

Unit 16: Basic Survival

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Priorities?



What are your priorities for survival?

The “Rule” of 3s (What kills you)

- 3 seconds to get off the “X”
- 30 seconds to stop your own arterial bleed
- 3 minutes without air
- 3 hours without shelter (harsh environment)
- 24-48 hours without sleep
- 3 days without water (weather & shelter...)
- 3 weeks without food (with all the above)

There is HUGE variability



Loose rule of thumb for priorities: Rule of 3s.

For some very immediate threats (plane crash, sinking ship, vehicle in water, active shooter) very few seconds to act. You’ve got about 30 seconds to stop your own major arterial bleed before you become unable to do so.

Rule of 3s clearly indicates the priorities for “usual” backcountry survival: Shelter, sleep, water. Food isn’t a priority.

Huge variability (among people, among circumstances). Survival without shelter can be 5 minutes in cold water, weeks in dry, warm, temperate conditions.

Think: Immediate survival needs; Longer term survival needs.

Priorities

- Positive Mental Attitude
- Get off the “X” (about 3 seconds)
- Air – about 3 minutes
- Shelter – about 3 hours (harsh environment)
- Rest
- Signals
- Water – about 3 days
- Food – about 3 weeks



Most important priority is positive mental attitude.

Then, air, shelter, rest, signals.

Shelter is key – cold and wet is dangerous. Recall the survivability difference between 1-3 year olds and 4-6 year olds – you want to curl up somewhere warm, cosy and dry.

Water is down the list, you've got a couple of days to address that.

Food is way down the list, you have many days to address that.

Positive Mental Attitude

- Forget the promise that you'd be home for dinner tonight.
- Focus on survival priorities.
- Understand how you deal with isolation.
- Expect initial panic on realizing you are lost.

It's all about what you “go out the door” with
(in your head and on your person.)



Recognize that you are in a survival situation, put other concerns aside.

It's good that you promised that you'd be home for dinner tonight, that means someone will be concerned when you aren't.

Focus on the top priorities first: attitude, shelter, rest, signals.

Talk it through

- Out loud
- To yourself, to a squirrel...
- Out loud

PSAR Messages

- Hug-A-Tree
 - Hug-A-Tree (stay in one place)
 - Make Yourself Big (visible)
 - Bright (reflective)
 - Unusual (straight lines, threes)
- BSA: STOP
 - Stop
 - Think (stay put, stay together, conserve energy)
 - Observe
 - Plan
 - (First Aid, Shelter, Fire, Signal, Water (don't worry about food))



We talk about survival in the Preventative SAR (PSAR) program messages:

Hug-A-Tree, Hug-A-Tree and Survive.

Hug a tree: Stop when you get lost, stay warm and dry.

Make yourself Big: Make signals

Boy Scouts of America

STOP: Stop, Think, Observe, Plan

Stop: when you are lost.

Think: stay put, stay together, conserve energy.

Observe: situation, hazards, resources.

Plan: first aid, shelter, fire, signals, water.

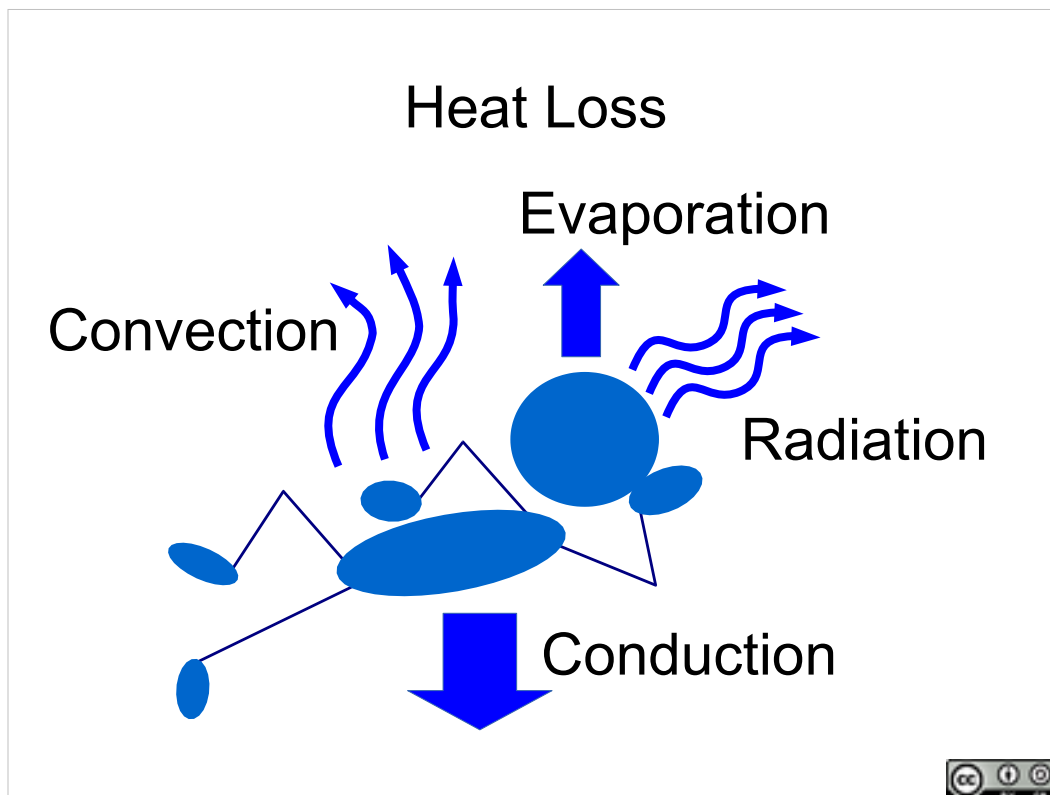


What are the most dangerous conditions for hypothermia?

