

Chapter 2: Wading, Swimming, and Crossings ¹

Rescuers have a need to move around in the water to effect rescues. They can wade in the water, swim, or use crossing techniques. This section covers several of these techniques. A secondary benefit of wading and swimming is that they increase the comfort level of rescuers in the water.

Wading Techniques

One way to reach the victim, move rescuers into position, to cross the river, and to alter river dynamics is through the use of wading techniques. Some of the commonly used wading techniques include solo wading with a paddle, two-person wading, four-person wading, pyramid, and in-line crossing. Generally, these wading techniques are differentiated from rope crossings since they are performed without the use of a rope.

Solo Wading with a Paddle (Figure 2.1) – The river bottom is rocky and uneven. A three-legged stool is very stable, even on an uneven floor. The three legs create triangulation and the stool easily adjusts to the unevenness. Solo wading with a paddle creates the same type of stable triangulation using the paddle and the two legs of the wader. Triangulating with a paddle can create the stability provided by a three-legged stool on an uneven river bottom.

To move in the water using this technique, place the tip of the blade on the river bottom. The current will force the blade downward which helps to keep the blade fixed to the river bottom. This makes the paddle very stable. Using the paddle for stability, the wader can move laterally in the water. Avoid crossing the feet since this reduces stability. When the feet are stable, reposition the paddle.

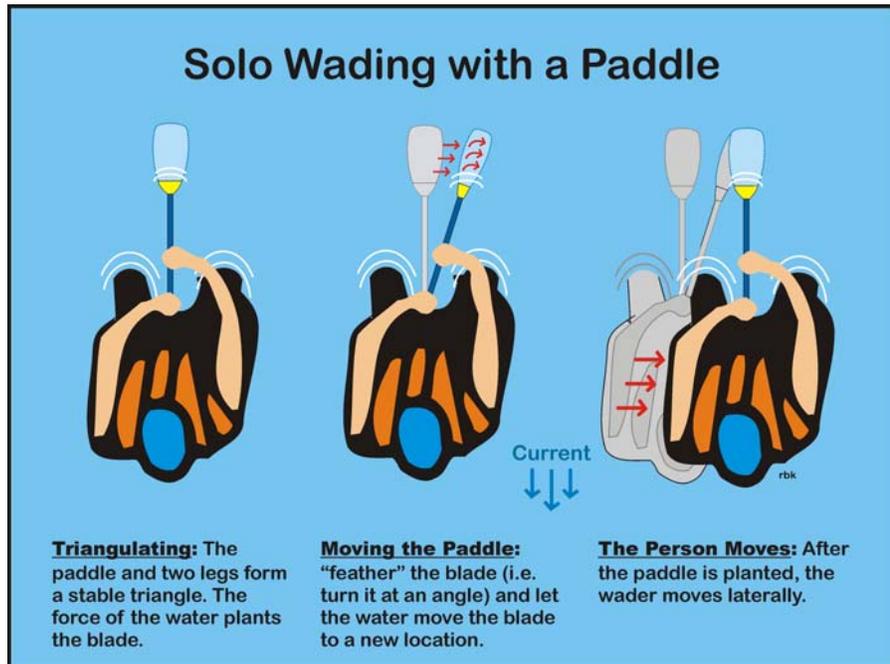


Figure 2.1: Solo Wading with a Paddle The paddle and two legs of the wader triangulate and create a stable base in the water. Source: author – [file:\SWM-WadeSolo.cdr]

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Repositioning the paddle can be done two ways. The paddle can simply be lifted out of the water and replaced where it is wanted. This works well in shallow water, but becomes cumbersome in waist deep water. Also, this can lead to instability since the third leg of the triangle is removed, if only briefly.

The second method is to feather the blade of the paddle and use the force of the current to move the paddle in repositioning it (see Figure 2.1). This approach works better in deeper water and maintains stability because it lessens the time the blade isn't in contact with the bottom. Feathering the paddle is turning the blade so that it is parallel with the current. This minimizes the force of the

current on the blade. Angle the blade slightly and the force of the current will move the blade in the direction that the top of the blade is pointing. Reverse the angle of the blade and the force of the current moves the paddle the other direction. Quickly turn the blade to the current and the force of the current repositions it on the bottom.

Two-Person Wading (Figure 2.2) – Where the solo wading with a paddle uses a paddle to provide stability, the second person in this technique provides stability. In the two-person wading, the upstream person faces downstream and the downstream person faces upstream. Each person grasps the corresponding shoulder straps of the other person's life jacket. Moving in the water is simple. While one person remains stationary, the other person moves and repositions herself. This simple process is repeated as they move through the water.

Four-Person "Huddle" (Figure 2.3) – The four-person huddle is an expanded version of the two-person crossing. It is also called the pinwheel or crab crawl because the group tends to rotate or pinwheel as it repositions itself. The four-person circle can easily be done with three or five people (not shown).

Each person grasps the shoulder straps of the life jacket of the person next to them. The group moves one of several ways. As with the two-person wading, two people remain stationary as the other two people reposition themselves. Or, one person remains stationary as the other three people reposition themselves. This tends to result in the group rotating or pinwheeling around the stationary person. Or, everyone in the group rotates or pinwheels at the same time. Depending on the depth and speed of the water the approaches can be used interchangeably to meet changing circumstances.

