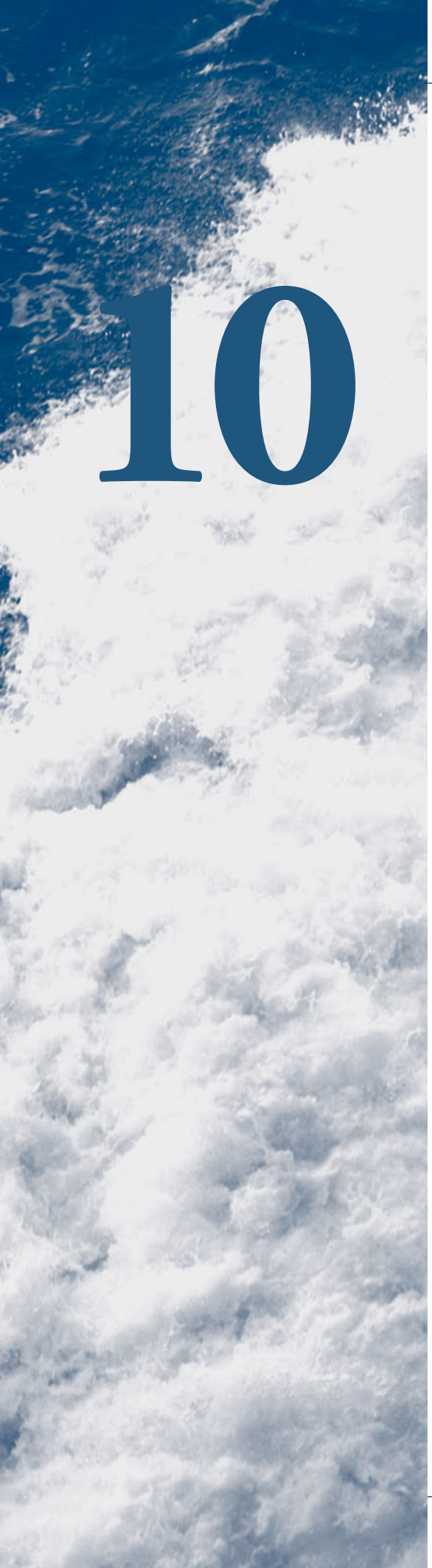


10

Rescue

This chapter sets out to gr ound CCGA crewmembers in concepts of co-ordinated effort and teamwork and lead them aw ay from notions of her oics and r isk taking. Effective marine rescue is always a team effort and successful team efforts are born from continuous training along with practised communication.

Rescue

Contents

Valerie & Brothers II

Written by Neil Peet (Supervisor of Marine SAR Programs CCG)

Ten Canadian Coast Guard Auxiliarists from Harbour Breton, Newfoundland and Labrador received the Canadian Coast Guard (CCG) Commissioner's Commendation for their lifesaving efforts during SAR Mission # 00-042: F/V Valerie & Brothers II, aground with 4 persons onboard (POB), 18 March 2000.

On 18 March 2000, at approximately 0745 (L), the Maritime Rescue Sub Center (MRSC) St. John' s received notification through Placentia Marine Communications and Traffic Services (MCTS) that the Fishing Vessel (F/V) "Valerie & Brothers II" was aground in Wreck Cove, Fortune Bay with 4 POB.

The F/V "Valerie & Brothers II", in the company of another fishing vessel, had returned to Wreck Cove on Friday, 17 March at 1630 (L) from the fishing grounds.When the weather deteriorated later in the evening, both fishing vessels broke their moorings and were in danger of being lost. Four individuals boarded the two boats in an effort to save them. In spite of their ef forts, one of the vessels became swamped and was lost. With all four persons now onboard the "Valerie & Brothers II", her engines also failed and she began to drive ashore.

Upon grounding in Wreck Cove, three of the occupants of the "Valerie & Brothers II" were able to evacuate to a nearby cabin for shelter. The fourth individual, Russel Cox, owner of the F/V "Valerie & Brothers II" who sustained injuries in the effort to save his boat, was unable to climb the slippery rocks to safety and was forced to remain with the stricken vessel.At the time of the incident, the weather was reported to be North East winds, 35 to 45 knots, heavy seas, with reduced visibility in heavy snow and freezing spray.

In addition to tasking several primary SAR Air and Maritime Resources and two vessels of opportunity , the MRSC tasked the following Canadian Coast Guard Auxiliary (CCGA) resources to this distress incident:

- CCGA V/L "Trina & Sons", under the command of Wesley Snook Sr.;
- CCGA V/L "Jane & Brothers", under the command of Reuben Rose Jr.; and,
- CCGA V/L "Stephen & Jayde", under the command of Arthur Pierce.

In spite of the severe weather at the time, all three vessels accepted the tasking and departed the small fishing community of Harbour Breton, Fortune Bay by 0815 (L).

After approximately 1 hour on task, the CCGA V/L "Jane and Brothers" stood down from the incident due to the severe ice accumulation on the vessel. The "Trina & Sons" and the "Stephen & Jayde" being lar ger vessels, were able to press on through the storm tossed seas and arrived on scene at 1030 (L).

Upon their arrival, it became evident to the Masters of the "Trina & Sons" and the "Stephen & Jayde" that the now holed and swamped F/V " Valerie & Brothers II" could not be towed from the rocks to safety . As well, due to the shallow water and heavy sea conditions, the larger fishing vessels could not be used to effect a rescue of the injured and now severely hypothermic man, still onboard the "Valerie & Brothers II".

After a quick scene assessment, it was decided that the small lifeboat from the "T rina & Sons" would be floated to the "Valerie & Brothers II" to evacuate the injured man.

To assist in the rescue, two crewmembers from the "Stephen & Jayde" had transferred to the "Trina & Sons". Once in position, the small lifeboat from the "Trina & Sons" was launched and boarded by Mr. Art Pierce and Mr. Rod Pierce. While Wesley Snook Sr. held the "Trina & Sons" stern to the heavy wind and seas, his crewmembers, Wesley Snook Jr., Gary Snook Sr. and Tim Stoodley, slacked the boat to the beach by way of a lifeline.

Once alongside the "Valerie & Brothers II", the injured man, Mr. Russel Cox, was evacuated to the beach by Art Pierce and Rod Pierce. It should be noted that due to his injuries and the ef fects of hypothermia, Mr. Cox was unable to walk or help himself.

Mr. Cox was assisted to an alternate location where all three men then re-boarded the lifeboat and were hauled to safety by the crew of the "Trina and Sons".

Once all three men were safely onboard the "Trina & Sons", Mr. Cox was taken below deck where all of his clothing had to be cut away as they had frozen to his body . Mr. Cox was then treated for hypothermia by the crew of the "Trina and Sons" and evacuated to hospital in Harbour Breton.

Mr. Cox had spent a total of five hours in the water and in his opinion and the opinion of the receiving physician in Harbour Breton, was very near death at the time of his rescue.

10.0 Introduction

In this age of mass media and live action video a glamorised view of search and rescue has distorted the reality of our work. This has given would be rescuers some dangerous ideas. On television the rescues, even the live action ones, always work out. The networks will show rescuers taking unwarranted risks and being successful in their dangerous heroic rescue attempts. The reality is, if you make a habit out of risking your life during rescue operations you will end up dead. Dead rescuers are not effective or popular. There is no room for heroics only well planned co-operative actions.

The priorities of a Canadian Coast Guard Auxiliary vessel are simple:

1. Safety of the Auxiliary vessel's crew
2. Safety of the Auxiliary vessel
3. Safety of the people in need of assistance

Do not put yourself or your vessel in unwarranted risk under any circumstances.

