

HURRICANE ISLAND  
**OUTWARD BOUND SCHOOL**

**Backpacking and Canoeing  
Handbook**



# Patrol List

Course Director: \_\_\_\_\_

Instructors: \_\_\_\_\_

Group Members:

Name	Address	E-Mail
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# Introduction

Congratulations on choosing to do an Outward Bound course!

You are about to learn many new skills, most of which require substantial practice in order to master. This handbook will provide you with many resources to help as you begin to acquire these skills.

The more competent you are with the technical skills taught on your course, the better prepared you will be to assume some responsibility for your expedition. Possibly, you will go on to employ some of these skills when you return home.

The blank spaces are for you to fill, perhaps with additional tips gathered from your instructors and other team members, or perhaps with thoughts that come to you about how this adventure fits into your life. The reading list following each section provides you with other resources you can use to increase your knowledge of a particular topic.

May your expedition be a grand one!

This handbook was written and edited by Caroline Blair-Smith, Ben Hoops, Lesley Herschlag, Roy Hunter, and Ashley Lodato. Drawings were done by Martha Bracy. Formatting and design work was done by Tim Swenson of Midcoast Creative.

A special thanks to all the staff who helped to influence the production of this book.

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# PART I

# General Curricula

## Expedition Skills Checklist

The length of your course will determine how many of these skills are taught as part of your course curriculum. If your course is three weeks or longer, you should be able to demonstrate all of the skills listed below.

### Campcraft

- Pitch tents/tarps well enough to stay dry in rain
- Properly use stoves to prepare tasty meals in appropriate quantities
- Keep food dry, clean, safe from animals throughout course
- Demonstrate basic stove repair skills
- Build a fire in an established site
- Understand basic nutrition
- Understand basic first aid: injury prevention, thermal regulation, hydration, treatment of small wounds and blisters

### Leave No Trace®

- Identify and observe the basic principles

### Lightning

- Perform lightning drill procedure
- Anticipate storms and adapt route accordingly

### Navigation Skills & Group Travel

- Identify all colors and symbols on a map
- Orient map, using compass or points on land
- Take and follow a bearing
- Measure distances and estimate travel times
- Practice basic route planning
- Practice basic search and rescue techniques

### Knots

- Figure 8 follow-through
- Tensionless knot
- Tautline hitch
- Overhand knot
- Slip knot/slippery hitch

# Leave No Trace®

*When we try to pick out anything by itself,  
we find it hitched to everything else in the universe.*

—John Muir

From its inception, Outward Bound has led the way in educating people about low-impact backcountry travel and helping them appreciate the earth's limited natural resources. Many of the early guidelines for campers, hikers, and backpackers used and recommended by the US Forest Service and National Park Service originated in Outward Bound instructor manuals.

Today, all Hurricane Island students are trained in Leave No Trace outdoor skills and ethics, which were developed by the National Outdoor Leadership School in a coordinated effort between federal land agencies, wilderness educators, environmental scientists, outdoor retailers and equipment manufacturers. Students are also introduced to the concept of environmental stewardship: an acceptance of personal responsibility for maintaining the health and beauty of the natural environment.

By living a simple, self-reliant, low-impact lifestyle in the wilderness, you have the opportunity to analyze firsthand the effect of human activities upon the environment and upon other users of the wilderness.

We hope that you are inspired to deepen your ties with nature and appreciate the value of preserving wilderness.

## Leave No Trace Principles

### Plan ahead and prepare

- Know the area and what to expect
- Select appropriate equipment
- Repackage food

### Travel and camp on durable surfaces

- Hike on durable surfaces and spread out
- Keep group size small
- Select durable ground
- Use trails where they exist
- Avoid fragile vegetation
- Avoid places where impact is just beginning
- Choose a shelter site with a small slope

### Dispose of waste properly

- Minimize soap and food residues in waste water
- Use soap sparingly when needed
- Pack out trash
- Dispose of human waste in catholes or outhouses

### Leave what you find

- Minimize site alterations
- Avoid damaging live trees and plants
- Leave natural objects and cultural artifacts

## Minimize campfire impacts

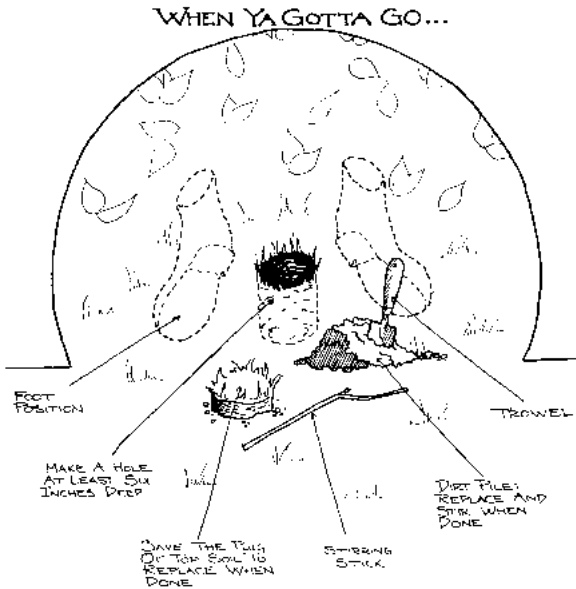
- Be aware of fire regulations and weather conditions
- Use only dead and downed wood if there is not a supply of driftwood
- In high-use areas, use existing fire rings
- In remote areas, use appropriate Leave No Trace fire techniques

## Respect wildlife

- Enjoy wildlife from a distance
- Never feed wildlife
- Store food securely
- Minimize noise
- Avoid sensitive habitat

## Be considerate of other visitors

- Avoid conflicts
- Minimize crowding
- Manage your pet
- Respect the privacy of other visitors
- Let nature's sounds prevail



### Resources:

Hampton, Bruce & Cole, David, *Soft Paths*  
 NOLS, *Leave No Trace: Northeast Mountains*

# Lightning

## What Is Lightning?

Lightning is a huge electric spark that can occur between the clouds and the earth, between two clouds, or within the same cloud. Lightning's strong electrical current heats and causes a sudden expansion of air, which produces a sound wave – the boom of thunder.

## How Does It Happen?

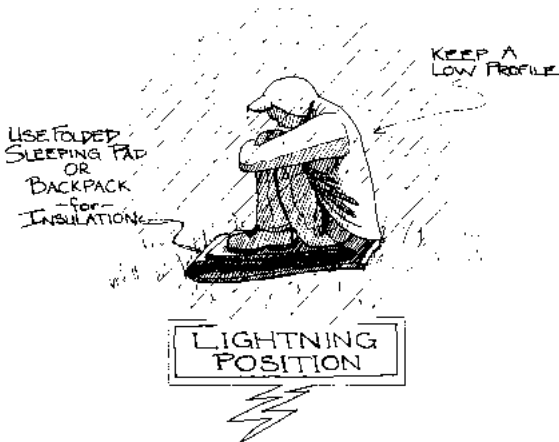
Electric potential builds up in a cloud in somewhat the same manner your body picks up an electric charge when scuffing your feet on a carpet. The friction of scuffing creates an electric potential or charge. Your body retains the negative charge, which will ground itself with a stinging zap when you touch a doorknob, for example.

## How Do You Know When a Thunder Storm Is Approaching?

Light travels much faster than sound waves. The flash of lightning is for all practical purposes seen instantaneously. The boom of the thunder arrives later, covering 1,100 feet per second, or roughly 1 mile in 5 seconds. By counting "one, one thousand, and two etc.," the distance from you to the lightning can be estimated. Every five seconds between lightning and thunder equals about one mile of distance between you and the storm.

## Minimizing Danger On Land

1. Time visits to high risk areas with weather patterns
2. Find safer terrain if you hear thunder
3. Avoid trees, peaks, ridges, wide open ground, high ground, water, cave entrances
4. Avoid long conductors (metal structures, wire cables, railway tracks)
5. Get in the lightning position





If the storm is on top of you, it's best if you can squat on your ensolite pad. When you tire of this you can sit down.

Resources:

Gookin, John, *NOLS Backcountry Lightning Safety Guidelines*

## Navigation

*Something hidden. Go and find it.  
Go and look behind the Ranges –  
Something lost behind the Ranges.  
Lost and waiting for you, Go!*

—Rudyard Kipling

Identifying your location and knowing how to determine how to get where you want to go next are necessary skills for wilderness travel. On your backpacking or canoeing course, you will be using topographic maps issued by the US Geological Survey to plot your course, measure distances, and identify particular geographical features. Topo means “place” and graph means “drawing,” so a topographic map is a drawing of a particular place.

At the bottom of each topographic map you will find a legend, which provides you with the contour interval, a magnetic declination diagram, a scale, and other useful information, such as the date the map was issued.

You will see several colors on topographic maps. The colors identify the following features:

White = non-vegetated areas

Green = vegetation features (wooded areas, forests, orchards, vineyards)

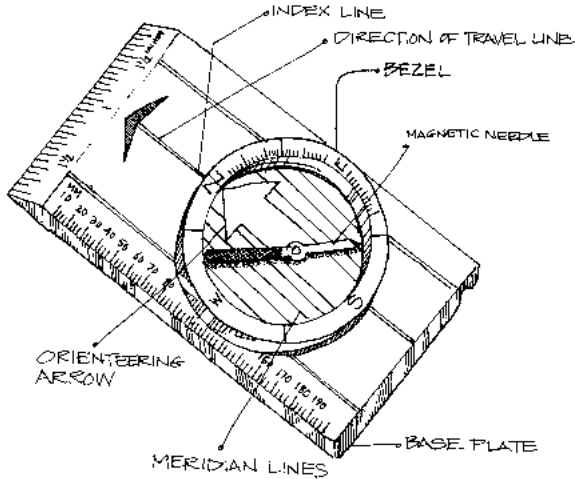
Brown = elevation features (mountains and hills)

Blue = water features (streams, lakes, ponds, rivers, marshes, springs)

Black = man-made features (buildings, roads, trails, railroad tracks)

Red = heavy-duty and medium-duty roads and highways

You will use your maps in conjunction with a compass, which uses the earth's magnetism to help you identify the cardinal directions of North (N), South (S), East (E), West (W).