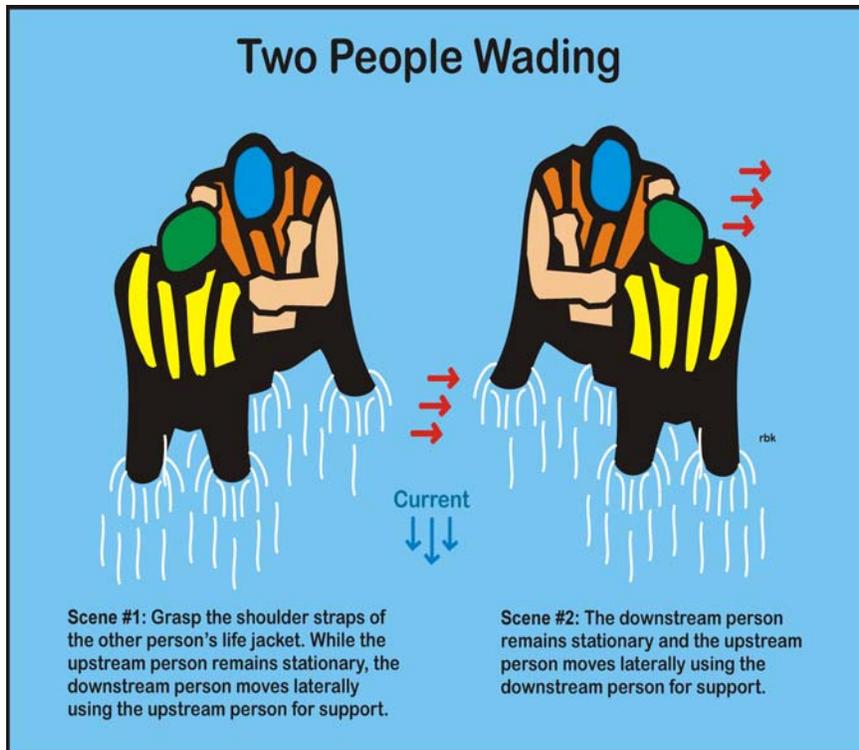


Figure 2.2: Two-Person Wading – The other person provides the stable base. Source: author – [file:\SWM-WadeTwoPeople.cdr]

Pyramid (Figure 2.4) – The pyramid can be used to move a group of people through swiftwater. It can be used to transport a rescued victim, and it can be used to alter the flow of the current upstream of a victim. Generally, it requires six or more people.

The point person in the pyramid is a solo wader with a paddle (see Figure 2.1). Usually, one of the larger people is chosen for the point. The point person maneuvers as if he is a solo wader with a paddle. The second row has two people. The person behind the point person on the river right side grasps the back left shoulder strap of the life jacket with her left hand and the back right shoulder strap of the life jacket with her right hand. The person behind the point person on the river left side grasps the back left shoulder strap of the point person's life jacket with his left hand and the back right shoulder strap of the life jacket with his right hand.

The third row has three people. The person on the river right side grasps the left shoulder strap of the person in front of them with her left hand and the right hand on the right shoulder strap of the same person in front of him. The person on the right does the same. The person in the middle grasps the back of rear right shoulder strap of the person on his left in front of him, and grasps the back left rear shoulder strap of the person on his right in front of him. Additional rows align themselves in a similar manner.

To work, the pyramid requires good communications. Usually, someone toward the rear calls out the commands. Being in the rear, they have a good overview of the scene. In contrast, the point person cannot see what is occurring behind them, and when they speak, it is hard to hear them because they are speaking away from the group. Although the point person is not a good command person, there needs to be

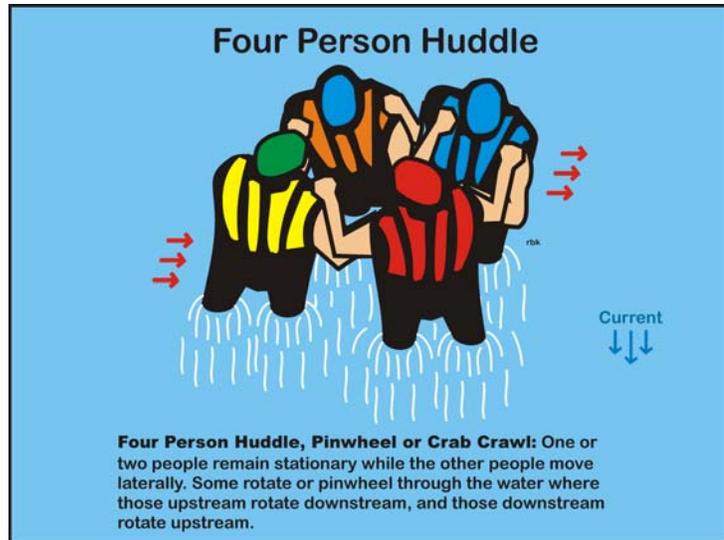


Figure 2.3: Four Person Huddle – Also called the pinwheel or crab crawl, the four-person huddle is a more stable version of the two person wade. Source: author – [file:\SWM-WadeFourPeople.cdr]

