Wild Water Racing Handbook

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Contents

Personal Performance Awards

BRITISH CANOEING

The Wild Water Racing Awards are designed for paddlers aiming to develop and progress their Wild Water Racing skills or looking recognition of their existing skills. So whether you're new to Wild Water Racing or looking to advance your skills, there's something for everyone!

The Wild Water Racing Awards are great milestones to track your progression and skill development.

Wild Water Racing

Wild Water Racing Explore

This award develops the foundation techniques and skills, giving you the ability to apply your choices to an enjoyable paddling session on sheltered water, as you start your journey into Wild Water Racing.

Developing your physical conditioning, steering and control, harmony with the water and team work, as well as developing a deeper understanding of your surroundings.

Wild Water Racing

Wild Water Racing Excel

This award helps you consolidate, develop and progress your paddling and decision making to underpin your skills on grade 3-4 water.

Advancing your steering skills and using features, as well as developing your physical and psychological conditioning to achieve your peak racing performance.

Wild Water Racing

Wild Water Racing Perform

The Wild Water Racing Perform Award further develops your skills and ability to apply appropriate decisions on moving water.

Developing and progressing a range of skills including your forward paddling, reading the white water, steering and using features.

Although not prerequisites, these awards provide appropriate acknowledgement of personal skills for paddlers wanting to attend Coaching & Leadership qualifications. Achieving these awards ahead of the relevant qualification will enable you to focus on the course content, rather than being concerned with your personal skills.

Wild Water Racing Explore: Paddlesport Leader or Kayak Coach (Sheltered Water)
Wild Water Racing Perform: Wild Water Coach

1. Introduction

"The test of Truth", the Wild Water time trial is the purest of White Water racing forms - the athlete, the river, the clock. A racing performance is the result of physical conditioning, skill and harmony with the water and is the only sport where social paddling is necessary to achieve a peak performance. Beautiful water, scenery and companionship make the Wild Water Racing experience compelling. The competitor is free to take whichever route on the river they desire, a freedom of racing unsurpassed in the White Water world.

The sense of speed and exhilaration when a sequence of moves are made in White Water is immense; waves, rocks, spectators fly past in a blur of concentration and elation - the satisfaction of a 'clean and fast' run can be achieved by all competitors, from the world champion to the beginning racer. All strive for the ultimate run - and come back for more.

1.1 Core Skills

Wild Water Racing is a combination of 3 core areas:

a) Core White Water skills – including river awareness and understanding e.g. from playboating or slalom
b) Flatwater skills – the ability to make a boat move fast on flatwater and training Discipline
c) Wild Water Racing specific skills – steering a Wild Water Racing boat, paddling forward effectively and essential river skills in a Wild Water Racing boat

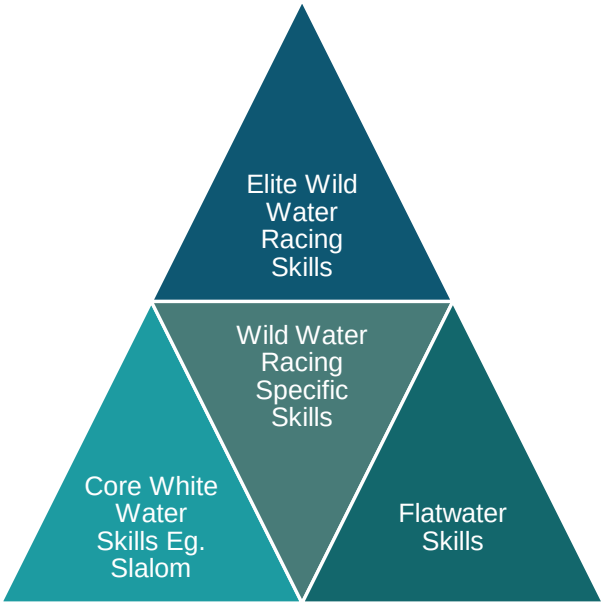


Figure 1-1

Athletes come to Wild Water Racing with a range of different skills and knowledge. Some athletes will progress quite well with the skills they already have, but without the foundation that all the core skills provide, it is difficult to provide the platform onto which further Elite Wild Water Racing skills can be built (Figure 1-1).

When all the components of these 3 areas are in place an athlete will be a ‘complete’ Wild Water Racer and likely to get the most enjoyment from Wild Water Racing and potentially move on to build further Elite Wild Water Racing skills.

This manual, in conjunction with the Wild Water Racing Development Academy’s athlete syllabus, aims to highlight the full range of skills and knowledge that create the platform of core skills.

1.2 The Manual

This manual is intended as a guide to coaches of Wild Water Racing, and will hopefully reinforce the knowledge of coaches as well as fill in any gaps in knowledge. The approach and vocabulary of the manual is being used at national level. By sharing this approach and vocabulary, athletes who progress to national squad level will already have a good foundation and communication path established.

Whilst the manual is intended for coaches, it can be used equally well by athletes themselves.

The manual will continue to grow as new knowledge and new approaches are developed. Contributions to improve or add sections to the manual are welcomed.

2. Rules

Check the British Canoeing Wild Water Racing Rules and International Canoe Federation Rules to confirm the regulations in force.

The basic rules to be highlighted are:

- The equipment regulations regarding boats, helmets and buoyancy aids
- Start line procedures
- What to do when overtaking and being overtaken
- Assistance to fellow competitors in difficulty
- Finish procedures (remaining on the water for the next two competitors to finish)
- Drugs, supplements and doping control

2.1 Entering a Race

Check the British Canoeing Wild Water Racing Yearbook for instructions about how to enter a race.

The basic details to be highlighted are:

- Determining the suitability of the course
- Who the organiser is and how to contact them
- What the entry fees are
- When the entry should be sent (to arrive 2 weeks before the race)

3. Safety

Check the British Canoeing Wild Water Racing Rules and International Canoe Federation Rules to confirm the regulations and guidelines in force.

Safety points to highlight and possibly practice are:

- Rules on safety equipment (buoyancy aids, helmets, air bags etc.)
- Swimming and self-rescue in white water
- Rescue of others in white water
- Keeping warm (prevention of hypothermia)
- Warm-ups prior to paddling
- Early identification and/or prevention of injury

4. Equipment

4.1 Boats

4.1.1 Regulations

There are regulations concerning maximum length, minimum width and minimum weight of boats. There are also regulations concerning the amount of buoyancy (air bags) fitted into a boat. Check the British Canoeing Wild Water Racing Rules and International Canoe Federation Rules to confirm the regulations in force.

4.1.2 Hull Shapes

Modern racing boat hull shapes are all very similar now. However there are subtle differences which affect the handling of a boat.

Most modern boats have an elongated teardrop shape at the waterline (think of the shape of a tadpole). The hull then expands rapidly upwards and outwards above the waterline. This introduces volume when a boat starts to pitch and thereby keep the boat flatter (and moving faster).

The main differences concern the amount of rocker in the boat. Rocker is the curve of the hull from bow to stern. It is most easily seen by placing the hull on flat ground and seeing the rise of the bow and stern from the ground. Generally the greater the rocker the easier the boat is to turn, though it can become ‘skiddy’. The less the rocker the more the boat will hold its line and track. There can be different amounts of rocker at the front and back of a boat.

Modern flatwater racing boats have a surprisingly large amount of rocker. This is so the boat generates lift and, in fact, rises out of the water, thereby reducing the wetted area of the boat and hence the resistance of the boat. It’s uncertain whether Wild Water Racing boats are moving fast enough for this principle so it’s probably simpler to consider rocker just from the handling point of view discussed above.

4.1.3 Fitting Out

Attention to boat fittings is not just for the elite athlete, the beginning racer will benefit from the control and power. Being in an ill fitted boat is similar to trying to drive a car fast down the motorway with a loose steering wheel - you have to make large correction movements before something happens.

4.1.3.1 Importance of fittings

Boat fittings are designed to address two key requirements:

1. Applying power to the stroke, allowing a dynamic and free paddling position
2. Maintaining control of the boat, over leans and pitch etc.

At the extremes these two requirements are contrary, a very free paddling position will offer little control and a very tight fitted boat with great control will offer little in the way of dynamic paddling support.

Although there are some key principles of boat fitting, each person is individual and will develop personal preferences over time.

4.1.3.2 Kayak fittings

The key to optimal boat fitting is to reach a compromise where the athlete can drive dynamically with the legs, gain a full rotation of the pelvis to initiate the paddle stroke and yet still offer control over the lean of the boat. In white water, there are very few 'pure' paddle strokes where the application of power has no steering component. Thus the athlete needs to make sure that they can control leans and still drive powerfully with the legs.

The key principle is the fittings should be set up so that there is always three points of contact at any point in the paddle stroke, this allows the paddler to maintain control over the direction and lean of the boat even if a dynamic leg drive is being used.

1. **Footrest** - must be solid bar or plate across the whole width of the boat. The feet are used to assist in steering, and so need to be able to reach to the side

of the boat, but should be kept in the middle of the boat for normal paddling. When the feet are at the edge of the boat this locks out the hips and makes rotation more difficult, and also introduces a torque to the paddle stroke which causes 'boat waggle'. The footrest should be set up close enough to keep the athlete in the seat, and allow a strong leg extension. Typically this is actually feels quite tight, a footrest that is too loose allows the athlete to slide down the seat, inhibiting rotation - or requires the paddler to brace too much to get purchase on the thigh braces.

2. **Thigh braces** - The braces (or bars) should be set up to be in contact with the high at the hip, and then follow the angle of the leg when braced. The fittings should allow the knees to be held relatively close into the middle of the boat for normal dynamic paddling, but have the option to move wider if necessary. The key is the height at the hip - it should be tight enough to allow the leg to be relatively relaxed and still maintain control. Be aware that the knee needs to lift up and drive forward in order to allow the pelvis to rotate, and so any fittings need to permit this.
3. **Seat** - Ensure that the seat is fitted close to, or on, the bottom of the boat, and is blocked out to the sides and front/back. A high seat will be more unstable than a low seat. Seat design is a personal preference and can make the difference between a fun paddle and a raw back. Once you have found a seat design that you like - keep with it.

   Seats can either be high back or low back (traditional) - traditional seats require the addition of a backstrap to ensure a solid paddling platform. Ensure that this backstrap is snug, and very smooth to reduce chafing. Ensure that the seat allows you to 'spin' within it to allow hip rotation, and that blocks are placed each side above the hips to remove any lateral play. The seat should have a little lean forwards to tilt the pelvis and assist in rotation. The feeling you want to achieve is being able to spin, without moving up out of the seat, or moving from side to side.

When fitting out a boat make sure that you are wearing the same clothing you will be using to paddle in, as the thickness of the material will have an effect on the tightness of the fittings. If you paddle in a shared club boat, try to ensure that the fittings (footrest, seat, backstrap and thighbraces) achieve a good fit for each athlete.

4.1.3.3 Example kayak fittings

Through all of the following you will find reference to measuring and recording. This is important in ensuring that subsequent boats of the same design will be fitted out identically.

Starting point – original fittings in old boat

Target – a new boat of new design

If you have the same design of boat for practice and race, ensure that both are set up identically. This ensures that both boats will perform the same way and transition from practice to race boat is seamless. Typically the seat will make a big difference to the feel of the boat – and so taking a primary seat from one boat to another is a way of reducing the amount of variation in feel between the boats. In these examples the seat is swapped from the old boat to the new – and provides the reference for all the fittings. However a new seat of exactly the same design can also be used (make sure the tilt and fitting of support foam is the same as the old seat).

4.1.3.4 Installing the Seat

When you find a comfortable seat design, stick with it. The seat should allow rotation, but provide a secure paddling platform. Make sure the back is well supported to provide lower back/pelvis support and allow good leg drive.

The seat should be comfortable and snug. Ideally the seat shape will fit the athlete's bottom shape, but if the bottom is too slack, then foam pads should be added to make it snug all round. A backstrap is important as it provides an extension to the back of the seat that moulds to the back flexibly when the body is moving around. The backstrap anchor points should be far enough forward on the seat to allow the backstrap to hug the back as much as possible. The seat is best mounted on flanges in the side of the boat. Seats attached to the bottom of the boat risk being dislodged when running over rocks. If a seat is floppy and poorly fitted, controlling the boat will be very difficult.

Sit in the boat and adjust the position of the seat for height from the hull and the angle of the fore and aft rake for the most comfortable position and one which will give the correct trim when in the water.

Measure:

- Height of the nose or point of the seat from the hull
- Height of the back of the seat from the hull
- Distance of the seat from a reference point e.g.
- the rear of the cockpit or bow of the boat
- Square angle across boat for seat.
- Write these down somewhere safe.
- A garage wall is ideal

These dimensions will ensure that the seat is always in the same location and altitude.

Ensure that the seat is firmly fixed, either epoxied or screwed into place. Fit high density foam to block the seat and stop any flexing of the seat at the rear or the side. Bracing either side of the centre point allows a little flex where the coccyx touches the seat, reducing chafing.

Ensure that the seat is as close to the bottom as possible– a high seat is more unstable than a low seat.

4.1.3.5 Installing the footrest

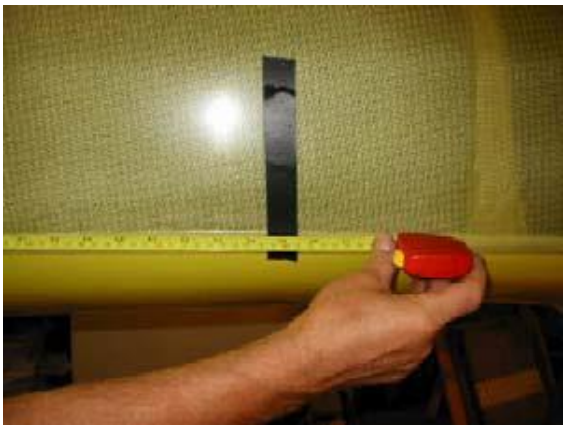
The footrest should be a comfortable distance away, which allows for a leg position similar to a flatwater boat but with the knees slightly parted. The footrest should be a bar across the full width of the boat to allow the feet to be central but also to allow the possibility to slide sideways the whole width of the boat. Some athletes prefer a wooden bar footrest to allow the ball of the foot to slide up and down slightly when the heel of the foot is moved in or out slightly.