Why?

Most dangerous conditions: 50 degrees and raining.
(People aren't prepared)

Some other higher risk conditions:
Falls during river crossings.
Sweating into cotton. -- Why?



Let's think about paths by which heat is lost:

Conduction – laying on cold ground, conduction into water. Sit on a cold wet rock, what happens?

Convection/bulk transport – Bulk Transport: cold wind, flowing water, transporting the heat away (in still conditions, body heat warming surrounding air, surrounding air rising (convecting away)).

Radiation: body heat radiating away. Most noticeable if you wrap yourself in a space blanket.

Evaporation: Moisture on the body evaporating, changing water from a liquid to a gas takes lots of energy, moisture on the skin evaporating cools the skin. Sweating – the main way the body sheds excess heat.

Also: Respiration: Breathe in, air is warmed in lungs, breath out, heat is lost to surrounding air. (We can see it in the winter). (Mechanism is bulk transport + evaporation).



STOP: Plan: top priorities: first aid, **shelter**, fire, signals, water.

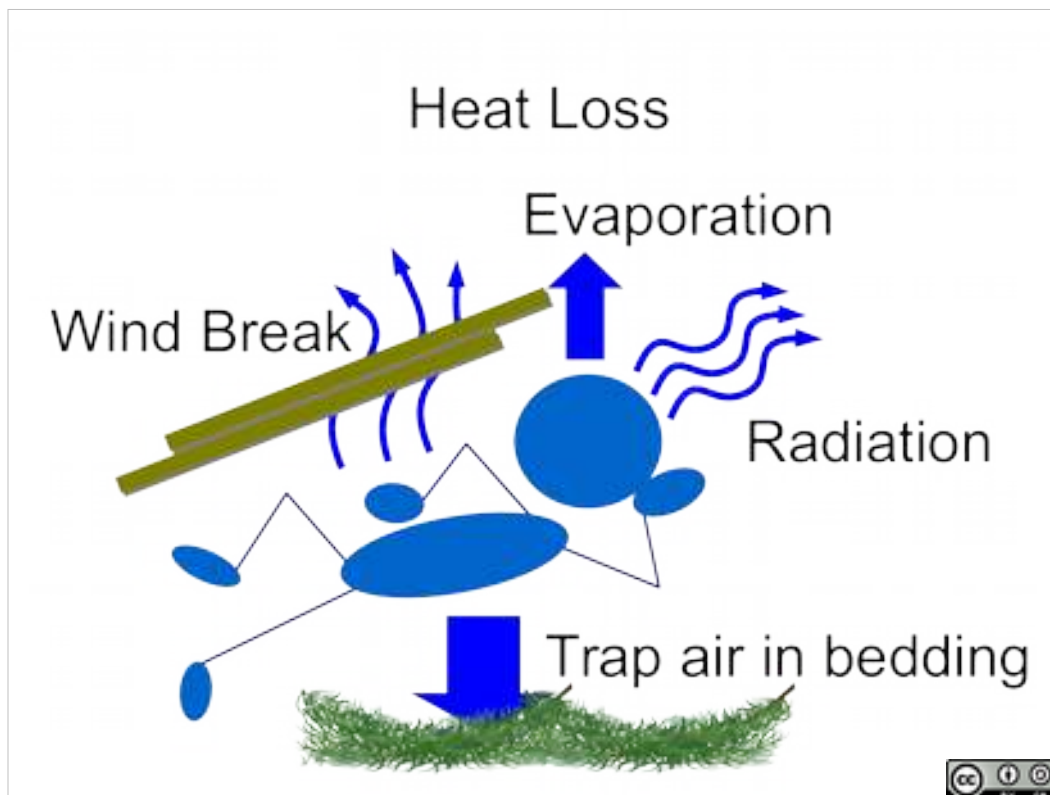
Understanding heat loss pathways can help you build an shelter.

Heat is lost by convection/bulk flow: build a wind break.

Heat is lost by conduction into cold ground: Put insulation below you. Old phrase: “One below is worth two above” - put insulation under you, think mattress, not blanket.

What else do you want in a shelter?

What do you think of this shelter?



Block conduction to the cold ground by trapping air in bedding below you.

Block Convection and bulk flow by constructing a wind break.

Focus on **head and core** – most heat loss through them.

What else might you want to do?

