

Fording For Everyone

Revised March 2020

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including details of

A Fail-safe Rope-assisted Routine

Part 1: Rope; the Safest Mutual Support

Part 2: Our Experience of Fording

This is a shorter and extensively revised version of the paper based on the article *Fording for Everyone* by Brian Wilkins in the FMC Bulletin No 186 Nov 2011 pp 30-33.

Introduction

The report draws upon more than a century of experience in the back country. A range of issues is examined. Coroners reports have provided much useful information: one revealed that that a trapper was drowned in a water course, only 3-4m wide, which drained Taranaki.

Successful trials, described in Part 1, have validated the new two-rope approach which employs light but strong, cheap, floatable rope, tape instead of harness, and a new, easily learned, crossing routine.

Fording techniques: The three options; good, bad, and vulnerable.

1. Solo; no mutual support; if anything goes wrong you might not survive.
2. Group; mutual support only by means of some form of close contact. Much better than nothing, but can deceive; the weaknesses are not always foreseen. Things can go wrong and have often done so.
3. Group; mutual support using rope. This is the safest method. Recovery is built in to the two-rope routine. This and the light, inexpensive, equipment employed, has significant advantages over previously used fording methods.

Part 1: Rope; the Safest Mutual Support

If you don't have the time, at the moment, to read Part 2, but have a trip coming up where a river, stream, or unexpected rain, might be an issue, this section contains what you need in preparation for employing the user-friendly fording routine.

Routines breed confidence

You're nearly there; the hut is just across the water. During the day, even where hazards were not obvious, at two other fords, you eliminated danger by getting your party to apply the same, uncomplicated, technique. This is your new approach. At the same time you have noticed that the more timid members of the party have begun to look happier. Now, at the end of the day, to get across to the hut, everybody moves easily through the same stress-free routine. You feel quietly satisfied when you get out into the middle and realise that a few more traps lie hidden within that particular ford than you had expected. The use of rehearsed, easily-learned, routines is the essence of good planning. Likewise the equipment is basic and easily handled.

Getting the gear together: rope, tape, and carabiner

Rope

Let's assume that you don't own a rope or any other gear connected with back country travel. Without much expense you can get a 40m length of 7mm diameter polypropylene rope from your local marine supplies shop and you are on your way.

The fording routine requires a party of at least three and the availability, for the whole party, of two of these 40m lengths.

The rope is 3-strand twisted polypropylene and it floats. The low drag of a floating rope is an advantage over non-floating ropes, as is the ability to ride above rocks and other snags. Nylon and

polyester ropes, as well as retaining more water than polypropylene when wet, are more expensive, and too dense to float.

Additionally, the rougher corrugated surface of the twist type of rope, and its water-shedding ability, confers a significantly better grip compared with the fine-woven braided rope which can become water-logged. In relation to the practicalities of fording I consider that this difference is significant.

Pure polypropylene is not as stable to UV as is polyester, but UV protective agents have been added, and in any case the exposure involved for the present purpose (fording) is miniscule compared to that in general marine use.

A permanent loop is tied in each rope at both ends. No particular knot is recommended; either a bowline or a simple overhand knot is adequate provided that some excess length is left which can allow some half hitches, over which, for tidiness, and as an insurance against unravelling, some binding or good adhesive tape can be placed. These loops take the carabiners during fording.

Seven millimetre diameter polypropylene rope is extremely strong and resists wear very well. Whilst it is not designed to take the place of vertical wall rock climbing ropes, it does have the ability to stretch and elongate by 13-16% at 25% of its breaking force. Therefore, apart from those situations where vertical falls are a normal part of the day's work, there is no reason why polypropylene should not be regarded as adequate for a great deal of other climbing, whether it be on rock or ice.

A great variety of metal friction devices are now available for controlling ropes or moving on them, but you don't need them for fording, and you can do plenty of climbing without them.

Three months after this work was completed I came across a USA outdoor website which mentioned the desirability of using floatable rope for fording.

Tape

Bought from a climbing or outdoor activities shop, soft climbing tape, width 18mm. Four meters per person, is the length, useful not only for fording. Compared to a common brand of climbing harness weighing 400g, four metres of this tape weighs 170g and is both cheaper and, for the general tramped and mountaineer, more versatile. For fording it is doubled and tied tightly around the waist, with a simple overhand knot, and a generous excess length hanging down in front of the body. It is comfortable and no special knots are needed. No problems have been found with simple knots provided that the excess is there to ensure against failure from slippage of the tape.

It has been widely advocated that the rope should be tied high on the chest above the water but, with the floatable rope, this is no longer necessary.

Fording is mostly quite a tame business requiring nothing more than a gentle pull. There will be occasions when the pull on the rope is greater because the force of water on the legs is greater. Physics tells us that we will be more stable if the pull of the rope in one direction is from a point as close as possible to where the water is pulling in the other direction. A high rope is no advantage.

Carabiners

From a climbing or a marine supplies shop. Each member of the party carries one carabiner. These should be screw-lockable, and, to minimize weight, light alloy.

Practising the routine

Gather your party (1,2,3,4 or more) in a room, outdoors, or alongside a friendly watercourse. Each of you wraps the doubled tape around your waists, ties the knot, and attaches a karabiner. One of you (1) volunteers to be first across and is attached by karabiner to two ropes while 3 and 4 each clip on to the other ends of each rope. 2 is an onlooker, not required for the fording routine.

The party leader checks all the knots and clip-ons.

1 takes up a position on the bank at the estimated best crossing point.

3 stands behind 1 holding, at short length, the rope between them.

4 moves upstream, as far as possible out from the bank, still linked to 1, while providing a steady stabilizing force where needed.

As the photograph and diagram show, 1 moves towards the opposite bank while 3 pays out the rope, all the time being alert and ready to pull 1 back to safety should 1 strike trouble.

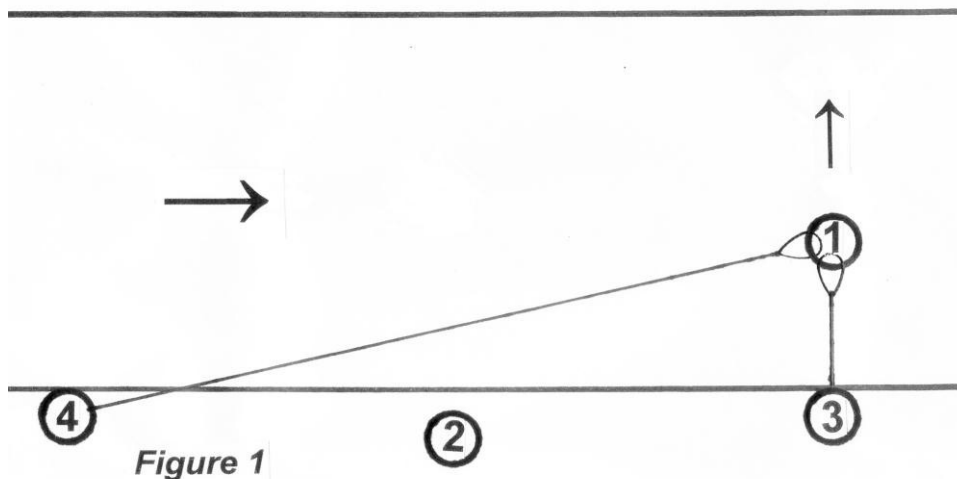


Figure 1: First Across



Trials in Hutt River, near Te Marua, May 2, 2011. Joe Nawalaniec (centre) first across, with Shaun Barnett (right) on long belay, and John Rhodes (left) on short belay. The water on the right side of the photo is easier, but we chose the more difficult section below it for most of our crossings.

Shoulder belays, assuming the right hand is the stronger, have the rope coming over the right shoulder, and down across the back to the left side, under the arm, where it can be pulled down by the left hand. The rope is pulled in and paid out freely under good control, both hands working together.

If number 1 can't get across, someone else may volunteer. If others also fail it means that the difficulty, in relation to the abilities of the party, is greater than was apparent on first inspection. If a more suitable place is not found, plans are changed and other options are considered.