The form of the footrest is down to personal preference, from wooden bar to carbon tube. The principle for installation is similar.

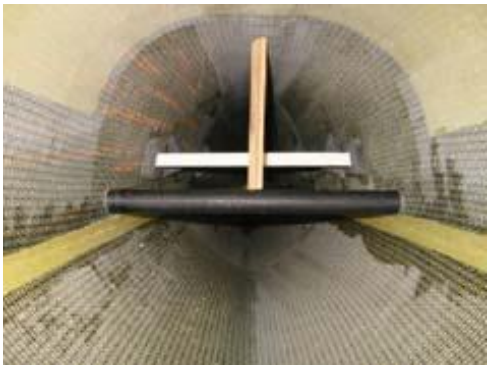
Sit in the boat and wedge your intended footrest at a position which is comfortable. Make sure that you wear the type of shoes that you will be using when paddling, different shoes could add more than a centimetre and start to push you to the back of the seat.

Measure the distance from the bow to either side of the hull and mark the position on the hull to ensure that the footrest is square on. By shining a light from the outside of the boat it is possible to accurately position the footrest inside the boat.

Write down the dimension.



Measure the height of the footrest from the hull. A good idea at this point is to make a height template (a piece of wood of the correct length) so that when the footrest is removed from its temporary position relocation for height is simple.



When using tube for a footrest, aluminium or carbon paddle loom, cut this a little short (2 mm either side) and stuff in firm ether-foam before wedging it back in place. This will allow some flexing of the hull if you hit something side-on and minimise the chance of punching a hole in the side. Also, if you should need to reposition the footrest, you only hacksaw through the tape and foam and not the tube as well.

Clean the area to be fixed and if necessary abrade the tube lightly with 180 SiC. A mixture of glass and Kevlar tape is probably best for installation, ensuring that there is sufficient to prevent detachment in time of crisis. Bear in mind that the crucial bit is the first layer. Several layers will not necessarily improve the strength but will add weight.

Weigh all the resin and materials as they are used. Record the information. Fittings will normally add approximately 500g over the weight of a boat + seat – if they weigh more, think how could you reduce this weight?

4.1.3.6 Thigh Braces

Having fitted seat and footrest in the correct position it is time to turn attention to thigh braces.

Thigh braces are important to give further refined control, including lifting the bow and holding leans. The bars should pass over as much of the thigh (rather than the knee) as possible. They should be positioned so that on flatwater the thigh braces are just brushing the thigh. The athlete can then tighten their legs into the thigh braces by simply sliding their heels back and shortening their leg length, thereby raising their thighs into the thigh braces. The relationship between footrest position and thigh brace position is therefore important. The thigh braces should be positioned to encourage as narrow a leg position as possible when on easy water but allow for a slightly widened leg position in rough water.

There are various designs and preferences. In all instances make sure that they are strong enough and securely fitted. Should they fail at a crucial moment it could result in capsize.

Sit in the boat and fit the thigh braces around you, packing them into position with tape and foam. To ensure good contact cut the bars to fit the contours of the hull. Mark the position for fixing onto the boat, if possible measure the location and record for reference.

As with the footrest, epoxy well into position. Weigh the thigh bars, resin and fabric and record it.

You will now have a well-fitted boat, which should be comfortable and an efficient means of energy transfer. (note this example shows an old seat being installed - this normally would be a new seat)

By recording all of the information as you progress, fitting out the next boat (of the same basic design) will rely on a minimal amount of trial and error. If you find it necessary to change the position of any of the bits, record the information.

If all your boats are fitted identically, the transfer from practice to race boat becomes seamless and paddling will improve in the knowledge that equipment is at its optimum.

Expect to take 1 day to fit out a single new boat, up to 2 days to fit out a new design of boat. Check and re-check the fittings and feel against existing fittings – and only fix in place when you are sure. If you can find an assistant with excellent glassing skills – this also helps!

4.1.4 Trimming

A boat should be trimmed to gain maximum performance from the hull shape. The general goal is to have the boat flat trimmed or slightly bow light when moving at race pace. For this to be the case on flowing water, the boat usually has to be set to be a little more bow light when paddling at race pace on flat water.

How bow light to make the boat depends on the hull shape. Having a boat set slightly bow light usually makes for easier steering as the bow does not ‘stick’ in the water. Sometimes the aim of setting a boat bow light is also to set the stern deeper to overcome too much stern skid. If an athlete is trying to overcome this problem, perhaps changing to a hull design that has less stern rocker may be a better solution.

4.1.5 Protection

Racing boats are moderately expensive but their life can be extended by using protection when practising. Guards can be made to fit a boat, usually to the stern and bow. Some boat manufacturers sell ready-made guards for their boats. Guards, particularly on the stern, need to be well attached with tape as it is easy to scrape them off. The negative aspect of guards is that they change the performance and steering characteristic of the boat. This can cause more rock hits due to the lack of control an athlete has. Too often athletes train with guards and remove them for the race only to find the boat handles completely differently. Other material such as lino can be used as a guard. A heavier tape-like material known as Action Patch affords very good protection, but once applied it may not be possible to remove it, so is only really suitable for boats intended for practice only. Whilst affording less protection, simply using duct tape (or carpet tape) is a better compromise. It protects from bumps and scrapes, though not from heavy hits. However, when not scraped or torn, it has minimal effect on the performance and handling of the boat.

4.1.6 Repairs

A modern racing kayak or canoe is remarkably resilient to damage, and it's lifespan will be greatly enhanced by repairing damage as soon as possible. Often at races it is not practical to repair the boat so gaffer or duct tape is used to protect the damage until a sound repair can be undertaken at home.

In all cases it is best to ensure that the boat to be repaired is fully dry, clean and the damaged area has been masked off to ensure there are no unexpected dribbles of resin onto the remainder of the boat.

Minor damage to the boat, cracks in the gelcoat etc can and should be repaired from the outside by applying a little epoxy to the damaged area to allow it to re-wet out. Warm epoxy will flow better than cold to seep into cracks.

Major damage to the stern is the most common in a Wild Water Racing boat, and will often require a repair from the inside to recreate a good approximation to the original shape.

4.1.7 Bow Repairs

One of the most common repairs that need to be undertaken to a racing kayak or canoe is to repair the bow after a head on collision. Without repair to the bow, over time it will become weakened and 'fat'. This will often require more radical repair from the inside to strengthen fully

For minor repairs to the bow, cut all loose material back from the damaged bow. Mask off closely to prevent drips and to allow a fine and accurate finish. Tease apart some Kevlar cloth or tape to create some Kevlar string or rope of approximately the correct length – cut slightly over length to ensure you have something to hold onto. Fully wet out this small rope section – and then carefully apply to the damaged bow section making sure it is well bedded in (use latex gloves to allow you to use your fingers). Roughly shape to the correct curves of the bow and allow to cure.

When the epoxy is cured, remove the masking tape and cut back the excess rope. Allow it to fully harden. When it is fully hardened, roughly cut to shape with a Stanley knife, and then sand back to an accurate shape. Work down through the wet and dry

grades (use wet to stop the Kevlar from going ‘furry’) and finally finish with t-cut or similar cutting paste to give a fully polished finish.

You should now have a bow which is shaped pretty closely to the original, and being made of solid Kevlar it will take a few knocks.

4.2 Paddles

4.2.1 Regulations

There are no regulations surrounding paddles.

4.2.2 Size and Shape

The advent of winged paddles has created a myriad of shapes and sizes of blade. Generally a number need to be tried by an athlete to determine which they prefer. A blade is deemed to be ‘big’ if it requires a lot of force to paddle with. There are a number of variables to be considered when assessing a blade shape.

1. **Area** – the area of a blade is the simplest measure of how ‘big’ the blade is
2. **Scoop and top lip** – the depth of the scoop and, in particular, the depth of the top lip affect the amount of grip the blade has. A blade with a lot of grip will make it feel ‘big’.
3. **Lay-back** – all winged paddles have lay-back. If you look down the line of the shaft you will see that the blade face lays back from the line of the shaft. A blade with less lay-back will give better grip at the catch and start of the stroke. A blade with more lay-back will have a lighter catch (which can reduce pressure on the forearms) but feel more powerful in the middle and end of the stroke. It is generally better to have a strong catch on rivers to assist steering and give a feeling of stability, so a blade with less lay-back is generally favoured.

4.2.3 Shafts

Virtually all modern shafts are made of a composite of glass and carbon, occasionally with the use of Kevlar. The amount of carbon in the shaft is what affects the stiffness of the shaft most, although the amount of resin used in the shaft will also have an effect.

The aim is to have a shaft that is stiff enough to feel responsive but not so stiff that the flex effect of the shaft is lost. Also, it is important to avoid very stiff shafts as they can cause injury, particularly to the shoulder. Generally a shaft with about 20%-30% carbon is favoured.

The standard diameter of a shaft is 30mm measured from the outside edges (outside diameter – Ø). Most shafts have a wall thickness of about 1mm so the internal diameter is usually about 27-28mm.

For athletes with small hands it may be more comfortable to use a narrower diameter shaft. This is possible (usually 28mm Ø) but not as abundantly available mainly because there are not as many blade ends manufactured to be compatible.

Athletes that suffer from forearm trouble could try using a larger diameter shaft. This is non-standard and would usually be done by adding material (such as cork mat) wrapped around the shaft where the hand grips. However, forearm trouble usually indicates poor timing and technique or possibly an injury or condition (such as compartment syndrome).

Winged paddles are much more stable in the water than old-style flat blades, so some athletes don't find it necessary to use a hand grip under their control hand.

Most athletes do favour them, though, as they help locate the control hand properly and add comfort. It is very important, however, to align the hand grip correctly which can be very difficult with winged paddles.

It is usually best to have a smooth plastic 'grip' (known as shrink-wrap) around the shaft under the hands. This will smooth any unevenness in the, often rough, manufactured finish of the shaft.

Often athletes like to experiment with paddle lengths, or use different lengths for training. The best solution for this is to use an adjustable shaft. Usually the length can be altered by about 6cm. The shaft is more expensive but is cheaper than buying 3 or 4 fixed length shafts.

4.2.4 Joining Paddles

Blades can come in two types for joining. Male blades have a stub that inserts inside the shaft. Female blades have a sleeve into which the shaft inserts. There is no real difference between the methods of joining these two types of joint.

The most important thing is to ensure the blade and shaft fit snugly together. You may need to sand down either of them, but be careful not to sand too much off a shaft that is fitting into a female blade as this could weaken the strength of the shaft at the joint too much. If a joint needs to be packed to ensure a tighter fit, you can either paint resin on beforehand or wrap Kevlar rovings before or during the jointing process.

The angle to set the blades is important. Generally an angle of between 65°-75° is most common. Because winged blades are different shapes it can be difficult to determine a ‘face’ to measure angle from. It is usually best to setup a new paddle angle to be the same as an old paddle which has the angle you would like. It is often best to set up a jig to do this. If it is a brand new paddle shape you are setting up, it is best to use an adjustable shaft first to decide what angle is most comfortable.

The most reliable and permanent join is done using resin. Obviously once a resin joint is made, it is permanent. An alternative joining method which has proved successful is joining using ‘hot glue’ dispensed from a glue gun. Apply the glue to the blade or shaft being inserted, re-apply some heat with a hot air gun to ensure the glue remains soft and then slide the glued end in. Heat can be re-applied to the outside to keep the glue soft while any adjustments are being made. The joint between paddle and shaft must be well taped to prevent water leaking in through the joint. ‘Hot glue’ joints have proved reliable, though care must be taken if a paddle is

left in a hot environment, such as a car on a sunny day, to ensure the blade does not come loose or twist.

4.3 Waterproof Layers

The waterproof layers are an integral part of the racing equipment. Keeping water out of the boat is of primary importance. The last thing you want is to take on the extra weight of water and worse still have it washing around the boat.

Special care should be taken of waterproof equipment. Ideally an athlete will have training sets, and a race set (which is taken very special care of). Good lightweight race kit will damage easily, so take care of it and save it for races that matter most.

4.3.1 Regulations

The only regulations are regarding helmet and buoyancy aids. Check the British Canoeing Wild Water Racing Rules and International Canoe Federation Rules to confirm the regulations in force.

4.3.2 Helmet

A helmet should meet the regulations and fit correctly. It is a safety item, so should fit properly. Not only that, an ill fitting helmet is simply uncomfortable and annoying if it is moving around on the head each time you hit a wave.

Helmets should be worn at all times on rivers. Hitting a head on rocks or the river bed is actually quite rare, but bumping a head on overhanging tree branches is surprisingly common.

4.3.3 Buoyancy Aid

A buoyancy aid should meet the regulations and fit correctly. Again it is a safety item, so should fit properly. Again, an ill fitting buoyancy aid is simply uncomfortable. Ideally a racing buoyancy aid will be very light. It should be narrow in the chest and back area allowing complete and free movement of the shoulders and arms. A buoyancy aid should also be short in the body. With the advent of large volume boats, a buoyancy aid that is too long will sit on the spraydeck and restrict body rotation.

The foam in a buoyancy aid does deteriorate, so a race weight buoyancy aid is likely to need replacement, or additional foam adding, every 2 or 3 years to be sure of passing the regulations of supporting the body.