## Orienting a Map Using a Compass

Use the following step-by-step reminders when you want to orient a map, or triangulate.

1. Lay the map on a level surface.
2. Locate the declination diagram in the lower left corner of the map.
3. Lay the compass on top of the diagram.
4. Without disturbing the compass, rotate the map until the line that points to magnetic north in the diagram on the map lines up with the red needle of the compass.

## Taking a Bearing from a Map (when map is not oriented)

Use this method when you know your exact position on the map and want to walk or paddle in a straight line to some distant point that you have located on the map. It is critical that your actual position be very close to your estimated map location. If you cannot pin-point your location on the map, try traveling to the nearest point that you can identify with absolute certainty, even if it means going somewhat out of your way.

1. Identify NESW on the map, then locate these directions on land. Point to your location on the map and where you want to travel. Ask yourself, "if I want to go from here to there, in which direction would I travel?" This is your estimate of what bearing you will need to follow in order to reach the destination.
2. Put the compass edge along the intended line of travel, with the direction of travel arrow pointing in the direction you want to go.
3. Now calculate your bearing by turning the compass housing until the meridian lines inside the housing are parallel to the meridian grid lines on your map (or, the side of the map if your map doesn't have grid lines). The north orienting arrow on the compass housing ("the Shed") must be pointing toward the top of your map.
4. Read the number on the housing dial at the base of the direction of travel arrow; this is your bearing.

5. Compare your estimate with your calculation. Are they similar (within 30° of each other)? If so, proceed. If not, re-calculate; have you reversed your bearing by 180°?

Now that you have **estimated** and **calculated** your bearing, it's time to **declinate** using simple math and following the steps below.

### To Compensate for Declination in the Eastern US:

Add the number of degrees indicated on your map legend. In Maine, it's between 17° and 20°.

Rotate the compass housing to reflect this addition; this is your declinated bearing.

For example, if your calculated bearing was 137°, your declinated bearing would be 157° if you have 20° declination calculated.

Finally, it's time to **navigate**. Stand up, holding the compass in front of your stomach with the direction of travel arrow pointing away from you. Turn your whole body until Red Fred is in the Shed (until the magnetic needle is housed inside the north orienting arrow on the compass housing). Walk following the direction of travel arrow (not the red needle).

**Estimate** your bearing

**Calculate** your bearing using a compass

**Declinate** by adding X

**Navigate** by following your bearing

## Triangulation

Triangulation is a method you can use to establish your approximate location on the map. The catch is that in order to use triangulation you need to be able to see one—and hopefully two or more—known features (and you need to be able to find those features on your map). Typical features that we use are: radio towers, fire towers, summits of mountains, tangents of islands, points of land in a lake.

## Establishing a Line of Position (LOP)

1. Point the compass direction of travel arrow at the known feature (KF).
2. While holding the compass base plate steady, rotate the compass housing until north etched on the housing matches up with the magnetic needle (“put Red Fred in the Shed”).
3. Now, read your magnetic bearing (indicated by the line at the base of the direction of travel arrow).
4. Subtract (assuming you're in eastern North America) the declination from the magnetic bearing, and rotate the compass housing accordingly.

5. Disregarding the magnetic needle, lay the compass on the map; place the front side corner of the base plate on your KF.
6. Rotate the entire compass, pivoting around that KF, until the north orienting arrow on the compass housing (neither the needle nor the direction of travel arrow) points straight to the top of the map. Draw a line from the KF along the side of the compass base plate; extend this line using a long straight edge.
7. You are somewhere along this line.

## Triangulation With Two or More KFs

In an ideal world, you have two KFs and their LOPs relative to you are about  $90^\circ$  apart. (As that  $90^\circ$  figure approaches either  $0^\circ$  or  $180^\circ$ , your two-KF triangulation becomes less accurate.) To use two KFs, simply establish and draw the two LOPs...your approximate location is where the two lines cross.

In an even more ideal world, you have three KFs. When you plot your three LOPs, you will find the lines intersect in such a way that they form a little triangle: your approximate location is in the middle of that triangle.

<b>Time Control Plan</b>		Navigator:			Leader of the Day:		
Starting Location:		Destination:			Date:		
Alternative destinations, bail-outs, points of refuge:							
Waypoint	Route Description	Distance	Estimated Time	Elevation $\Delta$	Corrected Time	Actual Time	Evacuation Route
Totals:							Departure Time: ETA:

## Estimating Distance Traveled

It is generally a good idea to keep track of distance traveled. Not only is measuring and timing your rate of travel a good skill to develop, but you will also find that you appreciate knowing how much farther you have to go before the next campsite, or being able to estimate what time you need to get up in order to complete the next day's mileage.

## Rate/Time/Distance (RTD) Methods

This model involves estimating your rate of travel (miles per hour) and measuring your time traveled. The time traveled is the easier part. When you are using the RTD method have a designated time-keeper...this person needs to be wearing a watch with a stop watch function. They simply have the stop watch running whenever they are walking and the watch is stopped for all breaks.

The very best way to estimate your rate of speed is to measure your time over a known distance over a known type of hiking. Hiking on-trail is a great place to use this method. Say that the Appalachian Trail guide tells you it is 9.0 miles from the Ponds Road to the Newhall Lean-to; and after your group walks that route, your time-keeper tells you that the total walking time was 5 hours 10 minutes.

You'd do the time conversion from minutes to tenths of hours (minutes x .01666 = tenths of an hour), and apply the formula:

$$\text{Rate} = \text{Distance}/\text{Time}$$

$$\text{Rate} = 9.0 \text{ miles} / 5.16$$

$$\text{Rate} = 1.75 \text{ miles per hour}$$

Now, you know this was your group's rate on a section of the AT that included going up and down a 3,600' mountain. Your group will probably be faster on the AT on fairly flat sections and will be slower off-trail.

Another way to estimate rate of travel is to use one of the many available rate estimates. One we like is:

- flat trail w/heavy pack goes at about 2 mph
- off-trail (but, fairly easy going) clunks along at about 1 mph
- off-trail but very thick, small-diameter, evergreen trees or slash zips along at 1/2 mph
- for each 1000 feet of elevation gain or loss add 1/2 hour to your time estimate

So, with a stop-watch measured walking time and an estimated rate, you can estimate distance, thus:

$$\text{Rate} \times \text{Time} = \text{Distance}$$

## Pacing Methods

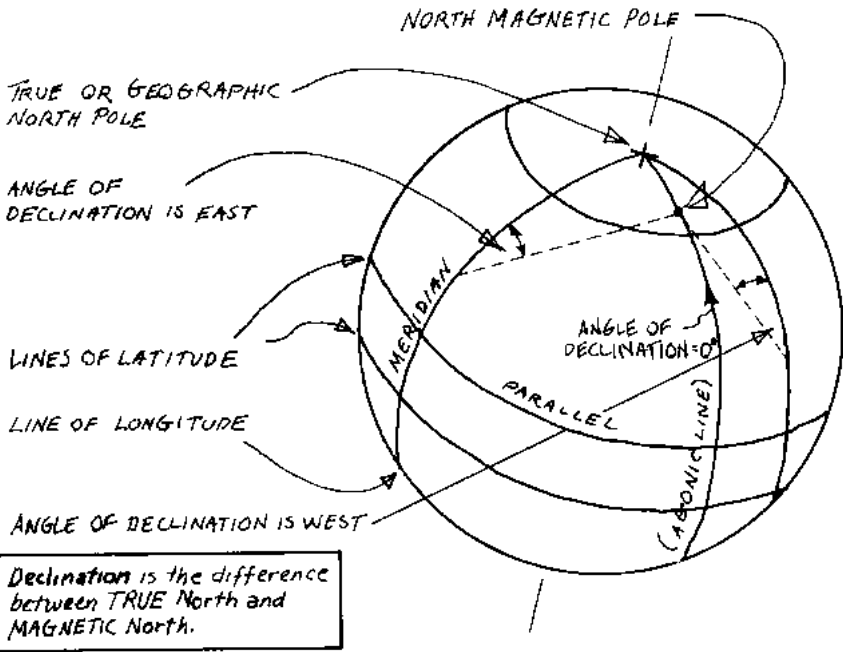
The best approach to pacing is to have your instructors measure off a chain course before leaving base. A surveyor's chain is a unit of measurement that is very handy for pacing and map work. A chain is 66 feet. The way you measure off a chain in the woods is by counting your paces...to count a pace, you count every-other foot fall. For instance, start with your feet together, step first with your left foot, and then you'll count every time your right foot hits the ground.

So, walk the 66' course several times to get the best estimate of your pace. Your pace should be something close to 10 to 15 paces per chain. When you're out in the woods and need to use this method, you can count in your head until you count 10 chains-worth of paces. So, if your pace is 13 paces per chain, you'd count until your right foot hit the ground 130 times and then you'd know you've walked 10 chains.

