3 Hours without "Shelter"
Thermoregulation
Keeping your body core at 98.6º
Shelter & Fire

Thermoregulation Overview:

• With ambient temperatures roughly around 75º to 85º, nothing is needed to regulate body temperature. Outside this range, additional steps are needed to warm or cool our bodies such as clothing, shelter, shade and fire to avoid:

- **Hypothermia** (body core temperature too COLD)
- **Hyperthermia** (body core temperature too HOT)

•Hypo means LOW
•Hyper means HIGH

Keep your body core temperature at 98.6º. If your body temperature is much higher or lower for an extended period, it could kill you. Exposure is the #1 Killer in Wilderness Survival Situations.

It is easier to maintain than raise or lower body core temperature!

Hypothermia or Hyperthermia can have an Acute or Chronic onset.

- **Acute** - Very fast onset
  - **Hypo**thermia (example - Falling through ice or snow)
  - **Hyper**thermia (example - Overactive or overdressed on a very hot day with too much time spent in direct sun)

- **Chronic** - Slow onset over time to the point where your body can't regulate itself.
  (it can be hard to notice a slow onset)
  - **Hypo**thermia (example - slow fall in body temperature due to exposure to cold and dampness
  - **Hyper**thermia (example - slow rise in body temperature due to warm weather, no breeze, not enough shade, not cooling off at night)





How do we deal with Hypothermia and Hyperthermia

1) Shelter (including shading-up on hot, sunny days).
2) Fire (in addition to shelter for Hypothermia)*

*sometimes due to weather and location, fire may not be an option…….

Ask yourself these questions prior to making a shelter.
1) Do you need to warm up or do you need to cool down
2) What's in my pack to address these issues
3) What resources are available



Heat Loss Mechanisms

How is heat lost from you body?

- **Conduction** – Transfer of heat from a warmer object or environment to a cooler object or environment.

Temperature flow is from hot to cold



Desert

Heat from the environment is flowing to your cooler body. You are absorbing HEAT!



Arctic

The cooler environment is absorbing your body heat. You get COLD!

Heat Loss Mechanisms….continued

NOTE: In cold or cool weather, regardless of what kind of shelter you create or use, getting yourself insulated from the cold ground is essential otherwise conduction will suck away your body heat.



*Lying directly on the ground (not on rocky soil) in hot weather can aid in cooling you.

Heat Loss Mechanisms….continued

- **Convection** - Movement of cooler air displacing the warm air next to your skin. Given the same temperature, you always feel colder when there is a breeze.

- **Radiation** - Radiative heat loss from your body. Electromagnetic waves from the body to cooler surrounding surfaces, or just out into space.

- **Evaporation** – Your body dissipates heat to turn sweat from a liquid to a gas. *This is the body's cooling mechanism*.

- **Respiration** - Warm moist air in our lungs exchange with the cooler dryer outside air.

What happens when your body starts getting too cold?

- Shivering is your body's effort to generate heat (early stages of hypothermia)
- Blood starts leaving your extremities to protect your core

• What are the signs of "Hypothermia"? - The "Umbles":

- •Fumbles - loss of fine motor skills (hard to work buttons or zippers)
- •Stumbles – abnormal walking pattern
- •Mumbles – slurred speech
- •Grumbles – an "I don't care attitude", depressed, abnormal behavior

Test for "Hypothermia"

1) Touch your thumb to each finger on your hand individually.
2) Walk a straight line.



Treatment for Hypothermia

1) Warm your body using.....Shelter and Especially Fire (if safe to do so)!

2) Get out of any wet clothing - Replace with dry clothing

3) Re-warm in a sleeping bag (with another person if necessary)

4) Warm Fluids if the person is able to drink

*At a certain point, the body is unable to generate enough heat to warm itself, in this case an external heat source is needed to help warm the person. This is where FIRE and/or re-warming with another person is essential!



IMPORTANT

As you become hypothermic, your body will start taking blood from your extremities to keep your core warm.
This will cause you to lose fine motor control in your hands.

This will make it difficult if not impossible to do simple things like build your shelter or build a fire.
So, in a sense, hypothermia will kill you long before you die since you will not be able to help yourself if you are alone.

