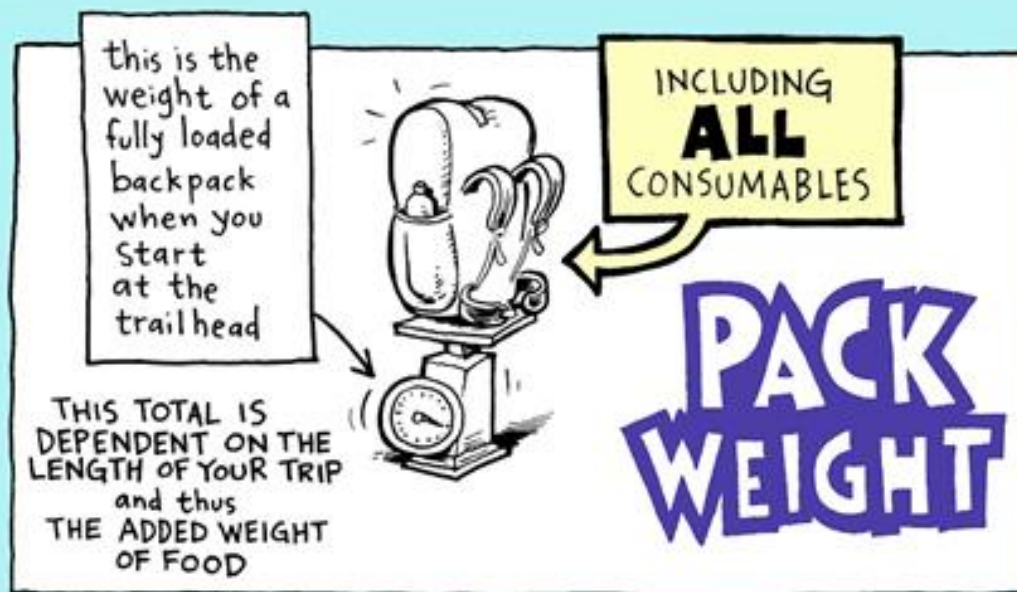
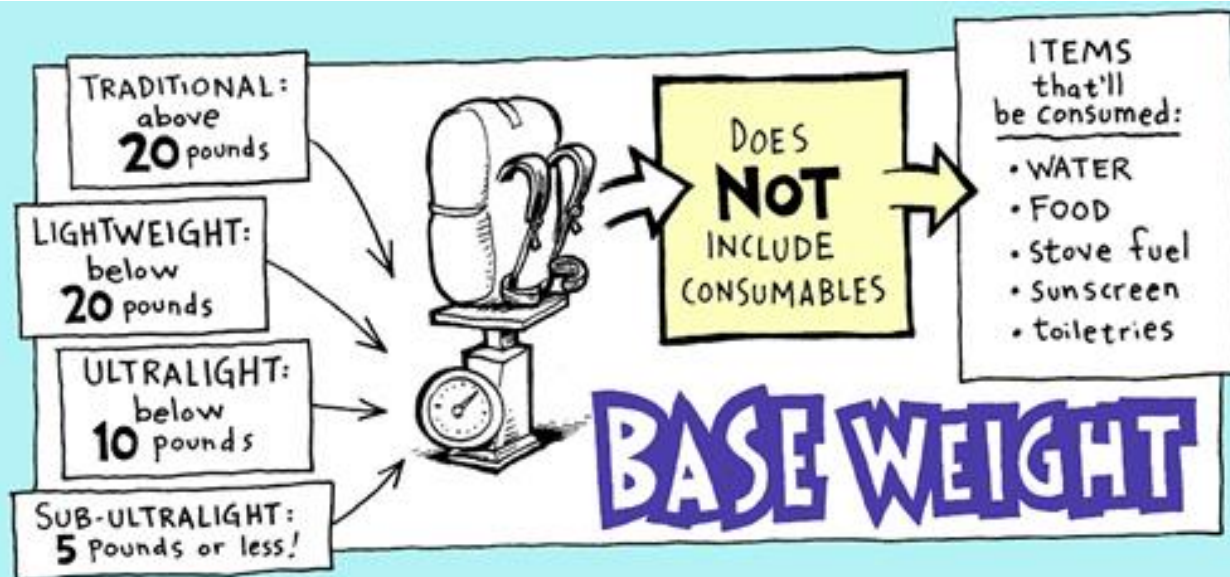
↑  
Dennis Today  
<12 lbs

MY MOTTO: Bring what make you comfortable and helps you enjoy the experience.

# Principles of Lightweight Backpacking

1. Take enough gear to be safe, comfortable and confident.
2. Know the actual weight of each item.
3. Whenever possible, use multipurpose items.
4. Look at the heaviest items first.
5. When selecting gear, pick the smallest that will suit your needs.
6. Choose lightweight gear that is useful, sturdy and dependable.
7. Know how to use your gear in emergency conditions!