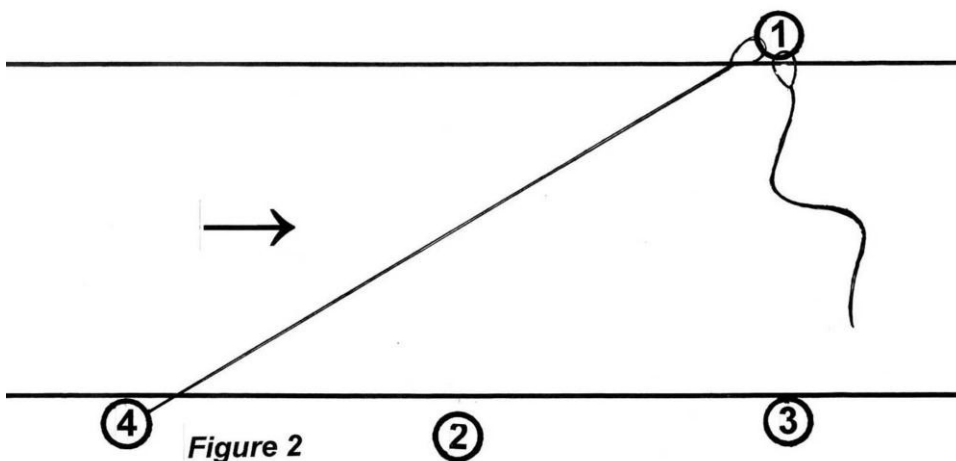


Figure 2

When 1 reaches the far bank 3 unclips from his rope, retaining his carabiner, allowing 1 to pull the rope over to him.

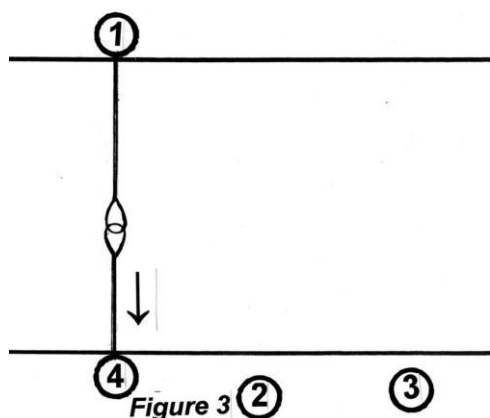
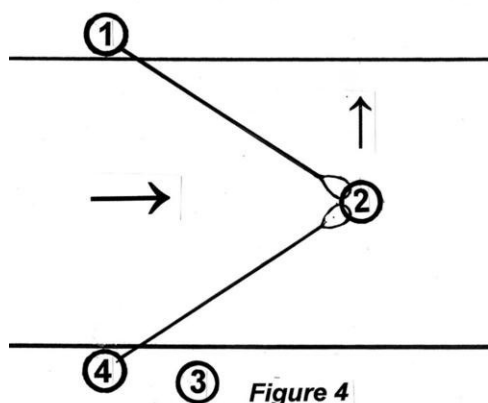


Figure 3



1 unclips from both carabiners, joins them together, and, while holding the end he has pulled over from 3, allows 4 to pull the linked carabiners back across to him.

Figure 4

4 passes the linked carabiners to 2 who separates them and clips them separately to their waist loop. 2 then crosses, with 3 ready to assist.

Angling the ropes downstream allows 2 some flexibility in choosing a route. Moving straight across from 4 to 1 may be required in some locations with limited space, in which case the rope would be tighter and less comfortable for the movement of 2.

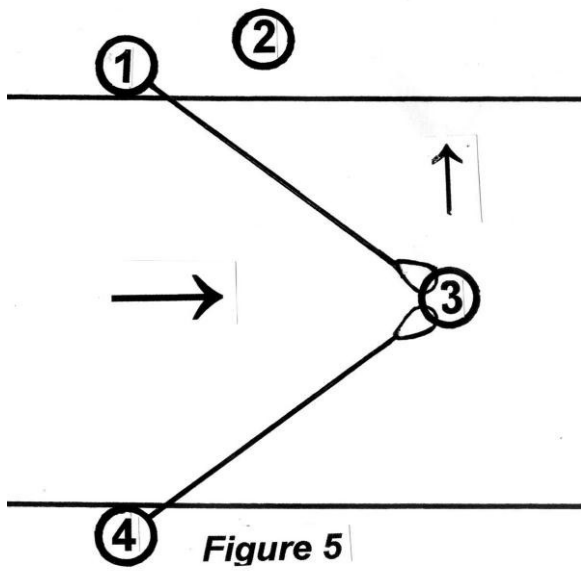


Figure 5

Likewise, 3, and every other member in larger parties, can be shuttled across, with 2 ready to assist.

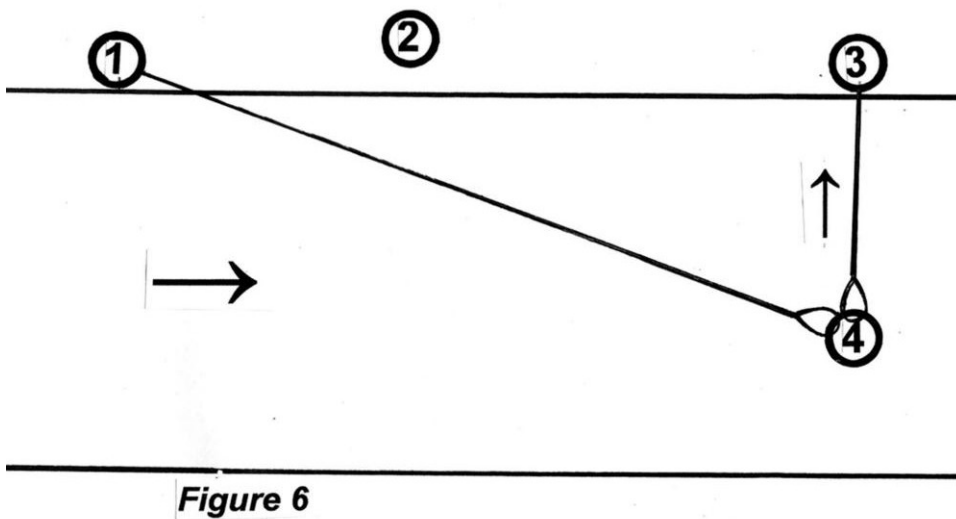


Figure 6

Figures 6 and 7

For the last across two methods are available; the two-rope method or the pendulum. If no difficulties have been experienced in the earlier crossings, the two-rope method may not be considered necessary for the last. Provided that one end of the rope can be thrown back over to 4, it is possible to re-enact the arrangement that was used for the first across (Figure 6).

If the pendulum is used it takes 4 towards the desired bank, (figure 7) and easier than the first crossing.

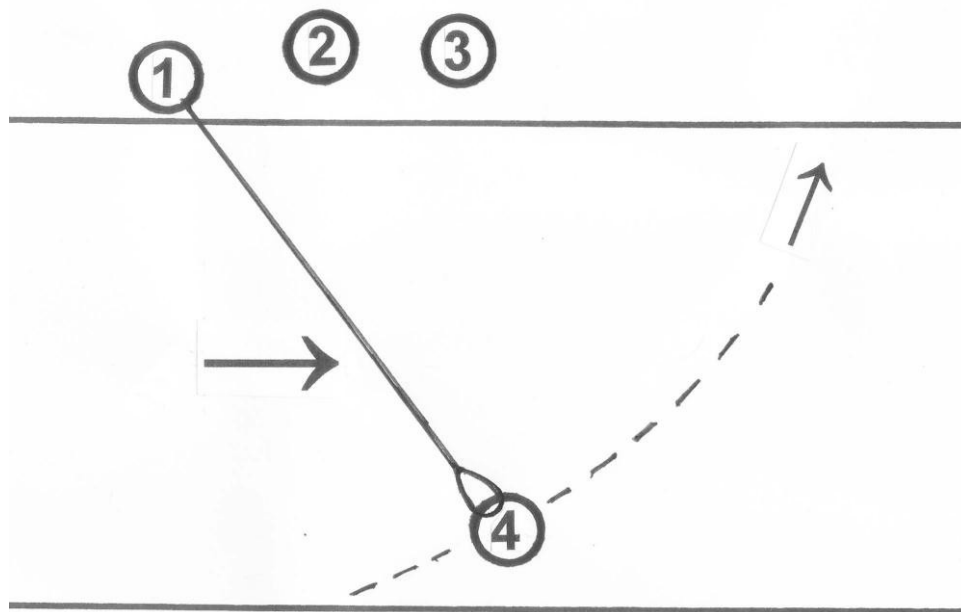


Figure 7

Figure 7

In some circumstances waiting for water levels to drop is the only option, but in others, the availability of a fail-safe technique, where an attempted crossing is tried then safely abandoned, helps to ensure that a planned trip is not ruined unnecessarily.

