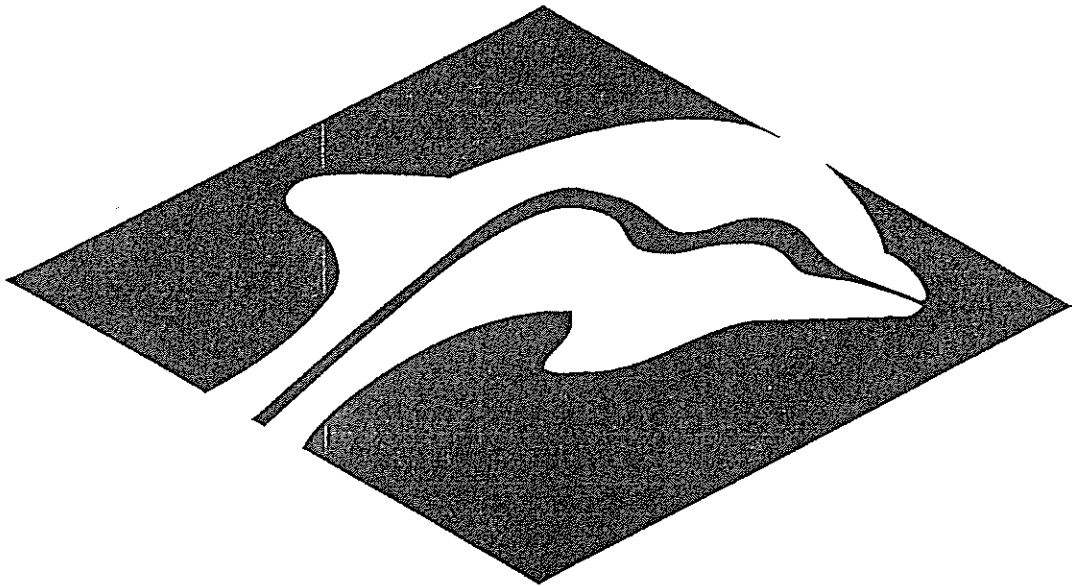


THE INTERISLAND LINE - RIVER RECREATION PROGRAMME

RIVER CROSSING

MODULE 4

**THE INTERISLAND LINE
RIVER RECREATION PROGRAMME**



**RIVER
CROSSINGS**



**DAVID ERIKSON
TRAINING OFFICER
N.Z.R.G.A.
P O BOX 4053
CHRISTCHURCH**

RIVER CROSSINGS AND METHODS

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RESOURCE MATERIAL

A/V VIDEOS: To Cross or Not to Cross



INTRODUCTION

Hiking or tramping is an activity enjoyed by many people in this country. It is however an activity with inherent risks where fatalities occur on a regular basis. Most of these fatalities can be explained away as bad luck but the underlying factor is poor judgment and lack of experience. Because of the geographic make-up of New Zealand at some stage on any outing into the wilderness rivers streams and creeks will have to be negotiated. Whether this is done successfully or not will depend on good judgment, past training and some practice in river crossing techniques.

Module Four, River Crossings and Methods is designed to give additional knowledge, and when used in conjunction with the preceding modules will give a better understanding of the hazards associated with crossing rivers.

A number of problems can occur during any attempt to cross a river. These include, the risk of being swept away, the risk of being caught by snags or in whirlpools, the risk of being marooned in the middle of a river and the risk of hypothermia. To help combat these risks a knowledge of the basic techniques for crossing rivers both singularly and with a party is necessary. Survival techniques will also have to be practised so that the party will have a better chance of recovering if the best laid plans go wrong.

The only way to learn these techniques is to practice in a controlled environment with properly trained personnel and good equipment. Getting into frozen rivers is hardly an appealing sport but continued training, practice, experience and observation is necessary in order to develop judgment and skill.

All rivers must be treated with respect and if in doubt err on the side of safety and caution. Always be prepared to decide against crossing. Nothing can go wrong if the party stays on the bank. To be a day or two late back home from a trip is a small price to pay when the alternative may be the unnecessary loss of life.

