Chapter 4.0:
Strokes and Maneuvers

The focus of this chapter is on paddle and rowing strokes for rafts, and on river maneuvers for rafts. Essentially, the strokes in the stroke section are independent of river features. In contrast, maneuvers are specific reactions to river features. An eddy turn describes how to maneuver the raft into an eddy. A ferry describes how to move the raft laterally in the water. Setting the raft describes how to maneuver the raft around a bend in the river. The strokes described in the previous chapter are used by guides and the crew to accomplish these maneuvers.

In terms of strokes, they are kept fairly simple. First, there were two strokes presented for passengers: the forward and reverse/back strokes. For guides, five strokes were presented. These were the forward, reverse/back stoke, draw and pry.

Second, stroke mechanics can become quite sophisticated. This author wrote the stroke section for the ACA book on Canoeing and Kayaking published by Human Kinetic (Dillon and Oyen, 2009). The stokes in this chapter are "***pure strokes***" (e.g. forward, reverse, draw and pry strokes). "***Compound strokes***" are stokes pure stokes are combined together to form new strokes (e.g. J-stroke or inside pivot turn). They are not discussed nor are they necessary strokes for a rafter. Nor are "***complex strokes***" discussed. In complex strokes the blade moves through the water at an angle rather than at right angles to the paddler and boat. The stationary draw and sculling are examples of this concept. Although these advanced strokes are nice to know and useful in rafting, there are many good raft guides who know how to use only the pure strokes to maneuver their raft very successfully. And passengers don't need to know them either.

Concepts and Principles

This section provides the setup or fundamentals needed for strokes and maneuvers. It includes the parts of a paddle and oar, the paddle or oar as a lever, blade placement in the waves, and the turning circle.

Parts of a Paddle/Oar (Figure 4.1) – The parts of a paddle are listed in Figure 4.1. For passengers, the critical paddle components are the grip, shaft and throat. These components are important because paddlers need to hold onto the grip and throat of the paddle. As noted later, there is a tendency for paddlers to hold the paddle too high on the shaft. Guides need to familiarize paddlers with these parts in order to orient them on how they should hold the paddle.

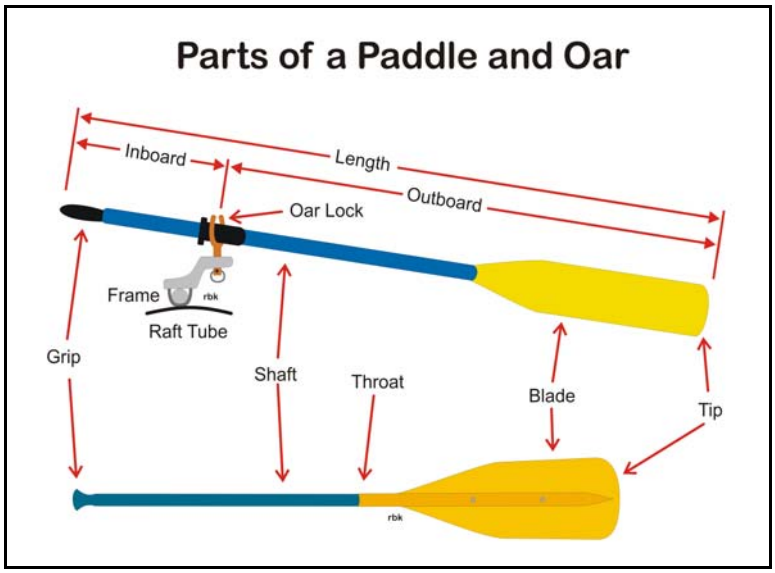

Figure 4.1: Parts of a Paddle/Oar – Source: author – [file: \EQ_PaddleOars.cdr]

Since guides are doing the rowing, they should be familiar with all the parts of an oar, if only for informational purposes (see Figure 4.1). For consideration, the overall length of the oar should be sufficient to provide a good bite in the water. Also, the inboard length should be sufficient to help offset the weight of the outboard length of the paddle.

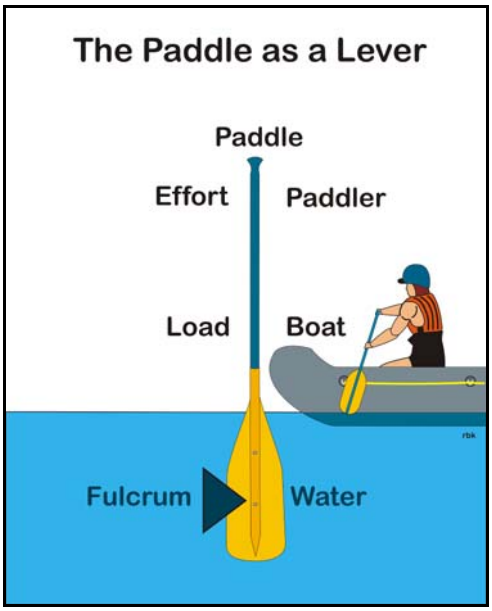

Figure 4.2: The Paddle/Oar as a Lever – Although it is not intuitive, the water is the fulcrum and not the load. Source: author – [file: \ST_LeverPaddler.cdr]

The Lever (Figure 4.2) – The paddle is a lever. There are three components in a lever. These are the fulcrum, the load and the effort. The paddler is the effort. This leaves determining the load and the fulcrum with the water and the raft. Is the fulcrum the water or raft? Is the load the water or the raft? Intuitively, many will answer that the water is the load because in practice the blade is moving though the water. This is particularly true with oar rigs because the oar lock looks like a perfect fulcrum. However, the water is the fulcrum, if only an imperfect fulcrum at best.

Think of it this way. The paddler is moving the boat past the paddle. The lighter the boat, the more this principle will become apparent to the paddler. The bigger and heavier the boat the less likely this principle will be evident. Although technically not correct, for most rafters and crew (i.e. passengers), the paddle moves through the water with the water feeling as if were the load. Practically, this is okay. From a guiding perspective where it is important to get the crew trained quickly, it is perfectly okay to teach the passengers to move the paddle through the water. In a full raft, it will feel this way anyway.

The guide should examine how the passengers hold the paddle. Often, they will have one hand on the grip and the other hand about a foot or 18 inches down the shaft. In terms of leverage, these paddlers are applying little if any power with their stroke. Because of the position of their hands on the paddle, they can't. They have no leverage. Examination of world class C-1 paddlers reveals that their hand grips the throat of the paddle just above the blade. This allows them to apply maximum power and leverage. Passengers won't have their grip hand this low. However, guides can monitor the hand position on the shaft to help obtain more power from the paddle strokes.

Blade Placement (Figure 4.3) – In whitewater, the paddler and for that matter, rower, wants to place the blade in the water to obtain the maximum bite. Figure 4.3 shows a typical wave configuration. Essentially, catching the backside of the wave (B) gives the most support to the stroke taken. Catching the front side or face of the wave (A) will

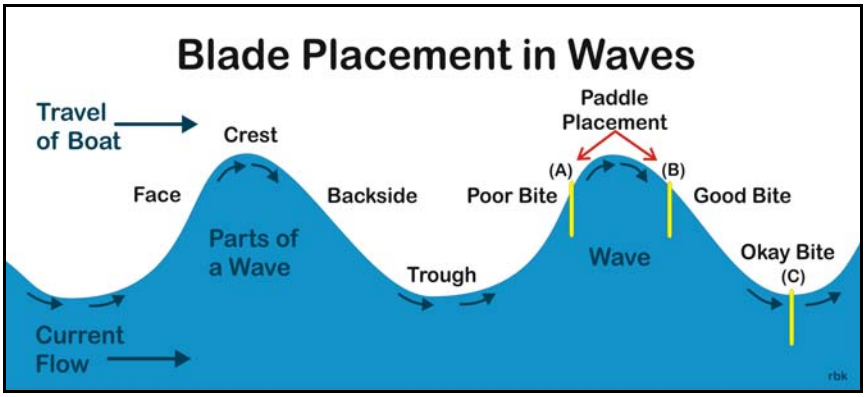

Figure 4.3: Blade/Oar Placement in a Wave – Place the blade on the backside of a wave for best effect. Source: author – [file: \ST_LeverPaddler.cdr]

generally result in catching air. Usually, there is an insufficient amount of water to support taking a power stroke. The problem catching the trough (C) is that the rafter may have to reach down to get a good bite of water. Other than this, there is sufficient support in the water to take a stroke.

