Cold water immersion guidance
Avoid becoming a casualty

Rowing is a sport that normally takes place *on the water* rather than in the water! However you can end up in the water;

When can immersion occur?

Immersion can occur during rowing; when learning to scull,

- a boat capsizes,
- someone catches a crab,
- collisions occur between boats or with objects,
- a boat is swamped,
- a participant or coach falls into the water; from a boat, a launch or a landing stage.

In an appropriately managed environment, where the risks have been appropriately assessed and managed, capsize and immersion can represent an acceptable level of risk, and in some circumstances can even be fun.

Everyone involved in rowing should be aware that; Cold water can kill!

Sudden, unexpected immersion in cold water below 15°C is potentially dangerous. The coastal and inland waters of the UK remain cold all year round and a peak of drowning deaths often occurs in the summer, as the hot weather tempts people into the cold water. The effects of the cold water mean that even healthy individuals, who are good swimmers, can still drown within a short period of time, often only a few feet from the shore.

Adopt the 'One minute - One degree rule' to help you plan any rescue time to be within the same number of minutes as the water temperature in degrees C.

For example if the water temperature is 10°C then you can assume you will have 10 minutes of time to usefully get yourself out of the water.

When assessing risk before going out on the water then this should be a consideration in planning your route and planning to have suitable rescue at hand.

Clubs need to carry out a risk assessment for activities carried out in cold weather conditions and there should be an emergency action plan that all members should understand. All participants should be trained in the correct action to carry out in the event of swamping, capsize and immersion.

Why is cold water such a risk?

Cold water affects your breathing and circulation and these pose a risk, even before hypothermia from immersion develops.

The cold shock response.

(Maximum risk 0-5 minutes)

If you fall into cold water, you will immediately start gasping and will hyperventilate by 4-5 times your breathing at rest. This increases the possibility that you will breathe in water and may mean that you can't hold your breath. If there are waves too, you are more likely to inhale water as you won't be able to co-ordinate your breathing with the peaks and troughs.

Cardiac irregularities or cardiac arrest can occur as your heart rate increases rapidly and the blood flow in your skin shuts down, diverting your blood to your central circulation and causing a sudden spike your blood pressure.

If you fall in the water, keep your nose and mouth clear of the water and face away from the waves.

In these first few minutes the main priority is to stay calm! Don't panic! It is important to know that your breathing and heart rate will decrease after the first minutes in the water. Know that the gasping and hyperventilation will pass!

The main aim initially is to stay afloat. Upon falling in, try to keep a hold on the boat to keep you afloat as you deal with the cold shock. It is important to know what the effects of the cold can be, so that should you fall in, you know what to expect

Reducing the risk from cold shock

- **Consider the use of automatic lifejacket.** If the water is very cold this may be the only factor that saves the person
- **Avoid submersion;** If possible, try to keep your head and face out of the water when you fall in, and face away from the waves
- **Remain calm,** as your breathing and heart rate will decrease after the first minutes in the water.
- **Practice capsize and immersion training in a warm pool**

Dry-drowning.

(Maximum risk immediately to any time after immersion)

As you fall in and when you are in the water, cold water hitting your throat can cause it to spasm and stop water, but also air! getting into your lungs. This shock to your throat causes "dry-drowning" where casualties are found to have no water in their lungs. When falling in, keep your mouth closed and pinch your nose shut if you can, avoid jumping feet first into water as this will cause the water to shoot up your nose and hit your throat. When in the water, keep your back to the waves to help stop the water going into your mouth and nose.

Cold incapacitation and swim failure.
(Risk increases with time in the water)

Once you are over the initial shock you are likely to be feeling cold, wet, and dazed. The next risk from being immersed is cold incapacitation which can lead to swim failure. Water has about 25 times the thermal conductivity of air and so is much more effective at removing body heat.

The use of your hands arms and legs will be affected, making it difficult to swim, grip a throwline, climb a ladder, hold onto a boat, or climb into a rescue boat to safety. You may eventually not be able to hold onto the boat causing you to lose your grip and drown.

