FIRE SITE PREPARATION AND BUILDING

Campfire vs. Camp stove – What can you do and then what should you do?

If camp fires are permitted:

Campfires - take more time to build, sustain and extinguish than camp stoves

Campfires – even when practicing LNT principles – leave a mark on the environment.

Campfires - consume wood that might be used by animals

Campfires - in certain conditions – dry, hot, low humidity and windy conditions may "get away from the camper" and cause a forest fire.

Campfires – some would argue are the essence of camping.

Camp stoves – are generally easy to light in all conditions

Camp stove - are light, compact and easy to use.

Camp stoves – are clean and quick to heat water and food

Camp stoves – have adjustable heat for cooking requirements

Camp stoves – make clean up easier and faster

Camp stoves – leave no marks on the land

Camp stoves – do not require firewood

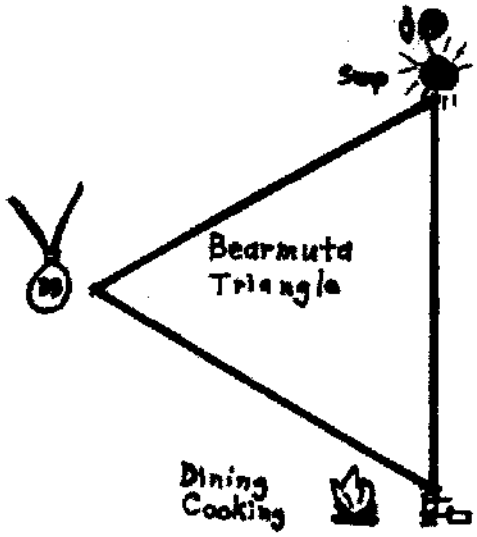
Camp stoves – are often the only means of cooking allowed in campsites

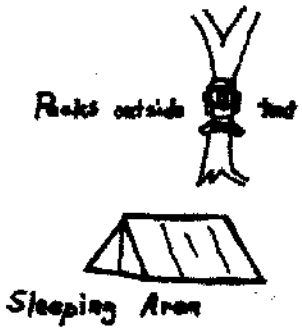
Camp stoves – must be maintained

Camp stoves – require the use of liquid or propane fuel

The primary objectives of laying out camp are to find a safe sleeping area and to leave as little trace that you were there as possible. This means respecting wildlife that might be interested in your "Bearmuta Triangle" and insuring that you don't contaminate ground water or leave anything behind. The Bearmuta Triangle is formed by the (1) the fire ring & cooking (dining), (2) the bear bag, and (3) the sump (cooking waste water) "smellable/bear areas". [The Backpacking Equipment List indicates which items are stored in the bearbag [BB] and sump or dining areas [SD].] The tenting area should be safely outside this triangle because animals are likely to travel between these areas, and crewbies don't want to be in their path. To prevent being a bear lollipop, no food should EVER be in the tent, packs (with cover) should be hung outside, and a sleeping bag stuff sack or tent bag NEVER used as a bear bag. Shoes should not be

left on the ground. Actually, in the Pennsylvania mountains, bears are not the only "critters" to guard against. Crewbies may encounter racoons, porcupines and skunks. All are attracted to smells or salt and can "maul" a pack. Below is a simple illustration of an appropriate camp layout.





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

CHOOSING A FIRE SITE

When choosing a fire site, you must be sure to choose one that will offer little chance for your fire to spread.

- Fires should not be built near overhanging branches, slopes, stumps, logs, dry grass, leaves or firewood.
- Never build a fire against a tree.
- Never cut down trees or branches, even if they appear to be dead. Use only downed wood.
- Don't use rocks to support pots and pans when cooking over a fire (they turn an unsightly black). Instead, invest in a small, lightweight-cooking grate.
- If possible choose an area with a natural windbreak, like a boulder or sinkhole. But never build a fire so close to a rock, tree or cliff face that it blackens the surface. Nobody likes to look at charred wilderness. But do not let the fire blacken the boulder.
- Use an existing fire ring if available. Avoid placing a ring of rocks around the fire since they blacken from smoke and leave signs of your presence or use existing ones.
- Otherwise, dig a fire pit about six inches deep, keeping the sod intact for replacement. Scrape away any burnable material within 10 feet.
- Or build an earthen pad 2 feet square and at least 3 inches think on the bare ground.