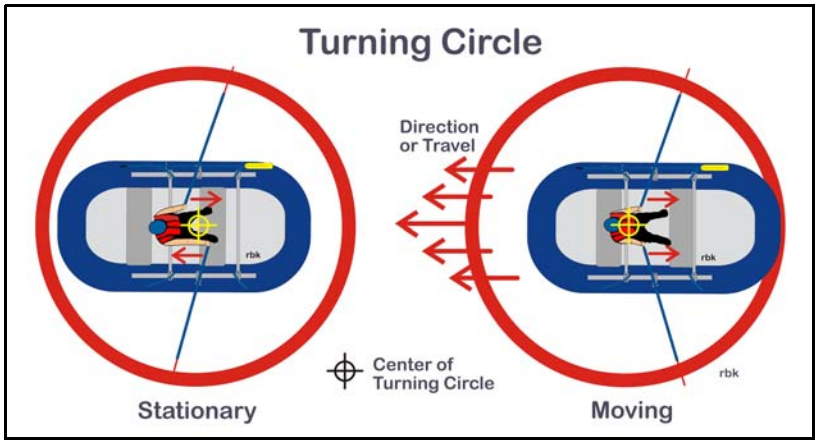

Figure 4.4: The Turning Circle – Imaging a horizontal wheel. Any stroke applied along the wheel will maximize the turning force on the boat. Source: author – [file: \ST_TurningCircle.cdr]

Turning Circle (Figure 4.4) – Imagine a bicycle wheel placed on its side. Any stroke applied along the wheel (turning circle) will rotate the boat on axis. For a stationary boat, the axis is in the center of the boat. The further away from the axis that the power is applied, the greater the turning effect on the boat. (e.g. the oars provide this distance).

As a raft moves forward, the turning circle and its axis move forward also. The greater the speed, the further forward the turning circle tends to move. This means that turning strokes applied in the stern of a raft will turn the raft more easily than strokes applied in the bow. Intuitively, C-2 canoeists have long known this principle by placing the better boater in the stern where they can easily steer the canoe. As a practical matter, rafts tend to move relatively slowly and the turning circle doesn't change appreciably with speed. Regardless, the turning circle explains why raft guides sit in the rear of the raft and not in the bow. Sitting in the rear provides guides with greater maneuverability.

Strokes – Paddle

In general, passengers in a raft need to know two strokes: the forward and reverse strokes. In addition, guides need to know the pry or push away and possibly the draw strokes. Working together with the commands of the guide and the corrections provided by the guide, the raft can be successfully maneuvered with these "pure strokes." Maneuvers involve river features or situations. All maneuvers can be created by using different combinations of these strokes. Guide commands for using theses strokes are covered in Chapter 7, Trip Leadership.

Three Phases of a Stroke (see Figure 4.5) – Typically, a stroke has three phases. These are the catch, power phase and recover phase. The ***catch*** occurs when the paddle enters the water. Most of the forward power is provided initially with the catch. This is followed by the ***power stroke*** or phrase where the paddle moves past the paddler. Technically, the boater and raft are moving the boat past the paddle (Note: *See lever discussion*). However, given the weight of the raft and the inefficiency of the water as a fulcrum, it more likely appears that the paddle is moving through the water past the paddler. The last phase is the ***recovery phase***. Normally, the blade is feathered, but in most rafting situations the paddler simply lift their paddle out of the water and return it for the catch phase of the next stroke.

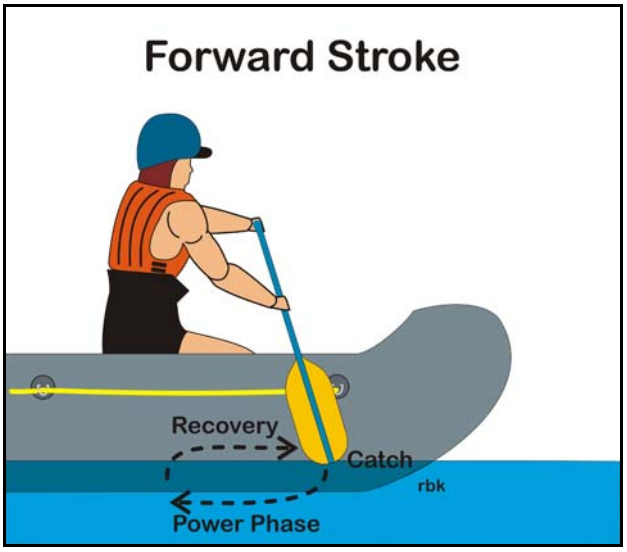

Figure 4.5: Forward Stroke –The forward stroke propels the raft forward. Source: author – [file: \ST_StrokeForward.cdr]

Forward Stroke (Figure 4.5) – The forward stroke is one of two strokes used by passengers to propel the raft forward. Keep it simple. Reach forward with the paddle, catch the blade in the water and pull the blade back to the hips. Lift the blade out of the water (i.e. recovery phase) and reach forward to take another stroke. Forget torso rotation and other important nuances involved with more advanced versions of the stroke. Again, keep it simple.

Most guides will emphasize stroke coordination to get paddlers to take their strokes in unison. Technically, if one member of a crew of five takes a stroke early without the help of others, the paddler is pulling the entire weight of the raft. This is a lot of work. If all five paddlers catch the water together and take their strokes in unison, they are only pulling one fifth of the weight of the raft. This is easier on the body and much more efficient.

One of the commands used by this author when guiding is to call out the strokes. It is reminiscent of the old Roman galleys where the Roman in the galley of boat pounds out the beat and rhythm of the strokes. All the oars are catching the water together and all strokes occur in unison. The raft command is simply a loud "stroke," "stroke," "stroke." With each "stroke," the group catches the water together in unison. It works exceedingly well in clutch situations when power needs to be applied and the raft needs to move more quickly. Also, the passengers can tell the gravity of the situation by the inflection of the guide's commands. So be forewarned. Regardless, the cadence set by the stroke, stroke, stroke command is useful in non-clutch situations for guides. The emphasis is on the coordination of passenger's strokes with the commands of the guide rather than developing perfection of stroke technique.