If swimming, it doesn't matter how good a swimmer you are, the cold leads to rapid heat loss in your limbs, cooling your muscles, shutting down your circulation and slowing your nerve impulses. Your cold-affected limbs will cause you to adopt a more upright swimming posture, drastically slowing your forward progress.

The risk of cold incapacitation and swim failure increases with the time you are immersed in the water. Once you have dealt with the cold shock the priority is to **get as much of your body out of the water as quickly as possible, (preferably all of it!)** before your dexterity and muscles are affected.

Don't waste time trying to right the boat. The quickest way to do this is to lie across the upturned hull of the boat. Use the boat as your life raft!

This should at least get your torso out of the cooling water and reduce heat loss

In an accidental capsize of a single, double/pair, buoyant four or eight, where you would normally remain out of the water when swamped, you should be able to get onto the hull to support you. If you have entered the water because your boat has swamped and has insufficient buoyancy to support the crew, it won't be much use as a life raft to keep the torsos out of the water.

Reducing the risk of swim failure

- **Consider wearing an automatically inflating lifejacket.** If the water is very cold this may be the factor to save you. G-Tech make one suitable lifejackets for sculling and rowing
- **Remain with the boat.** It will help to keep you afloat or act as a life raft.
- **Try and get as much of your body as possible out of the water;** either by re-entering the boat, or lying across the upturned hull and deck
- **Get as much of your body out of the water as quickly as possible** before your grip is affected

LOOK AFTER OTHERS in your crew

Smaller, leaner, lighter individuals, e.g. children, or lightweight rowers will lose heat more rapidly than larger rowers, and in a group in the water, particular attention should be given to the lean individuals, to help them get as much of their body out of the water as quickly as possible.

If you can't get out of the water then turn your mouth and nose away from the waves. Hold onto the boat or any object that floats. If there is nothing to hold onto then remain as still as possible to try and conserve heat.

Because of cold incapacitation leading to swim failure, swimming to safety should only be considered as a last resort. Unless rescue is immediately to hand, i.e. within a throwlines reach, or there is another immediate danger, such as being swept over a weir, stay with the boat, it is your life raft, until rescue arrives and can be more easily spotted than a head in the water.

Immersion Hypothermia

Maximum risk from approx 15+ minutes (depending on factors such as insulation and water temp) (risk increases with time immersed)

Hopefully you will have reached safety on the bank/shore or been rescued. If you remain in the water you will continue to cool rapidly, and your core temperature may drop to the level at which hypothermia begins to set in.

If, for whatever reason, you find yourself in the water for a long time, you should avoid unnecessary movement, as any heat you generate will just be lost to the cooling water. Wet clothing is poor insulation and heat lost from moving your arms and legs in the water will far outstrip heat production.

It may seem obvious, but PFDs help you float!

If you took the precaution of wearing a personal flotation device (PFD) (a lifejacket or a buoyancy aid) then this will help you to float and conserve valuable energy and heat. If not, you will have to waste energy and heat treading water. A lifejacket will support your head to keep it clear of the water even if unconscious, whereas a buoyancy aid just helps you to float.

HELP yourself

If you cannot be rescued and remain immersed in the water, adopt the heat exchange lessening posture (HELP) posture if you can, (basically the foetal position), in which the arms are pressed against the chest, with the elbows close to the side of your body, the legs are pressed together and the knees drawn up. This will be a lot easier to adopt if you are wearing a PFD. If immersed in a group you should huddle together for support and for some thermal insulation. If you can't huddle together in a group then you should try to link together and individually adopt the HELP posture.

Even when you are rescued, you will be wet and cold, so hypothermia is still a risk! Your core temperature will continue to fall on dry land, your hypothermia may get worse before it gets better.

Circum-rescue collapse after immersion (during rescue or in the hours afterwards)

The last stage of risk from immersion occurs during rescue or in the hours afterwards. A drop in blood pressure upon rescue can cause you to collapse and lead to heart failure. Any water that has been inhaled can cause damage to your lungs.
It is vital, therefore, that individuals who have been immersed are watched closely, well after they have been rescued, and medical help is sought if water has been swallowed or hypothermia or other consequences are suspected.
Where possible, when rescuing individuals, lift the individuals out of the water in a horizontal position and keep them in that position and as still as possible to reduce the chances of heart failure, due to the drop in blood pressure that can occur.