The techniques for crossing rivers vary. What may be appropriate in one area and for one river may be quite unsuitable elsewhere. The character of rivers also change with time and weather. Being able to anticipate these changes will influence a decision about when and where to cross. In glacial areas, for example the heat of the day will cause the river to rise, so it will be better to cross early in the day before the thaw. Heavy rain in bare tussock country can lead to dramatic rises in river levels, whereas in heavily bushed country the rise may be slower. Some rivers may be impassable for a few hours only, while others may be impassable for days.



COLD WATER CROSSINGS

Crossing rivers with cold water on a cold day can have its own inherent problems especially if there are older members in the party. Even a short period in cold water causes rapid cooling of the legs and feet and can result in poor coordination, stumbling and cramps. With water above the knees, the effect will be even greater and deeper immersion can bring on the onset of hypothermia.

POINTS TO REMEMBER

1. Always monitor the reactions of the party members
2. Choose a route in advance which requires as little immersion as possible
3. Choose the route with the least amount of crossings
4. If party members are showing signs of hypothermia consider stopping to make a fire or warm drink, changing into dry clothes or sheltering out of the wind until they recover.

DECISION MAKING

At any river crossing there are 3 important decisions to make:

1. Whether to attempt to cross
2. Where to cross
3. What method to use

NEVER IGNORE THESE SIGNS

1. Discoloured surging water
2. The sound of rolling boulders
3. The sight of debris and trees being carried along in the current

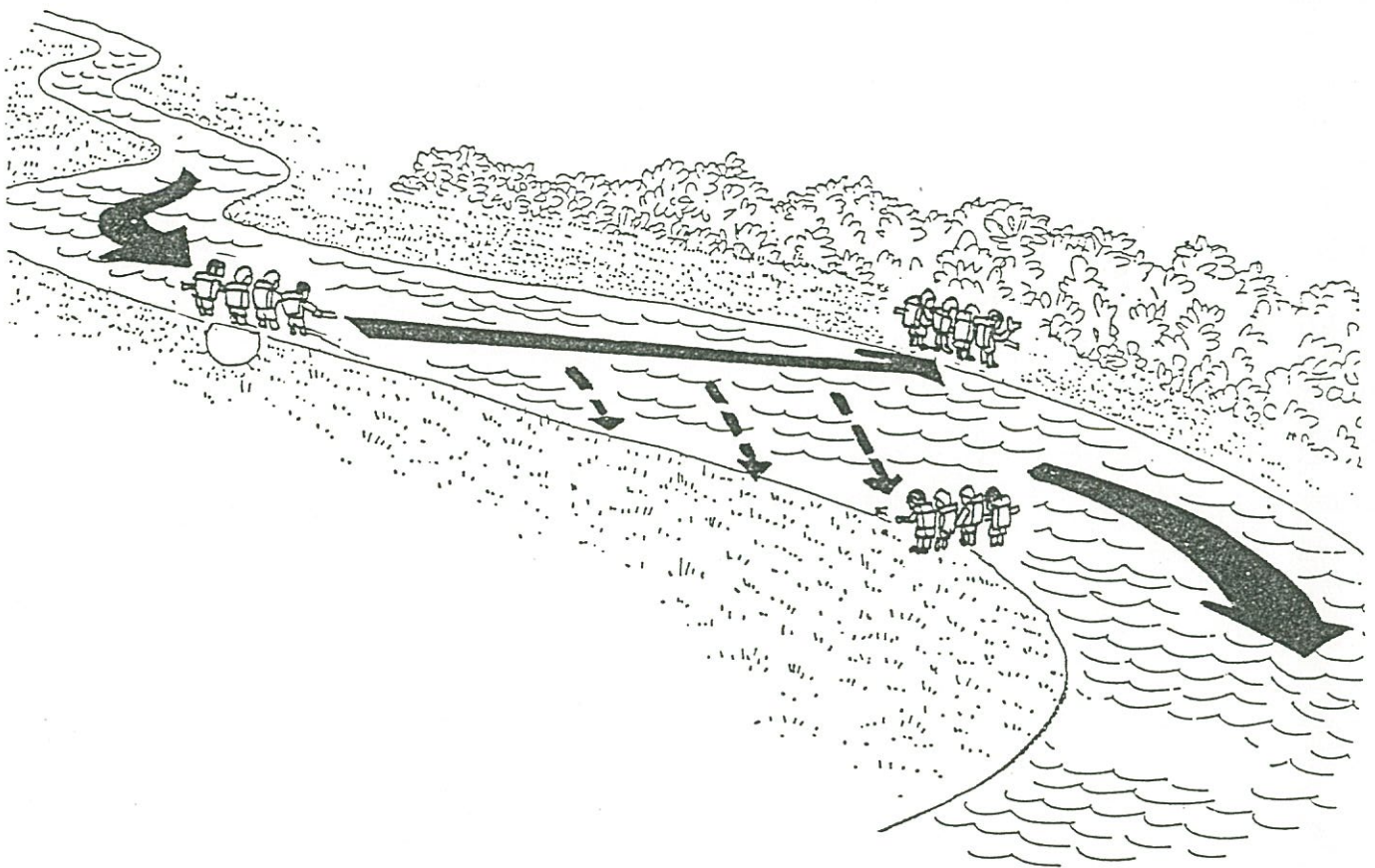
To attempt to cross in these conditions could be extremely hazardous.