4.3.4 Spraydeck

The spraydeck is the most important piece of equipment, as it is this that keeps the water out. The deck itself should fit the cockpit of the boat perfectly. If it is too large it may pop off under water pressure, or be too slack where it clips under the cockpit trim and let water in.

When clipped in, the deck should be taught and rigid so that water is shed quickly and doesn't pool in the lap. The most common material to achieve this is neoprene. It is a material proven to be watertight and have reasonable longevity. There are newer neoprene-like materials available, but all of them create a taut deck. The elastic should be quite tight to create a good seal under the cockpit rim. Make sure it is clipped snugly with no bumps in the neoprene as it passes over the cockpit edge. Any minor imperfection in the seal will create a small leak which lets in a surprising amount of water.

If the cockpit rim is proud of the side of the boat, watch out for damage on the cockpit edge. The area can be easily caught against big rocks or simply with your hand or paddle shaft.

The bodice of the spraydeck should fit snugly to create a good seal, but not so tight to prevent freedom of movement and breathing. A loose fitting bodice made of thick nylon or similar material is most popular. Tight elastic at the top is required to keep water out. The join of the bodice to the deck is the most important part. This must be waterproof. It is the area of the deck that wears out most quickly as it rubs against your waist whilst rotating and has the most strain caused by body movement. Always keep a careful check on the condition of the spraydeck.

4.3.5 Cagoule

A cagoule should be waterproof and light. The seals at the neck and cuffs must be good. Creating a good seal without having them too tight can be difficult. Dry seal cuffs do this best, but they need to be looked after as they can perish or tear if good care is not taken. However, they are usually easy to replace as they are simply glued to the cagoule. It is difficult to get a dry seal neck to be comfortable, so neoprene neck bands are most common.

The waist band should be tight enough to prevent water rushing up the body and in through the top of the spraydeck. Again it is a difficult compromise between keeping a good seal and not being too tight on the stomach which can hamper breathing and body rotation.

The best solution is to have a cagdeck, which is where the cagoule and spraydeck are a single sewn together item. This allows complete freedom in the waist area. The weak point of cagdecks is the cagoule near the join to the spraydeck. This area often suffers from constant rubbing against the body which can wear away the waterproofing and allow water to enter. An awful lot of water can enter the boat through this route, so it is important to take good care of race cagdecks saving them only for racing.

4.3.6 Pogies

Pogies are the nylon over mitts to keep hands warm and are an essential item for Wild Water Racers. It is important to keep hands warm to prevent extreme discomfort or possible injury from cold hands. Thin nylon versions as well as silver lined or fleece lined thermal versions are available.

If an athlete doesn't like wearing pogies, sometimes simply warming up for 10 minutes with a thermal version is enough to get hands warm at the start of a session or race and then the pogies can be removed.

4.4 Clothing

Clothing should be light and comfortable. It should provide sufficient warmth in cold weather and reduce overheating in hot weather.

Clothing should be dry when you put it on, to provide most comfort and keep muscles warm. Ideally athletes will have a number of sets of clothing so that they are always using dry sets. This can even extend to their shoes!

Clothing should be kept clean to prevent the risk of bacteria. Laundering of thermal wear after every use does prevent ‘smelly helly’ syndrome.

When paddling has finished, change into dry warm clothes as soon as possible; Getting cold whilst wet uses a lot of energy and it is at this point the body’s immune system is at it lowest, so keeping warm can also reduce chances of illness.

4.4.1 Shirts

The most common choice of clothing is thermal shirts. These can be short sleeve or long sleeve, however remember muscles should be warm to perform well, so long sleeve would be the usual choice.

If the weather is hot and overheating is a problem, lycra shirts are good. They provide a layer to protect your skin from your waterproof layers, whilst creating a cooling effect.

4.4.2 Legwear

The most versatile legwear is neoprene shorts. They are comfortable to wear in the boat and provide good grip on the seat. Ensure the shorts have a high back to prevent chafing on the backstrap. They provide sufficient warmth in the cold and are cool enough in hot weather.

If an athlete likes to have vigorous rotation, they may prefer to use lycra shorts which will slide on the seat. These are not very warm in cold weather though.

In particularly cold weather, you could use thin neoprene leggings which are now available.

4.4.3 Footwear

Footwear should be as light as possible. It's silly to trim weight off a boat only to get in it with heavy shoes!

If they can bear using bare feet, then clearly this is the lightest footwear! However care must be taken to avoid cuts and risk infection from dirty water or riverbanks. They could use footwear to get to and from the river, and ask someone to carry their footwear to the finish. However, It is likely a rule insisting upon footwear will be introduced in the next year or two so the barefoot option should be discouraged.

The best solution is to use lightweight shoes. There are many watersports shoes available now, which are fashionable and practical. It has been said the first rule of canoeing is to 'keep your feet dry'. By keeping shoes and feet dry they will remain warmer.

4.5 Tying boats on Roof Racks and Trailers

It is important to tie boats onto roof racks and trailers properly to ensure the boats are not damaged or worse still fall off and cause a road accident.

4.5.1 Roof Racks

Most people carry boats on roof racks on their sides. This allows more space on the roof for more boats and tends to tie the boat down on the seams of the boat which is generally the most rigid part of the boat. Placing boats on their side usually requires an upright or J-bar to lean at least one of the boats against. Boats can then be stacked against each other. Boats should be centred between the roof rails so that they are nicely balanced. Facing them forwards will reduce fuel consumption.

Most people choose to tie with straps with buckles. It is best to 'tie off' the strap at the buckle or around the roof rack as straps can slide through the buckle if put under strain potentially causing the strap to go slack or release completely! If you are good with knots, ordinary rope is very effective. Elastic cords or straps can be very effective as a stretched cord doesn't go slack. However the knotting or clipping together of cords should be carefully checked to ensure they won't slip, break or

detach. The hooks on commonly available bungy cords are not really suitable anchoring mechanisms.

Having tied the boat/boats onto the roof rack it is important to complete the securing process by end tying the boats. The stern ends should be tied into the roof rack to stop the boats sliding backwards in the air pressure. The bow ends should be down tied down to an anchoring point around the bumper area. Some people use the towing eye in the front bumper, others attach small loops of rope (ears) around engine mounting points just inside the edge of the bonnet. These ears just poke out when the bonnet is shut. It is very important to down tie the bows of the boats to resist the enormous uplift generated by the boats. Most roof racks and the roof rack mounting points are only rated for a downward load and not the uplift load. It has been known for roof racks, integral roof rails, integrated roof tracks and parts of car roofs to rip off cars carrying wild water racing boats.

5.5.2 Trailers

The principles for tying boats on trailers are similar to roof racks. Due to the lack of suspension on trailers, boats have a greater tendency to loosen and bounce around.

Boats on their sides will tend to turn themselves to 45°, so often it is best to accept this will happen and tie the boats at that angle in the first place. Unfortunately if a boat is soft this may cause some squashing of the boat.

Using elastic chords or straps to tie boats on trailers is very effective because they don’t go slack. This is often enough for shuttling slowly up and down a river. However, for longer journeys or on rough roads it is sensible to also use additional ropes and straps to tie over the boats, but also to end tie the bow and sterns to prevent boats slipping forwards or backwards.

You should always make sure the trailer is safe. Check tyres are in good condition and welded joints are still sound. Trailer boards should be checked they have the correct number plate for the vehicle towing it and that all lights work correctly. If boats stick a long way out the back of the trailer you should attach a sign of flag to indicate the longest point.

5 Fundamental Skills

The fundamental skills are simple, but will be constantly used throughout an athlete's career. Getting in and out of a boat, getting to a start line, warming up facing upstream all require strong basic skills.

5.1 Getting in and Out

Getting in and out of a Wild Water Racing boat can be a little awkward but with a little practice becomes straightforward.

Because racing paddles tend to be light and fragile, the 'beginners' method of placing the paddle across the back of the cockpit and sitting on the shaft, is not a viable option. Instead a method, similar to getting into a flatwater boat, can be employed.

Place the shoreside hand firmly on the bank and the waterside hand on the foredeck or front of the cockpit to keep the boat steady and held into the bank. Step both feet into the centre of the boat. Now transfer your waterside hand from the front and reach behind to firmly grasp the back of the cockpit rim in the centre of the boat with the heel of the hand on the deck and the fingers gripping the underside of the deck. With one hand still on the bank and the cockpit held firmly it should now be possible to wriggle under the thigh brace fittings and sit down.

It may be possible, for more agile athletes, not to require the 'stepping-in' part of the procedure, simply grasping the centre of the back of the cockpit while on the bank.

Getting out is simply a reverse of the getting in procedure. With the bankside hand firmly on the shore and the waterside hand grasping the centre of the back of the cockpit, it should be possible to wriggle out from under the thigh brace fittings and either stand up in the boat or put a foot on the shore.

The easiest method is to place the boat in slack water facing upstream. However an athlete should progress to getting in facing upstream on fast flowing water and also getting in facing downstream in slow and fast flowing water. The main issue to guard against is the boat catching the flow and being pulled away from the bank. Getting in

and out is more about preparation and choosing a suitable place to launch or exit the boat, rather than the action of getting in and out.

Having got in, the spraydeck should be attached. Initially Wild Water Racing boats can feel a little wobbly especially when reaching behind to clip in the back of the spraydeck, but with practice becomes much easier. Practice in slack water first, to get used to it. Attaching the spraydeck in faster flowing water can be quite tricky as you can easily get separated from your paddle whilst you're hands are on your spraydeck.

You can get someone to hold the boat to stop it drifting, alternatively, you can hold the middle of your paddle shaft under your chin so that the paddle stays with you! Sometimes the eddies used for launching can surge up and down which makes balancing the boat while clipping in the spraydeck very tricky. Sometimes a better option is to sit in the flow away from the bank where the water is not surging. Hold the paddle under your chin and attach the spraydeck.

5.2 Breaking in and Out

Breaking in and out is essentially the same as simple breaking in and out that would be done in a playboat or slalom boat. The major difference is that the ends of the boat are deeper in the water and so the current will catch the boat much earlier and much harder when the eddy line is crossed. Because of the extra boat length, sometimes the boat will start to ferry across the current rather than turn into it. The athlete should be prepared for all of this by preparing their body weight (leaning the boat slightly) and reading when the boat will start to turn adding additional steering, if required, to complete the turn.

A simple low brace turn is by far the best way to break in and out. It is a stable position and the brace can easily be turned into a backstroke should more turning assistance be required. Simply practicing in slower water and then faster water will provide the knowledge and experience required to be confident on any kind of water.

5.3 Ferry Gliding

Ferry gliding to cross from one side of a current to another, is essentially the same as simple ferry gliding that would be done in a playboat or slalom boat. Because the ends of the boat are deeper in the water, the current will catch the boat much earlier and much harder when the eddy line is crossed. Because of the extra boat length making late steering adjustments is almost impossible. The angle and speed of attack into the current is the key element for a successful ferry glide. This is only learned by lots of practice. Practicing in slower water and then faster water will provide the knowledge and experience required to be confident on any kind of water.

The next stage is to learn to cross a line of waves. Again, angle and speed of attack are most important. The aim is to 'surf' across the current through the trough of a wave. Wild Water Racing boats have a big advantage because they can go faster, thereby allowing them to cut into and across very fast flowing water. However, the athlete's body weight must be prepared and the angle of attack carefully chosen. A good skill to practice is simply surfing on standing waves. This teaches the athlete body weight control as well as the effect the water has on the boat especially at the eddy lines.

5.3.1 Reverse ferry gliding

Reverse ferry gliding is, again, essentially the same as simple reverse ferry gliding that would be done in a playboat or slalom boat. As already described currents and eddies can catch much earlier and much harder so greater attention must be paid to the angle of the boat. Because backwards paddling is less powerful than forwards paddling, shallower angles of attack must be used against the current flow. Back paddling with winged paddles takes a small amount of practice, but doesn't add too much extra difficulty.

The easiest method to learn to reverse ferry glide is to paddle forwards down some gentle flowing water then stop the boat in the flow with backwards strokes. Gradually let the stern point a slight angle one way while continuing to paddle backwards against the flow. The boat should start to ferry glide backwards. With strong

backwards steering strokes try and steer the stern back the other way. With this kind of practice the athlete should become familiar with the combination of boat angle and strength of paddle strokes required to maintain control. The athlete can progress to faster flowing water as well as starting to ferry glide from eddies.

5.4 Paddling Upstream

Paddling upstream is a skill that frequently required. Warming up and moving to a start line will often require paddling upstream. Athletes who do their local training on flowing water will usually do a loop requiring them to paddle upstream.

Paddling upstream is very good for learning boat control and increasing understanding of rivers so it's worth including upstream paddling into an athlete's training plan. Using eddies and slack water and the skills of ferry gliding from one side of the river to the other, it's possible to paddle up surprisingly fast flowing rivers.

The only issue to be wary of when paddling upstream is damaging paddles. It can be very easy to stub or jam a blade on rocks or the river bed.

5.5 Turning and Changing Direction

The basic skills of turning and changing direction can be practiced and mastered on flat or easy flowing water.

5.5.1 Boat Leans – Drop Hip Steering

When paddling on flat or easy water, a Wild Water Racing boat can be steered by leans of the boat. This allows for smooth arced turns with only a small reduction in forward power. The basic principle is to lean the boat to the outside of the turn, the greater the lean the more the turning effect.

To have good lean control, boat fittings must fit the athlete properly. If the footrest is too far away, the seat is too slack or moves about, or thigh braces are in the wrong place the athlete won't be able to have full control.

Boats should be leaned by downward pressure into the seat using the bottom and dropping the hip. The lean will cause the opposing thigh to naturally rise into the

thigh brace but it should NOT be lifted, it should simply be braced. The athlete should still be able to paddle forwards with a strong leg drive whilst the boat is on the lean.