(reflective blanket, good way to bounce radiated heat back on yourself)

(waterproof barrier to keep the rain off you).

(not build in a low spot where a puddle will form in your bedding)



Fire

STOP message: Top priorities in Plan: first aid, shelter, **fire**, signals, water.

What is fire good for?

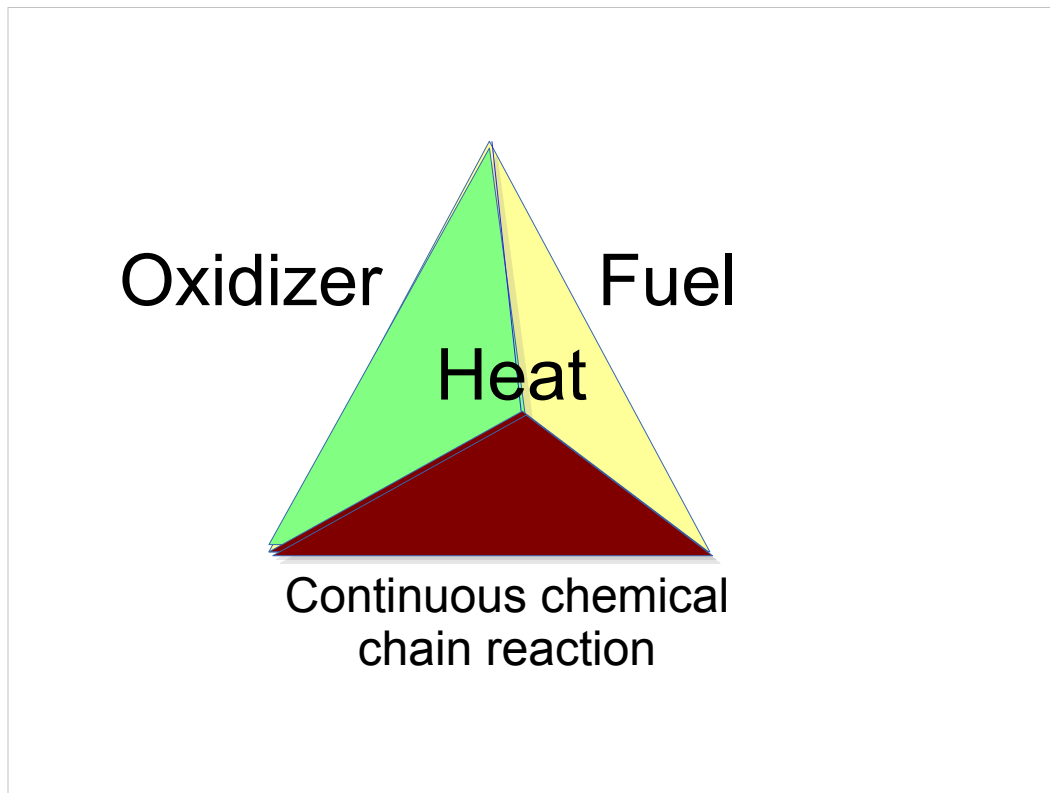
Discuss.

Warmth

Attraction/Signal

Boil Water (boil how long per CDC? (rolling boil at least one minute, at least 3 minutes over 2000 feet))

Morale – Positive Mental Attitude



How do you get a fire going?

You put the four of these together.

Air – with oxygen, an oxidizer.

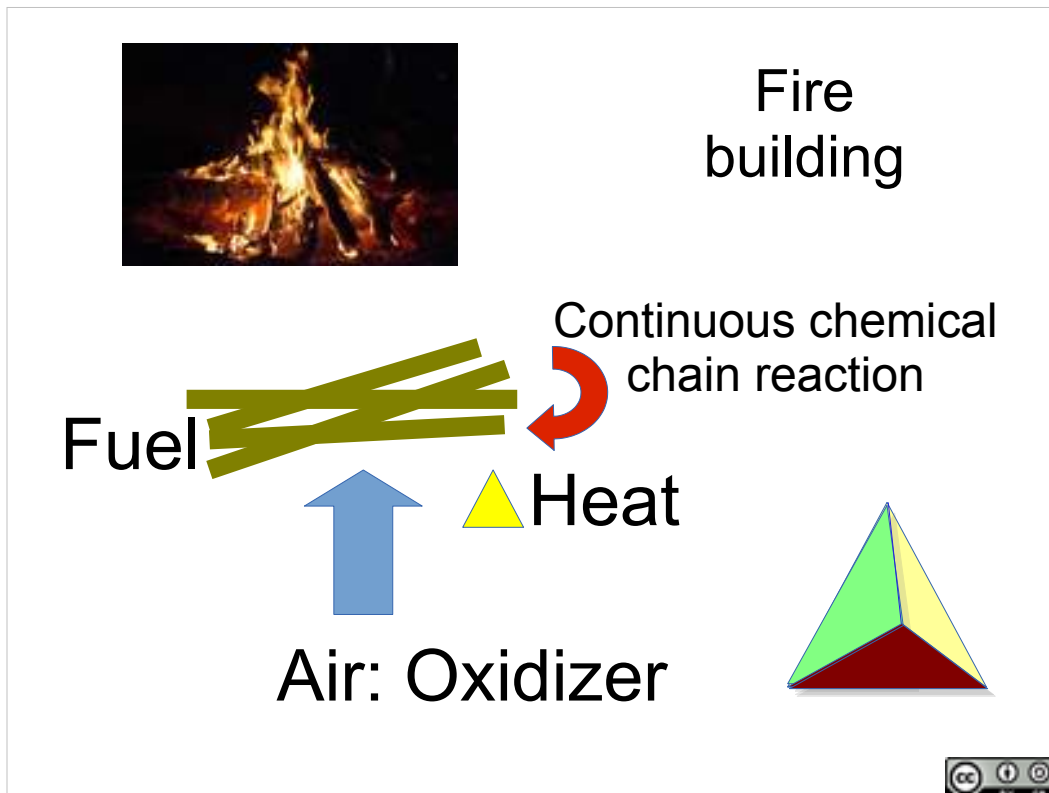
Fuel – something to burn.

