Whitewater Safety & Techniques

1st Merrickville

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V3

Credit for portions of this presentation go to Mike Miller of 2nd Orleans and to Mark Orzel, Swift Water Rescue Instructor.

Overview

- White water is fun.
  - It is such a thrill crashing through the waves!
- White water is dangerous.
  - From the movie *Top Gun*: "Top Gun rules of engagement are written for your safety and for that of your team. They are not flexible, nor am I. Either obey them or you are history. Is that clear?"
  - Instructors must be obeyed without question.
  - Risks can be minimised, but that is dependant on instructions being followed to the letter.
- White water is wet.
  - You will get wet. Plan on it.
  - Dumping is part of the learning process. If you never dump, you aren't trying hard enough.
- Canoeing versus Rafting.
  - Your parents will think this is like white water rafting. It is not.
  - In a raft, 99% of the time you will make it to the bottom of a rapid right side up, no matter what you do.
  - In a canoe, if you do not paddle correctly, 99% of the time you will dump. This is the challenge that makes white water enjoyable. Rafting is boring in comparison.
- If you are not comfortable with a given rapid, just say so.
  - There is no shame in walking around a rapid; somebody else will take your partner through.
  - Do not paddle a rapid you are not willing to swim.
  - Challenge by choice.

Concepts of River Flow

- Volume / Flow Rate.
  - Amount of water passing a point per unit of time.
- Gradient.
  - Average steepness or slope.
- Velocity.
  - Speed and direction of the current.
  - Depends on volume, gradient, obstacles, river bed, river course, etc.

River Reading

- Around corners, water flows straight until it hits the opposite shore.
- Features may turn from good to bad depending on the water level and flow rate.
- All rapids must be scouted immediately before running.
  - Water level and fallen trees can change a river overnight.

Simple River Flow

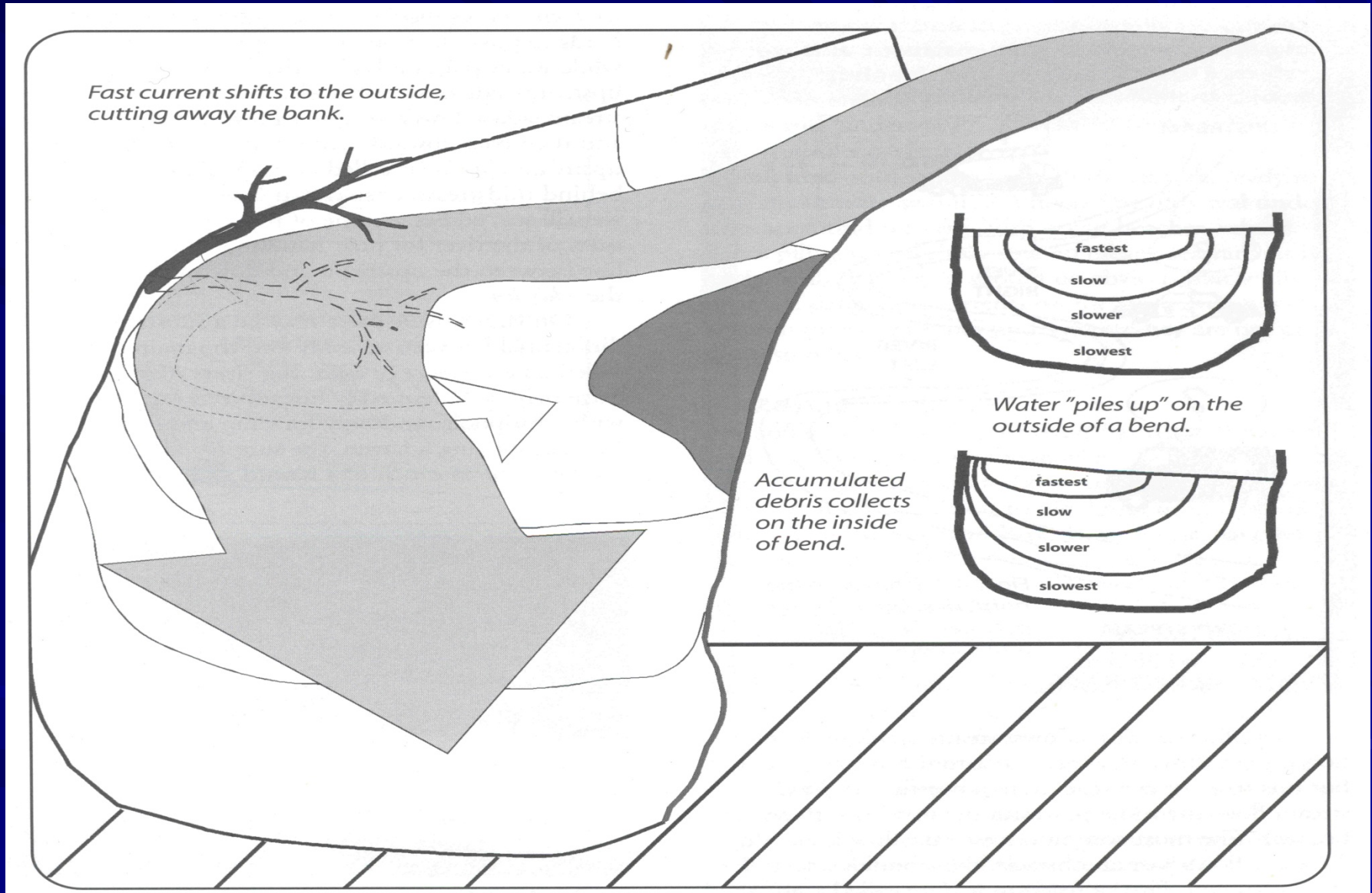
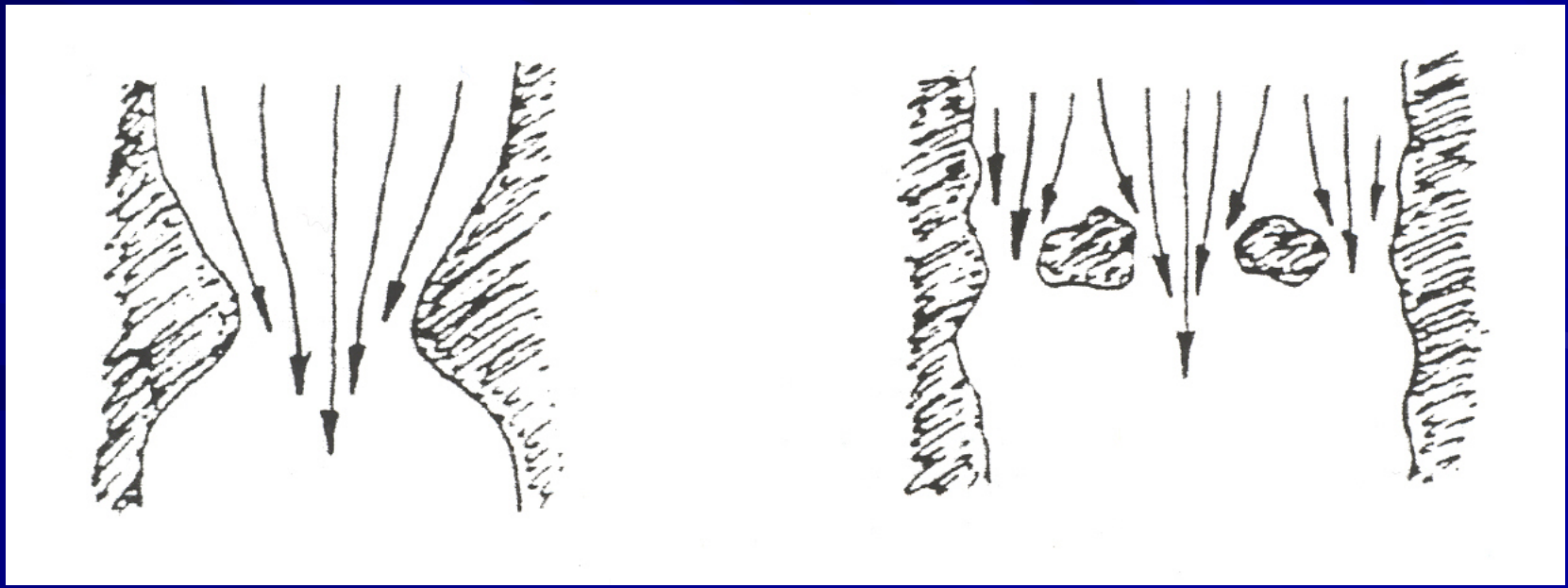


Fig. 2.3 The river's main current meanders up and down as well as side to side.