5.5.2 Single Stroke Foot Steering

Single stroke foot steering is probably the most important skill required to control a Wild Water Racing boat on moving water. It is the ability to create a rapid change in direction with a single powerful stroke which is only possible by strong use of the legs and feet, hence the term ‘foot steering’.

Make sure the body is fully wound up, top hand near the ear and blade close to the boat. Strong leg drive and powerful body rotation is required and a slight sweeping motion to the stroke. Use the feet to direct the bow into the new direction. A little lean can be incorporated, but the key is to get a very powerful stroke. On flat water a single stroke turn will only have a small effect, but it should be noticeable. When transferred to waves on a river a well-timed steering stroke can have an enormous effect.

5.5.3 Double Stroke Foot Steering

Double stroke steering is a useful skill, which will often be used when learning a river and rapid direction change is required. Double stroking is essentially 2 single strokes executed quickly on the same side. The first stroke should be as powerful as a single steering stroke, making strong use of legs and body rotation, described above. Emphasis should then be placed on rewinding quickly for the second stroke.

5.6 Adaptive Strokes

Adaptive strokes are strokes which are altered from the normal forward technique to giver greater control and generate more power in white water situations.

5.6.1 Wet Hands

When paddling on white water, particularly in waves, it is important to get the best grip and most power from the water (see River Technique - 7.1.2 Pulling Deep). This requires a deeper stroke to the point where the hands dip into the water.

This adaptation can be practiced on flat or easy water. Over emphasise getting the blade buried, the hand should be wet. The catch should be strong and deep, the emphasis is on the lower arm/body pulling and unwinding rather than the top hand pushing. The top hand is forced down the line of the shaft to get the depth and to hold the blade in place. It should be possible to push through at about eye level with the hands wet. If the paddler uses a very narrow grip, this may be tricky so recommend widening the grip.

5.6.2 Hyper-Extended Stroke

When paddling on white water, particularly in waves, it is important to adapt stroke length to the cadence and length of the waves (see River Technique - 7.1.1 Timing Strokes – synergy with the white water). Sometimes this entails using a longer, or hyper-extended, stroke to match stroke timing to wave length whilst taking care not to accidentally steer the boat.

This adaptation can be practiced on flat or easy water. The objective is to rotate as much as possible to reach as far forwards as possible and pull as far back as possible. Pull directly down the line of the boat, extending as far back as possible. Maximise leg drive, and rotation in the seat to maximise stroke length. Try to minimise the kick of the bow by pulling down the line of the boat.

5.7 Drills

There are some drills which can be done on flat or easy flowing water to develop the Steering and Adaptive Strokes, described above, that will later be used on white water. These are very useful for athletes that can’t get to white water on a regular basis, helping to develop skills, muscle memory and an understanding of Wild Water Racing boat handling.

5.7.1 Drills on Flatwater

a) Single stroke "foot steer"

This drill exercises the muscle coordination required to move the boat quickly onto a new line. This is most commonly used when the bow is in the air (shortened length principle), and the stroke will be most effective. On the flatwater we will not expect a major change in direction, but we do expect to see a good connection with the water and a strong 'kick' of the bow. Beware of trying to steer the boat too much and extending the stroke behind the body where the paddler will be unstable. The paddler should be able to incorporate the steer stroke quickly into the normal flow of paddling. Make sure the body is fully wound up, top hand near the ear and blade close to the boat. Strong leg drive and powerful body rotation is required and a sweeping motion to the stroke. Use the feet to direct the bow into the new direction. A little lean can be incorporated, but the key is to get a very powerful stroke with good connection.

b) Double stroke “foot steer "

2x single stroke. The first stroke should be as powerful as a single steering stroke, making strong use of legs and body rotation. Emphasis should then be placed on rewinding quickly for the second stroke.

c) Drop hip steering

Apply only down weight, control a smooth, slow, roll from one wing to the other whilst paddling forwards. The trickiest point is just either side of upright. The aim is to maintain leg drive whilst controlling the rolled lean of the boat (no deck is good to see if this is being done). A smooth 'S' should be prescribed by the boat on the water. If the boat is jolting from side to side, it may be an indication the athlete is lifting with the thigh rather than pressing down with the bottom and hip.

Key points:

Keep the boat moving forward with good technique and strong leg drive constantly change the boat angle - do not leave it on one wing for a long period of time

Smooth control of angle of boat, not flopping from one wing to another

d) Wet hands

Over emphasise getting the blade buried, the hand should be wet. The catch should be strong and deep, the emphasis is on the lower arm/body pulling and unwinding rather than the top hand pushing. The top hand is forced down the line of the shaft to get the depth and to hold the blade in place. It should be possible to push through at about eye level with the hands wet. If the paddler uses a very narrow grip, this may be a tricky drill so recommend widening the grip.

e) Hyper-extended stroke

Rotate as much as possible, pull directly down the line of the boat, extending as far back as possible. Maximise leg drive, and rotation in the seat to maximise stroke length. Try to minimise kick of the bow through pulling down the boat. This is a tough drill - usually 30 seconds is enough - it's often better to mix the rates up with this drill.

5.7.2 Drills on short pieces of flow

a. **Forward Stability** - A skills drill which works well is to take a weir chute or rapid, ideally a long piece of flow. Start in slack water, establish a good aggressive technique and then continue to paddle directly upstream into the more turbulent water. It only needs slightly turbulent water for this drill to work well, as it is trying to get the athlete to rely on leg drive and power to provide the boat stability - not locking the legs out.

   1 min upstream, turn around cruise back to start - repeat 10 times in a set. It will be very noticeable if the leg drive is not there as the rotation will be limited.

b. **Figure 8's** - Another drill is figure of 8's paddling across a flow into very large circulating breakouts, repeating the loop 3 times to make around 2 mins of

effort with 1 min rest. This is good, as gradually the athlete gets tired but continues to push in the turbulent water and eventually becomes more comfortable on it. The change in boat speed from flow to breakout is good to use as an emphasis of having to go to the legs to re-accelerate the boat.

5.8 Rolling

Rolling is a core whitewater skill, which when mastered allowed the paddler to be much more positive with their attack on the rough water as they have a higher degree of confidence that they can recover from a problem. The technique for rolling a river racer is identical to a slalom or playboat with one exception. A river racer has a tendency to get stuck on its side which means that the boat is almost upright – but the paddlers body is on the opposite side and stuck way down underwater (see diagram below). There is usually no way to reach the surface with the paddle from this position – and the paddler needs to take 'two goes' – one a simple tug on the blade to get the boat flat and then the second a full roll to right the boat.

This technique should be practiced in a swimming pool to gain confidence. Rolling over very slowly will often cause this situation – otherwise see the extended drills below which will often cause the problem and force the paddler to rectify.

5.8.1 Rolling Drills

Once the paddler has mastered rolling in a swimming pool, it can take some time to take this skill into the cold and dark world of rolling on a river. However the key element to this skill transfer is psychological – remaining calm and realising that they do have enough breath to attempt a roll. The following drills (in increasing difficulty) are designed to improve the confidence of the paddler when they capsize so that they can attempt to roll – and if they can get a breath they can have another go and that having another roll is a faster way to get a breath than bailing out.

a. Roll left and right sides as normal
b. Roll over, switch sides underwater then roll up
c. Place paddle directly across the boat, roll over - get into position and then roll up
d. One hand only on paddle - capsize, re-grab paddle get into position then roll up.

e. Reverse screw roll left and right
f. Roll over - switch side, half roll up - take one breath, switch back - repeat 5 times then roll up
g. Roll over - one hand on paddle, switch sides, one breath - repeat 5 times, grab paddle and then roll up
h. Paddle to one side (not holding) - breath on each side x 5 - then find paddle, and roll up (paddle can be handed to help)
i. Hand roll - left and right (often only one side will work)

6 Forward Technique

The aim of good forward technique is to propel the boat forwards in as straight a line as possible whilst utilising as many parts of the body to apply force to drive the boat with as full and long a stroke as possible.

The key concept to understand is that the athlete is not trying to pull the blade towards them, but is actually trying to lever themselves and their boat past a static blade in the water.

6.1.1 Reach and Extension

A good stroke will be as long as possible to give the athlete as much leverage time as possible. A stroke can only be long if the athlete reaches and extends as far forward as possible.

Firstly, simply reach forwards with the hand and a straight arm. Secondly reach further by extending the shoulder. Finally extend further still with the back by rotating from the waist and hips by using the legs. The stroke side knee will be lifted slightly and moved forwards. The ‘off side’ leg will be straightened thus rotating the pelvis in the seat.

6.1.2 Catch

Once fully extended, the next stage is to enter the blade in the water, the catch. The catch is very important. The aim is to develop a large inertia which allows the blade to stand still in the water and hence allow the athlete to lever past it. A lot of force should be applied as the blade hits the water. Though the action should be very forceful, it should also be smooth to prevent splash. If too little force is applied the blade will simply slip through the water.

You can do an experiment with your hand in water. Immerse your hand in water. Slowly pull your hand backwards. Feel how your hand slips easily through the water. Now immerse your hand in the water again and pull backwards as hard and fast as possible. You should feel a much greater force pushing back against your hand.

The blade should be presented square to the side of the boat, if the blade is not perpendicular the catch will be weakened.

6.1.3 Rotation from the legs and hips

Rotation from the legs and hips allow for complete extension of the pushing side, but also provide the engine for the pulling side. Powerful leg drive and hip rotation is the trigger for upper body rotation which applies the big shoulder and back muscles as well as stomach and hips. Without proper leg drive the body has nothing to brace against when applying large forces.

As the drive leg extends, the off side knee is lifted up and is driven forwards within the boat, causing the pelvis to rotate in the seat.

6.1.4 Accelerating blade

Having made a powerful catch the aim is to keep applying as much force as possible to retain the blade inertia. This requires an accelerating force throughout the stroke which is usually achieved with increasing and more powerful rotation as the stroke progresses.

6.1.5 Top arm

The top arm provides a vital input to the rotation force being applied. The top arm provides static tension in the first phase of the stroke where the legs and body are unwinding then strongly drive forward and extend in the second phase of the stroke, finishing fully extended and taking the shoulder with it. The top hand should be at about eye level and push through on a level plane with the shoulder and chest pushing behind it. A top hand shooting up into the air instead of staying level is often the first sign of technique breaking down.

6.1.6 Exit

Once the hand comes level with the body, there is very little more the body can do to apply a force to the blade. The focus should now be on reaching and extending for the start of the next stroke on the opposite side. The blade exit should be smooth and clean using a combination of hand, arm and shoulder to release and lift the blade. The hand and arm should come up so that the upper arm is lifted sideways,

approximately 85° to the water, and the upper arm prepared to push, approximately 45° to the upper arm. In this position the hand is roughly level with the ear, the elbow slightly below the shoulder level and no tension should be in the shoulder muscles.

The top hand should be held back as long as possible to allow a catch position on the other side that is well forward. A common fault is for the top had to 'get ahead' and cause a shortened catch position. From this position by the ear the hand and arm are ready for the push-through at eye level (described above) to begin.

6.1.7 Video Analysis

Video analysis of forward technique is vital. It helps an athlete match a feeling to a self-image. If an athlete can see for themselves that their rotation needs to be a little more, they can then relate it to what they feel with their legs, hips and stomach.

A valuable video analysis session is to choose a flat stretch between 250m and 500m long. An athlete will then do 2 or 3 passes in 3 sets. Each pass is timed. Video should be taken so that the boat and paddler are fully visible in the frame and that both ends can be seen to check for run on the boat. If video can be taken from above/in front as well as from the side this is very useful information to check how straight the boat is running.

The first set will use a slow stroke rate (70 for Kayak, 50 for Canoe). The aim is for the athlete to go as fast as they can over the stretch but holding the stroke rate at the chosen rate. The athlete should be trying to generate lots of power through good technique. It takes a little practice for an athlete to use such a slow rate, but it does highlight athletes who struggle with timing and power. Because of the slow rate, it is actually easy to see technical flaws with the naked eye, but is even easier when reviewing the video.

The second set will use a medium stroke rate (90 for kayak, 60 for Canoe). Again the aim is for the athlete to go as fast as they can over the stretch but holding the stroke rate at the chosen rate. At this rate an athlete should have better timing and show better power. Generally an athlete will look their best at this rate.

The third set, the athlete goes flat out using the rate they favour for the distance (typically 100-120 for Kayak, 70-90 for Canoe). As fatigue sets in on the last pass, flaws can begin to show themselves, commonly a bent pulling arm or top hand 'getting ahead' causing short stroking.

The times taken are useful, particularly if the session involves a number of athletes allowing a relative comparison of times. If an athlete is relatively slower at the slow rates than they were at the high rate, it highlights that their technique perhaps lacks timing and power, which the higher rates have been hiding. Better use of legs and hip rotation can help with timing and power. If an athlete is relatively slower at the high rate, it highlights that there may be breakdown of the technique, perhaps incomplete extension and rotation.

6.2 Wash-Hanging

Wash hanging is the art of using the side or stern wash (or wake) of a boat to assist speed. This allows a paddler to move at the same rate as the lead paddler with considerably less effort (for the skilled paddler). From a single boat there are 3 washes which can be ridden by another boat.

- **Left and right side washes** – where the bow of the boat riding the wash will typically be around the same level as the cockpit of the lead boat. This is the most effective wash, and is the wash favoured by flatwater paddlers – however it is the more difficult wash to sit on in a river boat as it causes the boat to steer towards the lead boat. Ensure that the paddler sits far enough out so that the lead paddler does not catch their paddle on the bow of the boat.
- **Stern wash** – directly astern, a smaller wash than the side, but an easier to sit on. This is the typical wash that would be used in a team event as it allows the paddler to follow the same line and does not affect the steering as much as the side wash.