- Dead leaves and broken branches called *duff* and other organic matter called *humus* are very combustible and may smolder and then break out in an open blaze.
- Have plenty of water handy and a shovel for throwing dirt on the fire.
- Keep the fire small to reduce impacts and the danger of a wildfire. Start with dry twigs and small sticks, followed by larger sticks and logs, pointing them toward the center to be gradually pushed in. Burn dead and down wood only, and only that which is necessary.
- Be sure your match is out, holding it until it is cold and then break it so that you feel the charred portion.
- Never leave a fire unattended, even for a few minutes.
- Allow the fire to burn down to white ash; do not try to put a fire out by scattering it. Drown the coals thoroughly with water, stir the remains, drown it again, and stir again (where water is scarce, damp dirt and sand may also be used).
- If your fire begins to spread out of control, beat *toward* the wind to avoid fanning the fire and spreading sparks ahead of you.
- Feel all materials with your bare hand to make sure it is "dead out". Make sure that no roots are burning. Do not bury coals--they can smolder and break out. A practice we learned at Philmont was to plant a dry stick in the ground in the middle to demonstrate the fire was "dead out".
- Only after the fire is definitely dead out, pick out and pack out any bits of paper, foil, and unburned food left.
- Accumulated ash from the fire pit is scattered away from camp. Leave No Trace

CONSERVATION AND ECOLOGICAL CONSIDERATIONS

The supply of natural resources must have seemed inexhaustible to our first settlers. "Chop and burn" was a way of life to them since the trees had to be cleared for building homes and farming. Lumbering soon became a major industry. Protection for future generations was not a concern.

Today the development of natural resources management seeks a way to use our lands in ways most beneficial to both present and future generations.

One of the biggest problems facing resource managers who work to maintain our outdoor recreation areas is the impact of campfires.

Campers are now either discouraged or prohibited from building wood fires in many of our wilderness and backcountry areas, especially in those that are frequently used.

Although wood fires can no longer be widely encouraged for general camp use, there are some situations in which they are still permissible such as Resident Camps.

CAMP STOVES AND ALTERNATE SOURCES OF FUEL

SOURCES OF FUEL

- Canned heat – a jellied fuel found in Sterno canned heat and heat tabs that give off very little heat.

- Charcoal briquettes – used in grills or on Dutch ovens.

- White Gas – an unleaded appliance gas that can be found at any outfitter store, used in backpacking stoves.

- Propane and Butane – gases compressed under low pressure and contained in a thin metal cylinder or cartridge that attaches directly to the stove.

FUEL FOR YOUR CAMPFIRE

Three components are necessary for successful fire building:

- Tinder – material that will catch immediately – dry pine needles, grasses, shredded bark.

- Kindling – material which, in turn, sets the fire – dead twigs no larger than a pencil.

- Firewood – burns with enough force to produce heat, light or atmosphere you want – larger wood.

LAY THE FIRE:

Types of fire lays:

Log cabin –

Lean Too –

Tepee –

Make a ball of kindling using dry bark shavings, grass and toothpick-size twigs along with your fire starter.

Next, add small sticks and twigs (not much larger than the kindling) around the ball to form a tepee shape. Make sure there's a small opening somewhere along the bottom so you can sneak in a match.

Continue adding more twigs, using progressively bigger ones as you build outwards -- go from toothpick to pencil to Magic Marker-size. Always maintain the tepee shape.

Light a match and ignite the kindling ball through the opening.

When adding wood to a tepee fire, never arbitrarily toss wood on top. For best results, always maintain the tepee shape.

Arrange tinder, kindling, and fuel wood so that the heat of a single match can start your campfire.

Fire Starters –

Battery and Steel Wool

Cotton balls and Vaseline

Lint – Candle Wax – Cardboard Tube

Sawdust – Candle Wax – Egg Box

Magnesium shavings – steel/flint

Fuzz sticks

Commercial Jells, fire blocks, fire sticks

Windproof/waterproof matches (Lifeboat Matches)

Butane lighter

WET WEATHER FIRE TIPS:

Before rain begins – gather tinder and kindling for several fires and store under tarp or in backpack.

Keep a supply of dry tinder in a plastic bag

Split wood with axe – inner wood should be dry

Kitchen or torch matches are best to start your fire. Be sure they are kept in waterproof containers.

