

# 2

## PERSONAL SAFETY

*The vessel turned yet the crew did not. Two twenty-year veterans flew gracefully out of the Zodiac and landed in the water. Their heads popped to surface and they established that they were unhurt.*

*“I thought I was holding on”*

*“Yeah,... you were holding on to me!”*

*When involved in search and rescue there is always a chance that something may go wrong and you may end up in the water regardless of your experience or your preparation. This chapter lays down the essentials to surviving the experience. If you take the time to wear the proper thermal protection and put the right gear in your pockets then you may be able to laugh about it later.*



# PERSONAL SAFETY

## CONTENTS

<b>2.0 Introduction</b> .....	35
<b>2.1 Flotation</b> .....	36
2.1.1 Life Jackets .....	37
2.1.2 Personal Flotation Devices (PFDs) .....	38
2.1.3 Anti-Exposure Work Suits .....	38
2.1.4 Abandonment immersion suits .....	39
<b>2.2 Insulation &amp; Thermal Protection</b> .....	39
2.2.1 Thermal Underwear .....	40
<b>2.3 Protection</b> .....	40
2.3.1 Drysuit .....	40
2.3.2 Helmets .....	40
2.3.3 Eye Protection .....	41
2.3.4 Gloves .....	41
2.3.5 Footwear .....	41
<b>2.4 Mobility</b> .....	41
<b>2.5 Visibility</b> .....	41
<b>2.6 Signalling for Distress</b> .....	41
2.6.1 Equipment Vest .....	41
<b>2.7 Additional gear</b> .....	43
2.7.1 Knife .....	43
2.7.2 Pocket Mask, Rubber Gloves and Eye Wear .....	43
2.7.3 Gear Bag .....	43
<b>2.8 Maintenance &amp; Cleaning</b> .....	44
2.8.1 Drysuit Maintenance .....	44
2.8.2 Drysuit Repairs .....	44
2.8.3 Float Test .....	44
<b>2.9 Cold water survival</b> .....	45
2.9.1 Preventing Hypothermia .....	45
2.9.2 Signs and Symptoms .....	45

### **A Kayaker who prepared for the worst**

Written By Bryan Pennell (Victoria Joint Rescue Co-ordination Centre)

Early May 2000, at 08:55 local time, RCC Victoria monitored a mayday relay by Victoria MCTS regarding a red overturned kayak with a person (male) in the water. The position given was in the vicinity of Chatham and Strongtide Is. near Discovery Islands. No other details followed. A fishing vessel that had answered the initial call was tasked by RCC. The following resources were in the area and were briefed, tasked, and departed at approx. 09:00: CGA Oak Bay, CGA Victoria, Sir Wilfred Laurier 733 from Victoria base, CG helicopter 357 flying locally, and the navy patrol boat HMCS Whitehorse.

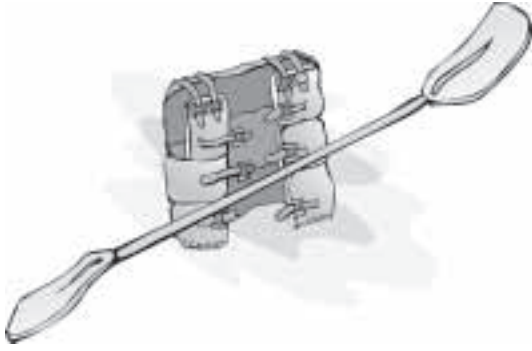
During briefing and tasking, communications were established with the kayaker. He had a hand-held VHF radio and he was in direct contact with Victoria MCTS. He gave his position and additional details regarding his craft and equipment onboard. The Kayaker who was swimming for shore relayed this information in a calm and rational manner. The SAR units were not able to locate him. As the Search progressed his battery ran out and his transmissions stopped. Rescue Centre now feared for his life because when the search units got close he could no longer guide them towards his position.

The Radio crackled and the kayaker announced that he had just changed his radio batteries. When the helicopter was close he told MCTS that he could see the aircraft and vessels in the area. The search units were still unable to locate him. Pulling himself up onto a rock, the kayaker reached into his life jacket pocket and pulled out his flares, his dye marker, and his flashing light.

CG helicopter 357 now reported she was low on fuel and would have to return to base in the next minute or so. CG 357 then sighted the flare and set down in his vicinity at 09:15. CGA Oak Bay was on scene at 09:21 and treated the kayaker with hot packs and proceeded to evacuate him to an ambulance at Oak Bay. The Laurier's Fast Response craft towed the kayak to Oak Bay and assisted as necessary. All other resources were stood down once it was determined there were no other individuals involved and the patient was safely transferred to Emergency Health Services. This incident started at 08:55. First on scene resource was at 09:15. The incident was resolved at 09:31 when the kayaker was landed at Oak Bay. The incident was closed at 09:42 when Emergency Health Services reported they had care of the kayaker.