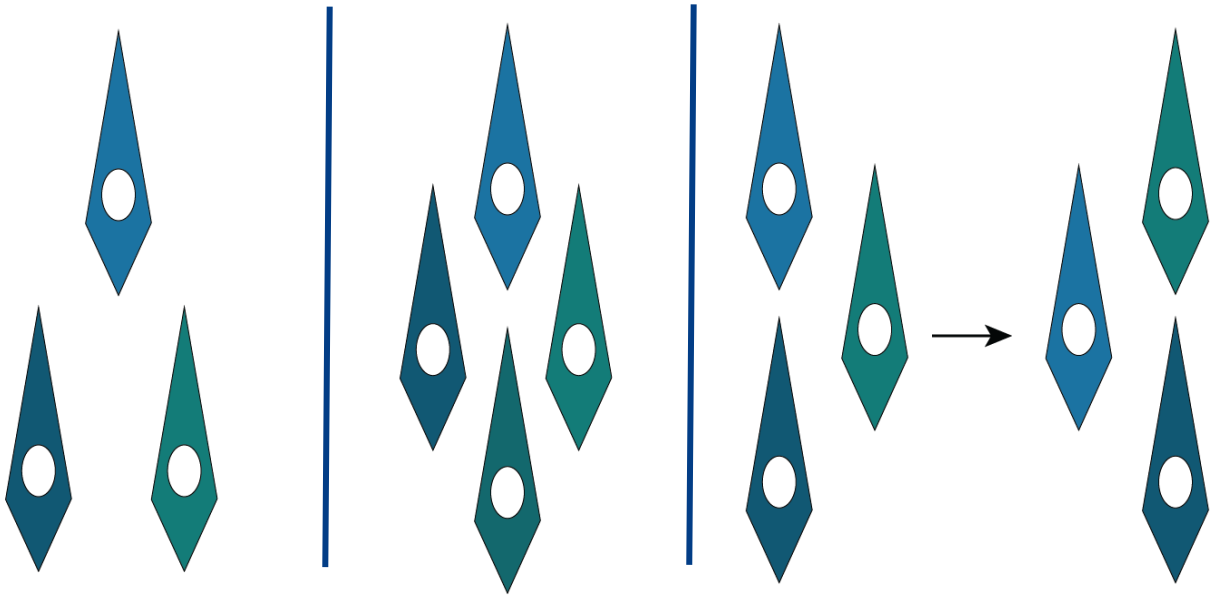
6.3.1 Sitting on side wash

To sit on a side wash and paddle effectively requires the paddler to continue to use their leg drive and powerful body rotation. To do this, use the ‘drop hip’ form of steering where the paddler will sit heavy on one side of the seat causing the boat to turn. This will allow the leg drive to be used. To provide additional assistance it may be necessary to offset the feet in the boat – moving the foot nearest the lead paddler to the side of the boat and moving the outer foot over to match normal foot position. This will then increase the turn effect of the nearside leg drive and assist in keeping the boat straight.

The paddle stroke will be slightly leant over, but should be easier than paddling in the lead at the same pace. Ensure that the nearside paddle stroke is fully extended to make sure the bow is kept away from the lead paddler.

This will take practice, but paddling in a group environment is great exercise for lean control and core stability workouts. It’s also great fun to be able to take part in group races!

6.3.2 Standard wash formations



Standard 2 or 3 boat on side wash	4 boat formation – 2 side wash and one in the ‘V’ wash at the back. Rear V wash is a very easy surf wash	Alternate 3 boat formation. Where there is a weaker 3rd boat, and two well matched lead boats the 3rd boat will stay in the ‘Half –V’. It is them easy to switch washes without having to cross around the back of the boats.

7 River Technique

7.1 Technique

“The most subtle of arts”, racing white water efficiently is a result of understanding and harmony with the river. This might sound a bit “hippyish” but the best white water exponents work with the river rather than battle against it. At its best Wild Water Racing can be an expressive sport – where moves are executed with flamboyance and grace, which goes beyond the mere functional. It can be summed up in “it’s not what you do it’s the way that you do it”.

Why does the speed of two competitors making apparently the same line on the water differ so much? The answer lies in how much the paddler is able to apply their power and how they are utilising the river to achieve an aim.

The principle of good river technique is to maximise boat speed and maintain your best forward technique. This is generally achieved by making best use of the fastest water. Also, the aim is to minimise energy usage by reducing steering strokes and avoiding shallow water and obstacles, such as rocks, stoppers and drops, as much as possible.

To maintain boat speed using the water, you need to keep the boat parallel to the current line with the stern following the bow (i.e. not crabbing or slipping). With that basic principle in mind you then need to apply powerful strokes that are placed in the best, most powerful water to propel the boat forwards effectively and maintain control.

In general you should try and sit on the fastest current. This will give you the greatest boat speed, require the least steering and use the least energy. Only move from the fastest current if you’re sure there is a time saving by using a shorter line or you need to avoid an obstacle.

7.1.1 Timing Strokes – synergy with the white water

The ability to change stroke tempo to fit with the waves is the key skill to acquire. Almost every Wil skill and manoeuvre will flow from this core skill. The paddle is placed on the back of the wave – a strong leg drive along with torso twist is utilised to move the boat onto the top of the next wave (strong core conditioning really helps here!). Depending upon the wavelength it may be necessary to really reach for the next wave.

This results in the boat being moved from wave crest to wave crest – instead of being driven down into the back of the waves. This gives a feel of a much lighter and manoeuvrable boat. As the ends are out of the water more frequently it's relatively easy to introduce a change in direction into the normal flow of paddling.

Timing strokes can be a little tiring to start – as you do not have a regular cadence. A longer stroke may need to be followed by a couple of chopped short strokes.

Stability can be an issue in waves – it is important that your fittings are installed correctly for you (see boat fittings section) and the seat is fitted as low as possible.

However timing strokes and rotating to grab the next wave in the chain will give a much more stable paddling platform as the blade is fully locked into the water. Typically the elbows will drop a little in white water to provide stability and steering, so an adaptive stoke is important.

7.1.2 Pulling Deep

Related to timing strokes for manoeuvrability, a deep paddle stroke is important to ensure the blade is fully locked on to the water and to provide the purchase for rotation. The hand should just touch the water to make sure the blade is well buried.

Placing the blade in solid fast flowing water will allow you to use other parts of the body to steer or maintain control. Once you have locked a blade in the water, you have scope to use your feet, legs, hips and torso to adjust the direction of the boat, without having to do a sweep stroke.

7.1.3 Single stroke acceleration

Racing rivers is not a case of paddling like a Duracell bunny, with no change in cadence to match the river features – the most significant variation is the single stroke acceleration. This stroke utilises some very fast moving water – and allows the athlete to raise the boat speed to match that higher pace water. The paddle is seated firmly in the faster water and held onto, utilising a strong leg drive (and strong core muscles).

7.1.4 Right Stroke Right time

As with so much of river racing, timing is critical and many manoeuvres simply require the correct stroke to be executed at the right time. Waiting to put the stroke in at the correct time is not wasted time – the alternative is to miss the move. Top exponents will be able to time the sequence of strokes leading up so there is little break in the flow of paddle strokes – but the timing is still there.

7.2 Steering

The objective is to reduce steering by paddle strokes to a minimum. Steering strokes require more energy and are not contributing as effectively to propelling the boat forwards.

There are 2 key methods of steering a white water boat:

- Shortened boat length
- Flow differential/feature

7.2.1 Shortened length

By taking advantage of the when the ends of the boat are in the air, the Wild Water boat becomes more manoeuvrable due to the reduced waterline length. The boat can then be “thrown” around onto a new line – this does require some strength, but most importantly timing – many top female exponents of Wild Water Racing have been small and have been exceedingly accurate with their timing.

Shortened length turning can be used:

- In waves – the bow is out of the water, and can be pushed onto a new line. This is the most common mechanism for changing direction.
- On drops – as the boat goes over the edge both ends are out of the water, and a radical change in direction can be made.

7.2.2 Flow differential/feature

On learning a new river the first couple of runs are used spotting the main features and getting the main lines sorted. Beyond this, one will look for features to assist in maintaining a line on the river without the need for steering strokes, and so allow more power strokes to be applied.

Several river features provide flow differences/turning forces

- Rocks – breakouts
- Eddys on corners
- Curling waves
- Wave offsets
- Stoppers
- Rock pillows
- Boils

When trying to adapt routes to use less steering – look for features that will help, so if you have a problem with drifting right (for example) into a wave chain, look for a feature such as slack water or a breakout to hold the boat on line.

Using the slack water behind rocks etc is one of the most fundamental mechanisms for aided steering in Wild Water Racing. By exaggerating or opposing the turning force it is possible to achieve a wide variety of direction changes. By leaning away from the rock the turning force is increased, leaning into the rock opposes the turning force. Be careful when exaggerating a turn as this can easily lead to unexpected veering or even capsize – it is usual to need to exaggerate the turn only on very small features with a small breakout. The amount of direction change is a factor of the flow difference and the angle of attack.

We often encounter offset sequences of rocks. A typical attack is to use the leading rock/slack water to hold the boat on line away from the subsequent rock.

It is important to remember that ordinary powerful forward strokes cause a ‘natural’ steering effect which you will recognise as boat ‘waggle’. When paddling in waves or through chutes, the ‘natural’ steering of an ordinary forward stroke can be enough to make the steering required. Choosing carefully when and where to place strokes in the fastest water may mean you can simply paddle ‘forwards’ but still steer.

7.3 Reading Rivers

When reading a river for racing, you are trying to spot the fastest and deepest current line. The fastest water is usually indicated by waves. The deepest water usually looks a little darker. It is important to look well ahead to see the trails of flow and shades of colouring of the river.

When approaching a river feature, whether it is a wave chain, drop, hole or boils, try and identify where the fastest current exits the feature. This is particularly useful when you can’t see the bottom of the feature until you are very close. You should be approaching the feature already on a current or from the deepest part of a pool, so your aim is to navigate smoothly from your entry point of the feature to the exit point you have already identified. In general this line is likely to have the most and flow and deepest water, which as already discussed is likely to be the fastest line.

If obstacles prevent a smooth line, or too much steering is required, then your line can be refined.

Think of the fastest current line as the ‘straight line’ down the river, this is the fastest course gravity can push the water down the river. Be aware this is not necessarily parallel to the river banks. Every time you stray from being parallel to and sitting on the fastest current line you are losing the best energy from the river which you will have to make up for with your own energy, so be sure that straying from that line is worth it in terms of time savings.

7.4 River Features

7.4.1 Shallow Water

Shallow water should generally be avoided where possible; however there are times when it is necessary. In shallow water there is increased bottom drag as well as a shock wave off the bottom of the boat reflected off the river bed which, when it rises underneath the boat will cause it to sit back in the water making it feel like you're paddling uphill (in fact you are!). Attacking shallow water with extra speed can cause the shock wave to rise behind your seat and give the effect of surfing down it. If you maintain this speed, it may be possible to 'surf' across the whole shallow section.

7.4.2 Boils

Boily water is caused by flow hitting a very sharp object under water – such as a rock shelf or cliff face.

Boils are pretty tricky to negotiate, and are best avoided if possible. However there are occasions where the flow of a boil can help you keep the boat on line. If you need to run boils, the "up and over" the middle of the boil route is typically the most straightforward, otherwise you will need to predict the push of the boils to help keep the line. Steer slightly into the flow and lean away to 'carve' the turn as well as to prepare your body weight to counteract the movement that will occur when your boat hits the boil. Remember, any movement that occurs to the bow of the boat will equally occur to the stern of the boat as you pass the boil, thereby straightening the boat for you, so be careful not to over-compensate your steering when you meet the boil. Stay loose in the boils and 'go with the flow' as much as possible, paddling powerfully with ordinary forward strokes.

7.4.3 Rock Pillows (cushions)

In higher flow "pillows" or cushions appear on the front of larger rocks. These pillows can exert a significant turning force. Try to run parallel to the rock and allow it to push you sideways. If you steer away from the rock, the turning effect will be exaggerated, and you will move significantly off line. Beware running straight at the rock – the pillow will not normally have enough force to direct one way or another!

7.4.4 Chop

Chop is small waves. Sometimes the waves are uniform and small, usually with short wavelength, sometimes it is more confused water.

With modern large volume boats it is generally best to run chop straight through the middle on the fastest water. It is important to get good grip in the water with the paddle, by seating the blade in the back of the wave, and using powerful strokes, drive through the chop. The boat should stay flat and supported on the peaks of the waves.

If the waves are a little larger or the wavelength is a little longer, you can still skip the boat from wave peak to wave peak, but it will require a more determined effort. You will need to time and place your strokes to lift the bow in the air slightly. Add to this strong use of your feet and legs to lift and hold the bow in the air. The aim is to fly the bow in the air to reach the top of the next wave, landing the hull, roughly in the area of your feet, onto the next wave top. If you're successful the boat will run flat and dry. If the wavelength is too long or the waves are too big, then it is no longer chop it is waves (see 7.4.5 Waves)

7.4.5 Waves

Waves are bigger than chop. The waves indicate where the fastest water is, so ideally you will try and ride the waves. The aim is to avoid the boat pitching or the hull leaving the water or for waves to start landing in your lap. If the boat starts to pitch, the bow of the boat will start slapping onto the water and in large waves the bow will drive into the bottom of the following wave which is very energy sapping and loses boat speed. Waves coming over the deck into your lap are also energy sapping and lose boat speed.

To reduce pitching of the boat, time your strokes to the waves. Place your blade into the wave (usually the back of the wave) so that you get a proper grip of the water and apply power carefully to propel the boat forwards but not up or down.

If the wavelength is too short and pitching into the waves cannot be avoided or waves are landing in your lap, you will need to move to the shoulders of the waves

where they are smaller and more rounded. This means moving closer to the eddy line beside the waves so you must be careful not to stray too far from the waves and out of the best flow.