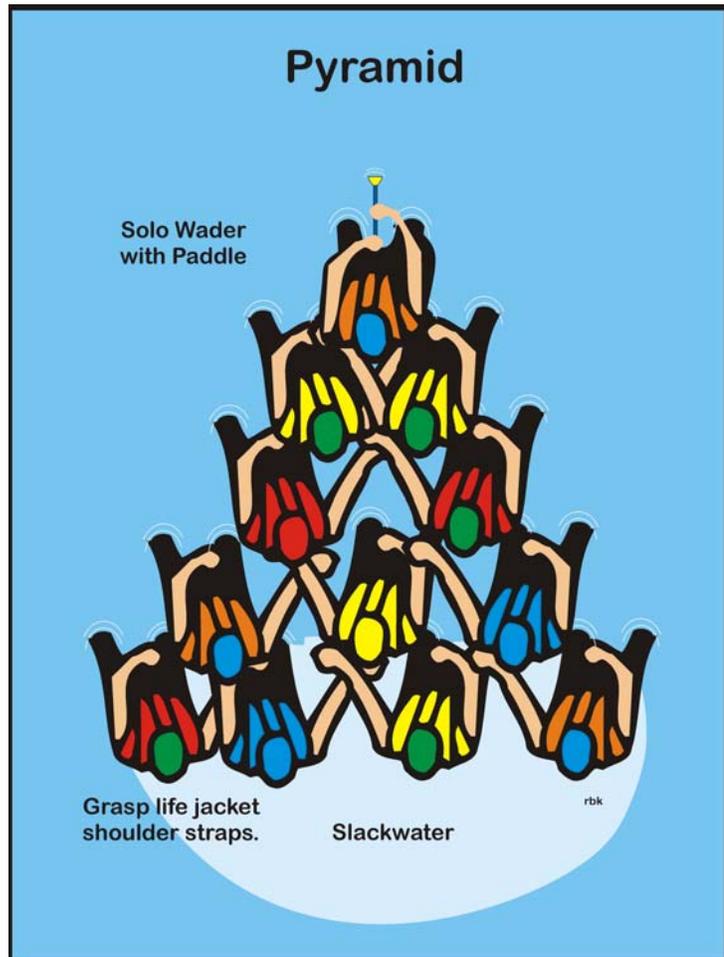


Figure 2.4: Pyramid – The pyramid can move a lot of people in the water and it can be used to alter the river dynamics. Source: author – [file:\SWM-Pyramid.cdr]

communication between this person and the person calling out the commands.

In-line Crossing (Figure 2.5) – The in-line crossing is derived from Rescue 3 International. It is useful for moving large numbers of inexperienced people through moving flood waters knee deep or less. It can easily be applied to river rescue situations.

The first person enters the water facing upstream (Scene #1). The next person enters the water behind the first person. They use the person in the line for stability and take a position next to the first person. They lock arms (Scene #2). More than one person can move along the line at a time. Making it easier to move in the water, a series of eddies or slackwater behind each of the people inline is created by the line. After everyone in the group assumes their position on the line, the first person who entered the water moves on down the line and assumes a position at the end (Scene #3). The second person follows, and then the third. The line moves toward the other shore. To speed up the process and depending on circumstances, more than one person can move down the line at a time. When the line encounters the other shore, people rotate onto the shore (Scene #4) until everyone is on the shore (Scene #5).

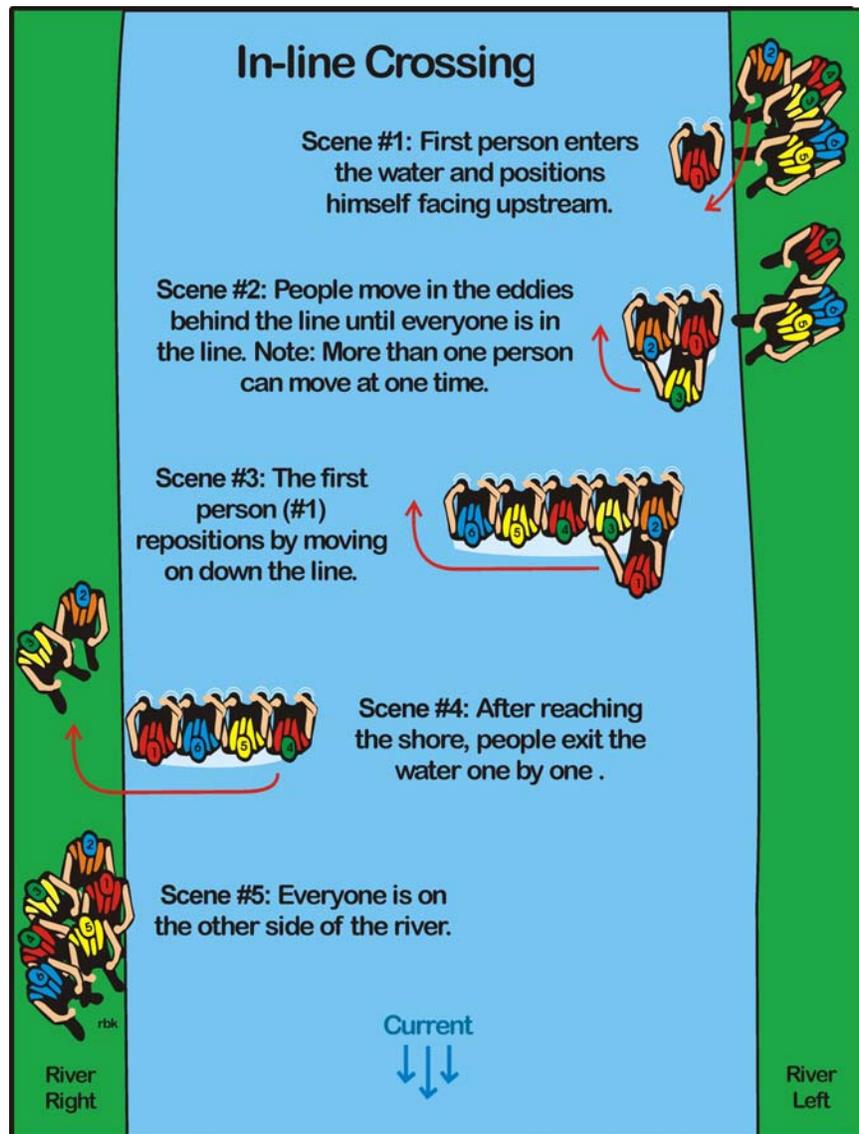


Figure 2.5: In-line Crossing – From Rescue 3 International, the In-line Crossing is a useful tool for moving large groups quickly through shallow moving water such as often found in floods. Source: author – [file:\SWM-LineWalk.cdr]

Swiftwater Swimming Techniques

There are two swimming modes: *defensive swimming* and *aggressive swimming*. Rescuers should be familiar with both methods. They can be used interchangeably. In addition, there is the barrel roll into eddies, back ferry and strainer drill which emphasize swiftwater swimming techniques.