A butane lighter will give a flame in most conditions – store away from heat

EXTINGUISHING YOUR CAMPFIRE

- Water is the best thing to use for extinguishing a campfire.
- Scatter all embers and douse them thoroughly.
- Stir the fire bed repeatedly and keep sprinkling it with water.
- Search for any remaining heat with your hand.
- If water is unavailable, smother the fire with sand, gravel or dirt (choosing soil carefully).
- Make sure it is *dead out!*

CAMP STOVES AND WOOD FIRES STOVES

Your first question when stove shopping should be, "How do I plan to use it?" For long-term economy, heat output and year-round versatility, white gas and multifuel stoves are the most popular, but simmering can be tricky with some models.

For flame control, low initial cost, and sheer three-season convenience, butane/propane cartridge stoves are the winners. Trouble is, fuel-canister costs add up, you have to pack out the empties, and they usually can't be recycled. denotes seasonal suitability. Here's what the letter codes mean.

For simplicity, silence, and environmental correctness, an alcohol stove is the best choice. The drawbacks? Fuel can be expensive, hard to find, and packs only a fraction of gasoline's cooking power for comparable weight.

If you're planning extensive Third World travels, kerosene or multifuel stoves are your only reasonable option. And if you're planning a month-long unsupported backpacking trip, a forced-air wood stove designed to burn twigs will save a lot of fuel weight as long as there will be plenty of wood to burn where you're going, of course.

Seasonal Considerations

Each season and activity makes its own demands on your equipment. This guide is set up to help you match the right stove with the proper fuel for a reliable combination whatever your activity

Three-Season Stove: A three-season stove emphasizes convenience and simmering ability over cold-weather function and performance. The gas-cartridge stove dominates this category. Pack a TS stove along when you don't have to worry about the mercury diving way below freezing. If frost decorates your meadow, expect tougher start-ups and longer boiling times.

Four-Season Stove: A four-season stove can crank out maximum BTUs year-round and usually burns happiest at full gallop. It's the tool of choice when you want fast hot drinks and quick one-pot meals. White-gas or multifuel models are usually pump-pressurized to maintain full blowtorch mode at frigid temperatures. Most also require priming to start. This dicey operation improves with practice, but is still unsafe to do inside your tent. The multifuel model is ideal for overseas travel where kerosene and auto fuel may be your only options.

High-Altitude Stove: This featherweight, ultra convenient stove is designed to operate in the cramped confines of a bivouac tent or snow cave. Most are gas-cartridge models with integrated pots and windscreens designed for hanging from tent ceilings or climbing anchors. This type is most useful for boiling water and instant meals for one or two half-starved mountaineers.

Fuel Types

Alcohol: The alcohol stove boasts a small but enthusiastic following. This type has few moving parts and is dead silent while cooking, a relief from the constant tinkering and rocket-launch racket of most white-gas or kero stoves. Alcohol's low volatility makes it safer in confined spaces such as boat cabins and tent vestibules. It's also a renewable alternative to petroleum-based fuels. The downside is that denatured alcohol produces about half the heat per equal weight of gasoline, so boiling times can be long. Fuel can be hard to find outside of a drugstore or hardware outlet, and the price is usually higher than that of white gas.

Auto Gas: Dollar-conscious campers face the enticing prospect of spending $1 for a gallon of auto unleaded gasoline rather than $4.50 for super-refined white gasoline. But unless your stove is designed to

run specifically on auto unleaded, it will probably smoke and fume a lot, quickly leading to sputtery burners and sooty black cookware. Leaded gas contains even more toxic stove clogging and lung-choking additives. If you must bum auto fuel, buy the lowest octane-grade available, and bum it outdoors.

Butane and Blended Fuels: The butane-blend cartridge stove is popular for three-season cooking because this type is far and away the simplest to use. Mixtures of butane and propane (and straight isobutane) have largely supplanted pure butane because of the better cold-weather performance. In general, cartridge stoves do not perform well in subfreezing temperatures at low altitude, so most winter campers will prefer something with more flame power. Most of these stoves work above 15,000 feet because the reduced atmospheric pressure helps the fuel vaporize even in subzero cold. These fuels come prepackaged in various thin-walled steel canisters, which are more expensive than white gas or kerosene on a per-meal basis. Besides fuel cost, another big drawback to this type is the difficulty of recycling empty canisters. Some cartridges cannot be removed from the stove until empty a headache for packing.