Assess the river carefully. The factors below about choosing a place to cross must be taken into consideration. An assessment must also be made about available equipment and the condition of the party members. Before crossing the whole party must know the plan and the contingency plan, such as who does what and where to meet if things go wrong.



The noise of the river will make communication difficult, therefore hand signals should be agreed on before anyone entering the water. Crossings should never be made if the water is more than thigh deep or the current any faster than walking pace. Be especially aware of young children as they may not realize the potential danger, will be swept of their feet easier, and may also be more susceptible to the cold.

CONSIDER THE FOLLOWING FACTORS WHEN CHOOSING A PLACE TO CROSS



Water Depth - Do not cross if the water is over thigh deep and moving

Water Speed - Do not cross if the water is moving faster than walking pace

River Bottom - Look for a crossing place that has an even river bed

Entry & Exit Points - Look for a crossing place where the party has easy entry and exit points



BASIC PRINCIPLES

Though river crossing techniques vary, the following basic principles will always apply and will influence the choice of the crossing place and the technique used.

1. Multiple points of contact: Always keep multiple points of contact with the river bottom as this will help with stability.
2. Do not fight against the current: Use the power of the current to help cross. Move diagonally with the current rather than waste energy by trying to go straight across.
3. Use mutual support methods: The more people in the party the more strength there is for crossing and for supporting anyone who slips or falls.
4. Swim if you fall: If by chance a member does slip and fall and become separated from the party they must swim to shore and must not put their feet down until safely eddied out.
5. Anticipate what might go wrong: Recognizing and avoiding potential problems increases the safety factor. If possible, a party member can be positioned down stream with a rescue throw bag in case a member of the party gets swept away.

LOCATION OF CROSSING

Always anticipate what would happen if someone were swept away. Choose a place where the run out leads into easier conditions such as a calm pool or clear slow moving shallow water. If the run out is dangerous, look for another crossing place. If the run out is obscured by a bend or some other obstacle take the time to walk down and have a look. Before attempting to cross it is always a good idea to take a look at a proposed crossing place from a high vantage point such as a tree or high bank. The gravel bars, sand banks and river channels can be easily identified from this position.

WATER DEPTH

If the water is over thigh deep and moving it will be very difficult to stand in the current and if the water is deep enough to reach a pack or life jacket these will then act as floatation devices and lift the wearer off their feet.

WATER SPEED

An idea of the water speed can be gauged by tossing a stick into the current and trying to keep pace with it by walking along the bank. If the stick is moving faster than walking pace, crossing is potentially dangerous even for experienced parties. Never underestimate the water velocity as ankle deep water can move fast enough to knock even a strong person off their feet.



RIVER BOTTOM

Beware of cloudy or dirty water which hides the river bottom. Avoid mud and sand or areas which may conceal quick sand and stretches of river with logs, snags or boulders. Look for a place with an even bottom preferably with a shingle bed and slow moving smooth running water. This can often be found where the river starts to widen out after a set of rapids or downstream of a corner.