Waves are rarely uniform and straight across a river. They are organic, rising and falling. They have rounded edges and are often offset to each other. Try to spot these and use the lower wave height to your advantage (see Figure 7-2). The boat will often roll about as it passes through the offsets – but sit loose and allow the boat to run. Time your strokes so that ordinary forward strokes steer you through the offset waves. Your paddles should be deep inside the biggest part of the waves getting maximum grip, propelling your boat through the channel between the offset waves. Allow the hull of the boat to roll against the waves slightly so that more of the hull is in contact with the water. This will assist navigation through the offsets and reduce pitching. Make good strong use of the feet to steer the bow of the boat through the offsets.

If you need to steer in waves to change direction, time your steering stroke when the boat is most out of the water and in the air.

Because the boat may be pitching in waves and be in the air a little bit, ordinary forward strokes can have an unplanned steering effect. You will sometimes need to hold the boat straight by use of the feet to push the bow towards the pulling side and use of the hips to push the stern away from the pulling side. With a lot of boat out of the water it can be possible to steer the boat towards the pulling side by strong use of the feet and hips.

If waves are large enough to splash in your face, raise your chin up high so that water is dispersed away from your eyes and they don't fill with water.

As mentioned earlier, be careful not to stray off waves into eddys. Beware of the boat bouncing off wave shoulders into the eddy. You will need to steer against the wave shoulder to prevent it. If you are very tired in the later stages of a race, it is sometimes better to sit in the waves and use less steering rather than risk an eddy out because you are too tired to steer against the wave.

7.4.6 Curling Waves

Offset waves diagonally across the river will normally cause the boat to mover along the length of the wave, and thus across the river.

This can be opposed by turning into the wave, or the effect can be used by turning inline with the wave.

7.4.7 Corners

When running corners and bends you are usually faced with a decision to either cut the bend or run with the flow around the outside. If you cut a bend it usually means you will be paddling through shallow dead water. You will need to carry extra boat speed into and through the slack. Accelerate as you approach the bend and maintain the higher speed to counteract the bottom drag of the shallow water. This obviously requires extra energy to do this. It is often better to simply follow the flow round the outside and save energy for later in the race. Test the two alternatives to determine the time advantage and decide.

When using the flow to travel round the bend, you need to ensure the boat does not start crabbing. The aim is to have the stern following the bow and the boat to be as parallel to the current line as possible. You should try and run the bend without steering strokes, only using ordinary forward strokes. You can do this by using the slower current, or the eddy, on the inside curve of the flow to draw your bow round the corner. If you find a bend causes your stern to slip and cause crabbing, you can counteract it by leaning back slightly as you approach the bend. This will cause the bow to rise slightly so that it doesn't catch the corner so hard and, more importantly cause the stern to sink and resist the slippage more

7.4.8 Drops

When running a drop you are trying to minimise deceleration by limiting how much water goes over the deck on landing and avoiding obstacles in the bottom of the drop (i.e. stopper, rocks, the ledge causing the drop). Ideally you will fly as far and as flat over the drop as possible.

Try to keep the boat flat fore and aft by raising your feet and legs to keep the bow up as you fly off the top. Time your strokes so that your last stroke pushes you off the top and in the direction you want to point when you land. The later the last stroke is taken the greater the push-off and the further you will fly beyond the bottom of the drop. Also, the later the last stroke is taken the greater the potential steering effect of the stroke as more of the boat is out of the water. The last push-off stroke will also give stability as the boat starts leaving the water. Try and keep a smooth paddling rhythm and technique continuing with your next stroke, as you land at the bottom, to maintain boat speed, and give stability. If you are landing close to an eddy or breakout it may be better to time your strokes so that the landing stroke is on the side of the eddy. This would mean your push-off stroke would need to be on the opposite side at the top of the drop.

If the bow is going to bury and water will cover the foredeck, sit the boat upright as you go over the drop. When a bow rises with water on its deck it will balloon up at the angle the deck is pointing, so if the boat is sat upright, it will rise up straight. If the boat is leaned at an angle it will pop out from under the water and exaggerate the angle and lean of the boat making it feel unstable as your body weight is thrown around due to the boat movement beneath you.

If you think the landing is shallow you may need to lean back to try and stop your bow hitting the bottom. If you think the landing is very shallow, you may need to reduce speed before the drop so as not to bury too deep.

If you think you will hit your stern, you may need to lean forward as you land at the bottom. This will reduce how fast the bow rises and therefore how fast the stern kicks down. If a stern hit is unavoidable, be prepared for the jolt. When the stern hits, it will briefly cause the boat to project in the direction it is already pointing, preventing steering, so ensure your boat is pointing in the direction you want to go at the top of the drop, before the stern hits.

A stern hit also exaggerates any lean on the boat with a jolting effect making it feel unstable as your body weight is thrown around due to the boat movement beneath you.

A simple rule of drops is to sit up straight. This will give stability whether you expect water on the deck, a stern hit or both.

7.4.9 Holes (Stoppers)

Try and avoid running holes by sneaking down the side if you can. If that is not possible, running holes is similar to running drops except there is more water force, in the form of a stopper, to overcome. The objective is to minimise deceleration.

If the drop into the hole is not too steep you may be able to ‘fly’ your bow onto the top of the stopper wave and pass your boat over the hole supported by the peak of the stopper wave.

If the drop is steeper the boat is likely to drive into the hole. Remember the Rule of Drops and sit up straight. Choose the point in the hole where the most flow is exiting from the hole. This will minimise your deceleration. If the stopper has a sideways movement, generally you will try and shoot the hole at the side the stopper is moving towards. This is where the water is exiting and therefore fastest. Also, the boat will have the least sideways movement as it hits the stopper. Too much sideways motion will make it feel unstable as your body weight is thrown around due to the boat movement beneath you.

Generally you will try and shoot perpendicular to the hole so that the boat exits pointing in the same direction it entered. If you enter with an angle to the stopper it will increase the angle on exit due to the stopper dynamics and the ballooning of the boat. If the stopper is not too big this can be used as a deliberate method to turn the boat but obviously increases risk of instability.

If the stopper is large enough to splash in your face, raise your chin so that water is dispersed away from your eyes and they don’t fill with water.

7.5 Comparing Lines

On any course you are often faced with a number of route choices. The difficulty is deciding which is best. The obvious rule of thumb is whichever takes the shortest time, but this is not always the case for instance, the fastest route may use a lot of energy, the expending of which may cost more time later in the race. Perhaps the fastest route involves a lot of risk in terms of possible breakout or damage to equipment.

All the various considerations must go into the equation, but still the most important variable is which is fastest. To determine which is the fastest there are a number of ways. You can simply time each route on consecutive runs. You could have someone video each route on consecutive runs and compare them later by watch or using video tools to put images side by side. These methods require a number of runs and are not necessarily practical or even possible.

The best and most efficient method is to practice with other athletes. Run the river in close formation line astern. Whenever a route choice presents itself, the lead boat will take one line (usually the most obvious line). The following boat(s) will then deliberately choose a different line. When the differing lines merge again below a rapid or feature you can easily assess which was the faster line. One boat length equates to approximately one second. The following boat(s) are usually in the best position to assess the loss or gain of their route and should communicate the resulting information immediately to the other athletes. This method relies on full cooperation between athletes. Ideally athletes will be a similar speed and know each others paddling style well. The lead boat sets the pace down the river. When boats separate to take different lines, they must maintain the same pace. The closer boats are before separation, the easier it will be to assess the gains or losses. Being a lead boat requires good river reading skills. Being a following boat requires even better river reading skills to spot less likely routes. The following boat must have a high degree of concentration to see not only the routes the lead boat is taking but to identify alternatives. Communication is vital.

Athletes who are well practiced at this can decide upon the best routes of a simple river in a single run. That means further training runs can be limited to practicing the execution of the chosen lines.

As discussed earlier, whilst the fastest line is probably the most desirable line, it isn't necessarily the best line. Consider whether using extra energy to take a short cut is worth the time gain? Is there a high risk of equipment damage? Is there a high risk of a breakout? If you are fit, your equipment is well prepared and you have good skills you are then in a better position to select the fastest line as being your best line, but even the very best athletes will factor these and other considerations into every route choice.

7.6 Drills for Whitewater

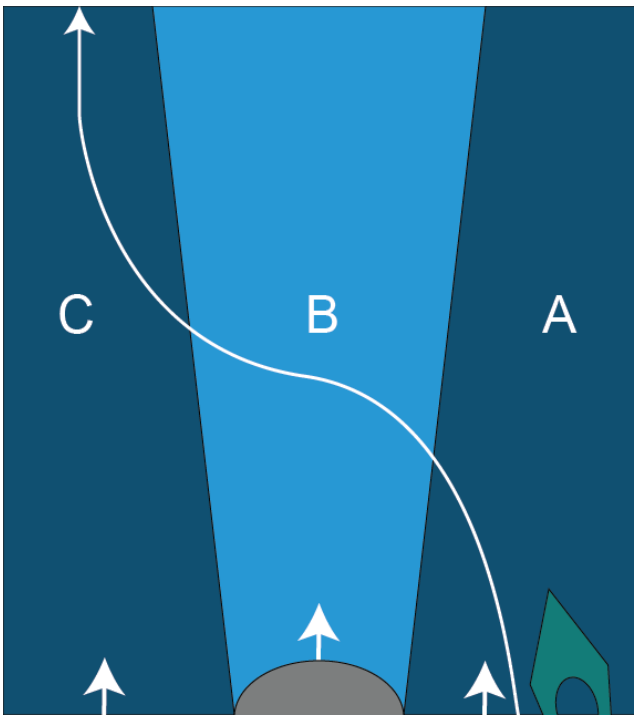
7.6.1 Soften the Transitions

Controlling the Wild Water Racing boat on rivers is a constant process of encouraging or opposing the turning forces that are applied to the boat. The most obvious example is entering slack water on the inside of a bend, but even in downstream flow there are differences in the flow rate which will apply turning forces to the boat.

Whenever the paddler encounters changes in flow, it is important to "soften the transition" so that the boat stays high in the water (quicker and more manoeuvrable) and so the paddler is not knocked off balance (even quicker!). Even in the case then the paddler wishes to encourage the turning effect, it is important to soften the initial transition and then allow the correct amount of boat to be 'grabbed' by the water to make the turn.

An obvious example is using the slack water behind a rock to turn the boat onto a new course. By using varying amounts of opposing steering a wide variety of lines can be obtained. But the transitions must be smoothed out even when wanting to make a big direction change.

As the paddler enters the slack water (B) from the fast flow (A) the boat will be leant to the left (upstream) to “carve” the turn and keep the boat light on the water. As the boat leaves the slack water it will be leant to the left (downstream) to soften the final transition and re-enter the fast flow (C).



The point at which the lean is put on is a matter of feel, i.e. assessing the penalty of if not enough lean is put on. Generally when you feel the turn start on the bow, the lean is initiated – the G-forces are then trying to throw the paddler to the outside of the turn and the lean provides the opposing force. See image sequence below – note how the water at the boat indicates that the boat is starting to turn, and the lean is put onto the boat to oppose these forces.

1. Entering Slack

2. Lean initiated

3. Full lean on - Full Power

It should be noted that these leans should be executed by downward pressure on the seat (drop hip steering – see 5.5.1 Boat Leans – Drop Hip Steering) not by

bracing up into the thigh bars. This it is possible to maintain a strong leg drive throughout the stroke.

7.6.2 Drills to improve edge control crossing flow

Utilising a piece of water with a relatively good flow (around 3-4 metres wide is ideal) and large breakouts that will allow the paddler to get a good run up and run out from the flow. Weir chutes are ideal for this purpose, as the breakouts are often well defined and large.

a. Find out what happens when the boat is kept upright.

This is a common flaw for many paddlers, you will see them suddenly thrown off balance by some slack water – this drill will show what happens to the boat when it is not leant over (note the flow needs to be reasonable enough to prove the point but not enough to throw them in!).

Paddle in a straight line from Breakout A to Breakout B with the boat kept upright. As the boat enters the flow it will be grabbed, pushed down into the water and downstream, also most likely the paddler will be a little unseated and has to recover from being thrown in upstream. A similar reaction will occur as the paddler exits the flow into the breakout.

b) Now try to predict and feel the push of the boat

We will now try to paddle a completely straight line across the flow, this will require leaning downstream when we enter the flow (and pulling slightly harder on the downstream side) and upstream as we exit the flow. The boat should feel lighter, more manoeuvrable and quicker.

Continue this exercise trying to not only see what he boat is doing but ‘feel’ then the boat is being affected by the flow.

c) Next try to hit a point further downstream in the opposite breakout

This will require using the flow to turn the boat, so we want to come more upright in the flow (and in extreme cases even lean upstream to make the turn)

– but the key point to remember is to soften the transition and then bring the boat upright – this will allow the paddler to introduce the appropriate level of turning force and not get off balanced.

d) See the benefit of wet hand drills

In turbulent water it is important for the blade to be fully buried provide a stable platform. Perform the drills above in conjunction with wet hand to see the difference a well seated blade makes (should make things a lot easier and more dynamic)

8 Physiology

8.1 The Three Energy Systems

There are 3 major energy pathways in the human body, known as the aerobic, anaerobic and Adenosine triphosphate /Phosphocreatine pathways. They can and often do work simultaneously, but the demand on each depends on the intensity and duration of exercise.

To understand the use of the energy systems it helps to consider, if you start paddling slowly, and then progressively increase pace for 15 minutes until you are doing a maximum sprint, which can only be maintained for a few seconds.

In the first few minutes all the energy is produced by the aerobic pathway, that is energy produced ‘with oxygen’. As the pace goes up clearly more energy is required, we start to breathe more heavily and this extra energy comes from greater use of the aerobic pathway. As the pace goes up again, more and more energy is demanded of the aerobic energy pathway, however it can only supply energy at a maximum rate, and when we reach a pace that could only be sustained for about 8 minutes then the aerobic pathway is working at maximum.