10.1 Stop Assess Plan

Panic and poor judgement kill rescuers as well as victims. When faced with unusual circumstances in adverse conditions, proper assessment is the key to survival. A few moments standing away from the action observing and communicating with your team will enable you to formulate a plan based on what you see and hear. This will save countless minutes in fumbling, re-planning or winging it. These few minutes may prevent a serious accident or save a life. In extreme conditions this allows time for the team and team leader to act calmly and not be prisoners of their adrenaline. Rarely, are you faced with the typical Hollywood scenario where we only have seconds to act, or all is lost. Yet many times a scene will contain hidden or subtle dangers that are missed at first glance. There is always enough time to assess and plan.

10.1.1 SAP is a team communication process

Whenever a small team confronts an unknown situation we are compelled to get involved and help quickly. This sense of drama and ur gency can draw bystanders as well as rescue professionals into situations before they are ready to deal with them. The dramatic "just in time" rescues we hear about are very misleading. Very rarely does a situation warrant instant action upon arrival. There is usually always time to gather your thoughts. What is needed is a tool to get rescuers in the habit of going through three essential steps before they leap into an unknown situation.

Stop Stop outside of the event zone (100 feet in most marine situations).

Assess Everybody observes, being careful to only discuss his or her observations and not plans.

Plan Everybody gets input on the plan but the leader has the last say. The leader assigns tasks and clarifies each team member's role. When everyone acknowledges the plan, the team can approach.

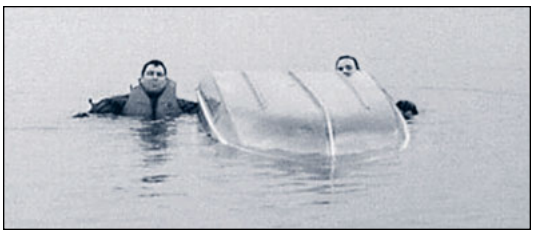
Use of SAP must always be considered when confronted with new information during a rescue, such as prior to entry into an enclosed space on the vessel. There may not be an atmosphere that will support life in that space, and the unwary crewman may become a casualty. This can be made worse by seeing an unconscious casualty lying in that space.

10.2 Rescue and Recovery

Do not put yourself or your vessel in unwarranted risk under any circumstances.

Recovering people from the water is the single most important task in rescue operations. A well thought and planned approach is critical to the overall success of the operation. If dealing with more than one person in the water, rescue centre and other search units should be notified that you are commencing rescue operations. Before you start, communicate the number of people you can see and the exact location of the survivors.

The crew of the CCGA vessel should be aware of the driver's/captain's intentions as to the means and



method planned for extracting people from the water. Any equipment necessary to bring people aboard should be prepared prior to arrival. If the person is not conscious, it may be necessary to place a crewman forward with a boathook to guide the survivor to the vessel's recovery area (i.e., swim grid, boarding ladder, dinghy, etc.)

10.2.1 Person in the Water

Recovering someone from the water is a dangerous manoeuvre. The best way to prevent injury and accident is to practice this evolution repeatedly. Everyone should be familiar with all the positions so that the vessel is ready to respond efficiently.

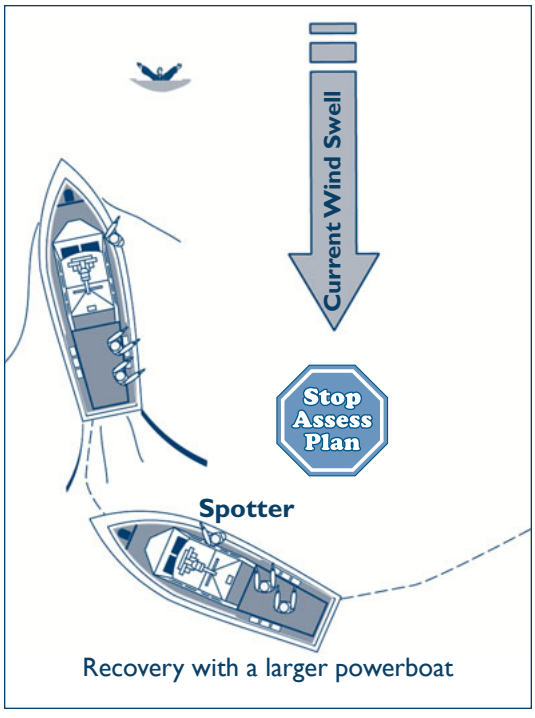
Once someone in the water is spotted, the helm position must quickly assess the prevailing conditions in order to set the vessel up for a successful recovery. If the crew takes their time in planning and preparing then the recovery will be successful.

The team shall consider the following:

- ✓ Wind
- ✓ Current
- ✓ The vessels configuration
- ✓ The method of recovery that will be used

VesselApproach

Do not manoeuvre the vessel while close to the person in the water



Recovery with a larger powerboat

Bow into the Dominant Force

For effective control, the bow of the vessel normally will be head into the prevailing dominant forces being wind, current or swell. One of these will have the most effect on your vessel.

Stop the vessel well clear and take the time to notice any details or surprises. Communicate with the crew and confirm that everyone is ready to perform his or her task. This SAP need only be a few seconds but those seconds will save time when everyone works together effectively to recover the person. When approaching overturned sailing vessels and/or fishing vessels, watch for trailing lines. Approach from downwind, as lines drag upwind. The spotter must maintain verbal contact with the person in the water . This will enable you to assess the person' s level of consciousness as well as reassure them.

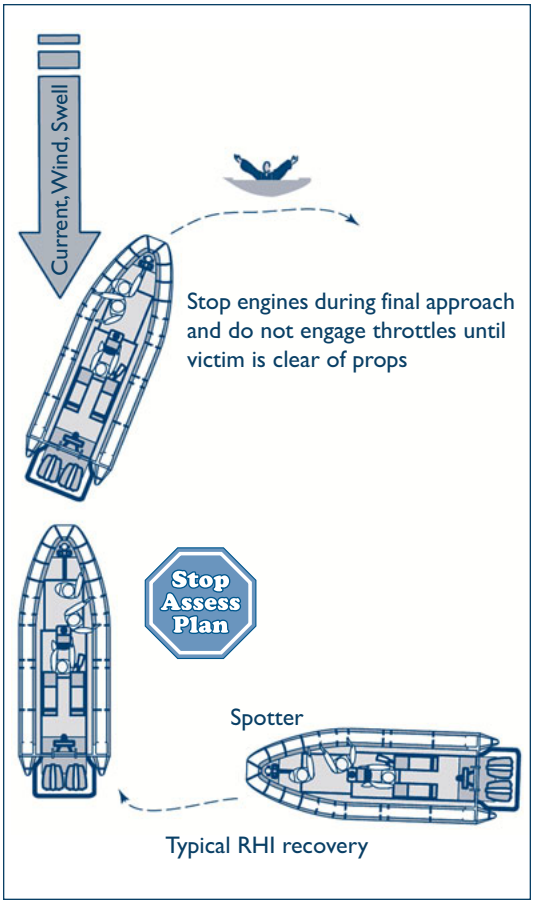
FinalApproach

Once the SAP is completed, the final approach should start 2-3 boat lengths downwind from the victim (further away if wind and sea conditions dictate) to ensure that the bow is kept up into the wind. If the driver can't see the victim, the engines go into neutral. If the vessel is not close enough to recover the person, wait until the person in the water is clear of your stern and go around again for a full approach. The crewmember responsible for sighting and calling distances must remember to continue indicating position even after the victim disappears from sight under the bow. This keeps the coxswain informed of the status of the rescue. Get a hold on the victim as quickly as possible because the boat will drift downwind rapidly. The person pointing must keep his/her eyes on the victim, even if it is necessary for the vessel to make another approach.