Heat – (solids don't burn, they produce gasses which do), need heat to make the fuel burn.

And a continuous chemical chain reaction.

Take any one away and you put the fire out.

To make fire, need to understand what fire needs.



You need some fuel.

The fuel needs ventilation to get a supply of oxygen in.

You need to add heat.

You need to maintain the conditions to keep the continuous chemical chain reaction going.

Fuel too large – can't get it hot enough to get the chain reaction going.

Fuel too dense, can't get air in.

etc.

Preparation

- What kind of fire do you want/need?
 - Heat (warmth, morale?)
 - Signal (heat, smoke, light)
 - Cooking, heating water?
- Plan the location (what's above and below).
- Gather Materials
 - Tinder
 - Kindling
 - Fuel
 - Ignition



First, prepare for your fire. **Why would it make a difference what sort of fire you want?**

Gather materials. **What might you use for:**

Tinder? Drier lint (not if you wear nomex clothing), petroleum jelly saturated gauze, vaseline soaked cotton, magnesium chips, fuzz stick, shredded cloth, birch bark, etc...

Kindling? twigs, etc.

Main fuel? larger and larger sticks, branches, etc.

Ignition source? Lighter (fuel can leak away); magnesium, knife and sparker; matches: (hurricane, strike anywhere, book).



Here's one theory: Build a structured pile of materials all ready to ignite and have the fire grow into the pile.

This one is intended as a signal fire.

Kindling, with a hopefully complete enough sequence of larger and larger twigs and sticks, and then damp leafy pine branches on top to generate smoke.

What are some issues you see here?

Ground might burn.

There might not be enough kindling for the fire to grow beyond burning the tinder (might not be able to get the enough heat to establish the continuous chain reaction in the main fuel).



Here's another approach – start small and add fuel.

Tinder, small bits of kindling stacked on top, open to allow air to draft through.

Ignite tinder – get enough heat for the kindling to ignite, then...



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DoD photo by Senior Airman Jonathan Snyder, U.S. Air Force. (Released)



then slowly add larger and larger fuel. As larger fuel items ignite the fire will grow and build up more and more of a draft, bringing air (oxygen) into the fire – and it becomes self sustaining as long as you keep a supply of fuel.

You can add more air into the fire by blowing on it. In windy conditions you may need to set up a windbreak to reduce the initial air flow through the kindling (bulk flow, removing heat, not letting the tinder heat the kindling enough to ignite)

Think about what is below the fire. Will it burn? Does it maintain a draft of air into the fire? Will it shatter when heated (wet layered sandstone)?

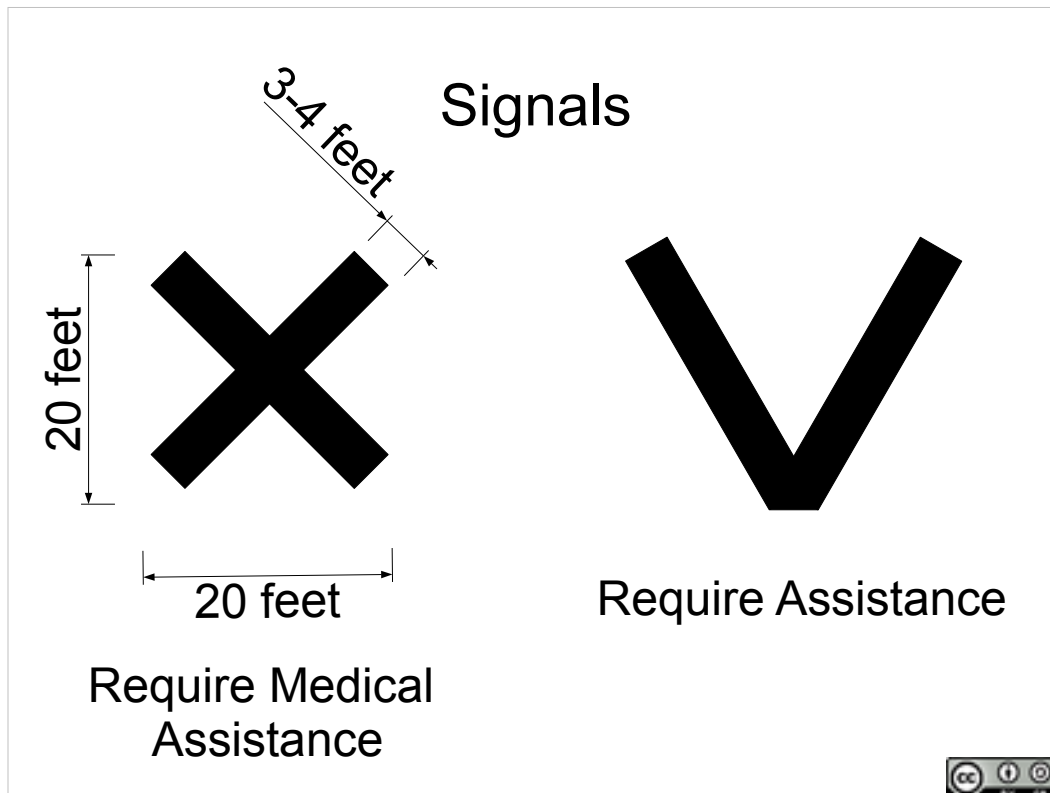
Think about what is above the fire. Wet snow on a tree limb...