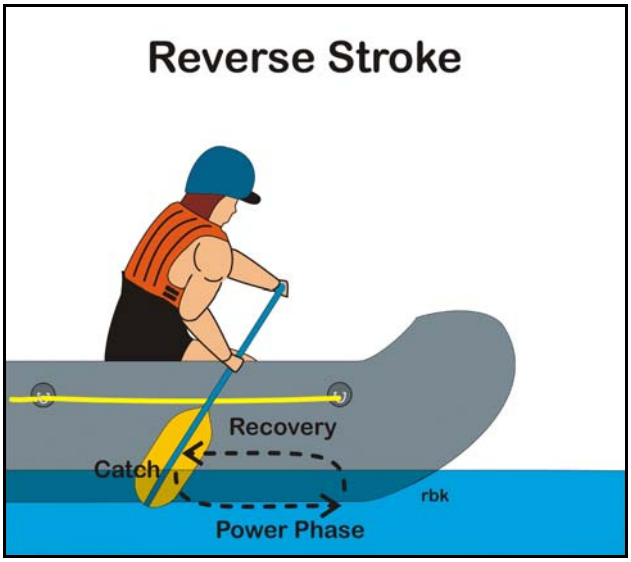

Figure 4.6: Reverse Stroke – The reverse or back stroke is used to propel the raft backwards. Source: author – [file: \ST_StrokeReverse.cdr]

Reverse/Back Stroke (Figure 4.6) – As its name suggests, the reverse stroke propels the raft backwards. Sometimes it is referred to as the back stroke. Either term is acceptable. The passengers may lean forward, reach back with the blade and catch the water just behind the hip. They push with the lower arm and pull with the upper hand. Using their back, they may end the stroke leaning backwards. When the paddle is in front of them, they remove the paddle from the water and take another stoke if needed. In the recovery phase, they can feather the blade where the blade is horizontal to the water or they can simply move the unfeathered paddle forward for another stroke. Most guides will find that the unfeathered paddle recovery works well and is more than adequate. Many paddlers will find it convenient to place the

blade on the hips and use it as a wedge. Technically, it is not the most efficient stroke, but it works well and is a perfectly acceptable alternative.

Pry/Rudder/Reverse Half-Sweep (Not shown) – The pry and rudder are guide strokes. The pry and rudder can be used to move the stern of the raft away from the paddle stroke. The pry is useful in a R4 configuration where the guide can literally pry off the side tube. The paddle is turned sideways, the shaft of the paddle placed against the tube, and the stern of the raft literally pried.

When sitting on the stern of the raft the guide will often find the ***reverse half-sweep*** a more efficient stroke. It can be a powerful turning stroke. Conceptually, it is a half-sweep because the sweeping action is on the turning circle. A half-sweep maximizes the turning effect. If a full sweep is done, the second half of the sweep stroke is off the turning circle and is counter productive.

The guide will also find the rudder useful. It is most useful when the guide is on the stern of the raft. Place the shaft of the paddle on the tube of the raft with the blade in a feathering position (i.e. perpendicular to the water). Simply use the paddle as a rudder. A rudder only works when the raft is moving faster than the current. For a rudder to work the water moves at an angle against the blade. If the raft and current are moving at the same speed, there is no force against the blade and hence, the rudder doesn't rudder. As a general rule, the rudder is a convenient stroke without a lot of power. In practice, most guides will merge a rudder into a pry for more effect.

Draw Stroke (Not shown) – The draw stoke is another guide stroke. In its simplest form, a draw stroke is really a forward stroke at a right angle to the boat. From there it comes into its own with an underwater recovery. The draw stroke is a counter stroke to the pry, rudder, or reverse half-sweep. If they are used by a right-handed paddler to move the stern toward the left, the draw is used to move the stern to the right.

In a raft, the draw stroke is considered a weak stroke and in some cases a half-back stroke on the opposite side accomplishes the same thing. However, as a former C-1 (canoe) paddler, this author finds the draw stroke a useful stroke in his repertoire.

Strokes – Oar

Most oar rigs are configured with the guide and oars located in the center of the raft responsible for providing motive power. The passengers are along for the ride. To be a successful rower, there are three things the rower needs to be able to do. First, the rower needs to know how to row a rowboat. Surprisingly, the mechanics are the same. Second, the rower needs to know how to back ferry. The back ferry covers for a multitude of sins. Some western rowers may disagree with this because the back ferry slows down the speed of travel. Regardless, the back ferry slows down everything and allows for increased maneuverability. The back ferry is covered in the maneuver section of this chapter. Third, the rower needs to have river reading skills. This topic is covered in the previous chapter.

Phases of Stroke: Oar (Figure 4.7) – As with paddling, there are three phases to a stroke with oars. These are the catch, power phase and recovery. The catch is when the oar enters or catches the water. The power phase is applying power to the stoke. Recovery is feathering the blade back for the next catch and stroke.

"*Oar rights*" are a popular device today that keep the blade of the oar perpendicular or at right angle to the water. Unfortunately, they prevent feathering the blade during the recovery phase. It is easy to hit the top of a wave with the blade during the recovery phase. An advantage of the oar right is that during a crux move when the blade is inserted for the catch, it catches the water. Without a blade right, the oar may skip and miss the stroke. Although the author prefers not using oar rights, he has messed up a crux move on occassion because of the blade placement. Oar rights would have prevented the mess up.

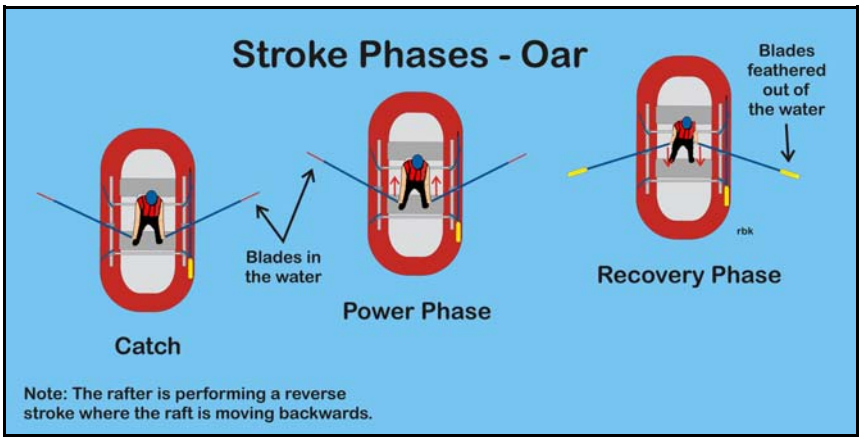

Figure 4.7: Three Phases of an Oar Stroke – Caption: The three phases are the catch, power phase and recovery. Source: author – [file: \MA_StrokePhases.cdr]

<u>Forward Stroke</u> (Figure 4.8) – In its pure form, the forward stroke moves the bow forward in the water with the rafter facing toward the bow. The stroke starts with the grips close to the chest. The arms extend forward completing the power phase of the stroke. Physiologically, the stroke is similar to doing a series of bench presses with considerable emphasis on the use of the triceps. Although this seems to tax some of the weaker muscle groups, western rowers seem to row all day walking the raft with alternate forward strokes. For the recovery phase, the blade is lifted out of the water and returned close to the chest for the next stroke.

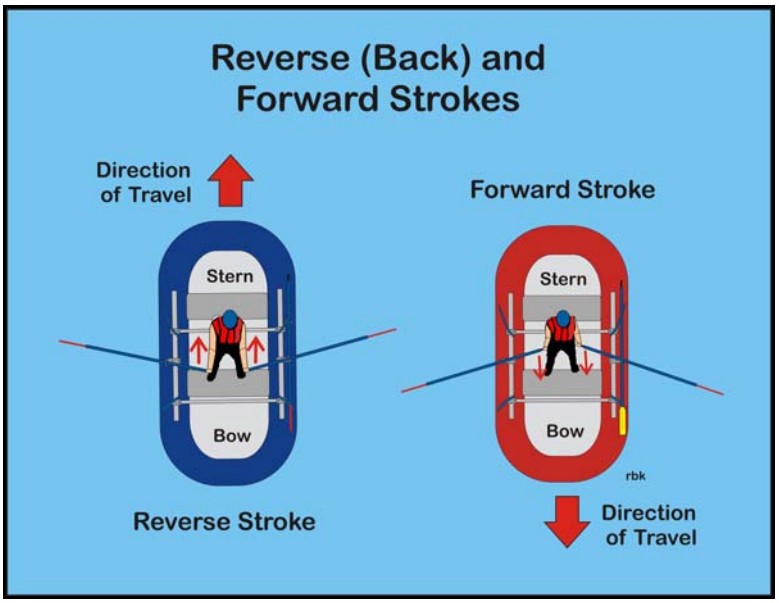

Figure 4.8: Forward Stroke The forward stroke propels the raft forward with the rafter facing forward toward the bow. Source: author – [ST_ForwardBackStroke.cdr]

<u>Walking the Raft</u> (Figure 4.9)– "Walking the raft" is a technique of moving the raft through the water where the rafter is facing forward toward the bow and toward the direction of travel. It is a popular technique on western rivers that tend to be continuous drop and where they are using a "follow-the-leader" approach through the rapids (see Chapter 7). It is called walking the raft because the forward stroke alternate like a person walking. When walking, the legs alternate with one foot going forward while the other foot remains stationary. It is strictly a rowing technique and not applicable to paddling situations.