Six steps to a typicalecovery

1. Appoint one crewmember to keep sight of the person in the water, and have them point and wave their arm towards the person when they have the victim in sight. If they have momentarily lost sight of the person, they should hold their arm out straight in the direction of the last sighting.
2. Keep your bow into the wind, with the person in the water ahead of you.
3. Stop Assess and Plan when you are 2-3 boat lengths away, establish communication.
4. Go slowly on final approach. It's better to take your time and succeed the first time, than to have to go around again.
5. Put throttles into neutral when the way of the vessel will bring the vessel slowly alongside the person. Do not touch the throttles until the person is onboard, or well past and clear of the engines.

6. Use the appropriate retrieval method. Be careful during this recovery as persons in distress have pulled would-be rescuers into the water. Keep your centre of gravity inside of the boat.



Typical RHI recovery

With the person alongside, assess what is the best means to bring the person on board. Persons who have been in the cold water a long time will have lost muscle strength and grip, may be incapable of helping themselves, and may be hypothermic.

Water Extraction Techniques

Handling Your Victim

Getting a person aboard is much more difficult than many expect.

Keep the victim on the upwind side of the vessel.

- When recovering the victim, move him/her gently; severe hypothermia can quickly become cardiac arrest with rough handling.
- Support the victim's head at all times.
- Talk to the person and reassure him/her Always assume that the victim can hear you.
- Keep the victim on the upwind side of the vessel. This will allow the victim's feet to act as a drogue, reducing the friction and effort required to pull him/her up over the side. If the victim is on the downwind side, the feet are pushed under the hull, this increases the effort required to lift.
- If the victim has been in the water for any length of time, they must be brought into the boat, carefully and as near horizontal as possible to prevent cold blood, in the extremities, suddenly returning to the heart. Parbuckling is the prefered method for this.
- Once aboard, place the victim in the position of most comfort and as protected from the elements as possible.
- Treat for hypothermia and administer first aid as necessary.

Parbuckling

This technique works best with RHIs but can be used on vessels with low freeboard and round hull shape (tumble home), in calm conditions. Parbuckling is an old sailor's trick, originally used to roll barrels up the side of ships. Rescuers can apply the same technique to gently recover people horizontally out of the water.

- Start with the person floating on his/her back.
- Attach two lines to the lifelines, one opposite the person's knees, and one opposite the midpoint between the person's shoulder and elbow. If you have to make a choice, attach closer to the elbow to prevent the line slipping up around the person's neck.
- The aft crewmember controls the victim alongside, while the forward crewmember passes his/her line under the victim at the aforementioned midpoint and back up the outboard side.
- The forward crewmember controls the person, while the aft crewmember passes his/her line under the knees and back up the outboard side.
- The crewmember at the head controls the lift. The crewmember at the head is not necessarily the coxswain, but should be the person with the best first aid qualification.

- ➜ Reassure the person and continually communicate with the other crewmember if you are the person controlling the lift.
- ➜ Give a three count, then start pulling.
- ➜ The person will be carried through one complete rotation, and end up face-up lying on top of the cap rail or sponson.
- ➜ Crewmembers involved in the lift should keep their knees and lower legs against the sponson to help stop the victim's progress.
- ➜ Gently lower victim down to the deck.

Crewmembers involved in the lift should keep their knees and lower legs against the side to help stop the victim's progress

Reassure your victim

WARNING

***Do not** place a crewmember into the water to help with the recovery, due to the extra time required to recover the second person and the risk of injury to your own crew*

Debrief Survivors

Once the survivors have been located, brought on board, and any necessary medical check up and attention rendered, the SAR crew should, where possible, question them regarding the circumstances of the incident, and the possibility of other survivors.

Information obtained from survivors must be immediately relayed to JRCC or the On Scene Commander (OSC). When questioning the survivors, speak in a calm, clear and reassuring voice. Let them know that the information they provide will help with the search.

Ask simple questions and don't suggest answers:

- ⇛ How many people were onboard?
- ⇛ Is anyone missing?
- ⇛ Do you know where any missing person may be?
- ⇛ Do you have any pre-existing medical problems that we should know about (i.e. heart problems, diabetes, etc.)?

Treat all cold water immersion victims for hypothermia. If the victim is suf fering from severe hypothermia, call JRCC and request a MEDEVAC then proceed to shore immediately to obtain proper medical treatment for the victim.

One Person Lift Using a Short Piece of Line (for vessels with low freeboard)

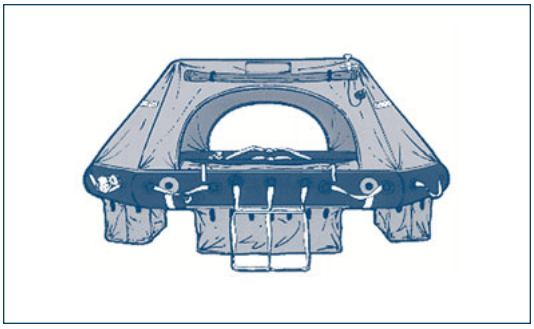
- ➜ Call out to reassure the person
- ➜ Throw one end of the line to the victim and ask he or she to grab hold of it
- ➜ Pull the victim towards the side of the vessel while explaining what you are about to do
- ➜ Clear a space on the deck on which to lay the victim
- ➜ Loop the line under the victims arms and around their chest, the two ends meeting in the middle of the chest
- ➜ Hold the line with both hands at their chest and ask the victim if they are ready
- ➜ Bob them up and down in the water three times (not in over their head) and on the third count, pull the victim up and across the rail
- ➜ Rotate the victim onto their back as you haul them on-board, then lie the victim down gently on the deck face up

Two Person Line Lift for vessels with low freeboard

- ➜ The forward crewmember gains control of the person and then places a short piece of line under his/her arms.
- ➜ The forward crewmember controls the lift as well as reassuring the victim throughout the process.
- ➜ Each of the two crew members should have one knee up on the rail or gunwale.

- Both crew members hold the line with both hands, as close to the person's chest as possible.
- Count to three and pull straight up until the person's hips are at the top of the rail, then continue the pulling motion as the forward crewmember controls the heads.
- The aft crewmember grabs the feet.
- Together with the aft crewmember, pivot the person so that he/she is head towards the bow.
- Slowly lower the victim gently onto the deck.

10.2.2 Recovery From Various Survival Craft

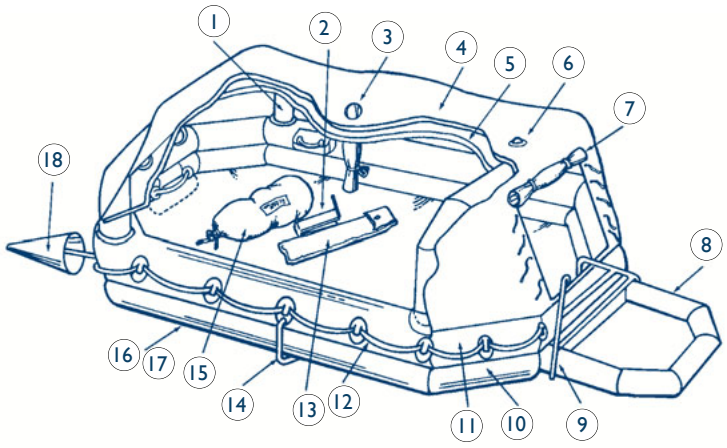


Rescue from survival craft may involve dealing with liferafts, open lifeboats, enclosed lifeboats, or any of a number of types of survival capsules. The physical condition of the survivors and the physical characteristics of the survival craft may complicate rescue and transfer of personnel. Modern totally enclosed liferafts are designed to provide the best survival platform, but as they ride on top of the waves, the occupants may well be suffering from severe seasickness and be very unsteady on their feet. Other survival craft such as open lifeboats, totally enclosed lifeboats, rescue capsules are very buoyant by nature of their construction and have an extremely lively motion at sea. Many of the enclosed survival craft are very buoyant by nature of their construction and have an extremely lively motion at sea. Each situation requires careful evaluation before approaching the survival craft to determine whether immediate removal of personnel is safe or your vessel may be required to wait until the weather/sea conditions improve.