Kerosene: Kerosene is inexpensive and widely available both domestically and overseas. We recommend the cleaner, more refined l-K heater fuel instead of sooty, additive-laced auto diesel. The downside is that kerosene can be hard to light, smokes liberally on start-up, smells terrible, and takes a long time to evaporate if spilled. Once it's rolling, though, kero puts out excellent heat per fill-up.

Propane: Propane burns hot and happy in subzero temperatures, but transportation regulations require that the bottles be thick-walled steel canisters which, unfortunately, weigh several pounds apiece. That's a big drawback for backpacking, but the propane stove remains popular with river runners and Scout troops, where the extra weight can be floated or split up between hikers.

White Gas: This additive-free gasoline is the best cold-weather performer and typically produces the shortest boiling times year-round. WG packs more cooking power into a smaller bottle than any other choice. Though readily available in North America (Coleman fuel is one example), white gas can be a headache to find overseas. Virtually all white-gas and auto-gas stoves must be primed, but once up to speed, white-gas stoves generally bum clean and hot, and over-all fuel costs are low.

Wood: Downed limbs are a fuel of choice in fast-growing temperate forests. A lightweight collapsible sheet metal stove can warm a roomy wall tent, and a few wood burners designed for backpacking can rival white-gas heat output if the fuel is right. A wood-burning pack stove must be tended carefully for best performance. Dry softwoods work well for starters. Finger-size chunks of seasoned hardwood bum longer and put out more heat. A wood stove saves fuel weight for long unsupported trips, but it's an acceptable alternative only in places where woody growth rates outpace use.

Design Features

Boiling Time: We advise a healthy dose of skepticism when interpreting manufactures boiling times. Boiling time is dependent on; operator skill; stove cleanliness; fuel quality; beginning water temperature; ambient temperature; altitude; and prevailing winds. For a faster boil keep the pot covered and use a windscreen.

Burn Time: Another manufacturer supplied statistic. It shows how long the stove will burn at full blast, starting with a full fuel tank.

Brand Specific Hints; hard won feedback from the field

Each brand has it's own idiosyncrasies, comforting strengths, and infuriating weaknesses. Here are a few hints for operating and repairing some common models.

Camping Gaz, EpiGaz, Olicamp, and other bottled brands. A hanging wind-screen/pot set (Bibler, Markill Stormy, Scorpion II Cookset, and others) really improves overall efficiency. Prewarming cartridges by hand or in your sleeping bag helps frosty morning start-ups. Boost heat output by hand-warming the canister while you heat water on the stove. After the water heats up a bit, dip the fuel can briefly into the warm liquid - but never into boiling water. Do not warm fuel canisters with a match or cigarette lighter. Repair kit: spare stove or a campfire, otherwise it's cold oatmeal if you have a problem.

MSR XGK and Whisperlite . These popular stoves have earned a reputation for clogging that's not entirely their fault. Most clogging comes from the sputtering yellow flame that lingers after shutoff and coats the burner jet with soot. Blow out the flame and let the stove fume away - outside - to let raw fuel cleanse the jet. Also, use clean fuel. Don't overfill the tank - leave 1 or 2 inches of air space. Keep the leather pump cup oiled. Repair kit: cleaning needle (taped to fuel bottle), extra burner jet. MSR cable/jet tool.

Coleman/Peak 1 Multifuel and Feather models. More recent Peak 1 models cold-start better than previous incarnations, but can clog during priming and require replacement of the entire preheat tube assembly. Carry a spare assembly on a long trek. New models are jetted to run on auto-unleaded gasoline. To reduce start-up flaring on all models, avoid overfilling the fuel tank.

Coleman Apex. This new model mimics MSR's remote-fuel-bottle design. Protect the rather fragile burner unit by packing it in a cook pot. The hose remains connected to the fuel bottle, so put it away where you won't mind a bit of dribbled fuel. Always cover the hose end with the provided cap lest pack-pocket cooties flub up the burner's superb lighting and simmering capabilities. Avoid filling the fuel bottle more than two-thirds full.

Optimus. This sturdy Swedish stove may not be as ubiquitous as it once was, but it remains as simple and reliable as ever. Priming paste helps reduce carbon buildup; alternatively, fill the priming cup with an eyedropper of fuel, which produces less flaring than dousing the whole burner. Avoid wrapping foil windscreens closely around the Climber 123 (originally Svea) model; we've overheated two that way, blowing the safety valve with spectacularly unpleasant results. Repair kit: wrench or vise-grips, spare jet, extra name-spreader plate.