Then for your main fuel – larger sticks, branches, logs.

Leave them long and push them in as they burn.

Have all the materials you need gathered and on hand – tinder, kindling, main fuel, and ignition source – before trying to light the tinder.



STOP: Plan: first aid, Shelter, Fire, **Signals**, water

Here are two signals for ground to air signaling by persons in distress from Annex 12 to the Convention on International Civil Aviation.

Make as large as possible, preferred minimum size is 20' by 20' with width $\frac{1}{5}$ to $\frac{1}{6}$ of length.

Make as strongly contrasting with the background.
Make deep/tall to cast shadows if possible.

Place in the open, visible from the air, away from shadows.

Destroy after signal has served its purpose.

Audience: Aircraft.

Audience & Methods

- Flashlights
- Strobe Light (flasher)
- Mirrors
- Sound: whistle
- Smoke
- Radios
 - Amateur Radio Wilderness Protocol (2m calling frequency for 5 minutes after each hour)
- Satellite (PLB, ELT, Phone)
- Rescue laser beacon



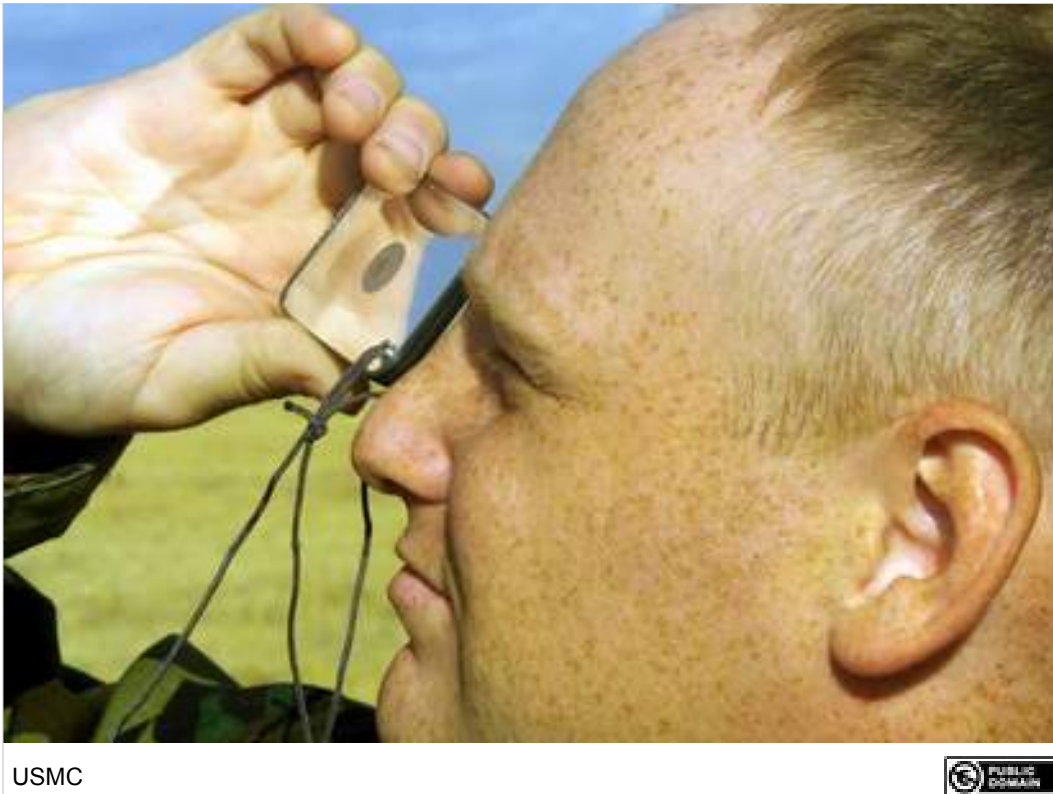
Think – who are you signaling to? Who is the audience for your signals?