Further increases in pace are possible but the additional energy is supplied by the anaerobic pathway, which is energy produced ‘without oxygen’. However, this energy pathway has some nasty side effects, notably lactic acid is given off and causes fatigue. If the pace goes up again it requires more anaerobic energy, and thus quicker build-up of lactic acid and increasingly intense fatigue.

Finally if the paddler sprints all out the extra energy for this really high intensity work comes from Adenosine triphosphate and Phosphocreatine, which are small very short-term stores of energy in the muscle.

(N.B. The aerobic pathway will continue supplying energy at its maximum rate right to the end of the sprint, it’s just that it cannot supply all the energy demanded, and other pathways must contribute at these high speeds).

8.2 Training the Energy Pathways

Training for the 3 energy pathways is considered below. The energy pathways involved in an event represent just one part of the myriad factors important for physical training and competition. The period of training given is just an indication to achieve a reasonable level of fitness for each. Of course we can (and some people do!) spend a lifetime continually trying to improve each of these qualities.

8.2.1 The Aerobic Pathway

Also known as the O2 system, aerobic means "with oxygen", this pathway is used when sufficient oxygen is available to meet the energy needs. In this case the fuels fatty acids and glycogen are metabolised with oxygen to provide the energy (Adenosine triphosphate) for muscle contraction. Typically the aerobic pathway is used for long periods of low to medium intensity. This is the endurance system and you can use it almost indefinitely. A marathon runner trains and races at a relatively low intensity (they do go fast, but that's just because they are very fit!) all the energy for their exercise will be produced by the aerobic pathway. It is the most efficient of the three systems for converting fuel into energy.

During easy exercise this system will also dissipate any lactic acid built up in the muscles from higher intensity bouts using the anaerobic energy system.

It takes 3 to 4 months of steady training to develop aerobic fitness. To improve aerobic fitness it takes 3 to 6 sessions per week and to maintain existing aerobic fitness it takes 2 to 3 sessions per week. You should also include 1 speed session per week to keep up some speed.

There are 3 main ways to develop aerobic fitness:

Training sessions that are a minimum of 45 minutes of steady-paced effort and preferably over an hour. During these sessions the intensity should not be tiring, but it is the duration that leads to fatigue. This training is primarily for the aerobic ability of the muscles, and you should be able to talk to people while doing this type of training, not be gasping for breath. This type of training is particularly good for general fitness, health and weight loss without being too hard.

Repeated hard efforts of between 3-6 minutes. These sessions develop the maximum rate of the aerobic system. As they are hard efforts there will be some anaerobic metabolism, but this is required to work the heart and lungs to a high level. At the end of these efforts you will be breathing very hard and it may take a minute or so for this to come back to normal.

Threshold training 20-40 minutes of hard effort, where the pace is very close to maximum for the distance. This trains the aerobic system just at the point where noticeable amounts of anaerobic energy are produced, and thus the aerobic pathway adapts to working well even if there is some lactic acid and fatigue. During this type of training you will be breathing quite hard, but if you stopped your breathing would come down to normal quickly.

8.2.2 The Anaerobic Pathway

Used for limited periods of fairly high intensity effort. It is the major energy pathway for events lasting from 10 to 90 s. For sports events of this duration the intensity is too high for purely the aerobic pathway (which can only supply energy at limited rate) and most of the energy comes from the anaerobic pathway, which involves the metabolism of glycogen "without oxygen". This reaction has a by- product of lactic acid, which causes fatigue – basically the intense burning sensation and failure of muscle contraction at the end of a 400m running race as the legs turn to jelly. The higher the rate of energy supply from this anaerobic pathway the faster the build-up of lactic acid and the quicker the onset of fatigue.

This energy system is most important for long sprints (10 –90 s), but also important for middle distance events (90 – 360 s).

The ability of muscles to work with lactic acid build up and the consequent fatigue can be trained using interval training, typically repeated efforts of 30 seconds to 2 minute. It takes 6 to 8 weeks of training to develop the anaerobic system. To improve fitness it takes 2 to 4 sessions per week and to maintain existing fitness it takes 1 to 2 sessions per week.

You normally start to train the anaerobic system about 8 weeks before the event, and between 6 and 2 weeks prior to the event your training should be at its most intense. It is important to maintain your aerobic fitness as well.

Examples of a typical anaerobic session:

a) (2 min on, 2 min off) * 10
b) 210, 20,-----90, 100, 90,------20, 10 stroke pyramid
c) sprints for the length of the pontoon
d) {(40 on, 20 off) *3, (80 on, 40 off) *3, (40 on, 20 off) *3} *3

8.2.3 The Adenosine triphosphate /Phosphocreatine Pathway

Used for very short periods of maximum intensity effort. Adenosine triphosphate /Phosphocreatine are energy stores in the muscles that last for less than 10 seconds of all-out maximum sprinting. It takes ~2 min of rest or easy work before these stores are replenished. This is the main energy pathway for a 60-m running sprint (<7s). This energy pathway does not require oxygen or produce any nasty by-products.

This energy system is most important for very short sprints (<10 s), but also medium sprints (10 – 30 s).

Training is thought to increase the rate of energy supply from Adenosine triphosphate - Phosphocreatine i.e. faster maximum speed and extend the time it lasts for by a few seconds.

This system can be trained in 3-4 weeks and is lost in a similar time, so tends to be trained in the month before the event.

a) A typical Adenosine triphosphate / Phosphocreatine session would be:
b) second effort every 2 minutes *20
c) second sprints during a long steady paddle practising starts from standstill

When planning training schedules, try to spread the types of training out. If you have a hard interval session one day, have a steady aerobic session the next day etc.

9 Training

9.1 Weight Training

9.1.1 General principles

Weight training is a useful addition for athletes that have plenty of canoeing mileage ‘in the bank’. If you are still developing your canoeing physiology, it is better to go canoeing more often rather than embark upon weight training.

A weight training program should be to develop strength and power. There is little point in doing endurance training in the gym. It is better doing it in the boat. Therefore repetitions of 4RM to 15RM are best. Starting off you should do 1 or 2 sets building up to 2 to 3 sets.

Consistency is the key. You should be doing at least an average of 2 sessions per week. If your average is less than 2 sessions per week, you are probably better doing other forms of training such as more paddling or resistance training in the boat. You will all be familiar with the stiffness in the days that follow weight lifting. Only if you are consistent will that stiffness feeling reduce. You should note that you will always carry some fatigue into your next paddling session but again by doing consistent training fatigue can be reduced.

The best exercises are multiple joint – compound exercises (because paddling is a compound exercise). These have the added benefit of developing co-ordination. It is better that these sorts of exercises feature at start of a session. For instance you don’t want to start off with an isolated bicep curl which will then fatigue a small muscle that you need for a compound exercise.

The most important exercises are ones that increase the power of the pull phase. However it is also important to develop balanced musculature and physique so pushing is useful as well.

Adding ‘core-stability’ exercises, for instance using swiss ball type exercises, is very useful.

Be pragmatic. If you don't have a gym with equipment to do all the exercises, develop alternatives with the equipment you do have. If you don't have a spotter, don't lift very heavy weights. Develop sessions that fit into the time you have available.

Be very careful! A lot of canoeist's injuries come from the gym rather than paddling. Make sure you warm up properly (get your heart rate and body heat raised). Make sure you use good technique. Progress to larger weights conservatively to avoid injury.

9.4.2 Program Advice

RM – Repetition Maximum is the maximum you can manage to lift for the no. of repetitions e.g. 4RM is the weight you can just manage to lift on the 4th lift.

At the beginning of a program, move in a controlled manner and concentrate on technique.

Recommended to lift 10-12 RM, start off with 2 sets building up to 3 for 10-12 workouts.

Later (minimum 10 sessions):

- Move as quickly as possible whilst maintaining good technique.
- Rotate the load i.e. mix –up sessions of 4 –RM, 8-RM, & 12-RM.
- Shift the emphasis from strength (4-RM) to power (12 RM) where the lighter weight can be moved move quickly) in cycles of 2 to 3 weeks.
- Some overloaded eccentric work is also useful, but requires care as the loads tend to be very heavy.

Recommended standard programme: exercises A to L (12 exercises),

To make the session quicker, do the exercises alternating in pairs i.e. for 2 sets: A, B, A, B, C, D, C, D, E etc. where the pairs are using different muscle groups.

This session can take a while especially if 3 sets are done, but there doesn't need to be much rest at all between exercises.

The most important exercises for paddling are A and E. R can be interchanged with C, and M or N for B. If doing more than 2 sessions per week best to include a greater range of exercises in the programme as a whole i.e. not all the same exercises every session.

9.4.3 Exercises

A. Seated 1 arm pulls (on cable row)

- Sit up straight (chest out), legs bent, keep head still throughout.
- Start from rotated position with arm straight.
- Pull back with lots of twist in the first part of the pull, until hand level with hip

B. Bench Press

- Barbell should touch chest

C. Pull-Ups (neutral or overhand wide arm grip)

- Work through full range i.e. go down to maximum reach.
- Keep lower body static (cross ankles).

D. Dumbbell flies

- One dumbbell in each hand, with arms by the sides and elbows very slightly bent.
- Keep the elbow fixed (i.e. arms almost straight throughout) lift both hands up in a wide arc until dumbbells touch above the head.
- To make it harder – in the downphase pause with arms horizontal and then lift back up above the head in an arc. This can also be done seated on a Swiss Ball, which requires some core stability.

E. Bent-over 1 arm pulls

- Place one knee and hand on a bench of about knee height.

- Hold dumbbell in other hand and start with the arm straight, fully extended forward, and the trunk rotated.
- Keeping hips and non-pulling shoulder still, pull hand up towards the hip, but also out to the side. Ensure there is a really good twist.

F. Dips

- Elbow should be a right angle at the bottom of the movement.
- Keep the lower body static (cross ankles)

G. Reclined Leg press (1 leg)

- From 90 degrees knee angle to leg straight.

H. Shoulder press

- Use a paddle width grip. Alternate lowering in front of and behind the head.
- Over the weeks try to extend the range of motion (i.e. lower further on both sides) –best done with 10RM or lighter weights.

I. Medicine Ball twists

- Lie on you back with the knees well bent (>90□). Hold a medicine ball in both hands with the arms extended out straight up in front. Keeping the arms straightish, rotate the trunk and lower the ball down in an arc to the left, touch it down level with the shoulders or slightly higher, then back up and to the right. Repeat until tired.
- Keep the abs tense, and the front of the pelvis pulled up towards the ribcage throughout.
- This can be made more difficult by doing it on a swiss ball, but whilst still holding a medicine ball. Maintain good spine posture throughout.

J. Dumbell waves

- Lie on the floor on one side, with legs separated for stability.

- Place both arms out straight in front with a dumbbell in the upper hand (little finger upper most) and this elbow slightly bent.
- Keeping the chest still, and the elbow slightly bent move the upper arm in an arc from straight out in front to vertical.
- Lower dumbbell through same arc until it almost touches the ground, then repeat.

K. Crunches

- Lie on your back with a bench tucked in the back of the knees so hips and knees are at 90 Degrees. Place hands to the side of the head and crunch forward by progressively flexing the spine forward, should be no movement at the hip.
- Ideally touch elbows to opposite thigh/knee i.e. twist on the way up. Try to move in a slow controlled way, jerking up and down quickly makes this much easier.

L. Swiss ball balance exercise

- Kneel with hands and knees on the ball.
- Squeeze your glutes and maintain a neutral spine, upper back straight not hunched, with head up.
- Stage 1 is just to balance.
- Stage 2 is to Raise one arm slowly off the ball at a time, so it is straight out to the side.
- Stage 3 is to raise one arm and opposite leg.
- Stage 4 is raise alternate arms high and wide in quick succession.
- Must keep spine in good position throughout!

M. Alternating dumbbell press

- Lie back on a flat bench, with a dumbbell in each hand, held at the shoulder.

- Push one arm straight up to vertical, then as that comes down push up the other arm.
- Some side to side chest roll is fine.

N. Decline Press-Ups

- Place the feet on the end of a bench, and position low boxes or thick disc weights under each hand (the hands should be lower than the feet).
- Keep the trunk flat and rigid throughout (do not sag!), do a regular press-up, but lower the chest beneath the level of the hands (you need a space between the 2 boxes) before pressing up. Try to move through as big a range as possible, and in a controlled manner.

O. Power Cleans

- A great exercise for whole body co-ordination, pulling with the arms and pushing with the legs. But requires careful coaching and good technique, not for the novice.

P. Bananas

- Lie flat on the floor, face down. Place hands next to the head and elbows out to the side.
- Lift feet and knees with legs together as well as shoulders, chest and head off the floor, so you are balanced on your stomach and hold for 15s.
- Rest and repeat 4 times.
- Adjust time as fitness improves.

Q. The Plank

- Hold this position for 30s. Important to keep body straight. Raise each of the four limbs in turn for 15 s each. This can be made harder by

placing the feet on a bench (or harder still on another swiss ball) at the same height as the elbows.

R. Bench Row

- Lie on a high bench face down so the edge of the bench is just under the chin, with a barbell perpendicular under the bench. Lift the barbell up to at least a 90 Degree elbow angle.

S. Lunge

- From standing upright with both feet together, take a big step forward, bending the front knee until the back knee touches the floor.
- Start with just body weight, 20 each side in a slow controlled way, and progress to a barbell across the shoulders.

T. Reverse Crunch

- Lie on back with the knees bent up towards the chest.
- Hold weight between ankles, curl lower back up (without any hip/knee/ankle movement).
- Progress with heavier weight or pulling knees up to opposite shoulder.