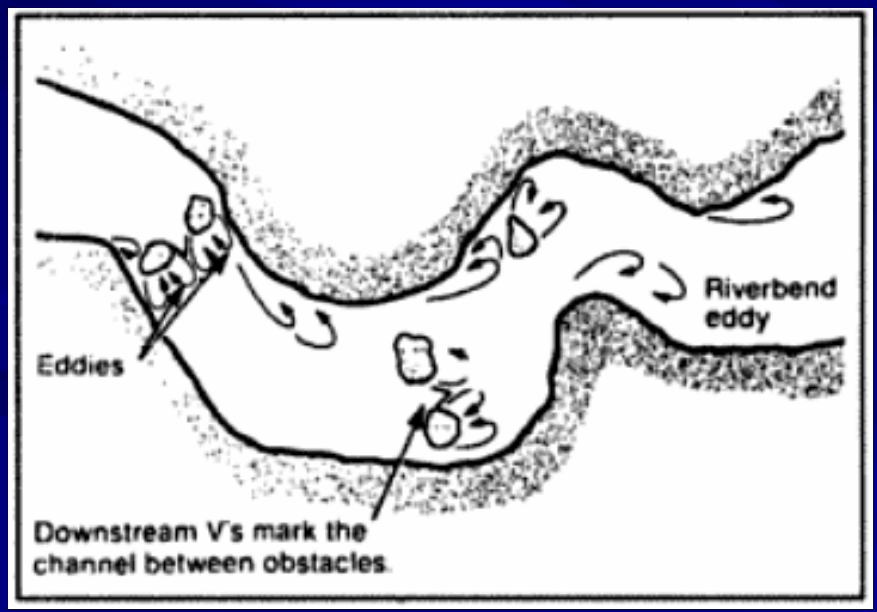
River Formations - Constrictions

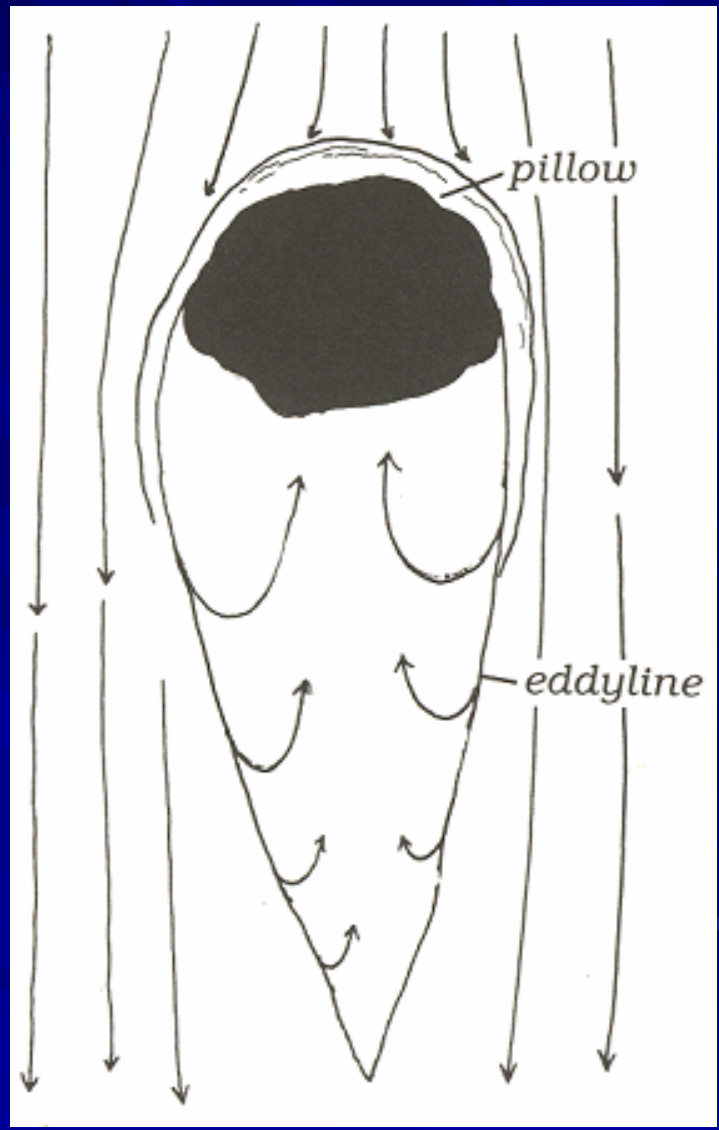
- Whitewater happens when the water velocity increases.
- Whitewater is less dense than flat water due to all the air bubbles.
  - Less resistance for your paddle to push against.
  - Less buoyant for your PFD.
- Caused by narrowing of banks, rocks, shallow bottom.



Eddies and Eddy Lines

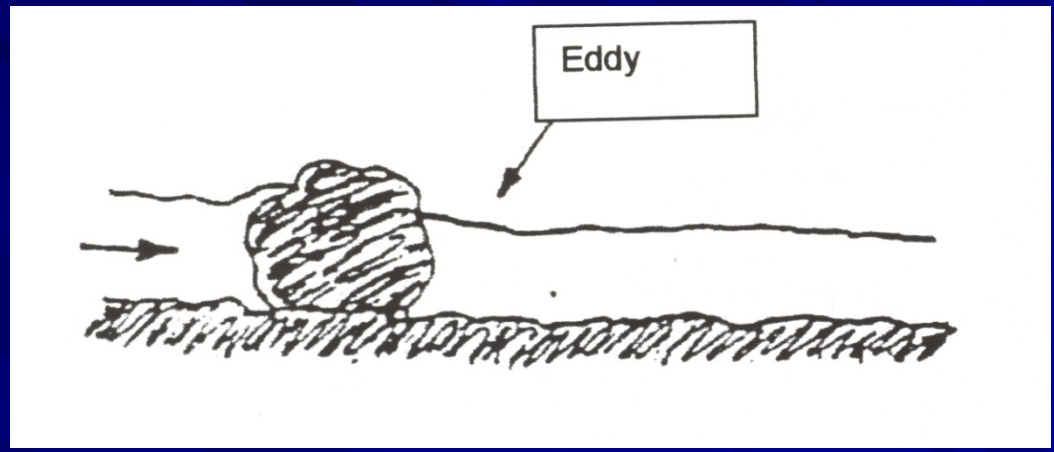
- Water passes around rock and speeds up.
- Water behind the rock actually flows upstream.
- Eddy line is where the water flow changes from upstream to downstream – sharpest near the object.
- Also occurs at the rivers edge.



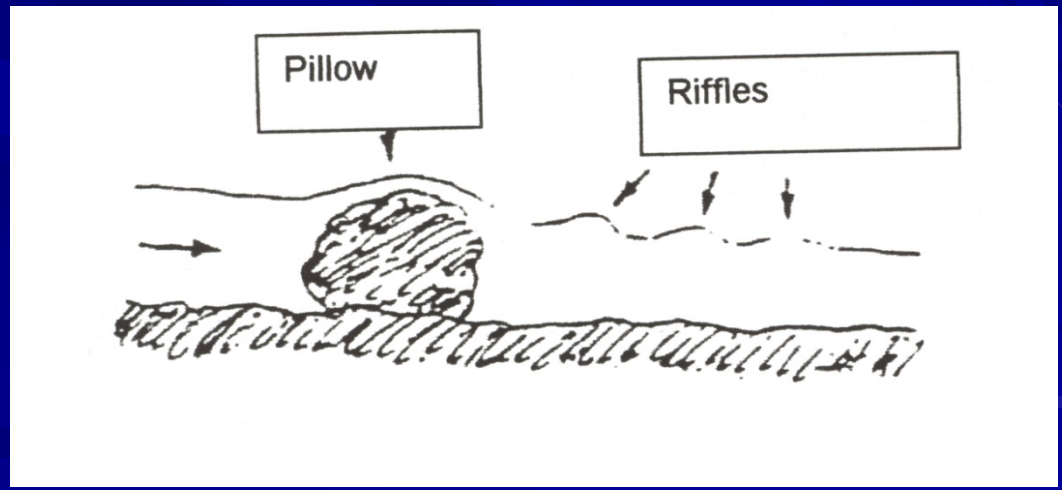


Obstacles - Pillow

- Simple eddy behind a rock.

