Chapter 6.0:
Rescue Techniques [1]

This chapter focuses on raft rescue techniques. Where the previous chapter focused more on general safety, this chapter focuses on raft rescue techniques for rafters. The general flow of the chapter begins with search and rescue techniques. Although the location of the victim is usually known in river rescues, there are occasions where the victim's location is not known. A primer on search technique is provided. Next, throw bags are covered. This is followed by rescue techniques involving mobility in the water with swimming and wading techniques. Then the chapter moves into rescue techniques. Initially, it focuses on traditional entrapment cases. Then it moves to self rescue and reentry techniques. The chapter finishes with raft rescue techniques including bumping, unpinning rafts, and using rafts as a rescue platform.

Search Techniques for Rafters

In most cases, the location of the victim is known and a search for the victim is not necessary. However occasionally, the victim needs to be found. The following section is a primer applying search and rescue techniques to a rafting situation. The case study used in this section is based on an incident on the Arkansas River where the raft guides lost sight of one of the passengers. Also, the materials in this section were adapted from Kauffman (2017), *Swiftwater Rescue Manual*.

This discussion is delimited in its focus to groups already on the river such as private boaters and commercial rafters and not to rescue squads who usually arrive later. In terms of the rescue curve, its focus is "*rescue by others in your group*." It does not include extended searches by rescue squads. The section draws upon three sources: (Kauffman and Moiseichik, 2013, Ch.10; Setnicka, T., 1980; Stoffel, R., 2001). To a certain extent, the materials used are adapted from land base techniques.

<b>**Search and Rescue Phases** (Figure 6.1) – In a normal search and rescue operation there are five phases. They are the search, rescue, first aid (medical), evacuation and management Kauffman and Moiseichik, 2013, Ch.10). Except for the management phase, the phases are generally sequential. This means that before performing the rescue phase, the victim needs to be found. Before performing first aid, the victim needs to be removed from the MOI (Mechanism of Injury). This reduces the likelihood of a second victim. And, before evacuation, the victim needs to be stabilized and prepared for transportation (i.e. first aid).

<c>***Search Phase*** – The search phase is the first phase. The purpose of the search phase is to locate the victim. Usually, but not always, the search phase is fairly easy because the victim is easily located. However, this is not always the case and it is important to prepare for situations where a search needs to be conducted. The search phase will be addressed in greater depth regarding swiftwater rescue in the next section.

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<c>***Rescue Phase*** – The purpose of the rescue phase is to remove the person from the source of harm or MOI (i.e. Mechanism of Injury). This is the primary focus of most swiftwater rescue skill instruction. It is the focus of this book and subsequent chapters.

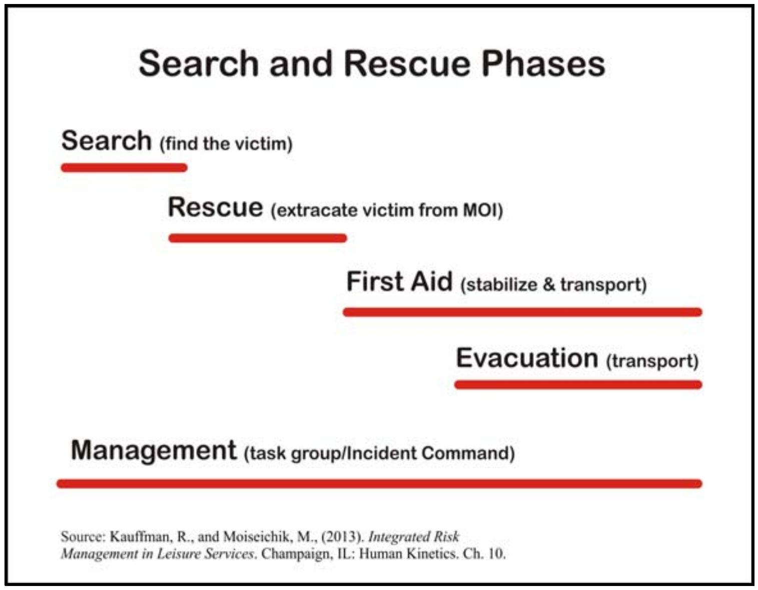

Figure 6.1: Search and Rescue Phases – Caption: In general, the four phases are sequential. Before extrication, the victim must be found (search). Before rendering first aid, the victim needs to be extricated (rescue), Before evacuation, the victim need to be stabilized and prepared to transport (First Aid). Source: Author – [file:\PHIL-S&RPhases.cdr]

<c>***First Aid (Medical) Phase*** – The purpose of the first aid or medical phase is to stabilize the victim and prepare them for evacuation or transport. Conceptually, this phase follows the rescue phase. First aid skills are generally covered in Wilderness First Responder and similar courses. First aid techniques are not included here.

<c>***Evacuation Phase*** – The purpose of the evacuation phase is to transport the victim to a location where they can be transported to the hospital or appropriate facility. Usually, this phase receives passing consideration or everyone assumes the helicopter will simply lift the victim out of the incident site. Unfortunately, not every site is accessible by helicopter nor is a helicopter always available. Anyone who has done a mock evacuation carrying a loaded stokes litter understands the difficulty and energy consumption of the evacuation process. Although more consideration should be given to evacuation, it too receives limited discussion in this section.

<c>***Management Phase*** – The purpose of the management phase is to provide the administrative support to a search and rescue operation. In most search and rescue operations associated with private boaters and commercial rafters, the management structure tends toward a task group in contrast to the incident command structure associated with larger and more formal SAR efforts.

The incident command structure was outgrowth of efforts to fight wildfires in the 1970s. It divides the administrative structure into operations, planning, logistics, and finance and administration. The incident command structure is mentioned because it is usually associated with rescue squads and larger groups. In contrast, swiftwater rescue situations associated with private boaters and commercial rafters tend to involve a smaller group of rescuers, and they are not extended multi-day efforts. For this reason, they tend to use a task group structure where one of the rescuers takes on the leadership role.

<b>**Search Phases for Rafters** – As noted in the beginning of this section, there may be times when it is necessary to search for the victim. For this reason, it is appropriate to integrate some of the search principles into swiftwater rescue training. In a river situation, the objective is to locate the victim as quickly as possible. Usually, time is of the essence. Pre-incident activities are important because the first step is to recognize that someone is missing. This is not always as easy as it may sound. Next, determine the Point Last Seen (PLS) for the victim. This along with the river current and hazards determines the search areas and where the hasty search is conducted.

<c>***Pre-Incident*** – Pre-incident behavior and procedures followed by the group is important. This is the first line of defense because when an incident occurs, everything seems to unravel. This is the nature of incidents. There are two important objectives of any group on the river. First, boaters need to keep track of the people in their boat and when possible other boats also. Know the count. Be sure to keep track of the other boats on the trip. Follow normal river running procedures and protocols. Second, when one or more people fall into the water, it is important to keep track of the swimmers. Doing so minimizes the need for a search. Key to the process is that once an incident occurs, people can easily become dispersed and it is important to account for everyone so that a search can begin if someone is missing.

<c>***Point Last Seen (PLS)*** – The Point Last Seen (PLS) is the location where a witness last saw the victim. Determining the PLS is important because it helps determine the search area. It is one of the first tasks of the rescuers to determine. Be sure to ask other people on the trip including passengers on commercial trips. In Figure 6.2, the PLS was identified at the bend of the river. Area (a) is the logical area to begin the search.

<c>***Last Known Position (LKP)*** – Some of the safety literature mentions the Last Known Position (LKP) also. This is the last place where the victim was known to be based on physical evidence. In a swiftwater rescue situation, it determines the upper limit of the search area. In Figure 6.2, the LKP is where the victim falls out of the raft in the large breaking wave. As a practical matter, the LKP and PLS are often the same location. It is mentioned, but as a matter of practicality, most rescuers will refer to and use the PLS.