There are two advantages of the method. First, the rafter is facing forward through the rapids. Second, every stroke is used to propel the raft down the river. When covering twenty miles a day, this is not

unimportant. Philosophically, it is similar to the slalom racer where any stroke other than a forward stroke is slowing their time.

There is one disadvantage of the method. There are times when things need to be slowed down in order to make the maneuver. The back ferry method of running the river slows things down and makes for easier negotiation of a rapids. However, it is energy not being used to move the raft down the river. For some, it is considered wasted energy.

In Figure 4.9, walking the raft is a technique where the guide facing forward takes alternating forward strokes with the raft. A forward stroke is taken with the left oar (catch and power stroke phases). The stroke drives the raft forward and the bow toward the right. Simultaneously, the right oar is being repositioned for the next stroke (recovery phase). It is lifted out of the water and the blade is feathered toward the bow of the raft. (Note: If oar rights are used, the blades cannot be feathered. Next, a forward stoke is taken with the right oar and the left oar is repositioned for the next stroke (recovery phase). The process is repeated.

Reverse Stroke (see Figure 4.8) – In an oar rig, the reverse stroke tends to be a more powerful stroke than the forward stroke because the rafter can get his back into the stroke. The major disadvantage of the reverse stroke is that when facing downstream, the rafter has obstructed visibility. Another advantage of the reverse stroke is that if the rafter is walking the raft, the rafter can easily execute a reverse stroke at an angle to the current and back ferry. This slows the raft in the current and moves it laterally.

Right Turn (Figure 4.10) – In its pure form, a right turn moves the bow to the right and the stern left. As pictured, the raft will pivot on an axis in the center of the raft (see turning circle Figure 4.4). As pictured, the handle of the left blade is positioned close to the rafter. The handle of the right blade is extended outward. Both blades catch the water together. In the power phase, the left arm extends forward and the right arm draws in toward the body. The raft rotates on the center point of the raft to the rafter's right. For the recovery phase, both blades are lifted out of the water, feathered (blades are horizontal to water) and positioned again for the next catch phase. (Note: If blade rights are used, the blades cannot be feathered.)

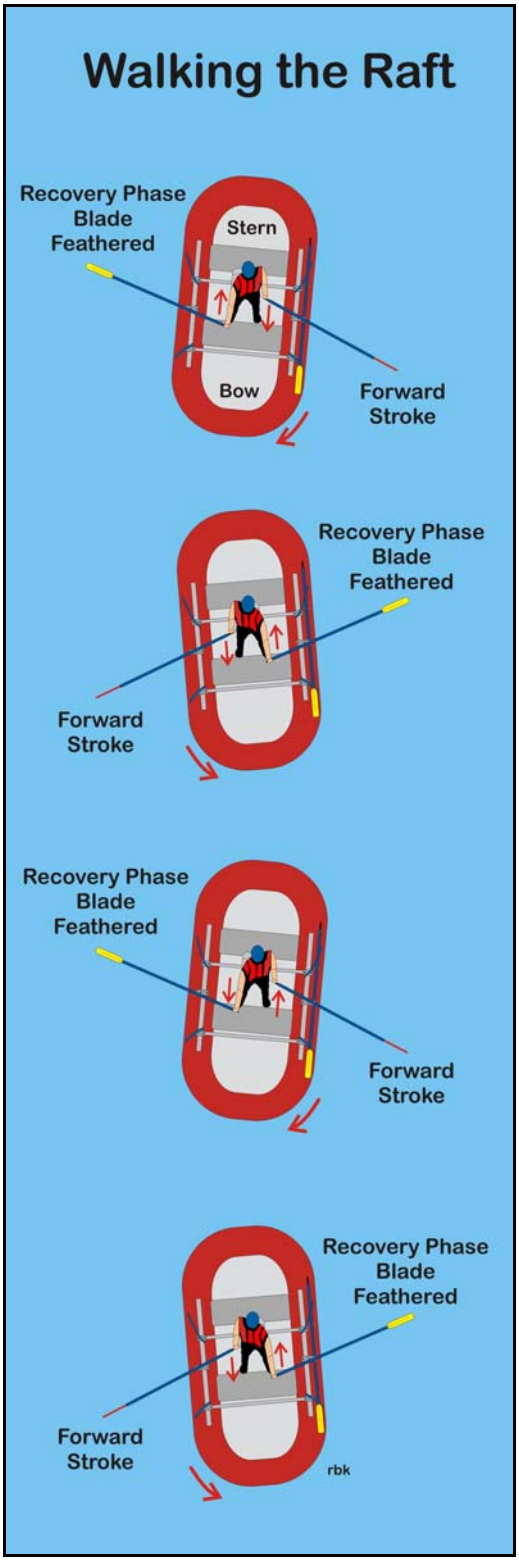

Figure 4.9: Walking the Raft – Caption: Alternating forward strokes walking the raft mimics walking. Source: author – [file: \MA_WalkingRaft.cdr]

Left Turn (Figure 4.11) – Performing a left turn is the direct opposite of a right turn. The handle of the right blade is positioned close to the rafter. The handle of the left blade is extended outward. Power Phase. Both blades catch the water together. During the power phase of the stroke, the right arm extends forward and the left arm draws in toward the body. The raft rotates on the center point of the raft to the rafter's left. In the recovery phase both blades are lifted out of the water, feathered (blades are horizontal to water) and positioned again for the catch phase.

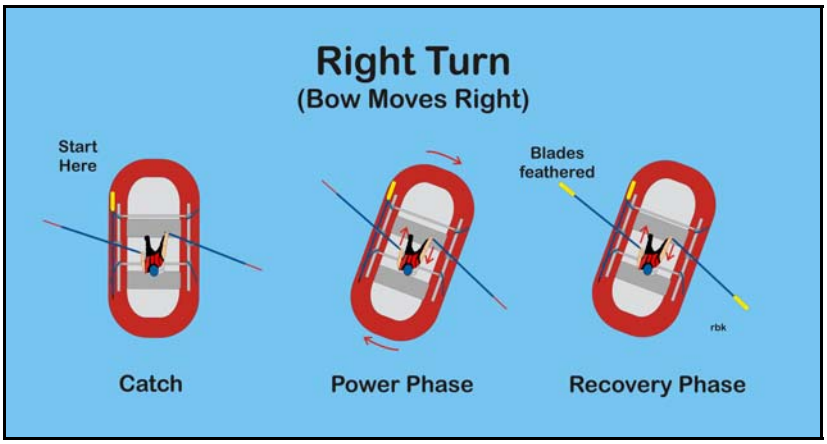

Figure 4.10: Turn Right: Pushing forward on the left oar and pulling back on the right oar turns the bow of the raft to the right. Source: author – [ST_TurnRight.cdr]

River Maneuvers - Paddle

River maneuvers include ferrying, eddy turns, peal outs, and setting a raft around a bend. These are the standard river maneuvers. These maneuvers build upon the strokes described above. Oar rig maneuvers are included in the next section.

