Swiftwater and Flood Rescues
Rescue Throw Bags

Part 3 of our continuing series: "Swiftwater Rescue-Back to Basics".

The "throwbag" or "Rescue Bag," has become virtually synonymous with swiftwater rescue over the last 25 years, as familiar to rescue teams as the lifejacket and inexpensive whitewater helmet that covers the ears of the wearer. Like the helmet and lifejacket, there are as many types and designs of throwbags as there are manufacturers, as virtually every company with an industrial sewing machine have felt compelled to enter the market with their "unique" product. Today there are bags varying in quality from "home brewed" bags put together from a stuff sack and cheap line by small departments determined to "save money," to aerodynamically designed bags capable of deploying extremely long distances.

Indeed, when questioned, most water rescuers consider the throwbag the minimum requirement for shore-based rescue techniques.

Yet, when I started working as a commercial whitewater guide in 1973 there was no such thing as a throwbag on the river. Instead we carried short hanks of rope for bowlines, and for throwing if necessary.

Legend has it that the throwbag was the result of a couple of canoeists in the northeast of the US delving into an old nautical training book; they supposedly saw a drawing of a canvas bucket with rope stuffed into it utilized as a "field expedient" device for passing a line from ship to ship at sea. Using a sleeping bag stuff sack and some light polypropylene line the throwbag was born. Later on a piece of foam was added to provide some flotation in aerated water. Soon canoeists and kayakers in the east were carrying bags, and eventually professional guides started to see the value in them.

A variation of the original idea that has continued to be used is simply a plastic jug with cheap line stuff into it. These "rescue jugs" are found throughout the US, particularly in the trunks of large fleets of police cars in flood-prone southern states.

By the time we started teaching the Swiftwater Rescue Technician program in 1979, the throwbag was part of our curriculum, as it was in similar schools in Ohio, North Carolina and elsewhere by the American Canoe Association.

Indeed the antecedent of the rope bag for high angle rescue teams was the humble throw bag. It wasn't too long before other rescuers saw the value of the throwbag, particularly rope rescue teams, who had traditionally coiled their ropes, and were then forced to "flake" the rope out before it could be used. As the result rescue ropes, some up to 300 m. long, are now routinely stuffed into bags, so that they can immediately be used.

And the rest, as they say, is history.

The endless arguments since then have centered around: how to throw it, retrieve the line and toss a second time, belay a swimmer with it, and other uses for it.

Construction and design of "rescue" bags has certainly improved since our early homemade versions. "Premium" rescue bags today are made of 1000 dernier nylon to reduce damage from wear, have grommets to reduce rope wear, are stuffed with high-density foam and use hybrid ropes for great strength. Early bags were stuffed with simple braided polypropylene. The rope floated, but had little tensile strength.

Today's throwbags are filled with ropes made of a mixture of polypropylene, Perlon, and Spectra ™ to provide not only a bit of positive buoyancy, but also enough strength so that they can be used in some rope rescue applications in an emergency.

"Rescue" bags today generally come in three lengths, depending on use.

Small "parrot" bags, generally containing less than 9 m. of 8 mm, are designed for boat-based rescues-a guide making a short toss to a passenger who has fallen out-as well as for emergency tie-lines, flip lines and anchors. "Standard" rescue bags generally contain 18 to 25 m. of 9-mm. line. And some bags are filled with as much as 30 m. of rope, though it is a rare and strong arm that

can pitch one that far.

Bag design has changed little in all of that time, other than cosmetically. Some designers make the bags completely of mesh so that the water will drain out; while others are fully encased so that the water will stay in the bag to aid a second toss. Most are cut cylindrically with a flat bottom, but some are cut in a flatter shape. Some are made with a rubber "bobber" on one end to aid in a second toss, while elsewhere, particularly in the general opinion of the British Canoe Union, the end of the line must ABSOLUTELY be "clean," with no knots or attachments, to avoid getting the end of the rope stuck in rocks and other obstructions in current. In recent years, many companies, including Force 6, Northwater, and Northwest River Supply, have adapted the concept originally created by Downstream Products of Bothell, Washington, US, and have made a bewildering selection of "butt bag" throw lines, the idea being that the thrower can simply undo the buckle, take out the end of the rope and throw the whole rig. Some of these arrangements are designed to be used as "strong swimmer" belt, to carry extra gear for boat wraps-such as a prusik loop and a carabiner-and to attach flip lines. Some have the bag inside a pouch. And some have a bag on a quickly release strap on the side so it can be thrown in a "quick draw" motion. Below: Northwater "butt-style" bag/belt.