<c>***Determining the Search Area*** – Once the PLS is determined, determine the search area and prepare to conduct a search. A hasty search may already be initiated. In river situations, consider the following in determining the search area. It is unlikely that the victim will be found upstream of the PLS. It is likely that the victim's location will be affected by river dynamics and currents. It is more likely

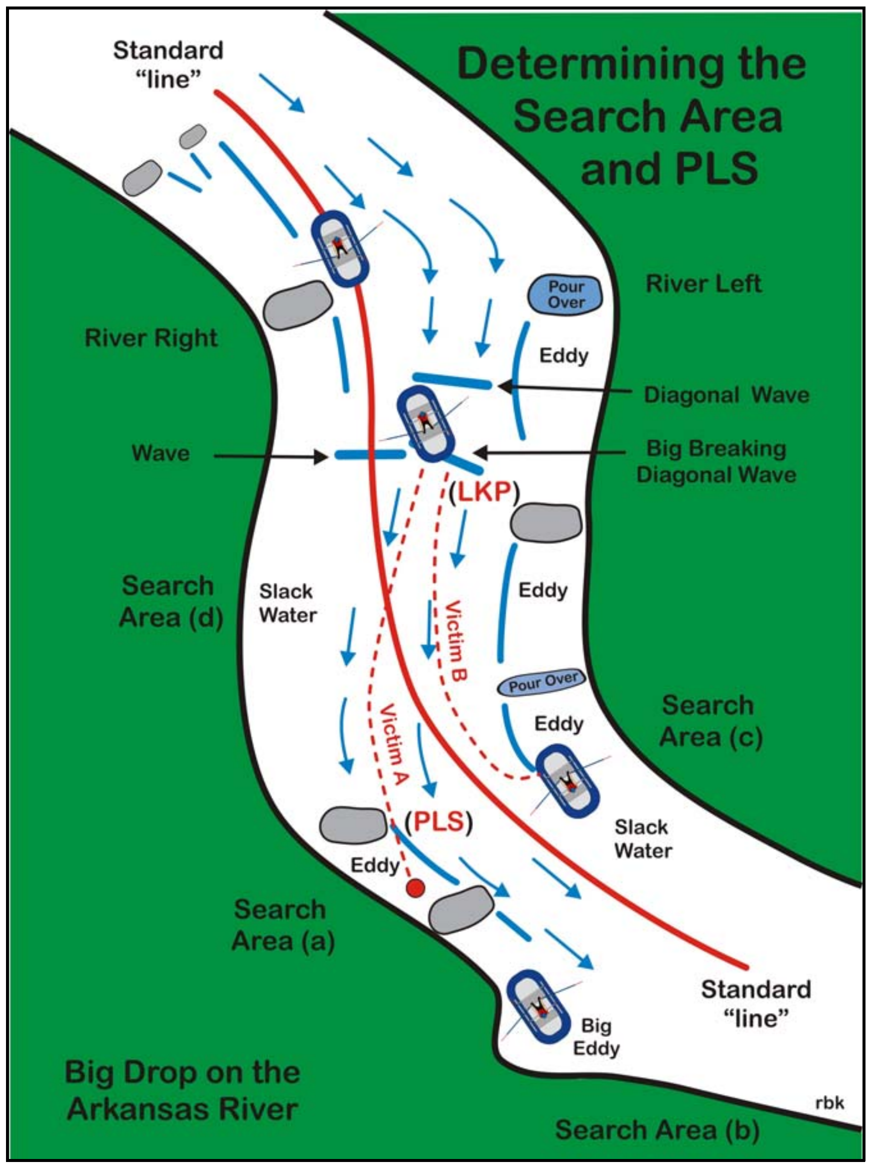

Figure 6.2: Determining the Search Area and PLS – Big Drop on the Arkansas River, Colorado. Source: Author – [file:\PHIL-PLS.cdr]

that the victim will be found on the outside of a bend in the river where the current is stronger than on the inside of the bend where it is shallower and the current is less strong. Known hazards such as strainers and undercut rocks are likely collectors of victims and are a likely place to search.

Using Figure 6.2 as an example, a raft dumps two passengers in a large breaking wave at the top of the rapids (LKP). The one passenger drifts downstream toward river left and is picked up by another raft on the inside of the bend at the bottom of the rapids. The other passenger drifts downstream with the current. The PLS was determined by one of the passengers in another raft who thought he saw the victim above the tight bend in the river. The importance of determining the PLS is that it focuses the search on the most likely place to begin the search.

Based on the PLS, the first area to be searched is area (a). Based on the river currents and known hazards present, a hasty search discussed in the next section can be conducted immediately. A second area in which to conduct a search is area (b). This assumes the victim was swept through the rapids and further downstream. Also, remember that the victim would float past the raft situated in the eddy on river right without being noticed. After a search of area (a) and (b), area [c] and (d) may also be included. Area [c] is on the inside of the bend where it is shallower and where the current tends to be moving toward river right than river left. Area (d) is above the PLS site and less likely to have the victim. It depends on the strength of the those who determined the PLS. If it is weak, this area may be included earlier in the search.

<c>***Hasty Search*** – As the name implies, the purpose of a hasty search is to perform a quick search in the most likely area where the victim is most likely to be found. Its emphasis is on speed. If personnel are available, it may be conducted simultaneously with determining the PLS. Searchers should use the buddy system where the buddies are in close visual contact with each other. In a swiftwater rescue situation, the hasty search is influenced by river dynamics, known hazards and if readily determined, by the PLS.

Returning to Figure 6.2, the main current plows into the river bend at the bottom of the rapids before exiting river left. Also, there is a known hazard of undercut rocks on the bend. A drifting passenger is very likely to become entangled in the undercut rocks on the bend. Even without identifying the PLS, area (a) would be a logical location to search for the victim since the river current would normally sweep a person into the eddies and undercut rocks located on the bend of the river. If the water is deep, paddles or sticks could be used to locate an underwater victim.

<c>***Take Care of Non-searchers*** – If there are passengers on a commercial trip or people in a private boating group who are not involved in the search, make sure they are in a safe and secure area. If needed, have someone supervise them. You don't want a second victim.

<b>**Search Techniques Summary** – This section addresses a niche in swiftwater rescue. Often, but not always the victim is readily found and the rescue can begin. However, there are instances where the victim needs to be found first before the rescue can be performed. This section adapts basic search techniques and protocols to swiftwater rescue situations.

Safety and Prevention – Throw Bags

Safety and prevention is interwoven throughout the manual. Wearing wetsuits, drysuits and paddling jackets covered in the previous chapter on safety is an example of safety and prevention. The same can be said of most of the equipment in Chapter 2. This section includes a discussion of throw bags.

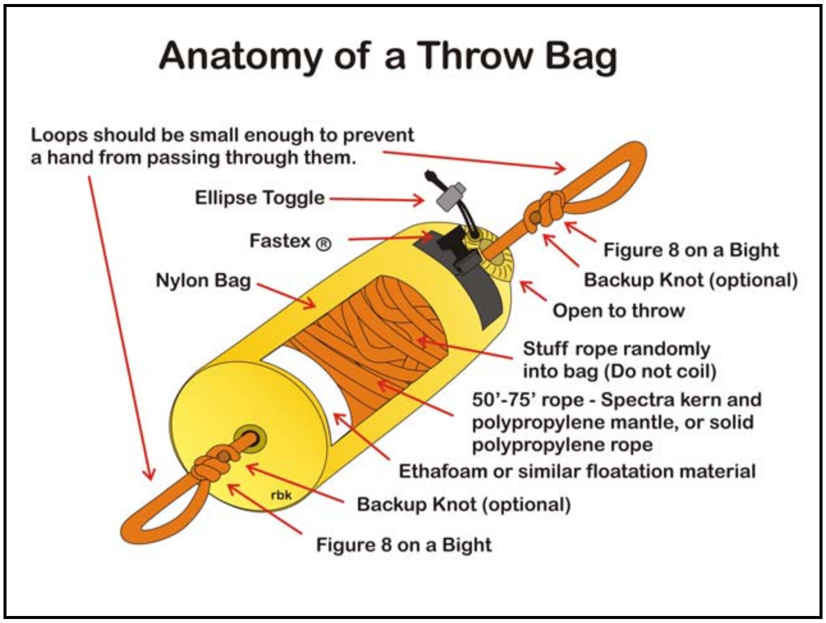

Figure 6.3: Anatomy of a Throw Bag – Caption: Throw bags come in may sizes and shapes. The bag diagramed is a typical bag used by the author. Remember to choose a bag that you will carry with you. Source: Author – [file: \BAG-AnatomyThrowbag.cdr]

Throw bags come in many sizes and shapes. One of the main determinants for selecting a throw bag is to ask yourself the following question. "***Will you take it with you at all times?***" If you don't have it with you, you can't use it. The bag may be one like the author's pictured in Figure 6.3, a hip belt, or a small hand bag. Regardless, the first and most important rule is that the throw bag is of no use if it isn't with you.