# Packing Categories

No.	Description	Notes
1	Risk Management	Know before you go: weather forecast , terrain, route and water sources.
2	Pack Weight	My Base Weight objective is 10-12 lbs
3	Footwear	Trail shoes or low cut hiking boots
4	Backpacks	What is comfortable load weight for pack?
5	Navigation	Map, compass, GPS
7	Clothing System	Weather protection, thermoregulation and layers
8	Sleep System	Sleeping bag or quilt, pad, sleep wear
9	Shelter	Tarp tent, ground cloth, trekking poles
10	Hydration	Bottles or bladder, filter or purification tablets
11	Food & Cooking Equipment	Plan for about 2 lbs of food per day, stove, fuel, pot/bowl/cup, spoon, bear canister (if required)
12	Hygiene	Toothbrush, toothpaste (mini size), hand sanitizer
13	First Aid	Advil, bandaids, moleskin, tweezer



# How Has Technology Helped?

## Lightweight Fabrics for Tents

- Old School – PUR Coated Nylon or Polyester
  - Heavy, thick and very durable
  - Inexpensive
- Middle School – Silnylon
  - Thin woven nylon impregnated with liquid silicone from both sides.
  - Light, strong, durable and fairly inexpensive
- New School - Dyneema Composite Fabric
  - Formerly Cuben Fiber
  - Thin, requires care, very expensive

# How Has Technology Helped?

## Metals for Stoves, Tent Stakes and Small Appliances/Utensils, Bear Canisters

- Old School – Stainless Steel
  - Heavy, very durable and inexpensive
- Middle School – Anodized Aluminum
  - Lighter weight, durable and inexpensive
  - Non-stick coatings available for pots and pans
- New School - Titanium
  - Lightweight, strong, expensive

# How Has Technology Helped?

## Standards Establish Sleeping Bag Ratings

EN 13537 measures four temperature ratings:

- **Upper Limit** — the temperature at which a standard male can sleep without excessive [perspiration](#). It is established with the hood and zippers open and with the arms outside of the bag.
- **Comfort** — the temperature at which a standard female can expect to sleep comfortably in a relaxed position.
- **Lower Limit** — the temperature at which a standard male can sleep for eight hours in a curled position without waking.
- **Extreme** — the minimum temperature at which a standard female can remain for six hours without risk of death from [hypothermia](#) (though [frostbite](#) is still possible).

# How Has Technology Helped?

## Standards Establish Sleeping Bag Ratings

EN 13537 measures four temperature ratings:

- **Upper Limit** — the temperature at which a standard male can sleep without excessive [perspiration](#). It is established with the hood and zippers open and with the arms outside of the bag.
- **Comfort** — the temperature at which a standard female can expect to sleep comfortably in a relaxed position.
- **Lower Limit** — the temperature at which a standard male can sleep for eight hours in a curled position without waking.
- **Extreme** — the minimum temperature at which a standard female can remain for six hours without risk of death from [hypothermia](#) (though [frostbite](#) is still possible).

# How Has Technology Helped?

## Standards Establish Sleeping Bag Ratings

EN 13537 uses these standard test subjects:

- **Test Conditions:** These ratings are taken assuming that the subject is using a sleeping pad, tent and is wearing one base layer of thermal underwear.
- **Standard Man** is assumed to be 25 years old, with a height of 1.73 m and a weight of 73 kg
- **Standard Woman** is assumed to be 25 years old, with a height of 1.60 m and a weight of 60 kg.



# How Has Technology Helped?

## Natural Insulation Materials

- **600-650 Fill Power**
  - Heavy, durable and inexpensive
  - Somewhat compressible
- **700-800 Fill Power, Also Dridown**
  - High loft, lightweight, durable and more expensive
  - Compressible
  - Think “Patagonia” Down Jacket or Sweater
- **900 Fill Power**
  - Premium power down, lightweight, high loft, very expensive
  - Very compressible

# How Has Technology Helped?

## Synthetic Insulation Materials

Advantage: Water resistant, retains heat when damp (but wool is better)

Disadvantage: Not as warm, heavier

- Polarguard (long fibers)
- Primaloft (short fibers)
- Polarguard 3D
  - Premium synthetic insulation
  - Performs like down, somewhat compressible

# How Has Technology Helped?

## Electronics

**Smart Phones:** Very versatile but not power efficient, needs source to recharge. While GPS will work, little chance for cell coverage in the backcountry,

**Camera:** Smart phone is a great option for multifunctionality but I prefer a dedicated camera.

**GPS:** Single purpose, disposable batteries. Prefer touchscreen and built-in electronic compass. Always carry extra set of batteries. Download route and map before you go!

**Emergency Satellite Transmitter (SPOT):**  
Let people know you are OK (with GPS tag) or call SAR in a **REAL** emergency

# How Has Technology Helped?

## Electronics

**Headlights:** LED technology rules, lots of styles, lots of brightness options, consider your real needs, carry extra batteries anyway. How good is your night vision?



Petzl e+LITE  
0.9 oz  
50 lumens  
1x CR2032



Petzl Zipka  
2.5 oz  
200 lumens  
3xAAA or Rechargeable



Petzl Actika  
2.9 oz  
350 lumens  
Rechargeable

# How Has Technology Helped?

## Power Back-up for Rechargeable Electronics

- **Extra batteries** – disposable lithium Ultimate AA or AAA batteries are light and long life (at any temperature)
- **USB Power Pack** – for recharging Smart Phones and Cameras, and other devices
- **Solar Array** – recharge while you walk or top off rechargeable battery. Not really very efficient.
- **Biolite Stove** – thermoelectric generator can recharge (partially) your smartphone