How can you signal to them?

Will different sorts of signals have different effectiveness for different audiences? Will a plane hear whistle signals?

What means to signal do you have on hand?

What means do you have to improvise signals?



Heliograph/signal mirror.

Demonstrate use – and use of arbitrary reflective object (hold hand with fingers in V, aim at target, hold mirror near eye, reflect light onto you hand)

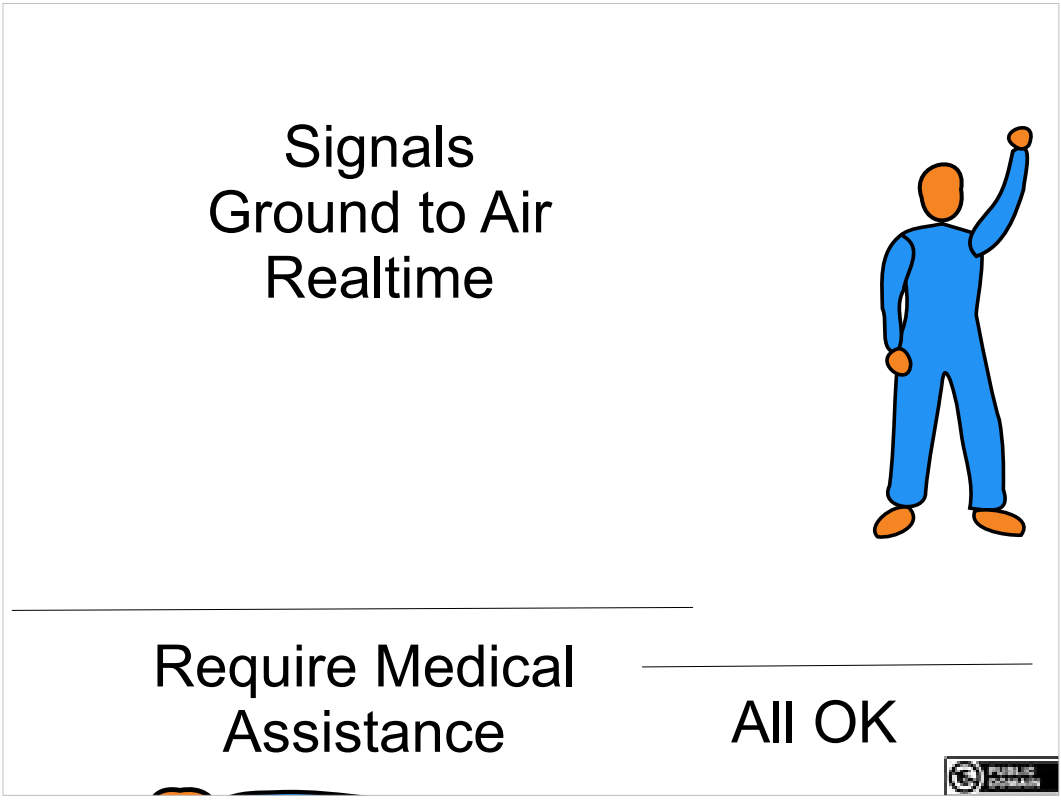
Signal with a mirror when you have something to signal at.

Hug A Tree: Make your self Big.

How do you make yourself big for aircraft?

Lie flat, spread eagled, in the open.

Lights, heliograph, standard ground to air markings, etc.



Here are two signals for realtime ground to air signaling by persons in distress from Annex 12 to the Convention on International Civil Aviation.

Audience: Ground Searchers

- Make your shelter findable
 - Trash, Flag lines, Disturbance Lines
- Sound: Whistle, Gunshots
 - Distress: Sets of three, Response: Two whistle blasts
- Smoke
- Flashlights
- Strobe Light (flasher)
- Mirrors
- Radios
- Rescue laser beacon



Think – who are you signaling to?

Ground searchers?

How can you signal to them?