<b>**Anatomy of a Throw Bag** (Figure 6.3) – The design of a throw bag is relatively straightforward. The rope is stored in the bag. One end is knotted and passes out the bottom end of the bag into a loop. The other end of the rope passes out the opening in the top of the bag. When the bag is thrown, the rope in the bag feeds out through the opening in the bag. The following sections discuss the items identified in Figure 6.3.

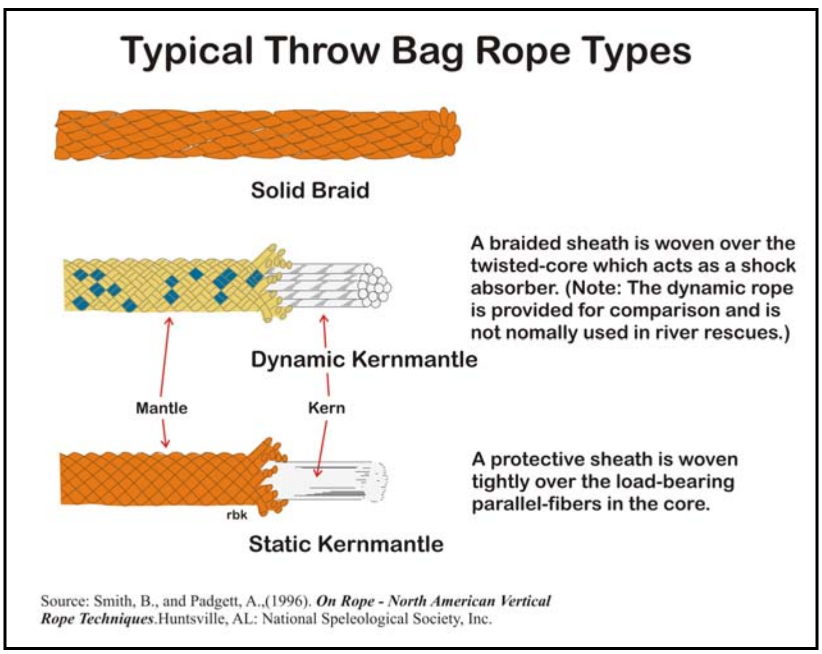

Figure 6.4: Typical Throw Bag Rope Types – Caption: There are many different types of rope construction. Typically, throw bags use either a braided or static kernmantle rope. Source: Author – [file: \BAG-RopeTypes.cdr]

<b>**Types of Ropes** (Figure 6.4) – Generally, two types of ropes are used in swiftwater rescues. These are braided and static kernmantle ropes. Static kernmantle is preferred.

Generally, in river situations, a kernmantle static rope constructed using Spectra rope is preferred over a braided throw rope. Spectra floats and is as strong as steel. Unlike nylon, it has little stretch even when wet. A less expensive rope that floats uses polypropylene. Polypropylene has less tensile strength. Also, it is often used as the mantle layer surrounding the Spectra kern.

<b>**Stuffing a Throw Bag** (Figure 6.5) – There are many different ways to re-stuff throw bags. The method presented in Figure 6.5 was used by an employee whose job it was to stuff throw bags for sale. It was the method he used to stuff hundreds of bag for sale. The key to stuffing the throw bag is to randomly stuff the rope into the bag. DO NOT COIL THE ROPE, it will only become entangled. There have been numerous tests performed and randomly stuffing the rope into the bag results in the least chance or the rope becoming entangled when the bag is thrown. As a footnote, may graphic artists incorrectly draw a neatly coiled rope in the throw bag. This is incorrect.

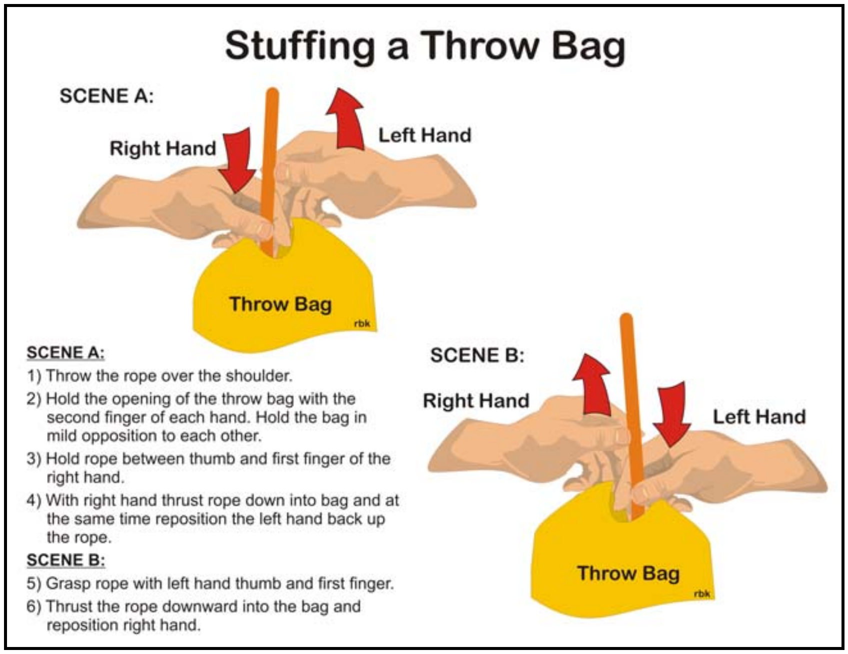

Figure 6.5: Stuffing a Throw Bag – Caption: There are many ways to stuff a throw bag. This method was used by an employee who stuffed hundreds of throw bags for sale. Source: Author – [file: \BAG-StuffingThrowbag.cdr]

The recommended method of re-stuffing a throw bag is as follows. Open the end of the throw bag. Hold the bag open using the middle finger of each hand. The fourth and fifth fingers may be used also but most people will find using the middle fingers most comfortable. This frees up the first finger and thumb to grasp and stuff the rope. Place the rope over the shoulder. The life jacket prevents the rope from slipping off the shoulder. With the thumb and first finger, grasp the rope and thrust it downward into the bag. At the same time, the other hand repositions itself up the rope. In a hand-over-hand motion, stuff the rope into the bag. If the rope needs to be settled in the bag to create more room for rope, quickly drop the bag five to six inches so that the inertia of the rope will pack it snugly into the bag.

<b>**Throwing a Throw Bag** – There are three approaches to throwing a throw bag. These are the underhand, sidearm an overhand approaches. All can be use effectively. Generally, the farthest throws occur underhand. When standing in knee deep or deeper water or when standing in a raft, the underhand throw may become impractical and a side arm or overhand throw will need to be used. Practice all three methods and determine which works best in different situations.