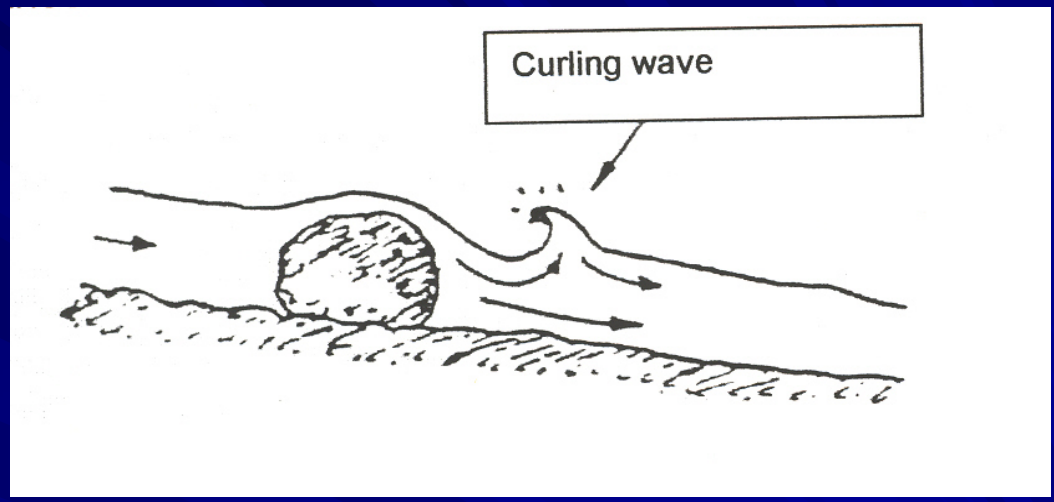


- Increased water flow, water pours over rock, becomes a “pillow”.
- Smooth flowing over rock, shallow.

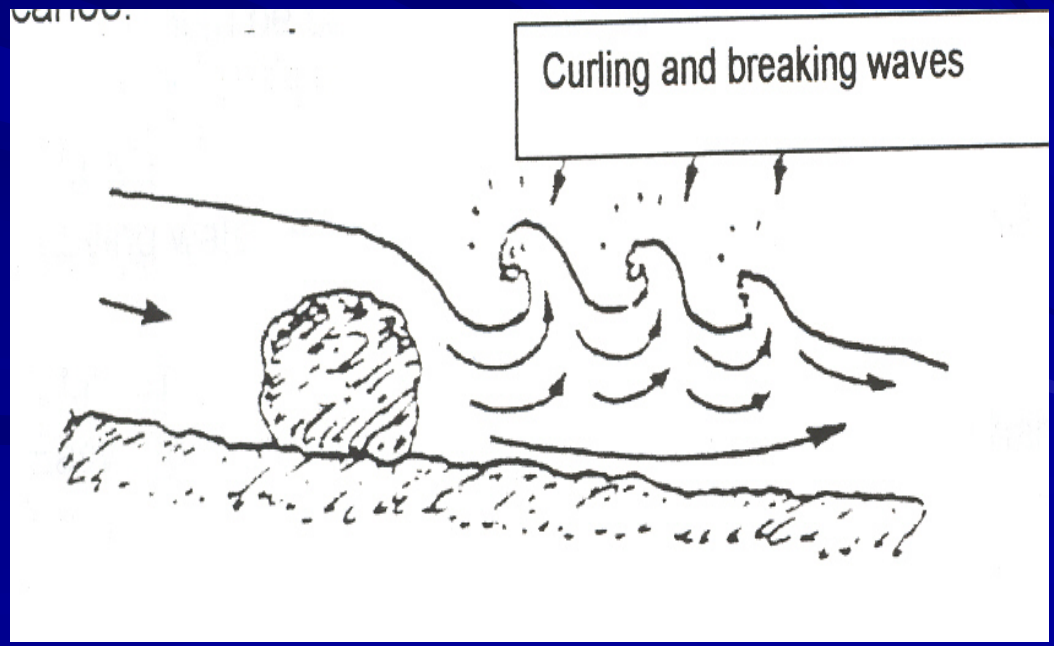


Obstacles - Pour Over

- Water flow increases, riffles become “curling waves”, have white foaming tops.

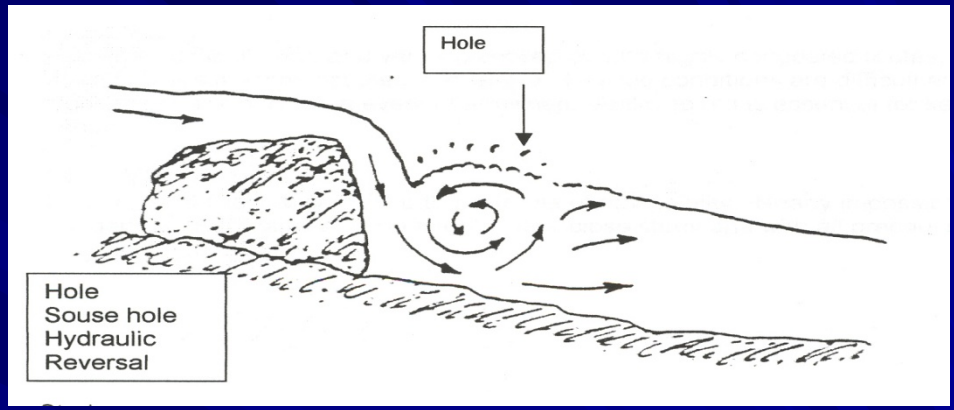


- Further increase in volume and velocity, larger waves, continuously breaking, upstream direction.



Obstacles - Holes and Ledges

- Holes: flow continues to increase, curling waves create circulating water.
- Can be dangerous. More on these later.



- Ledges: long structure extending over part of river, drops upwards from 2-3 inches, to the extreme of a water fall.
- Recognized by straight line of foaming water.

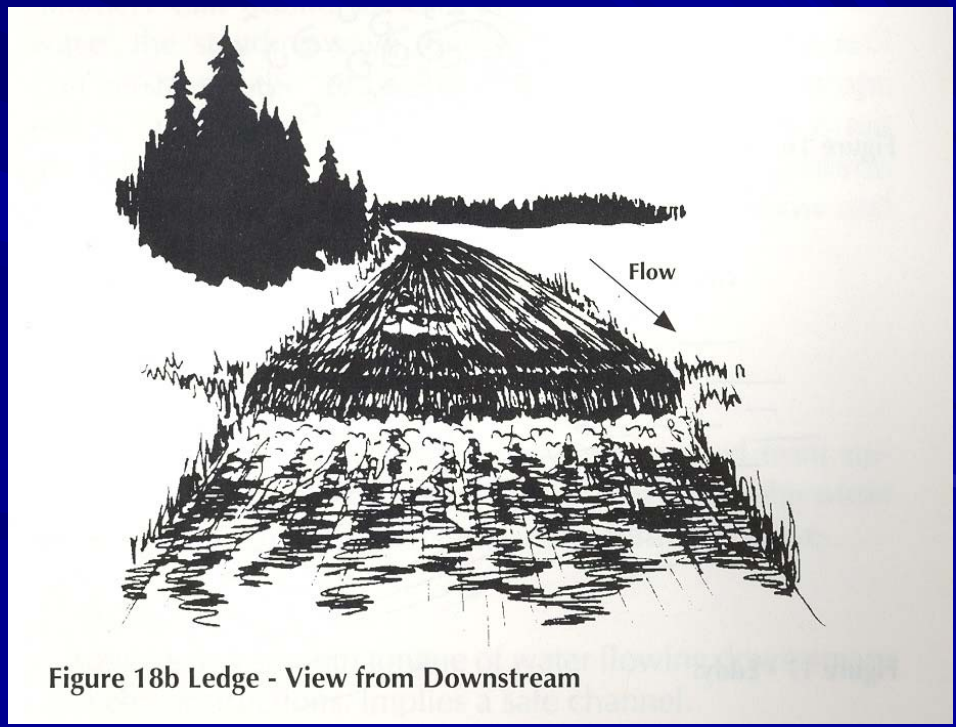


Figure 18b Ledge - View from Downstream

Smiling and Frowning Holes

- Frowning holes – tend to keep floating objects in centre.
- Smiling holes – easily wash out the sides.
- Man-made objects particularly dangerous. E.g. Low head dam
- Size of backwash: 2’ easy flush out, 4’ and you are stuck.