ENTRY AND EXIT POINTS

Choose a crossing place where the party can both get into the river easily and escape again if necessary, and where the far side provides an easy exit. In Module Two River Dynamics it is shown that the current is faster and deeper on the outside of the bends.

Plan the crossing between two bends and in a section where any member being swept downstream is able to get out of the water before going around a corner.

BRAIDED RIVERS

These rivers often have several channels, meandering over a shingle bed. By choosing a route carefully and crossing a small part of the river each time, a major crossing can be avoided. Braided rivers however can rise very quickly if it has been raining in the high country. Care should be taken not to get marooned on a rapidly decreasing gravel bar as the river rises rapidly in the channels on either side.

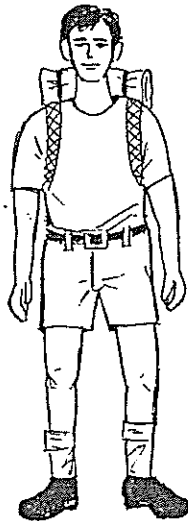
If this does happen and the water is now too deep and fast to cross safely, the only method of retreat will be to swim for it. This does not have to be as haphazard as it sounds because if the party has come prepared and are carrying throw bags or a long length of floating line the retreat can be carried out efficiently and safely.

(Refer Module 3 Use of the Rescue Throw Bag).



WHAT TO WEAR

Keep boots or running shoes on. These protect feet from bruising and cuts and make footing more secure. Avoid loose, baggy clothing which may drag in the current, especially if the water is deep. Shorts are preferable, but if crossing several times in cold, windy conditions, long johns and water proof pants can be an advantage. Wear a warm shirt or jersey and wool hat in cold conditions.



WHAT TO WEAR

Keep boots or running shoes on.
Avoid loose, baggy clothing.

EQUIPMENT

Pack all gear into waterproof plastic bags or if carrying a pack always use a strong plastic bag as a pack liner and secure the open end tightly. This will increase the buoyancy of the pack and if swimming help to support the person wearing it. For most crossing methods the pack can be worn in the usual way. If using an old style pack with thread through or fastex waist fasteners it is generally wise to unfasten the buckle and loosen the shoulder straps to enable the wearer to get out of the pack quickly if the need arises. Where the water is deep the pack will need to be held down by the wearer hooking their thumbs through the bottom of the straps and pulling down. The disadvantage of this type of waist belt is that it will tie up the wearers hands making it difficult to hold onto props or supports and in deeper water the pack unless held down tightly will ride up over the shoulders forcing the head forward and down.

Most modern packs now have a camlock fastener on the waist belt which can be left cinched tight as camlocks release easily especially under strain. The advantage of keeping the waist belt securely fastened is that in deeper water the pack will stay firm on the back without the necessity of holding it down allowing the hands to stay free. If an unforeseen swim is taken the swimmer reverts to the white water float position (Module 3) using the pack for flotation and the arms to assist in steering and propelling the swimmer to shore.



CHOOSING THE CORRECT TECHNIQUE

The choice of an appropriate crossing technique is a vital decision. Even in simple crossings, it is advisable to use the strength of the party to make the crossing easier and safer. The following techniques can be used for both groups and individuals.

INDIVIDUAL CROSSING, USING A POLE AS A PROP

This is a useful method and can be done, either side on to the current or facing directly upstream. When reading this text the intention is for the person concerned to be facing directly upstream. Using a prop or pole gives a person considerably more support than without and can be particularly helpful if the bottom is slippery or uneven. The pole should preferably be about two metres long and at least five centimetres thick. When moving into the water the person crossing faces upstream holding the pole in both hands and pushing the lower end into the river bed about a metre upstream in front of their feet.

The prop is used as a "third leg" and leaned on to stay in balance. Feet are kept shoulder width apart with the pole moved through, not over the water. It is important to keep two points of contact with the river bottom at all times whether that be both feet or one foot and the pole. Leaning firmly on the pole will ensure that it remains in the desired position and if the current is strong move slowly and with small steps. The crossing is made diagonally with the current, using the small eddies behind rocks to rest and re-orientate. A lookout must always be kept up stream for descending hazards such as floating trees and river debris.



