

PCESAR COURSE 1

REQUIRED EQUIPMENT

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ACQUIRING EQUIPMENT

- In ESAR, we require you to have the proper equipment, but we don't require you to spend outrageous sums of money. The best equipment is functional equipment that is acquired cheaply.
- There are many options for collecting equipment:
 - You may already own it
 - Check thrift stores (fleece clothes)
 - Retailers such as Sportco, Costco & Dick's Sporting Goods
 - Discount sales (REI garage sale)
 - Online (look at Campmor.com, Amazon.com, Craigslist, SteepandCheap.com...)
 - Borrowing from friends
 - Holiday presents
 - The last option should be purchasing (brand new high cost equipment).
- Options are available for most items, but try to stick to the items listed as closely as possible—they are time tested and proven.

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BACKPACK

- Depending on your choice of gear an ESAR backpack will require a volume of approximately 60-80 liters (3600 to 4900 cubic inches).
- Fit is important – brand is not.
- Some features/options to consider when looking at packs are:
 - Top load vs. panel load (lighter weight vs. greater accessibility).
 - Top lids & expansion collars (provide expanded volume).
 - Number of pockets (offers better organization but at the cost of added weight)
- In any pack, proper fit is extremely important for the comfort of the user. Improperly adjusted or sized packs will make a person miserable.
- When trying a pack on, be sure to have the salesman add beanbags for weight. Have him or her adjust it to fit you properly and wear it for a while in the store.



TIPS:

- Bungee cords are not recommended to secure gear to a pack. They tend to get tangled in brush and come unhooked leaving a trail of gear through the woods. Nylon straps with plastic buckles are preferable.
- Putting a plastic garbage bag inside your pack and then packing your gear inside the bag does an excellent job of keeping your gear dry. As a minimum be sure to have your sleeping bag and clothing inside plastic bags.

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SHELTER

- **50' of rope:**
 - 1/4" braided poly rope or 1/8" parachute chord works well for knot making & has minimal stretch.
- **Shelter tarp:**
 - 10'x12' (6 mil recommended)
 - Typical blue tarp sold in hardware stores.
 - Do not be tempted to go larger as the extra weight is a detriment.
- **Ground tarp:**
 - 5'x7' or 6'x8' (6 mil recommended)
 - Typical blue tarp.
- **Tent pegs:**
 - 8 each
 - Aluminum or plastic are acceptable
- **Sleeping Pad—(\$25-\$40)**
 - A full length closed cell foam pad such as a Thermarest Ridge Rest or Thermarest Z-Lite.
 - The closed cell foam pad is a useful tool for splinting and packaging a subject.



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KITCHEN GEAR

- **Stoves:**
- Many options are available. Typical models seen in ESAR are:
 - MSR Pocketrocket (~\$39) or Optimus Crux (~\$37)
 - Compact
 - Isobutene fuel for quick and easy starting,
 - No built in starter
 - Pot can be somewhat unstable
 - Jetboil Zip (~\$75) or Jetboil (~\$99)
 - Compact with an integrated cup and stove
 - Quick to set up and start with isobutene fuel
 - Built in starter.
 - Primus Classic Stove (~\$20)
 - Compact
 - Isobutene fuel for quick and easy starting,



TIPS:

- Always disconnect stove from fuel when not in use.
- Be sure to try your stove before you arrive at course 2. When it is dark and raining it is not the best time to learn how your stove operates.