Regardless of design many organizations operate under the comfortable delusion that, having purchased lifejackets and throwbags, they have dealt with the basic issues of water safety and primary water rescue.

The reality is that the throwbag is like the first aid kit that hangs near the water cooler in many offices, providing a subliminal comfort level to employees just by being there. Then, on the day it is most needed, those opening it discover a mystifying bundle of vials, bandages and packages.

Like the office worker and the first aid kit, most rescuers note the presence of the rescue bag, but never take it off the truck. After all, its there, its full of rope, its use is obvious. Whitewater guides, canoeists and kayakers are equally sanguine, generally not taking the time to practice with this most basic of rescue tools, resulting in poor performance when needed most.

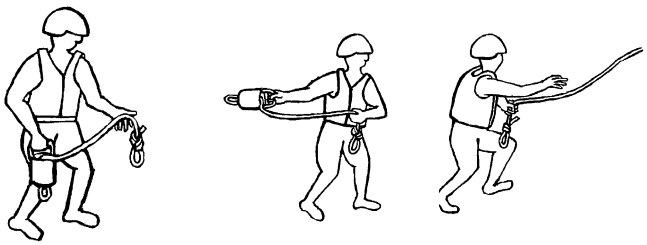
The result is that in the moment of urgency and emotion rescue ropes are inexpertly thrown-short of the victim, behind the victim, too far downstream of the victim, behind the thrower, up into the trees, and occasionally the whole thing is thrown into the river! In short, most rescuers are miserable at simply throwing a rope, much less to a distressed victim 20 m. from the bank going off in the dark at 30 kph!

By way of example: The test for certification as a Swiftwater/Flood Rescue Technician © includes a series of skills tests, one of which is to throw a rescue bag twice within 20 seconds to victims at least 15 m. from shore, moving downstream at 20 kph. First-time failure rate at that station averages more than 50% internationally. Instructors are required to pass that test in 15 seconds or less.

The test is simply designed to highlight the fact that most thrown ropes miss on the first toss, and the rescuer needs to have training and technique to get the rope back and throw it again before the victim is washed beyond reach.

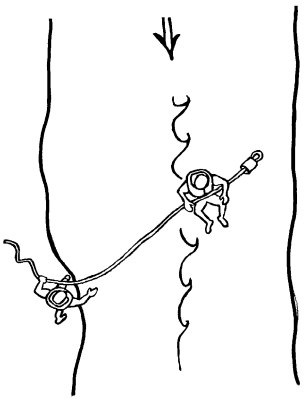
Practice Makes Perfect

I generally start my throwbag drill by having students face each other about 15 m. apart in two opposing lines, and then have them simply toss the bags back and forth. This drill gives them an idea of the weight, the arc needed to get the back the distance, and the point in the arc at which they should release the bag. I don't make a big deal about stance, which foot to go forward, whether to hold on to the strap or the bag, or whether to throw sidearm, underhand, or overhand. The idea is simply to get the back accurately from here to there.

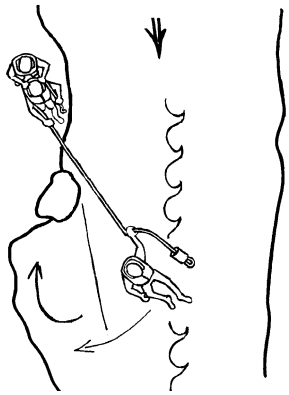


Once everyone is comfortable, and with the caveat that there are approximately 200 ways that have been suggested as to how to do this, I recommend as follows:

1. The end of the rope should be held in the offside hand, and the bag should be thrown with the strong arm.



2. The thrower should choose a place with good footing, hopefully with an eddy immediately downstream, and perhaps with a tree or rock close at hand in case it is necessary to take a half-turn with the rope for additional friction. If necessary, a place should be chosen so that the rescuer can walk downstream as he or she pulls the victim towards the bank. The thrower should avoid places where the victim will swing into rocks, debris piles or other hazards, and should avoid throwing from the inside of turns, since the current will push the victim hanging on to the rope towards the outside of the turn.
3. Ideally there should be at least two throwers set up as safety. If such is not possible, the single thrower should have more than one bag. I suggest a series of bags, tied to trees or posts, so that one thrower can run along the bank, throwing bags as necessary.
4. Accuracy is the key. The rope should be thrown UPSTREAM of the thrower but IMMEDIATELY IN FRONT of the intended victim, with the bag beyond the victim. If the rope is upstream of a victim in panic, it is unlikely he will look around for it, and even it drifts downstream and around the swimmer's neck, such a victim is unlikely to even realize the rope is there. If it thrown too far downstream it is unlikely the victim will swim for it, particularly if thrown in aerated waves. All that should be necessary is for the victim to simply grab the rope.
5. The rescuer should communicate his intention by yelling, blowing a whistle, and holding the bag up for the swimmer to see. If the swimmer DOES get the line, the thrower should encourage the swimmer to "get on your back!" The natural instinct is to roll over on one's face in order to see the thrower, which will create more



drag, potentially pulling the swimmer under, or forcing him to let go. Ideally, the person receiving the line should transfer the rope to the OUTSIDE hand, which helps set him into a "ferry" angle to the current, thus pulling him to the bank faster.

6. Once the victim has the rope, the rescuer should quickly transfer the end of the rope to the strong hand and bring back as much slack as possible, in a small "butterfly coil." This will prepare the rescuer either for a second toss using the coils, or, if the victim DOES get the rope, the coils provide some slack to help keep the victim on the surface while he is being towed towards shore.

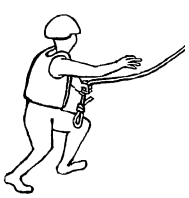
The small loop frequently seen in throw bags should be kept small enough so that the thrower is not tempted to put it over his or her wrist! Further, as mentioned, there is some merit to the idea of not have any knot in the end of the rope at all, since if the rescuer is forced to let go and the victim is ensnared in the thrown rope, the end will not "chock" on the bottom of the river, creating a potential entrapment, where a few seconds before there was a rescue.

7. Since the victim will frequently not be wearing flotation, any tension on the line may pull him or her under the water. Once tension is on the line and the victim is swinging toward the bank, the rescuer can either walk downstream while pulling in more rope, or play out slack to help keep the victim on the surface.

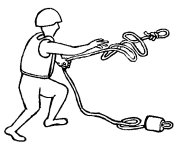
8. In situations where the water is moving very quickly and the shock load is going to be big, more than two rescuers should hold on to the rope, or one rescuer should hold the rope while another holds on to him. However, I strongly advise avoiding "body belays," or putting the rope around one's waist. This stance looks good in the movies, but one must remember that the shock load of even one swimmer at the downstream end of a 15 m. rope in a 20 kph current will be several hundred kilos minimum. Thus the well-intentioned rescue is in danger of a lower leg injury or even being pulled in as well.

9. Instead, the diagonal belay, as taught in the UK, is suggested, when a belay has to be used at all. The rope is thrown from the strong hand with the rope behind and over the opposite shoulder, the opposite leg ends up forward in the toss, so the thrower can pull in with the strong arm, down with the off-hand arm, and squat at the same time, thus putting the force downward and establishing a lower center of gravity. If unable to hold the line, the absence of the knot in the end makes good sense with this technique, since the rope will simply slide throw one's hands and away.

10. In the very likely event that the thrower misses on the first toss, the drill remains the same: The thrower transfers the end of the rope to the strong hand and starts re-coiling in small butterfly coils, while coiling he moves downstream until he has enough rope to reach the victim and then throws the END OF THE ROPE as the second toss. Granted, most programs suggest the bag partially filled with water as the most effective second toss, which is a good idea if the victim would simply stay in one place long enough to pull back the entire rope in order to throw the bag! The bags with the big rubber float on the end are designed so that the float helps that second toss, and to provide some flotation on the end of the line.