Forget about things like making natural cordage if you don't have fine motor control!

DEHYDRATION:



Impairs the body's ability to regulate Core Temperature, so it makes <u>Heat Illness more likely!</u>

-You lose the ability to sweat effectively.
Sweat is the body's cooling mechanism.

-Blood volume is lower (less fluid in the body).
So, your heart needs to work harder to pump blood – Increase in HR

-Vital organs (brain, heart & lungs) compete with muscles for oxygen rich blood.
Muscles lose out, which can cause muscle fatigue.

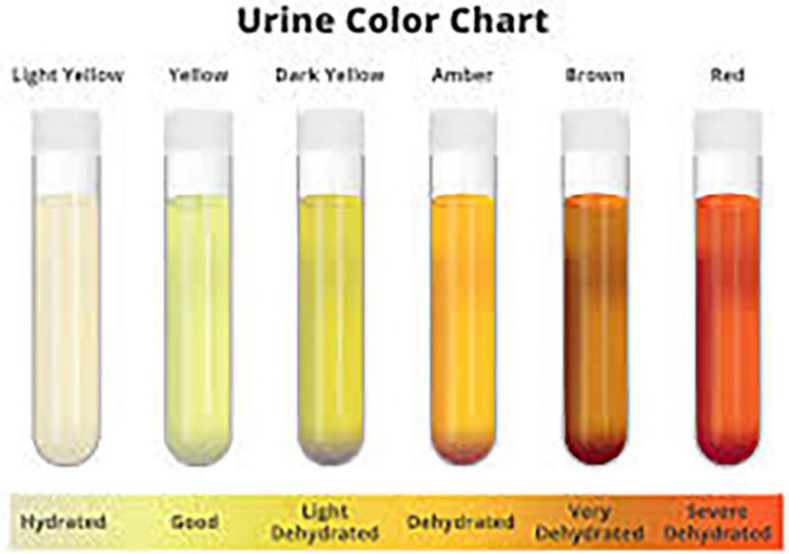
-Less blood to the brain causes dizziness.

*Dehydration can happen in cold environments as well as we tend to drink less when we are cold.

Indications of DEHYDRATION:

-Thirst:
Is triggered by an increase of blood concentration (lower volume).
There is a ”Lag Time”, so thirst is not always reliable!

-Urine Color:
A better indicator, however, still not 100% reliable…..
There is a “Lag Time”
Certain medications, vitamins and supplements can throw off the color.
Urine should be a very light yellow, not dark, not clear.



-How to encourage Hydration:
Cold Beverages / Flavored Beverages / Salty Snacks.

-During the Activity:
Stay Hydrated, add electrolytes to your water!

Do not “Chug” water directly before activity:

-<u>Overdrinking:</u>
Stimulates Urine Output
Can cause Abdominal Pain
Can cause Hyponatremia (low blood sodium)



Hyperthermia
Heat Illnesses

• How is body heat gained?

- Vigorous activity in warm to hot weather.
- Overdressing in hot weather.
- Slow rise in body temperature from being in hot weather.

• <u>If you start feeling warmer than comfortable, try these few things:</u>

- Use a cool wet towel, bandana or cooling rag around your neck
- Spray bottle (on the misting setting) – I always carried one as a hike leader, they work amazingly well.
- Wet your shirt to provide evaporative cooling*
- Get into shade, either natural shade or rig up a temporary tarp shelter.
- Immersion in a cool water source (best not to do this alone)

*in this case a cotton shirt, that dries slowly can be extremely helpful.

- Heat Cramps
  - Heat Cramps: (muscle cramps, normally in the abdomen and legs)
  - Usually due to electrolyte loss through sweating and not replenishing fluids and electrolytes during the activity.