The patient suffered mild hypothermia and minor cuts and bruises. RCC spoke to him directly after he recovered and commended him for being so well prepared on the water. This individual had paddled the local waters for years in fine and adverse conditions. He was familiar with local tides and currents and he indicated that he simply got taken unawares by the local rips and undertows.

This incident illustrates a few key factors regarding our present SAR system. Even though an area can be saturated with resources in good time after an initial reliable alert, people in the water are extremely difficult to find. The kayaker, who was more prepared than your average mariner, was truly responsible for getting himself found.



## 2.0 Introduction

Imagine having fallen overboard at night, floating in frigid waters. What kind of safety gear would you wish for while you patiently tread water waiting for rescue? Answering that question will give you a good idea of what you may need to carry with you. Be warned: most drowning occurs in good weather, when danger awareness is at its lowest.

It is easy to underestimate your needs when the sun is shining at your departure. Always remember that you may know the weather when you leave, but you can never know for sure what it will be like when you try to come back.



Like the kayaker in the story, you, the CCGA crewmember, are responsible for getting yourself found. What you wear, what is in your pockets and in your kit bag will make the difference between getting rescued or watching the vessels and aircraft fly by. It is you who may face the consequences if your

gear is not adequate. Give yourself a chance to survive by thinking ahead.

It is easy to forget how quickly the water can claim a life. It removes heat from our bodies twenty-five times faster than air at the same temperature. Yet, individuals who are not wearing flotation will not be given the chance to get cold. The shock of the icy waters forces them into hyperventilation and they ingest water. This is called cold shock. Spasms in the upper airway will prevent the entry of water into the lungs, causing “dry drowning.” These people will die from suffocation. In most cases, water will eventually penetrate into the lungs and cause drowning.

Those that are wearing flotation will find it easier to guard their airway and survive that critical first minute in the water. Yet if the seas are rough and winds are churning the waves, then even a PFD may not provide the protection needed for a victim’s airway.

Search and rescue crews that hit the water will be wearing enough insulation and protective gear to prevent death from cold shock, yet surviving the initial immersion simply allows them to begin the struggle for survival in the icy grip of Canadian waters.

Professionals who work on the water must be prepared for the unexpected. Wearing gear suited to the job provides a survival advantage.

### **Environmental Exposure and Fatigue**

Fast, open vessels can move quickly through conditions that many other vessels would find cumbersome and inhibiting. This fact alone can make the ride very uncomfortable. If exposed to adverse conditions for extended periods of time coxswain and crew will suffer from fatigue. Some studies suggest that even after half an hour fatigue may have serious effects. This is a concern because it affects the ability of the operator to safely handle the boat.

Any experienced crewmember has noticed that the ride gets rougher as the driver gets tired; this is because the reactions needed to provide a smooth ride suffer as a result of prolonged exposure to adverse conditions. It is safe to assume that judgement may also be affected by exposure.

Most of the biggest advantages can also be disadvantages. As the rescue vessel advances at high speed through stormy seas many factors can increase or decrease fatigue such as weather, temperature, sea state, wind chill, noise level and the constant pounding over the waves.

Most designs offer no protection from the elements, only a platform to stand on. In adverse winter conditions certain situations occur in which crew are exposed to weather more severe than any other natural environment endured by humans. Up to negative sixty-degree wind chill factors, 11G impacts

and noise levels approaching two hundred decibels have been recorded. Some crewmembers become violently seasick in these small vessels without ever being prone to seasickness before.

Fatigue effects should be considered when your vessel is assigned to a particular role. Prolonged extensive searching with search patterns may be a waste of time for not only is the vessel a poor search platform (visibility wise) but the fatigued crew are also too busy dealing with the weather to keep an effective lookout for prolonged periods. Proper clothing is the only barrier the operators have between themselves and the weather.

**To increase your chances of survival in cold water:**

- ◆ Wear gear that fits you
- ◆ Wear gear that fits the weather
- ◆ Wear gear that fits the mission



**Wearing the Gear that Fits the Weather the Mission and You**

Safety equipment that does not fit is of no use to you. There are many stories of people struggling to survive and being hampered by exposure coveralls that are too big or a PFD floating above their head.

Safety-conscious crewmembers organise their gear before they leave and usually leave it set up and ready to put on quickly. Safety equipment chosen must have five essential features:

- ◆ Flotation
- ◆ Insulation
- ◆ Protection
- ◆ Mobility
- ◆ Visibility

*Life jackets are designed for two purposes only:*

*To assist the survivor to stay afloat (conscious or unconscious) with his or her airway above the water line and to aid in detection when rescuers are close by.*

## 2.1 Flotation

How do rescue personnel survive the first few minutes of exposure, and protect their airway from the water? Flotation keeps your head above the water and reduces the physical struggle to stay afloat. A PFD or life jacket is essential for surviving those first dangerous minutes in the water. As a Coast Guard Auxiliary crewmember you will be required to wear your PFD at all times when in an open vessel or on the deck of a larger vessel.