Here is the cool part: there are 80 chains per mile. So, you know when you've walked 20 chains, you've gone 1/4 mile (40 chains to the half mile, and so forth). Since we rarely pace-off more than a mile at a time, keeping track of 10 chain units is pretty easy.

## Navigation Glossary

<b>Agonic Line</b>	Line of zero declination, running from Florida to the Great Lakes
<b>Bearing</b>	A compass reading or line that describes the direction of an object relative to your position
<b>Cardinal Points</b>	Principal points of direction: north, south, east, west
<b>Contour Lines</b>	Brown lines on topographic maps indicating elevation
<b>Course</b>	The specific direction from where you are to where you want to go
<b>DR</b>	"Dead Reckoning" is a theoretical position based on time, course, and rate from a known point
<b>Declination</b>	The angle between True North and Magnetic North
<b>LOPs</b>	"Lines of Position" are lines on or near which you are at the moment, without knowing exactly where on the line you are
<b>Magnetic North</b>	The direction of the flow of the earth's magnetic field
<b>True North</b>	The geographic North Pole. USGS topographic maps are generally oriented to True North



## Resources:

Kals, W.S., *Land Navigation Handbook*

Kjellström, Björn, *Be Expert with Map & Compass*



# Search and Rescue

Many people fear getting lost in the woods. While lost students are an unusual occurrence on Outward Bound courses, occasionally students wander away from the rest of the group and find themselves disoriented and unable to relocate the group. The following tips will help you know what to do if you get lost, as well as help you organize a search for a missing group member.

## Lost and Alone Procedure

If you find yourself separated from the rest of your group and you don't know where they are, you are lost. Don't panic! Stay calm, stay put, and make yourself comfortable and visible (if possible, locate yourself in a clearing or on top of a large boulder). Blow your whistle in blasts of three. Pause to listen for shouts or other responses to your whistle. It is likely that you will be found within minutes.

## Search & Rescue

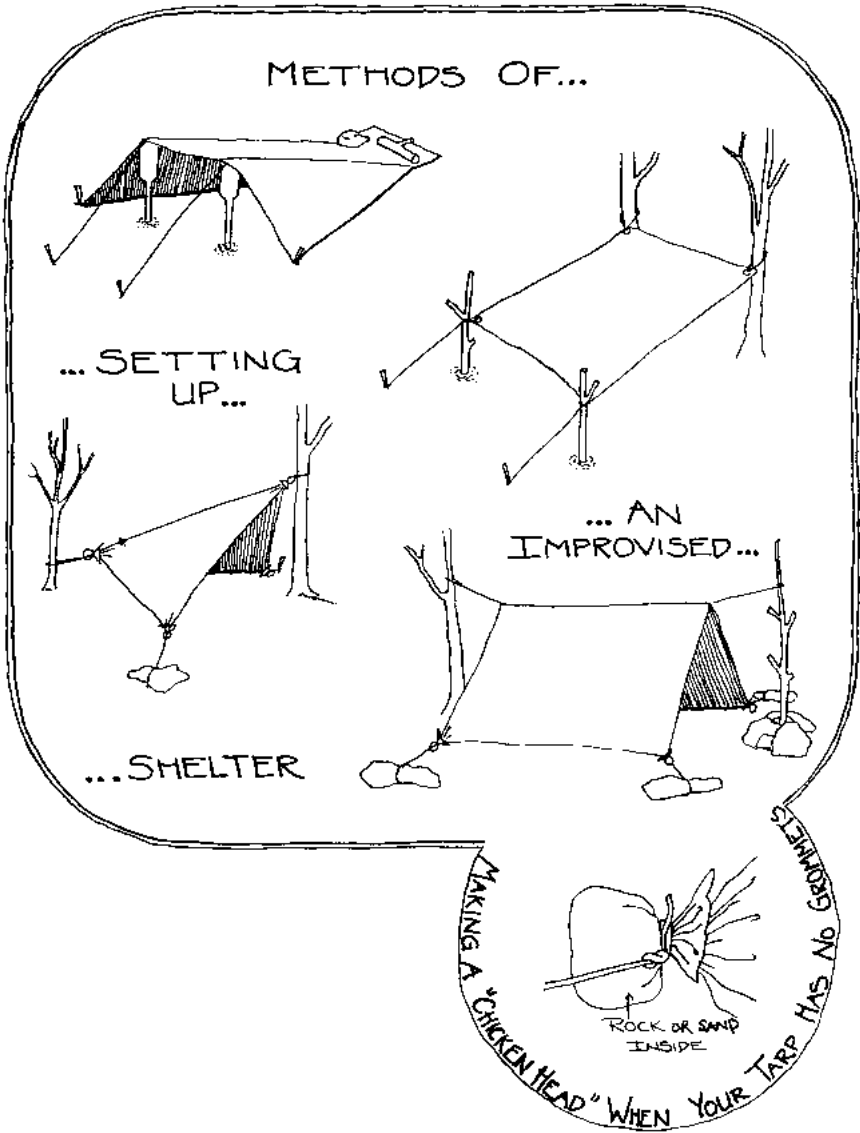
If a group member is missing and unaccounted for, you and your instructors will organize a search to look for the missing person. The following types of searches are listed in the order in which they should be undertaken.

**Hasty Search:** The purpose of the hasty search is to scan quickly the areas that have a high likelihood of containing the missing person. Travelling light and moving quickly, a hasty search team will identify the missing person's "point last seen" (PLS) and move in directions that they suspect the missing person moved in. The members of the hasty team will try to figure out where the missing person was going when he became separated from the group and predict the logical place that the missing person might be. It is important that the hasty team not disturb the PLS, because if the missing person doesn't turn up soon it may be necessary to use tracking dogs to locate him. Tracking dogs rely on scents found at the PLS and if the PLS is trampled, valuable evidence is disturbed.

**Line Search:** If the hasty search is unsuccessful, you may employ a line search. In a line search, all searchers form a line, with individuals close enough together that they can see and search all of the ground between them and their neighbors. The line moves as a single unit, with a team leader on either end of the line calling out commands. Searchers look behind trees, between large boulders, and in ravines for the missing person.

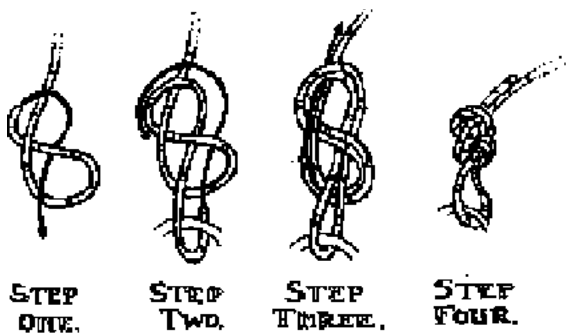
**Grid Search:** If the line search is unsuccessful, you will have to organize a grid search. A grid search involves marking out sections of area to be searched and then scanning these areas in painstaking detail. If a search advances to a grid search, it is likely that your instructors will call in the Maine Warden Service and possibly tracking dogs to aid in this type of search.

# Tarp Construction

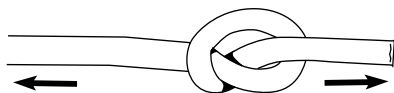


# Knots

Figure Eight Follow Through

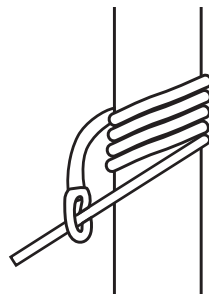
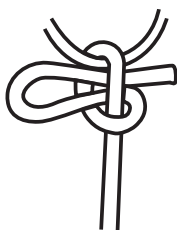
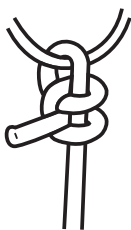
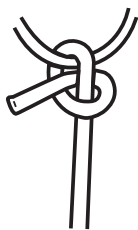


Overhand

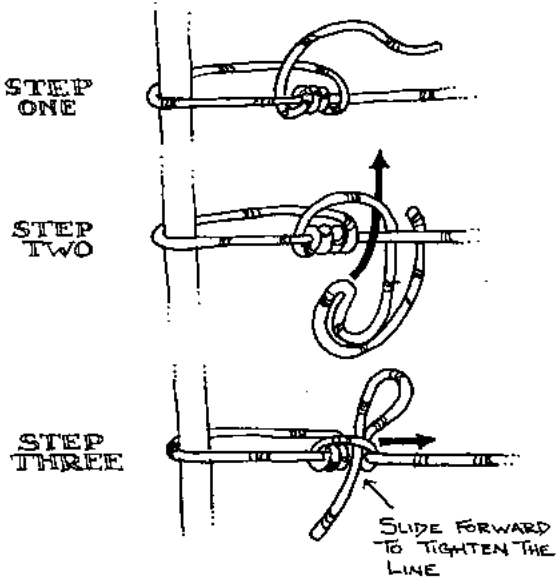


2 Half-hitches

Tensionless



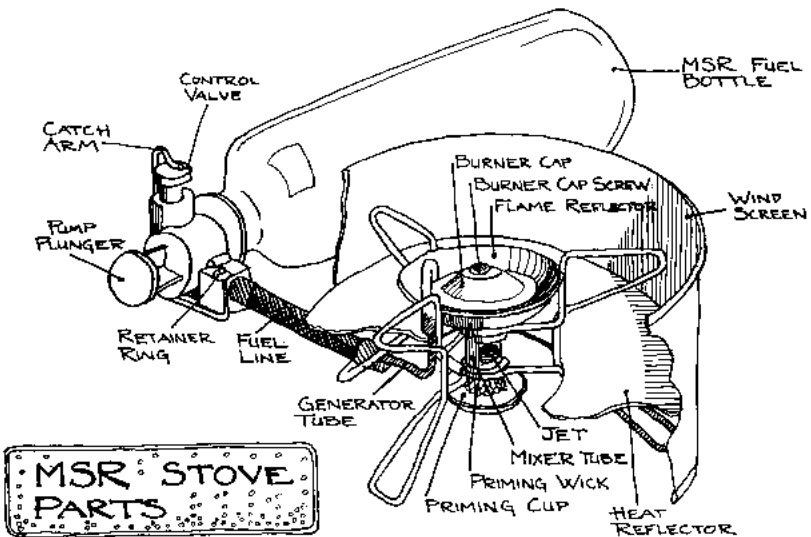
## Taut Line Hitch (slipped version)



### Resources:

Grayson, Don & Hanson, Kurt, *Mountaineering: The Freedom of the Hills*,  
Owen, Peter, *The Book of Outdoor Knots*

## Stove Use



## Lighting an MSR Whisperlite

Believe it or not, more Outward Bound students have been injured lighting stoves than rockclimbing or paddling whitewater. The stove is essentially a gasoline bomb that, if handled properly, can be used to prepare tasty and nutritious meals in the backcountry.