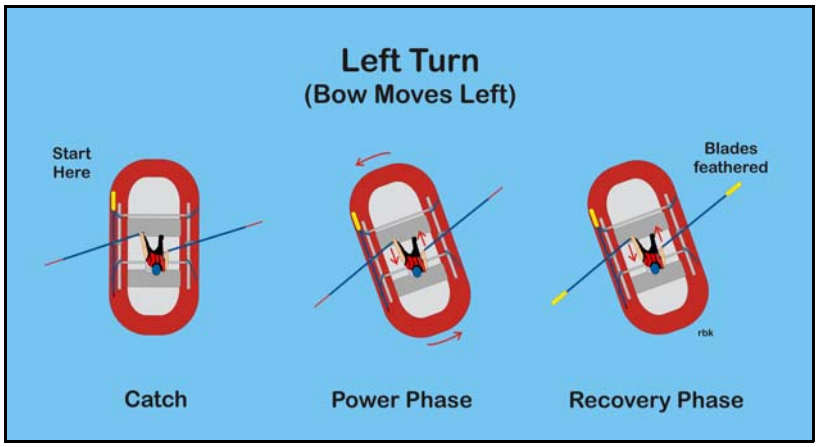

Figure 4.11: Left Turn: Pushing forward on the right oar and pulling back on the left oar turns the bow of the raft to the left. Source: author – [ST_TurnRight.cdr]

Forward and Back Ferry (Figure 4.12) – In Figure 4.12, the forward ferry is shown moving the raft from one eddy to another eddy. In a paddle raft the forward ferry has more power and is more practical than the back ferry. For this reason, the back ferry is not shown. In the figure, the raft is moving from an eddy on river right to an eddy on river left. Also, the guide is in the stern of the raft on the right side.

Exiting the eddy, the raft leaves the eddy somewhere between the upstream current and the neutral current. The closer to the rock the more powerful the current and the more the turning effect of the current differential as the raft exits the eddy. As the raft crosses the eddy line of a big powerful eddy, it may be necessary for passengers on the upstream side to lean inward to prevent falling out of the raft. In most cases the raft is comparatively large and there is little tendency to catch the upstream side and lose passengers.

As the raft crosses the eddy line (Scene A), the current differential will want to turn the bow of the raft downstream and execute a peel out rather than a ferry. To counter this, the raft guide can do one of three moves. First, the guide can do a hefty draw stroke in the stern and pull the stern out laterally into the main current. This tends to negate the turning action and maintain the correct ferry angle. The second

alternative is to have those on the left side cease paddling and those on the right take several strokes. This will help to maintain forward momentum and counteract the downstream force of the current. Potentially, it has the same effect as a good hefty draw in the stern. The third approach is to do a left turn where the paddlers on the left to a reverse stroke and those on the right do a forward stroke. The disadvantage of this approach is that it reduce forward momentum and the raft will drift downstream.

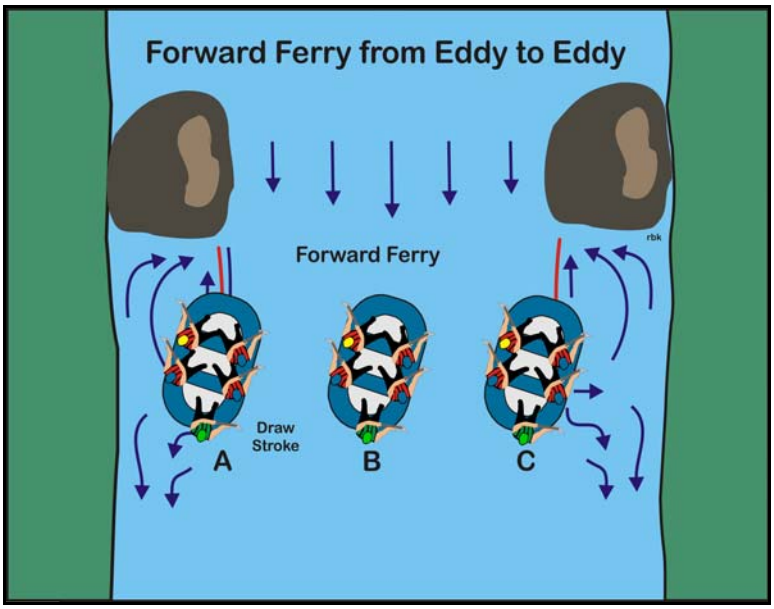

Figure 4.12: Forward and Back Ferry: In the forward ferry, the bow of the raft is pointing upstream at an angle to the current. The current hits the hull at an angle and ferries the raft in the direction the bow is pointing. Source: author – [RR_FerryEddy.cdr]

Once in the main current (Scene B), the guide maintains a good ferry angle with sufficient forward momentum from the forward strokes of the passengers to ferry across the river to the eddy on the other side. The force of the current hits the boat at an angle and propels it to the far shore. If a correction in the angle is needed, the guide can use a pry or draw stroke.

Entering the eddy (Scene C) is the opposite of leaving the eddy. As the bow crosses over the eddy line it may be necessary to apply power with one or more forward strokes on the left side to insure the raft crosses over the eddy line an into the eddy. Once the bow is into the eddy, the guide may use a draw stroke to straighten the raft within the eddy. Usually, this draw doesn't need to be hefty.

Consider a couple of variations to the above scenario from moving from eddy to eddy. The first is that the forward ferry can be performed without the eddies. Common use of this maneuver is when the raft is turned around and the guide needs to ferry the raft away from the obstruction.

Second is the back ferry. In a paddle craft it is a very useful maneuver for minor corrections in the main current or when the raft is about to plow head on into a rock or other obstruction. It slows down the raft in the current which makes maneuvering easier. The guide simply changes the angle of the raft by applying a draw or pry off the stern. Point the stern in the direction of travel. Then command both sides to back or reverse paddle. The force of the current on the hull of the raft at an angle will move it laterally. As a footnote, the backferry is a staple with an oar rig.

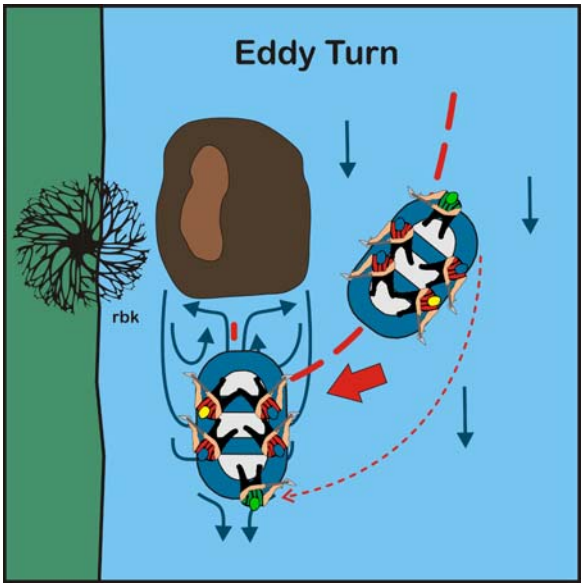

Figure 4.13: Eddy Turn: The raft needs to have speed an angle to enter the eddy. Source: author – [RR_EddyTurn01.cdr]

Eddy Turns (Figure 4.13) – To make an eddy turn, the guide needs forward momentum and an angle to drive the raft into the eddy. Examine the three parts of an eddy (see Figure 3.7). Where the raft enters the eddy will influence what the guide does. Cutting across the eddy line (1) and into the upstream current behind the rock, the raft will tend to be turned by the current differential so the bow is pointing upstream. Depending on the strength of the eddy, the guide may need to augment the turn. Again, the guide can use a half-back right and a half-forward left command. Also, as the raft crosses the eddy line with a strong current differential, the downstream paddlers may need to lean inward to avoid the tendency of the current catching the tube and throwing the rafters into the water.