There have been cases of survivors found safe in a survival craft only to be accidentally rammed in heavy seas by their would-be rescue ship trying to manoeuvre alongside.

Modern enclosed survival craft can safely and effectively maintain survivors in relative protection for long periods of time. In some cases, there is no need for immediate removal of personnel from the craft. Some survival craft are self-righting with all hatches sealed and all personnel strapped into their seats. These boats are capable of operating at full capacity and at six knots for a period of 24 hours. Boats for tanker vessels will have a self-contained breathing air supply together with water spray coverage for the exposed hull, and can operate in fire or a toxic atmosphere safely for a period of ten minutes. The hatches on these craft are very small in order to accommodate both the self-righting and fire survivability features. However, the small hatches also make transfer of personnel difficult. Transfer of injured or sick personnel may be extremely dangerous even in a moderate sea.

1. Canopy Arch
2. Pump
3. Rain Catcher with Tie-Down line
4. Exterior Canopy
5. Inner Canopy
6. Outside Light (Recognition)
7. Canopy Closure
8. Boarding Ramp
9. Boarding Handles
10. Hull Tube
11. Gunwale Tube
12. Life Line
13. Paddle Bag
14. Righting Line
15. Equipment Container
16. Hull CO_2 Bottle
17. Gunwale CO_2 Bottle
18. Sea Anchor



10.2.3 Person trapped under a vessel

WARNING

The first rule for the rescue team is NEVER enter an overturned hull under any circumstances.

When people are trapped underneath an overturned vessel it presents a very dangerous and unstable scene for the rescuers to deal with. The first rule for the rescue team is never enter an overturned hull under any circumstances.

A CCGA team can be most effective when trying to stabilise the scene and recover any survivors that are in the water around the area. The CCGA vessel should approach the vessel slowly, to prevent wave action that could possibly break a sealed air pocket. Once alongside, try to determine if anyone is trapped inside the vessel, and if so, their probable location in the vessel. The crew should communicate with the survivors through the hull of the vessel by tapping on it and shouting. Keeping the people advised throughout the rescue on what steps are being taken to rescue them will reassure them.

There are a number of things that can be done to stabilise the vessel and prevent it from being upset and sinking. The CCGA vessel can request a "Securité" broadcast that notifies vessels in the area to reduce speed and wash when passing. The CCGA vessel may also hold the vessel in a sheltered area or tow it carefully to shore.

Management of the scene

- Contact JRCC and request that divers and someone familiar with the internal structure of the craft be provided.
- Stabilise the hull with flotation bags, other boats tied alongside, or with heavy shipboard lifting tackle. Place vessels on either side and carefully pass a line under the capsized vessel. Do not attempt to right the vessel at this stage.
- Inject air under the vessel (preferably clear air from diving tanks or a diving compressor). This will help keep the boat afloat and may provide more breathing air to trapped victims. Be watchful that adding air to air pocket(s) does not decrease stability of overturned vessel, causing the uncontrolled righting and subsequent sinking of the vessel.
- Attach a line and marker to the hull to mark the position in case the vessel sinks.
- If someone familiar with the internal structures of the boat arrives, consider having him/her coach the survivors on how to escape, and advise the divers on how to enter the vessel.
- Once the divers have arrived on scene, they should be fully briefed and provided with any required assistance.
- If it is necessary to tow the vessel, always tow very slowly to prevent breaking any air seals.

10.2.4 Recovering from shore

Shorelines and vessels do not mix. Surf and rocks are extremely dangerous to rescue vessels.

In calm conditions some small vessels are able to beach or get close to rocks and recover people from shore.

When conditions are rough, attempting to recover someone from the beach or from shallow water can be a fatal mistake for your team. An inexperienced coxswain/captain operating too close to rocks and surf may have his/her rescue vessel and its crew, pounded to pieces in minutes. Helicopters are very effective in these situations and are not in danger of being capsized by surf and will be a more suitable resource in this situation. Whenever attempting to recover from shore:

Stop and Assess

With the vessel in a safe position the crew can assess the elements and feature of the scene. The coxswain will ask the crew to report what they see.

In order to assess the wave and water behaviour the team should observe it carefully for a period to witness the range of wave and water motion.

The team can assess the shoreline and identify potential sites for taking people off of the shoreline.

Helicopters are the better choice for getting patients ashore

The coxswain will ask the team for suggestions regarding a plan of action. Once the coxswain has considered the plan, he or she will describe the plan and assign tasks to the crewmembers. The crewmembers will confirm their roles and then the coxswain will review the commands and signals for the tasks and emergency contingencies.

Commands and Signals to be established

- ✓ Distance measurements
- ✓ A sign or command to indicate to the survivor to board the vessel
- ✓ Sea watch person's warning of large incoming sea
- ✓ Coxswain's warning of a violent manoeuvre
- ✓ Coxswain's warning of pulling vessel away

Some common plan tasks:

- ⇛ Contact the people on shore and advise them of your plan and expectations
- ⇛ One crewmember should be assigned to look to seaward and watch the oncoming seas and swell.
- ⇛ One crewmember should go to the bow to communicate with and recover the people

Floating in a Liferaft or Lifebuoy

Some vessels engaged in SAR may carry a liferaft. The liferaft can be used to conduct the safe transfer of persons to and from a shore. Before launching the liferaft, the SRU should be positioned to take advantage of wind and current to drift the raft into the beach. If the situation will not allow the raft to drift in on its own, a messenger line may be sent ashore by line-throwing gun, heaving line, or floating in with a smaller object. The raft will have to be inflated and have adequate line attached to send it in to the beach. Depending on the circumstances, the coxswain may want to send a crewmember in the liferaft to assist the survivors. If a crewmember does board the raft, he must be dressed in full protective clothing including hypothermia protection (drysuit or immersion suit and a helmet).

Transferring personnel from a liferaft to a rescue vessel can be very difficult, particularly in less than calm sea conditions. The liferaft will experience constantly varying motion from the soft bottom and soft floor as well as a constantly changing movement of the whole raft, making safe movement of personnel difficult.

Alternatively a lifebuoy, with a line (and light at night) attached to the rescue vessel, can be floated ashore to the victim, to aid their recovery.

10.2.5 Recovery of non-survivors

Many persons still die at sea and unfortunately bodies are not always recovered during the initial search operation. When the conditions permit, drowning victims may refloat after a period of submersion. Vessels engaged in SAR can be dispatched to assist in recovering dead bodies. When doing so, it is essential to follow proper procedures to avoid contamination and to facilitate legal issues.