**Complete the following checklist every time you light the stove.**

1. Assemble the stove and pump according to the diagram above.
2. Make sure that you have at least 1/3 of a bottle of white gas.
3. Pump the plunger 15-20 times (until you feel resistance).
4. Open the control valve slightly to leak liquid fuel into the priming cup until it is about 2/3 full, then turn the control valve off (a little more fuel will leak into the cup).
5. If any fuel spilled on the ground or on your stove board, wait for it to evaporate.
6. Move to the side of the stove, so your face, hands, and clothing are not above the burner.
7. Light the fuel in the cup. This is called “priming” the stove; you are heating the generator tube so that the fuel within it changes from a liquid state to a gas state.
8. Allow the fuel in the cup to burn until the flames seem to be dying out, then...
9. Turn the control valve slowly on, allowing more fuel (now in a gas form) to mix with the flames in the priming cup. If you are too late, have another match ready to light the burner.
10. Your flame should now be a steady blue. If it's yellow, you may need to prime the stove longer.
11. For trouble-shooting stove problems, refer to the stove manual in your repair kit.

## Nutrition

*“I think”, said Christopher Robin, “that we ought to eat all our provisions now, so we won’t have so much to carry.”*

—A. A. Milne

- **Nutrients** include carbohydrates, proteins, fats, vitamins, and minerals. They are found in a variety of foods and serve different functions in our bodies.
- **Carbohydrates** provide the most efficient source of energy to the body. When you are hydrated, carbos are easy to break down and they go to work quickly. Our most common sources of carbohydrates are the sugars and starches found in grains, pastas, crackers, dried potatoes, cereals, and cocoas. Simple carbos (sugar) break down quickly, like kindling in a fire; complex carbos (starches) break down slowly, like a big log in a fire. Sugars give us quick bursts of energy; starches provide energy for hours.
- **Proteins** are used to build muscle tissue, hormones, enzymes, and antibodies. They can serve as an energy source once carbohydrate sources are exhausted. Our protein comes from dairy products, grains, legumes, fish, nuts, seeds, and occasional meats.

- **Fat** provides the body with additional calories for energy and gives us the feeling of being full. It is the most calorically dense food type. We get our fat from nuts, cheese, oils, peanut butter, fried trail foods, margarine, and butter.
- **Vitamins** and minerals serve a variety of functions in our bodies. Some help release energy from food while others maintain bodily functions. For example, vitamin A helps with night vision, while sodium provides electrolyte balance. We get vitamins and minerals from occasional fresh fruits and vegetables and by eating a wide range of food types each day.
- **Water** is an integral part of healthy nutrition. Drink enough so that your urine is clear and copious all day long.
- **Changing caloric needs** are a result of different climates and activities, as well as body weight and metabolism. Cold weather demands calories for the body to burn for heat production, as does strenuous exercise. In general, the average summer wilderness experience (backpacking, kayaking, etc.) requires that the average teen consume between 2500 and 3500 calories per day. A more strenuous activity, such as snow camping or mountaineering, requires between 3000 and 3700 calories. The most strenuous activities, such as extreme mountaineering, call for 3700-4500 calories per day.
- **The Outward Bound diet** is largely plant-based for several reasons:
  - Plant food requires less energy, water, and natural resources to produce than meat. It is a more ecologically friendly diet.
  - The average American diet is too high in fat and calories, and especially high in saturated fat, which is routinely found in animal products.
  - Fresh meat has a short shelf life and is impractical in the field.
  - Canned meat is heavy and the can must be carried out. Meat also attracts animals more than other food.

Resources:

Miller, Dorcas C., *Good Food for Camp and Trail* NOLS, *NOLS Cookery* (1991)

## PART II

# Backpacking

The length and type of your course will determine how many of these skills are taught as part of your course curriculum. If your course is three weeks or longer and includes backpacking, you should be able to demonstrate all of the skills listed below.

## Expedition Skills Checklist

### Backpack Packing & Carrying

- Properly load pack
- Make pack adjustments
- Distribute gear and food effectively
- Practice proper pack care: picking up & putting down packs

### Stream Crossings

- Understand stream crossing protocol
- Recognize potential hazards
- Use handline and/or podding

### Navigation Skills & Group Travel

- Identify all colors and symbols on a map
- Orient map, using compass or points on land
- Take and follow a bearing
- Measure distances and estimate travel times
- Practice basic route planning
- Use appropriate navigation tactics: handrails, aiming off, etc.
- Identify distant unknown points

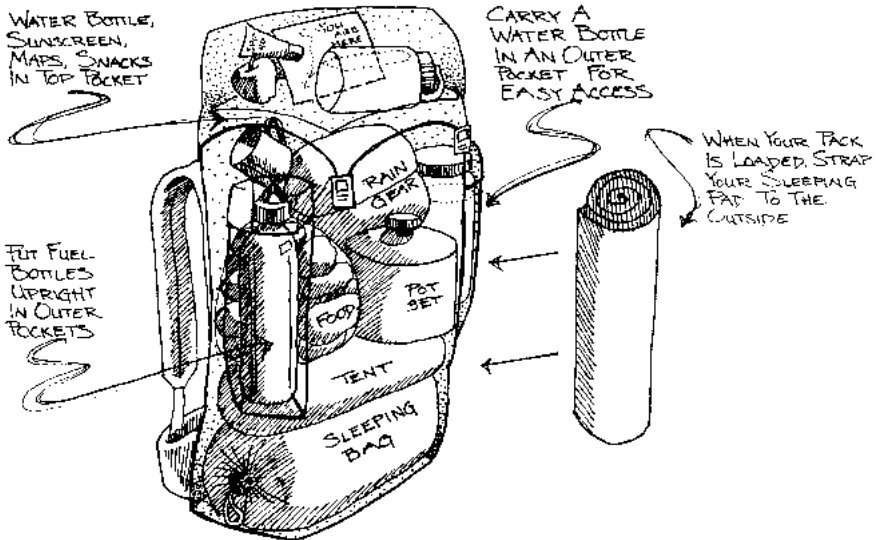
# Loading a Backpack

## Fitting the pack

- Size pack by length of torso
- Pack stays may be adjusted for shape of back
- When shoulder straps are on shoulder, hip belt should rest on iliac crest
- Shoulder straps should round over the shoulder evenly, not angle up
- Pack weight should not be held on waist or buttocks
- Adjust shoulder straps so that 1/2 to 3/4 of weight rides on the hips
- Adjust sternum strap to help relieve pressure on shoulders
- Caution against “pack palsy” (numb arms) caused by shoulder straps being too tight or by having too much weight on shoulders because of a too-long pack

## Packing the pack

- Use stuff sacks to help organize contents of pack e.g., food bags, clothes bag, etc.
- Pack with accessibility and comfort in mind: sleeping bag at bottom; heavier items on top and close to body; rain gear, flashlight, water bottle should be easily accessible
- Attach foam pad vertically to outside of pack to reduce its tearing during bushwhacks
- Keep fuel and stoves away from food – outside pockets are a good place for these
- Don't clutter outside of pack with items that may fall off or be damaged or get snagged on trees.







Face the back of the pack and grasp the straps...



Hoist the pack onto your bent right knee... (if right handed)

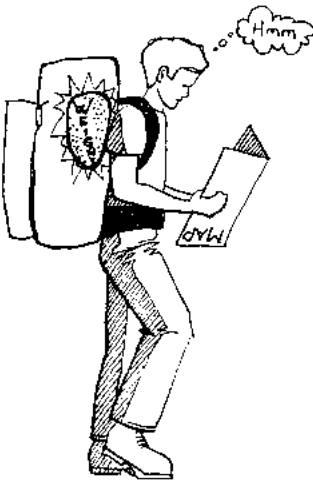


Put your right arm through the right hand shoulder strap...



Insert your left arm through the left shoulder strap, fasten the hip belt.