Defensive Swimming (Figure 2.6) – In defensive swimming, the swimmer floats on her back with her feet on the surface and pointing downstream. If the swimmer wants to move laterally or across the current, she rotates her body so that is no longer parallel with the current and uses her arms to back paddle. Back paddling at an angle against the current executes the basic back ferry. Also, it slows the downstream movement of the swimmer. Both are good outcomes.

Aggressive Swimming (Figure 2.6) – Aggressive swimming is the crawl stroke with the head up out of the water as much as possible so that the swimmer can see where she is swimming. When swimming, the emphasis is on pulling the swimmer through the water with the arms. Excessive kicking uses more energy than the propulsion it provides.

As might be expected, there is often a controversy regarding which method is better, which method is faster, or which method is safer. Generally, defensive swimming uses less energy, and the swimmer moves slower in the water. The butt absorbs hits and

often there is a tendency for the butt to hang down in the water because of the sitting position. Also with defensive swimming, the swimmer has a broader view of the waterscape. However, if the swimmer wants to get from one point to another quickly, aggressive swimming will do it. Also, when using the swiftwater entry, the swimmer enters the water in position for aggressive swimming. For these reasons, the two swimming methods are used interchangeably as a changing situation demands.

Barrel Rolls (Figure 2.7) – The barrel roll is a technique used to help a swimmer break the eddy line and enter the eddy. For the purposes of discussion the barrel roll is broken into three phases.

Entry – As the swimmer approaches the eddy, the swimmer in defensive swimmer mode reaches over into the eddy with his right arm and plants the hand into the upstream moving water in the eddy.

Barrel Roll – Scoop the eddy water with the right hand and barrel roll over the arm. This tends to move or rotate the body laterally into the eddy. The swimmer scoops the water and begins the rotation in



Figure 2.6: Defensive and Aggressive Swimming – Defensive and aggressive swimming can be used interchangeably. Source: author – [file:\SWM-DefensiveAggressiveSwimming.cdr]

the entry phase. In a continuous rolling motion the swimmer rotates over on his stomach into what would be considered an aggressive swimming position.

Recovery – In a continuous motion, the swimmer continues the role until there is one full rotation. The swimmer is on his back in the defensive swimming mode. If needed, barrel roll again. It may be necessary to cover more distance to actually make it into the eddy. The barrel roll can end in either the defensive swimming mode (shown) or the aggressive swimming mode (not shown). Barrel roll as many times as needed to enter the eddy.

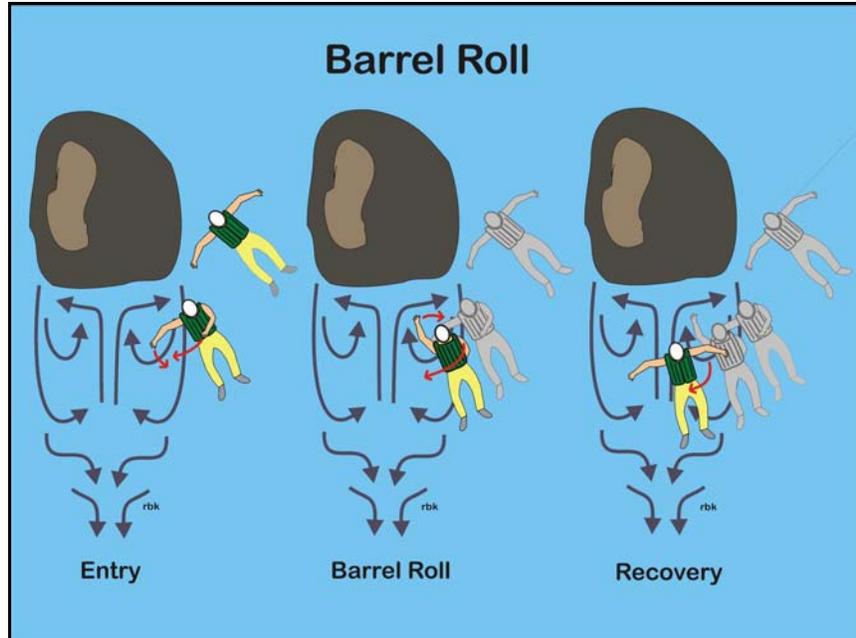


Figure 2.7: Barrel Roll – The barrel roll is a useful technique for crossing over the eddy line in an eddy. Source: author – [file:\SWM-BarrelRoll.cdr]

Back Ferrying (Figure 2.8) – The back ferry is a fundamental technique used to maneuver a swimmer or boat in moving water. In fact, most swimmers in the defensive swimming mode intuitively perform the back ferry. In a canoe, kayak or raft, the back ferry occurs with the bow of the boat pointing downstream and with the boater facing downstream. This differentiates it from the forward ferry where the bow is pointed upstream. Similarly, for the defensive swimmer, the feet or bow is pointing downstream and the defensive swimmer is facing downstream also. Also, the back paddling of the swimmer has the same effect as reverse strokes used in a canoe, kayak or raft. Hence, the defensive swimmer in defensive swimming mode is back ferrying. Also, it is why this section is titled back ferrying.

To perform a back ferry, the swimmer must do two things. First, the swimmer points her head toward the shore where she wants to go. This creates an angle with the main current. Her body is no longer parallel with the current. Second, the defensive swimmer back paddles with her arms. Back paddling at an angle against the current creates both a horizontal and vertical force. The vertical force slows the swimmer in the current and the horizontal component moves the swimmer toward the shore to which the head is pointing. This method of moving laterally or across the current is a back ferry.