If the raft enters the neutral current in the eddy (2) or the downstream portion (3) in the eddy, the guide will need to help facilitate the turn. Again the same commands will work.

The rafter turns the raft and drives it into the eddy (Zone #2). This is a conservative and safe entry point. After entering the eddy, the rafter orients the raft parallel with the shore or eddy current (not shown).

Peel Out (Figure 4.14) – There are three distinct eddy zones: (1) the water flows back upstream, (2) the water is neutral and doesn't flow upstream or downstream, and (c) the water flows downstream but at a slower rate than the main current. Rafts are big and unless the eddy is very big, a guide can usually exit from any one of the three zones without having to worry about edge control. If there are any doubts, the safe exit point is the neutral waters found in Zone #2 (see diagram). Also, it may be necessary to have passengers lean inwardly to stay in the raft when crossing the eddy line (Zone #1).

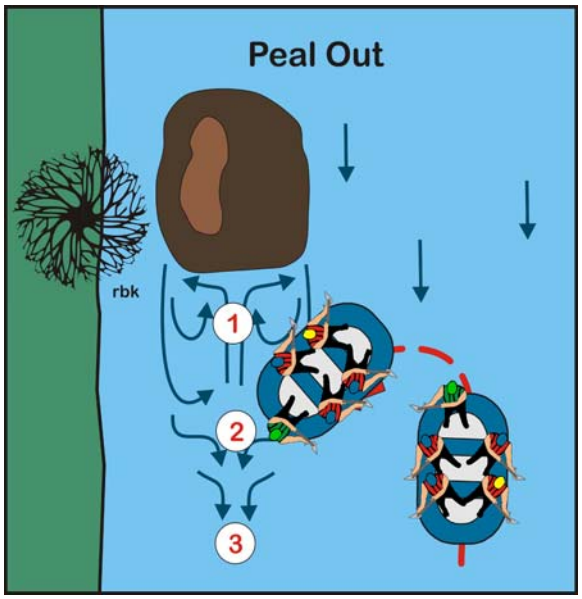

Figure 4.14: Peel Out: Rafts need to have speed an angle to enter the eddy. Source: author – [RR_PeerOut01.cdr]

The rafter powers the raft out of the eddy, in this example between Zone #1 and Zone #2. This reduces the differential effect of the eddy line. It is conservative and a relatively safe exit point. As the raft exits, the main current swings the bow downstream. If needed, the guide may augment the turn or the guide can increase the arch with a forward ferry that extends the peel out further out into the current. The rafter continues on downstream. If the current differential is exceeding strong, it may be necessary to caution the paddlers on the upstream side (i.e. left side) to lean inward.

If the guide pulls out of the eddy in zone #2 or #3 (i.e. neutral or slightly downstream current), the peal out will require more assistance by the guide. There is less current differential because the raft is leaving the eddy in the neutral area or in the current that is moving downstream but more slowly than the main current. The guide can execute a simple right turn with one back stroke on the right side and one forward stroke on the left side. This will line the raft up facing downstream.

Setting the Raft Around a Bend (Figure 4.15) – As the current goes around a bend, the current on the outside of the bend is moving faster than the current on the inside of the bend. A raft that is pointing straight downstream will have its bow in the slower moving water and its stern in the faster moving water. The result is that the current differential will tend to turn the raft around in the current so that the bow is pointing upstream.

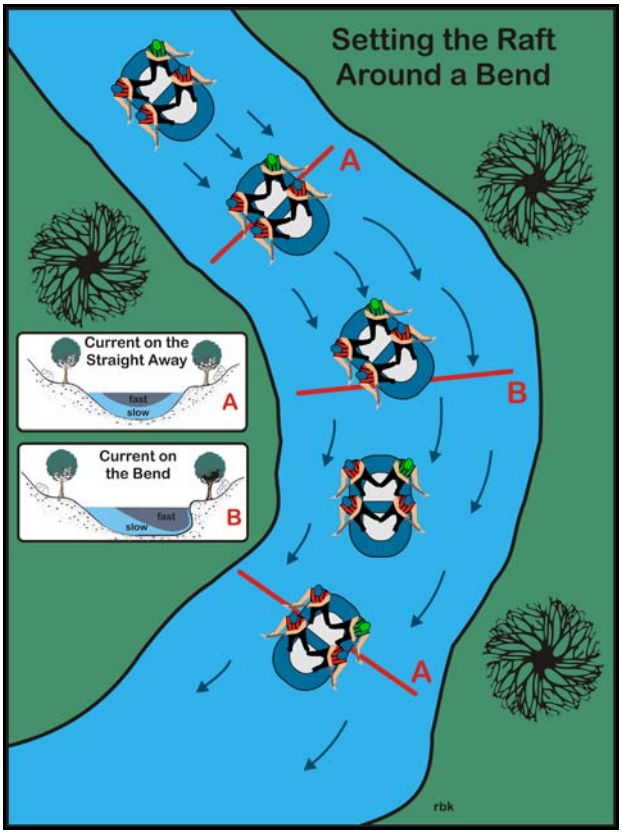

Figure 4.15: Setting the Raft Around the Bend – The stern of the raft is turned inward so that both the bow and stern of the raft are going at the same speed. Source: author – [RR_Setting02.cdr]

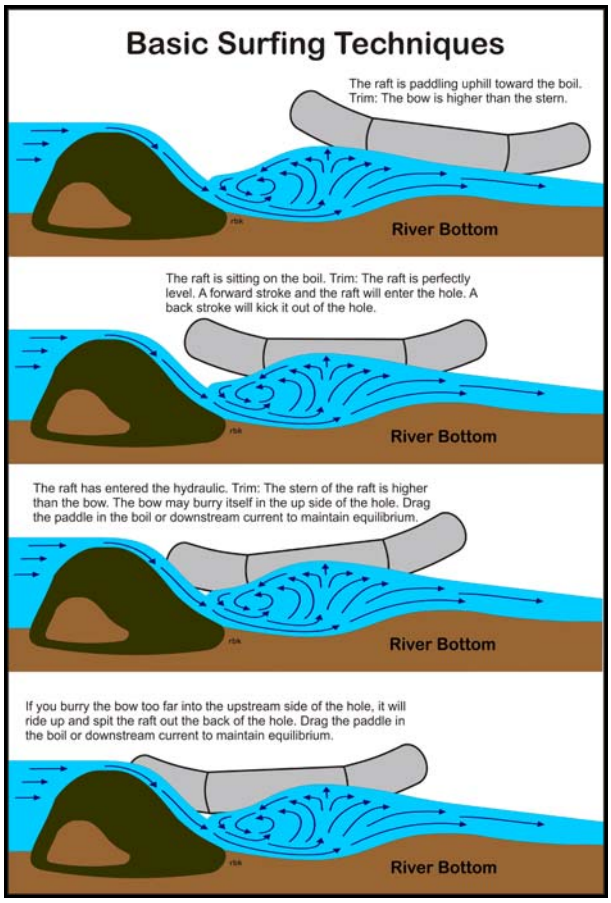

Figure 4.16: Surfing: Rafts need to have speed an angle to enter the eddy. Source: author – [HH_HydraulicSurfing.cdr]

To set the raft, the guide moves the stern of the raft inward on the rapids so that both the bow and stern are moving at the same speed in the current. A simple back ferry will help prevent the raft from being swept to the outside of the bend.

Surfing (Figure 4.16) – Generally, surfing is either a result of a fun activity or a screw up. Surfing a hole can be precarious or fun. As a fun activity, the guide will surf a hydraulic and provide the crew with a fun ride. In contrast, a raft is thrust into a hole where the hole plays with the raft rather than the raft playing with the hole can result in flipping the raft or dumping passengers into the water.