# Packing Categories

No.	Description	Notes
1	Risk Management	Know before you go: weather forecast , terrain, route and water sources. What If? bag.
2	Pack Weight	My Base Weight objective is 10-12 lbs
3	Footwear	Trail shoes or low cut hiking boots
4	Backpacks	Gossamer Gear Mariposa
5	Navigation	Map, compass, GPS
7	Clothing System	Weather protection, thermoregulation and layers
8	Sleep System	Sleeping bag or quilt, pad, sleep wear
9	Shelter	Tarp tent, ground cloth, trekking poles
10	Hydration	3L Platypus or Camelback, purification tablets
11	Food & Cooking Equipment	Plan for about 2 lbs of food per day, stove, fuel, pot/bowl/cup, spoon, bear canister (if required)
12	Hygiene	Toothbrush, toothpaste (mini size), hand sanitizer
13	First Aid	Advil, bandaids, moleskin, tweezers

# How To Lighten Up or Invest In Your First Gear?

- Focus on the Big 3 (in this order):
  - Sleeping Bag
  - Tent or Tarptent
  - Backpack
- If your gear is big and bulky, you'll never be able to downsize your backpack
- If you don't downsize, you cannot effectively reduce your base weight
- All your gear should fit **inside** your pack
- Do not lash on equipment unless absolutely no other solution
- After a trip, look at what you brought and didn't use and what you forgot to bring

# My Favorite Gear

- WHAT-IF? Bag
- Petzl e+LITE (1 oz) 
- Gossamer Gear Mariposa backpack (24oz)
- Gossamer Gear LTC4 trekking poles
- Black Diamond Mega Light (45 oz) tarp tent for 2-4 people (includes pole)
- Black Diamond Beta Light (24 oz) for 1-2 people (sets up with poles)
- OWARE Draw Closure Bivysack (MIL OD, 7 oz) for 1 (no rain expected)
- Gossamer Gear polycro ground sheet (1.5 oz)
- Marmot Arroyo 30°F (28oz)
- Exped DreamWalker 40°F down sleeping bag (32oz)
- JetBoil Solo Ti 
- Lithium Batteries (AA, AAA)
- Garmin Dakota 20 GPS
- Kindle Paperwhite or Paperback Book/Magazine



# My Favorite Clothing

- Salomon QuickLace GTX Mid Hiking Boots or Trail Runners
- Smartwool PHD Medium or Heavy Weight trekking socks
- Patagonia Dragonfly rain-resistant windbreaker (4oz)
- Patagonia Down Sweater (Also wear at night if cold, 12oz)
- Mountain Hardwear Mesa Convertible Pants
- Mountain Hardwear Canyon Long Sleeve Ventilated Shirt (1 Size Larger)
- Mountain Hardwear Wicked Short Sleeve Shirt
- Acorn Fleece Socks (for sleeping only-keeps my feet warm at night, 2oz),

# Manufacturers of Lightweight Gear

## **Commercial Manufacturers**

- Black Diamond
- Outdoor Research (OR)\
- Exped
- Big Agnes
- Marmot
- The North Face
- Mountain Hardwear
- REI

## **Specialty Manufacturers**

- Gossamer Gear
- Bear Paw Wilderness Designs
- Hilleberg
- Oware
- Six Moons Design
- Tarptent
- ZPACKS
- Feathered Friends
- Western Mountaineering
- Jacks R'Us



# Pack Options Depend On The Volume and Weight of Your Gear

## Gregory Baltoro 75

- Weight = 5 lbs 5 oz (Med)
- Total Capacity = 4577 in<sup>3</sup> (75 L)
- 10 Exterior Pockets
- Mesh Pad Holder accommodates SitLight Pad or folded sleeping pad
- Load Limit = 50 lbs



## Gossamer Gear Mariposa

- Weight = 1 lb 13 oz (Med)
- Total Capacity = 3487 in<sup>3</sup> (57L)
- Main Compartment = 2200 in<sup>3</sup> (36L)
- 7 Built-In Pockets
- Mesh Pad Holder accommodates SitLight Pad or folded sleeping pad
- Load Limit = 30 lbs



# The Difference of Premium Down

## North Face “Blue Kazoo”

- Old School Mountaineering Bag
- EN Temp Rating: 28°F (-2°C)
- Insulation = 650 Goose Down Fill
- Weight = 2 lbs 12 oz
- Packed Size = 1081 in<sup>3</sup>
- Price = \$279-\$299



## Marmot “Hydrogen”

- Lightweight/Compactness using Higher Quality Down Fill
- EN Temperature Rating: 30°F (-1°C)
- Insulation = 850 Goose Down Fill
- Weight = 1 lbs 9 oz
- Packed Size = 368 in<sup>3</sup>
- Price = \$399



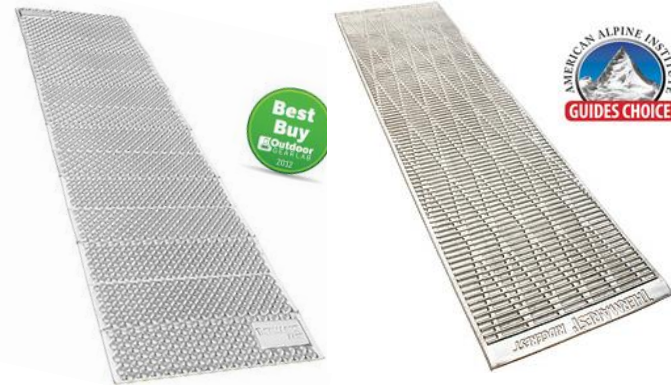
# Sleeping Pads

## Cascade Designs / Therm-A-Rest

- Neolite Xlite (12 oz), \$160
- Z-Lite and Z-Lite-SOL (14 oz), \$45
- RidgeRest SOLite (14 oz), \$30