*Mustang Survival*

Flotation devices are made from either kapok or unicellular foam. Despite the mildew inhibitor treatment required for the cloth, the webbing tapes, tape threads and certain areas of the envelope will occasionally rot. Seriously affected areas will appear aged, stained or otherwise discoloured. Kapok buoyant devices will frequently become water-logged and unserviceable. This is most common with old devices exposed to oil vapours or new devices whose plastic pad covers have been punctured or remain wet and difficult to dry. Flotation devices should be thoroughly dry and stored in well-ventilated spaces. They should be kept clear of the bottoms of lockers or stowage boxes where moisture may accumulate. They must be stowed away from excess heat.

The small vessel regulations state that all boaters must carry buoyant devices to fit the persons on board. SAR units should carry some additional devices to accommodate the occasional passenger (injured, rescued persons etc.). Since SAR personnel should wear PFDs at all times when on board, the only necessary recommendation is to choose PFDs that are comfortable and visible (red orange or yellow).

### 2.1.1 Life Jackets

There are two main types of life jackets: the standard and small vessel life jackets. Life jackets are designed specifically for two purposes: to assist the survivor to stay afloat (conscious or unconscious) with his or her airway above the water line and to aid in detection when rescuers are close by.

The life jacket has bulky float pads on the front and usually no flotation on the back. This arrangement ensures that these devices will right a person in the water. Some things that life jackets do not do:

- ❖ Do not provide insulation from heat loss
- ❖ Do not protect the body trunk from injury with padding
- ❖ Do not serve as comfortable work dress
- ❖ Do not have pockets to keep gear

The CCGA crewmember requires most of these features when engaged in SAR. This is why most rescue crew wear PFDs rather than life jackets.

#### Standard Life Jackets

The approved standard life jacket is mandatory equipment on all commercial vessels subject to Marine Safety Inspection and on all small fishing vessels.

The Canadian approved standard life jacket is built to the provisions in the International Convention of the Safety of Life at Sea (SOLAS) of which Canada is a signatory. These provisions cover such features as:

- ❖ Workmanship and materials
- ❖ Buoyancy capabilities and wearability
- ❖ Head support and face and body position for an unconscious person in the water
- ❖ Effect of petroleum products and colour



Mustang Survival

Standard life jackets are manufactured in only one style -keyhole -but are available in two sizes. The adult size is designed for a body weight of 40 kg (90 lbs) or greater, and the child size for a body weight of 40 kg and under. All jackets should be fitted with whistle, retro-reflective tape and light. The main feature of a standard life jacket is its ability to turn an unconscious person in the water from a face down position to face up, with the mouth and nose clear of the water. However, the bulkiness of the life jacket makes it quite uncomfortable to wear for long periods. Life jackets are to be donned when immersion is imminent (e.g. boat is sinking).

#### Small Vessel Life Jackets

Approved small vessel life jackets are for use on all pleasure craft and certain classes of small commercial craft (excluding fishing vessels) and are not subject to inspection by Transport Canada Marine Safety. Small vessel life jackets are designed in two styles. One-piece (slab or keyhole) and open front (vest). They are also manufactured in three sizes: "A" for body weight over 41 kg, "B" for body weight between 18 kg and 41 kg, and "C" for body weight up to 18 kg.



Mustang Survival

These devices have less buoyancy and righting moment than a standard life jacket, but must be able to turn the body to a safe flotation position once it enters the water. They must also support the head so that the face of an unconscious person is held above the water, with the body inclined backward from the vertical position. As for the standard life jacket, small vessel life jackets tend to be relatively uncomfortable. PFDs remain the best alternative for SAR crews.

*It is important that the PFD be worn with straps and zippers fully fastened, and that it be in good condition.*

### 2.1.2 Personal Flotation Devices (PFDs)

Approved personal flotation devices (PFDs) may be used in lieu of standard or small vessel life jackets on all pleasure craft, and are designed to be worn constantly while boating. They represent the best balance of flotation, mobility and comfort.

Although the PFD does not turn survivors face up in the water the design requires that they must not have a tendency to turn the wearer face down. This gives the unconscious survivor a 50/50 chance of landing face up and staying that way.

#### **There are two approved types:**

**Type I** has inherent buoyancy capabilities due to its construction from unicellular foam or macro cellular elements.

**Type II** has two buoyancy types: inherent features and inflatable capabilities.

The inflatable section has an oral inflation device and a manual device consisting of a cylinder of compressed CO<sub>2</sub> operated by a manual trigger.

#### **Type II Inflatable**



*Mustang Survival*

It is important that the Personal Flotation Devices (PFD) be worn with straps and zippers fully fastened, and that the PFD be in good condition. PFDs are designed to offer padded protection for the front and back of the body during high-speed operations: their straps and buckles will stay fastened on impact with the water. A snug fit and slim design give the wearer comfort and mobility to work. Remember that PFD flotation foam will deteriorate after heavy use and exposure to the elements.