10 Psychology

Psychology of Wild Water Racing is a massive subject, as so much of a competitive performance is influenced by the athlete's mental approach. From the ability to cope with external factors such as changed schedules or unexpected events, to the ability to visualise a race being executed well. All has a mental component to some extent.

10.1 Visualisation

The mental side of racing hinges around the ability to visualise. To be able to recall images and emotions to allow the athlete to master a new skill or to prepare for a yet to be experienced event.

Visualisation plays a part in:

1 **Learning a new skill** - for example working on flatwater technique. The ability for the athlete to be able to imagine the perfect technique and to be able to feel the coordination of the muscles to achieve this ideal is a great asset.

2 **Coping with new water** - positive visualisation/reinforcement, visualise paddling a piece of water with confidence and making a good line down the river. Feeling the movement of the boat and the water, and the strokes needed to execute the moves. This is particularly key if the paddler is apprehensive about whether they are going to be able to paddle the water. An attacking attitude is a much better response than a passive one, as the water is able to take control.

3 **Race rehearsal** - extending from positive visualisation, visualising a good race run, the effort which is being expended and the discipline of the paddling. Rehearsal of paddling discipline is of particular importance in sprint events, when controlled aggression is required, rather than 'red mist' runs.

10.1.1 Technical Rehearsal vs Emotional Rehearsal

Technical rehearsal corresponds to visualisation of the routes, the strokes and feel of the water needed to make the moves. Emotional rehearsal is a little more abstract in that it is rehearsing the nerves and emotions that are going to be felt before and during the race.

Sprint events are typically held on good technical water, and are fairly short in length. It is practical to rehearse the entire course in detail from both a technical and emotional perspective. The athlete is able to walk through in their mind the entire race run - feeling the extreme but controlled effort and the water movements needed to achieve a good performance. The rehearsal allows the athlete to achieve a state of readiness for 'controlled explosion'.

Classic events introduce a greater scope for mental rehearsal, particularly on longer courses where pacing is vital. A great classic performance is the result of great commitment from the paddler. Without mental rehearsal the athlete is unlikely to be ready for the extreme effort and emotions that will be experienced during the course of a classic race. Rehearsal for a classic is less focussed on small detail than the sprint rehearsal due to the long nature of the course, but instead focuses on the commitment the paddler is going to make to the race, preparing for the emotions and sensations they will experience at certain points in the race. Only by being truly ready for these will the athlete race to their potential. The athlete achieves a state where feedback from the muscles is considered just that - feedback of how hard they are pushing, and not interpreted as pain.

The classic athlete will be capable of recalling the entire classic course in 'technical mode', and will make positive mental rehearsals of critical sections, but the majority of mental preparation will be focussed on 'emotional rehearsal'.

10.2 Pre-Race Nerves

Everyone gets nervous, it's needed to achieve high performance - but it also needs to be kept in check. It's likely that the bigger the event the greater the nerves, as this will be the culmination of many months or years training and the nerves represent the uncertainty of being able to achieve the performance they are capable of. It is important that the athlete only focuses on the factors that they can control, and try to control them - and not worry about the factors which they cannot control (for example the water level, or how much training the other competitors have done).

There are some simple techniques and tactics to cope with nerves;

1 Only worry about what you can control, and control it (i.e. yourself)

2 Start to prepare for your race well in advance, prepare slowly to keep everything in check

3 Allow plenty of time to get to the water and warm up

4 If you are feeling weak and tired on the water - don't worry this is normal and common. Use relaxation drills to centre and calm yourself.

- Find a quiet breakout, get hold of the bank, close your eyes, breathe slowly and deeply in through your nose and out through the mouth.
- Listen to your heart rate - gradually calm down and slow down your heart rate.
- When you are ready and calm and centred, open your eyes - really flex your muscles, think strong thoughts and take some good strong deep paddle strokes.
- Feel yourself being really strong and powerful. Go through your race plan - and you are ready!

11 Race Preparation

The major contributors to race preparation are the regular fitness training and the regular practice of river skills. However there are a number of, possibly, less obvious contributors that will affect an athlete's performance in a race.

11.1 Equipment

Race and practice equipment should be in good order. The equipment should be checked that they conform to regulations. Boats should be watertight and have their air bags properly fitted, practice boats should have the protection they need, paddles should be checked for stress points and chips. Buoyancy aids, helmets, spraydecks and cagoules should be checked they are in good condition.

This should all be checked well in advance of the race. Ideally race equipment should be trialled before the race to check it's all OK.

11.2 Travel and Accommodation

Determine how an athlete will travel to the event. How will all their equipment be transported to the venue? How will the athlete be transported up and down the river for practice runs and the race?

If the race involves an overnight stop, where will the accommodation be? Will it have drying facilities? (if not, more kit will be required). Will it be possible to repair boats if required? (if not, perhaps a practice boat or more boat protection will be required).

How close is the accommodation to the race venue?

11.3 Nutrition and Hydration

Decide what food and drink will be required for the lead up and the event day itself. Will the athlete get suitable carbohydrate meals? Ensure the athlete is well hydrated. Whenever the athlete is off the water, they should carry a drink bottle with them.

On race day, what breakfast, snacks and drinks will the athlete require? This has become more pertinent with Sprint racing, as these tend to be long days with 2 runs often spanning lunchtime.

11.4 Course Practice

The course should be practiced well. The aim is for the athlete to know exactly how they will do the race.

The athlete should know all the lines they are going to use in the race and, ideally, have executed them.

Does the athlete understand the nature of the water? Would a higher or lower stroke rate, greater or less power, be more suitable?

How long is the race? Have markers been identified to divide the race into sectors?

What is the start area like? Will warm-up be difficult? Will moving to the start line be difficult?

Has the start line been practiced? Will the paddles hit the bottom? Will a left or right stroke be better to start with?

What intensity will be used for the first 15 seconds and then the first minute? When will intensity change during the race? Do these points relate to the sector markers?

As you can see there is a lot of information to be acquired in, sometimes, very few practice runs. With a little forethought, however, it is all easy information to gather.

Make sure the athlete tries the start line, make sure they take a watch and time the runs and so on.

11.5 Pre-Race

Typically athletes will want to do a practice 1-2 hours before the race. This is a final check of lines as well as a ‘loosener’ to wake up. This kind of warm-up is probably more psychological than physiological but, because of that, is an important aspect of the pre-race schedule. Athletes should change, immediately after the run, into warm dry clothes.

At the race start area. If the launch area is a long walk from the car park, then drop the boat at the launch area early so that the discomfort of carrying a boat is done well before race time.

Make sure a thorough bank warm-up is carried out. This should involve stretching and running. It may be possible to use resistance aids such as bungies or even a paddling machine. During this time ensure any toilet requirements are dealt with.

Launch time should be 10-20 mins prior to race start. It is more down to an athlete's personal preference, as well as the nature of the warm-up area, that will determine how long before race start they will launch. However, to do a good water warm-up requires at least 10 minutes. The water warm-up should be preparing the body for the intense effort to come. The athlete should keep moving and introduce some intense Adenosine triphosphate efforts. About 2-3 minutes before race start, it is usually good for the athlete to relax and reduce their nervous level by narrowing their focus on to how they will move to the start line and how they will execute their start using the knowledge they gained from practice (will a left or right stroke be used to start? will the paddles hit the bottom? what intensity will be used for the first 15 seconds and the first minute?).

12 Racing Strategy

12.1 Splits

Splits are used to communicate information to athletes about their performance relative to other athletes in the race. Splits can either be communicated during a race or be analysed after a race.

12.1.1 Splits during a race

Splits are most effective for athletes who are aiming to win the race. A simple up or down split on the fastest boat conveys all the information (and motivation) needed.

Splits become more difficult to use when an athlete's goal is to finish, say, in the top 10. A number of approaches are available.

1. Give splits against the athlete's own target time. The target time could be derived from past results on the same river or from a timed training run. Obviously the split point needs to be the same for all the runs to be accurate.
2. Give a positional split i.e. call the position in the race so far. If an athlete is 4th at the split and only 6 athletes are still to come, then they are on target for 10th place or better. Additional information can be given about how far down on the place in front they are.
3. Simply shouting encouragement. A split position is often a good 'marker' on the course for an increase in pace so a lot of motivation can be given to an athlete at a key point in the race.

Splits must be practiced by both athlete and coach. An athlete must learn how to receive the information whilst concentrating on racing. It is useful for the split taker if the athlete acknowledges they have received the information, perhaps with a nod of the head. They also need to learn how to react to the information. They need to learn to cope with up and down splits. An athlete often fears how they will react to a down split. This in itself is revealing about the confidence level of an athlete. However, it can be turned into a positive, because that fear could be the motivation they need to

go hard from the start to get a split they want. If good and accurate goal setting has been done throughout the season, a worry about splits should not arise as the athlete will be clear about their goal and what they need to do to achieve it.

A split taker needs to learn how to do splits. The maths itself can be difficult. The split taker should use a marker at least 10 seconds, preferably 15 seconds, upstream so that there is plenty of time to do computations and decide what they are going to say. It is useful if the split taker is a coach as they can decide what it will be best to say to motivate the athlete. The split information should be shouted clearly and concisely and shouted twice. Ideally the athlete will confirm receipt of the information with a nod. Once the split information is conveyed, other encouragement or technique points, perhaps, can be shouted as well.

12.1.2 Splits after a race

Splits can simply be recorded and analysed after a race. This can be very useful to assess the performance of an athlete and perhaps identify areas for improvement. Did an athlete lose time in a rough technical section? Did an athlete go too easy or too hard off the start? Did an athlete fade in the last part of the race? All these may point to technical skills or fitness areas to be worked on.

This kind of split analysis is very useful during Sprint racing. Margins in sprint racing can be tiny, so gathering split information from a sprint run can help identify areas for improvement for the second run. If the split information is combined with video coverage, it can often indicate the exact part of the course where an improvement can be made.

12.3 Team Racing

Team racing is an enjoyable form of Wild Water Racing that can be enhanced with some extra knowledge and practice.

Ideally a team will comprise of 3 boats that are very similar in speed, however this is rarely the case and so strategies have to be adopted to get the slowest boat from start to finish in the fastest time.

Miracles rarely happen, particularly when the team is made up of more experienced paddlers. Athletes will not go 30 seconds faster. Generally the best that can be hoped for is going a few seconds faster than the slowest boat's individual time. There is a higher risk of errors due to washes and potential over exertion of the slowest boat. A good team race needs good planning and good execution to minimise errors and get the best from the slowest boat.

A team will only perform to its best when there is a complete understanding of each other. Each athlete must understand the speed, skills and psychology of their team mates. This only comes from training together in close proximity. They should vary the boat order in training to learn about each other. Only when all 3 team members appreciate and respect the attributes of their team mates will the best performances be achieved. Many hours of practising rivers together are required so they have to want to do it with each other and for each other.

The tried and tested order is for the 2nd fastest boat to lead, the slowest boat to go in the middle and the fastest boat to go last. Other boat orders have been used, but usually it is in a desperate attempt to chase a miracle and rarely does it work.

12.3.1 Lead Boat

The lead boat is usually the second fastest boat. They have a very important role. They need to execute a good line and paddle the race at a smooth pace to allow the middle (slowest) boat to simply follow. It requires very good white water reading skills to choose a good line, good paddling skills to execute a good line and excellent pace judgement to set the right speed for the middle boat. It is important to practice many times with the middle boat, both leading and following them, to learn what the pace of the middle boat is and to learn what lines the middle boat prefers and how they like to execute them.

12.3.2 Middle Boat

The middle boat is usually the slowest boat. This is the least enviable member of a team. They simply have to follow the line of the lead boat and try and keep up! They should have complete trust in the lead boat and follow everything they do. The aim is

to try and ride a wash and gain some advantage. This can be difficult as current flows narrow and widen and water depths change. It is important that the middle boat communicates with the lead boat if they are getting dropped or if they could go faster.

When the last boat comes to overtake, the middle boat should be aware of the fastest current and the abilities of the last boat to decide how much room and how much flow the last boat will need to pass by.

12.3.3 Last Boat

The last boat is usually the fastest boat. This is because they have the toughest washes to overcome, can paddle within themselves to manage the team in front of them, but most importantly can overtake the middle boat before reaching the finish line. Their job is to assess the middle boat and call, if necessary, to the lead boat to slow down or speed up. It can be easy for the last boat to get dropped. They should be the fastest boat, so should be able to catch up, but it should be done sensibly and gradually. It is vital near the end of the race to be close up tight to the middle boat so as to pass them before the finish. The last boat may have raced the individual race 15 seconds faster which equates to 1 second per minute. When they are 2 minutes from the finish that means they only have a 2 second advantage which is only 2 boat lengths, 1 minute from the finish only 1 boat length! The last boat needs to be closer as the finish gets nearer. The last boat should pass the middle boat before the finish as it is wasteful for the fastest boat to be last over the finish. Care must be taken not to harm the progress of the middle boat with a dirty wash. Awareness of what line the middle boat will be taking is vital to execute the overtake efficiently.

13.3.4 Wash Hanging

A side wash gives the best speed advantage, however in a wild water racing boat this requires a lot of energy to steer, particularly if the pace is uncomfortably fast. Often the fastest current line is narrow and a side wash would actually be through an eddy, thereby negating any advantage it may have had. If river conditions allow and the slowest boat is experienced and skilled at wash-hanging on the side then use

any opportunities that may arise. The lead boat needs to know when this will occur to allow the middle boat to come up and over the wash. Alternatively, the last boat can move up and down to give a half-V for the middle boat. Any involvement of side washes can be very energy sapping, so the best and most reliable wash is the stern wash. It makes the task of the middle boat simple, just to follow the lead boat. Riding a stern wash requires practice as the wave behind can move forwards and backwards as the river depth changes. It requires great experience and lots of practice to ‘feel’ the wash.