Details of river trials

Date: 2 May, 2011

Location: Hutt River at Te Marua just below where the river exits a gorge.

Width 20m;

Depth: (across about half the profile); 1.25m in pool, 0.75m in rapids. Riverbed: Rough; small to moderate-sized boulders in rapids; relatively smooth gravel bottom in pool.

Flow Rate: (Wellington Regional Council figure for 2 May); 15.8 cumecs.

Water velocity: (Our measurements); in pool 0.67 m/s; in rapids 1.62 m/s.

We obtained acceptable figures for the flow rate by measuring out 20m on the bank, and timing the passage of a piece of wood thrown into the water. This method overestimates the water velocity which, averaged from top to bottom, is about 85% of the surface velocity.

Applying the relationship quoted by Chris Paola (Pt 1, ref.21), multiplying the flow rate in m/s by the depth in metres, we get 1.25×0.67
 $= 0.84 \text{ m}^2 \text{ s}^{-1}$ for the pool, and $0.75 \times 1.62 = 1.22 \text{ m}^2 \text{ s}^{-1}$ for the rapids. Values greater than 1 indicate water that threatens stability; a condition which calls for the rope. Our experience is in agreement with this relationship.

Since the first publication of this work a second group has tested the new two-rope method. The FMC Bulletin No 187 March 2012 contains the findings of Johnny Mulheron, Antony Stephens, and Carl Babe who validated our findings.

Part 2: The Experience of fording

- (a) Awareness
- (b) Good and bad fording
- (c) Stick or ice axe
- (d) Choosing the best method
- (e) Handrails
- (f) Belaying
- (g) Close, closer, closest
- (h) Mining the literature

(a) Awareness: Will water be the problem or will it be you?

You know that water can be dangerous. You will also have read where this danger lies. In fact, the 'where' is easy enough to describe, on the basis of what we know about water. But because no book, article, or instruction course, can guarantee that you will value such knowledge as being important to you as your boots or your pack, we immediately come up against the wide-open problem of the capricious, the unpredictable, response. Because no one can be relied on to make the right decision all the time we must adopt fail-safe methods as detailed in Part 1.

We know plenty of reasons why people have been seduced into making fatal attempts to cross. The following are just a sample:

We don't want to miss our transport, our rendezvous, our night in the warm hut.

Some of us need to be back at work on Monday morning. It's getting dark; we must cross now.

We're tired and hungry, we can't stay out here any longer.

We don't have enough food to wait here for a day while the water level drops. We don't want to take the higher route that avoids the crossing.

The guide book says this ford is usually safe. Other parties we know of had no problem here.

We don't want to appear slow in the club write-up of the trip. Having to wait is embarrassing.

Our leader has done a course in fording.

Readers could add to the list. For comment that sounds mundane among all this plausible, but dangerous, reasoning, I add simply that, provided they

have water, people can stay alive for weeks without food. Short steep streams rise and fall very quickly, as do many larger rivers, especially those draining lightly bushed country. Sometimes you must wait, escape from the noose of a fixed timetable. Before you leave home, tell others that waiting is a natural part of the back-country deal.

A more general comment would go something like this:

Let the water speak; the water is the voice that matters; everything else can spoil it for you. Study water; note all the various types of water; read Tony Nolan's advice in Part 2 about how to get to know water.

Not unrelated to the above is a problem with some leaders/teachers where the dominant aim is to maintain the impression that there is no loss of control.

While this may be good for group/classroom order, here, beside water, it is potentially fatal. Better to step back from the seamless exercise of authority and admit frankly to the doubt which precedes discussion and a life-saving change of plan.

Wear clothing that provides as little resistance to the water as possible; shorts rather than longs. If cold

is an issue, wear polyprop longjohns under shorts. A little time spent changing clothing on the bank is well worth it for a deeper, faster, ford.

(b) Good and bad fording

What influences the choice of method?

We are fortunate to be able to draw upon a century or more of back country experience. Those who ignore it, and the facts set out in coroner's reports, do so at their peril.

Examine any likely fording place from as high over it as you can get. A smooth firm gravel bottom is best. Sand or silt at the edge of a glacial stream may be quicksand. Shallow, fast-moving water is not to be underestimated.

Good fords are mostly found:

- Where the river is wide.
- The water is shallow and flowing more slowly.
- Above rapids.

Where the river runs in several channels, these are easier to cross than one big one. But, when moving out among braided channels, make sure that you are always aware of your route back, should you need to retreat.

Between bends the water is shallower and quieter. On curves the water scours deeper channels near the outside bank. Even on slight curves these need care.

On long diagonal shallower gravel bars that can traverse the whole width. These are useful, but again, watch for the final, deeper section.

A glacier stream is deeper from about mid-day to about mid-night, and lowest in the morning.

Don't lift your feet any higher than you need to: if possible, just shuffle along with small steps. This helps you to keep control of your legs and your balance.

(c) Stick or ice axe

We can nominate a like-minded group; the early West Coast miners and all those many trampers since then who have cut a stout pole out of the bush to steady them in water: they grasped it firmly with both hands. Add to this the new refined rope technique and we have a formidable combination.



Two ropes, two hands, a stout stick

Where does the ice axe fit into this? The simple answer is that, if fording is the only issue, the long stick is better. Just look at the picture to see the advantage of the two-handed grip. But, of course, there is a lot more to back country travel than fording. An ice axe gives you the freedom to travel safely in many more places than you could negotiate with only a stick. If the shaft is long enough it can stop you sliding and slipping in all sorts of places, not only on snow or ice. We compromise because we don't wish to carry both ice axes *and* stout poles.

One compromise is the tubular metal alloy walk stick/pole, but they lack strength against bending, whether or not they are extended, and they are even weaker when extended out to the length that is of most use in fording. For this reason, they are virtually useless when employed using the two-handed grip that provides good bracing. The stick, or, giving it its older name, the staff, has been used from ancient times, through to the Swiss alpenstock, which was also used to cross mountain streams, and, in the present day, the stout pole given to parties being guided on glacier ice.

The participants in most of the many illustrations of fording published by the Mountain Safety Council of NZ don't carry anything in their hands. One exception is Lindsay Main's illustration of rope technique in Manual 20: that person is carrying an ice axe and is therefore capable of benefiting from it in two ways; probing the bottom for holes and boulders, and using it as a third leg for better balance. Contrast this with the restriction imposed by grasping methods. Apart from the two at the ends of the group, each of whom who have one hand free, the others are denied any such interaction with their surroundings.

We valued the long (about waist-length) ice axe in New Zealand for almost a century. Short axes, of various lengths, used in specialized climbing, also for nearly a century in the Northern Hemisphere, were brought here about seventy years ago. At the same time, with virtually no discussion of the consequences, axes about 70cm in length, were introduced into general mountaineering in New Zealand. Not unexpectedly, among their numerous other shortcomings, they were found less useful in

fording.

This report is written for outdoor users across a wide range, from those who may never go above the bushline, to hunters, high and mid-level trampers, and mountaineers. Many of them, except the latter, will not carry an ice axe, although, for that border country enjoyed by high trampers and cross-country mountaineers, they really should do so.