Zzip Ztove . Feed this solid-fuel stove with dry sticks or charcoal briquettes and it'll keep pace with most gas models. But feed it green twigs and you'll smoke out half the campsite. Remove the draft-fan battery for transport; the primitive switch gets clicked on easily in the pack. The Zzip also serves as a cheery mini campfire for marshmallow roasts. Check backcountry fire regulations - some strictly no-fire zones don't allow the Zzips.

LIFE ON THE ROAD WITH STOVE: hot tips on getting along with your cooker

- Pack your stove and fuel carefully in a side pocket, padded bag, or special stove case away from food and clothing.

- Carry cleaning needles taped to your fuel bottle and keep key spare parts right in the burner sack. Stove maintenance is generally simple: Learn to recognize problems and to make repairs before they are necessary.
- Test-fire your new stove at home before relying on it in the field.
- Check the fuel for water and sediment before filling a gas or kerosene stove. Fuel sometimes develops condensation during extended storage. Use a filter funnel to keep detritus from clogging your unit.
- Use a stove base when cooking on snow, uneven ground, or tent floors. A plywood scrap, ceramic tile, or old license plate works well as a base.
- Clean your stove immediately if it won't run at full efficiency before excessive carbon buildup worsens the situation.
- Cover pots and use a windscreen for increased efficiency. A full wraparound windscreen is the most effective, but make sure it isn't reflecting heat onto the gas tank.
- Cook with a blackened pot because it heats faster than a silvery clean one. A heat exchanger further decreases boiling times and fuel consumption rates, which become logistically important on long treks.
- Opt for a multifuel stove if you're globetrotting, but this type typically comes with a hefty price tag, and some models are more complex than other stove types, creating more potential for failure.

a friend to the Red River Gorge in Kentucky last January. The temperature during the day was up to 30 degrees (F), but at night it got down to around 10. There was 6 inches of snow on the ground. Other than the clothes on our backs we each had a military style butt pack full of survival supplies and a blanket. This is a true test of ones ability to improvise "survival" shelters and we have experimented with quite a few styles, some much less successful than others. Needless to say, in such circumstances a fire is a real comfort!

Even hot water can be a delightful drink! (unpretentious, yet with a subtly smoky bouquet) However, few things can be more frustrating than having your pyrotechnic skills thwarted by Mother Nature. If you have the pack room to carry dry kindling with you in a bag all is well - generally. But when you're going ultra-light, that is usually not an option.

I've spent a few hours with a bow and drill, and a few of the other "primitive" methods, and discovered three things.

- First, these are not the sort of things I want to be doing while kneeling in the forest in the dark and in the rain.
- Secondly, if its just mildly chilly, these activities will quickly elevate your body temperature to the point that you no longer feel the need for an external heat source and loose all of your motivation.
- Thirdly, these methods only work in ideal conditions or require lots and lots of time and effort. I feel that everyone should learn the "primitive" methods, but only so that they develop an appreciation for the ease and convenience of more modern methods.

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1. Butane Cigarette Lighter:

OK, OK, not a revolutionary break-through, but it can't be beat and I never leave home without one. I used to wrap a rubber band around the top of the lighter and underneath the gas valve button to keep it from discharging in my pocket. Few things are more worthless than an empty lighter! All lighters now have an idiot proof safety mechanism that requires adults to seek the assistance of a child to operate!

2. Flint and Magnesium:

This is a really cool product that has been on the market for a few years now and is an item that I always carry! Its a 3" x 3/4" x 3/8" block of magnesium that has a flint rod molded into the side of the block. It also has a hole in it and comes set up as a key-chain. I keep mace and a police whistle attached to mine in an outside pocket where its ready-to-hand. To use, shave magnesium from one side (of course I don't need to tell you to carry a knife) and collect the shavings. Then with the back of the knife blade, "shave" the flint so that the sparks ignite the magnesium shavings. Have your kindling handy! This heat is intense! But it doesn't last long, so you've got to get right on it with that kindling. It helps if you pile the shavings on something flammable.