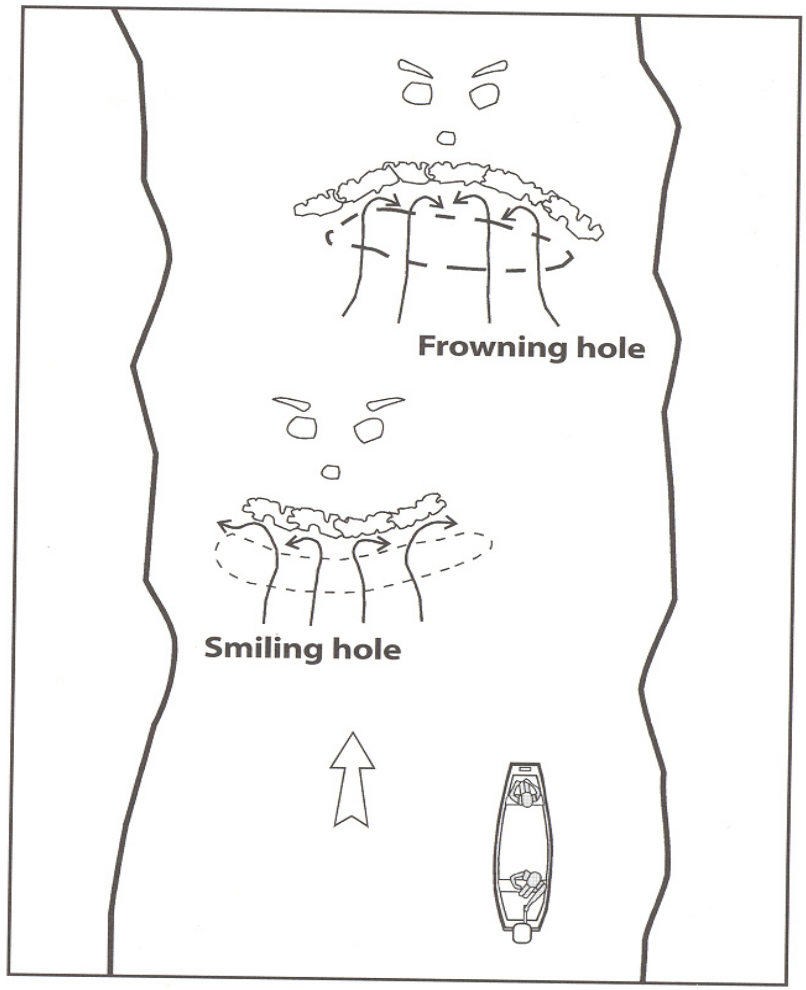
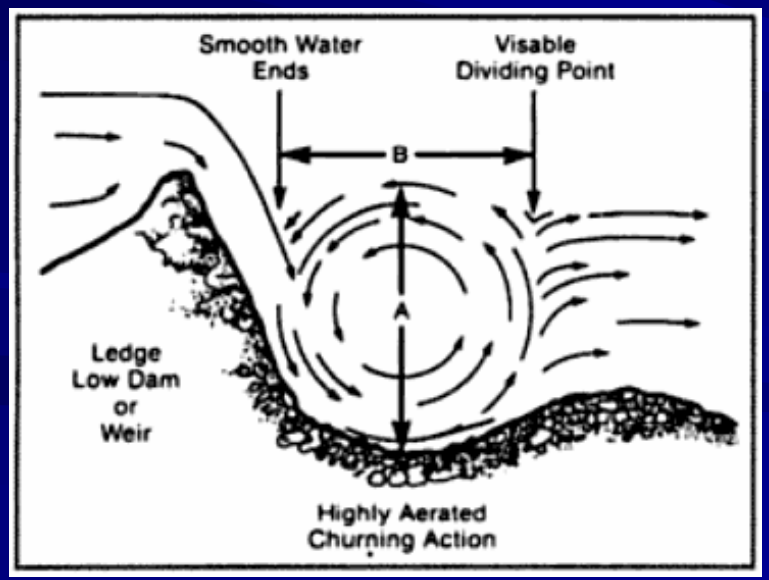


Fig. 2.10 Water flows out of the ends of a smiling hole, making escape easier. Water flows back into a frowning hole, making escape more difficult.

Dangers - Big Holes

- Water pouring over edge re-circulates, holds objects.
- Try to swim out.
- Try changing body position. Tuck up, spread out
- Remain calm.
- Swim towards the edges.
- In last desperation, remove your PFD.



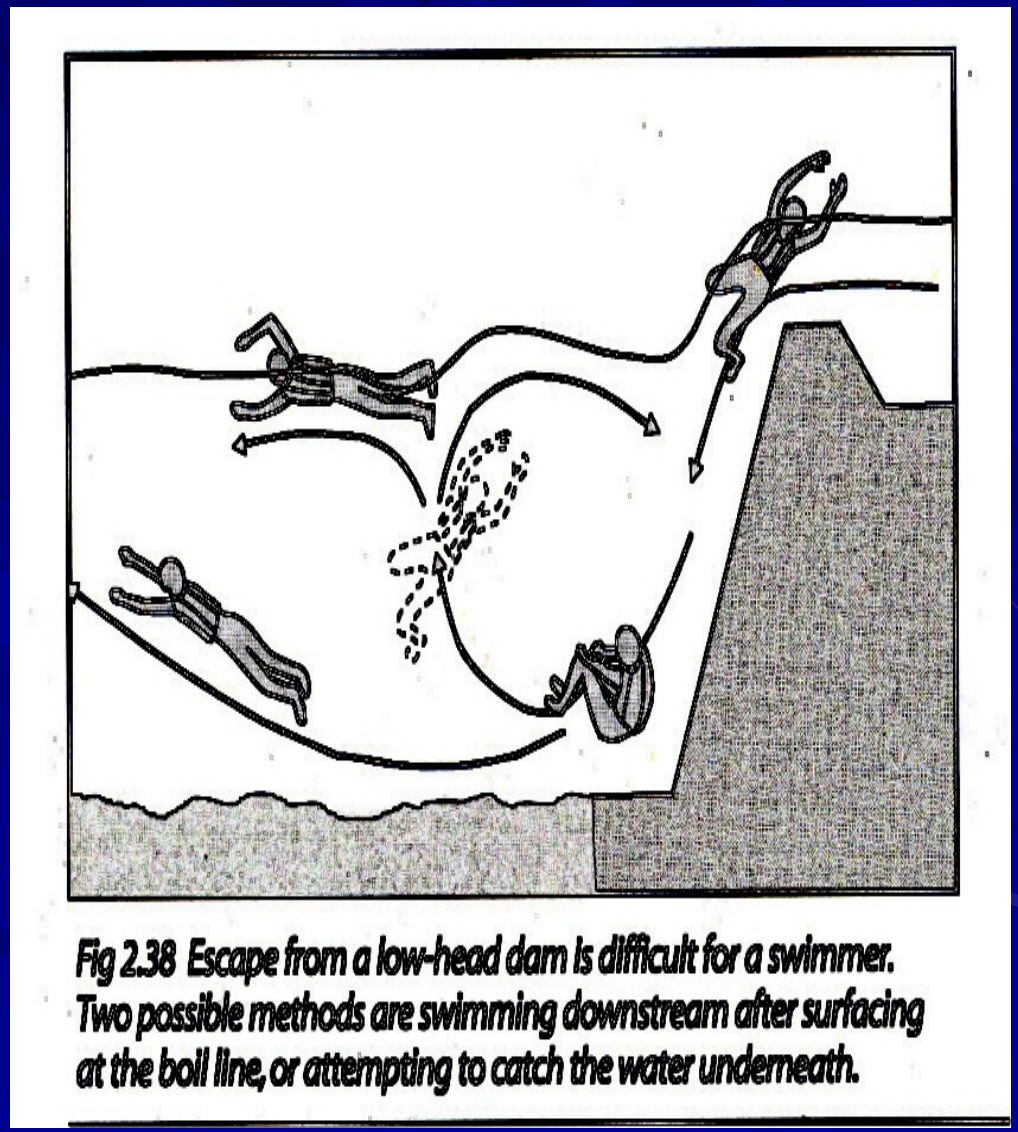
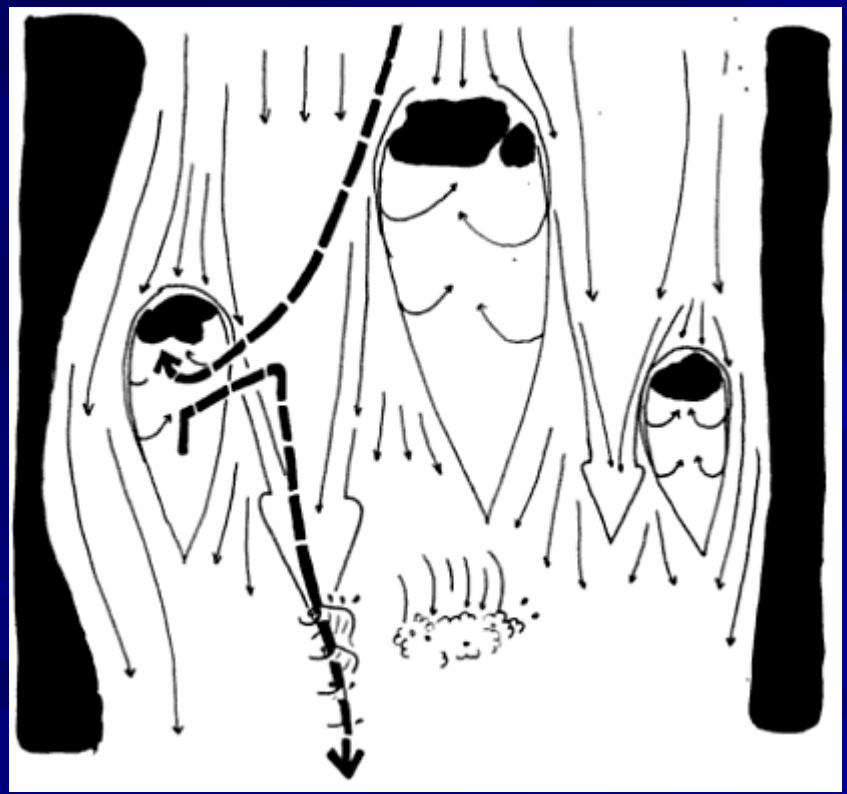