Face upstream with pole firmly braced on river bottom.

MUTUAL SUPPORT USING A POLE OR PROP

This is a good method for crossing where the river is slightly faster and more difficult for a person to cross on their own. In all mutual support methods, it is advisable to have the strongest person upstream. In this position they will take the full force of the water breaking the flow of the current and allowing the less confident or smaller members to cross in smoother water.

As in method one, the leader uses a pole or prop and faces up-stream. The other party members line up behind the leader also facing upstream. Each person in the party reaches forward holding the pack straps or shoulders of the person directly in front, pulling down (not back) to hold that person on the river bottom. The group must be kept tight and compact and move with the leader. The great advantage of this system is that if the group decides to retreat it merely means walking back the opposite way and there are no unnecessarily complicated manoeuvres.



Place the strongest member upstream.



MUTUAL SUPPORT, USING LINKED ARMS

This is a good method for very straight forward crossings where the river is quite shallow and the current not very strong. Three to four people link arms at the elbow forming a line with the strongest members at the upstream and downstream ends. The group then moves into the water as a single unit, keeping the line parallel to the current. If any party member slips they can be held up by the linked elbows of the other members. As this is a mutual support method, the upstream person will feel the full force of the current. If retreat becomes necessary the party can either move backwards or turn around one at a time. The group must not be swung out perpendicular to the current as this will expose the whole party to the full force of the water.



MUTUAL SUPPORT USING LINKED ARMS

Position the tallest & strongest members at each end.



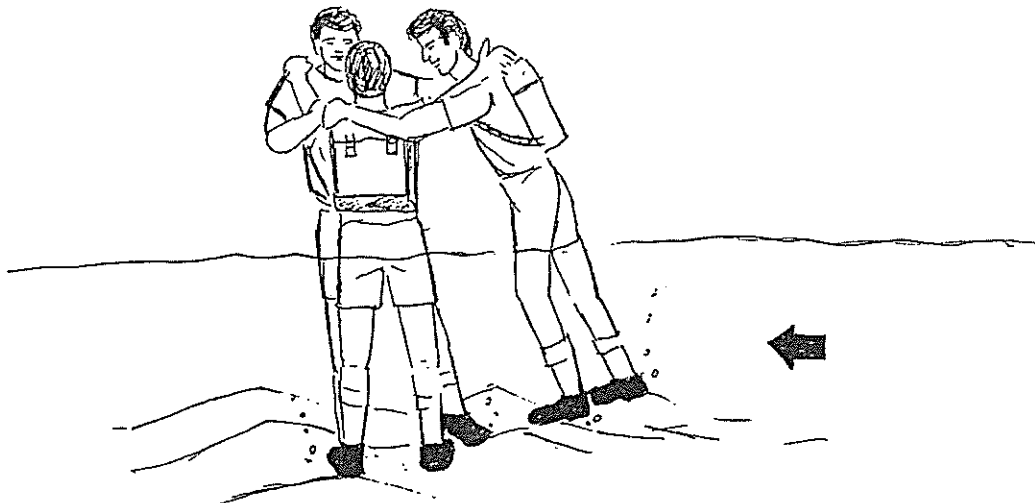
MUTUAL SUPPORT IN A CIRCLE

This method works very well in groups of three. It is an excellent method for quick easy crossings as it requires no equipment other than that normally carried and gives mutual support if anyone stumbles or slips.

A circle is formed with the members facing inwards and the strongest most experienced person on the upstream side. Each member reaches around the shoulders of the person either side and holds onto the opposite pack strap or grabs a handful of clothing. If the person on either side is too tall then members hold whichever part of their pack or clothing that can be reached comfortably. The circle is kept tight with feet spread wide apart to gain maximum support and moved into the current as one unit. The leader or upstream person will break the main force of the water allowing the other two members to walk in the some what calmer water directly downstream.

There are four advantages to using this method over other methods.

1. If the leader gets tired the circle merely needs to be rotated for the next strongest to take a turn at breaking the water force.
2. Retreating back to the original bank is a simple matter of retracing the original path and does not require any technical or potentially dangerous manoeuvres.
3. There is no need for any extra equipment.
4. It can be used effectively on uneven river beds as the party has some flexibility to move up over and around objects. The leader will however have their back to the current and it therefore becomes the responsibility of the other members to watch for upstream hazards and floating debris.