11. The THIRD TOSS will be the bag, partially filled with water, with some small coils in the hand in order to give it some distance.
12. The rope is ALMOST ALWAYS recoiled in to the strong hand. Experience and time have shown that trying to recoil into the off-hand and then transferring the coils inevitably leads to the coils becoming enmeshed, so that when they are thrown they only go a few feet.
13. The most common error with this method is the failure to transfer the end of the rope from the off-hand to the strong hand. Instead, the rescuer starts bringing coils back to the strong hand, and then attempt to throw the MIDDLE of the rope.



14. Another common error follows the suggestion of standing on the rope while recoiling. While this suggestion makes sense on the face of it, rescuers frequently move their feet just prior to tossing the line, and simply throw the whole kit and caboodle into the river as the result!
15. A caution must be to emphasize that all these drills involve throwing a bag to someone wearing flotation; and that during flood rescues it is improbable that victims will have such flotation. So, if the rope does reach the victim the rescuer MUST encourage the swimmer to stay on his or her back, and NOT roll over to look at their savior, since that will like push them underwater, and most certainly will put water in their face. At the same time the rescuer will need to be moving-running more likely-downstream while pulling the swimmer to the bank, since too much pressure on the rope will force the swimmer to let go.
16. A final suggestion for night operations is to secure a Cyalume light stick to the bottom of the bag, so that swimmer will actually see what they are swimming for!

Having covered those basic suggestions, I then have one line of students take the end of the rope from the bag, hold on as suggested and lob the bag to their opposite, the idea being to try to put the bag through the upheld arms of the "target," not unlike goal posts. I also caution those opposite to protect their faces if it looks like the bag is going to hit them square on.

Once the bag is thrown, students then practice recoiling into their strong hands and throwing the coils. They then re-stuff the bag, something they will quickly discover is the most tedious but necessary of basic swiftwater rescue skills. Properly re-stuffing the throwbag is best done by either using the thumb and first two fingers of one hand as a guide and then put the entire other hand in the bag in order to pull the rope in; or run the rope either over the shoulder or through a carabiner hanging on the front of the life jacket, so that the both hands can be used to push the rope into the bag a few inches at a time.

So critical is this skill that the instructor must caution students to avoid speeding up the tedium by grabbing several loops and shoving them in the bag, as this will cause a "bird's nest" of rope to potentially hang up the toss the next time the bag is used.

After a couple of tosses and re-stuffs on each side, we repeat the drill, only for time. The requirement is to toss the bag twice, ACCURATELY, within 20 seconds. This portion of the drill is endlessly entertaining, with ropes going in every direction except towards the "victim," and the majority of second tosses not even close.

Practice makes Perfect

At this juncture students start to understand why we've spent so much time on such a seemingly simple skill. As the course goes on, tosses become progressively farther and more accurate. The "trick" is to continue the practice as an on-going thing. I always suggest to firefighters that they play a variation on "horseshoes" with the bags. Teams of two set mop buckets up on the apron behind the station about 50 feet apart. Each team has three throwbags. The idea is to throw the

bags in the bucket-good for three points. A bag that "leans" on the bucket is worth two points and a bag that lands within a bag's length of the bucket is worth one. The first team to score 21 wins!

Another fun drill is to simulate the hammer toss with the bag. Each contestant in turn holds on to the bag by the handle and can approach the line either with a twist or any other wind-up, the winner throws the bag down range the farthest, but within flags set up 20 feet apart. Each contestant gets three tosses.

Variations On The Theme
The "Shotgun" Toss

The biggest challenge for the rescuer with a throwbag is getting the line accurately to the swimmer who is moving past at some considerable speed. And the faster the current the greater the challenge. Thus the basic concept of making sure that multiple throwbaggers are set up, ideally on both sides of the river, downstream of the rescue location as downstream protection.

Frequently rescuers find themselves protecting extremely fast moving locations, which may be narrow-such as flooded low-water crossings, rivers with extreme drops, and narrow storm channels. All of these situations beg the questions: Is it effective to throw a 75 foot throwbag when the distance is only 30 feet or less?