- Treatment for Heat Cramps:
  - Move to a cooler place
  - Drink fluids with electrolytes
  - Stretching and Massaging the affected muscles

Once symptoms have resolved, you are good to continue the activity

Heat Illnesses (Continued)

- Heat Syncope (Fainting)
  - Blood pooling in legs from prolonged standing (less blood in the brain)
  - Shunting of blood to the skin to aid in cooling the body (less blood in the brain)

- Treatment for Heat Syncope:
  - Move to a cooler place
  - Lay the person flat with legs elevated (do not hyperextend the knees)
  - Cool with misting water or wet, cool towels
  - Re-Hydrate once the person is conscious

This should be a very short fainting spell, if otherwise, seek medical attention.
Elderly persons should be evaluated by a medical professional.

Heat Illnesses (Continued)

- Heat Exhaustion (core temperatures up to 104º)

- Signs and Symptoms:
  - **Rapid, weak pulse** - Due to blood vessels dilating to send blood to the skin to aid in cooling. (remember, sweating is the body's cooling mechanism)
  - **Dizziness** – Blood leaving the brain to go to the skin to aid in cooling.
  - **Headache** – Dehydration reduces blood volume in the brain.
  - **Nausea** – Blood leaving the digestive system to go to the skin to aid in cooling.

- Treatment:
  - Move to a cooler place, into the shade and out of the sun
  - Remove excessive clothing
  - Cool the person with cold compresses or ice packs (sides of neck, armpits, groin)

Heat Illnesses (Continued)

- Heat Stroke (A Medical Emergency!) (This person needs Medical Attention – Quickly!)

- Signs and Symptoms:
  - Confusion (Altered Mental Status) – This is the primary method of determining HEAT STROKE!
  - Weakness
  - Dizziness
  - Headache
  - Unconscious
  - Seizures
  - Dry or WET skin (Activity induced Heat Stroke will often see moist skin)

- Treatment:
  - Move to a cooler place in the shade. Or…create your own shade.
  - Remove excessive clothing
  - Supervised Cold Water immersion up to the shoulders
  - Cold, Wet sheets (if unable to do water immersion)
  - Apply Cold Water (if unable to do water immersion)
  - Fluids, if awake and able to swallow (this is a minimal help)

Shelter

Shelter regulates the “Flow” (Heat Transfer) between you and the environment.

- **Clothing** - *It’s your first line of defense* - Dead air space - Close up collars and cuffs so warmed air (warmed by your body) does not escape (bellowing effect). Cover exposed skin, especially your head and insulate yourself from the ground (if trying to warm up).

Learn how to properly layer your clothing for outdoor activities. (Class #6 will cover layering)

Remember the Shelter Questions?

1) Do you need to warm up or do you need to cool down
2) What’s in my pack to address these issues
3) What resources are available

Personal Emergency Shelters (on body shelters)

- Emergency Mylar Blanket (can also be used as emergency sunglasses)
  You lose the use of your hands because you need to hold it in place.
- SOL Emergency Mylar Blanket (a tougher version of the basic mylar blanket). *You still lose use of your hands.*
- Emergency Bivvy (good if you are just laying down in one place)
- Emergency Reflective Tube Tent (Can work as a Bivvy as well as an emergency tent)
- Heat Reflective Poncho (best choice because you now have use of your hands for shelter building or fire making)
  (combine with a large plastic bag or a bivy bag or a tube tent)

- Trash Bag (55gal 3mil Contractor Bag) ***Uses of a trash bag:***

- **Emergency Waterproof / Windproof Poncho**
- **Used to transport leaves to build natural shelters.**
- **Water Carrier / Water Catcher**
- **As a Tube Tent (two taped together)**
- **Insulation below or above (Sleeping Pad or Blanket)**
- **Fill with leaves for a debris hut plug (Door)**
- **Snow Melter (Dark color bags)**
- **As a tarp or lean-too (two taped together)**
- **Flotation device (Fill with air when crossing a body of water)**

- Bread Rack Bags - Plastic bags used to cover bread bins in bakeries. (Larger and lighter than the contractor bags) I have gotten these for free from my local supermarket. – (Same uses as a 55gal Contractor Bag, however, being clear, you can use as it as a transpiration bag to make water) – I carry both types of bags.

- Military type poncho – Can be a Personal Shelter (rain/wind protection) or set up as a tarp for cover (something to sleep under.

Shelters for Cover
"The System"

Should be a "System" you can mix and match!