Place the strongest member upstream.



MUTUAL SUPPORT, USING A THIN POLE

This is similar to the mutual support using linked arms method but in this case the pole gives the party greater support making it easier to work as a team. The pole should be about 2.5 metres long, 5-6 centimetres thick and strong enough to support a persons weight. Again the strongest person should be at the upstream end and the next strongest at the downstream end. The upstream person grasps the poles with both hands. The next person links through and back across the nearer arm of the leader and grasps the pole, and so on down the line. If anyone lets go of the pole for any reason, they will be held by the linked arms on both sides. If retreat is necessary the person on the downstream end moves around the end of the pole and up the other side. The other members of the party follow around the end until everyone is facing the original bank. Then it is a simple matter to return to the shore.



Always link arms as an added safety measure and place smaller members in the centre.

POINTS TO REMEMBER

In all mutual support methods, the person upstream controls the party and makes sure that it maintains the correct line in the river.

In the case of a large party it may be advisable to split into two groups with the group not making the crossing stationed downstream with rescue throw bags. The groups should be split with equal strength to avoid any possibility of the weaker group getting into difficulties.

Retreating in the river can sometimes be difficult. Choose the crossing place with care.

Always cross on a diagonal with the current using the small eddies behind rocks to rest.

Be aware of the physical condition of the other members of the party.



SWIMMING METHODS

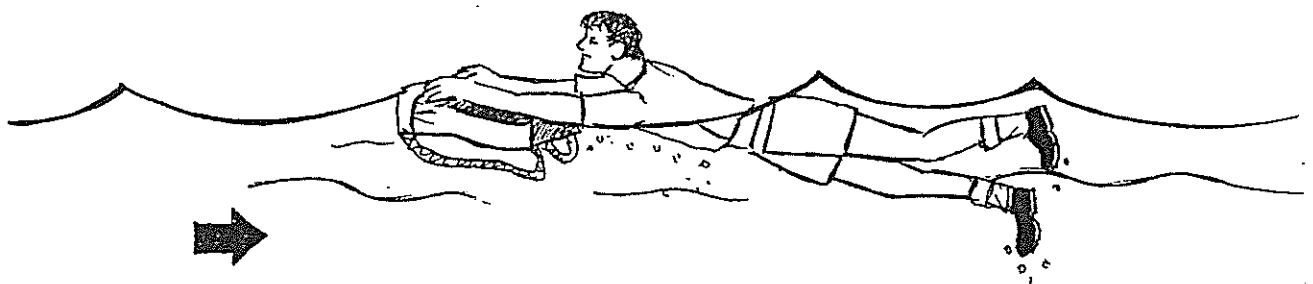
When the river is too deep to walk and there is no other option such as walking down to the nearest bridge or waiting for the river to drop, the party may be able to cross by swimming. This does however carry a considerable risk factor especially if some of the party are not strong swimmers. It is the responsibility of the leader to always be aware of the capabilities of all members in the group.

The following methods must be practised in a swimming pool before attempting to use them in a river situation.

SWIMMING, USING A PACK AS A FLOAT

This method is for strong swimmers only, as each person swims separately and therefore does not have any support from the rest of the party. Most swimmers will need a clear run and if there is any current a long run out so a careful choice of the crossing place is necessary. The swimmer wades out into the river facing upstream with the pack in front floating on the water. As long as it has been well packed, with all items secured inside a water proof bag, the pack will have considerable buoyancy. As the water becomes deeper, the pack can be used like a kick board either held out in front or by pushing it under the chest area to keep the upper body slightly raised out of the water. The arms and legs are used for propulsion as one would when swimming and an attempt must always be made to stay facing upstream angling towards the far bank (Module 3 Swift water Swimming Skills).

If the party has a rescue throw bag the strongest swimmer can swim across first and assist the other members by throwing a rope out as soon as they get close. Once the person swimming receives the rope they then roll over onto their backs into the white water float position with the pack downstream. Taking the rope over the opposite shoulder will pendulum them into shore.