Fig 2.38 Escape from a low-head dam is difficult for a swimmer. Two possible methods are swimming downstream after surfacing at the boil line, or attempting to catch the water underneath.

Good Features - Eddies

- Play the river by eddy hopping, pause to scout/relax.
- Skill testing on how many eddies can be hit on a given stretch of river.



Good Features - Downstream V

- Downstream “V”s show deep water channel between obstacles
  - Dark water tongue
- Often standing waves at the bottom.

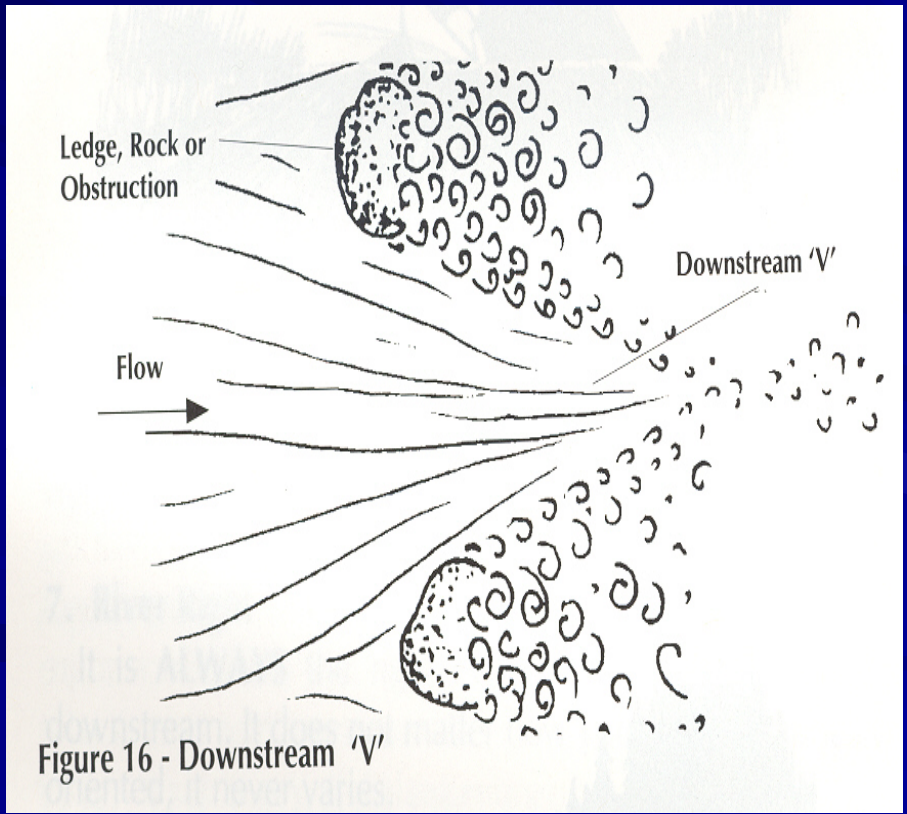
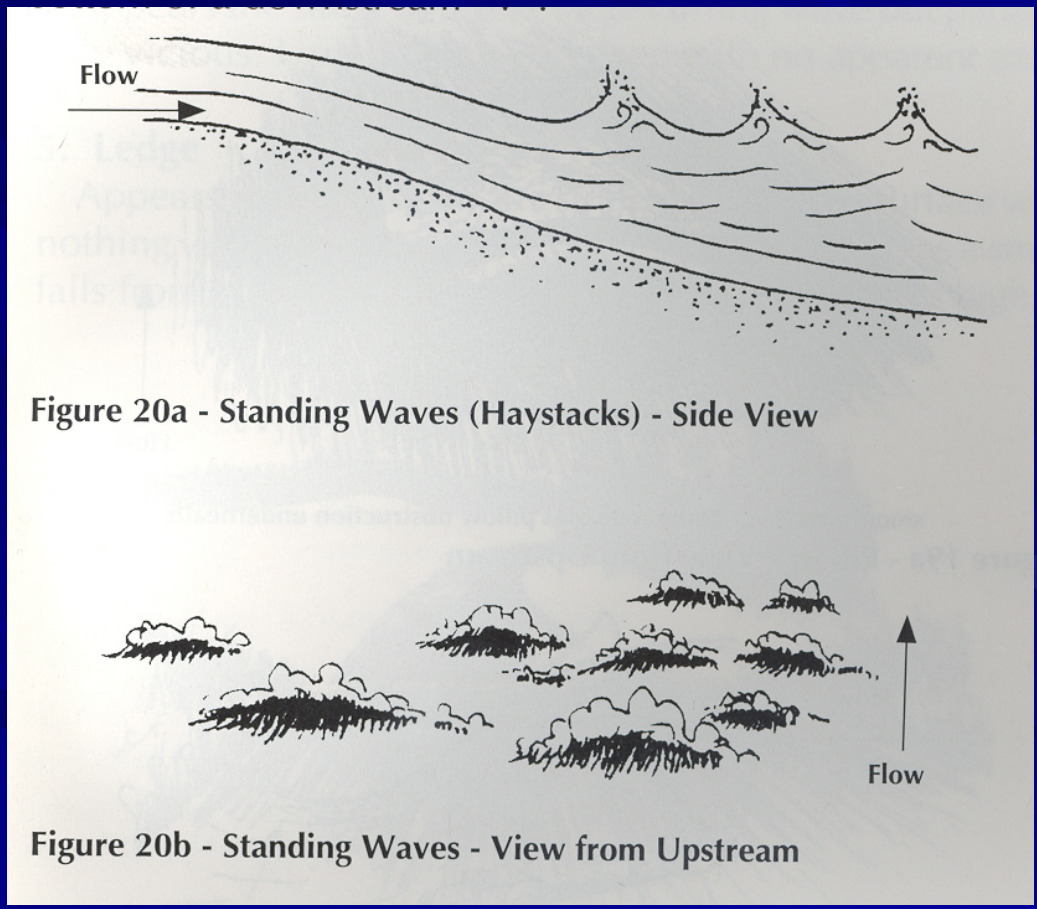


Figure 16 - Downstream 'V'

Haystacks or Standing Waves

- Waves “bouncing” in regular pattern, deep and slow moving water, often at bottom of V’s.

- Fun to canoe through, but large ones can swamp the canoe.