And what to do for a second toss when the victim goes rocketing past at 20 miles per hour? The answer to both questions is that in such circumstances it is virtually impossible to recover all the line and throw effectively a second time.

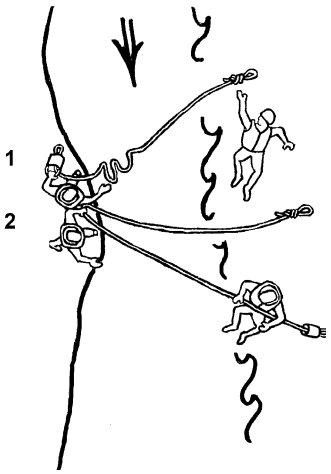
A possible solution is the "shotgun toss." The throwbag MUST have a loop in the end, or alternatively, as goofy as they appear, one of the throwbags with a float ball attached to the end is a good alternative for this method.

The thrower takes the first half of the bag out in loops in the strong hand, holding on to the bag with the weak one. The coils are thrown first, (1 in the picture) and if the swimmer doesn't catch the rope, the thrower quickly switches hands and throws the bag as the SECOND toss, (2 in the picture.). Thus, two tosses can be made in virtually as many seconds, effectively like a double-barreled shotgun.

The "shotgun toss" also is a potential way to catch two swimmers, one on each toss, the hazard being that the thrower on the bank is left hanging on to the middle of the rope with double the load! In such situations another rescuers to help hold the lines would be advisable.

The "Human Throw Bag," or "Live-Bait" Rescue Technique

Given that shore-based line throwing techniques are virtually useless to assist an injured or unconscious floating victim; and that free swimming rescues in current present the greatest challenges and hazards to rescuers, one alternative that has become standard practice is a tethered swimming rescue, combining a rope with the "quick release" rescue belts that have either become part of many rescue lifejackets, or the independent rescue belt/bag combinations, or independent rescue swimmer harnesses mentioned earlier.



Originally developed for offshore rescue operations, the harnesses are now integral to many swiftwater rescue lifejackets. Like the throwbag they have become so commonplace that many rescuers simply assume their ease of use.

But like the throwbag nothing could be farther from fact.

Early stories of tethered swimmers emerged from Russia over two decades ago. Russian whitewater enthusiasts, hardy pioneers, determined to run as much of challenging rivers as possible despite homemade rafts and inadequate lifejackets and equipment, developed a last-resort technique for catching

rafts headed for falls and dangerous drops. One fearless, (possibly brain-dead) participant, donned a pair of coveralls stuffed with extra flotation and tied a rope around his waist. If

the paddleboat or raft missed the last eddy and throwbaggers stationed on the bank, this "forlorn hope" then jumped from the bank into, or close to, the boat, thus "anchoring" it so it could swing to safety!

The most obvious downside of this particular "system" was that the potential for drowning tied to the end of the rope was fairly good.

The quick-release system initially grew in popularity among European whitewater boaters, who saw its use more for rescuing entrapped swimmers and kayakers, rather than as a swimming rescue tool. The harness design has changed little, featuring a plastic buckle with a quick-release toggle, and generally a back plate to increase the friction by weaving the webbing through it first. US manufacturers recommend the webbing always be weaved as illustrated, while European boaters suggest going straight through the buckle, since the back plate may create so much friction that the belt won't slide when the buckle is opened under some low pressure situations.

Finally, if the life jacket is being used for swiftwater rescue, most professional urge the use of the "cow's tail," an additional webbing strap with a carabiner on the end that is fixed to the quick release point in the back of the jacket. The carabiner is then attached with a breakaway loop to the front of the jacket. The rescuer can then hook him up to the rope without dislocating his arm trying to reach behind. This cow's tail also aids an entrapped swimmer, since they can hook themselves up to a line thrown to them.