Swimming using a pack as a float.
Face upstream angling across current.



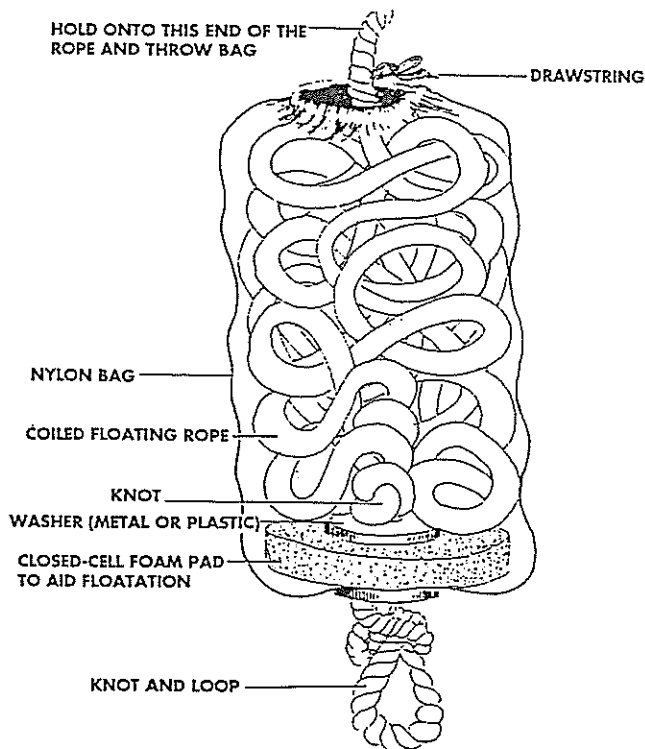
RESCUE:

REMEMBER

- * Never attempt to cross a dangerous river, be prepared to wait for it to go down, or use an alternate route.
- * Be prepared to spend time and energy looking for a safe crossing place.
- * Choose a technique that gives a good safety margin.
- * Rivers can be dangerous. Treat all crossings seriously.
- * If possible always have a person stationed downstream with a throw bag as an additional safety margin.

ROPES

Carrying floating ropes is a major advantage in any river crossing manoeuvre provided they are used with care and the group have practised in a safe environment.



Caution should be used to make sure that no one is ever tied into a rope and that the rope is never looped around the thrower or receiver. A knife must always be carried in an accessible position by the person controlling the rope in order to be able to cut a trapped person free if this becomes necessary. (Refer Module 3)

RESCUE THROW BAG



RECOVERY OF SWIMMERS

There is always a possibility that something can go wrong during a crossing, but as long as the crossing place is chosen carefully this need not lead to disaster. The main problem that will occur is that of people getting swept off their feet. When this happens the pack becomes a lifejacket. The swimmer assumes the white water float position (module 3) leaning back on the pack, head upstream and body turned slightly towards the direction of travel. Kicking with the legs and using the arms in a backstroke motion provides a more than adequate means of propulsion. The swimmer must wait until safely eddied out before any attempt is made to stand up.

With the modern camlock waist belts keeping them cinched tight will stop the pack riding up allowing hands to stay free for swimming. Older style packs will generally have to be taken off and used as flotation devices



RIVER SWIMMING

If suddenly thrown into the current the swimmer rolls onto their backs facing downstream with their feet just below the surface to protect buttocks.



CROSSING WITH INJURED PERSONS

If there is an injured person in the party it is best to stay put and wait for help to arrive. But if the situation arises where an evacuation is required, the following are two methods which work well:

MUTUAL SUPPORT USING A POLE

This method is the same as in the preceding pages except that behind the leader the rest of the group will form two parallel lines. The leader moves into the water, facing upstream with the pole out in front in both hands and the bottom end pushed into the river bed about a metre upstream.

The rest of the team lines up in two parallel lines behind the leader. The pair directly behind the leader use their outside arm to pull down (not back) on the leaders shoulders or pack straps if wearing a pack and link their inside arms across each others shoulders and so forth down the line.

It will depend on how many members in the party as to where the biggest and strongest members will be placed. They can either link inside arms with the patient sitting on their arms or sit the patient on a pole carried between them. The load can also be shared between two pairs in this manner with the pair in front supporting the legs.