Care in rescuing individuals from the water

Rough handling in rescue is dangerous, handle individuals carefully, lift them out horizontally if possible and then wrap them in extra layers of clothing to reduce further heat loss
Shield rescued individuals from the cooling effects of the wind, e.g. if travelling in a speeding launch

Medical Attention!

Hypothermia can present a substantial risk to life and expert medical attention is important in the treatment of moderate or severe hypothermia In these cases an ambulance must be called to transport the victim to hospital as quickly as possible.

Safe practice in cold weather

- Adopt the ‘One minute – One Degree Rule’
- Go sculling with a buddy
- Wear a buoyancy aid or lifejacket in cold weather, particularly if you have chosen to scull alone. PFDs help you float and conserve energy=heat.
- Stay nearer safety. Keep the furthest point of your outing closer to safety, do laps in a safe area rather than a long out and back row. Wider bodies of water, large rivers, lakes and the sea can place you further from safety, and increase rescue times, seek shelter and safety nearer the shore if water conditions deteriorate and your boat starts taking on water.
- Land at a safe point if your shell starts to take on water. In cold conditions it is better to be out of your boat on the bank or shore, than out of your boat in the water, know the area around where you row so you know where to shelter and seek help in an emergency

Summary; What should you do if you end up in the water?

1. **STAY AFLOAT. Avoid submersion of your head and face;**

2. **STAY CALM. Know that the effects of cold shock will pass.**

3. **STAY WITH THE BOAT. If rescue is likely, stay with the boat.**

4. **GET OUT OF THE WATER. Get yourself or as much of your body as possible out of the water as quickly as possible.**

5. **STRADDLE AND PADDLE if on a single**
   - In a single scull, if there is no-one to rescue you, or if other dangers are present then with your torso over the upturned hull, paddle the boat with your arms to the nearest point of safety.
6. **DON'T SWIM**
   - Unless rescue is immediately to hand or other danger is imminent, don't swim
   - Cold water can impair your swimming ability no matter how good a swimmer you are in a warm pool. Tests of Olympic swimmers showed that cold water severely affected even *their* ability to swim. Do not make the decision to swim even a relatively short distance in cold water, you may not make it!
   - When in the water you may underestimate the distance that you do have to swim.
7. **If you are separated from your boat or remain immersed away from the shore. H.E.L.P yourself!**
   - If you have something that floats then hold onto it.
   - Adopt the heat exchange lessening posture (HELP) posture if you can, this will be easier if wearing a PFD. If in a group huddle together or link together and adopt the help posture. Keep facing your nose and mouth away from the oncoming waves.
   - Remain as still as possible to conserve heat, treading water and swimming will increase heat loss.

Before getting on the water; (participants, coxes and coaches)