Risks

- Rivers are Powerful, Persistent, and Predictable.
- Hypothermia.
  - You spend a lot of time wet and in the water.
- Drowning.
  - Holes, entrapment, incapacitation.
- Repetitive Strain.
  - Blisters.
  - Old fashioned high brace can dislocate the shoulder.
  - Keep elbow tight in against chest to protect shoulder in case your paddle hits a rock getting into an eddy.
- Albedo effect.
  - Sunlight reflecting off the water.
  - Feels like sand in the eyes.
  - Same as snow blindness in the winter.
- Surfers ear.
  - Putting ear continuously in cold water.
- Waterborne pathogens.
  - Weil's disease, Giardia, Cryptosporidium.
- Trauma.
  - River structures, boats, other paddlers.
- Rashes from wetsuits.

Dangers - Strainers

- Allows water to pass through, but not objects.
- Fallen trees, wire fences etc.
- Something the water will get through but a person will not.
- Tree with branches sticking into water (fangs of death), fence, shopping cart.
- Very deadly; once caught you will not be able to lift yourself up.
- Avoid or swim aggressively and launch yourself up and onto (or over) the object.

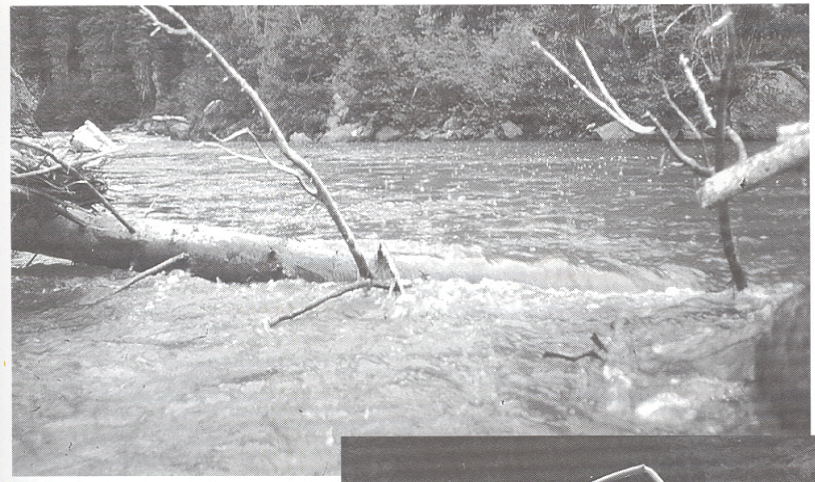


Fig. 2.11 A natural strainer – a tree down in the river's main current.

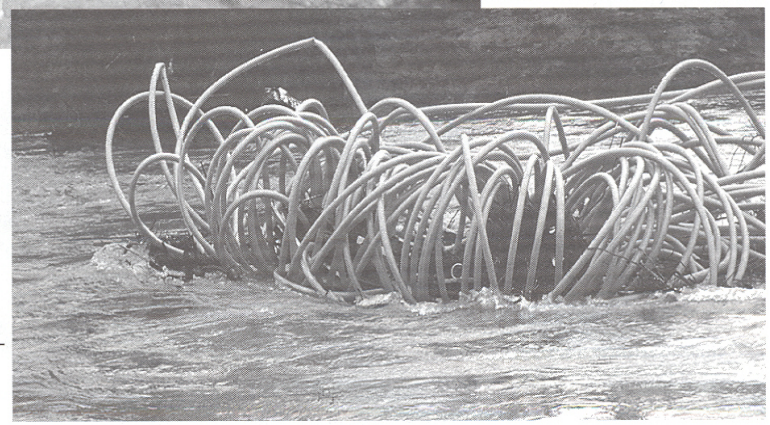


Fig. 2.12 An artificial strainer – fiber optic cable washed into the river.

Dangers - Sweepers

- Tree across river that would knock you out of your canoe.

Dangers - Foot Entrapment

- Foot becomes wedged between rocks
- Force of water knocks swimmer over; prevents them from getting up.
- Water is unrelenting. You will eventually be forced over into the water.
- Never stand up in moving water more than knee deep. Preferably in an eddy.

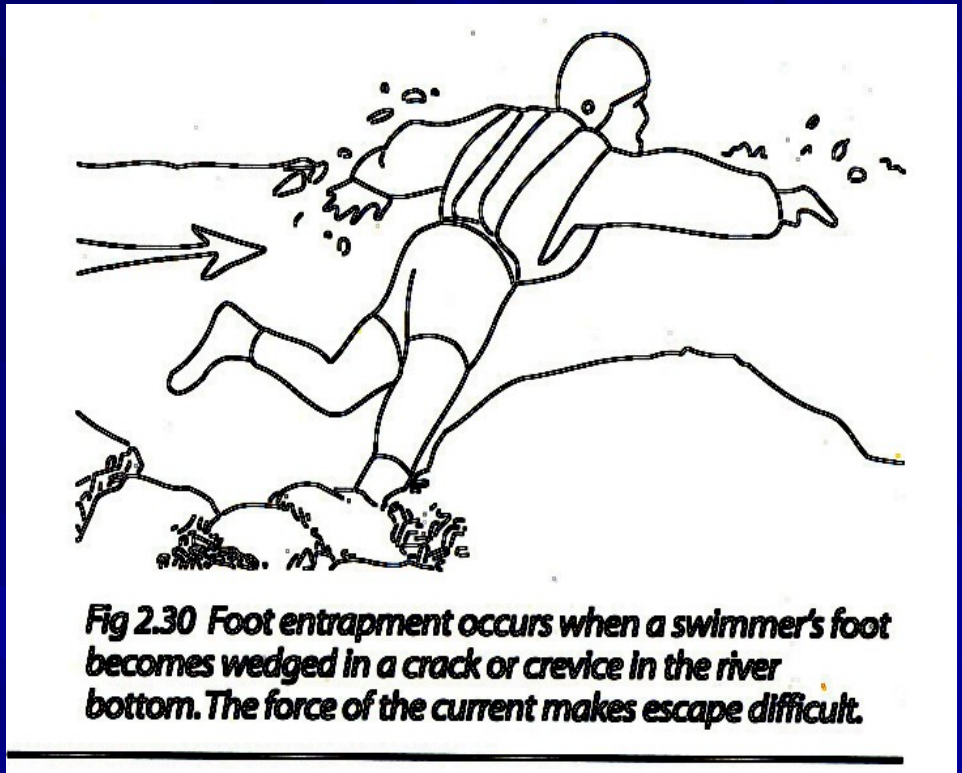
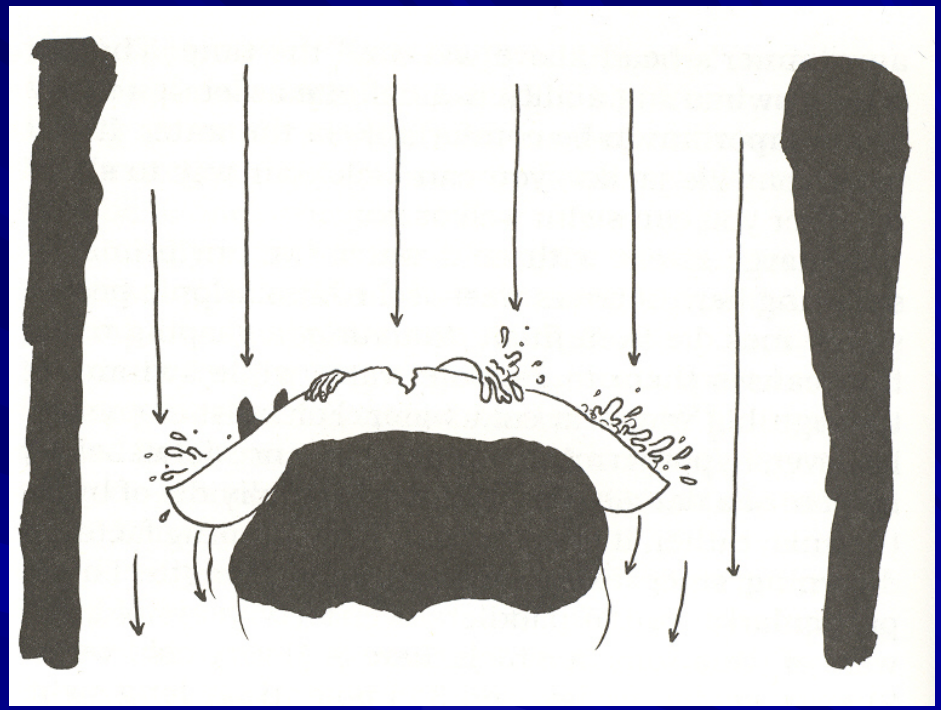


Fig 2.30 Foot entrapment occurs when a swimmer's foot becomes wedged in a crack or crevice in the river bottom. The force of the current makes escape difficult.