The patient if conscious can relieve some of the load by wrapping their arms around either shoulder of the main carriers. The load bearers are placed in the middle of the line and the rest of the party closes up to form mutual support.

CARRYING A STRETCHER

If the patient is seriously injured or too heavy for the above method a stretcher can be made out of poles or rope. The stretcher is placed down the centre of the two lines and lifted with the inside arms of the rescuers. Each person in the line grasps the outside shoulder of the person directly in front with their outside arm as in the method above. The group closes up to gain mutual support and moves as a team under the instructions of the leader.



POINTS TO REMEMBER

Never tie a person into a stretcher when crossing water in case the people carrying slip and fall. The patient if tied in would have no chance of survival unless rescued immediately.

Do not place a patient face down in a stretcher or allow their head to go under the water.

If the patient is strapped in, remove all ties before reaching the rivers edge and pack them safely away. Re strap the patient only when the party is safely on the opposite shore.

Carrying a patient on a stretcher successfully across a river will take some practice and will generally require a large group.

In all group crossing methods the person at the front of the line calls the commands and in the case of a large group will need to call loudly and clearly.

ENTRAPMENT:

AVOIDING STRAINER / TREE ENTRAPMENT

Trees are a major river hazard and have been the cause of a number of river fatalities. Lying across the river surface with their branches hanging down they form a natural sieve which can easily entrap a swimmer.

If a swimmer cannot avoid floating towards a strainer or tree they must change their position from the white water float position to a head first position. From this position a front crawl stroke can be used with the intention being to use the forward momentum to assist the swimmer to propel themselves up and over the tree.

This can be a difficult manoeuvre especially if the tree has a large trunk. As an absolute last resort if the swimmer cannot get up and over the tree, they must plan to dive underneath head first, timing their breathing and attempting to pull themselves through the branches.

When participating in any recreational activity on rivers where trees are a factor participants must plan on scouting around corners before entering the water especially after floods.



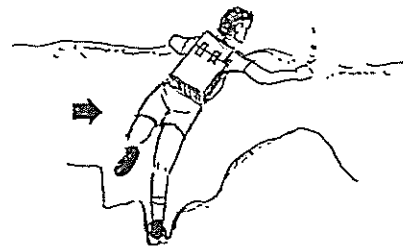
FOOT ENTRAPMENT

Foot Entrapment is a very common drowning scenario and is usually caused by swimmers finding themselves in relatively shallow moving water and attempting to stand up. In this situation it is very easy to wedge a foot between two large rocks especially if the swimmer is wearing hiking boots. The force of the current will carry their body forward forcing their head under the water.

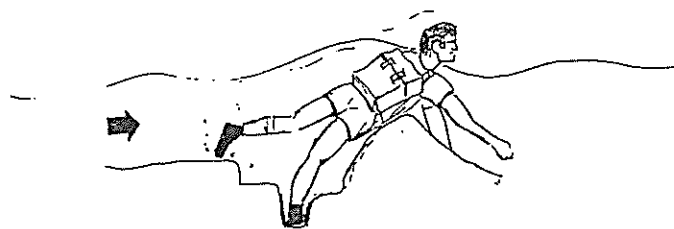
Once entrapment of this type occurs it is difficult if not virtually impossible for a victim to escape unaided. Rescuers must try and reach the victim without putting themselves at risk. This can be done by either shallow water crossing up to the victim or as a last resort swimming down. The intention being to reach the victim and keep their head above water until extrication can be achieved.



1. Swimmer attempts to stand up in fast water.



2. Swimmer becomes entrapped and is pushed over by the force of the water.



3. Only the most fortunate of swimmers are capable of holding their heads up until help arrives. If they can reach the bottom they can push up and breathe in the air pocket formed by their head.

CONCLUSION

There are a number of technical methods used by rescue personnel not discussed in this module as they require large amounts of equipment not normally carried when hiking. These methods can however be taught on request by the various river rescue organisations.

REMEMBER

- Fatalities in river crossings are the result of bad judgment by inexperienced people. There is no substitute for good training, and experience.