Recently, Transport Canada approved new colours

such as blue and purple for PFDs used by recreational boaters. Some of these colours are not as visible as the standard red, yellow and orange PFDs. Those who work on the water usually choose the more visible colours to increase their chance of survival if they fall overboard. It is important to note that the approval for PFDs is valid only if the PFD is intact (no tears or holes) and unmodified (nothing has been glued, sewed or written on the PFD). Any PFD that has tears or holes should be replaced.



*Mustang Survival*

### 2.1.3 Anti-Exposure Work Suits

Anti-exposure work suits (often referred to as flotation suits) are a good choice for operations in colder weather conditions or when water temperature may cause hypothermia. The flotation suit is one of the most common pieces of safety equipment being used by rescue personnel today because it offers warmth and protection as well as many pockets for carrying safety equipment. Flotation jackets can also be a good choice for warmer days. Some models have a beaver tail that straps between the legs to protect the groin area from heat loss. Both these flotation garments offer at least fifteen pounds (6.8



*Mustang Survival*

kg) of positive buoyancy, and some models incorporate an inflatable flotation collar that can be activated by an oral inflation hose. The flotation collar provides additional buoyancy about the head and shoulder area to keep the wearer's head clear of the



water. Heat loss is greatly increased if water is allowed to circulate freely throughout the suit. Many designs have straps located on the arms and legs that restrict the water flow when pulled tight. Maximum hypothermia protection is ensured when the hood is on the head, all zippers are fully closed, and all straps are fully tightened.

The most common designs of anti-exposure coveralls and jackets are not waterproof. These items can deteriorate rapidly if not properly washed and maintained. The foam flotation can break down and become matted and lumpy after a few years of use. When this occurs, the suit will no longer offer the positive buoyancy required in order to keep the head out of the water. Suits and jackets that are worn often should be replaced when the material begins to deteriorate. These garments will increase survival time in cold water, but do not offer the same protection as a drysuit or a survival suit. The full-exposure coveralls can severely limit swimming and movement, especially if they do not fit properly.



Mustang Survival

be viewed as working flotation devices such as PFDs or anti-exposure work suits.

Owners of abandonment immersion suits are encouraged to practice donning their suits in all kinds of conditions (at night, in rough weather, etc.) to simulate actual emergency conditions. A device to assist with pulling the zipper can be used. Whistles, strobe lights, flares, etc. should be stored with, or attached to the suit. Suits should be stored in an accessible location for quick and easy access in an emergency situation. Many manufacturers of immersion suits recommend factory servicing of the suits every five years, but owners of these suits can try them on at least once a year in the water to check for small leaks. These suits must be checked periodically for:

- Holes, punctures, and rips
- The teeth of the suit's zipper are aligned
- The zipper works all the way up and down (The zipper should be periodically lubricated with silicone spray.)

An immersion suit is truly the best thing one could wish to be wearing while floating in cold water. It keeps dry and is very well insulated. The only problem is mobility. With big floppy arms, feet, and thick neoprene rubber, the immersion suit is almost impossible to walk or move in. It is solely designed for survival in case of immersion.



*Owners of abandonment immersion suits are encouraged to practice donning their suits in all kinds of conditions.*

#### 2.1.4 Abandonment immersion suits



An abandonment immersion suit is a heavy rubber suit somewhat similar to a diver's drysuit. These suits are designed as abandonment devices and should not

## 2.2 Insulation & Thermal Protection

So you have made it past the first few minutes with your PFD or life jacket keeping you afloat. Now, if you are swimming in 11 °C Canadian waters, hypothermia is your next concern. Without thermal protection, chances of survival after a long exposure to cold water are slim. The high heat loss areas of the body are the head, neck, torso and groin. When you are dressing for cold weather try to protect these ar-

ear first. Use a wool toque or balaclava on the head and a scarf or a polypropylene neck warmer. Covering the head and neck can reduce heat loss by 25%.

### 2.2.1 Thermal Underwear

Thermal underwear constructed of polypropylene fibres provides good insulating value in a marine environment. Maximum protection from hypothermia can be achieved by layering thermal underwear. Polypropylene tends to keep moisture away from the wearer, increasing comfort and aiding in reduction of heat stress. The best wicking characteristics are obtained when the fabric is worn next to the skin.

To achieve maximum cold protection, it is a good idea to use layering. Tight polypropylene or polyester light underwear will keep the moisture away from your skin. Additional heavy underwear will provide insulation. Cleaning routines for thermal underwear are limited to laundering after use.

**Polypropylene** Uses heat energy to keep moisture away from the skin. It provides better insulation than natural fibres.

**Wool** Stays warm when it gets wet, reducing heat loss, but retains water, making it heavy.

**Cotton (DO NOT WEAR)** Soaks up water like a sponge, and holds it against the skin. As the water evaporates, heat energy is pulled away from your body. Cotton is a very poor choice for our operational environment.

On warm days, bring both cold-weather and warm-weather gear for added safety. The weather can change in minutes, and you may be caught by surprise. Thermal underwear like polypropylene or wool long johns will help keep you warm. If you are wearing a drysuit, don a fleece or polypropylene liner for excellent thermal insulation. This liner can be worn underneath a floater suit as well. Do not wear any cotton clothing under a liner, because cotton will keep the cold water against your skin.