The matter of ice axe length is of considerable importance, I refer readers to two research-based articles which demonstrate the deficiencies of short ice axes: 'My Ideal Mountaineering Manual' by Brian Wilkins, *The Climber* No. 54, Summer 2005-2006, pp 44-45, and 'Short Roping: Questioning the safety of traditional guiding practice' by Gottlieb Braun-Elwart, *NZ Alpine Journal*, 2008, pp 98-101. One of Gottlieb's conclusions was that 'The good old 'guide's ice axe' can be brought to the fore again' adding that 'although short light ice tools give us a modern appearance, they are useless for cutting steps'.

Moving through high country requires us to cope with many different types of terrain, not only the snow and ice on which Gottlieb did most of his guiding, but rock, bare earth, tussock, scrub, and forest. In every one of these environments there are situations where a longer axe is helpful, but in others we must learn to deal with its occasional tendency to obstruct free movement. Common practice nowadays, is to carry an axe of around 70-80cm; a compromise, and, I believe, a poor one, a sort of no-man's length that is neither short enough for certain specialist climbing, nor long enough to provide all the benefits that are possible with more length.

Where do we go from here? Summary of the problems:

- (1) Even the long ice axe in water can't match the firm control attainable with a stout stick in both hands.
- (2) Trampers don't all carry ice axes, but they do come across situations where they need them eg. a gully filled with old snow across a track; surfaces on ice, tussock, bare earth, or scree, where a stumble can lead to a roll and a dangerous slide. Tubular walk sticks provide very little help on these, but the pick of an axe can easily and quickly arrest the stumble.
- (3) The currently fashionable tubular metal walk sticks, lacking bending strength, are basically dangerous for bracing both in water and out of it.
- (4) Trampers might not want to carry long wood sticks in many situations eg, thick bush or where a bit of climbing is involved.
- (5) Mountaineers have a need for long axes in some situations eg. cutting steps, especially downhill, getting good shaft belays in firm snow/ice, probing for crevasses, enjoying a standing glissade with the long axe held behind as a third leg(the list could go on). In other situations they need a shorter axe eg. where the work face is at the point of their noses, or where they expect mainly rock.
- (6) Bush-level trampers who become more ambitious will find, sooner or later the limitations of poles and sticks, metal or wood, for many situations.

(d) Choosing the best method

What might lie ahead: River Access, banks high or low, easy, or difficult.

Water, cold, warm, dirty, clear (and perhaps, for that reason, deeper than it looks), wide, narrow, shallow, deep, slow, fast, smooth, quiet, noisy, turbulent, standing waves, floating debris, changing level, dangerously differing water velocities across ford. Riverbed, narrow, wide, muddy, sandy, solid, loose(perhaps loose enough to be washed from under our boots and affect our balance), quicksand,

rocky, small stones, big boulders, mixed boulders and small stones, iced-up boulders, tree snags, man-made snags, slippery, slimy, weedy, holes, pools, deeper channels in parts, shelving, level, changing, stable.

The NZ Mountain Safety Council, in recent years, has published safety manuals where long-established rope techniques, that had been applied successfully by a great many outdoor people, were either downplayed or dismissed. This arbitrary change of direction in MSC publications except one (Manual 20, 1987) since 1984, opened the MSC to serious criticism. One hopes that progressive clubs run courses in basic rope technique for those members who plan to step out from the manicured surfaces of the Great Walks. This greater freedom to move safely through a wide range of country lies at the essence of our outdoor experience.

(e) Don't trust hand rails alone

As mentioned earlier, the NZ Alpine Journal, for many years, published accident reports, analyzing causes and advising how such accidents could be avoided. One such report concerned the drowning of Ailsa Tarrant of Mosgiel, while attempting to cross the Routeburn River, opposite the Routeburn Huts, on 17th December 1954.

The river was fairly high after rain and, after the party had made several unsuccessful attempts to cross, one member succeeded and found a length of rope 25-30ft long in the hut. He brought this back to help the others, the rope being held by two men to span the deepest part of the stream.

Ailsa tried to cross on the upstream side of the rope; in the centre she looked up, lost her footing, her pack went under, she seemed to be doubled over the rope, and was swept away under it. She could not release herself from her pack and her head was frequently immersed. She was dead when pulled ashore half a mile downstream. Although the right shoulder strap of her pack was loosened before she entered the water, she was unable to get rid of it when she slipped. Her plastic raincoat appeared to have become tangled around it.

Both Moir's Guide Book and the FMC Safety in the Mountains handbook had warned that, when crossing using a handrail, one should cross on the downstream side of the rope. The FMC book also stated that 'even for valley tramping, a light rope of adequate length should always be carried by the party' but 'the rope handrail river crossing method should never be used when there is a likelihood of being swept away.'

A friend has told me of an incident involving a hand rail, fortunately not leading to tragedy, but nearly so. A member of his party was crossing while grasping a hand rail from the upstream side. Out near the middle of the crossing the force of the current had forced him and the rope down into a deep V shape from the centre of which, for an anxious period, he was unable to move either way.

Hand rails could be useful for a large party but only in conjunction with one, or preferably two, other ropes connected to the forder. Weight of numbers makes it feasible for the US Army to adopt the latter method.

(f) Belaying

The term belaying refers to the technique of exerting friction on a climbing rope so that a falling climber does not fall very far. Falling, in its full practical sense, includes, stumbling, sliding, and rolling, even on quite moderate slopes. Providing this friction, in the horizontal or near-horizontal arena of fording, presents fewer problems. Many accidents have been prevented in climbing by the use of simple belaying techniques. Early reaction can arrest falls before they develop into something more serious.

Likewise, a belayer on a river bank is well placed to provide this early reaction.

The pull on the rope from someone in a strong current is neither as sudden nor as large as that generated by a vertical fall. Climbing engineering has produced a variety of mechanical devices to provide friction in all circumstances, including the extreme, but we don't need them. A simple and well-tested method will do the job; this is the body belay, with the rope over the shoulder and around the body, the friction being generated both from the hands and the body. Good belaying means watching carefully what is happening out in the middle, and hovering sensitively around the point of pulling lightly or slackening. Unless they are in a place where, for stability, they need to be anchored in some way to the bank, belayers will be free to move around, to some extent, in response to any demand, including, if necessary, sitting down to attain a better link to the ground.

The two belayers can also draw on help. Where numbers allow, there is no reason why others, if necessary, should not stand in front of a belayer, running the rope through their hands. This provides both support and the ability to lift the rope free of any obstructions near the bank. No one needs to be standing around doing nothing.

What do we make of some of the present advice that is given to trampers and mountaineers, and can we improve on it?

The gap between trampers and climbers need not be big: I'm tempted to regard the return to basic rope use in fording, using cheap, light, but highly effective, equipment, not greatly different from that experienced by all mountaineers and high trampers in an earlier era.

As far as I am aware none of the mountaineers or trampers of the last century, whether they were experienced or inexperienced, were told that the rope was a dangerous way to ford. Most trampers carried a light rope and, with a bit of advice and the commonsense to use it, the basic principles of good fording practice were generally accepted. Of predominant importance was the acceptance that where there was any danger whatsoever, the rope was safer than walking out into the water in groups abreast. Many of these trampers enjoyed themselves below the summits: some became mountaineers.

Arnold Heine compared the security conferred by rope in fording to that conferred in climbing; a nice analogy that recognises two life-threatening forces, one gravitational, the other hydrodynamic; one vertical, the other horizontal, both of them life-threatening. We can extend the analogy. Climbing parties don't climb, moving together abreast, holding on to one another. When the going is tough, they move singly. Furthermore, climbers haven't stopped using ropes just because, every now and then the ropes between them get snagged, and on rare occasions people die as a result.

Looking at close contact fording in its stark reality we see a group of people, with no restraining link whatsoever to the shore, moving vulnerably into water which, even for the experienced, is partially unknowable, and which, among the powerful forces of turbulent water, may hold dangers beyond their ability to cope. The narrow margin of error inherent in this method is not a hallmark of good technique.

The way is now open for us to remedy the situation. We need to move on and see the rope, not as a specialised tool of the elite, but as a safe and reliable item of equipment carried by many trampers. Putting on the rope can become as natural as donning a parka. I would be happy to hear people say 'I didn't think we really needed to use the rope there'. The more it is used the easier it will be for it to become routine. The same problem is common in climbing; the mistaken attitude of some that associates putting on the rope with the approach of great danger.