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• FOOD

- 6 Hot Meals—foods high in protein and carbohydrates are desirable. Meals should be quick and simple to prepare one-pot meals to facilitate ease of cleaning up. Food should include some high-energy meals that can be eaten without cooking. There are often times when there is not enough time to cook a full meal or a location that is not appropriate for cooking. A stove is required equipment in all 48-hour packs.
- **(2)-1 Quart Water Bottles**
 - Typically 1 liter Nalgene water bottles.
 - Adding a hydration reservoir/system to your pack is a convenient means to replenish fluids
- **Cooking/Eating Kit**
 - Pot to boil water
 - Utensils (mug, bowl, plate, spoon, fork as needed)

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Water Purifier Tablets & Systems

- Necessary when refilling water bottles in the field.
- Consists of water purifying tablets (iodine or chlorine based) or a water filter/purifier.
- With purifier tablets, water cannot be used until the tablet has had sufficient time to react.
- **Iodine based tablets:**
 - Kill bacteria and protozoan cysts (giardia), but not cryptosporidium.
 - It leaves a bad taste to the water, which can be minimized by the neutralizing tablet which typically accompanies iodine based tablets.
 - An advantage is that the treatment process only takes 30 minutes.
- **Chlorine based tablets:**
 - Kill bacteria, giardia and cryptosporidium.
 - There is not a bad taste to treated water.
 - However, the treatment process takes 4 hours.
 - Chlorine Dioxide based treatment such as Aquamira has water ready in 30 minutes.
- **Water filters:**
 - Leaves water tasting clean and available for immediate use.
 - Effective for removing bacteria and protozoan cysts (giardia), but not viruses.
 - Higher price (\$60+).
 - The added weight is a drawback on filters.
- The vast majority of existing ESAR members carry some type of tablet. The cost effectiveness, lighter weight and the likelihood of trustworthy water sources being available during a long search give the clear advantage to tablets.



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SEARCH EQUIPMENT

- **Leather Gloves**
 - Leather work gloves or gardening gloves capable of protecting hands when searching in brush & stickers.
 - Full grain leather is optimal but difficult to find & more expensive.
- **Headlamp**
 - The purpose of an ESAR headlamp is to enable the searcher to remain functional after dark.
 - Consider specifically the brightness (the lumens) which is total light output and the distance when comparing headlamps. (100-200 lumens is good.)
- **Flashlight**
 - Consider specifically the brightness (the lumens) which is total light output and the distance when comparing flashlights.
 - Handheld – 200+ lumens (LED).

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- **Small Pocket Knife**
 - Small folding type is all that is necessary.
 - Some members carry a small multi-tool or Swiss Army knife. These can be useful in the field, but the usefulness comes with added weight.



- **Fire Starter**
 - Candles
 - Cotton balls or dryer lint soaked with Vaseline
 - Commercial fire starter.
- **Matches**
 - Waterproof/windproof matches are adequate but expensive
 - Butane lighters work well
 - A typical box of wooden matches stored in a Ziploc bag is sufficient.

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- **Notebook & Pen/Pencil**
 - Small 3"x5" or 4"x6" spiral bound notebook.
 - Rite in the Rain notebook (preferable) available at outdoor stores.



- **Grid Tape**
 - Small roll of orange or pink flagging tape sold in hardware stores.



- **Compass & Ruler**



- **Eye Protection**
 - Personal safety gear for searching in stickers. Can be found in hardware stores.



- **GPS (Optional)**
 - Garmin 64S or 64ST are comparable to the units used by PCESAR.

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PERSONAL GEAR

- Toilet Paper (Small portion of a roll in zip lock bag.)
- Toothbrush, toothpaste
- Hand sanitizer
- Small plastic sanitation trowel

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SLEEPING BAG

- Your sleeping bag should be lightweight, warm comfortable, and easily compressible and good for year around camping in Western Washington.
- A bag good to 20° F (or possibly a 30° if you are a warm sleeper) is usually adequate for most situations encountered on missions.
- A good three-season bag should fit this requirement.
- Any sleeping bag will lose its loft over time if kept compressed. For this reason do not store your sleeping bag in its compression sack.
- There are two main types of insulation available, synthetic and down.
 - Synthetic insulation (**recommended**)
 - Resistant to moisture
 - Retains most of its loft when wet
 - Dries relatively quickly
 - Less expensive than most down filled bags
 - Slightly heavier than down and does not compress as well
 - Down insulation (natural fill of goose or duck feathers)
 - Warmest, but if it gets wet it is next to useless as an insulator
 - Compressible, retain their loft well and are well built and last a long time if properly cared for
 - They are very expensive and if they get wet they take a long time to dry out
 - Treated downs (moisture resistant) are in the marketplace. They are pretty high end when considering how we use them.