When recovering a body, follow these guidelines:

- ➜ If possible and practical, have a police officer on board during body recoveries. Ensure that police officers and morgue personnel will be waiting for you at the delivery point. (If no officer is present, obtain authority before moving the body.)
- ➜ Wear protective gear (goggles, masks and long rubber gloves) before approaching the body.
- ➜ Manipulate the cadaver with plastic boat hooks.
- ➜ If you have a camera, take a photograph of the body's position and state before attempting recovery.
- ➜ Prepare a body bag (the thick black or green canvas bags are better than the thin white bags, which may break.)
- ➜ If the body is badly decomposed then a par-buckling method may be preferred. Try to avoid grabbing limbs and lifting the entire weight of the body.
- ➜ Keep in mind that this is a very emotional time for the family of the victim. In this regard, the body needs to be treated with the utmost respect and dignity.
- ➜ Communications must be conducted with the proper discretion when reporting bodies, and preferably by mobile phone if possible.

After the operation, wash everything that came in contact with the body with soap and disinfect with a solution of water and bleach (1/4 cup of bleach per gallon of fresh tap water). Used rubber gloves should be replaced.

Submerged Victims

Recovery of submerged victims may be quite difficult and hazardous for the untrained rescuer. Under no circumstances should any untrained rescuer, including certified scuba divers, attempt to enter the water to recover a submerged victim. Statistics show that untrained rescuers attempting such recoveries often die or get injured in the process. Submerged victims quite often have very little chance of survival.

It is not advisable to risk the life of a crewmember to rescue someone that may already be dead. In those situations, the only rescue actions available to you are those that can be performed from the deck of your vessel.

Using sonar to find a body

Take your time with the initial assessment after recovery

10.3 Treatment, Transport and Transfer of Survivors

10.3.1 Patient management for marine specific accidents

Near Drowning

Drowning is defined as death from suffocation due to submersion. The major causes of drowning include the following:

- exhaustion in the water
- loss of control and being swept into water that is too deep
- loss of support (such as a boat that has sunk)
- becoming trapped or entangled while in the water
- hypothermia
- trauma
- having a diving accident

Factors to consider in cold water submersion survival

The following general guidelines are applicable as an indication of potential survival conditions:

- The colder the water, the better. The less warmth there is in the body, the less oxygen is needed to maintain metabolism
- Moving water cools faster than standing water. This factor must be added to the balance when ambient air and water temperature and time of year are considered in calculating survival chances
- Water depth usually correlates with temperature. Temperature drops as you descend
- Smaller objects lose heat faster than larger objects. (e.g. children)
- Cleaner water makes for an easier recovery. Contaminants or biological growths ingested into the lungs frequently cause massive infections following pulmonary injuries after the initial immersion incident
- The less the victim struggles in the water, the better. If the victim submerges with a minimum of struggling, his or her bloodstream and lungs retain more oxygen for cellular maintenance

Diving Accidents

A diving accident can require the assistance of the CCGA stationed in the area.

If you are alerted for a diving accident in your area, consider these actions:

- A decompression chamber is normally necessary. It is JRCC/MRSC's responsibility to find out where the closest decompression chamber in your area is located. Plan your best evacuation harbour accordingly
- Bear in mind that a helicopter might be the best means of evacuation
- Make sure that all detailed information concerning the patient's accident travels with him or her

Pressure is the main problem for diving emergencies. To understand how these injuries can occur, it is important to understand the effects of varying pressure on the human body. Here is a synopsis of the effect of pressure on air-filled body cavities and on inspired gas properties.

The effect of pressure on an air-filled cavity can be easily explained with the example of a balloon. When a balloon is taken to the bottom of a pool, the volume of that balloon decreases during descent.

When the balloon is brought back to the surface, its original volume is restored. This phenomenon is caused by pressure. As the pressure increases during descent, the air inside the balloon gets compressed and the balloon shrinks. When pressure is decreased on the way back up, the air expands (or is decompressed), and the balloon expands.

Now imagine what would happen if someone was to put additional air into the balloon to restore its original volume at the bottom of the pool. Nothing would happen as long as the balloon remains at the bottom of the pool. If the balloon is brought back to the surface, however, it will expand to well past its original size and possibly even burst.

This simple phenomenon explains most diving injuries. All air-filled body cavities can be compared to the balloon. On the way down, the volume of air in these cavities decreases. If the air-filled cavity is rigid (sinuses for example), additional air will be drawn into the cavity, or it will collapse. This phenomenon is called "equilibration." Failure to equilibrate generally causes severe pain and will discourage any diver from going down. On the way back up, the pressure in the rigid air-filled cavity will increase. If equilibration does not occur again, the pressure may build to the point where the cavity may "explode." In other words, the air will force its way out of the cavity. For soft cavities (such as the lungs or digestive tract), things are less dramatic. The elasticity of these cavities will prevent immediate damage. Ruptures can still occur if the pressure is diminished too quickly (i.e., the ascent is too fast).

The amount of gas that can be dissolved in liquids increases as the pressure increases. Another model will be used to explain this fact. When you observe an unopened bottle of champagne, you do not see any bubbles. This is simply because all the gas is dissolved into the precious liquid. When you remove the cork, air flows out of the bottle, the pressure around the liquid rapidly decreases and bubbles begin to form. At this lower pressure, the liquid cannot hold that much gas, so the excess must leave the liquid. You have probably noticed that bubble formation can be prevented if the cork is removed slowly. Conversely, you can increase bubble formation by rapidly removing the cork.

All this applies to a diver. When a diver goes down. pressure is increased, and an increased amount of gas can be absorbed into the diver's body (this is the unopened bottle situation). If the diver observes the dive tables and the ascent rates, significant bubbles will not form. If the diver does not observe the tables, bubbles may form. Formation of bubbles in the tissues and the blood stream can cause decompression sickness and gaseous embolism, two life-threatening situations.

Decompression

Pressure is the main problem for diving emergencies.

This section on diving physiology could not be complete without a few words on decompression. Divers accumulate gas (mostly nitrogen) in their tissues when they are at depth (because of the increased pressure and gas density). The accumulation of gas is a function of time. The longer a diver spends at a given depth, the more gas he or she will accumulate in the tissues. Gas accumulation is also a function of depth (or pressure). The deeper you go, the faster the accumulation. At some point, if a diver stays too deep for too long, he or she will not be able to get back to the surface without stopping along the way to allow the excess gas to leave the tissues. These stops are called "decompression stops." The "no-decompression limit" is the maximum time a diver can spend at a given depth without decompression stops. Information on no-decompression limits and decompression stops is found in diving tables. Failure to perform required decompression and rapid ascent rates are the most common causes of decompression sickness and air embolism. To minimise risk of injury. prudent divers will conduct the deepest part of their dives at the beginning. They will then ascend slowly and perform decompression (if required) until they surface.

The longer a diver spends at a given depth, the more gas he or she will accumulate in the tissues.

Failure to perform required decompression and rapid ascent rates are the most common causes of decompression sickness and air embolisms.

Minor Cavity Barotrauma

All air-filled body compartments or cavities have the potential to suffer from the pressure variations that occur in diving. The most common problems are:

- ⇛ Ear barotrauma
- ⇛ Sinus barotrauma
- ⇛ Tooth barotrauma
- ⇛ Digestive system barotrauma

Air Embolism

Air embolism can occur when a diver holds his or her breath during ascent. As the pressure decreases, lung volume increases. At a certain point, lung damage occurs and air is forced into the circulatory system. The air bubbles can then obstruct small blood vessels and deprive certain areas of the body of blood and oxygen. In the coronary arteries, this will cause the equivalent of a heart attack. In the brain, it will cause the equivalent of a stroke. Air embolism is a serious, life-threatening condition that requires the patient get immediate transport to a decompression chamber.