Our methods must be inherently safe, and because they can be acquired with a moderate amount of training, they can be recommended with confidence.

(g) Close, closer, closest

Following the elevation of close contact to a higher status, problems arose which called for a serial MSC patch-up, the need to discard methods which had, in fact, never been intended for serious fording. According to the changing MSC attitudes linked arms were out, as was non-entwined mutual grasping of packstraps or clothing, or sharing a log or stick.

The process culminated in the ultimate in close contact. The MSC recommended an intimate anatomical coupling involving the closest possible side-by-side contact with arms reaching right around the body of the person alongside to grasp pack straps on the other side. A claimed advantage was that, should one person let go, the other would still have an arm around them and still be able to hold them. Two three four become as one, a feat of erotic, or even theological, intimacy, so effective, I am told, that the participants, when they reach the bank, find it difficult to extricate themselves from it.

Unfortunately, it all adds up to very little. Loss of footing, stepping into holes and channels, legs being swept away, groups being tossed around together: these are the recorded facts; none of these of these traps have respected attempts to hold together.

For less threatening water strong fit slimmish people are those who will make the best of this method. Getting a good grip is most likely to be more efficient for someone with long arms and where either or both of the coupling pair is not overweight. Grip strength for women is significantly less than for men. Closeness of contact is very much at the mercy of what we are carrying on our back. The great variety of pack shapes these days, including packs that are wide, packs with big side pockets, and packs to which wide objects, such as a bed-rolls and other things, are attached, brings another potential barrier to good side-to-side contact.

The rigid contact involved is a potentially serious barrier to stepping over and around a heavily bouldered bottom where some flexibility and a degree of separation of movement is called for.

To summarise this ultimate close contact:

1. It is still a grip
2. No matter how strong the grip, or linking, *above* the water level, the human body *below the water and experiencing the full force of the current can be swung away and out of control.*
3. Any grip, however much it is enhanced by body contact, can be broken
4. Even two or three, as the records tell us, can be swept out of control
5. The power of water is immense; it can break any grip; close contact merely creates a denser barrier against the flow and increases the water pressure.
6. The common first event, well documented, is the legs being lifted off the bottom.
Grip can stabilise to some degree but it can't prevent the legs from being carried away
7. It offers no link to the shore
8. Only the two at each end can employ, with one hand, a 'third leg' to aid stability
9. Turbulence in fluids is unpredictable

Maybe someone will claim that no one has died using this new version of close contact. I don't know whether or not such is the case but, in the light of the factors I have set out above, it is immaterial. To argue otherwise is to revisit the now discredited position that used to be taken by drug companies. They argued that their new drug was virtually free of side effects and compared it with older drugs which had many. Before long the fallacy of this became clear. Now it is realised that because they are

new, enough time hasn't elapsed for the inevitable side effects to show up. The new approach worldwide is to apply basic evaluation criteria of both a general and a specific nature to all drugs from the start, and not wait for the harm to be done first.

(h) Mining the literature

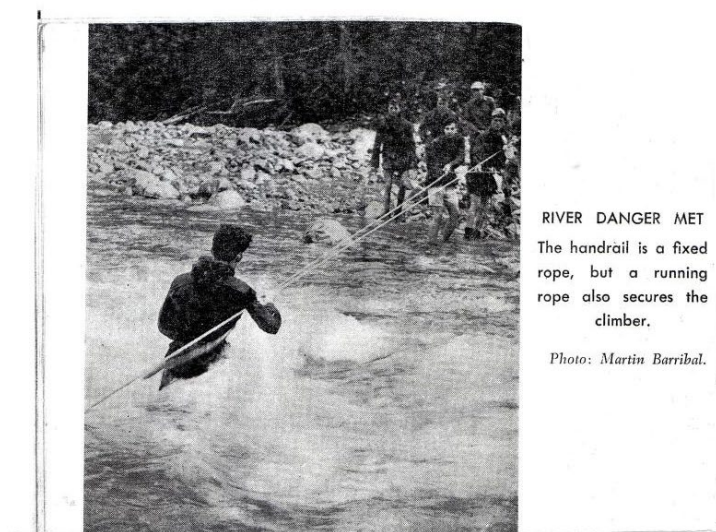
Moir's Guidebook, 2nd Ed. W.S. Gilkison & A.H. Hamilton, 1948, p.95-97.

More than 2000 words, a distillation from hard-earned experience. 'Where there is any doubt about being able to cross singly, some form of mutual support is needed'. Various grasping methods are discussed, including the use of a long horizontal sapling. 'If there is any doubt about a ford a rope should be used, and every party should carry a light rope for river work'.

Safety in the Mountains, The NZ Handbook for Trampers, Skiers, Deerstalkers, and Mountaineers, FMC, 1954. p.8,26-33,46. Authorship is collective.)

This booklet is a landmark in safety literature. When recommending that the pack should be kept on for fording, they add 'Your bodily rhythm has become adjusted to it...' They put the body gripping technique into an appropriate, and, it should be noted, a very limited, context 'Where the river is a little too difficult for easy individual crossings, some form of mutual support may be adopted. Where there is any danger should any of the grips be broken, use a rope. The rope is the trampers' and mountaineers' lifeline as much in the valleys as in the peaks. Even in easy tramping country' they say 'a light rope should be carried for river work'.

A length of 100ft is necessary, plus 150 ft of heavy cord if there is only one rope in the party. They describe rope use in some detail accompanied by diagrams. A photo illustrates a two-rope technique being applied by a party crossing quite swift water. One rope is set as a handrail while the other is attached to the person crossing. The two-rope technique is illustrated in 'Waking to the Hills' by Geoff Spearpoint, 1985, p.24.



NZAJ (1958) Accident Reports p.465-466.

Although these highly valuable accident reports appeared regularly in the NZ Alpine Journal for many years, they were not confined to climbers. The analyses and recommendations dealt with all manner of back country incidents in which the participants were of all ages and experience.

Four drownings as a result of three incidents are discussed. The conclusions are unequivocal. In every case the rope is recommended 'A rope is an essential part of equipment', 'Always carry a rope for river work', 'The only safe way of crossing a dangerous or difficult stream is by using a rope in the proper way'. In one case the drowned man had over-balanced in fairly swift waist deep water attempting to retrieve cigarettes that had dropped out of his pocket during the crossing; in another deerstalkers had attempted to swim a deep pool with rifles, and in the other three boys, 16, 13, and 12, attempted to cross the almost waist deep flooded Orongorongo River with arms linked together over shoulders. The two older boys were swept off their feet and drowned.

Bush Lore by Tony Nolan, Whitcombe & Tombs, 1961.

' Rivers...bushland's greatest peril...even small streams can present a serious danger. During the gold rush days on the West Coast drowning was known as 'the national death'. A Coast man himself, Nolan had no illusions, yet he could say 'River crossings can be safe, much safer than crossing a city street. But sound rivercraft is necessary, and rivercraft in turn requires study, commonsense, and an alert mind. But rivercraft does not teach you how to cross flooded rivers. Develop an eye for fords and look for them wherever you go. Whenever you see a river-from a road, train, during walks, or in photographs-look for fords and if and how you could cross them. You will soon find that it becomes second nature, and in the bush you will be able to locate fords quickly and make your decisions without hesitation'.

Discussing mutual grasping he applies it where 'A river is no more than knee- deep but is swift or has a rough bed'. Adding 'The limit of the mutual support method is reached fairly quickly, either when the current tangles the legs of the upper man among the those of the man next to him, or, in calmer water, where one or the other begins to float'.

Pole methods are looked at in some detail, but in the circumstances where neither of the other methods is satisfactory he comes to the rope, recognising only one system as safe; a long rope twice the length of the width of the water and with a loop in the middle. After one member has crossed the next one steps into the loop which is then shuttled back and forth until the last member is brought over on the end of the rope.

NZ Mountain Safety Council, First ed. 1993, pp.91 & 104.