Rather than throwing the entire bag, a second alternative is pull line from the bag, coil it and throw the coil. The bag remains in the boat. Generally, most of the throws from a raft are less than 20 feet from the boat. This is because most swimming victims remain in close proximity to the raft.

Self-rescue – Swimming

Falling out of the raft is not an uncommon experience. Rafters and passengers should be familiar with defensive and aggressive swimming and the back ferry in the following sections. In most cases, the guide will provide swimming instructions to passengers. It may be to look for the raft and swim toward it where the guide will pickup any swimmers. Or, it may be swim to the shore. Relevant hazards such as strainers or undercut rocks should be noted by the guide also.

This author paddles R-1 in his Shredder. Around the rear tube is a nine foot NRS strap used to fasten the spare paddle. Roughly four feet in length, its tail is left floating in the water. Others note the dragging tail in the water. It serves the purpose that the author can tow the raft by the tail after falling out of the raft and swimming to shore. It serves this purpose quite well. An no, it doesn't become entangled.

<b>**Defensive Swimming** (Figure 6.6 and Figure 6.7) – 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.

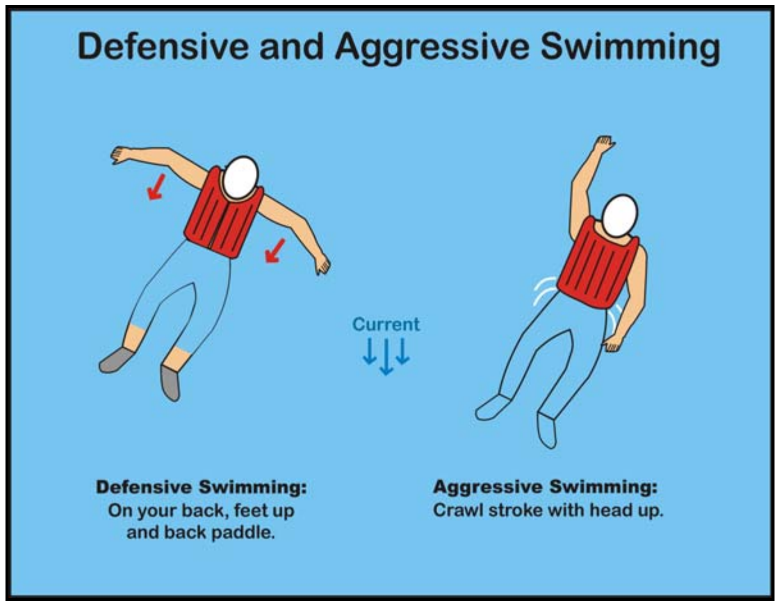

Figure 6.6: Defensive and Aggressive Swimming – Source: Author – [file: \SWR-DefensiveAggressiveSwimming]

<b>**Aggressive Swimming** (Figure 6.6) – 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.

<b>**Back Ferrying** (Figure 6.7) – 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 preform 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 point 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.

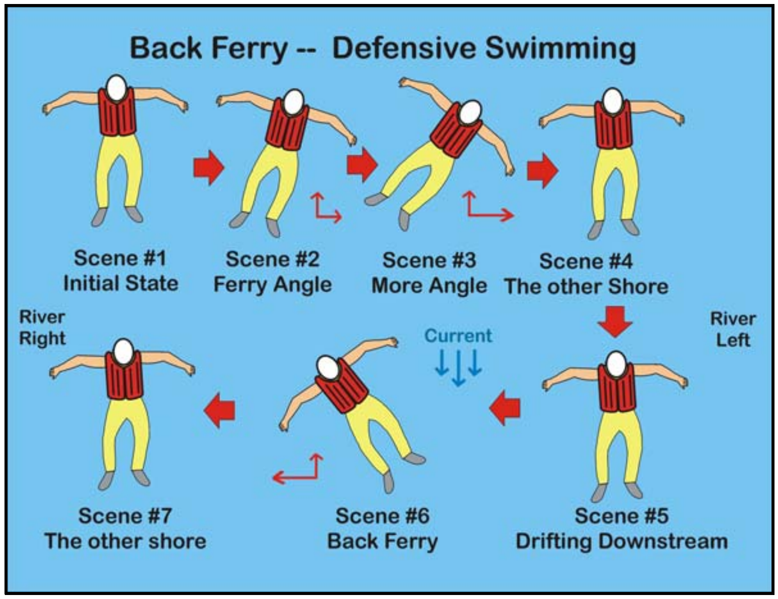

Figure 6.7: Back Ferry – Source: Author – [file: \SWR-BackFerry.jpg]

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. The simple instructions to passengers is to back paddle toward where you want to go.

Self-rescue – Rafts

Self-rescue is defined as what the boater can do to rescue themselves. The simple but important self-rescue technique of high siding is easily overlooked as a self-rescue technique. It is no different than an Eskimo roll for a kayaker. Other self-rescue techniques included in this section include aggressive and passive swimming, and self-reentry into a raft. For the sake of discussion, self-rescue includes the rescue of other in your raft. Rescue by others in your group is defined as rescue by other rafts in your group.

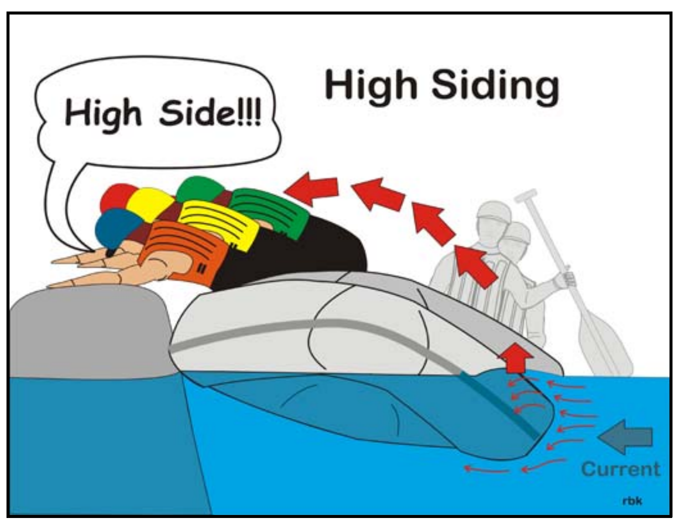

Figure 6.8: High Siding – High siding is a self-rescue technique where everyone on the upstream side moves to the downstream side of raft pinned on a rock. The strategy is that the upstream tube will float and not be pinned. Source: author – [file: \HighSide.cdr]

<b>**High Siding** (Figure 6.8) – High Siding is a self-rescue technique. When the raft becomes pinned broadside on a rock, the

current attempts to catch the upstream side of the raft and thoroughly pin the raft on the rock. If passengers remain on the upstream tube, they can potentially fall into the water as the tube is pulled underneath the water. In addition, their weight on the tube helps to submerge the tube and pin the raft.

The strategy of high siding is to move everyone to the high side which is the downstream tube pinned against the rock. This enables the upstream tube to break the surface. Once it breaks the surface the current will go under the raft rather than over the tube. This makes the extrication of the raft off the rock much easier.