Don't walk in moving water that is more than knee deep!

Dangers - Canoe Wraps/Pins

- Canoe full of water is equivalent to a small truck.
- Can be crushed by pressure of water.
- Caught in a capsized canoe.
  - Minimize items that could get caught.
  - Carry rescue knife to cut yourself free



When swimming rapids, stay well to the side of the canoe!

Proper Swimming Technique

- Feet up and downstream; to fend off rocks.
- Bum up; otherwise more likely to hit rocks. It hurts!
- Scull with your hands.
- Hold on to your paddle.
- Head for an eddy.
- Direct yourself by angling your body; the current will push you across the river (like ferrying).
- Once past the rocks, turn on to your front and aggressively swim to the shore.
- Know before entering a rapid which side you will swim towards if you dump.
- Don't stand up until the water is less than knee deep. Preferably in an eddy. Swim until too shallow to swim.
- Ball up if going over a sheer drop of several feet or more.
- Barrel roll across eddy line.
- Grab a rock.
- Aggressive swim over a strainer.

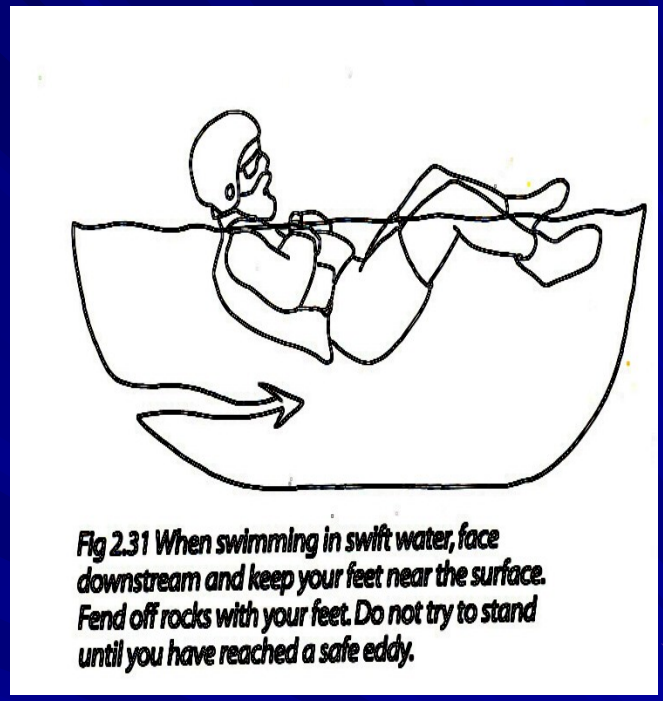


Fig 2.31 When swimming in swift water, face downstream and keep your feet near the surface. Fend off rocks with your feet. Do not try to stand until you have reached a safe eddy.

Throw Bag Swimming

- Stay in the “swimming” position.
- Hold rope to your chest.
- Rope over the shoulder AWAY from the shore.
- Throwing a rope:
  - Throw over the person in the water; don’t throw to them.
  - Don’t pull in, just hold on and let the person pendulum to shore.
  - Be aware you are not moving them into a more dangerous position (i.e. into a strainer).
  - Be prepared for the force exerted when the rope goes taut.

Fig 2.34 After grabbing a throw rope, roll over on your back and hold it against your chest.

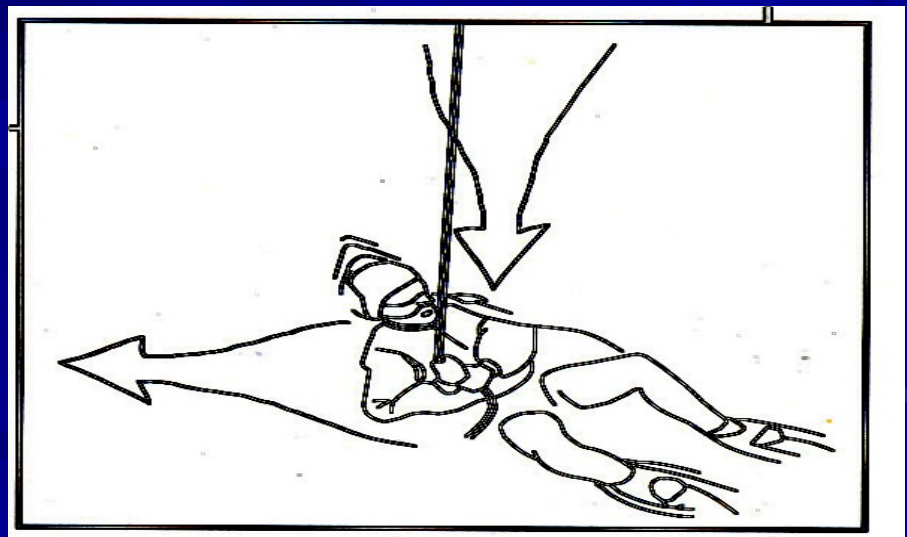


Fig 2.35 When holding a throw rope, angle your body toward shore. Hold the rope over the shoulder opposite shore.

Personal Equipment - PFD

Personal Floatation Device

- Correct size.
- Always wear when within 10’ of the water and when scouting rapids
- When wearing, it must always be fastened correctly.
  - So you never accidentally go canoeing without it fastened.
- Buckles across chest are recommended so it doesn’t rip off in a rescue.
- Fasten tightly.
- If there is a waist strap, cinch it tightly to prevent billowing.
- Whistle is mandatory. E.g. Fox 40
- Knife is recommended.
  - For cutting yourself loose if you get tangled on a dump.
  - Don’t use the knife for anything else so it stays sharp.
- Covers over straps and knife; the cleaner the better to prevent snags.

Personal Equipment - Other

- Helmet
  - Correct size.
  - Always wear when within 10’ of the water and when scouting rapids.
  - When wearing, it must always be fastened correctly.
    - So you never accidentally go canoeing without it fastened.
  - Must be designed for water sports (i.e. not a bicycle helmet).
- Paddle
  - Length is floor to armpit.
  - Plastic/aluminum is required. Wooden paddles break too easily.
  - Should be carried when scouting rapids for extra support.
- Water bottle
  - One for water, one for trail mix.
  - Fasten with carabineer to canoe.

Clothing

- March/April
  - Dry suit with fleece underneath.
  - Neoprene hat and gloves.
- May/June
  - Wet suit recommended.
    - Without arms is preferable, otherwise irritation from paddling can occur.
    - Highly recommended for kayakers as they spend more time in the water; optional for canoers.
- Fabrics
  - Cotton is bad; it takes too long to dry.
  - Polypropylene or other quick drying fabrics are recommended.
- Footwear
  - Must be worn.
  - Options:
    - Neoprene booties.
    - Water shoes.
    - Sneakers.
  - Sandals are not permitted; no toe protection and can get caught.
  - Large shoes (e.g. Keene water shoes) will generally not fit in kayaks.
- Gloves
  - Bicycle gloves work well, as do Mechanix gloves.
  - Neoprene.
- Paddling jacket
  - Keeps the wind and spray off.
- Covering arms and legs is recommended to reduce chance of abrasions from rocks.
- Secure eye glasses with a strap to prevent loss.

Canoe Equipment

- Throw bag
  - Minimum 15m (50') buoyant line required by law; 21m (70') recommended.
- Spare paddle
  - Required by law.
- Bailer
  - Required by law.
- Floatation
  - Bow and stern floatation bags.
  - Keeps canoe above water on dumps.
  - Makes canoe over canoe rescue much easier.

- Grab Loops
  - Grab loops or a painter required by law.
  - Painters not permitted in whitewater due to possibility of entanglement.
- Course Exceptions
  - During the courses, due to the number of instructors present for rescues, spare paddles, bailers, and throw bags are not carried in the canoes. They are just extra items to deal with on dumps.

Procedures & Signals

- Paddle.
  - Horizontal = Stop (answer with same signal).
  - Vertical = Come (answer with same signal).
  - Diagonal = Pointing blade in direction to go (don't answer).
- Whistle.
  - One blast = pay attention.
  - Three blasts = Get out of the way.
    - Get close to shore if possible.
    - Stay safe.
    - Wait until told to come.
  - Don't answer.
- Hand.
  - Same as paddle signals.
  - Hand tapping on head = Asking if OK; respond with the same.
    - If dumped, tap yourself on the head as soon as you surface to show you are OK (if you are).