This book has a generalized focus, for outdoor leaders. It says nothing specific about fording but the illustrations are explicit enough: a fording party walking abreast and a large photo of four young people, of perhaps early high school age, entering a wide expanse of quite shallow calm-looking water. They are abreast and grasping each other with arms behind their neighbour's back. Instructors are standing around in the water.

MSC-approved methods are also illustrated in images from the Arthurs Pass 'Home in the hills, website, and in a frame from the 1996 MSC video.

Ref. 13



2 The Evening Post, Tuesday, November 12, 1996

River Safety Awareness Day

ADVERTISING
FEATURE

Video urges trampers to think twice

The New Zealand Mountain Safety Council has released a video which aims to get people thinking about making the right decision when it comes to crossing a river.



The safety technique of 'binding together' was demonstrated at last Saturday's launch of the Mountain Safety Council's video "Do You Need To Cross?"

Personal Communication from Prof. Peter Ashmore. Dept of Geography, Univ of Western Ontario, London Ontario, Canada.

...avoid at all costs the junction of one or more channels where deep scour of the bed is very common, the flow is very strong and the bed is very mobile.

Personal Communication from Prof Chris Paola, Prof of Geology and Geophysics, St Anthony Falls, Laboratory, Minneapolis USA.

- Chris Paola is familiar with the NZ outdoors and writes as follows: ' John Pitlick and I often used a rope system when working in fast-moving water on Mt St Helens. It's a big help. The basic guideline we use for river walking is that you should not walk in water for which the depth*velocity product, also known as the unit discharge, exceeds 1 in MKS units (velocity in metres per second times the depth in metres ie. $1\text{m}^2\text{s}^{-1}$). A rope would surely help here.* The US Geological Survey has a standing

policy, which I fully support, against the use of chest waders for river walking. I myself advocate the use of wetsuits, which I think are the safest outfit for river walking. A rule of thumb for braided rivers that you might find useful is that maximum depth at a confluence is about 5 times the average depth in the converging streams.

There is a wonderful set of pictures taken by Prof Hiroshi Ikeda, emeritus of the University of Tsukuba (Japan), showing a chain of grad students upended by a big flow in a laboratory flume.'

Following our trials in the Hutt River, where we made some basic measurements, we can vouch for the rough validity of the $1\text{ m}^2\text{ s}^{-1}$ relationship. Details are given in Part 2. However, the rule of thumb needs to be applied with caution. The threshold of $1.0\text{ m}^2/\text{s}$ may be appropriate for lightly-clad tall heavy adults, but lower threshold values apply to people who are shorter, lighter or more heavily- clad. Mosley(J.of Hydrology(NZ) Vol 22 1983) gives figures 0.4-0.6 for these.

Personal Communication from Prof Trevor Hoey Head of Dept, Geographical and Earth Sciences, Univ. of Glasgow.

Trevor spent 5 years in Christchurch where he did his doctoral research on braided rivers. He wrote: 'I always prefer to use ropes when crossing; rigid poles etc. seem to be either 100% effective or 100% ineffective, whereas a rope, especially if clipped on to a harness, allows recovery when one member of the group has problems. In terms of river dynamics, there are some simple rules: 1. wider sections are shallower, so generally safer (they may be faster flowing, but fast shallow flow is usually easier to cross than slightly slower deep flow). 2. always cross upstream of where two channels join as the join leads to scour and there are often pools of deep water that extend a long way down from the meeting point. 3. avoid crossing at sharp bends - these usually have deep pools on the outside of the bend, so you can get into trouble when almost in touching distance of the far bank.'

Trevor's advice regarding the dangers close to the far bank in those situations is underlined by the accounts one reads of people being swept away just as they were about to climb out of the water.

New Ways of Doing Old Tricks in River Rescue, Matt Barker; article in Ki Waho, The magazine for NZ's Outdoor Community, Issue No.2 The Spring/Water Edition, 2008, Edited by Anne Johnston, p.16-19.

Practical, commonsense, research-based, article describing the testing of equipment and ropes employed in rescuing people and recovering kayaks, canoes, or rafts. Information on rope behaviour and strength. Ropes of 6mm diameter were regarded as strong enough in spite of the forces involving craft being larger than those involving people only.

Back-country Accidents. Johnny Mulheron on River Crossing: Pt 1, FMC Bulletin, August 2008, p. 18.

Part of a useful series of articles. An account of a near miss in the Otira River when the sight of his car, just across the river, seduced a solo tramp into trying an impossible crossing. An incorrect map didn't tell him there was a bridge nearby.

Statistics and Coroners' Reports: Listening to the Dead:

I am grateful for the assistance given to me by Annie Dignan of the NZMSC Wellington who provided statistics and made it easy for me to consult the coroners' reports held by her organisation. I also obtained reports directly from the National Office of Coronial Services NZ. As a narrative of where Death has waited at the fords this information is of great value. Whilst there is plenty of anecdotal evidence about near misses it is unfortunate that no organization appears to be making any effort to collect this information.

Good statistical summaries existed for the period 1979-98. The number of cases, and the variety of techniques and circumstances, served as a useful starting point for more detailed examination.

Excluding those who were not tramping or hunting, the number of fording fatalities during the period was 44.

24 of these lacked mutual support and died unobserved 15 others died attempting to cross using a contact method 5 died using rope.

Not included in this list of deaths involving rope are three which I have added to the present discussion.

Deaths involving rope

Although the actual events are not described or analysed in the MSC publications reviewed in this paper, one can assume, reading the references, in those publications, to ropes being snagged and people being held under the water, that such occurrences have played a part in determining current MSC thinking. It is therefore worth analysing these incidents:

Rees River

My friend John Whitcombe died in the Rees River, opposite Mt Earnslaw, on 2nd Jan 1960. He had gone out on the end of a rope. I have been told by Bill Keir, who was in the area at the time, that John and his friend had got out to an island. While attempting to complete the crossing from there, John was swept away, carried around to below the island, and trapped there in the current. A party of two using a rope to ford wide water has a low margin of safety, but this fatality has an unusual feature that distinguishes it from a normal roped crossing.

Wanganui River (West Coast)

In 1987 a party of two, a father and son, on a hunting trip, used a rope, after heavy overnight rain, to cross Hendies Creek, a tributary of the river. The creek was dirty and perhaps a foot deeper than normal. The father drowned, being washed away when the son, who survived, and who had been attached to one end, lost the rope. The son, in his statement, giving evidence, said 'we tied the rope to each other. As we crossed dad got swept off his feet. I then lost my footing and was washed under. The rope had now come off'.

Again, a party of only two, one rope, and in tough conditions. While it was not as wide as the Rees, it appears probable, from the son's account, that they both entered the water at the same time. I believe, because of what happened to the rope at a most elementary level, we can discount this tragedy as one requiring further discussion as an example of the application of rope technique.

Waitengaue Stream (Kaimai Mamaku Forest Park)

A party of seven, two of whom had been on five tramps, and the other five on two or three, left the Waitawheta Hut during rain which had been falling since the previous evening. Here is the party leader's account of the events leading to the death of Peter Reyngoud in 1984:

'The stream was about 30ft wide, running very strongly, and about waist deep. Liebert attempted to wade across the stream with a rope held in his hand, he lost his footing and we pulled him back, he then tied a piece of wood to one end of the rope and threw it across the stream and after two attempts managed to get the wood hooked through the fork in a tree on the other side, he then held on to the rope and, using the current, crossed the stream. He threw the rope back to me and we tied it to a tree while he tied his end securely to a tree on his side. I then asked Reyngoud to cross using the rope as he was the next largest member of the party and I wanted two big people on the other side to pull our packs across and assist the other members of the party to cross. He entered the stream on the down current side of the rope and started to cross, he got about two thirds the way over and the water was

about waist high when he lost his footing, he held on to the rope and Liebert came across and tried to help him the rest of the way over, the current was too strong and he couldn't manage it. I think Reyngoud was beginning to panic as well. Liebert then tried to bring Reyngoud back to our side of the stream. I could see they were having difficulties so I entered the stream and tried to help. There was nothing I could do to help; I was on the same side of the rope as Reyngoud and it was impossible to do anything from that side so I went back. I intended to go back on the other side of the rope. I got out and entered the up current side but I wasn't back in the water when I saw Reyngoud going down stream. Liebert had been holding Reyngoud by his shirt and coat front, Reyngoud was not holding on to the rope at all at this time. I felt the rope had gone a bit slack in the water. I saw Reyngoud and Liebert go down a bit. I looked at the rope around a tree and saw that it had twisted around the trunk a bit. I believe that this is what caused Liebert to lose his grip on Reyngoud'.