For defensive swimmers, factors influencing the back ferry include the speed of the current, the amount of back paddling effort, and the angle of the swimmer in the current. As a practical matter, swimmers should experiment in moving water to determine what works well and what doesn't. On the same stretch of moving water (i.e. constant speed of the current), experiment with different body angles and the amount of back paddling required to move the swimmer laterally or horizontally in the water.

Figure 2.8 illustrates the typical back ferry for a defensive swimmer. Scene #1 shows the swimmer without a ferry angle. Unless there is back paddling, the paddler will float at the same speed of the current and will travel with the current. In Scene #2, the swimmer has pointed his head in the direction that he

wants to travel. He now has an angle with the current. In order to maintain the ferry, he needs to back paddle. In Scene #3, the swimmer increases his angle with the current and needs to increase the back paddling effort to prevent drifting downstream. In Scene #4, the swimmer is swimming parallel with the current and with strong back paddling, he remains stationary in the rapids.

In scene #5, the swimmer has drifted downstream and ferries back to river right. The swimmer points his head toward the river right shore to create a ferry angle (Scene #6) and ferries back to the river right shore (Scene #7).

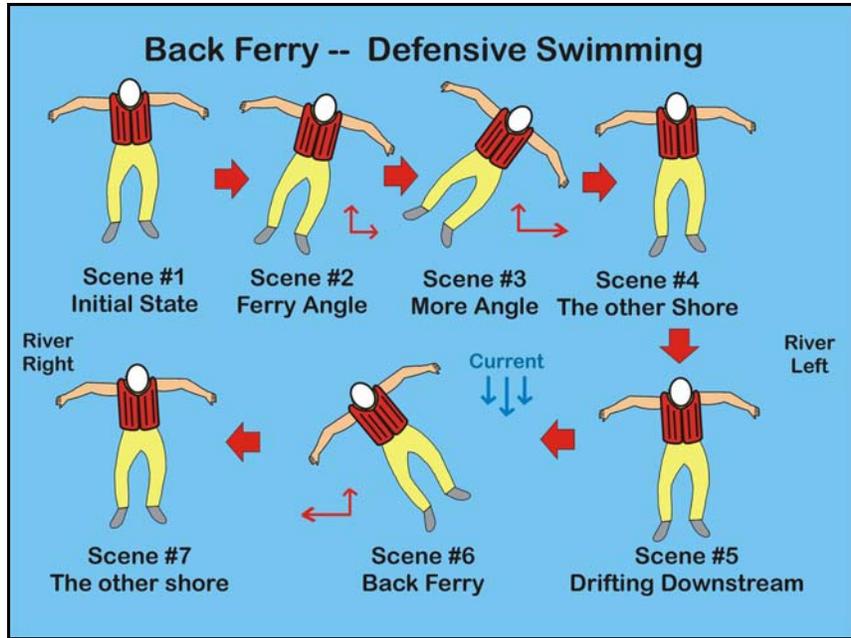


Figure 2.8: Back Ferry – Defensive Swimming – Back paddling at an angle against the current executes the basic back ferry. Source: author – [file:\SWM-BackFerry.cdr]

Using Defensive and Aggressive Swimming to Swim a Rapids (Figure 2.9) – Figure 2.9 depicts a typical river scene and a swimmer using defensive swimming to maneuver through the river. The numbers and captions correspond to the subheadings in the figure.

Scene #1: Defensive Swimming Position – The swimmer is in the main current in the defensive swimming position. Feet are up and pointing downstream. The swimmer maybe floating or back paddling slowly. Initially, the swimmer is going with the flow.

Scene #2: Back Ferry to Eddy – The swimmer decides to swim to the eddy. The swimmer assumes a ferry position and points his body toward the shore (i.e. eddy) to which he want to back ferry. The swimmer’s body is no longer parallel with the current. Generally, the greater the angle the greater the back paddling effort that is required. For the back ferry to work, the swimmer must be back paddling against the current. The swimmer back ferries with aggressive back paddling toward the eddy.

Scene #3: Barrel Roll into the Eddy – The barrel roll helps the swimmer break the eddy line and move laterally into the eddy. The swimmer reaches the eddy line. He barrel rolls into the eddy by reaching into the eddy with his right arm and rolling over the eddy line into the eddy (see Figure 2.7 for a more detailed barrel roll). More than one roll may be needed.