## Gossamer Gear/Klymit

- Air Beam Sleeper Wide, 14 oz, \$99
- 28" Wide tapering to 19" X 56" Long
- 2.5" tapering to 1.5" in height



Zoom

# Solo Solutions

## OWARE Drawcord Closure Long

- Weight: 8.8 oz, Price: \$90.00



## GOSSAMER GEAR The One

- Weight: 21 oz, Price: \$299.00

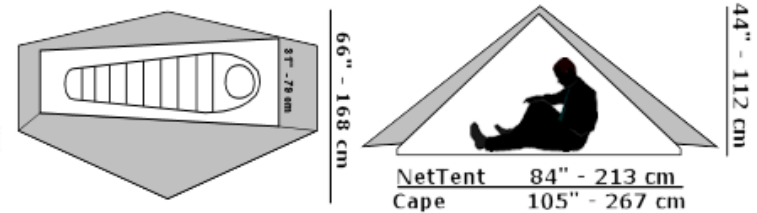


## SIX MOONS DESIGN Gateway Cape

- Combination Shelter and Rain Gear
- Weight: 11 oz, Price: \$135.00



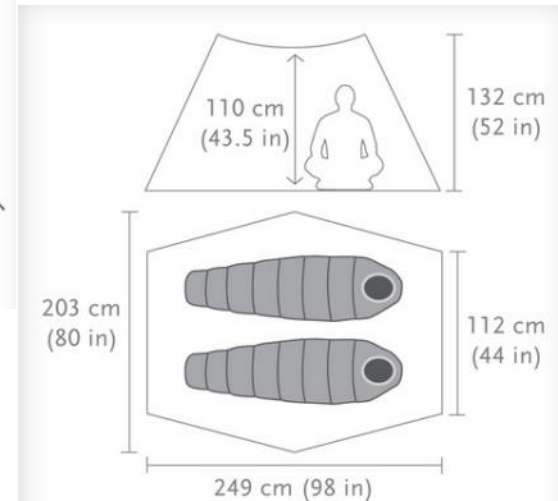
Gateway Cape / Serenity NetTent



# 2-4 Man Solutions

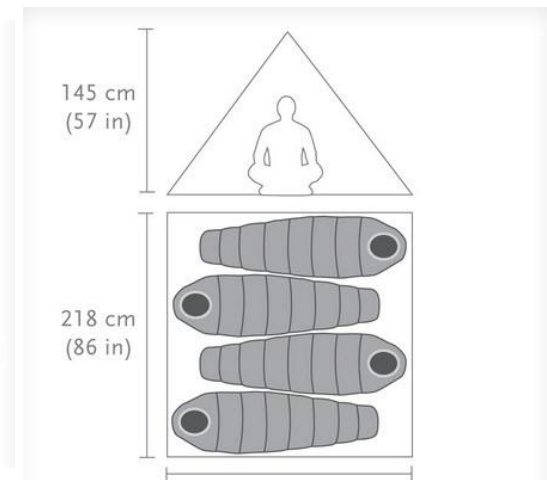
## Black Diamond Beta Light

- Sets up with 2 trekking poles
- No rope lines to adjust
- Weight: 24 oz
- Price: \$200.00



## Black Diamond Mega Light

- Sets up with 2 trekking poles (with adapter) or supplied carbon pole
- No rope lines to adjust
- Weight: 35 oz
- Price: \$199.95



# Trail Food and Cooking On The Trail

- Your meal plans, choice of stove, fuel requirements, cooking and eating equipment are all interrelated issues. That's why I don't think of individual gear - only the overall solution to the Food and Nutrition **Category**.
- Simple meals = Simple and light equipment, simple meal preparation, little or no cleanup, more enjoyment
- Do I need hot water for cooking? How much?
- Do I need to boil water for water treatment?

# What Size Pot Do I Really Need?

- 1 cup=8oz=235ml, 2 cups=16oz=470ml
- Cups/Mugs
  - \$13 for GSI 530ml Glacier Stainless Mug (4.4 oz)
  - \$36 for SnowPeak 450ml Titanium Mug (1.9 oz)
- Kettles (with lids)
  - \$40 for SnowPeak Trek 700ml Ti Mug (4.8 oz)
  - \$55 for Vargo 700ml Ti-Lite Mug (4.9 oz)
  - \$60 for MSR 830ml Titan Tea Kettle (4 oz)
- Pot
  - \$16 for Open Country 2 Qt Aluminum Pot (5 oz)
  - \$55 for Evernew 1.3L Titanium Pot (4.6oz)
- Sets
  - GSI Outdoors Soloist or Dualist Sets (\$45-\$65)
  - SnowPeak Mini Solo Set (\$65)







# Esbit Fuel Tablets



- Fuel Availability: Most sporting goods stores
- Fuel Cost: \$7 for 12 0.5-oz tablets
- Most efficient for boiling 1-2 cups of water, 5-6 minutes
- One 14g tablet will burn for about 12 minutes
- Fuel required to boil 2 cups: < 1 tablet
- Can use unburned leftover tablet or cut to size
- Stove Cost
  - \$12 for Esbit Pocket Stove (includes 6 tablets)
  - \$15 for Esbit Titanium “Wing” Stove
  - \$30 for Esbit 535ml Cookset (Wt=7 oz)
- Cook With Cup or Mug or Small Kettle