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SLEEPING WARM

- The body produces heat to maintain the body temperature at 98.6° F.
- When you sleep heat production is reduced by as much as 20%.
- Clothing and sleeping bags create enclosed confined areas for your body to heat up and contains that heat in order to maintain the optimum body temperature.
- A sleeping bag that is too large creates too much space for the body to effectively heat. If a bag is too long, tuck the end under so that the extra space does not have to be heated up.
- A sleeping bag produces no heat. If you are cold when you climb in you will remain cold.

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SLEEPING WARM cont.

- Exercise briefly before climbing in and the increased activity will generate heat, which will be transferred to the sleeping bag.
- Remove all wet clothing, sleep with minimal clothing on and make sure the layer against your skin is a dry layer.
- Don't wear a lot of clothes in your bag. You defeat the purpose of the sleeping bag by preventing heat from reaching the sleeping bag and warming it.
- Use extra clothing as insulation under or over or to fill extra space in the bag or as a pillow.
- frame pack to give it added protection.
- Use adequate full-length ground tarp and insulation. More heat is lost through heat conduction to the ground than to the air. Use whatever is available in an emergency to get off the ground. Backpack, extra clothing, ropes, etc.
- Remove constricting clothing that restricts circulation.
- Don't breath into your sleeping bag. A large amount of moisture is exhaled with each breath of air. (Up to a quart of water a night.) Wear a hat and keep your face out. If it's really cold, breathe into a facemask to conserve heat.
- Eat a warm meal and drink a hot drink to provide calories to burn and to start with a slightly warmer body
- **TIP:** Keep your sleeping bag dry! Pack it in a protective waterproof stuff sack that is lined with a garbage bag. Wrap the stuff sack in your tarp or carry it inside your internal.

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CLOTHING OVERVIEW

- Clothing---Cotton is not allowed on any mission and has no place in the Pacific Northwest wilderness setting by any professional outdoorsman.
- Cotton is a leading factor in many of the deaths from hypothermia in the country every year.
- If at all possible, avoid camouflage outerwear. Searchers need to be as visible as possible. Visibility by the subject, other searchers and other outdoor groups (i.e. hunters) is critical to the success of the search.
- Where possible, acquire clothing that is **RED** which is the official color of ESAR.
- Clothing creates a thin insulating layer of warm air next to your skin for you to keep warm. It creates a mini climate that your body is able to maintain at the essential 98.6° F needed for survival.
- In the environment you will be working in, the proper clothing is your primary safety tool. The proper combination of clothing will assure your survival and ability to function in most weather extremes encountered on missions.

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- Natural fibers such as merino wool are excellent insulators. They offer soft, reliable warmth and keep on insulating even when wet. Potential drawbacks include garment shrinkage, special laundering, insect damage and high cost.
- Man made fleeces such as Polartec and Thinsulate polypro work well. They're lightweight, breathable and insulate even when wet. Their main drawbacks are permeability, bulk and odor retention.

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LAYERING SYSTEM

- Layering is the key to proper body heat management.
- Layering makes it easy to adapt to the different temperatures encountered in the wilderness and for the different levels of exertion you undertake.
- **Inner Layer**
 - The first layer or inner layer should allow perspiration to pass through and evaporate without absorbing the moisture, which keeps your skin dry and therefore warmer.
 - Wet garments in contact with the skin cause twenty five times more heat loss than dry ones. (Major reason cotton clothing is such a hazard)
 - More than any other layer the inner layer helps regulate body temperature.

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- **Middle layer or Insulation layer**
 - The next layer or insulation layer should trap warm air next to the body.
 - Several light layers that can be added or deleted for changing conditions makes it easier to regulate your body temperature.
 - Several thin layers are generally warmer than one thick layer.
- **Outer layer**
 - The final layer is a shell to protect your first two layers from rain and from wind, which can cause heat to be drawn away at a dangerous rate.
 - Wind chill is the effect of wind on wet skin. A 10-mph wind in 50-degree temperatures can be fatal in just a few hours if not protected from the wind and rain.