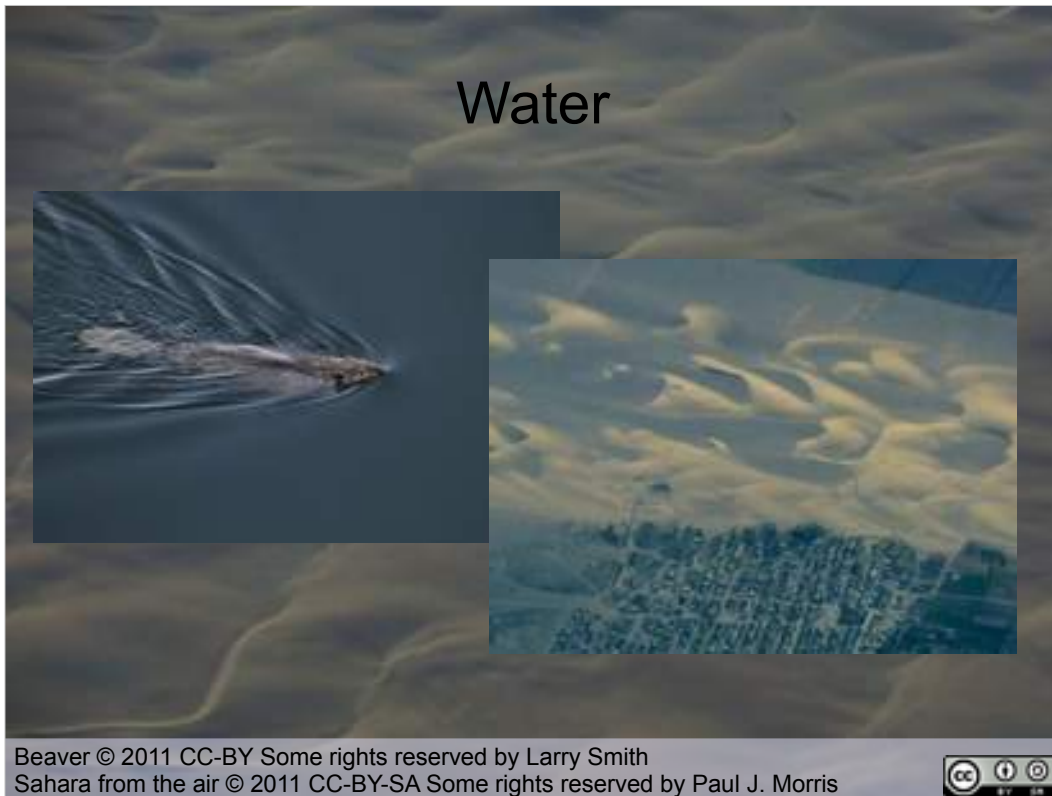
How can you attract them?

Shelter made out of natural materials sounds like a nice camouflaged hiding spot.

How can you make your shelter easier for them to see?

You probably want to respond to sets of three gunshots with sets of two whistle blasts.

What are the advantages and disadvantages of each method?



STOP: Plan: first aid, Shelter, Fire, Signals, Water

Two problems about water :

No water.

Water not fit to drink.

Potable (drinkable) water

- Boil
- Distill
- Filter
- Chemically treat it
- UV treat it

If you have a source for water (or snow, or salt water), you can make it drinkable. Assume any water in the wild in New England is contaminated.

Handout CDC Guidance on water treatment

CDC recommendation: Boil for 3 minutes or two other methods (filter and chemical treatment).

For chemical treatment to carry, look for long shelf lives.

Avoid eating snow, melt snow into water.

Distill fresh water out of salt water.



Obtaining water when you don't have a source is harder.

Survival methods have many methods, try them.

You may be able to obtain water with a transpiration bag.

Trees suck water out of the ground. Trees breathe through their leaves. Trees lose water vapor through their leaves.

Wrap a branch with green leaves in a plastic bag with a pebble in it to give it a weighted low point (for water to collect in), tie the plastic bag closed around the branch. Wait.

Improvise



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Stop
Observe
Think
Plan

You won't be carrying everything you want.

You will need to improvise.



Key to improvising is thinking about Function.

I need to keep my feet dry – what do I have that can serve that function.

Trash Bags have many uses



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A rain jacket doesn't need to have sleeves and pockets and a zipper and buttons.

What is it supposed to do? What materials do I have on hand that can do that?

It does need to keep you dry and let you breathe and trap air near your body (air is a good insulator, but wind carries heated air away from you).

Stop

Observe

Think about how to improve the situation.

Plan

Snow Shelters: Think Lazy

- Maximum (useable) space for Minimal Effort
- Insulation between you and the snow
- Small entrance
- Cold air sump



What is a snow shelter supposed to do?

Shelter you from the weather – thus: small entrance,

Snow is cold – snow conducts heat, conduction is very efficient at conducting heat.

Thus: Insulation beneath you (materials? Your pack. Pine boughs).

Cold air sinks – thus: build a low spot for the cold air to sink to.

Think Lazy. How can I get the maximum amount of usable shelter space with the least effort?