# White Gas aka Coleman Fuel

- Fuel Availability: All sporting goods stores
- Fuel Cost: \$13 for 1 qt (32oz), 110 mins/20oz
- Time to boil 2 cups: 4-5 minutes
- Fuel required to boil 2 cups: 0.5 oz
- Requires some skill to efficiently pump, prime and light. Universal models can burn various liquid fuels as well as canisters. Requires maintenance. Beware of spills & leaks.
- Stove Cost
  - \$80 for MSR Whisperlite Shaker Jet
  - \$139 for MSR Dragonfly
  - \$140 for MSR Whisperlite Universal
  - \$154 for Primus Omnifuel (Universal)





# Isobutane Canisters



- Fuel Availability: All sporting goods stores
- Fuel Cost:
  - \$6 for 100/110g “mini” canister (26 min, Wt=6.6 oz))
  - \$10 for 230g “regular” canister (55 min, Wt=
- Fuel required to boil 2 cups: 5g
- Fast lighting and quick boil (3min). Canister top mount or tripod styles. Optional built-in piezo lighter.
- How to manage partially used canisters?
- Stove Cost (\$30-\$150)
  - \$40 for MSR PocketRocket
  - \$50 for SnowPeak Gigapower w/Piezo Lighter
  - \$100 for Jetboil Flash, \$150 for Solo Ti, \$130 for Sumo
  - \$140 for MSR Whisperlite Universal



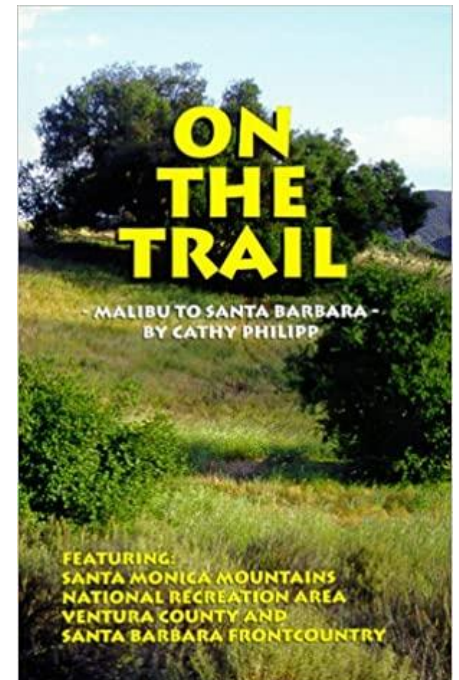
# Stove and Trail Meal Wrap-Up



1. For a 1-3 nites out, cooking with Esbit tablets or alcohol offer smallest, lightest & least expensive cooking option.
2. For 3-10 nites out, canister, white gas and biofuel stoves are the most efficient options.
3. We have assumed simple solo backpacking meals requiring 2 cups of boiled water.
4. Soup as a first course is a convenient way to rehydrate once in camp as well as restore salt levels.
5. Do-It-Yourself Freezer Bag meals can offer tastier and less expensive alternative to commercial BP meals.
6. Always hang your food at least 100 feet from where you sleep and cook. These 3 areas should form a triangle.

# Special Hikes - Ventura to L.A.

1. Santa Barbara Backcountry
  - Knapp's Castle / Painted Cave / Cold Springs Tavern
2. Ojai
  - Sulphur Mountain Road
  - Shelf Road
  - Sisar Canyon – High Clearance Vehicle Desirable
  - Horn Canyon
  - Gridley Trail to Gridley Springs/Trail Camp
  - Matilija Falls
3. Ventura County and Coast
  - Anacapa Island Loop – Inspiration Point
  - Steve Miller Trail – Point Mugu
  - Soltice Canyon - Malibu
  - Corriganville – Simi Valley
4. Los Angeles
  - Mt Baldy / Bear Flats / Icehouse Canyon
  - Bridge To Nowhere
  - Fish Canyon Narrows, Castaic

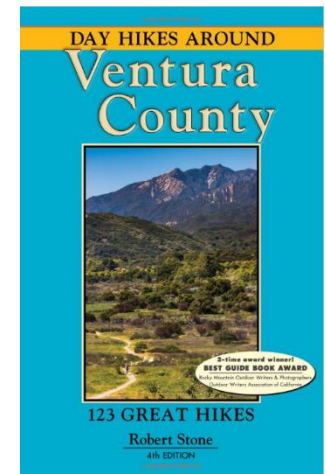
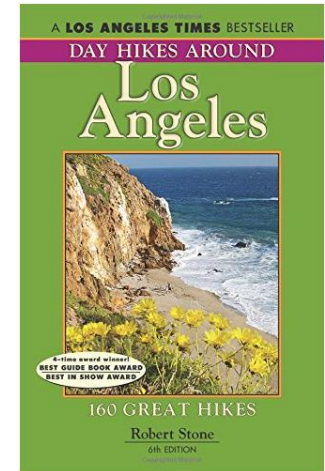


# Special Backpacking Destinations

## - Ventura to L.A.

1. Catalina Island – See the Buffalo
2. Santa Cruz Island
3. Santa Barbara Backcountry
  - Harmony's Waterfall & Hot Tub
4. Ojai
  - Horn Canyon
  - Sisar Canyon – High Clearance Vehicle Desirable
  - Gridley Trail to Gridley Springs/Trail Camp
  - Piedra Blanca – Sespe
  - Murietta Canyon / Murietta Divide
5. Los Angeles
  - Mt Lowe Trail Camp and Railway Trail
  - Sturtevant Falls & Camp – Hike to Cabins, Rent on HipCamp