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CLOTHING

- **Long Underwear**—(inner layer) Typically available in lightweight (summer), midweight, and expedition weight. Midweight Polypro, Capilene, Polartec, Coolmax or Merino wool is recommended.
- **Wool or Fleece Shirts**—(insulation layer) Traditional fleeces such as Polartec and Thinsulate polypro works well. They're lightweight, breathable and insulate even when wet. Their main drawbacks are permeability, bulk and odor retention. They can often be found in thrift stores at affordable prices. Some of the fleeces such as Polartec Wind Pro or Gore Windstopper add a level of wind resistance via a hidden membrane that does not affect breathability.
- **Soft Shell or Fleece Pants**—(insulation layer) See above. Consider full zippers on the legs as they are the most convenient.

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- **Rain Coat (with hood)**—(outer layer) waterproof & breathable membrane (i.e. Gore-Tex, REI elements). Lightweight plastic raingear is not recommended. Searches are often in stickers & brush and lightweight gear will tear easily. Ponchos are not recommended as they will get hung up in the brush, tear and not provide protection from the elements. Waterproof nonbreathable fabrics are not recommended as they do not allow perspiration to escape. Also check at Sportco or Costco where some cheaper effective rain gear can sometimes be found.
- **Rain Pants**—(outer layer) again waterproof & breathable--full zippers on the legs are the most convenient.
- **Winter Hat**
 - Wool, polypro or thick fleece stocking hat
- **Gloves**
 - Wool, insulated winter gloves, polypro or thick fleece gloves

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- **Socks**

- Socks cushion and insulate the feet and reduce friction between the boot and the foot.
 - Socks made of wool or synthetic materials can perform these functions.
 - Cotton cannot.
 - Cotton socks will get saturated and collapse
 - Stick to your feet
 - Soften the skin and lead to cold, sore, blistered feet.
- Socks must absorb perspiration because boots do not breathe well if waterproofed.
- Synthetic socks dry quicker than wool.
- The inner sock should be smooth and thinner to transport perspiration from the foot to the thicker outer wool sock.

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BOOTS

- A good pair of boots for search and rescue in the Pacific Northwest Mountains must be versatile.
 - It must be tough enough to withstand scraping of rocks, stiff and solid enough for kicking steps in snowfields, yet comfortable enough for long hikes and cross-country walking.
 - They must be warm enough for cold winter conditions and capable of being waterproofed against the miserable wet weather often encountered in the Olympics and Cascade Mountains. Many fabric boots utilize Gore-tex and work well. Others fabrics cannot be waterproofed and should not be used for SAR.
 - Typical terrain that ESAR operates in includes mud, streams, gravel, brush, scree, hard snow, soft snow and swamps and steep hillsides.

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Boots should have...

- A gusseted tongue, or bellows tongue, to keep water from easily entering the boot
- Beefed up toes and heels with multiple layers for durability
- Top that opens wide so the boots can be put on easily even when wet or frozen
- A minimum number of seams to decrease the potential leaks
- High uppers 5 1/2 to 7 1/2 inches to support and protect the ankles in rough terrain
- Vibram soles for good traction on slippery vegetation mud and snow
- A good boot should also have the following features:
 - A stiff shank
 - Rubber sealing the soles to the uppers, to aid in waterproofing and simplify boot maintenance
- Boots with all of these features tend to be expensive and if your feet are still growing there are lower priced boots that will work well. But in an effort to save money do not go so cheap such that the boot doesn't perform as needed.