Develop your swimming ability	Make sure that you are confident and competent in the water by practising your swimming and capsize and immersion drill
Decide whether you should wear a personal flotation device (buoyancy aid or lifejacket)	Remember lifejackets are designed to keep an unconscious or injured person's airway out of the water whilst buoyancy aids are designed to support a conscious person who can swim. They should be restricted to use only where rescue is close at hand. If combinations of factors, e.g. level of experience of the participant, boat type, poor weather conditions, cold water, mean that the risk of unexpected immersion and /or the risk from immersion are increased, wear an appropriate personal flotation device.
Do you have a medical condition?	If you have a long-term medical condition, which under the advice from your doctor does not prevent you from participating, the wearing a lifejacket may be appropriate, particularly where swimming ability is restricted or there is a history of collapse.
Practice rescue procedures in a safe environment, including self-rescue	Practice a capsize drill in a single scull Practice lying on the deck/upturned hull of the boat Practice re-entry into a single
Assess the current environmental conditions and the weather forecast;	Are changes in conditions predicted? For example, consider the wind, stream, waves, tides, rain, etc. Check the water temperature, consider wind chill
Know the local water	What are the local circulation rules? What hazards are present? Know where you can/can't get out easily, emergency ambulance rendezvous points, how to summon assistance etc. Seek advice and study maps of the water before going on unfamiliar water
Carry out an equipment check before getting on the water;	Is the equipment suitable and in good working order? Ensure that the buoyancy of the boat(s) is sufficient Ensure that buoyancy chambers are secure and watertight Is your choice of boat suitable for the conditions and your level of experience? e.g. its stability and suitability for the weight of the crew
Wear the right clothing	In cold/wet conditions or when on cold water, wear layers of warm/waterproof clothing to keep warm when on the water, and to stay warm if immersion occurs Wear a hat to reduce heat loss from the head in cold weather; the head has a rich blood supply and poor insulation and heat loss from the head can be significant
Make the right equipment choice	If combinations of factors, e.g. level of experience of the participant, boat type, poor weather conditions, cold water, mean that the risk of unexpected immersion and /or the risk from immersion are increased, wear an appropriate personal flotation device i.e. a buoyancy aid or a lifejacket.
Know how to steer and stop the boat in an emergency	To avoid collisions, learn how to do an emergency stop and practice it
Plan your session	Where are you going? In which direction? Are there any hazards about should you fall in? How far are you going? How long will you be?
Let someone know your plans	Do people know where you are going and how long you will be? Fill in the outing register to provide details of your planned outing Tell someone
Don't go out alone; Check that help is at hand.	Are there other individuals about who could assist you in the event of an emergency? If you are going out in a boat, check that help is at hand; are there other people about who could assist if you got into difficulties?
Plan what you will do in the event of emergency, should immersion occur	What would you do in the event of capsize/immersion ? What are the safety procedures in your club and on your local stretch of water? How will you summon assistance; do you have a charged mobile phone with a signal in a suitable water-proof container? (an empty water bottle can be used!)
Are you fit to row/coach?	Don't go out on the water if you are ill or under the influence of alcohol or drugs. This could increase the likelihood of immersion and reduce your abilities during any rescue.

A case study

Cold water immersion can cause death by cold incapacitation and drowning as well as by hypothermia.

On a winter evening an elite men's rowing eight and their cox started an outing at 16.00 when the air temperature was 6.7°C. during the outing, the wind caused a slight chop on the water, but then developed to a gale force with winds over 30km.h^{-1} with gusts up to 80km.h^{-1} Waves above 0.5m hit the boat and it swamped at 1710 about 1km from the boathouse. The lack of buoyancy of the boat meant that all of the crew entered the 4°C water and that the boat would not support them to raise their bodies out of the water onto the submerged hull.

It was 17.30 and dark before an inflatable rescue boat was launched, and searched the area where the rowers were expected to be. They were hampered by the poor visibility in the dark and the waves and found the crew at 18.00 after 50 minutes of immersion. During the time in the water, different rowers lost their hold on the boat and other rowers had to retrieve them. Just before rescue, one of the rowers lost hold of the boat and drowned. The effect of the cold meant that the remaining rowers could not assist the rescuers to help them into the boat, and 3 were close to unconsciousness.

The rowers then were subject to a 13 minute boat ride in cold wind and violent pitching to transport them to safety. On arrival at the boathouse, three rowers were in a serious condition as they were unconscious and not shivering, and were sent to hospital. Whilst two eventually recovered fully, one rower died despite sustained attempts to resuscitate and rewarm him.

Reference;
Giesbrecht, G.G. and Hayward, J.S. (2006). Problems and complications with cold-water rescue. *Wilderness and Environmental Medicine* **17**, 26-30.

What would you do in cold weather if?

Consider the following scenarios. Think about your rowing location, Imagine that you are one of the individuals involved, what would you do as a crew member, coach or club member if this incident happened where you row?

WHO	WHAT	WHERE
A junior Juniors A veteran Veterans A lightweight Lightweights	• Capsizes in a single • Capsizes a coxed four or quad • Swamps in an eight where the crew have to enter the water	• Within 1km of your boathouse • At the furthest point away from the boathouse that crews usually navigate • At the furthest point from the shore • At a location where it would be difficult to access the bank or get out of the water

IF IN DOUBT DON'T GO OUT