You need:

- Something to sleep on…Insulation if the ground is cold, or just for comfort if warm.

- Something to sleep in…A sleeping bag, bread bag, poncho, trash bag, emergency bivy, tube tent (used as a bivy).

- Something to sleep under…Tent, tarp, tube tent.

Shelters for Cover

First day, get your basic shelter together, then day 2 and forward, continue to improve your shelter.

- Trash Bags (55gal Contractor Bag) - Tape two together as a tarp, lean-to, or tube tent
- Bread Rack Bags - Same uses as the trash bag above.
- Painters Tarp Shelter - “A” Frame tent or Lean-to.
- Grabber or Arcturus Heavy Duty Survival Blanket…Several Set-up methods:
    - Cold weather Set-up with a fire (lean-to with an awning) (ridgeline)
    - Cold weather Set-up no fire (“A” frame) (ridgeline)
    - Hot weather Set-up (reflective side up) (ridgeline)
    - Plow Style Set-up w/tree (no ridgeline needed)
      -Hot weather, reflective side out / Cold weather reflective side in.

-Tarps: Large & Small, Ultralight or Standard Weight (many to choose from)

Note: For survival, get a color that will contrast with the environment.

- Military Poncho Shelter (set up as a tarp using some of the above methods)



















The Heat Reflective Mylar Tube Tent

A VERSATILE SHELTER THAT CAN BE AN EMERGENCY TENT OR USED AS A BIVY BAG.





- 10x10 Free Standing Tarp (W/Hiking pole)
  - Can be used in the same configurations as the Grabber space blanket tarp.
  - Modify so tarp ends can be used as doors
  - Can be used in the “plow” configuration if there are strong winds.
  - Second ridge line through tabs for wind protection
  - End tabs attached to ridge line with sticks by pulling ridge line through tabs
  - Free standing setup with trekking pole
  - Many configurations limited only by your imagination.
- Super Shelter
- Natural Shelters
  - Rock overhangs, large downed trees, caves and alike.
- Debris Shelter - **Can take several hours to build**
- Raised Shelters - More appropriate in the jungle
- Cold Weather Shelters (Igloo, Snow Cave, Quinzee, Tree Pit)



Squirrel Up:

Wiggle into a leaf/debris pile, only your face sticking out to breathe.

Think about the environment you will be in
to determine what shelter items to carry for emergencies.
Some examples below. Mix and match for your likes and needs:

Hot days, warm nights:

· A tarp for improvised shade if you get too warm and need to cool off during the day. Wind break at night.
· A trash bag. You may not need insulation from the cold ground, but a bag filled with leaves and debris will be more comfortable to sleep on.

Hot days, cool nights:

· A tarp for the same reasons above and to keep dry from any precipitation
· A mylar poncho for the cool nights
· A trash bag or bread bin bag for both insulation from the cold ground and comfort.

Cold days, cold nights:

· A tarp for cover – ideal if you are going to make a fire to keep warm.
· A tube tent – ideal emergency shelter if you are not going to have a fire.
· A mylar poncho for the cold nights (upper body) / Trash or Bread Bin bag (for your lower body)
· A trash bag or bread bin bag for both insulation from the cold ground and comfort. A second bag filled with debris for a cover.

Shelter & Shelter Location Considerations and Concerns:

- Insulate yourself from the cold ground (sleeping pad / bag filled with leaf litter / forest debris)
- Avoid: **widow makers** / game trails / dry creek beds / potential flood areas / windy peaks / cold valley floors / tops of hills / dead trees / windward side of a hill / below a rocky outcrop / areas with fresh animal sign.

- Look for: flat ground / windward side of a valley / Leeward side of woodland / Good drainage / 50-100 yards away from water.

- A south facing shelter will maximize your sun exposure and keep you warmer.
- A north facing exposure will minimize sun exposure and keep you cooler.

- **Unless Unsafe, try not to move your camp!** - Often times SAR will find your first camp then a day or two later find your second camp, and so on….

You significantly improve your chances of faster rescue by not moving camps!





Additional Considerations:

- In a very warm environment, laying directly on cooler ground may be beneficial in cooling off your body.