# Correct Weight Positioning



## On Trail

Position the weight against the spine between your shoulder blades



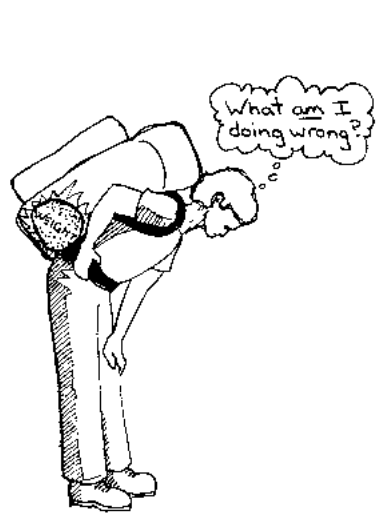
## Off Trail

Position the weight lower against the spine above the small of your back

# Incorrect Weight Positioning



**Weight Too High**  
Makes you tipsy and out of balance



**Weight Too Low**  
Makes you have to lean forward to keep the weight balanced over your hips

# Group Travel

Hiking and backpacking present many challenges: carrying a heavy pack, climbing over difficult terrain, extreme elevation gains and losses. One of the most frustrating challenges while hiking is keeping the group together as a cohesive unit. While you don't need to walk in a nose-to-butt line, members of a group need to stay within sight and sound of each other while hiking.

The following are tips for making your backpacking expedition pleasant and successful:

## Keeping Group Together:

- Evaluate your pacing (consider putting one of the slower hikers near the front to set a pace that everyone can keep up with).
- Consider your gear distribution (perhaps the fastest hikers can carry more weight, to compensate for their extra strength).
- Don't let the slowest hiker sweep (walk at the back of the group), because he is likely to get discouraged and fall behind.

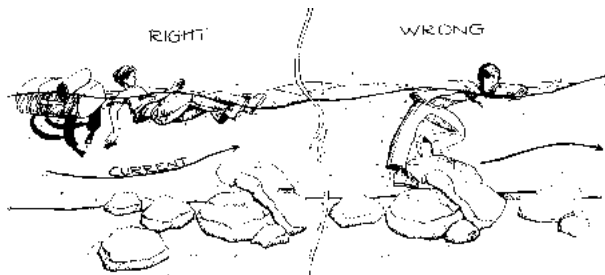
## Trail Etiquette:

- Pull off to the side of the trail and let other hikers pass—we are a big group and others shouldn't have to wait for us.
- Take breaks off the trail so that other hikers can get through.

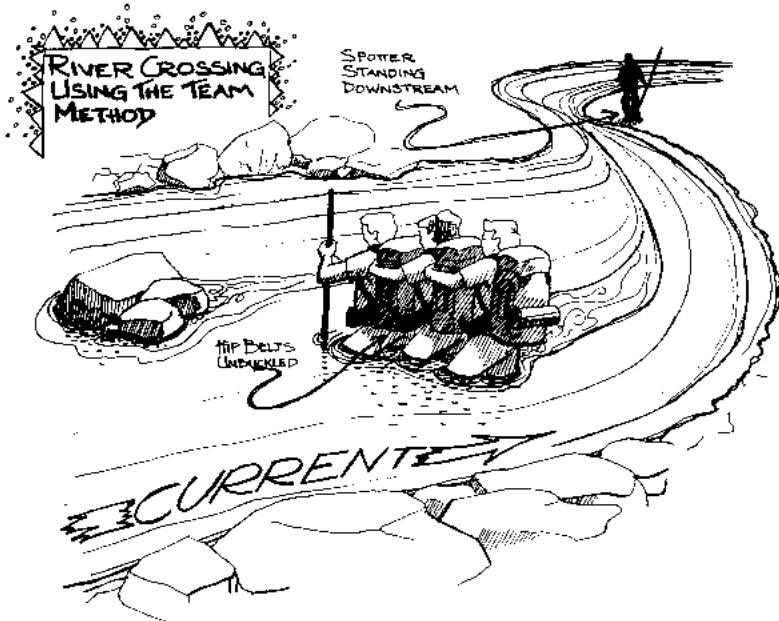
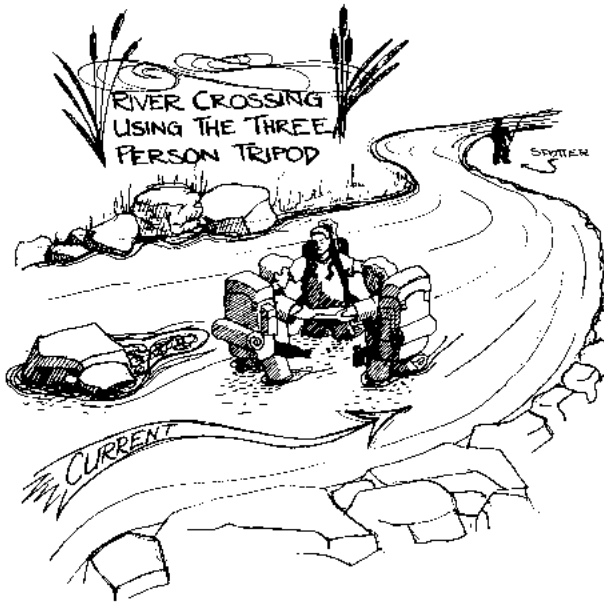
## Stream Crossings:

If you cannot cross on a log or on boulders....

- Pick the shallowest (usually widest) stretch of water—avoid high banks and make sure entry and exit points are reasonable.
- Use a stout stick to improve balance or link arms with a partner.
- If the crossing looks questionable, ask an instructor to cross first.
- Face upstream, so that the force of the water on the legs cannot make the knees give way. If the water is above your knees, don't cross.
- Unbuckle hip and sternum straps to allow pack to be easily jettisoned in case of a fall. For small, shallow stream crossings where balance and agility are needed to step on the stones, waist belts can be left buckled so shifting packs don't upset balance.
- Make sure that one foot is firmly placed before moving the other.
- Cross diagonally, moving slightly downstream, shuffling your feet rather than lifting them. Avoid wedging feet under or between rocks.



If you find yourself floating in a river/stream



Resources:

- Grayson, Don & Hanson, Kurt, *Mountaineering: The Freedom of the Hills*  
 Jardine, Ray, *Beyond Backpacking*  
 O'Bannon, Allen, *Allen & Mike's Really Cool Backpackin' Book*  
 Randall, Glenn, *The Outward Bound Backpacker's Handbook*

## PART III

# Canoeing

The length and type of your course will determine how many of these skills are taught as part of your course curriculum. If your course is three weeks or longer and included canoeing, you should be able to demonstrate all of the skills listed below.

## Expedition Skills Checklist

### Boat Care & Packing

- Consistently use wet foot loading
- Avoid broaching boats on shore
- Pack for level trim
- Pack for possible capsize
- Know when to load bow/stern heavy
- Keep gear dry in whitewater

### Paddling Strokes

- Forward
- Draw
- Pry
- Cross-draw
- Bow sweep
- Stern sweep
- J-stroke

### Paddling Skills

- Maintain group convoy
- Analyze lake crossings
- Portage
- Line
- Sail

### Maneuvering

- Move in a straight line using proper strokes
- Use on and off-side slips
- Demonstrate eddy turns & peel-outs
- Demonstrate upstream & downstream ferries

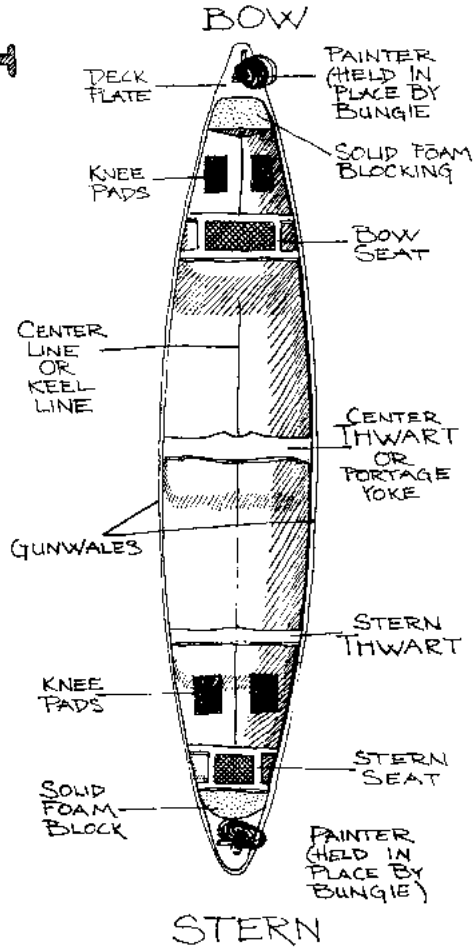
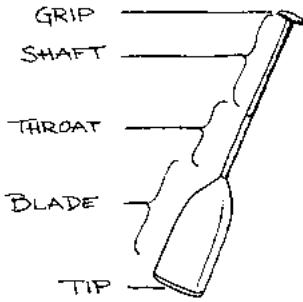
### River Reading

- Understand basic river hydrology
- Understand moving water protocol (if on moving water)
- Identify potential hazards
- Identify river features
- Analyze pool drop rapid (Class II)
- Select a line (Class II)

### Canoe Rescue

- Use throw bag
- Set up protection system for rapids
- Perform whitewater self rescue
- Practice rapid swim
- Know paddle signals
- Perform T and/or H rescue