3. Something Flammable:

You can make your own all-weather (water-proof) fire starters at almost no cost. Cut the bottom off of a cellulose egg carton. Do not use Styrofoam egg crates!! Whittle shavings into all the "egg pockets". Melt paraffin or anything wax in a double boiler. Candles from second-hand stores work great for this. Pour the melted wax into the carton until all the pockets are filled. Ensure that all the shavings get a good coating of wax. (its OK if the shavings stick out so long as they soak up enough was to make them waterproof. Once the wax is cool and hard cut the pockets apart. You now have twelve emergency fire starters. Place on something flammable so that any melted wax that seeps out while this is burning is not wasted on the ground. Light one with the magnesium or a lighter then pile on the kindling. There is enough wax contained here to keep this concoction burning for about three minutes. The shavings and cellulose sucks up the melting wax like a candle with a really big wick. I carried the same one of these around with me on outings for two years before I needed it, but one dark and stormy night ...

4. Waxed Paper:

That's right, waxed paper. You've got a roll of it in the back of one of your kitchen drawers where it was left behind by cling wrap, Tupperware, rubber-maid, zip-lock bags and Aluminum Foil. (the capitalization denotes the high regard with which outdoors-men should hold Aluminum Foil - don't leave civilization without some - but I digress!) Waxed paper can be folded up so that it takes up no space. It can be refolded and used as a cup. There are other uses, but the point here is fire. Fold a piece of this in half then fold back each "half" like making paper dolls. When half way stretched out, a view of the end should look like the letter M or W. Lay the paper down so that the two "ridges" of the letter M form a valley. Into this valley place your magnesium shavings and/or other kindling. Set this on fire and break out the vitals, Granny, Jethro's got an appetite tonight!

5. Fire Paste:

This stuff is commercially available for about four dollars. It comes in a tube like toothpaste, but smells like Johnson's Paste Wax. It probably tastes like it too, so don't brush your teeth in the dark! Smear Fire Paste on a stick, roll the stick so that the paste is on the bottom, and light the paste. Next lay the stick on top of half of your kindling. Then cover with the rest of your kindling. The kindling on the bottom will be

ignited as the hot burning paste drips off the stick. This stuff will make even damp wood dry out and burn.

6. Hexane & Trioxain Tablets, & misc. other commercial fire starters.

These are all functional, and some are better than others. Compact collapsible "stoves" are available for use with the Hex and Triox Tablets. Unless you have a good supply of these don't try to cook with them, use them to start a "real" fire. The stoves that are available for these are little more than fixtures to keep the cup or pan off the tablet. One tablet will boil a cup of water, but won't heat a meal. Here's a better idea: With a stick or knife gouge or cut a trench about an inch wide and about two inches longer than the diameter of the base of your cup or pan. This will be a miniature fire pit. Light a tablet and place it in the center of the trench. Place the item to be heated on top of the trench. By adjusting the size of the trench and moving the cup or pan, you control the draft and thus the burn rate of the tablet. The main problem with the stoves provided for the tablets is that the tablet burns out of control and typically flames shoot up well past the rim of the container being heated. This is a waste of the little amount of fuel that you have. A tablet in a fire pit can burn two to three times longer than one on a "stove", and can heat about twice as much water or food. In a pinch I have snuffed out a tablet in the trench and placed it in a plastic bag for use a second time!

7. Wood stove:

If you really want a stove to provide your heat consider one by Sierra. My buddy got one. I berated him soundly. I told him he was getting soft. He did have to go to a larger pack to haul it, but I must admit, if you're going to wuss-out and go with a stove (stoves are required in areas that do not allow open campfires) this is the one to get. It has a three speed blower powered by an AA battery. (the same size battery as your Mini-Mag - use that same battery size in all the gear you buy) The air is forced through an ingenious baffle arrangement between the inner and outer walls of the burning compartment. This preheats the air for the combustion allowing more of the volatile gasses to be ignited. I was going to build one, but that baffle design has me stumped and my buddy knows better than to loan his to me. In any case, they're only about $35.00 and do not require costly fuel or fuel bottles. Just build a fire inside using any of the above methods, allow heat to build up for a moment or two then turn on the blower. Within minutes you'll have a stove that will boil water in four minutes and will digest WET fuel without hesitation.