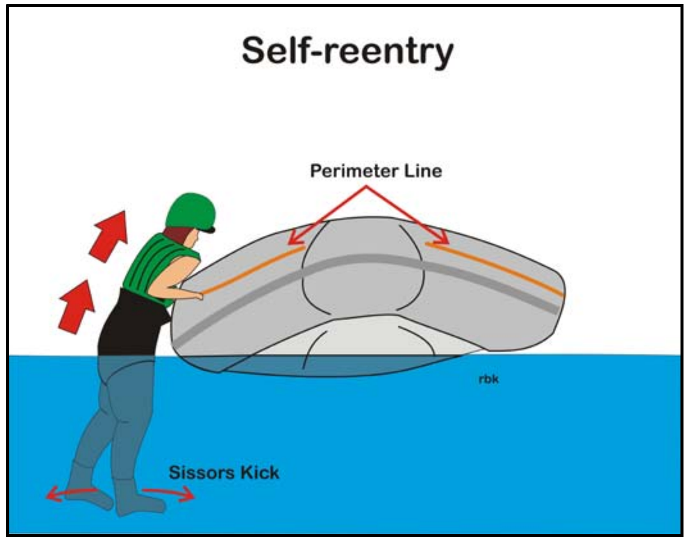

Figure 6.9: Self-reentry – Grab onto the perimeter line with both hands, kick hard and role into the raft. Source: author [file: \ReentrySelf.cdr]

High siding is a skill that should be practiced as part of the guide's training of the crew. At minimum, it should be verbal. In practice, the passengers can practice it. An alternative is that the guide can demonstrate it. High siding is reactive and when the command is given, there is little time for passengers to think about what they need to do. They need to do it. So consider a demonstration and actually practicing it as part of the guide's pre-trip preparations.

<b>**Self-reentry** (Figure 6.9) – Self-reentry is dependent, in part, on the type of raft and how it is outfitted. If the raft is outfitted with a perimeter line, the person in the water can hoist themself up and onto the tube. The person can kick with their feet and gain some extra momentum. Boaters paddling Shredders or similar boats can proceed to the stern, loop one leg over one of the tubes, and hoist themselves into the raft. A third option is to use the flip line or webbing to create a stirrup to aid in stepping into the raft.

<b>**Stirrup-reentry** (Figure 6.10) – Depending on the height of the tubes, the amount of rocker, the location of the perimeter line, and the upper body strength of the guide, it may be desirable to use a stirrup to assist in reentry. The stirrup is constructed from a loop of webbing. Its length is predetermined by the guide to allow the guide to step up and into the raft. The stirrup is particularly helpful on large tubed rafts that are flipped upside down. When flipped, the perimeter line is low in the water which impedes reentry. The stirrup can be fastened to the handle with a girth hitch or to a D-ring with a carabiner. Adjusting the size of the stirrup and practicing reentry should be done in flatwater.

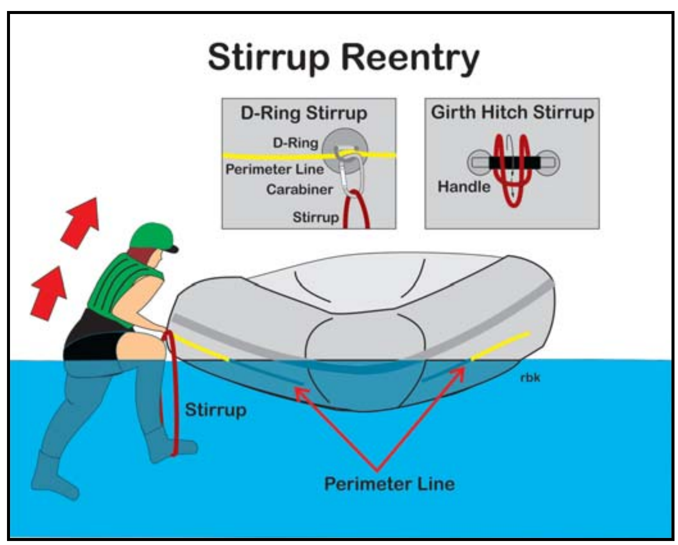

Figure 6.10: Stirrup Reentry – A loop of webbing fastened to the handle or D-ring can provide a stirrup or step to assist in renentry. Source: Author – [file: \RS-ReentryStirrup.cdr]

<b>**Assisted Reentry** (Figure 6.11) – It is not uncommon for passengers to fall out of the raft. Some can reenter themselves using the perimeter line to hoist themselves over the side of the tube. Most people will need or appreciate assistance. First, make sure there are no other hazards or dangers present. If need be, wait until after the drop and then pull the swimmer into the boat.

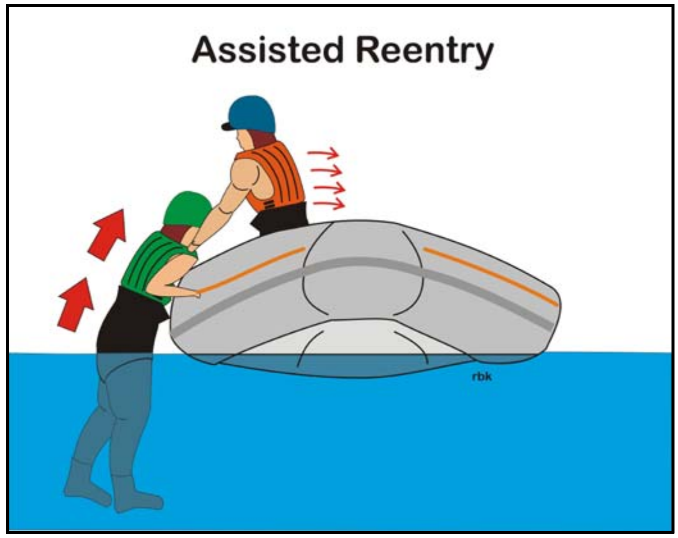

Figure 6.11: Assisted Reentry – Holding onto the shoulder straps of the swimmer, lean backwards and use your body weight to pull the swimmer into the raft. Source: Author – [file: \RS-ReentryAssisted.cdr]

To reenter, the swimmer should face the tube. They can assist by hoisting themselves using the perimeter line. Normally, it is recommended that the rescuer grab the swimmer under the arm pits and lift them into the boat. As a practical matter this is easier said than done and presents some disadvantages. First, it is difficult to get a good grasp underneath the armpits. Next, it requires bending over which encourages lifting with the back. In contrast, grabbing the life jacket shoulder straps is easy, convenient and easier to lift without using the back.

If the swimmer is lifted using the life jacket, visually, make sure that when the victim is hoisted, the life jacket will not come off. When pulling the swimmer into the raft. The rescuer should use his/her weight to pull the swimmer into the raft. Step backwards to prevent falling over in the raft. This will result in less strain on the back.

<b> **Additional Reentries** – The raft can eddy out along the shore and the passengers or swimmers can step into the raft from the shore. Or two rafts can gunwale up together and the passenger can step over the two tubes to enter the other raft.

<b> **Flipping a Raft** (Figure 6.12) – Flipping a raft is best practiced in a safe flatwater stretch. Be sure there is adequate depth. The first step is for one or more rafters to climb back on top of the overturned raft. Several methods may be used. The rafter can use the perimeter line to hoist him/herself over the tube. Sometimes the rafter can climb over the end of the raft. The rocker of an overturned raft creates a sloping bottom. If needed a sling or stirrup can be attached to a D-ring creating a step (See Stirrup Reentry Section).

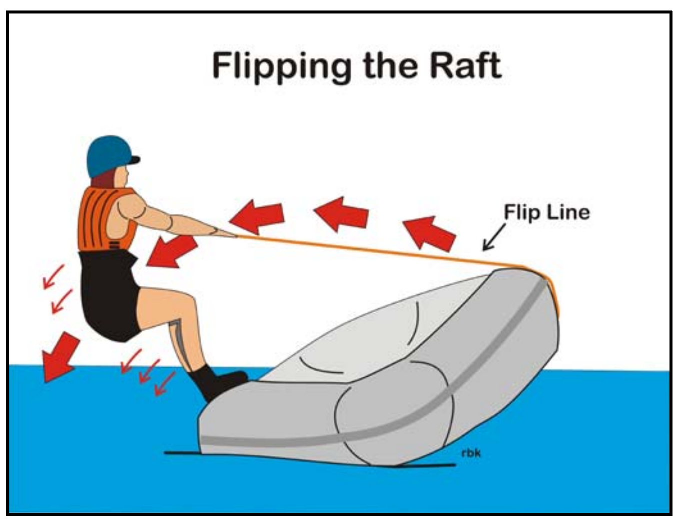

Figure 6.12: Flipping a Raft – Climb onto the overturned raft. Attach a flip line to the side tube. Lean backwards on the other tube and flip the raft. Climb back into the raft. Source: author – [file: \FlipRaft.cdr]

Once on top the overturned raft, the rafter can attach a flip line to one of the D-rings on the side tube of the raft. If easier, the flip line can be attached to the perimeter line. The flip line is ten feet of webbing worn like a belt around the waist. It is buckled together using one or two carabiners. The flip line should fit snugly around the waist to prevent snagging and entrapment.