HIPCAMP





# My Favorite Adventures



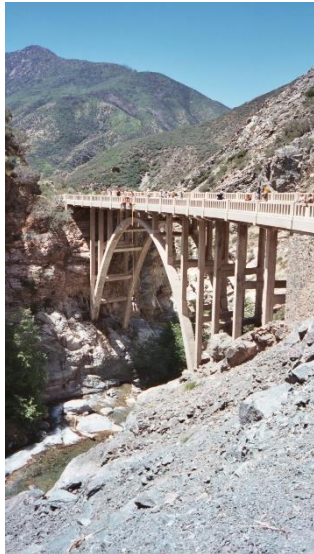
Catalina Island Traverse



Ancient Indian Dwellings,  
Superstition Mtns, AZ



Half Dome, Yosemite, CA



Bridge To Nowhere



Mt San Gorgonio



Mt Whitney

# Mt Lowe Railway Backpack:

One Hundred Years Ago, This Was The Site Of  
"The Most Scenic Mountain Railway In The World"  
(1893-1931)

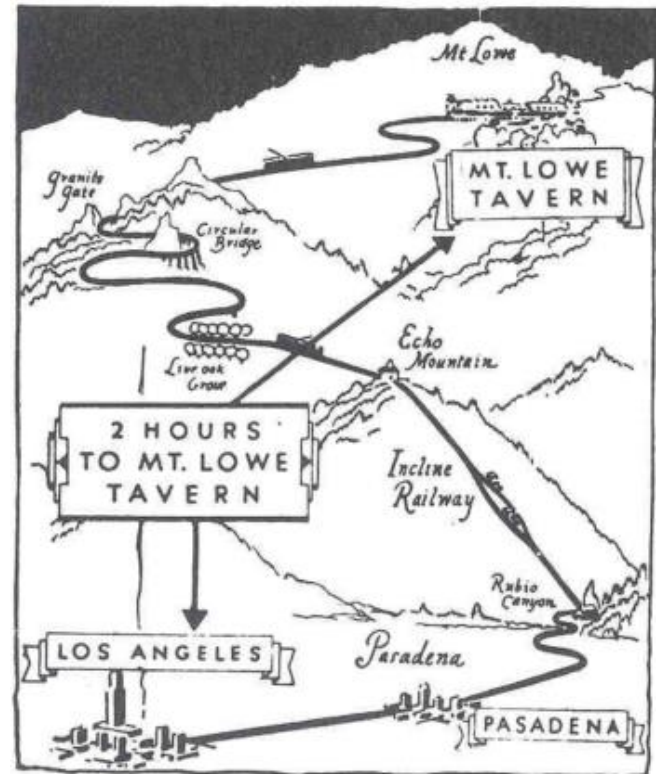
## Classic 2-Day Backpack, Old L.A. History

**Hike Type:** Car Shuttle, One Way, Downhill, 3050 ft  
Elev Loss

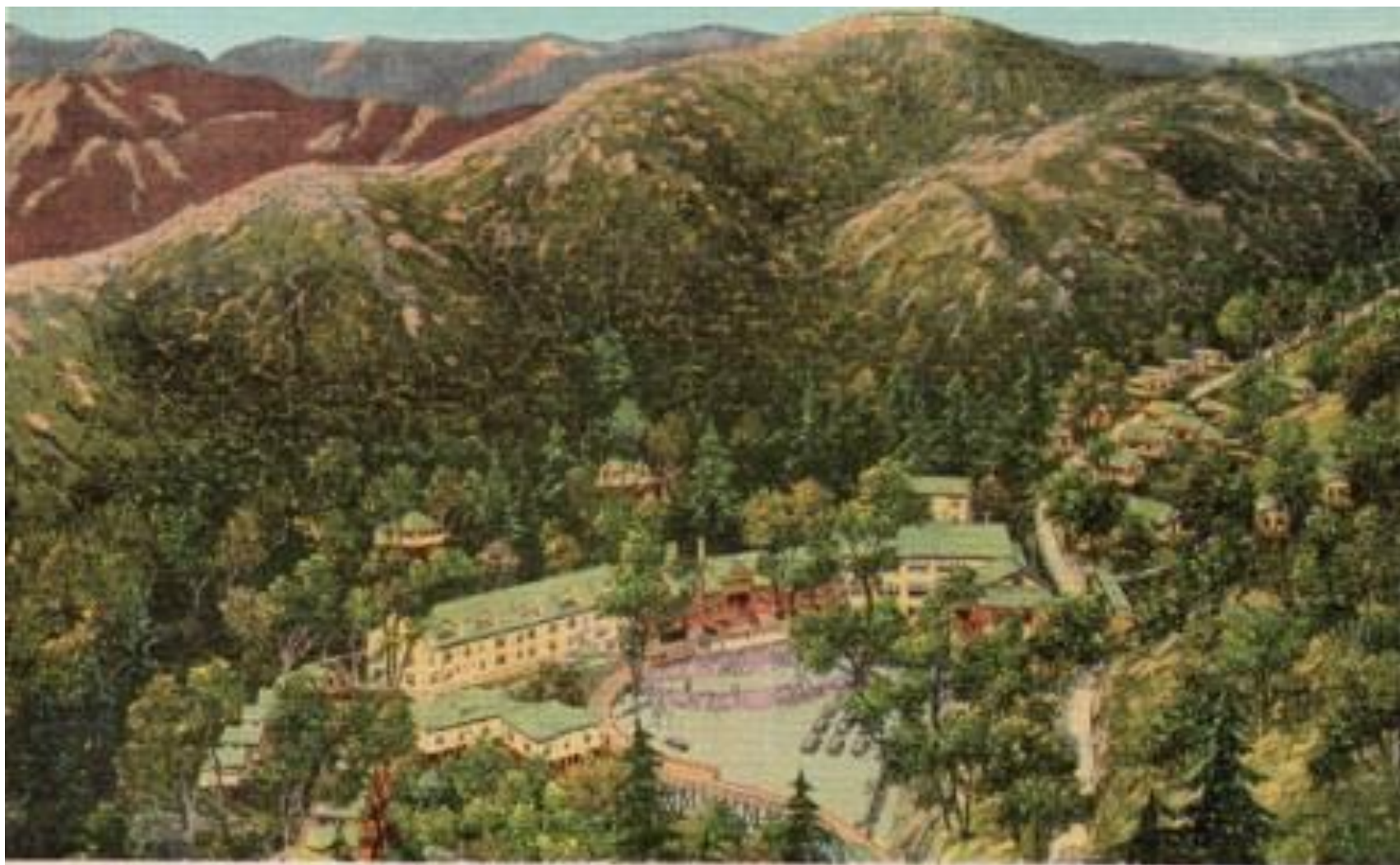
**Day 1:** 4 miles from Markham Trailhead (Mt Wilson  
Road) to Mt Lowe Trail Camp (original site of Mt Lowe  
Tavern); Side Trips to Mt Lowe, Inspiration Point and  
One Man & A Mule (OMAM) Railway