Homemade Three-Fuel Stove

My homemade stove is the result of my thinking about running out of fuel. During a 3 week solo Adirondack hike, I discovered that I hadn't brought enough Esbit fuel tabs with me. One night to conserve the Esbit fuel, I built a wood fire in a fire ring outside a shelter I was staying at. I found some rocks on which to balance my pot and moved some hot coals and small pieces of wood underneath it. The whole setup was pretty precarious and I was sure I'd end up spilling my dinner. Luckily for me that night, I managed to keep my pot balanced on the rocks during the cooking process.

After the hike, I started wishing that someone would make a multi-fuel stove that would alleviate problems like I had above. Ideally, it would burn my favorite fuel source, Esbit tabs, along with denatured alcohol (which is pretty easy to find at most trail re-supply points), and wood. That way I'd be covered no matter what my fuel situation was.

Since no one seemed to be interested in making such a stove for me to buy, I finally decided to see if I could make a homemade version. The result is the stove I'm now using. It weighs only a smidgen over 4 ounces and works rather well. Following are directions on how to make a stove just like it:

Parts List

- A one pound coffee can (actually a 12 oz can; does anyone still sell coffee in a pound can?)
- Some 1/4 inch wire mesh (also known as "hardware cloth")
- A 3 oz tuna can

Constructing the Stove

Coffee Can

1. Leave the bottom of the can attached.
2. Along the top, cut two 2 inch wide by 1/2 inch high slots about 1 inch apart from each other. These vents will allow air to pass out under your pot and keep it from smothering the fire.
3. Cut three 1 inch wide by 1/2 inch high slots so that their tops will be 3 inches down from the top of the can. Only cut the top three sides of these slots. The bottom is left uncut so that when completed the metal can be bent down into the can to form support tabs for the alcohol/Esbit burner.
4. Along the bottom of the can, and in-line with the top two vents, cut two 2 inch wide by 1 inch high slots. These vents will act as the air intakes when burning wood in the stove.

Wire Mesh

1. Cut a circular piece of wire mesh about 4 inches in diameter. Cut it to fit so that you can easily drop it into the top of the stove and have it rest securely on the three tabs you previously created. This mesh will serve as the platform on which the alcohol/Esbit burner will rest.
2. Cut a smaller piece of wire mesh of sufficient size to cover the top of the tuna can. This wire mesh acts as a catalyst to help improve the efficiency of the alcohol burning.

Tuna Can

1. Other than taking its top off, eating the contents, and washing it out, nothing else needs to be done to the tuna can. It will serve as the alcohol/Esbit burner. If you really want to, you can remove the label.

Using the Stove

To use the stove as a wood burner, just use the coffee can alone. Load it up with very small pieces of wood (I never use anything bigger than pencil-sized), get them going (Vaseline soaked cotton balls make wonderful fire starters), and put your pot on top. Make sure the intake vents face **into** the wind. The additional air coming in the vents will help the fire burn hotter.

When burning wood you'll find that you'll need to keep your eye on the stove. It only holds a small amount of wood, which will need to be replenished fairly often. My experience with this stove as a wood burner is that two cups of very cold water will require about two "can-fulls" of wood and 15 minutes to come to a boil. When the first can-full starts to burn down, lift your pot and add another load of wood, making sure that you don't smother the fire in the process.

To use the stove as an alcohol burner, put the 4 inch circle of wire mesh onto the three internal tabs, put the tuna can in the center of the wire mesh, and add alcohol to it. Then put the small wire mesh piece on top and light the alcohol. The wire mesh heats up as the alcohol burns and causes the stove to burn more efficiently. This **very** simple alcohol burner will get water up to a boil just as fast, if not faster, than a commercial Trangia alcohol stove. When using the alcohol stove make sure that the intake vents face **away** from the wind. This allows the back of the stove to provide a windscreen for the flame and greatly increases its efficiency.

To use the stove as an Esbit stove, put the 4 inch circle of wire mesh onto the three internal tabs and put the tuna can **upside-down** in the center of the wire mesh circle. Put you Esbit fuel tab on top of the tuna can's bottom and light it. Again, when burning Esbit tablets, make sure the intake vents of the stove face **away** from the wind.

That's it. If you make one of these stoves, I hope you enjoy playing with it as much as I have. Also, there's probably a lot of room for improvement in the design of the alcohol burner for this stove. Once I got to the point where I'd found something that works as well as the commercial Trangia units, I stopped working on it. You don't have to do the same and can likely come up with a design that's more efficient in burning alcohol than mine. In any case, enjoy this three-fuel stove!