Some rafters will have a flip line pre-attached to the side tube. It is a mini-throw bag with ten to fifteen feet on line in it. Before climbing up onto the raft, the line is tossed over the raft. It can be used to assist in reentering the raft.

Standing on the side tube, the rafter leans backward against the taught flip line (Figure 6.12). As the rafter falls backwards into the water, the weight of the rafter and the thrust of the feet inward on the side tube flips the raft over so that it is right side up. Depending on the size of the rafter and the raft, flipping the raft may require more than one person. Using one of the methods of reentry, the rafter needs to reenter the righted raft.

Depending on the situation, it should be noted that it may be easier to paddle the raft to shore upside down where it can be righted.

Rescue of Others in Your Group – Wading Rescues

Rescues of others in your group include the rescues of other rafts in the group. It should be noted that some of the rescues techniques in the self-rescue section are applicable to this section also. If another raft on the trip uses the assisted reentry to haul in a passenger from another raft, the reentry falls into this group.

The ACA Rafting course lists several suggested rescue techniques. Most of the items in this section were borrowed from the Swiftwater Rescue Manual. Wading and entrapment skills are always worthwhile skills to know.

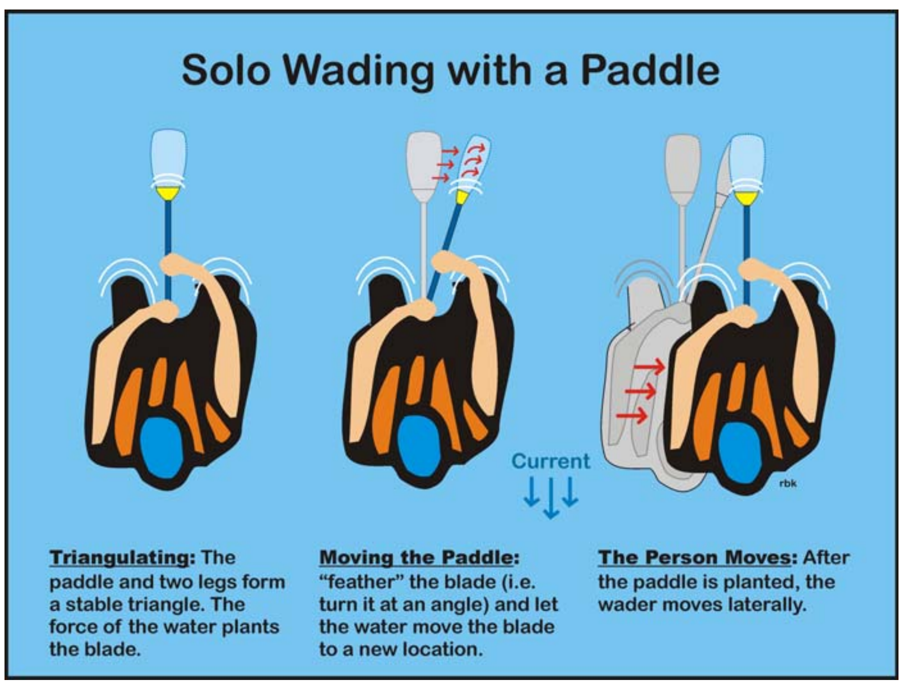

Figure 6.13: Solo Wading with a Paddle The paddle and two legs of the wader triangulate and create a stable base in the water. Source: author – [file:\SWM-WadeSolo.cdr]

<b>**<u>Solo Wading with a Paddle</u>** (Figure 6.13) – 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.

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 6.13). This approach works better in deeper water and maintains stability because it lessen 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.

<b>**Simple Rope Tether** (Figure 6.14) – The simple rope tether illustrates that often simple techniques can be done quickly and efficiently to effect a rescue. For this reason, it is included in this section. This technique illustrates a technique that can be setup quickly and with little fanfare. In the simple rope tether, the rescuer uses a belayed line for stability. In the solo rescue with a paddle, the paddle provides the same stability. In the two person rescue, the second person provides this stability. In this rescue, the belayer on the shore provides this stability. A belayer is shown in Figure 6.13. However, a rock, tree, or other object can just as easily provide the belay point for the rescuer to pendulum out to the victim using the belayed line for stability.

<b>**Stabilization Line** (Figure 6.15) – The purpose of a stabilization line is to provide support with which the victim can raise his head above the water to breath, particularly in a heads-down foot entrapment. It provides enough support for the victim to brace themselves against the line with their hands and arms.

The pressure on the belayers is considerable. Also, the stabilization line can be fatiguing when the time frame becomes extended. Hip belays are recommended. Also, consider the 120^{o} rule where if the angle between the victim and the two belayers is 120^{o}, the force is equal on the victim and the two belayers. If there is 100 lbs of force on the victim, there is 100 lbs of force on each belayers. Although it is not always possible, the belayers want to minimize the angle between them and the victim to reduce the force on the belayers. When possible, the belayers should be backed up. Holding onto the shoulder straps of the life jacket, the backup pulls downward on the belayer to prevent them sliding off the rock.

Position both upstream and downstream safeties. When there is a stabilization line or any line across the river, use an upstream safety. The purpose of the upstream safety is to redirect or stop anyone coming down the river. One or more downstream safeties should be provided. The downstream safeties provide two services. If one of the rescuers becomes a swimmer, they can rescue the rescuer. When a conscious or unconscious victim is extricated, they will need to be rescued or they will continue to float downstream.

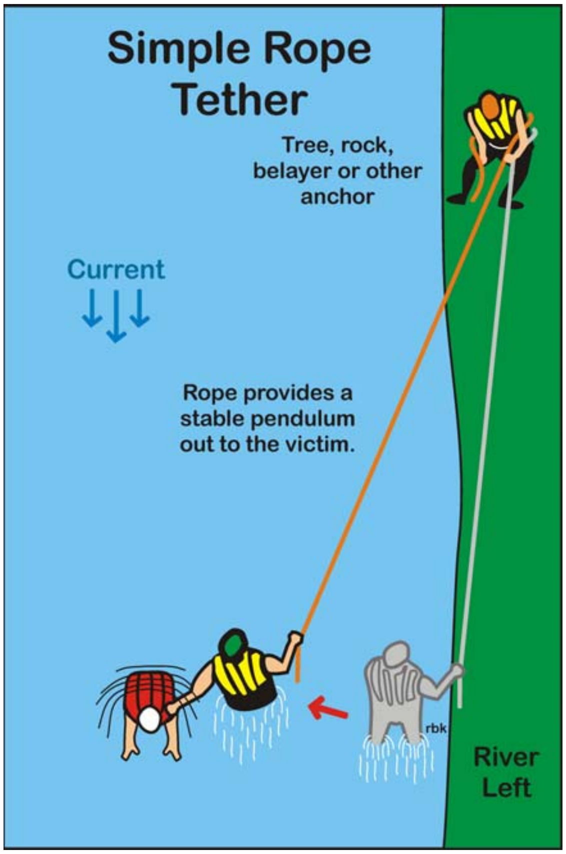

Figure 6.14: Simple Rope Tether – The simple rope tether illustrates that sometimes keeping it simple can create an effective rescue. The rescuer uses the belayed rope for stability as she wades out to the victim. Source: author – [file:\ROPE-SimpleRopeTether.cdr]