## 2.3 Protection

SAR vessels often operate in severe weather conditions. With frequent heavy impacts due to waves, high wind chills, and excessive noise levels, a crewmember can find himself or herself in an extremely hostile environment, even when things are going well. In the event that something goes wrong, crewmembers may be at risk for head injuries and/or blunt trauma (internal lesions caused by a collision with an object that does not cut well). Protective gear is essential, given that your vessel may be engaged in SAR operations in these conditions.

### 2.3.1 Drysuit

For open fast rescue craft, the crew does not have a cabin to provide protection from the weather. These crewmembers require a higher level of protection from exposure. The most effective way to keep warm is to stay dry. A lightweight drysuit offers the best balance of dryness and mobility in cold weather. The drysuit is ideal for extended missions in severe climates.

A lightweight drysuit delivers the optimum combination of dryness and mobility in cold weather. Most drysuits worn by SAR vessel crewmembers are made of nylon polymer. There is no valve on the SAR drysuits, and they generally come with reinforced knees and buttock areas. Hoods are not attached and the suit is worn with a thermal liner. Wrist and neck seals may be made of latex or neoprene. The choice of seal is often a matter of personal preference. Refer to the manufacturer for specific information regarding the choice of seals. Some drysuits also have integral work boots or soft-shoes.

A drysuit's floatation is dependent on its watertight integrity. If punctured, the inherent buoyancy provided by this suit will be lost. This is why drysuits are not approved as flotation devices and consequently, they must always be worn with a PFD.

Drysuits alone do not provide adequate insulation or hypothermia protection. Thermal underwear must be worn beneath the drysuit to provide insulation. In areas of very cold water temperatures, layering of underwear is recommended. Always use underwear that is specifically designed to keep you warm in a wet environment.



*Drysuits provide thermal protection in the case of accidental immersion*

### 2.3.2 Helmets

Head protection is very important for survival on-board any kind of Fast Rescue Craft (FRC). On-board these craft, crewmembers will be exposed to strong and sometimes sudden impacts and accelerations.



*Heatloss areas*



*Polypropylene underwear gives you a heatloss advantage*



to strong and sometimes sudden impacts and accelerations. Under these circumstances, the risk of head injury is high. It is imperative to wear helmets to minimise that risk. Helmets must be specially designed for use in the water: otherwise, they may fill with water and act like anchors. In addition, helmets must be lightweight to minimise stress on the neck during sudden speed change.

### 2.3.3 Eye Protection

Eye protection is vital, particularly in extended operations. Glare, salt, and wind easily damage eyes. The eye protection that you choose should protect you from all the elements but not interfere with vision by excessive fogging or restrictions on peripheral vision. If you wear eyeglasses, you should purchase goggles that fit over them, or buy prescription goggles.

### 2.3.4 Gloves

Gloves are a matter of personal preference. Some people prefer ski gloves, while others prefer a lightweight wet suit glove. Gloves should allow unrestricted circulation in the fingers to ensure sufficient warmth.

- ◆ Wool gloves will get wet, but stay warm
- ◆ Neoprene diving gloves aren't very warm in the wind, and tend to fit too tightly
- ◆ Gore-Tex™ gloves are effective, but need to be rinsed after every use, or the salt will destroy the material
- ◆ Rubber gardening gloves can be very effective and inexpensive, but they are cold
- ◆ Mittens, either wool or Gore-Tex™, provide hands with warmth, but reduce finger dexterity

### 2.3.5 Footwear

When your work involves handling heavy objects that could drop, you must wear protective footwear. Footwear worn under these conditions must not only protect your toes, but the bridge of your foot as well. Good safety footwear provides:

- ◆ Steel toe cover
- ◆ Cushioned bridge pad
- ◆ Sole guard to prevent nail punctures

With all these safeguards, the footwear can be too heavy or too cold to be worn comfortably. Not all operations require protection from injury, so requirements for traction, warmth and comfort become paramount. CGA crewmembers need a quality boot that provides good adhesion to the deck. A soft sole deck boot or shoe provides good traction. Footwear must not be so tight as to restrict circulation. If it does, then cold feet and cramps will occur.

## 2.4 Mobility

All personal gear should allow the wearer to move and work freely. In extreme conditions some restriction of movement may be necessary to give the crew adequate protection from the elements. Make sure all gear fits you properly.

## 2.5 Visibility

All protective and thermal gear (outside layers) should be highly visible. Items like PFDs must be red, orange or yellow. Vests, drysuits or floater suits should have reflective tape that illuminates in the beam of a searchlight. Automatic strobes or chemical light sticks will draw attention to you.

Active signalling devices require you use them to draw attention your way. All these devices should be inside the various pockets of your equipment vest.

Personal safety equipment must be considered lifesaving equipment and treated as such.