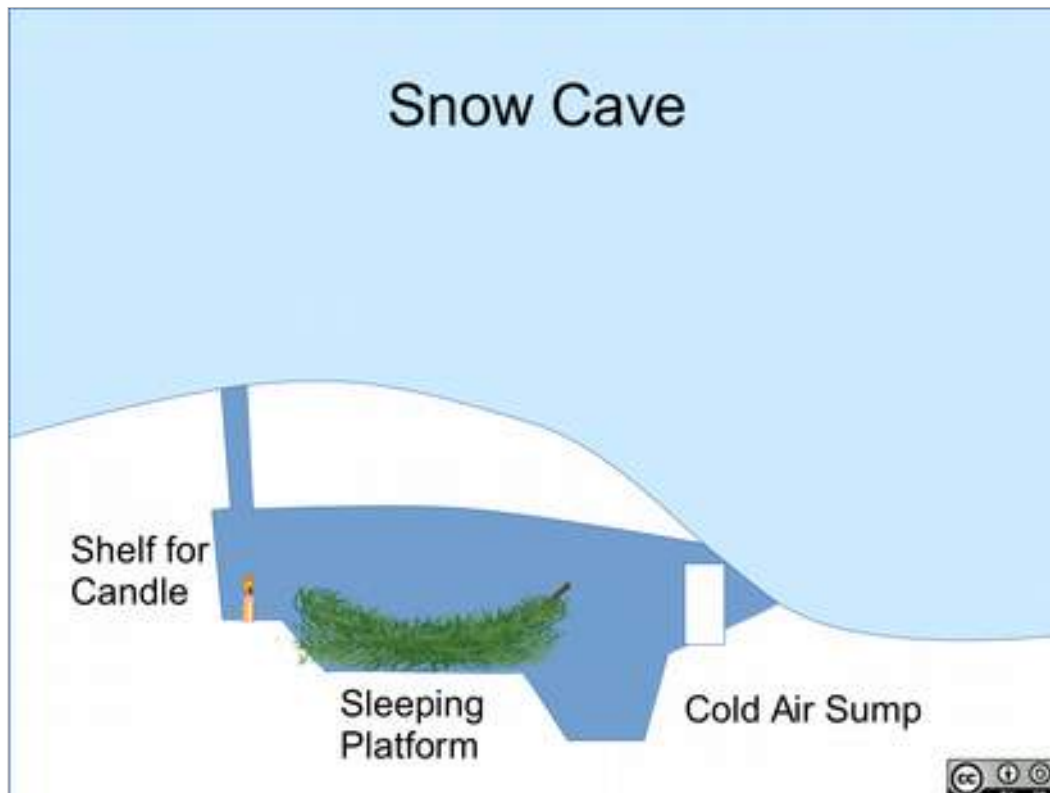


Here's an example of an Igloo building exercise. In the end this igloo got the open top covered by branches and a tarp, but it still took 30 person hours to build.

10 people to build, holds 6....

Not thinking lazy.

Building with snow takes the right snow conditions and takes effort.



Traditional snow cave: much less labor intensive.
Build a pile of snow and hollow it out.

Cold air sinks: Add a low spot for it to sink to.

Snow is a good conductor of heat. Insulate your underside from the snow – insulate your sleeping platform (insulation = something that will trap air (air is a good insulator)).

You can build an elevated shelf and a chimney for a candle.

You can partly block the opening to trap warm air inside.



Think Lazy.

This snow cave took three people, three hours (9 person hours), to pile up snow and hollow it out, holds 8 people.

Contrast with the igloo shown earlier, 30 person hours with 10 people, only holds 6, didn't actually finish the roof...



Three people, three hours (9 person hours), holds 8.



Entrance can be partially blocked to reduce bulk flow.



Candle can provide heat and light, needs a chimney to draft combustion products out.



An even simpler start for shelter is a tree well.

Coniferous trees catch snow on their branches, less accumulates around the base of the trunk.

By itself, shelter from the wind.

You can dig a snow cave into the side of the well.

Equipment: What to carry?

- What you can count on is what you have:
 - in your head
 - on your person.



For Survival, the only equipment that really counts is what is on your person.

What you can count on is what you have in your head and what you have on your person.

The backpack back in camp, the survival kit in the back of the plane, lots of nice equipment, but it isn't with you.

We'll come back to this.

The “Rule” of 3s (What kills you)

- 3 seconds
- 3 minutes
- 3 hours without shelter (harsh environment)
- (24-48 hours without sleep, function degrades)
- 3 days without water (weather & shelter...)
- 3 weeks without food (with all the above)



Three seconds... (to get off the X).

Thirty Seconds... (to stop your own arterial bleed).

Three minutes... (without air).

Lots of variability.

In a harsh environment, survival times might be 3 hours without shelter.

Fatigue severely reduces your ability to function and to think clearly. You need sleep for the Think in STOP.

Two days without sleep won't kill you directly, but it puts you at much greater risk (e.g. for doing stupid things).

Depending on weather and shelter, you need water within about 3 days.

STOP

- Stop, Think, Observe,
- Plan
 - First Aid
 - Shelter
 - Fire
 - Signals
 - (Sleep)
 - Water
 - Don't worry about food.



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So the rule of threes sets priorities for your plan (first aid, shelter, fire, signals, get rest and sleep, obtain and purify water)

Frame a scenario, and discuss each of these in turn. What do you normally carry that could provide these functions? What could you improvise to provide these functions.

(Make point again with image: the equipment you have is what is on your person).

Food

- We don't physically need food for the plausible (local) “lost in the woods” events
- BUT it sure helps on the psychological front
- And it makes a HUGE difference in your ability to keep working (and think rationally)!
- Hot drinks
- High caloric content in low volume & weight



Don't worry about food.

But food is good to have – very good for the positive mental attitude.

Good food to carry: high caloric content, small volume, small weight.

Which is better for warmth: A cup of hot water, or a cup of cold sugar water? (the sugar, there is more energy available in the calories there than in the heat in the hot water – hot is good psychologically as well).



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