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TIPS for Shopping for Boots

- Most recreational stores have a wide variety of boots for everything from walking to extreme mountaineering.
- You will want a boot designed for hiking with a heavy load and possibly as you continue on in training you may want a boot that is designed for alpine climbing and scrambling on rock and hard snow.
- Fit for any boot is critical.
 - When fitting boots take along the same combination of socks you intend to wear on missions. A mid weight synthetic liner and a heavy wool sock are recommended.
 - If you wear orthotics or insoles they should also be taken with you.
 - The best time to shop is in the evening since feet tend to swell during the day.
 - Put on the boots and lace them up tight.
 - There should be no movement of the foot inside the boot from side to side or in the heel up and down.
 - Wear the boots for several minutes and walk around checking for uncomfortable seams or pinch points.
 - Your heel should feel firmly locked into the heel cup.
 - Your toes should have plenty of room to wiggle and if you kick a wall or the floor you should not feel your toes touch the front of the boot.
 - Boots that are too tight will inhibit circulation and cause cold feet.
 - Boots that are too loose will cause blisters.
 - If your feet are still growing, go with larger boots over smaller ones and wear two pair of thick socks to take up space.

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Boot care

- Proper Boot care will increase the life of your boots.
- Most boots fail when the stitching rots or mildews because the boots were not cleaned or dried properly after use.
- After using stuff newspapers into the boot to absorb water. Remove after a couple days and air dry.
- **Avoid exposing boots to excessive heat such as campfires.** The glues used in manufacture of boots do not do well with such heat extremes.
- Apply water proofing liberally before use and on a regular basis thereafter if you want your feet to stay dry.
 - There are many types of waterproofing available
 - Follow the recommendation of the manufacturer because it depends on the tanning process used which product will work best.
 - Make sure your boots are clean and dry before applying waterproofing



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ADDITIONAL GEAR



- **Gaiters**
 - Gaiters are critical in foot care.
 - They keep debris, water and snow out of the boot and prolong the warm, dry feeling of your boots.
 - They also protect the boot to some degree and prolong their life by keeping the uppers cleaner and dryer.
 - It is nearly impossible to keep your feet dry without them regardless of how waterproof your boots are.
 - My preference is alpine style gaiters which are calf high (15-18") and utilize Velcro closures.
 - Try to avoid cheap gaiters with zippers as they can be difficult to work with in the field.
- **Handwarmers** (optional)
 - Handwarming packets sold at outdoor stores.
 - Typically they are air activated and provide warmth for several hours.
 - Hotties are a typical brand name.



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48 & 24 HOUR PACKS

- A 48-hour pack is a full pack with enough equipment to comfortably take care of one person & subject for two nights in a wilderness setting (see checklists at front).
- A 24-hour pack is a pack with enough equipment to comfortably take care of one person & subject for one day. A 24-hour pack contains at least the 10 essentials.
- Before training courses 2 & 3 there is a pack inspection to insure proper and adequate equipment is being carried by each trainee.
 - Each trainee is required to bring a full 48-hour pack.
 - Trainees without the proper equipment will not be allowed to leave rendezvous.
- Any time an ESAR team is away from base each member will have at least a 24-hour pack with them.
- Any time an ESAR team is away from base in a rural or wilderness setting each member will have a 48-hour pack or a team 48-hour pack with them.
 - A team-48 is your personal gear plus enough additional gear in each member's pack combined to make up a 48-hour pack should the team be forced to spend a night out away from base.
 - The team should also have enough equipment to care for the subject.

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FINAL THOUGHTS...

- **PHONES :**
 - While actively searching or training, phones are not be used for non-mission related applications.
 - Personal use of electronics when searching is a distraction from the search itself.
 - If you want to bring them for personal use it is ok, but they may only be used during down times and at night. At all other times keep them put away.
 - An important part of training is interacting with your fellow trainees.
- **Gear:**
 - With both boots & packs it is critical to wear them as much as possible before course 2.
 - Get boots broken in and get used to carrying your loaded pack.
 - Every hour or mile you spend ahead of time wearing your boots and pack will pay big dividends in your enjoyment at course 2.
- **If questions arise during your gear acquisition, feel free to contact me, Dan Tyrrell, at 253-326-1081 (dantyrrell@att.net)**

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