Plenty to comment on here: 'a rope held in his hand' doesn't inspire confidence, nor does the idea of penduluming on a rope tied to a piece of wood snagged on the other side. It's a pity all this energy wasn't accompanied by the application of advice that had been widely circulated to the outdoor community during previous years. Nowhere does that advice recommend that a rope handrail alone should be used except in easy situations as 'where the ford is good, but where there is call for special steadiness in the water, as above a waterfall, rapids, or a deep hole, where there are inexperienced members in the party, or where the water is cold and a ducking must be avoided'... 'The handrail method may, and often should, be used in conjunction with the tie-on method Always use the tie-on method if there is the least danger of being swept away'.

The length of the rope used by this party is not stated but, had it been long enough, five of the party could have been shuttled across one at a time while tied in the middle of it. John Pascoe's aversion to the hand rail alone method was well founded. Carabiners were in widespread use by 1984. If Reyngoud had been clipped over the handrail he would have been in less danger.

When I look at the pictures published by the Mountain Safety Council illustrating their close contact fording method which involves grasping clothing behind their neighbour's back, I also recall the image of Liebert desperately attempting to save Reyngoud, also by grasping his clothing.

Hawdon River (Arthurs Pass)

The young husband and wife, Anthony and Paulette Heywood, were described in the coroner's report as 'relatively experienced trampers'. They had crossed the river in the morning but, by afternoon, after two days of more than 500mm of rain in the area, the river was described as being 'in high flood'. The river is braided but at the point where they crossed it was in a single channel.

To cross they attached what was described as 'a six metre length of nylon cord to each of the waist bands of their packs'. There were poles in the water at this point which were positioned to aid stock crossing, particularly in the winter months. When the couple were swept off their feet Mr Heywood held on to one of the poles for a time before both were drowned, trapped under the water, being held there by the rope around the pole. Mr Ray Goldring, of the MSC, submitted evidence to the hearing informing the Coroner of the efforts being made his organisation to improve the safety of fording.

Either of their two mistakes would have been enough to jeopardise their chances; the high flood, and the crossing point where braids concentrate cruelly into a single channel. As for the rope; does six metres of cord tied to the waist bands of their packs qualify as a serious application of rope technique? Not in any circumstances, and certainly not in those conditions.

Wanganui River

MSC statistics from a 1984 coroner's report record someone named Malcolm as dying while fording on a rope. A coroner's report briefly records that Peter Malcolm died at Ohinepa in 1983 while attempting to swim across the Wanganui River.

Whether or not a rope was involved, an attempt to swim cross the Wanganui River would not appear to warrant further attention in the present discussion.

Skippers Creek

Bruce Hunter and Irene Darling, in 1969, having climbed Mt Aurum on a short trip from Queenstown, during rainy weather, died on their way back while attempting to cross a branch of Skippers Creek. When their bodies were found in the creek they were tied to each end of a rope, the middle of which was attached to a tree. It was thought that Irene, having gone in first, attached to the rope, got into trouble, and that Bruce died attempting to help her. There being no witnesses any attempt to detail the actual sequence of events must remain as speculation.

Deaths resulting from failures of close contact methods

Various close contact methods have been used to link groups walking out in a line abreast. The water flows parallel to the line; at least that is the theory.

The MSC currently recommends close contact contact between neighbours in the group with arms crossed behind backs and hands grasping the neighbours clothing, or some part of their equipment, on the far side of their body. Once-favoured methods such as grasping each other's pack straps or belts, or linking arms, or linking through a shared branch or pole, appear to be out of favour .

One also notes an increased attention to what to do when you are being swept away downstream. I don't think I'm alone in regarding such advice as somewhat academic for much high-country water, particularly when the witnesses and coroners tell us about people dying having suffered head injuries almost immediately after being knocked over.

Without knowing details, I chose, at random, six cases from a summary list where a close contact method of some sort was used.

Anti Crow River (Arthurs Pass)

In 1979 a school party consisting of two adults, both experienced trampers, and six pupils (4 boys, 2 girls), had been in the area for about four days. In evidence, their leader, one of the teachers, said they 'had crossed several rivers and these had all been satisfactory and I felt that all members of the party had gained some knowledge of crossing rivers'. It is clear from the fatal sequence of events, that they were using walking abreast methods. The leader said they 'were advised and instructed of the dangers to expect when crossing rivers'.

The leader crossed first with two girls and a boy. He stated 'The water was 'about mid thigh deep. The water was in two channels, the first channel was swift water. The second channel was quite easy and low water and not swift. When I reached the bank and looked back I saw that Larsen(the other adult) and his party(2 girls, 1 boy) were in the water in the first (swift) channel. One of the girls was having difficulty. About midstream Larsen buckled around a bit, this possibly was on account of the swift water. The girl broke away from the girl near her and was swept away down stream and at this stage Larsen also went with the girl, while the other two, boy and girl, reached the safety of the opposite bank. The girl managed to slip out of her pack and float on it, finally reaching the safety of shallow water. Larsen, unable to remove his pack appeared to be floating down the river held under by his pack. The head injuries, which were obvious when he washed up on a shingle bank, must have been sustained while he was being carried down in the current'.

Little need be said: the vulnerability of a group isolated out in rapidly moving water is only too obvious. We could take from it a lesson that pack waist bands should be unhooked prior to fording.

Wilberforce Area

In 1981 Vern Thompson drowned while attempting to cross a stream while sharing a pole with two deerstalking companions. A Christchurch police Constable described him as 'a very experienced hunter and shooter. For many years he had instructed in river crossing so was quite conversant with all types of rivers and well aware of the safe measures of river crossing'.

The water was a bit more than three feet deep striking them at about the bottom of their shorts. The river bottom was reasonably good, free of boulders. One of the party gave the following evidence;

'We all linked arms around the pole, I was upstream, Vern in the middle, and Wayne was downstream. We walked in parallel to the flow of water and headed slightly downstream at an angle. about three quarters of the way across my legs were swept from under me and I went over on my side. I couldn't get up again and by this time the others had gone over. I let go the pole. I managed to get back on my feet as the water got shallower. I saw that Vern had also let go the pole and that Wayne had managed to get out on the other side with the pole. Vern was still in mid-stream and never got out of the main current. He kept his pack on and at this stage was floating on his back, his feet were facing down stream and he had his rifle over his shoulders'. He was seen to go through white water and over boulders before disappearing from view.

The lessons are stark. Anyone recommending a close contact method, grasping a pole essentially being no different from grasping clothing, should reflect on these events. Here were three strong and experienced outdoor men, the upcurrent one wearing shorts, the approved method of cutting down water resistance to the minimum, misjudging the strength of the current to the extent that he was unable to keep his feet, leading to a progressive collapse of the whole group.

Ruapehu Area; Wahianoa River

Nine in the party, one, Robyn Foster, drowned. There had been rain all night. One of them gave the following account of what happened in 1983;

'I'm not an experienced tramper. The river was moving very fast and it was obviously higher than normal. I was told there was a hole on the other side. Foster had blisters and was lagging behind; when she and I caught up with the group three of the nine had already crossed. The leader told me to cross with Foster in the middle, above Alcorn. I was on the upstream side. Because of Foster's experience I was quite happy to cross with her. My instructions were to keep facing the other bank, link arms tightly and someone said to keep moving steadily all the time. The first half of the cross was easy, about knee deep. I was aware that Foster was hanging back a bit. Alcorn was behind her. I shouted to her to keep up with me. It was then thigh deep and I sensed that she had lost her confidence to get up to me. Our arms were still strongly linked. At that stage it was too late to go back because we were about two thirds across and in the thick of the current. The current was very strong. I myself was starting to have doubts. I couldn't hear any instructions from the bank over the roar of the river and the wind. I told Foster again to get up with me so we would all be side-on to the current. I got thrown forward because we had hooked feet and everybody went everywhere. I cannot recall exactly the unlinking of arms and I didn't see her go. I got taken downstream by the current but got to the other shore in a few metres and Alcorn a little further on.'