Personal safety equipment on loan to an individual must be maintained in appropriate condition in accordance with the manufacturer's maintenance guidelines. Each person to whom the gear is issued is responsible for keeping the gear in proper condition. Faults or problems which are beyond the scope of maintenance by the individual, are to be reported to the captain or coxswain for appropriate follow-up (e.g., personal strobe-light batteries must be changed annually). It is the responsibility of the master or coxswain to ensure that every crewmember wears their personal safety equipment as needed. It is also the responsibility of every crewmember to wear their safety equipment when they feel they should do so.

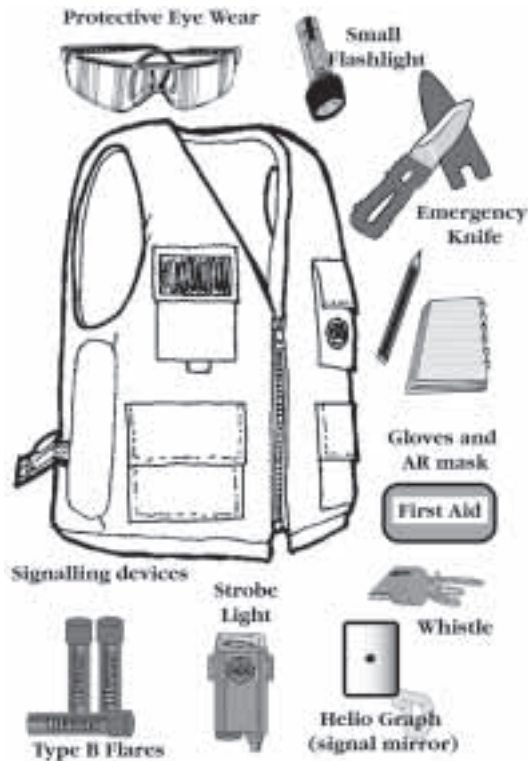
## 2.6 Signalling for Distress

It is critical for survival that you can call for help or at least attract attention to yourself when you are in the water. See Chapter 3.

### 2.6.1 Equipment Vest

Equipment vests allow you to carry required safety items without having to duplicate them for each type of clothing worn. The safety vest is worn over all of your other gear. It is used over your PFD alone, over your drysuit and PFD together, or over your floater suit.

A safety vest should contain the following minimum amount of gear:



### Some suggested items for your equipment vest

*Note:* Items can be secured to the vest with a long enough lanyard to permit easy access and use. The pocket snaps require frequent lubricating with Vaseline.

### Strobe light

A small waterproof strobe light can be used to attract attention. Strobe lights are especially useful if you need to be seen at night. Some models will activate automatically in contact with water. This is a useful feature since it will increase your chances of being detected even if you are unconscious in the water and unable to use whistles, flashlights or your voice to assist in detection. Other models need manual activation. The personal emergency strobe light emits a high-intensity flashing white light of 40-60 flashes per minute, visible for two miles. It may be used to attract the attention of aircraft, ships, or ground search parties. A lanyard must be fastened to the light and to the wearer's clothing to prevent loss of the light during use. The lanyard should be of sufficient length to allow the arm to be extended to the maximum reach with the light held in the hand. When donning safety gear for use, you should check the strobe light by activating the switch for a couple of flashes before proceeding with the task.

### Personal distress flares

It is recommended that three personal distress flares (type B) be carried by all crewmembers embarking on small SAR vessels during hours of darkness. Flares are normally carried in a pocket of the equipment vest, flotation jacket or drysuit or in a fanny pack with other items of personal safety gear.

The type B distress flare produces two red stars at intervals of not less than 15 seconds. These stars are projected to an altitude of 90 m (300 ft.) or higher. The stars burn with a luminosity of 5,000 candela for a period of four seconds or more and burn out before touching the sea. The type B distress signal may contain a firing device capable of throwing the stars automatically or may use a cartridge-firing device that requires loading for each star.

All distress flares approved for marine use in Canada have an expiry date of four years from the date of manufacture. Check the dates on your flares regularly and take steps to procure replacements before the expiry date.

Flares should be inspected weekly by the individual to whom they are issued, outside the vessel or buildings in an open area. Handle flares with care, and be particularly careful not to pull on the launch cord or chain while conducting the inspection.

Check the flares for splitting, cracking, loose caps, or any other signs of deterioration. Check the waterproof wrappings on your flares to ensure that they are still water tight. All the flares should be stored in their designated stowage pouch or pocket.

### Whistle

The whistle is an effective and inexpensive item of personal protective equipment that has been instrumental in locating and saving many lives at sea. A whistle should be attached to every crewmember's equipment vest zipper. Units that do not have equipment vests may attach the whistles to the zippers of PFDs, jackets and flotation suits.

Whistles should be of a type intended for marine use, such as standard life jacket whistles. Choose a unit that has no moving parts (peas), is compact and break-resistant and above all, produces a loud piercing tone during use.