**Day 2:** 6.6 Miles To White City/Echo Mt and Sam  
Merrill Trailhead

**Logistics:** Park cars at Sam Merrill Trailhead (corner of  
Lake Ave and Loma Alta Dr, Altadena; Take an Uber to  
Eaton Saddle/Markham Trailhead) below Mt Wilson.

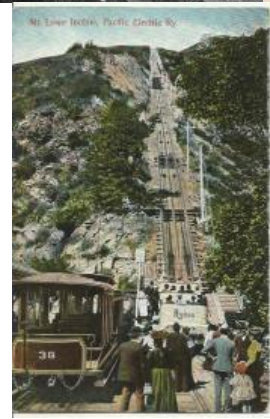
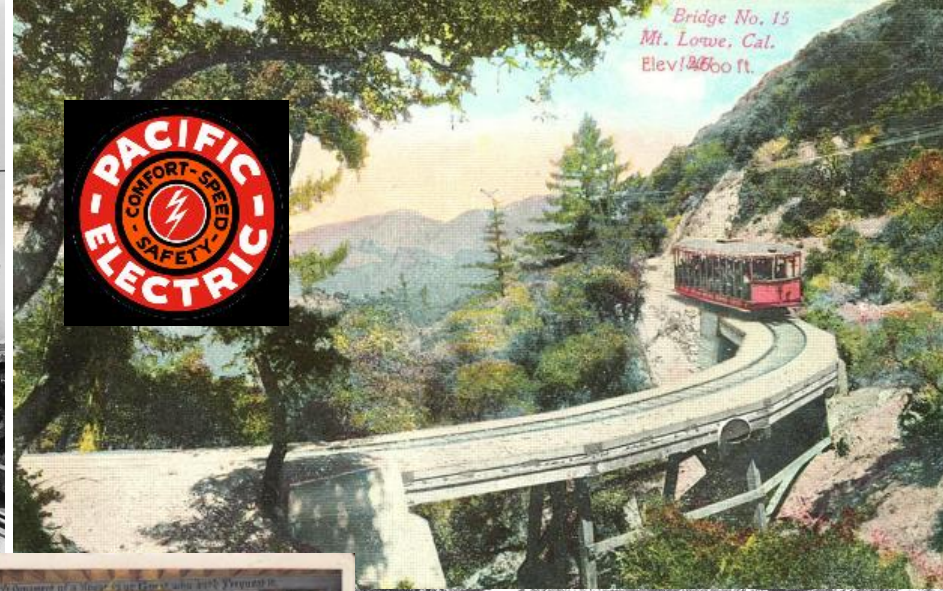
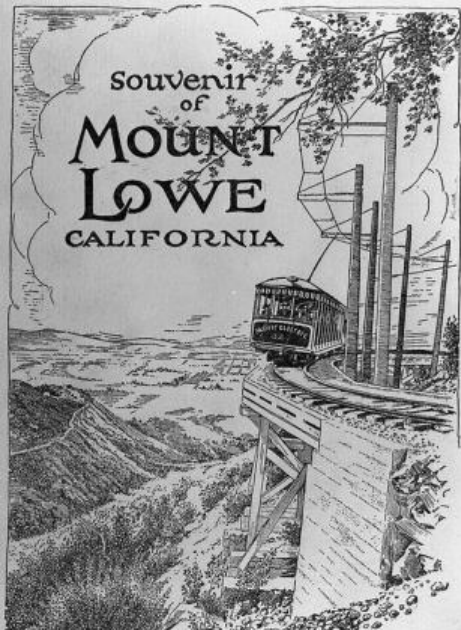