Signs and symptoms of air embolism are:

- ⇛ blotching (mottling of the skin)
- ⇛ froth (often pink or bloody) at the nose and mouth

- ⇛ dyspnea (shortness of breath) and cough
- ⇛ symptoms of a heart attack
- ⇛ symptoms of a stroke
- ⇛ dizziness, nausea, vomiting
- ⇛ difficulty in speaking
- ⇛ blurred vision
- ⇛ paralysis
- ⇛ decreased level of consciousness or even coma

Decompressionsickness (DCS) and bends

Decompression sickness usually occurs when a diver does not observe the dive tables and ascent rates. When this occurs, bubbles can form within the diver's body (the "champagne ef fect" described above). Depending on their location, the bubbles may cause several problems. In joints, bubbles usually cause pain (known as bends). When bubbles occur within the central nervous system, paralysis can occur. In the circulatory system, the bubbles may block small blood vessels and thus alter blood supply to certain areas. DCS is a life-threatening condition that requires immediate medical attention. The victim should thus be transported quickly to a recompression chamber. Signs and symptoms of DCS may occur hours after the dive.

Even if a casualty appears dead, basic life support should be started and maintained

Never give up!

- ⇛ sharp pain felt in joints or abdomen
- ⇛ signs and symptoms of air embolism
- ⇛ altered level of consciousness
- ⇛ paralysis
- ⇛ visual disturbances
- ⇛ difficulty walking
- ⇛ speech disturbances
- ⇛ convulsions
- ⇛ bowel and bladder problems
- ⇛ numbness/dizziness
- ⇛ weakness
- ⇛ extreme fatigue
- ⇛ headache
- ⇛ nausea

DCS is usually classified as Type I or Type II. Type I refers to skin bends, fatigue or pain involving joints or muscles. Type II includes neurological and cardio respiratory symptoms.

Treatment

All diving injuries are treated the same way. Here are the priorities:

- ✓ Remove the diver from the water
- ✓ Determine the nature of the problem
- ✓ Organise transport to a recompression chamber (if required)
- ✓ Support vital functions (CPR if needed) and administer the highest possible percentage of oxygen
- ✓ Perform a secondary survey and treat all other injuries

Dive Equipment

Divers may be very bulky and heavy due to the equipment they carry. Getting a diver on board may not be an easy task for anyone who does not know how to remove some of the equipment. The weights on the weight belt or on the Buoyancy Control Device will need to be removed, the Buoyancy Control Device itself and the tank must be removed, and the mask and snorkel must be removed. All equipment removed should be preserved for future examination.

Hypothermia

First and foremost, the casualty must be treated very gently. A reduced body core temperature increases stress on the heart. Rough handling may cause further stress and cause the heart to beat erratically or even stop. If the casualty is unconscious, assess airway and breathing. If no breathing is detected, begin rescue breathing using mouth to mask method (with oxygen if available, and if you are trained for its use). Check the carotid pulse. Severe hypothermia will make detecting a pulse very difficult. Great care must be taken to determine whether a pulse is present; take extra time to make sure (up to 2 minutes). Administering chest compressions over a weakly beating heart may cause erratic heartbeat (ventricular fibrillation) or full cardiac arrest. Rescuers should take at least two minutes to look for a pulse before starting chest compressions.

If the casualty cannot be immediately moved to shelter, wrap them in space blankets or tarps to slow down heat loss due to evaporation. Once you have moved the casualty to shelter, remove all wet cloth-

ing, wrap him or her in warm blankets and apply chemical heat packs to the high heat-loss areas such as the groin. armpits. chest. head and neck. If an Inhalation Warming Unit (Res-Q-Air) is available, a trained rescuer should apply it. If casualty is fully conscious, warm sweet drinks without caffeine or alcohol may be given. Do not put casualty into a hot bath or shower and do not rub the extremities to warm them up. Casualty must be transported to a medical care facility as soon as possible.

Note: Even if a casualty appears dead, basic life support should be started and maintained. The sudden exposure to cold can help to preserve the body, and this person may have a chance of recovery . Never give up!

Re-warmingthe patient

The underlying principle to remember is that cold, acidotic blood contaminated with the harmful by-products of metabolism without oxygen permeates the cooled body's periphery. When a large amount of this blood is allowed to circulate rapidly toward the heart and other organs, it can cause complications as serious as cardiac arrest. This afterdrop phenomenon will occur in any hypothermic patient as circulation increases. The goal is to slow and not aid its progression.

Most formerly-practised suggestions for treating the hypothermic patient such as wrapping him or her in warmed blankets, or immersing the torso in a warm bath, were more harmful than helpful because the overall effect of such procedures was to actually speed afterdrop. Research has indicated that re-warming from the inside out is less harmful to the patient. One simple and apparently efficient all-round method is warm, moist oxygen inhalation. Since the lungs jacket the heart, warming them will in turn warm the heart, thereby protecting it best from afterdrop.

10.3.2 Transport

Once the victim is carefully positioned, you may proceed toward the casualty reception point. Transit time should be used to complete a secondary survey and to treat the non life- threatening injuries of casualties needing quick transport (unstable victims). Try also to periodically re-evaluate vital signs (level of consciousness, breathing and pulse). Be aware that this assessment may become a difficult task due to noise and vibrations (especially at high speed). Confirm with JRCC/MRSC that an ambulance is waiting for you at the designated evacuation point. As for the transit from the scene to the evacuation point, use the quickest route. Try to write your observations and actions on the relevant form to inform paramedics and physicians of what happened and what was done. For less urgent situations, transit time can be used to complete emergency treatments and to complete the written patient care form.

Transit speed should be fast but safe. Transit speed will depend on several factors, including sea state and the casualty's condition. The nature of the emergency care that you must provide will also have an influence on transit speed. For example, it might be impossible to perform CPR adequately if you are going at 35 knots in 6 ft. seas! Transit speed should thus be a compromise between the need for quick transport and the necessity of keeping the casualty alive during transit. Under no circumstances should your speed prevent the administration of life-preserving emergency treatment.

Transit speed should be fast but safe

10.3.3 Transfer to or from another vessel

Where a patient has to be transferred from one vessel to another, great care should be taken to protect the patient during the transfer. The patient should be preferably in a stretcher fitted with flotation, or else wearing flotation, and stretchers fitted with a safety line. Try and fit some blankets under the patient as insulation and cushioning. Try to position the patient within the craft to minimise the effects of motion - the after end is generally better in a planing vessel. The layout of your particular vessel will dictate possible positions.

Research has indicated that re-warming from the inside out is less harmful to the patient.

DO NOT delay transport for the secondary assessment unless the victim can be classified as "stable."

***DO NOT** delay transport for the secondary assessment unless the victim can be classified as "stable."*

Preparingthe SAR Unit foTransfer

- Ensure that persons on both vessels are wearing lifejackets or PFDs
- Clearly explain the transfer procedure to the crew and the people on board the stricken vessel
- Designate one person to communicate with people on the distressed vessel, and caution others from causing confusion by calling out other instructions
- Rig fenders on both craft, if required
- If lines must be rigged, ensure that only slip lines are used.

Approaching a Distressed Vessel for Transfer

- If the distressed vessel is substantially larger than the rescue craft, the hull may provide a lee for the transfer. In this situation, accept lines thrown by the distressed vessel
- If the vessel is on fire, approach from the windward side
- Beware of lines in the water, or flotsam in the wake of a sinking craft

Transfer

If conditions permit, place the rescue craft alongside the distressed vessel and secure using slip lines from the rescue craft, and be prepared to cast off quickly if necessary. If conditions do not permit securing to the distressed vessel, try a "touch and go" with instruction on when to transfer given by a designated crew member.