Another demonstration of the fragility of close contact, the sad illusion that, when a group ventures out into turbulent water, there exists a strength in numbers; an illusion shattered by nothing more than a stumble, a tangle of feet.

Mt Taranaki Area; Stream near Ngatoro Track

The Hawera ladies group (at least one was over 60) on their Monday outing in 1989, four of them, three of whom were experienced trampers, with one man. One of the women died. Returning from Makatawa Hut they had crossed this stream on the way up, without getting their feet wet, using

stepping stones. Now after rain it was muddy and swift though only three or four metres wide. Here is the account by one of them;

'we eased out a little bit with our arms linked with Mr Blake encouraging us to follow him. Jean then hesitated and said no, that she didn't want to go and that she didn't think she could move her legs without being swept away. At about that point somebody slipped and I am not sure who, but the next thing I recall is the three of them tumbling down the stream, that is Mr Blake, Doreen, and Jean. Doreen, who died, didn't appear to struggle like the others and I can last recollect her lying on her back sort of floating down the stream, not like the others who were grabbing at things and who saved themselves.' In other evidence she was described as looking 'very calm' as she floated away. Another woman stated; 'Doreen let go of my arm...I grabbed hold of Doreen's jacket, but the water was too strong and it slipped out of my hand'.

Clearly a case where returning to the hut was called for; which is what the women had wanted to do. Blake persuaded them to cross. It seems probable that Doreen was not drowned but very quickly knocked unconscious, a type of occurrence which is not uncommon and which is a sobering footnote to what the MSC has been publishing about so-called recovery methods to be employed when one is washed away. On such a narrow stretch of water, most parties, with a little training in the use of rope, could have tackled that crossing without significant danger.

Arthurs Pass Area; Bealey Stream (1996)

The stream was discoloured and swift and about knee deep. The three men were all experienced trampers and one of them had crossed the stream at this point twice before. Here is what he said;

' the three of us linked arms with David up stream, Robin in the middle and myself downstream. We were three quarters of the way across and David lost his footing and stumbled. He didn't fall over. We got things steadied and the order changed. Robin up stream, David in the middle and me downstream. It didn't cross my mind that we should have pulled out. I didn't consider it dangerous. We continued across. It was only 6-7 metres wide and we were only a metre or two from the bank. At that point I stepped into a deep hole and lost my footing and went under. The water was over my head. I went to the bank straight away and pushed my pack off and onto the bank. I then went back into the stream and attempted to help the others. They were on their bums sitting down in the water, not bound together, a couple of metres apart, with David closest to the bank. David got to the bank himself but Robin was swept away. When I found Robin some distance down the river he had bumps on his temples and was dead'.

Shallow water, only a few metres wide, but the hole was unpredictable; it would be rash to claim that they could have bound tighter together. Again, the fatal vulnerability of close contact mutual help. It was a situation that cried out for the simple, fail-safe, routine, use of rope.

North Canterbury Tragedy

The NZ Mountain Safety Council view. In 1995 four members of the North Shore Tramping Club entered a side stream of the Hurunui River with linked arms after moderate rain. One of them described what happened;

'As the turbulence became more evident we decided to abort the crossing and commenced a return, still linked. Nola Ogle [who died] was on my left arm and she had two others on her left. She either lost her footing or was forced by the current and released her grip on me. She and the two others were swept downstream towards the main Hurunui River.'

A sadly familiar story needing no discussion. However the evidence given by the Programme Manager for the NZ Mountain Safety Council, who appeared at the Coronial hearing, gives us a clear picture of the new thinking approved by that body. Ray Goldring was the co-author of Bushcraft Manual No.31 which was about to be published. His attitude to the rope has been described earlier. We would expect

a defence of close contact support and that is what we got. He describes the three methods approved in some previous MSC manuals.

1. Clothing grasp, arms behind neighbours, a method, he stated, that 'is appropriate for shallow water which would be no deeper than mid thigh'.

I'm alarmed by this statement. Commonsense tells me that some mid-thigh deep water in the high country, such as that described above in the fatal crossing in the Wilberforce area, can kill you. Prof. Chris Paola, as reported earlier, adding scientific rigour to our commonsense, states that to gauge the force of water we must factor in the velocity as well as the depth.

2. Hip belt grasp method

This is recommended for deeper crossing and involves trampers putting their arms behind their companions and grasping their hip belts. This is currently the best method we have available and is suited to all safe river crossing conditions.'

Now I'm mystified. If it's safe why not just walk across? We can assume that most of those who died thought they were safe too. If Goldring, an experienced outdoor man, says it's safe, I think he is trying to tell us that it's safe if we use methods recommended by the MSC. But he hasn't removed the need for us to judge that any particular ford is a suitable place to use them.

Unfortunately, we know that many, making this judgment, have gone sadly wrong, and it was the combination of the need to judge and the crucial lack of a fail-safe component in the close contact methods that killed them.

3. The pole method

This is still a popular method and is best used in similar circumstances to the best grip. However, a flaw in this method is that if a member of the party loses grip he/she can't be rescued without the rescuer also letting go of the pole.'

He also recommended that, when aborting a crossing, rather than attempting to turn around, the participants should walk backwards. However, MSC Manual 39 also recommends, for those who have backed into safe water, a group turning maneuver entitled the caterpillar turn.

The sad facts are that even when they have been linked, in some way, above water level, people are on record as having lost their footing because of the water pressure on the lower half of their bodies carries their legs away.

Witnesses tell of this, and of legs tangling with those of their neighbours. This pressure would always threaten stability irrespective of which grasping method is used.

Goldring went on to say that the pack strap and the pole methods are no longer favoured by the MSC which now advocates walking close together while grasping clothing or a strap with one's arm across behind the neighbour's back. This close contact, involving some remaining support from your neighbour, even if you yourself have let go, is obviously designed to avoid the catastrophic disintegration that is a commonplace in the coronial evidence. But can we rely on this?

No matter how rigidly it holds together, an uncomfortable fact remains: the group is an isolated entity, at the mercy of all manner of traps, such as unseeable rocks and holes, unpredictable channeling, variable water velocity, and unexpected erosion of the shingle under their boots causing a rapid loss of balance. All of this could end up proving that those trusting people are no more secure than a big log waiting to be swept away.

Such is the turbulence of river flow fighting its way around on a rocky bottom that we could never be

sure that the group would always be side on to it. In fact it is conceivable that the very rigidity and closeness of the wall might hinder the free flow of water through the barrier and therefore increase the pressure.

Another question; will they actually hold together any better? I assume we have all used the pack strap method, not necessarily for safety, but merely to avoid slipping or tripping on rocks. Did you walk straight all the time, remaining as close to your neighbour as the illustrations depict? No, you moved around a bit, picking out the best line, around or over stones and boulders, putting your feet where you felt most secure. To expect people in a more serious fording situation to maintain a regular line ahead across all of the pitfalls mentioned in the previous paragraph is naive.

Whatever grasping method is used it is the strength of the fingers that determine success or failure. Are you prepared to stake your life on that strength? If you were climbing vertically would you be happy just hanging down from the rope with your fingers, or merely grasping your fellow climbers' clothes? Why should you do so to survive horizontal forces that threaten to carry you away? The force of water can be overpowering, the stress on your fingers, and on the fingers of your grasping neighbour. Can you hold, especially as you yourself are now likely to be in difficulty? Can you be sure that, in these circumstances, grasping, of any sort, is adequate? I hope that no more die providing the answer.

Acknowledgements

Thanks are due to the Federated Mountain Clubs Mountain and Forest Trust for providing funding for expenses connected with this research.