Figure 4.16 depicts the concept of the boat angle in the water. When teaching canoeing, the author would sit on the shore of the Nantahala River and watch boaters surf a wave. For the author, it was a game of determining when the boat fell off the wave. It was nothing more than watching the angle of the hull of the boat as depicted in Figure 4.16. If the bow was leaning downhill, the boat was still surfing the wave. If the hull was level, the boater could go either way and usually the boater needed to act quickly or they would fall off the back of the wave. If the hull was lower in the stern, the boater was off the wave. It was interesting to note when the boater realized they were off the wave and couldn't get back onto it. We would sit on the shore analyzing their situation. We would conclude that the boater was off the wave. They didn't know it. Now they do, but it is too late. For the instructor, the point is to be able to determine the attitude of the boat and make conclusions about it.

River Maneuvers – Oar

Compared with paddle craft, some things stay the same and some thing change drastically with oar rigs. With paddle rigs, the forward ferry will find greater utility than the back ferry. With an oar rig the back ferry and its variations are a staple.

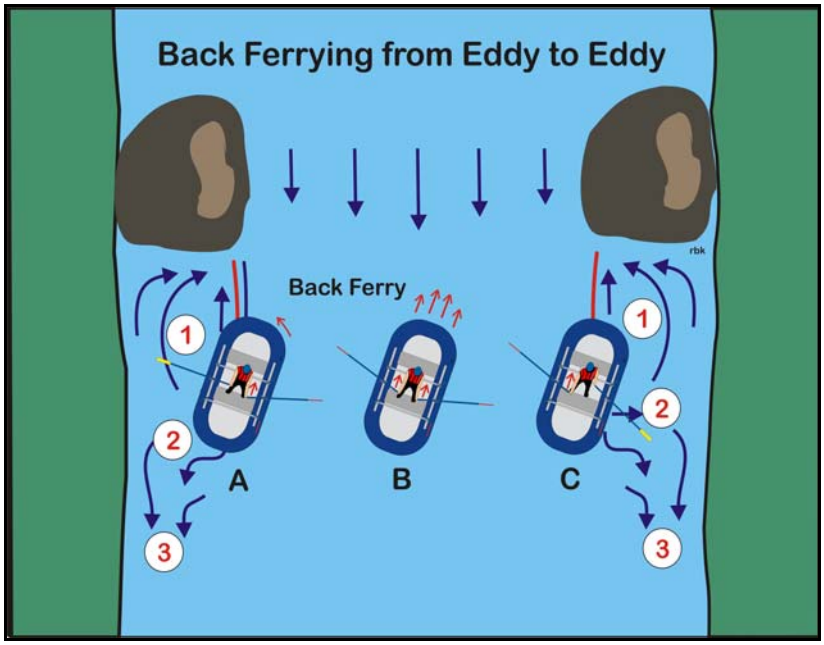

Figure 4.17: Forward and Back Ferry: In the back ferry, the stern of the raft is pointing upstream at an angle to the current. The current hits the hull at an angle and ferries the raft in the direction the stern is pointing. Source: author – [RR_FerryFerrying01.cdr]

<u>Back Ferry from Eddy to Eddy</u> (Figure 4.17) – Leaving the eddy with a back ferry is a fundamental maneuver. The back stroke is a more powerful stroke than the forward stroke. It can be more effective moving the raft across the eddy line (1) and into the main current. Figure 4.17 shows a back ferry from eddy to eddy. However, back ferrying out of the eddy positions the guide facing downstream. The guide can simply drop down with the current (see next section).

When exiting the eddy (Scene A), the rafter is using a reverse stroke on the left side only. This helps counter the turning effect of the current differential. This is a difficult stoke since the blade is in the main current. However, it maintains the raft's forward momentum and counters the turning effect of the current as the raft leaves the eddy. If the rafter uses the right oar, the raft will turn but it will have a tendency to drop further down river.

The rafter maintains the ferry angle and stokes hard enough with reverse strokes to move the raft laterally across the river. If the rafter needs to change the ferry angle, the rafter can take strokes with one oar or drag one of the paddles in the water. Dragging the paddle in the water works well but the raft will quickly drop downstream and should be avoided, unless of course, dropping downstream doesn't matter.

Entering the eddy, the rafter will need to counter the current differential (Scene C). The rafter may need to take a reverse stroke or two with the right oar to drive the bow into the eddy. The left oar is feathered and held out of the water. Taking a stroke with the left oar may tend to force the bow of the raft back out into the main current.

The back ferry can be used in the main current. The guide simply takes a turning stoke with the stern pointing toward the direction of travel. Then she takes some reverse strokes and ferries the raft.

There is some difference in use of the back ferry between eastern and western rafters. Western rivers tend to be more open and rafters tend to walk their raft with alternating forward strokes. Eastern rivers tend to be tighter in term of eddies and obstructions. Slowing things down with the back ferry is often a good thing.

Peal Out Using a Back Ferry (Figure 4.18) – Pealing out using a back ferry is a sweet move. It utilizes the power of the backstroke. The rafter can ferry out as far into the current as desired, turn and is facing downstream. The rafter can walk the raft down the river.

Leaving the eddy and setting up the ferry is the same as in ferrying from eddy to eddy (Scenes A, B). Generally, it is okay if the raft drops down in the current since the raft is going to drop down in the current anyway. The rafter executes a left turn (Scene C) which removes the ferry angle. Normally, making the turn itself will move the raft downstream in the current. The rafter is facing downstream (D). The rafter proceeds down the river.

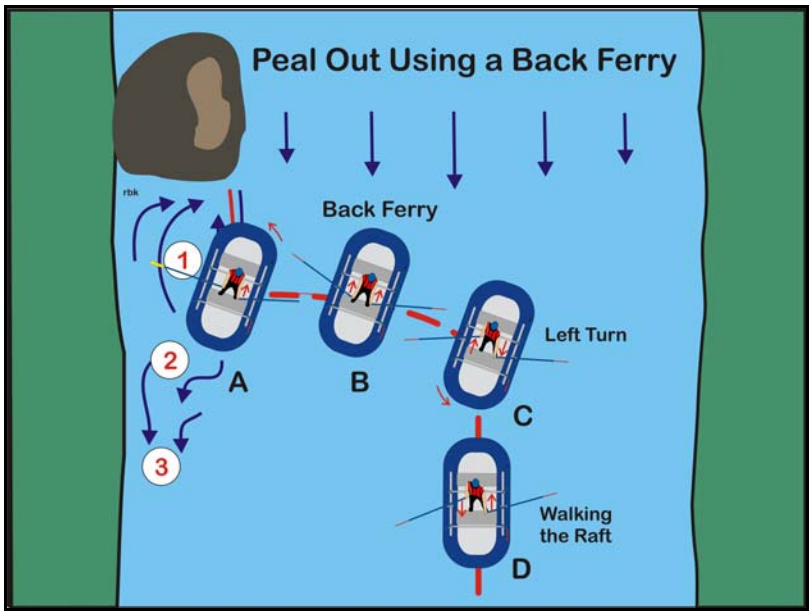

Figure 4.18: Peal Out Using a Back Ferry Ferry – A sweet move, the maneuver combines the power of the reverse stroke to exit the eddy, the back ferry to position the raft in the current and the rafter and bow of the raft both pointing downstream. Source: author – [RR_PealOutFerryOar.cdr]

Eddy Turn (Figure 4.19) – When performing an eddy turn, either a bow or stern entry can be used. The bow entry is depicted in Figure 4.19. As a general rule, if more power and speed is need to pierce the eddy line, use a stern entry with a series of strong reverse strokes.