# Canoe and Paddle Parts

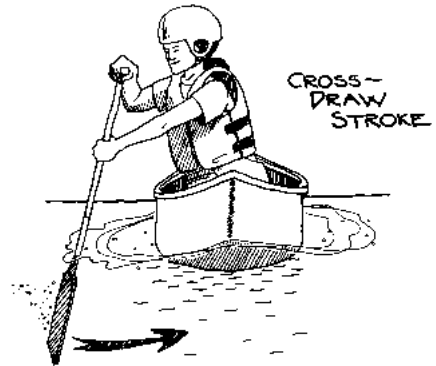
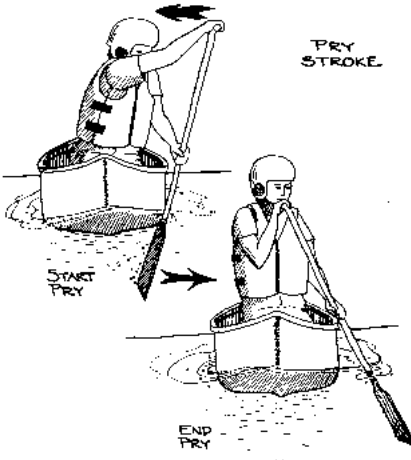
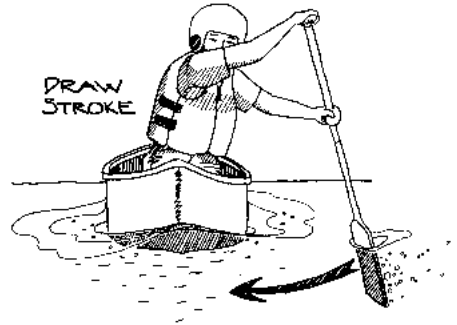
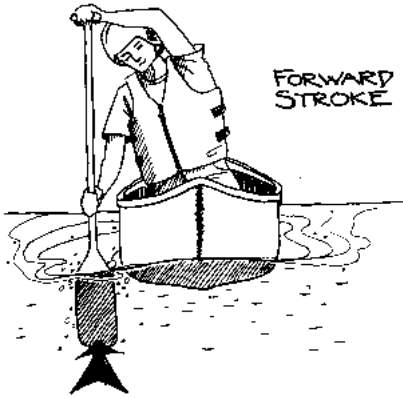


# Paddle Strokes and Maneuvers

## Strokes

Well-performed strokes are more efficient and more powerful than their sloppy cousins. With smooth and correct forward strokes, you will be fresher and happier at the end of a long day of flatwater paddling than the student who paddles, for instance, with her grip over the boat as opposed to over the water. And, those boat partners with picture-perfect draw strokes will be able to make the must-make eddy turn rather than being washed into the next rapid sideways and eventually doing a long cold trout inventory.

The four strokes we'll focus on are: forward, draw, pry, and cross-draw.



## Maneuvers

Assuming that the bow paddler is paddling on the left and the stern on the right, your paddling team can perform the following movements using the strokes on the previous page (if the bow is on the right and the stern is on the left, your maneuvers will move your boat in the opposite direction):

### **Paddle Canoe Straight Forward**

Bow: forward stroke

Stern: forward stroke with an occasional pry

### **Side-Slip to Left**

Bow: draw stroke

Stern: pry stroke

### **Pivot Canoe to the Right**

Bow: cross-draw

Stern: pry

### **Side-Slip to Right**

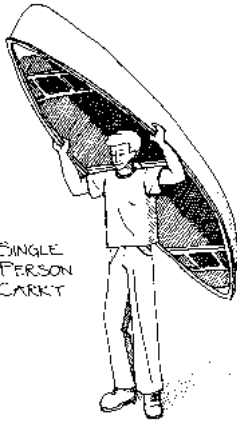
Bow: cross-draw

Stern: draw stroke

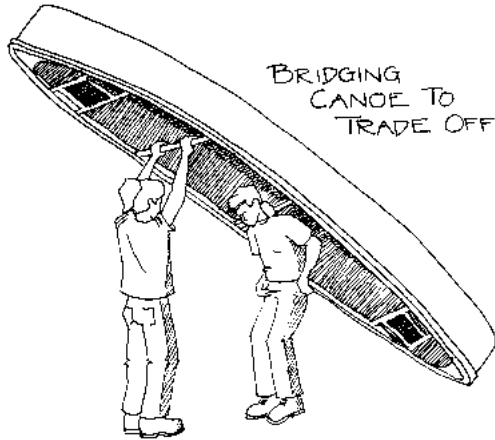
### **Pivot Canoe to Left**

Bow: draw stroke

Stern: draw stroke



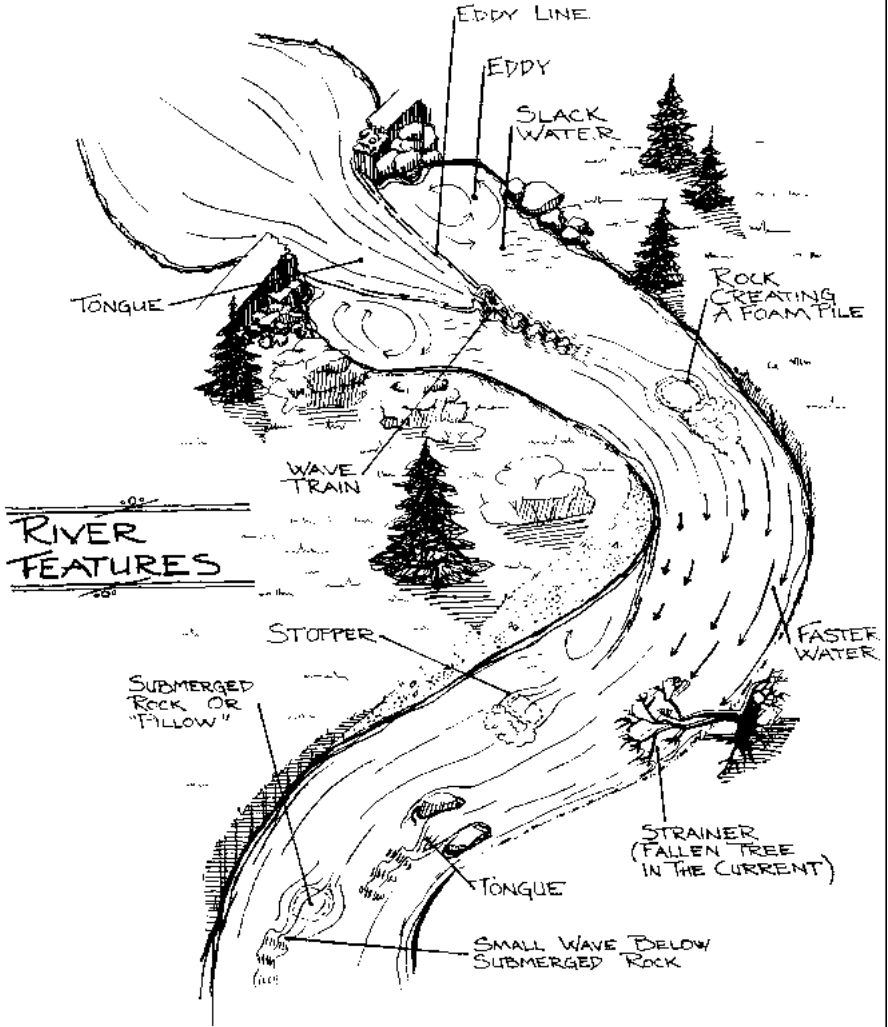
*Single person carry*



*Bridging canoe to trade off*



# The River Analysis System



Scope-out the rapid and define a preliminary route (use the concept of "seams" to help spot possible routes)

**Approach:** evaluate any difficulties between your boat's current location and the top of the rapid; e.g., rocks, strong current, current going somewhere you don't want to go.

**Turbulence:** how big are the waves on your route, are the eddies placid or boiling, how about those eddy lines, how much water will end up in the boat?

**Maneuvering:** how precise is the line you need to be on, how difficult will it be to stay on line (are there currents pushing you off line?), how twisty is the route, is the route so complex that you'll get "lost" or be unable to remember the moves?

**Run-out:** what's after the rapid... rocks, another rapid?

**Dangers:** list all the objective hazards: sticky holes, under-cut rocks, strainers, especially-high-probability pin rocks, vertical pin potential, long swim potential, swim-into-the-next-rapid-potential. Do not list as hazards features that simply make the run difficult or things which will tend to capsize your boat.

**Protection:** for each danger you have identified, try to come up with a protection plan. Also, always have a plan for protecting against the event of an unconscious floating-down-the-river victim. The plan should include how swimmers will get off the river at the bottom of the rapid.

**Decide:** run it with gear in the boat, carry gear around the rapid and then run it, send a "probe" down the rapid and see what happens to those paddlers (i.e., collecting more data), line the whole rapid, or portage. You can also consider lining or portaging part of the rapid and running the rest.

# Canoe-Over-Canoe Rescue

## T-Rescue

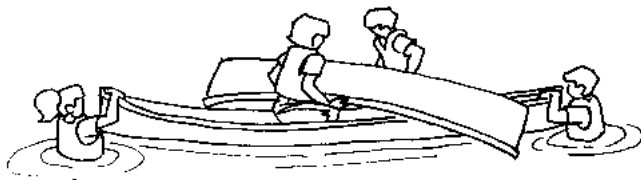
### Step 1

Lift the overturned canoe over the gunwales of the rescue canoe. Swimmers should help if possible.



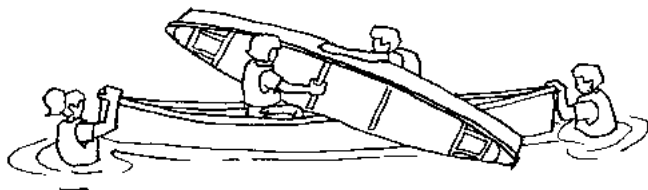
### Step 2

Rescuers roll the empty canoe upright and stay low to maintain their balance.