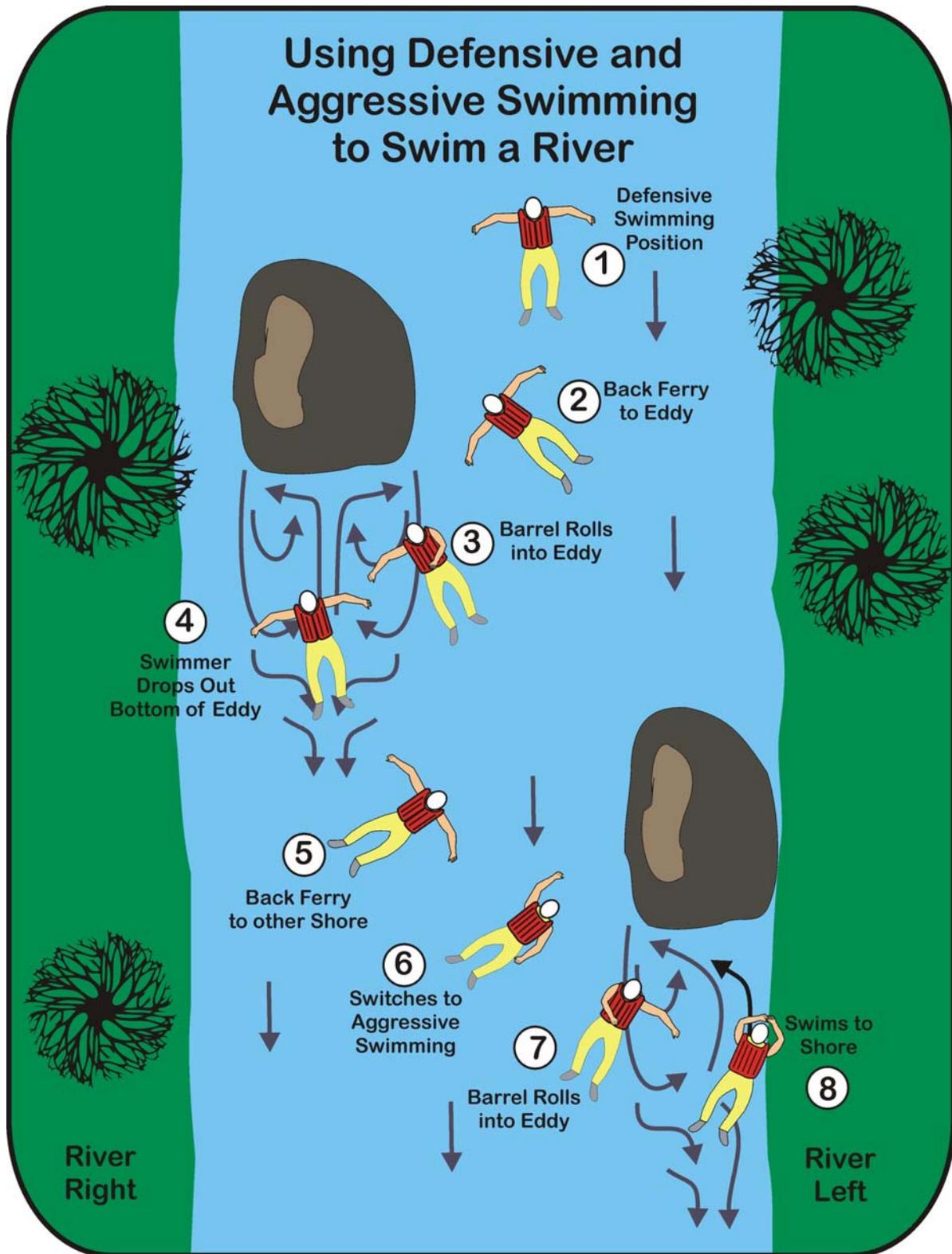


Figure 2.9 – Using Defensive Swimming to Swim a River – This scene depicts a typical swimming scenario using defensive swimming. Source: author – [file:\SWM-DefensiveSwimming.cdr]

Scene #4: Swimmer Drops Out Bottom of Eddy – Depending on what the swimmer wants to do, he can swim back upstream to the rock, hang-out in the neutral portion of the eddy, or drop out the bottom of the eddy in the slower moving downstream current. The swimmer decides to drop out the bottom of the eddy and back ferry to the eddy on the river left shore.

Scene #5: Back Ferry to the other Shore – Still in the defensive swimming position, the swimmer positions himself to back ferry. As the strength of the current increases, the swimmer will need to back paddle harder to reach the other shore. The swimmer may even need to switch over to aggressive swimming to maintain sufficient force to maintain the ferry angle.

Scene #6: Switches to Aggressive Swimming – The swimmer decides that he needs to flip over and aggressively swim (i.e. crawl stroke) to reach the eddy on river left. He maintains his ferry angle.

Scene #7: Barrel Roll into Eddy – The swimmer barrel rolls into the eddy on river left using a barrel roll. In this case, the swimmer reaches into the eddy with his left arm and barrel rolls into the eddy.

Scene #8: Swims to Shore – Using the eddy current, the swimmer decides to swim to shore in the aggressive swimming mode.

Strainers and the Strainer Drill

(Figure 2.10) – Avoid strainers, they are killers. If possible identify them early and use defensive or aggressive swimming to do whatever it takes to avoid them. This is the best strategy. In Figure 2.10, a downed tree in the bend of a river is shown to create the strainer. Strainers can be created by undercut rocks or loose rocks that allow the water to easily pass through them. Strainers and the strainer drill are included in this section because it uses both defensive and aggressive swimming modes.

The strainer drill is designed to simulate a strainer and how to approach them if a swimmer is inadvertently swept into one (Figure 2.10). Usually, the strainer is a four or six inch PVC pipe held firmly by two people in the swiftwater. Lowering the strainer in the water makes it easier to go over. Raising the strainer makes it more difficult to go over.