When entering an eddy there are three considerations: speed, angle of entry, and size of the eddy. The raft needs sufficient speed and sufficient angle of entry to pierce the eddy, enter it, and remain in the eddy. The angle of entry is to turn the raft more broadside to the current. This maximizes the forward momentum driving the raft into the eddy. If there is insufficient speed or too narrow of an entry (i.e. raft is parallel with eddy line), the raft will tend to be flushed downstream and miss the eddy.

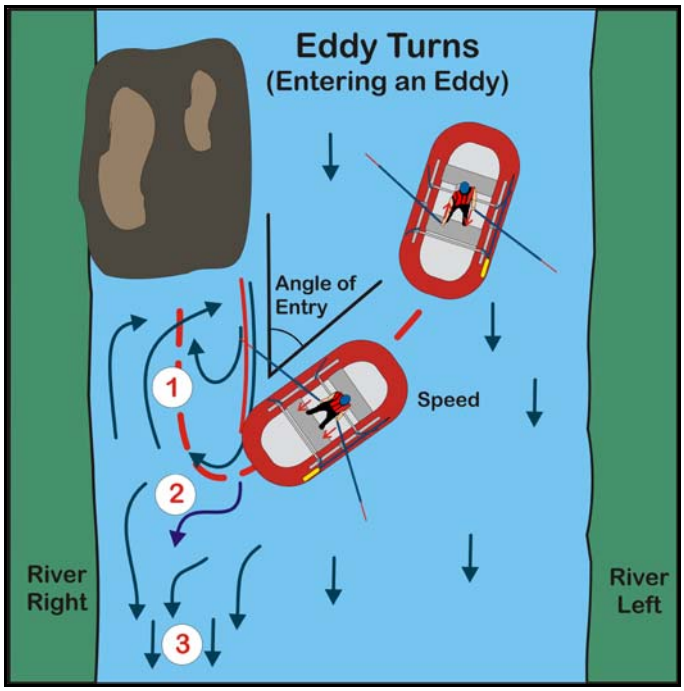

Figure 4.19: Eddy Turn: The raft needs to have speed an angle to enter the eddy. The oar rafter can enter facing either forward or backwards. Source: author – [RR_EddyTurns.cdr]**Figure 4.19: Eddy Turn:** The raft needs to have speed an angle to enter the eddy. The oar rafter can enter facing either forward or backwards. Source: author – [RR_EddyTurns.cdr]

The size and attitude of the eddy will determine where to enter it. Rafts tend to be big and stable. In general they can enter any one of the three zones. If the raft enters zone (1) of a strong eddy, it may be necessary to warn passengers to lean inside to avoid falling out. The safe zone to enter is zone (2) where there is no eddy line and no current differentially. The guide may need to add a turning stroke to align the raft in the eddy. Entering in zone (3), the guide may need to turn the raft and add a stroke or two to remain in the eddy.

Setting the Raft Around a Bend (Figure 4.20) – Conceptually, setting an oar raft around a bend is similar to a paddle craft. As the current goes around a bend, the current on the outside of the bend is moving faster than the current on the inside of the bend (BB). The current in the normal channel is shown in the (AA) profile. As the raft goes around the bend, a raft that is pointing straight downstream will have its bow in the slower moving water and its stern in the faster moving water. The result is that the current differential will tend to turn the raft around in the current so that the bow is pointing upstream.

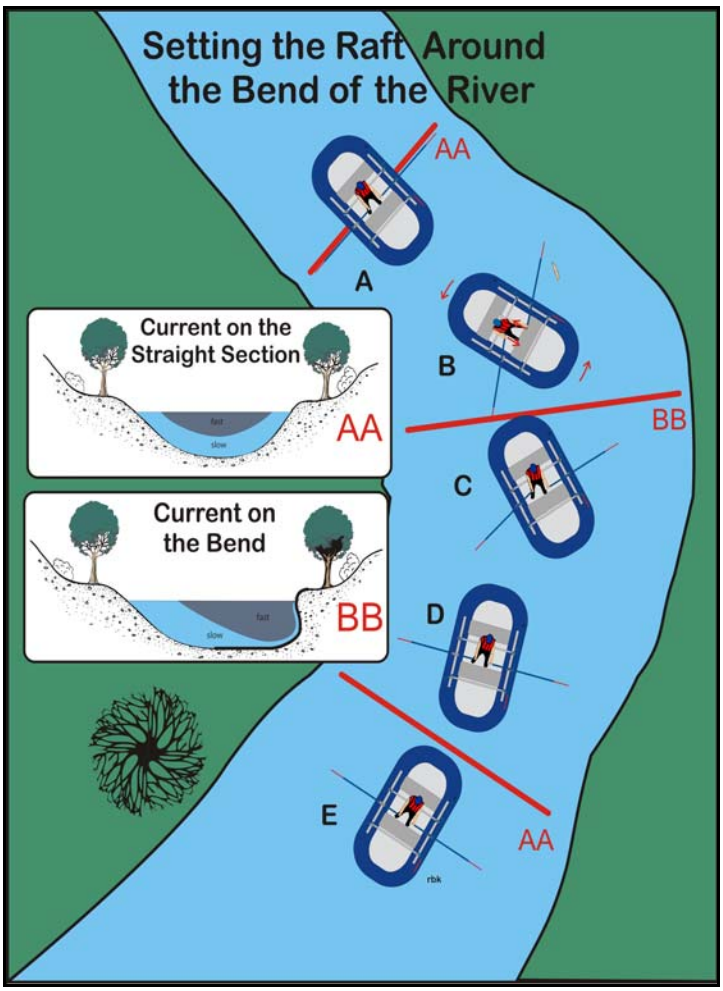

Figure 4.20: Setting the Raft Around the Bend – The stern of the raft is turned inward so that both the bow and stern of the raft are going at the same speed. Source: author – [RR_Setting01.cdr]

To set the raft, the guide moves the stern of the raft inward on the rapids so that both the bow and stern are moving at the same speed in the current. Figure 4.20 shows the rafter turning the raft so that the stern is pointing toward the inside of the bend (Scene B). In addition, a simple back ferry (Scene C) will help prevent the raft from being swept to the outside of the bend.

Summary

This chapter presents the basic strokes and maneuvers used by rafters. Both paddle craft and oar rigs are discussed. There are some significant differences. In a paddle craft, the guide needs to work with the passengers to maneuver the raft. In an oar rig, the guide propels the raft and the passengers are along for the ride. The strokes were kept simple. In a paddle craft, passengers need to know the forward and reverse strokes. The guide needs to know these strokes also along with the pry and rudder and perhaps the draw stroke. Using these strokes, the guide can eddy out, peel out of an eddy, ferry the raft, and set the raft around the bend and preform virtually every maneuver needed on the river.

For the oar rig, the forward and reverse strokes were introduced. Turns become variations of these strokes. By using the strokes in opposition to each other, the rafter can turn the raft by pulling on one oar and pushing on the other oar. In addition, the western technique of walking the raft was introduced. Using these strokes, the rafter can pretty much negotiate the same maneuvers as a paddle craft.

References

Dillon, P. And Oyen, J., (eds) (2009). Building Your Canoe Basics (Chapter 6) in *Outdoor Adventures: Canoeing*. Champaign, Illinois: Human Kinetics, March.

Dillon, P. And Oyen, J., (eds) (2009). Water Safety and Survival Skills (Chapter 5) in *Outdoor Adventures: Kayaking.* Champaign, Illinois: Human Kinetics, March.

Kauffman, R. (2017). *Swiftwater Rescue Manual*. McHenry, Maryland: Garrett College. Unpublished packet.

Kauffman, R. (2015). *Rafting Packet.* McHenry, Maryland: Garrett College. Unpublished packet.