Whistles should be checked frequently for cracks, breaks, or deterioration. Ensure that the whistle remains securely fastened to the item of personal flotation and that it can be brought to the wearer's mouth without removing it.

In addition, if the wearer is immersed in water, the whistle must reach his or her mouth without the need to put the face into the water. Test the whistle by blowing into it. Replace any whistle that fails the physical examination or fails to sound a loud shrill tone.

### Heliograph (mirror)

In addition to flares, strobe lights, and whistles, some SAR units issue an emergency-signalling mirror. The emergency signalling mirror is a compact unit that is used to attract the attention of passing aircraft or boats by reflecting light at them. The reflected light may be seen from two to four miles from the point of origin. The signalling mirror is used and maintained in accordance with the manufacturer's specifications. A weekly inspection of the mirror should be conducted to ensure that the surface is clean and polished, and the lanyard secure and in good condition.

### Flashlight

A flashlight can be used to attract attention on the water and serve as an effective tool at night on the boat. Waterproof flashlights are preferable for obvious reasons. Check the batteries once a week and lubricate the o-rings with silicone grease or spray before closing the flashlight. Rinse your flashlight with fresh water after exposure to salt water.

### Portable VHF radio

Many crew are also carrying a waterproof portable VHF radio in their vest. The portable radio can be used to call for help when needed or anytime one crewmember becomes separated from the rest of the crew. Note that some new models are compatible with Global Marine Distress Safety System, (GMDSS - a useful feature).

## 2.7 Additional gear

Some extra equipment is advisable for spending long hours on the water. Extra gloves and an extra hat are always a good choice. High energy snacks like granola bars or peanuts will get the crew through long hours at night or long patrols.

### 2.7.1 Knife

A knife is always handy. It is a good idea to have one in one of the pockets of the equipment vest. A lanyard should be used to keep the knife attached to the vest. Choose a blade that is designed to cut lines and that has good resistance to corrosion. Knives designed for scuba diving and kayaking often provide adequate resistance to corrosion. Always rinse your knife with fresh water after exposure to salt water. Dry your knife before putting it into storage. Keep your knife sharp. Lubricate the blade once in a while with a fine layer of oil to increase resistance to corrosion.

### 2.7.2 Pocket Mask, Rubber Gloves and Eye Wear

Some kind of barrier between you and potential patients is vital to your safety. AIDS and Hepatitis are real risks when dealing with all patients. The CGA crewmember must be ready to set up a protective barrier.

### 2.7.3 Gear Bag

Each crewmember should bring a small waterproof bag that contains some items that could be required depending on your mission. Some suggested items for your gear bag:

- ◆ Toque or hat, scarf or balaclava
- ◆ Extra gloves or liners
- ◆ Chemical hand warmers
- ◆ High energy snacks, and water
- ◆ Spare glasses or contact cases
- ◆ Phone number and ID
- ◆ Small first aid kit
- ◆ Quarters and cash (small amount)



*SAR crewmembers should not be asked to carry and use cartridge-fired devices as personal flares. Firing these devices by a crewmember in the water requires a degree of co-ordination and dexterity not needed for self-contained devices. Co-ordination and dexterity may be depressed by the effect of hypothermia, causing the act of firing the cartridge type to be very difficult. It is recommended that SAR crews use the compact type of flares to allow easy fitting and comfort in pockets of work suits and clothing. All SAR personnel should be well informed regarding the firing procedure for these flares. Seek training if necessary.*



## 2.8 Maintenance & Cleaning

### Maintaining your gear

Sewing or patching may repair suits that are damaged by small tears, broken zippers, open seams, or small burns. Suits that are more severely damaged should be removed from service. After use, suits should be rinsed with fresh water and hung in a ventilated area to dry. Do not expose to direct sunlight. Zippers should be lubricated periodically with silicone spray; it lubricates and retards corrosion.

*After use, suits should be rinsed with fresh water and hung in a ventilated area to dry*

### 2.8.1 Drysuit Maintenance

To prolong the life of the drysuit and ensure that it is ready for your next use, the following steps shall be followed after each use:

- ❏ Close the zippers and rinse the suit thoroughly to remove salt or other contamination
- ❏ Pay special attention to folds and creases
- ❏ Clean the zipper teeth and outer zipper guard (if fitted) with a soft wet brush, such as a toothbrush, to remove dirt and salt
- ❏ Thoroughly wash all seals, inside and out, using a mild soap-and-water solution to remove body oils or other contaminants
- ❏ If required, turn the suit inside out and rinse with fresh water
- ❏ When cleaning is completed, hang the suit on a sturdy wooden or plastic hanger to dry. The inside of the suit should be dried first, and then the outside. Do not expose the suit to bright sunlight or excessive heat. Do provide adequate circulation
- ❏ Once a month or as required, lubricate the zippers with paraffin wax or beeswax on both the inside and the outside of the teeth.
- ❏ Protect the seals in accordance with the manufacturer's recommendations. Unscented talcum powder can be used on seals. Do not use baby powder. Do not apply oils of any kind to seals

### 2.8.2 Drysuit Repairs

Drysuits cannot usually be repaired in the field. Many suits come with a manufacturer's warranty for repair of defects. Always contact the manufacturer if your drysuit needs repair. The only temporary repair that can be done in the field is replacement of a defective latex wrist seal when used with dry gloves and wrist rings. Note that this is useful only when the leak is located somewhere above the ring. If it is located between the ring and the sleeve, you will have no other choice but to have the seal replaced.