The swimmer begins in the defensive swimming mode. Roughly, 15-20

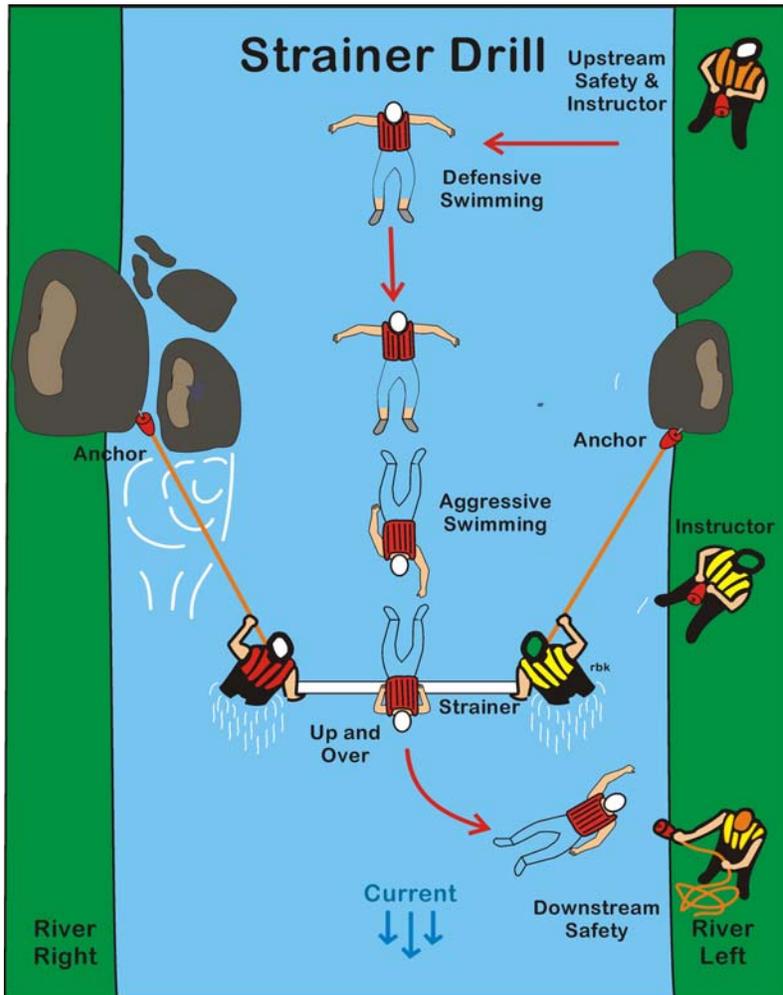


Figure 2.10: Strainer Drill – A PVC pipe is used to simulate a strainer. Source: author – [file:\SWM-StrainersDrill.cdr]

yards before the strainer, the swimmer flips over to aggressive swimming mode. With a good kick, the swimmer lunges up and attempts to swim over the strainer. Usually, if the swimmer's hips encounter the strainer, they will make it safely over the strainer. If their stomach encounters the strainer, the swimmer will usually flush underneath the strainer.

The difference between the strainer drill and a real strainer is that in the drill, the swimmer safely swims over the strainer or safely flushes under the strainer. With a real strainer, the best the victim can usually hope for is that they can lunge high enough on the strainer so that when they impale themselves, it is high enough that their head is above water and they don't drown. The strainer drill is fun. Real strainers aren't.

Crossing Techniques

In addition to wading or swimming to cross moving water, a line crossing and diagonal traverse can be used also. Both use a line or throwbag.

Line Crossing (Figure 2.11) – A static line is stretched across the moving water. It is tied off to a tree or rock on either or both sides. If belayers are used, a sitting belay should be used. Normally, the belayer is backed up. The backup emphasizes pushing down on the belayer to prevent them from sliding into the water. It is not uncommon to tie or carabiner two throw bags together to reach across the moving water.

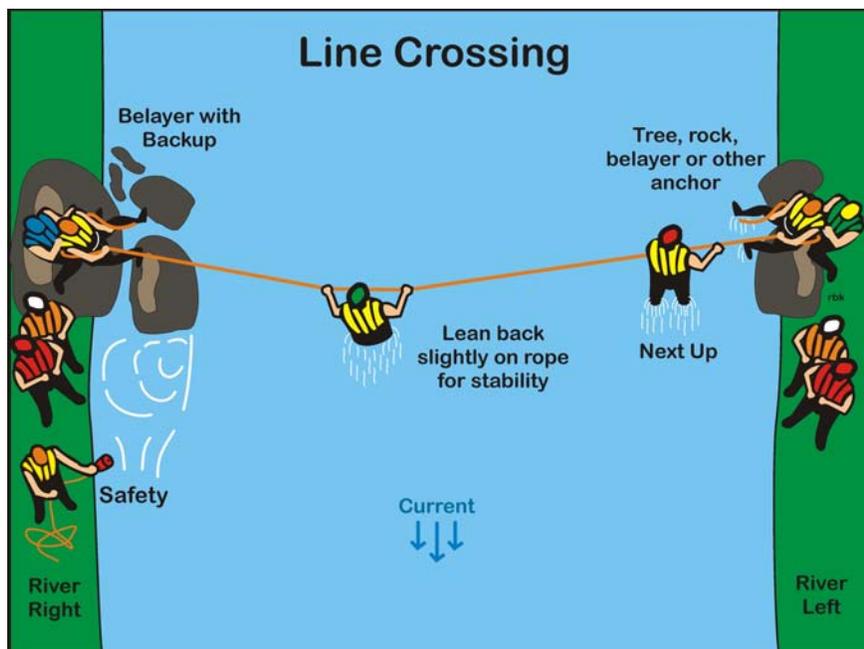


Figure 2.11: Line Crossing – The line crossing can be used to move rescuers across a river. Source: author – [file:\SWM-LineCrossing.cdr]

The purpose of the rope is to provide stability. In a sense, it provides triangulation between the rope and the wader's two feet. The trick for the wader is to provide

moderate tension on the line. No tension results in instability. As with the other wading techniques avoid crossing the legs when moving. Move the right foot close to the left foot. Move the left foot and then move the right foot close to the left foot again.

Diagonal Traverse (Figure 2.12) – In contrast to the line crossing, the diagonal traverse is designed to place the line across a stretch of river at a sufficient angle to the current to allow the current to vector or move the swimmer across the moving water. It utilizes the same principle as ferrying.

To setup, a line is stretched across a stretch of moving water at an angle. The rope can be tied off to a tree or rock. If a belayer is used, use the same procedures used in the line crossing including a backup. As a footnote, the diagonal traverse can easily consume more than one throwbag length. Clipping throwbags together is not an option since it impedes the carabiner from sliding along the line. The exception is that a throwbag can be clipped into either end of the line to extend it. However, it needs to be clipped in before where the swimmer clips into the line. On the takeout side it can extend the line as long as it doesn't impede the swimmer taking out.