- Dead Air Space below you will help in cold environments by reducing "conductive" heat loss from your body to the ground.
- Open Air Space below you will help in warm environments by allowing air flow beneath your body transferring your body heat to the cooler environment, thus cooling your body.

- A small "snug" shelter will help keep you warmer while a spacious shelter will keep you cooler.

- If you are WARM and want to LOWER your core temperature then put your body in direct contact with something COOLER than you.
- If you are COLD and want to RAISE your core temperature then put your body in direct contact with something that is WARMER than you are.

- If you are COLD and want to RAISE your core temperature, you need to block the air currents from reaching your body, Create "dead" air space of non-moving air.
- If you are WARM and want to LOWER your core temperature you need to maximize your exposure to moving air currents.

- Heat waves want to travel away from your body off into space. To stay warmer, create a barrier that will block their escape and reflect them back to you. To stay cooler, remove barriers and let the radiation escape to space.

Shelter - Attachments & Knots used

1) First attachment of ridgeline to tree: Siberian Hitch, Two Half Hitches, Loop in end of cord (pull entire line through) Loop in end of cord (pull a bite through, secure with a stick), Bowline around the Tree.

2) Attach the working end to the other tree: Modified Truckers Hitch, Taught Tarp Hitch

3) Tie out lines (at tarp): Adjustable Grip Hitch, Taut Line Hitch

4) Tie out lines to a tarp with no grommets or tie-outs: Slip Knot (with a button), Larks Head (with a button), Adjustable Grip Hitch or Taut Line Hitch (with a button), Sheet Bend

5) Stake end of tie-out cord: Figure 8 in a bite, Adjustable Grip Hitch or Taut Line Hitch

6) Stake end of tie-out with Stake above ground: Clove Hitch around a stick and lay a rock over the cord and stick.





Carving tent stakes out of branches:

1) Carve an “off center” point for “pithy” branches to avoid tip collapse.
2) Fire harden if time permits
3) Carve out a “7” notch to help “catch” the cord (see photo below)

Types of cordage used:

1) 550 / Paracord is very common but has some stretch (harder to get a taught ridgeline)
2) Utility cord (3mm from REI - used in set-up demonstrations)
3) 2 or 2.5mm or 3mm Reflective cordage (from Lawson Equipment) (my personal choice)
4) Bank Line



Tent / Tarp Stakes











A great example of why you test out and know your gear BEFORE you need it.

Fire - Modern Methods

• Fire Safety.
- Weather conditions (strong winds)
- Fire containment (fire ring)
- Never leave a fire unattended
- Know how to properly put out a fire until is it “Cold Out”

• Fire Prep
- Ember / Spark* based fire starting vs. Open flame fire starting
*Ember & Spark based fire making will need a Tinder Bundle
- Tinder - Natural or Man Made (at least 2x what you think you need)
- Base of the fire, allow oxygen under and into the fire
- Kindling Size Steps- Pencil Lead / Pencil / Thumb (at least 2x what you think)
- Fuel - Wrist size and larger
- Natural materials - Fatwood / Birch Bark / Pine Pitch
- Man made materials - PJ Cotton Balls / Commercially made fire starters

• How to know if the (dead & down) branches are good for fire making.
- You will hear and feel a good “snap” when you break them.
- Try to collect from lower dead branches that are still attached.



• <u>Be sure to have 3 methods of making fire on you or in your pack</u>





• Types of Fire Making:
- Solar - Fresnel Lens / Reflector
- Electrical - Battery & Steel Wool
- Open Flame
- Matches*
- Lighters*
- Spark Generators
- Firesteel (Ferro Rod)*
- Flint & Steel (not a ferro rod, over 3,000 year old method)
- Friction - Hand Drill or Bow & Drill

- Chemical - Potassium Permanganate & Glycerin / Chlorine & Brake Fluid
- Compression - Fire Piston



*My preferred emergency fire making items to carry.



Personal Shelters

Emergency Mylar Blanket vs.
Heat Reflective Poncho

Bread Bin Bags
55gal Contractor Bag
Emergency Bivy
Reflective Tube Tent