### WARNING:

Flotation suits should not be dry-cleaned.

Polypropylene underwear should be washed by machine in warm water up to 38°C, and rinsed in cold water. Air-drying is recommended, but a dryer on permanent-press cycle may be used.

Areas that become soiled may be washed with a mild soap solution, rinsed with fresh water, then hung to dry in a ventilated area. Do not wring the suit. Do not attempt to use solvent or thinner to clean suits. Salt, corrosion, and grease are the main enemies of safety gear. Given time, salt can cut material like a knife, transforming a drysuit into a wet suit and a rain jacket into a well-ventilated jacket. The salt molecules penetrate the fibres while in solution and crystallise when they dry. These crystals then cut the fabric during normal motion. Rinse your gear thoroughly with fresh water.

Grease should be washed out with a mild non-abrasive detergent. All zippers, metal buckles, and brass snaps or buttons should be protected with silicone spray or glycerine (hand soap).

### 2.8.3 Float Test

Vest pockets can be used for a wide variety of equipment, depending on the nature of work to be done. Pockets soon become full and the equipment vest becomes heavy. Fifteen pounds of buoyancy on your PFD will quickly become useless if you carry 30 pounds of equipment. Weigh all your gear that you would wear on the heaviest day. Rig a diving weight belt to the equivalent weight and put on your PFD. Jump into a swimming pool (not too deep) and count how many minutes you can tread water. If you sink to the bottom like an anchor, you should re-evaluate the equipment you carry with you and/or your flotation. The weight test can also be used to determine whether your flotation device is still in good condition. For this test, look at the label to find out how many pounds or kilograms the device is supposed to support. Rig a weight belt to that weight and attach it to the flotation device. Drop everything in a pool. Does the flotation device float or sink? Small variations between the rated buoyancy and the actual buoyancy may be acceptable, but any significant difference would suggest that the flotation device needs to be replaced.

## 2.9 Cold water survival

Cold waters can claim a life very quickly. Research done by the University of Victoria shows that most people who are not wearing thermal protection will die of hypothermia within the first few hours of exposure to 10°C water, even if they're wearing flotation. Hypothermia is a drop in body "core" temperature caused by cold water immersion, exposure to cool/cold air in water-soaked clothing and prolonged exposure to low environmental temperatures.

When the body core starts to cool off rapidly, the brain takes action to prevent the vital organs from becoming too cold. The warm blood is shunted away from the extremities, and restricted to the torso and head; circulation is reduced to a minimum.

One of the greatest variables in the survival times of people, who have actually been lost overboard, is the will to live. But even if you have an iron will, it's best to be prepared by wearing good thermal protection and ensuring that you don't fall overboard in the first place.

### 2.9.1 Preventing Hypothermia

The best way of dealing with hypothermia is to prevent it. Being aware of the risks is a good place to start. The following may provide additional protection from hypothermia:

- ↳ Drysuit
- ↳ Wet suit
- ↳ Immersion suit
- ↳ Survival suit
- ↳ Exposure coverall
- ↳ Multiple light layers of dry clothing
- ↳ Water or wind-proof outer layer

If you find yourself floating, try to climb up onto something. If there's nothing to climb onto, then use the Heat Escape Lessening Position (HELP). This position will protect your body's heat loss areas. By keeping your arms and legs in, and your body still (weather permitting), you can reduce the amount of water flow over your body core.

If you are floating in a group, then everyone should huddle together, keeping their chest walls close together. This position also reduces the circulation of cold water around the bodies.

### 2.9.2 Signs and Symptoms

1. **Skin colour** – with no blood in the limbs or near the skin, the victim will appear pale and blue.
2. **Restricted movement** – with no blood circulation to the limbs, a victim's movement will be slow and listless. The victim will be uncoordinated and clumsy.
3. **Altered state of consciousness** – with reduced brain cell activity, the victim may behave strangely or say inappropriate things.
4. **Shivering stops** – in severe hypothermia, the shivering response stops and the person becomes subdued and dopey.
5. **Slowing pulse and decreasing consciousness** – when the core temperature is very low, the victim's pulse will feel weak and slow, or not be felt at all. The level of consciousness will be reduced.
6. **Unconsciousness** – cardiac arrest usually follows after the victim loses consciousness by drowning or the dropping temperature.

*One of the greatest variables in the survival times of people, who have actually been lost overboard, is the will to live.*

### Personal Survival

Remember the priorities outlined in chapter one, crew safety comes before anything else. Your survival will depend on your forethought and preparation more than the actions taken after you find yourself in the water.