To use, the swimmer clips in her carabiner on the rescue vest tether to the line. If done properly, the current will ferry the swimmer over to the other side. The swimmer can maintain a ferry angle which can aid in the ferry. Point your head to the shore to which you are traveling.

Setting Up of Line – It is necessary to get the line across the river. It can be thrown. A swimmer can swim it across, or boater can tow it across.

Throw – The first approach to setting up a line across moving water is to throw the rope to someone on the other side. As a general rule, the higher the thrower's elevation, the further the throwbag can be thrown. A paddle can be used to extend the reach of the person catching the incoming throwbag. If the bag doesn't reach the other shore it may be necessary to extend the line across the river with a swimmer or boat.

Swimming (Figure 2.13) – This is the live bait rescue without the victim where

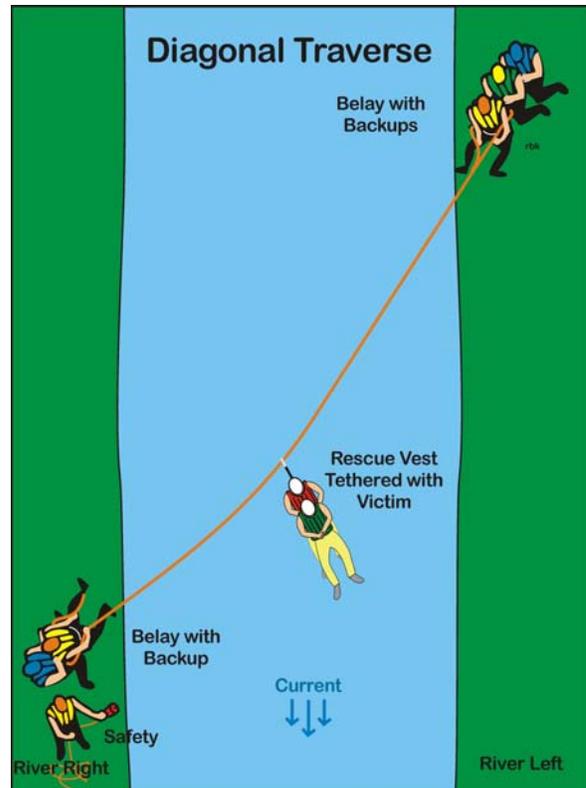


Figure 2.12: Diagonal Traverse – The diagonal traverse can be used to move rescuers across the river. – [file:\SWM-DiagonalTraverse.cdr]

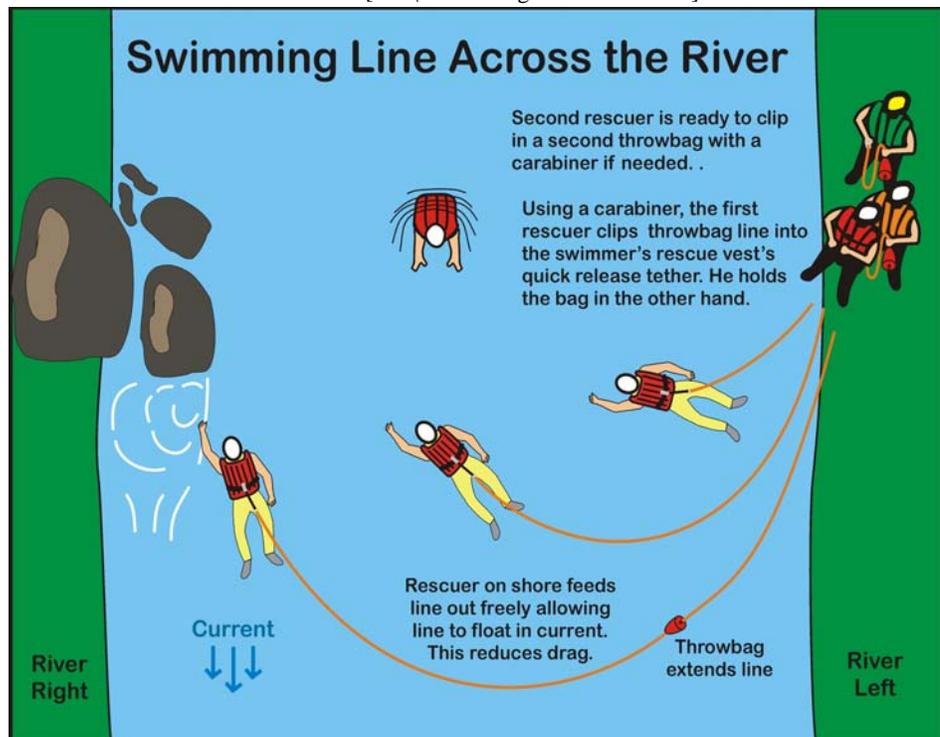


Figure 2.13: Swimming the Line Across the River – If needed, a swimmer can swim the line across the river. – [file:\SWM-SwimLineAcross.cdr]

a swimmer swims the line across the river. The line is clipped into the rescue vest's quick release tether with a carabiner. Again, do not tie the line directly to the swimmer. The swimmer enters the water with a rescue dive (i.e. a belly flop with hands guarding the face). Using aggressive swimming, the swimmer aggressively swims to the other shore. An important tip for the person feeding out the line is to let the line drift in the current. This reduces drag on the swimmer. Slack can be removed from the line once the swimmer is on the other side. Clipping another throwbag into the line extends the line.

Boat – A boater can ferry the line across the moving water. The same principles used for the swimmer apply to the boater. Do not tie the line to either paddler or boat. Use the detachable tether on the rescue vest.

References

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Unpublished packet.
- Walbridge, C., and Sundmacher, W., (1995). *Whitewater Rescue Manual – New Techniques for Canoeists, Kayakers, and Rafters*. Camden, Maine: Ragged Mountain Press.