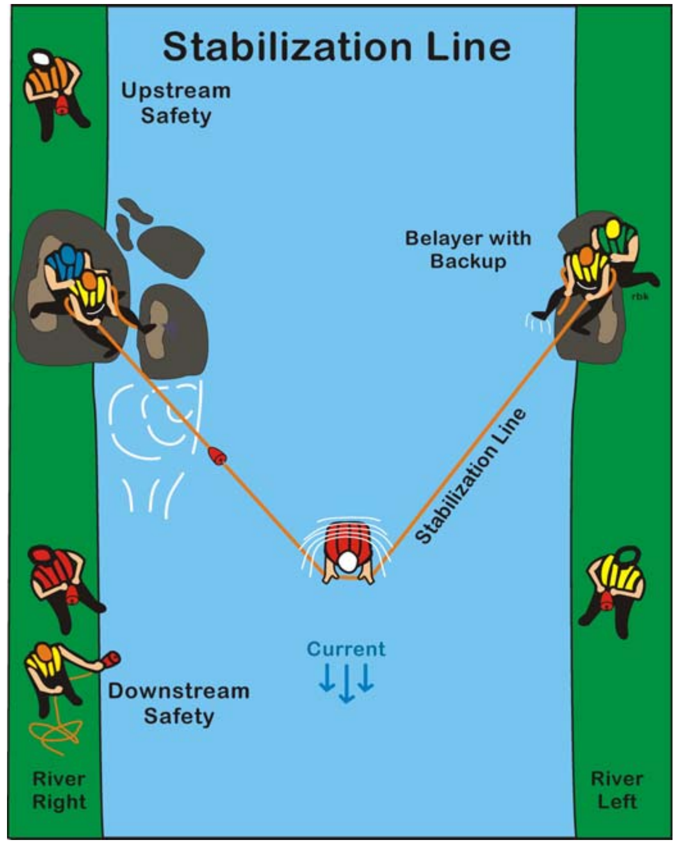

Figure 6.15: Stabilization Lines – The purpose of the stabilization line is to provide sufficient support to the victim so that they can breath. Source: author – [file:\ROPE-StabilizationLine.cdr]

Rescue of Others in Your Group – Raft Rescues

The focus of this section is on raft oriented rescues and in terms of the Rescue Curve, its focus is on rescue by others in your group (e.g. bumping and unpinning rafts). In addition, self-rescue techniques (e.g. flipping a raft) can be used also. Also, the techniques discussed in this section can be applied to rescues by others outside your group. Using rafts as a rescue platform is an example of rescue by others outside your group. In the example used, the raft trip performed a foot entrapment rescue when they came upon another group conducting the throw bag drill.

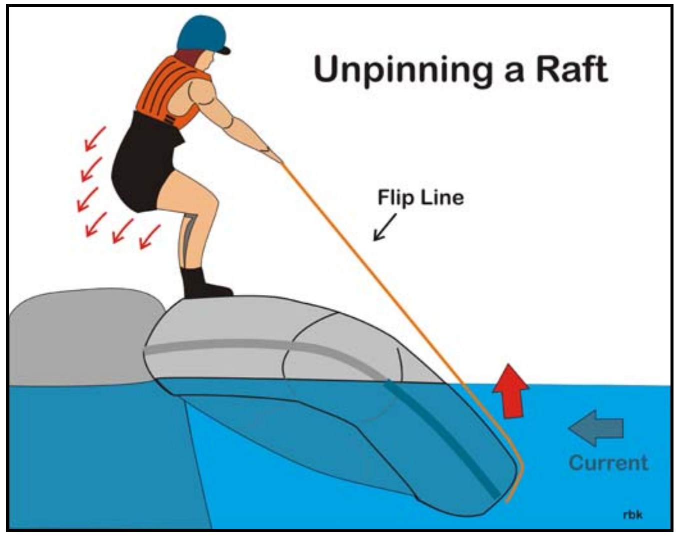

Figure 6.16: Unpinning a Raft – A flip line is attached to the underwater tube. The upward pressure lifts the tube toward the surface where it breaks free. Source: author – [file: \RS-PinnedRaft.cdr]

<b>**Bumping** (not shown) – An overturned or empty raft can be bumped to shore by another raft. Two words of caution. First, rescue passengers first. Usually, this assumes that others are picking up swimmers or they are self-rescuing. Second, when bumping another raft, be sure not to endanger your own raft. It is easy to pin your raft on a rock or to be somewhere you don't want to be when bumping.

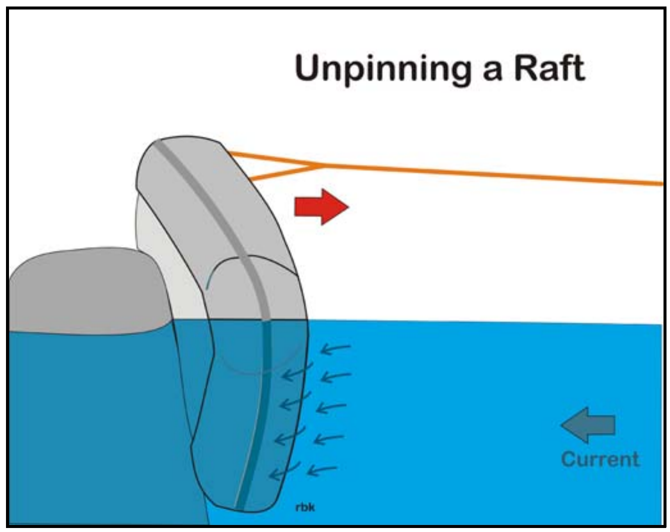

Figure 6.17: Unpinning a Raft – A line is attached to the tube out of the water. The strategy is to rotate the raft reducing the current pinning the raft and allowing the inflated tube to float to the surface. A mechanical advantage system can be used on the haul line. Source: author – [file: \RS-PinnedRaft02.cdr]

<b>**Unpinning Rafts** (Figure 6.16 and Figure 6.17) – The force of the water against the raft can easily pin a raft against a rock, bridge abutment, or other obstacle. As a general rule, when the tube underwater surfaces, the raft will float free. When possible, the trick is to use the force of the water and the flotation provided by the inflated tubes to free the raft. Unpinning a raft is as much an art as it is a science. There are numerous stories where a group is working to extricate the raft without any luck. Another rescuer comes along, tries a different angle on the rope or does something slightly different, and the raft pops free.

The author came across a pinned raft depicted in Figure 6.16 at World's End on the Youghiogheny River. He climbed up on the exposed tube, reached down and fastened a line with a carabiner to the upstream tube. Caution needs to be used to avoid pinning the rescuer. Gently leaning backwards, the rescuer pulls on the submerged tube. It began to rise. When it reached the surface, the raft popped free. Unlike in the raft flipping, the rescuer is not off balance and doesn't fall into the water. Also, consider attaching an end line to pull the freed raft into shore. Often the freed raft can easily float downstream.

A second strategy is to pull on the exposed tube with a line (Figure 6.17). The strategy is to rotate the raft so that the water flows underneath the raft. The rotation reduces friction between the raft and the pinning object. The inflated tube underneath the water begins to float upward. As a general rule, this method will work if at least half of the raft is exposed or if the current is moderate. When possible attach the main line to more than one D-ring on the tube. Consider using a self-equalizing anchor formed using an inline Figure-8 follow through. It may be important to distribute the load to more than one D-ring. The "arm strong" method or mechanical advantage can be used to pull on the haul line. Note in the rescue on the Upper Yough in the Figure 6.18 that the line was attached to the out–of-water tube and the raft was rotated until it popped free.

Figure 6.18: Unpinning a Raft on the Upper Yough – A line was tied to the out-of-water tube and the raft was rotated until it popped free. Source: author – [file: \5-7-05 sat may 062.jpg]

<b> **Mechanical Advantage** – For a complete discussion of mechanical advantage systems, consult Chapter 6 in the Swiftwater Rescue Manual (Kauffman, 2017). Topics discussed include range of the system, concept of throw, internal versus external systems, and types of systems. If mechanical advantage is used, consider the 5:1 pulley system (Figure 6.19).