10.3.4 Transfer to Medical Care

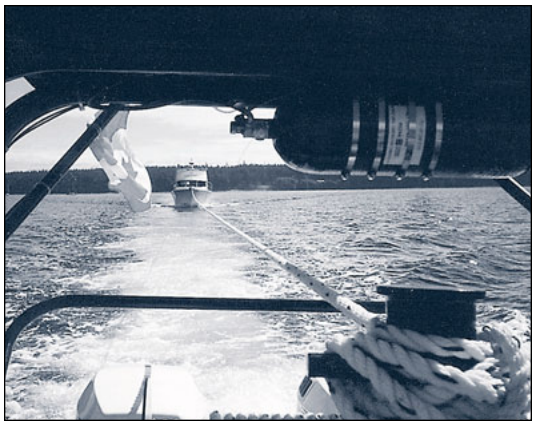
A thorough report on the patient's condition and treatments given should be given to the ambulance crew when the casualty is handed over. This may be done orally, but any recorded information such as patient care forms should accompany the patient. Any of the casualty's personal effects such as purses, glasses etc. should be noted before they are entrusted to the ambulance crew. Also, first aid equipment that goes with the patient (e.g., stretchers) should be noted and arrangements made for its return.

Notes on treatment of the patient on the vessel can be written on the back of the crew members rubber gloves in ball point pen or sharpie, and handed to the ambulance personnel.

10.4 Saving a vessel

The first priority is always the people followed by the vessel or property. However, many times the best way to save the people is to save the vessel. Each team should apply the basic principles of ensuring a safe transit to the scene and conducting a full SAP assessment when on scene.

When conducting rescue or salvage situations the plan may vary but the basic crew responsibilities and positions do not change.



When weather permits we save the people and the vessel

Helm

In situations like snatching a vessel from close to shore, an experienced helmsman is recommended. The coxswain or captain may be at the wheel.

The helm's basic responsibilities are:

- ⇛ Safe manoeuvring of the vessel through the various evolutions
- ⇛ Be prepared to take action in case of crew overboard
- ⇛ Lookout ahead for traffic, obstacles, objects in the water
- ⇛ Search spotting duties for the forward sector in a search
- ⇛ Control and monitoring of the speed, throttles, engine warnings, electronics, power and signalling/horn (smaller vessels 20m and under)
- ⇛ Monitoring the depth
- ⇛ Observing the SAR operations and watching for hazards
- ⇛ Anticipating and warning the crew of coming manoeuvres

Radio/Communication Watch

- ⇛ Relaying messages and instructions from JRCC/MRSC to vessel coxswain/captain and crew
- ⇛ Logging all communication and actions relevant to the vessel or the mission
- ⇛ Establishing contact with the vessel and conducting an assessment interview (see Towing, Chapter 8). In the event of imminent danger to the vessel the questions may be shortened to

"Is everyone safe and accounted for? Are you prepared to take our line, etc.?"

- ⇛ Regularly checking and testing the status and function of the radio/radios
- ⇛ Stopping the vessel if overhearing a distress signal or the spoken words **MAY DAY**
- ⇛ Notifying the coxswain if over hearing **PAN PAN, Securité**, or a relevant broadcast/radio traffic
- ⇛ Answering and communicating all vessel business
- ⇛ Sending a regular SITREP to JRCC via Coast Radio Station

Positions for Salvage Operations

This position requires one or two crewmembers that perform the tasks that are specific to the vessel in need. These operations can include:

- ➡ Salvage pump and suction hose
- ➡ Damage control gear set up
- ➡ Heaving lines and messengers (see Towing Chapter 8, line handling section)
- ➡ Towline set up and handling (see Towing Chapter 8, line handling section)
- ➡ First aid gear and stretchers
- ➡ Boarding a tow (see Chapter 8)

10.4.1 Assessing a Vessel's Stability

Vessels that are overloaded, damaged or have taken on water may be unstable and therefore extremely dangerous. It is important to assess the stability of any vessel that you are assisting. Some vessels that appear stable are not and some vessels that appear dangerous may be okay. You must be able to recognise the telltale signs of a vessel in trouble and stay off of that vessel. This assessment can be done during your SAP.

Reserve buoyancy

The sealed intact part of a vessel's hull above the waterline but below the superstructure offers something called reserve buoyancy. This is your vessel's insurance policy against adverse conditions and accidents. If a vessel is overloaded or has taken on water it may lose its reserve buoyancy and intact stability along with it. The best clue that a vessel has lost its reserve buoyancy is the waterline. Most vessels have a waterline or bootline painted on the hull. If this line is well below the water then the vessel is said to have no freeboard (distance from the water to the level of the main deck). With no freeboard and the main deck awash or close to underwater this vessel will not have enough reserve buoyancy to handle any seas or swells.

Watertight integrity and Down flooding

A vessel can have lots of reserve buoyancy but if her hatches, portholes and doors are not secure then she is at risk of down flooding in heavy weather (taking water into the hull). All vessels being assisted should be asked to secure all watertight closures if possible before rescue attempts can begin. Down flooding causes a vessel to lose her stability and may eventually roll over.

Vessels that are overloaded, damaged or have taken on water may be unstable and therefore extremely dangerous.

Free Surface and Load Shift

Water or fuel on board a vessel can cause trouble if it is allowed to travel across a free surface (a distance without breaks). This is why it is best to have fuel and water tanks either empty or full because liquid moving in these tanks reduces stability when it sloshes back and forth. Cargo should be kept low in the vessel and not allowed to shift in the rolling seas. Cargo or weight unevenly distributed on the vessel can cause the vessel to list (tilt to one side and stay there). Listing is another sign of reduced stability.

Water or fuel on board a vessel can cause trouble if it is allowed to travel across a free surface

Signs of Trouble

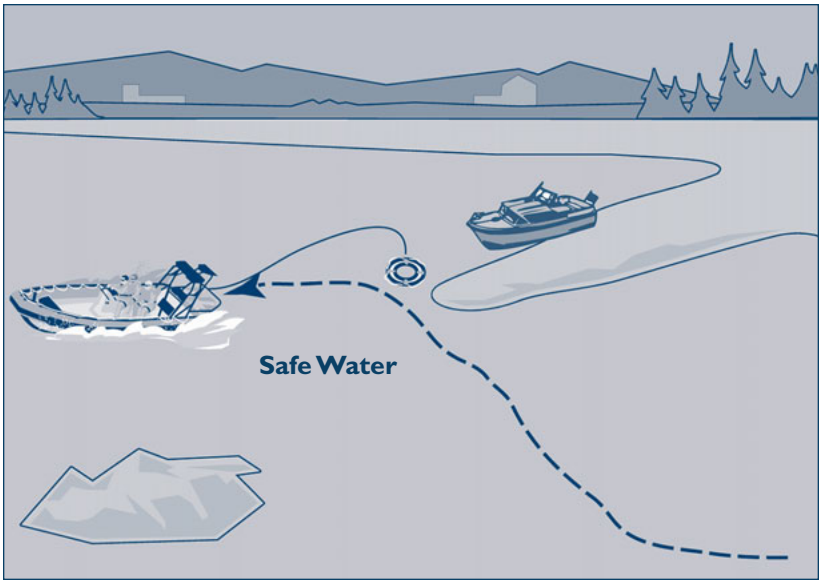
As you approach a vessel in trouble you should look for the following signs of reduced stability:

- ➡ Slow sluggish roll that hangs before returning upright
- ➡ Listing to one side or the other
- ➡ Low freeboard and a waterline (bootline) deep under the water
- ➡ Water in the bilges (more than a few inches)
- ➡ Cargo or loads high on the deck
- ➡ Cargo that has shifted
- ➡ (Loll) Lying on her side and flopping from side to side without wanting to sit upright

10.4.2 Rescue of a vessel drifting onto a lee shore

Remember, SAP equals one attempt and one success

When recovering a vessel that is drifting into danger the crew of the SRU may have to act quickly to get the vessel free of the surf or rocks. This does not mean that the SAP protocol can be skipped. This situation can be very dangerous and a proper assessment shall be made before any actions are carried out. Remember, SAP equals one attempt and one success. No SAP means a few botched attempts and possible failure.