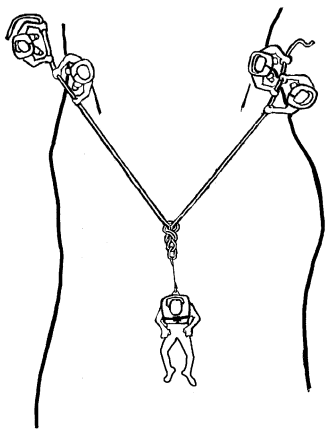
The best "cow's tail" system on the market is on the swiftwater rescue jacket generally recognized as the best in the field, the Force 6 SRS Lifejacket ™ made by Force 6 of Vancouver, B.C. www.force6.com Unlike other designs the harness strap clips close to the chest and over the shoulder. The rescuer can easily hook himself up, but the chances of getting the entrapped by the strap is virtually eliminated.

There are other, completely independent "live bait" tethered swimmer "systems," designed to simply be worn over the top of any PFD, such as the one shown here from Northwater.

The "live-bait" rescue lifejacket is not, as mentioned, foolproof. Sometimes the system won't release when the toggle is pulled-either because the webbing is folded over, or sometimes because the carabiner attached the back ring has slid across and hooked on the belt loop-a design flaw in most US manufactured rescue lifejackets. Sometimes the system releases when the rescuer doesn't want it to-generally because a combative swimmer grabs the toggle during a struggle, or because the buckle wasn't compressed closed completely at the outset.

So, using these jackets as an adjunctive rescue tool is HIGHLY recommended to be a technician-level skill, and should be further restricted to strong, confident swimmers, who feel they could make the swim even without the aid of a back-up rope. Again, too much dependence on the equipment, rather than skill, can be a formula for failure.

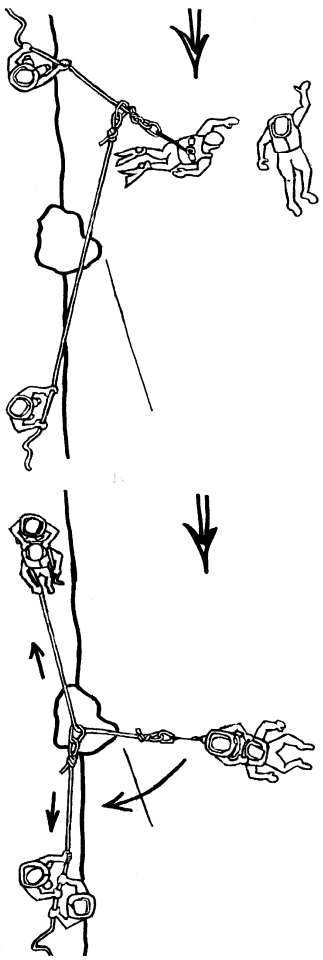
In my swiftwater rescue class I



include a drill where I tether each student in the middle of the river and have them purposefully release from the jacket. This drill gives the student an idea of how an air pocket will start to form over the head of a trapped victim; and also how such a two point system could be used in a very high-risk application to lower a rescuer down to an entrapped victim.

Again, the jacket doesn't always work as advertised.

As mentioned earlier in this series, rescue swimmers should wear fins; the extra propulsion is needed to get out into current fast enough so that they can reach the victim; plus, if necessary, they can reverse and use



the fins to keep themselves away from a victim in full-blown panic. The best fin currently on the market for this purpose is the US Divers Shredder Fin. ™ (See Product News item this issue). Scuba fins are too long, and don't work effectively in the laminar flows common to river currents.

In essence, the technique is just what the names imply, the swimmer becomes a "throw bag," throwing himself into the river with a rope attached to the release point on the back of the jacket, swimming out to grab the unconscious or injured victim, and both are then pulled back to safety. This technique even works well for combative victims, since the rescue swimmer only has to hold his breath for a few seconds while being pulled to safety. In fact, rescue swimmers have actually grabbed two or three floating victims in one attempt. As long as there are enough rescuers on the bank holding on to the rope, such multiple rescues are certainly possible.

The trick with this technique, like the throwbag, is timing. If the swimmer goes too early it is hard to stay in current waiting for the victim to reach him. If he goes too late he may have to chase the swimmer, possible to the end of the rope. Even

the entry is important. I suggest a head up "belly flop" so that the swimmer can get across the helical flow into the fast current as quickly as possible, rather than a jump or "scooting" entry. The head is kept up to keep an eye on the swimmer and to protect the cervical spine.