In terms of the previous discussion on extricating a pinned raft, if there are enough people present consider using the "arm strong" method. This is where everyone pulls on the line. If mechanical advantage is going to be used, consider starting with the 5:1 system (Figure 6.19). It can work as either an internal or external system. Also, it has good throw where the system doesn't need to be constantly readjusted. Also, if more mechanical advantage is needed, it can easily and quickly be converted to double Z-rig system with a 9:1 mechanical advantage.

As a practical matter, the use of a 3:1 Z-rig is of little use. It is the commonly taught system and along with the 2:1 system forms one of the three base systems from which other mechanical systems are created. Angle of pull and friction can easily reduce its effective mechanical advantage of a Z-rig to a 2:1 system. If there are a lot of people present, the "arm strong" method will work equally well without

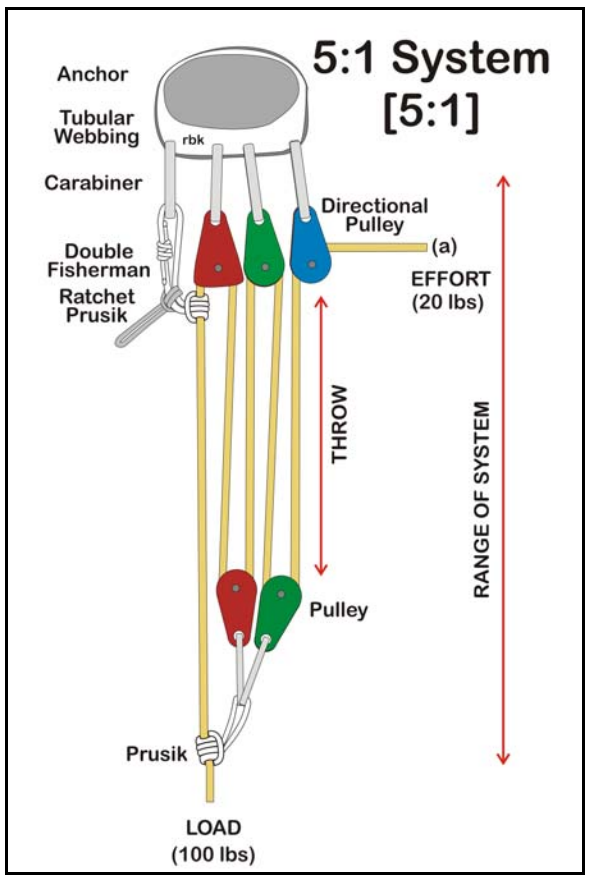

Figure 6.19: 5:1 Pulley System – The 5:1 Pulley System provides good mechanical advantage. It has good throw, and it can quickly be converted to a 9:1 double Z-rig system. Source: author – [file:\RS-51PulleySystem.cdr]

having to do all the setup. If mechanical advantage is needed, it only makes sense to maximize mechanical advantage. The 5:1 system provides the mechanical advantage needed. It requires two additional pulleys and two carabiners in the pulley bag over the traditional Z-rig.

<b> **Rafts as a Rescue Platform** (Figure 6.20) – Rafts can serve as a rescue platform. The first example is from the Dzialo incident on the Deerfield River in Massachusetts (Kauffman and Gullian, 2006). Crab Apple Rafting came upon the heads-down foot entrapment and proceeded to assist in the rescue. After trying swimming and wading rescues, they stretched a line across the river using two throw bags. They lowered a raft extricated Adam Dzialo from the foot entrapment and placed him on a backboard in the raft.

When considering the amount of rescue equipment that can be carried, rafters can easily carry more equipment. Jokingly stated, backpackers count ounces, canoeists and kayakers count pounds, and rafters count tons. The point is that larger rafts can carry rescue equipment that canoeists and kayakers would find prohibitive. The extra weight of carrying pulleys and lines is not an issue for rafts.

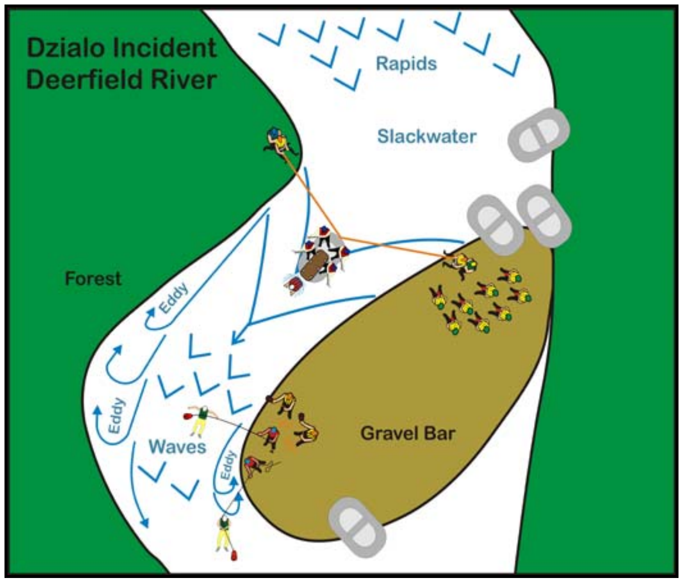

Figure 6.20: Using a Raft as a Rescue Platform – Rafts can be used as a rescue platform. In the Dzialo incident on the Deerfield River, a raft was lower to help extricate the victim. Source: author – [file: \RS-Deerfield.cdr]

Potpourri

The following items are a potpourri of safety items listed in the ACA course syllabus. Some of these items tend to be more ancillary to raft safety. They are included to help this document be complete in terms of the ACA syllabus.

RETHROG – RETHROG is an acronym standing for REach, THrow, ROw, and Go. It originates with the lifeguard community. The problem was that training tended to emphasize swimming rescues. In mock rescues the lifeguards tended to jump in the water and enact a swimming rescue rather than reaching out to the victim or throwing a rope to them.

Other than swimming, the other RETHROG rescues are used by rafters although they may be used in a different order depending on the situation. The following translation of RETHROG into the whitewater boating community is suggested. If the victim is close enough to the raft, extend a paddle to them. If they are beyond the range of reach with a paddle, use a throw rope to reach them. If the raft is an oar rig, row to the victim. It is unlikely that the guide will enact a swimming rescue.

Rescue Priorities – The normal rule is to rescue people first and then rescue boats and equipment next. As a general rule this is always true. Often, the victim is self-rescuing or there are other boaters assisting in the rescue of the victim. In this case, it may be appropriate to rescue the boat and equipment which will flush downstream if no one pursues them. Again, if there is any question, rescue the people first. Equipment can always be replaced.

Towing a Swimmer/Boat – In general, this author has never had to tow a swimmer behind the raft. Normally, it is more practical to pull the swimmer into the raft. Having noted this, there are two instances that conceptually are applicable. In the first, a swimmer grabs hold of the perimeter line of the raft and drifts with the raft through the rapids. It is normal protocol for the victim to move toward the stern (i.e. rear) of the raft and of course they should keep their feet up toward the surface. Second, I have a nine foot NRS strap around the rear tub of my Shredder. By design, the five to six foot tail is purposely trailed behind the raft. As an R1 paddler, if I am a swimmer, I use the tail to tow my boat to shore. Fortunately, I have had to do this on few occasions.

Summary

The chapter covers basic rescue techniques for rafters. There are the fundamentals such as search techniques and throw bags. The chapter covers swimming and wading techniques including defensive and aggressive swimming and the back ferry. Then it moves into self-rescue techniques including reentry into the raft. From there it moves into raft rescue techniques including bumping, flipping overturned rafts, unpinning rafts, and using rafts as a platform for rescue.

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