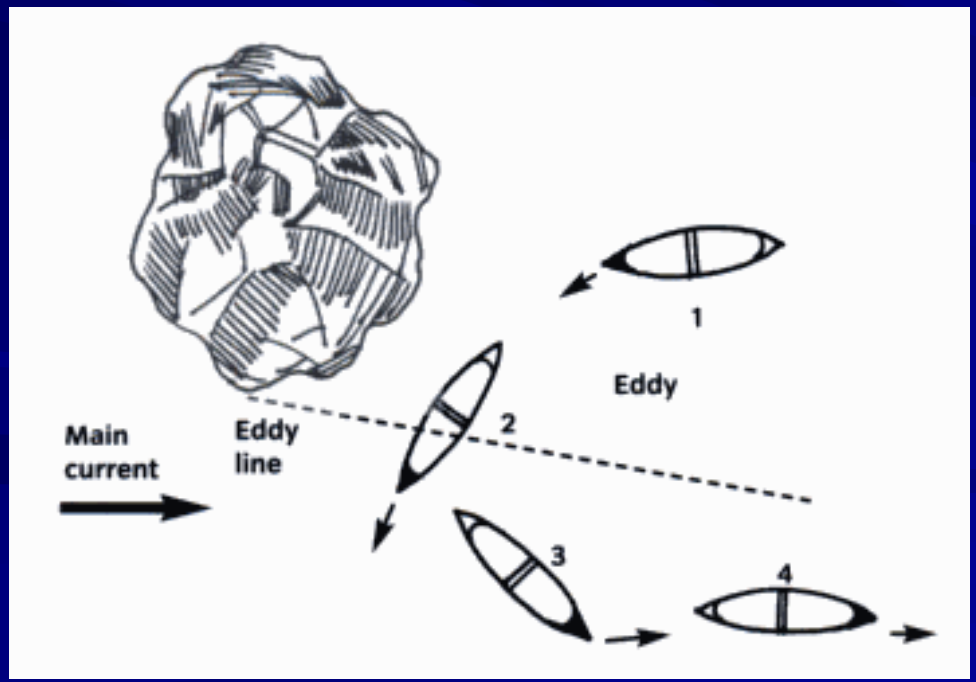
Always point in the direction to go!

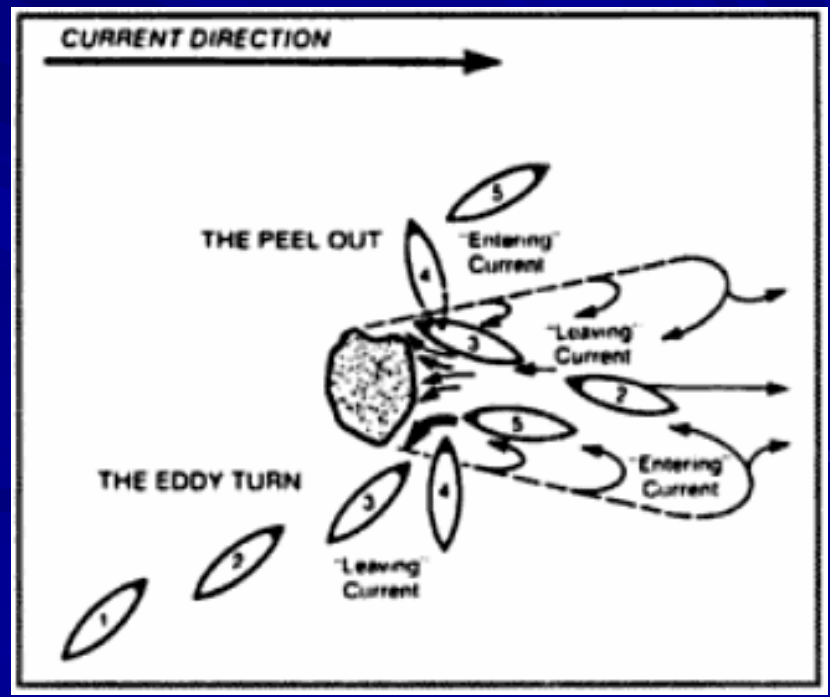
Paddling

- Keep your bottom hand above the gunwale, otherwise it will be crushed between the canoe and the rocks.
- River J stroke.
  - Don’t twist the paddle at the bottom of the stroke, but push directly outwards.
  - Less efficient than the regular J stroke, but more powerful.
- Bow and stern positions paddle on opposite sides of the canoe.
- Bow position is much more important than in flat water.
  - Bow cut and cross-cut strokes.
- Other important strokes.
  - Draws and prys.
  - Low brace.
- Always enter the current with the bow pointing upstream.

Eddy Turn & Peelout

- Power, Angle, Tilt.
  - Strong strokes.
  - Angle of about 45 degrees to the current.
  - Tilt the canoe into the turn (like a bicycle).
    - Upstream when entering an eddy.
    - Downstream when leaving an eddy.





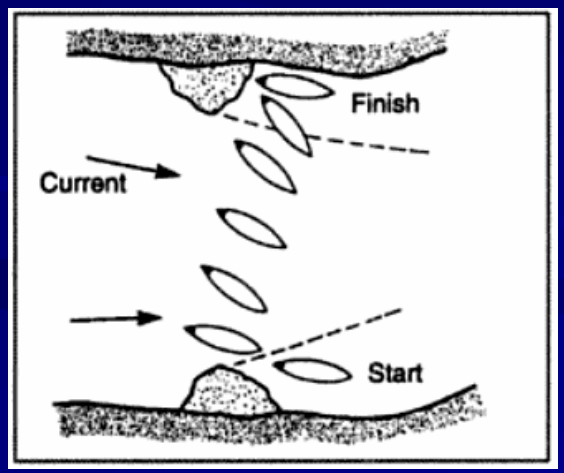
Eddy Turn & Peel Out

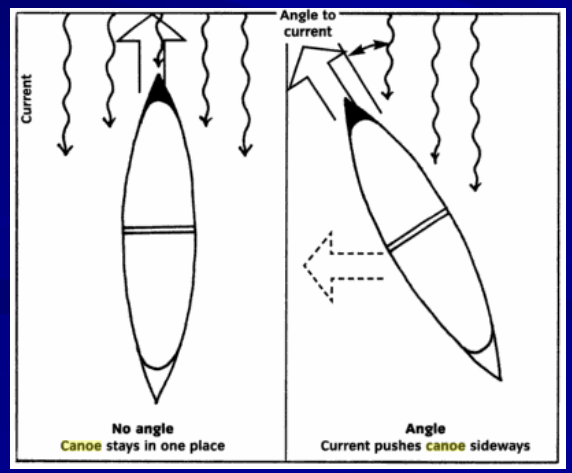
Eddy Turn

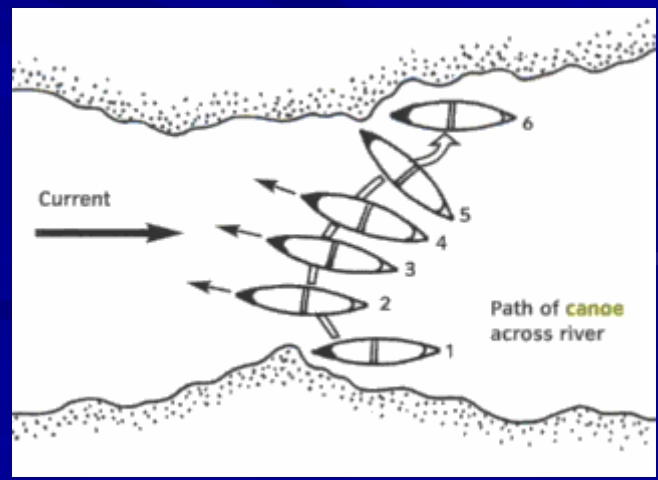
Eddy Peel Out

Ferrying

- Used to cross the river or move from one eddy to another.
- The angle of attack determines the speed at which you will cross the river.
  - Too much angle and the canoe will be turned downstream.
- Back Ferrying
  - Same as forward ferrying, except canoe points downstream, and you paddle backwards.
  - Used to move across river to line up with a downstream “V” and for holding position while boat scouting.







The End!

Have Fun!

Be Safe!