I've determined that the faster swimmer and victim get back to the bank, the less the chances of something going wrong during the attempt. Further, there are situations where the angle on the rope will be wrong to be pulled back to the bank, such as deploying a swimmer from the inside of a turn. For safety and speed, the "vector pull" works well. A least two rescuers on his direct line protect the rescue swimmer, while one or two others are deployed downstream at least the same distance as the potential swim, with a rope attached to the first line by a carabiner.

As soon as the swimmer reaches the victim and has a firm grip, BOTH lines pull back, created a mid-point vector and accelerating both rescuer and victim quickly back to the bank.

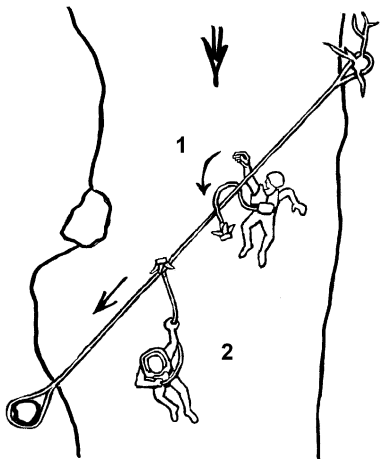
Innovations and New Devices

Several times a year I see "new concept" rescue bags, but very few have more than cosmetic changes.

However, two newly designed throwbags are definitely a quantum leap forward.

The Force 6 Rescue Bag ™ (www.force6.com) manufactured in Vancouver, BC, and developed by swiftwater rescue pioneer Jim Lavalley is revolutionary in design and application.

While several bags have come out in an envelope shape, the Force 6 bag is the first to be specifically designed in a wing shape, so that it will actually "fly" when thrown. The patented design also keeps the majority of the rope in the bottom of the bag, narrowing at the top. The combination of lower weight and wing shape allows even those with average strength to pitch the bag nearly 25 m. on the first attempt, something only the strongest can do with a "regular" design.



Covered in an earlier issue the REACH ™ device, developed by early Rescue 3 instructor Mike Croslin of Crossline Systems of San Rafael, California, is ideal for securing a floating rope, for instance when trying to pass a line across the river. The REACH will grab another rope virtually without fail.

One suggested use is as "reverse throw bag," for rescue swimmers or for rescue boats. The REACH can either be attached to the front of the rescue jacket over the rescue "blow-out" belt or kept clipped in a boat.

A downstream fixed line is then set, either floating along an eddy line, or at a diagonal (illustrations). The swimmer or boater pulls out the REACH and throws it FROM the water towards the fixed rope. The REACH clips on and the swimmer, or boat, swings to the bank. (www.crosslinesolutions.com)

Finally, a note about a device we saw several years and and most of us discounted. A plastic Frisbee-like device had a light polypropylene line wound around the outside, the idea being that while holding one end the rescuer could throw the "rescue disc" to the distressed swimmer. Since the idea of getting hit between the eyes by the disc was scarier than the potential for catching the line and being pulled to the bank, I put mine in my basement Museum of Failed Rescue Devices.

Now it has re-appeared, but in a significantly improved design. The Life Saver ™ is easy to use, goes a good distance, and provides several pounds of positive flotation, as it is foam-covered! It is easy to re-toss as well.

The inflatable throw bag from Rescue Solutions International of San Diego, California also gives the swimmer a inflated ring buoy, a definite plus.

The Future

As I write this somewhere there is a rescuer who has already thought of the next development in making a swiftwater or flood rescue faster and safer. The technology is there to make smaller and lighter throwing devices, and better adjunctive devices. Force 6, for instance, has a new release system design which is likely to revolutionize lifejacket design within the next few years. At the moment, however, it is in the "I have to kill you after I show it to you" stage.

And most encouragingly these new devices are less oriented towards rafters and kayakers, and more oriented towards their much greater need in the growing swiftwater/flood/tsunami events occurring around the world.

The throwbag and other shore-based methods account for the vast majority of swiftwater rescues already. There is no reason that the percentage can't increase. TR