MT. LOWE RESORT, 4420 FEET ABOVE SEA LEVEL





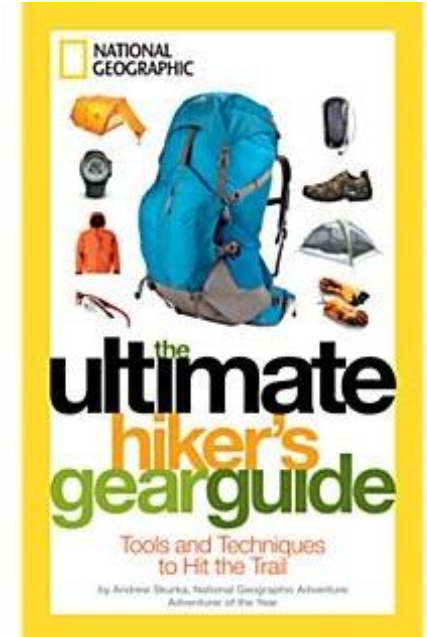
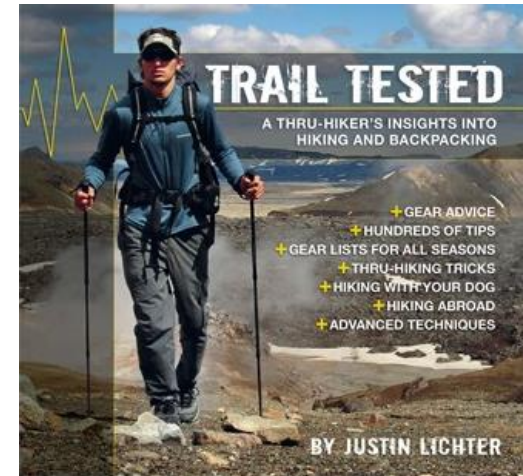
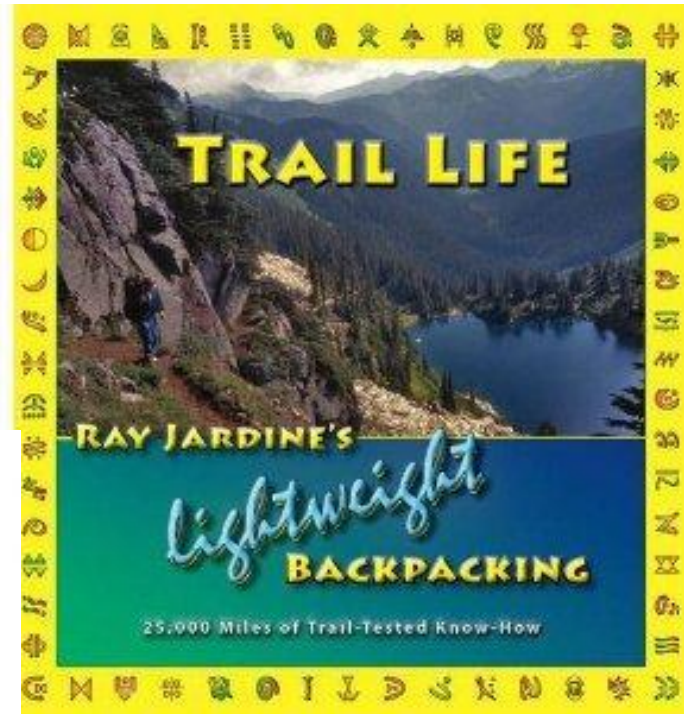
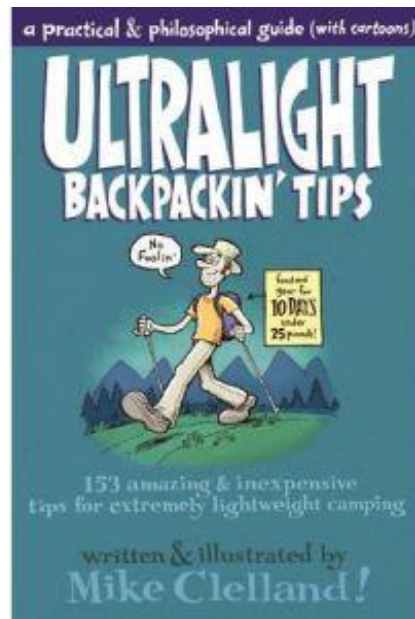
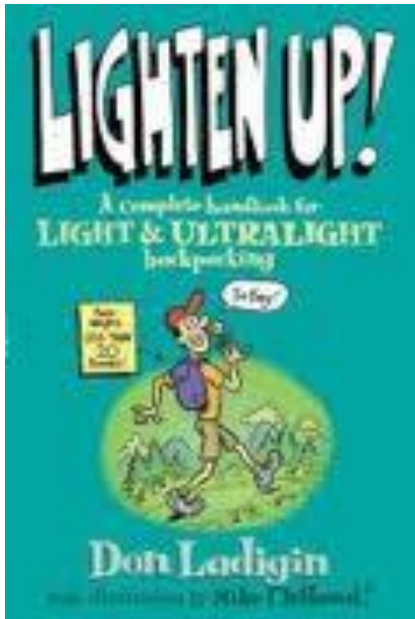
# Lightweight Backpacking Recap

1. Go lighter...Enjoy more
2. Lightweight backpacking is not just about the equipment. It's also about having the skills (wilderness first aid too!) and confidence to deal with uncertainty.
3. Don't be reckless in being light. Managing risk is about acting responsibly. Don't push 911 on your Spot Personal Messenger unless the situation is truly life threatening.
4. Weight your back before and after a trip. What did I forget to bring that I wish I had? What did I bring that I will never use? Too much food? Too much fuel?





# LWBP Resources



SUBSCRIBE HOME BLOG\* ARTICLES COMMUNITY SCHOOL

TECHNIQUES