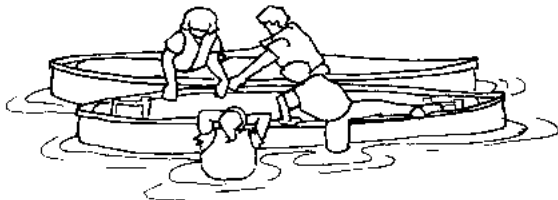
### Step 3

Turn the canoe over and slide it back into the water.

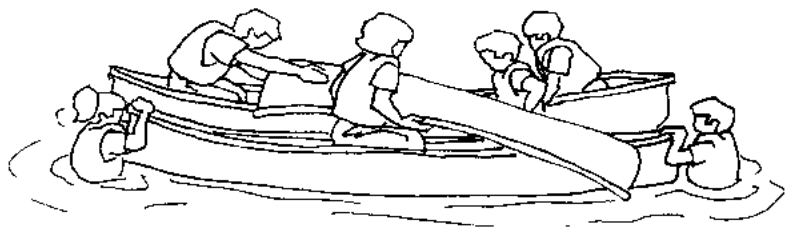


### Step 4

Swimmers climb back in their canoe.



## H-Rescue



A SECOND BOAT CAN  
HELP STABILIZE THE PRIMARY  
RESCUE BOAT

## THE "H" RESCUE

### Resources:

ACA, *Canoeing Basics for Lakes and River*

Gullion, Laurie, *Canoeing and Kayaking: Instruction Manual*

Ray, Slim, *Canoe Handbook*,

Ray, Slim & Bechdel, Les, *River Rescue*

## PART IV

# The Outward Bound Story

*The aim of education is to impel people into value-forming experiences, to ensure the survival of these qualities: an **enterprising curiosity**, an **indefatigable spirit**, **tenacity in pursuit**, **readiness for sensible self-denial**, and above all, **compassion**.*

Outward Bound was founded by Kurt Hahn, whose guiding philosophy is summarized best in his quotation above. Born to German Jewish parents in Germany, Hahn was influenced by Plato and the progressive school movement, which inspired his first school, called the Salem (German for “Peace”) School in 1920.

Salem represented an attempt to create a healthy environment in which young people could learn habits that would protect them against what Hahn saw as the deteriorating values of modern life. He identified the worst declines as those in fitness, skill and care, self discipline, initiative and enterprise, memory and imagination, and compassion...he incorporated egalitarian aims into the design of the school; while Salem naturally attracted the children of the wealthy, it also made space for, and actively sought, less privileged students. Among the unusual assumptions underlying all forms of instruction at Salem was Hahn’s conviction that students should experience failure as well as success. They should learn to overcome negative inclinations within themselves and prevail against adversity. He believed moreover that students should learn to discipline their own needs and desires for the good of the community.

– Thomas James: Kurt Hahn and the Aims of Education, 2000

Hahn championed the belief that moral aims should animate every aspect of education. In 1932, after Nazi storm troopers kicked to death a young communist, Hahn took a bold stand: he wrote to all Salem alumni, declared the values of Nazi Germany incompatible with the values of Salem School, and required them to choose between Salem and Hitler. Hitler imprisoned Hahn in 1933. Through the intervention of friends in Britain (including the Prime Minister), Hahn was allowed to emigrate and settle in Britain. Within the year he founded Gordonstoun, a progressive school in Scotland that advanced the philosophies of the Salem School. Gordonstoun boys were evaluated not only on their academic performance, but also on their integrity and principles. The Gordonstoun final report to parents graded boys in:

- Esprit de corps
- Sense of justice
- Ability to state facts precisely
- Ability to follow out what he believes to be the right course in the face of: discomforts, hardships, dangers, mockery, boredom, skepticism, and impulses of the moment
- Ability to plan
- Imagination
- Ability to organize: as shown in the disposition of work and in the direction of young boys
- Ability to deal with the unexpected
- Degree of mental concentration: where the task in question interests him, and where it does not
- Conscientiousness: in everyday affairs, and in tasks with which he is specially entrusted
- Manners
- Manual dexterity
- Standard reached in school subjects: German, modern languages, history, natural science and mathematics
- Practical work
- Art work
- Physical exercises: fighting spirit, endurance and reaction time

During World War II, Hahn was asked to adapt his educational philosophy to a program that became known as Outward Bound. In the early days of World War II, British merchant ships were torpedoed and sunk by German submarines. Survivors took to lifeboats and faced tremendous hardships in the stormy North Atlantic, particularly in winter. An unexpected phenomenon occurred with surprising frequency: the younger, fitter sailors often died while the older “salts” survived. Lawrence Holt, of the Blue Funnel Shipping Line, surmised that this unexpected outcome could be attributed to the life experience of the older men. He sought to develop an educational process that would “arm the cadet against the enemies within—fear, defeatism, apathy, selfishness.” He turned to Kurt Hahn, who developed programs with challenging physical and mental activities that helped build confidence, encouraged compassion, and instilled tenacity and perseverance. The first Outward Bound courses began in 1941.

After the war, enthusiasm for the proven value of the Outward Bound experience led to the founding of the Outward Bound Trust in 1949. Hahn expanded the concept of experiential learning to include real and powerful experience to gain self-esteem, the discovery of innate abilities, and a sense of responsibility toward others. For its name, the program retained the nautical term used when great ships left the safety of the harbor for open sea. Ships leaving port were said to be “Outward Bound” towards unknown challenges and adventures. From this beginning, a number of Outward Bound schools were established in the United Kingdom. The movement spread to Europe, Africa, Singapore, Hong Kong, Australia, New Zealand, Canada and the United States. More than thirty schools have been founded on five continents: Europe, Africa, Australia, Asia and North America. Kurt Hahn remained active in the Outward Bound movement until his death in 1974.

The Hurricane Island Outward Bound School (HIOBS) was founded by Peter Willauer in 1964, the first sea school in the United States. Originally based on Hurricane Island in Maine’s Penobscot Bay, HIOBS now runs programs in many wilderness areas on land and sea in New England, the Florida Keys and Central America.

## Important Milestones in HIOBS History

- 1964 Peter Willauer founds HIOBS, construction of five pulling boats begins
- 1965 First sailing courses for boys 16½ and up
- 1967 First courses for adults
- 1969 First backpacking & canoeing courses, based out of Dartmouth College
- 1971 First coed courses
- 1974 First youth courses for 14- and 15-year-olds
- 1977 First winter sailing courses in Florida
- 1980 Land in Newry, Maine purchased for backpacking & canoeing course basecamp
- 1982 First Intercept courses for at-risk youth
- 1983 First vets courses for Vietnam Veterans
- 1985 L.L.Bean Mountain Center built on Newry property
- 1987 First college-accredited semester courses
- 1999 Wheeler Bay Sea Base purchased for mainland sailing course basecamp
- 2006 First semester courses travel to Central America
- 2007 First vets courses for OEF/OIF Veterans

Outward Bound continues to innovate and expand programs, yet the essence of the school remains true to its beginnings. Kurt Hahn liked to describe a student's education (or "training program," as he called it) as a roof held up by four pillars: self-reliance, physical fitness, craftsmanship and service. These four pillars make the foundation of all programs, whether students are teenagers, college students, adults, veterans or corporate executives. Our timeless mission is **to change lives through challenge and discovery.**

# Outward Bound Code of Conduct

- Every student is a full participant on every course and is integral to the overall experience and success of the group. You are expected to demonstrate your commitment with honest and best efforts throughout the entire course.
- Use of drugs, alcohol, or tobacco is grounds for immediate dismissal, as is inappropriate use of prescription drugs.
- All students shall maintain a fundamental respect for the rights and dignity of others. Respect and courtesy shall be maintained at all times.
- In order to maintain the highest standards of safety, students must comply with procedures and backcountry practices as explained by instructors. Students who, through misconduct or unsafe practices, pose a danger to themselves or others will be removed from their course.
- Outward Bound courses visit pristine and fragile wilderness environments. We are guests who must respect and help preserve the natural conditions for resident animals and plants and for other visitors' enjoyment.



# Natural History

*Every tree like every man must decide for itself—will it live in the alluring forest and struggle to the top where alone is sunlight or give up the fight and content itself with the shade.*

—Ernest Thompson Seton

About 10,000 years ago, the glacier that covered most of New England during the most recent ice age was about a mile thick. As it expanded and retreated, it scoured surfaces, sculpted bedrock, and captured eroded debris and deposited it elsewhere. The result is the cirques (sculpted amphitheater-like hollows), aretes (knife-edge ridges), and U-shaped valleys that make up New England. Exposed bedrock surfaces are often covered with glacial striations (scratches) oriented parallel to the direction of the flow, that formed as a glacier moved across the landscape. Geologic debris deposited by the retreating glaciers can be seen today in the following formations:

- glacial erratics: boulders carried by a glacier and deposited as it retreated
- kettle ponds: sites on moraine where blocks of stagnant ice broke off from the retreating ice sheet; these ice blocks formed depressions of meltwater and continue to be replenished by precipitation and groundwater
- drumlins: masses of glacial debris shaped like the bowl of an upside down spoon and tailing off in the direction in which the glacier traveled
- eskers: long, sinuous ridges composed of sand and gravel deposited by meltwater streams flowing in tunnels along the bottom of a melting glacier

—*National Audubon Society Field Guide to New England* (pp.18-21)

## Types of Rock

Rocks are formed by different processes that are the basis for classification:

- Igneous rock is crystallized from magma. If it cools below the surface it is intrusive (granite). If it cools above the surface it is extrusive (basalt).
- Sedimentary rock is built up in layers by oceans or sand dunes in the desert. Erosion deposits layers on the ocean floor or as windblown deposits on land. As the layers build up to thousands of feet of thickness over millions of years the pressure causes the sediments to solidify into rock (limestone or sandstone).
- Metamorphic rock is formed when igneous or sedimentary rock is re-crystallized by intense heat and pressure deep in the crust of the earth into a new form of rock. Gneiss is metamorphosed granite and schist is metamorphosed sedimentary rock.

## Habitat

Habitat is where an organism lives. It is defined by local patterns of flora and fauna. An example: moose live in deep woods, sub-arctic plants grow above tree-line in the White Mountains; rainbow trout live in clear cold streams. The following are the major habitats comprising Outward Bound's course areas in Maine, starting with the lowest elevation:

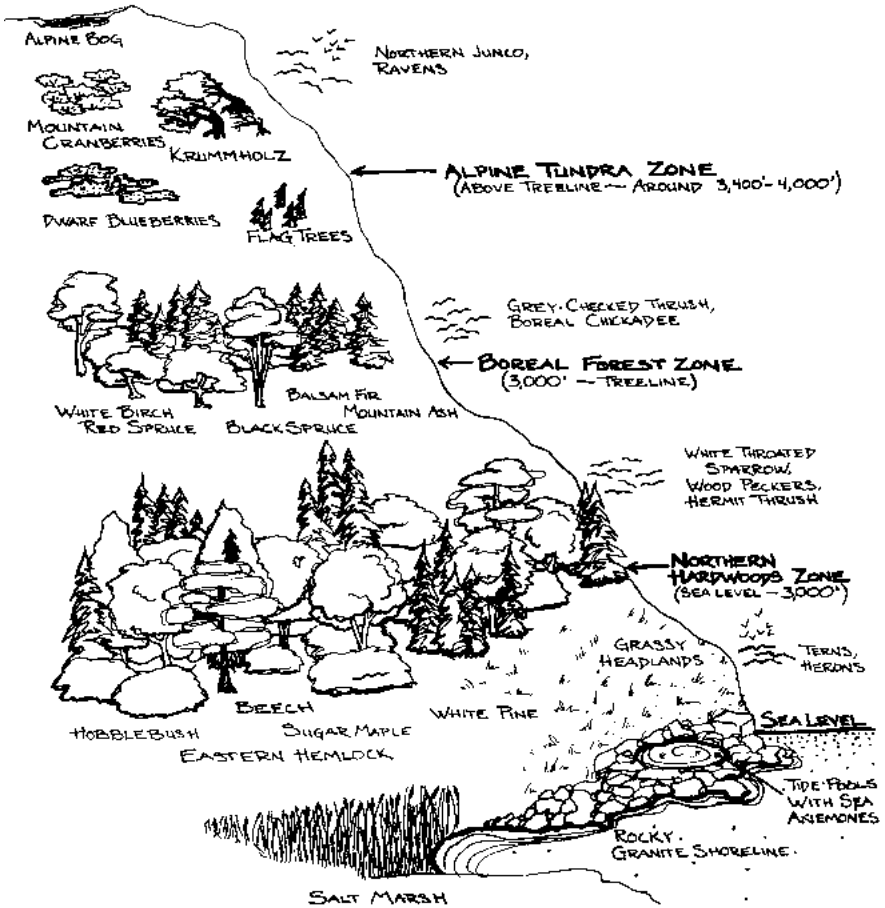
1. Maine's Northern Seacoast is made up of jagged headlands and rocky shorelines. Tidepools offer shelter for sea anemones and nudibranchs. Blue Mussels, Northern Rock Barnacles, and Sea Stars can all withstand the relentless pounding of North Atlantic waves and thus thrive on these shores. Coastal islands have proven critical to the survival of New England terns, shorebirds, and herons because they offer a haven safe from dogs, foxes, raccoons, and other land predators.

2. Inland, the Northern Hardwoods Zone is located in areas lower than 3000' from sea level. The canopy is made up of sugar maple, American beech, yellow birch, eastern hemlock, and white pine, while the understory contains striped maple, gray birch, pin cherry, and hobblebush. The broadleaf hardwoods that are predominant in this zone turn brilliant orange and yellow hues in the fall.

3. The Boreal Forest Zone—also called the “spruce-fir forest”—is located above 3000' and contains more evergreens than hardwoods because evergreens can survive at lower temperatures. The canopy contains balsam fir and red and black spruce, while the understory is made up of mountain ash, white birch, and mountain alder. Old Man's Beard and Rock Tripe lichen can be found in this zone. Many of the coastal islands are covered with spruce-fir forests.

4. The highest areas in New England are called the Alpine Zone—the area above tree line. Krummholz—twisted, gnarled evergreens growing only a few feet high—mark the transition zone between the Boreal Forest and the Alpine Tundra. Above tree line, mountain cranberry, dwarf blueberry, and various lichens and dwarf wildflowers carpet the landscape.

# Vertical Zonation In Maine



## Geological and Human Timeline for the Northeast

450-250 million BC	Three separate mountain building events form the Appalachians as the North American and Northwest African plates collide. The range extends from Newfoundland to Alabama and may have rivaled the Himalayas in size.
400 million BC	Amphibians evolve.
225 million BC	Mammals evolve.
180 million BC	Dinosaurs climax. The White Mountains are formed dramatically from volcanic rock. The highest point in the Whites, Mt. Washington is composed of metamorphosed crust but in most of the Whites erosion has revealed granite.
135 million BC	Dinosaurs die out.
250,000 BC	Ice Age begins. New England is covered by glaciers four separate times.
1500 AD	Five tribes of Abenaki people live on the Androscoggin, Penobscot and Saco rivers. First European settlers set foot in Maine.
1790	First land purchase deals struck. Two million acres near Kennebec river sold to William Bingham for 10 cents per acre.
1800-1890	Log drives are commonplace. White Pine is almost cut into extinction.
1900	Nearly all the forests of northern New England are owned by large lumber and paper companies.
1921	Benton Mckaye conceives the idea for the Appalachian Trail.
1948	Earl Shaffer of Pennsylvania becomes the first person to hike the AT continuously from Georgia to Maine.
1976	The last log drive on the Kennebec.

### Resources:

Alden, Peter & Cassie, Brian, *National Audubon Society Field Guide to New England*  
 Culross Peattie, Donald, *A Natural History of Trees*  
 Kendall, David, *Glaciers and Granite*  
 Peterson, Roger, *Peterson's Field Guide to Eastern Birds*

## PART V

# The Expedition

## Final Expedition

Final Expedition is a chance for you and your fellow students to test your mastery of the skills you've learned on your Outward Bound course. Depending upon the length and type of your course and the ages of the students, your Final Expedition will range from one to five days in length and will provide you with various levels of autonomy from your instructors. The type of Final Expedition your group undertakes will be based upon the course environment, prevailing and predicted weather conditions, and the abilities of the group.

Before your group embarks on any type of independent travel, you must have a solid working knowledge of the following topics:

- Final Expedition route & checkpoints
- contents and use of items in first aid kits
- basic life support (AR, CPR, bleeding, burns, spine care, head injury)
- hydration
- strains & sprains
- universal precautions regarding bodily fluids
- thermal regulation (hypothermia & hyperthermia)
- lightning drill
- stove use
- expedition behavior

Other things you will need to consider before you travel or camp independently:

- leadership roles
- job division or rotation
- communication (within group and with instructors)
- conflict resolution
- risk management

Be sure to use the lined and unlined pages in the back of this booklet to journal your Final Expedition.



# Expedition Plan

Day      Course Activity                      Campsite

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# Expedition Journal



# Expedition Journal



# Expedition Journal



# Expedition Journal





# Expedition Journal



# Expedition Journal



# Expedition Journal



# Expedition Journal





# Expedition Journal



# Expedition Journal



# Expedition Journal

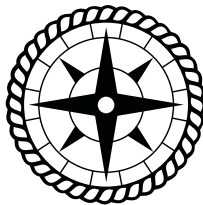
<b>Time Control Plan</b>		Navigator:			Leader of the Day:		
Starting Location:		Destination:			Date:		
Alternative destinations, bail-outs, points of refuge:							
Waypoint	Route Description	Distance	Estimated Time	Elevation $\Delta$	Corrected Time	Actual Time	Evacuation Route
Totals:							Departure Time: ETA:

<b>Time Control Plan</b>		Navigator:			Leader of the Day:		
Starting Location:		Destination:			Date:		
Alternative destinations, bail-outs, points of refuge:							
Waypoint	Route Description	Distance	Estimated Time	Elevation $\Delta$	Corrected Time	Actual Time	Evacuation Route
Totals:							Departure Time: ETA:

<b>Time Control Plan</b>		Navigator:			Leader of the Day:		
Starting Location:		Destination:			Date:		
Alternative destinations, bail-outs, points of refuge:							
Waypoint	Route Description	Distance	Estimated Time	Elevation $\Delta$	Corrected Time	Actual Time	Evacuation Route
Totals:							Departure Time: ETA:



<b>Time Control Plan</b>		Navigator:			Leader of the Day:		
Starting Location:		Destination:			Date:		
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Waypoint	Route Description	Distance	Estimated Time	Elevation $\Delta$	Corrected Time	Actual Time	Evacuation Route
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HURRICANE ISLAND  
**OUTWARD BOUND SCHOOL**

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