Floating a messenger line

Stop and Assess

With the vessel in a safe position the crew can assess the elements and feature of the scene. The coxswain will ask the crew to report what they see. In order to assess the waves and water behaviour the team should observe it carefully.

The team can assess the vessel and occupants and identify potential complications or sites for attaching to the vessel.

Plan

The coxswain will ask the team for suggestions regarding a plan of action. Once the coxswain has considered the plan, he or she will describe the plan and assign tasks to the crewmembers. The crewmembers will confirm their roles and then the coxswain will review the commands and signals for the tasks and emergency contingencies.

Commandsand Signals to be established

- ✓ Set up/ready the line
- ✓ Prepare to pass the line
- ✓ Stand by
- ✓ Pass the line
- ✓ Put on/take off another wrap.
- ✓ Slack, surge or pay out the line
- ✓ Take in
- ✓ Bring her alongside
- ✓ Let her all go
- ✓ Distance measurements
- ✓ A sign or command to indicate to a survivor to stay still
- ✓ Sea watch person's warning of large incoming sea
- ✓ Coxswains warning of a violent manoeuvre
- ✓ Coxswains warning of pulling vessel away

Some common planning tasks:

En route, advise the vessel operator to have everyone aboard don life jackets and to drop anchor (There have been cases involving vessels drifting ashore in which a ready and available anchor was not used. People may forget that they have an anchor for use in just such an emergency.) The SRU crew shall ready all required towing equipment for arrival on scene. Bear in mind that the seas on scene may be agitated (e.g., secure towline to prevent the possibility of fouling screws). The coxswain or captain will usually approach the disabled vessel in an arc from seaward, keeping the SRU to windward of the disabled vessel. The path of the arc should bring the stem of the SRU across the beam of the disabled vessel. At this point the line should be passed, but at no time should the SRU lose headway or be allowed to drift toward the shore. When the line is secured. the SRU should start towing immediately to slowly pull the distressed vessel out of danger. Once the disabled vessel is clear of the lee shore danger, the towline should be checked and adjusted as necessary to carry on with the tow. If water depth or sea conditions are such as to endanger the SRU, the towline should be passed by floating down to the casualty or firing a line from a line-throwing apparatus.

10.4.3 Damage Control

Damage control is a challenge that requires ingenuity and experience due to the range and circumstances.

Wood plugs and wedges

Plugs and wedges should be used from inside when the hole is accessible; it could be very hazardous to try to plug a hole from outside the hull. Wrapping a piece of cloth around wood plugs or wedges will increase their efficiency.

10.4.4 Righting or Towing Capsized Vessels

One must make absolutely certain that all people from a distressed vessel are accounted for before beginning any procedure to right the vessel. Survivors may be trapped inside the overturned hull.

When assisting a capsized vessel:

- ✓ Recover all PIW immediately
- ✓ Check all recovered PIW for injury and/or hypothermia
- ✓ If anyone is injured or hypothermic, organise transport toward shore and have another unit (if possible) take care of the boat. If no one can deal with the boat, leave it there and notify MCTS
- ✓ Have towing waiver signed and prepare to right the vessel
- ✓ Discuss the procedure with the boat operator(s)
- ✓ Assign tasks to everyone and proceed

Damage control is a challenge that requires ingenuity and experience due to the range and circumstances.

WARNING

Crewmembers should never go below decks or into areas where they may be trapped

Many vessels are best left to wait for the tide

Stop and Assess

With the vessel in a safe position the crew can assess the elements and features of the scene. The coxswain will ask the crew to report what they see or "detail" the scene. In order to assess the seas and current the team should observe the signs carefully.

10.4.5 Assisting Grounded Vessels

When the vessel is slightly aground (bow into the bottom and the stern afloat), a straight pull off is the simplest and most effective method of assistance. The straight pull is conducted as follows:

It is important to know when your efforts will cause more harm than good.

Vessel State

- Vessel size, rigging, and type
- Vessel stability and/or obvious damage to hull and waterline
- liferaft or survival suits available
- Vessel's securing points and rigging tackle (lines, wire and anchor)
- Vessel's safety equipment and dewatering capability
- Leaking fuel or risk to environment
- Can the vessel wait for the tide to rise

In most circumstances it is better to wait for the tide than to pull a vessel off of a rock or a beach.

Environment

- Tide tables
- Current on scene
- Wind
- Anchoring spots and securing points on the shoreline
- Rocks and shore
- Depth of water around the vessel
- Weather forecast

People

- Number of people on board
- All people accounted for
- Injuries or problems
- PFDs and safety equipment
- Do they have an evacuation plan?
- Waiver

Plan

The coxswain will ask the team for suggestions regarding a plan of action. Once the coxswain has considered the plan, he or she will describe the plan and assign tasks to the crewmembers. The crewmembers will confirm their roles and then the coxswain will review the commands and signals for the tasks and emergency contingencies.

Commands and signals

- Distance measurements
- A sign or command to indicate a survivor to stay still
- Sea watch person's warning of large incoming sea
- Coxswains warning of a violent manoeuvre
- Coxswains warning of pulling vessel away

Some possible plans

- Ascertain current, and plan to use it to your advantage.
- Ensure that anchors have been laid out to seaward to prevent the vessel from being driven further aground.
- If hull damage exists, determine the location and extent. If the boat is beached, have a beach party from your unit visually inspect and evaluate the condition of the vessel (if possible). Ensure the vessel's interior hull is free of sand, water and leaks. Be sure that it is not leaking pollutants into the sea. If the vessel is holed, temporary repairs will be required to reduce leakage to a minimum. If the vessel has a wooden hull ascertain whether any seams have worked open. Effect temporary repairs if possible.
- Hand the towline directly to the vessel. If you must use a messenger line, the hand-thrown heaving line is preferred. Another method to transfer this line is by using a buoyed, floating line. This must be done cautiously in order to avoid fouling your propellers with the line and putting your own vessel aground. The line should not be floated straight down to the vessel. Pay it out parallel to the shore. Position your vessel upstream from the grounded vessel, and pay out the messenger until the end is near the shore. Turn about and manoeuvre past the stranded vessel, paying out the messenger as you go.
- Instruct the disabled vessel on securing the towline, and then clearing personnel from the deck area.
- Go out into clear water and drop the anchor , after you clear the beach or shoal.
- After the towline is secured and the crew clear of the danger area on deck, go ahead slowly, weighing anchor and paying out the towline to maintain a generous catenary. This requires preplanning and flawless crew communication and co-ordination.
- Commence pulling so that optimum force can be applied at maximum high water. The strand-

ed vessel can best be pulled off in the direction opposite to that in which it ran aground.

10.4.6 Fire fighting

Vessel on Fire at Sea

When attending a fire at sea, your first priority is to extricate, stabilise, and evacuate any victims.

Fires should only be fought:

- ⇛ To save lives (i.e., victims trapped inside a burning vessel)
- ⇛ To prevent danger to bystanders

Prepare your vessel to act

The coxswain/captain will contact the JRCC when on scene while the crew make preparations to extricate and stabilise survivors. Any readily flammable materials (portable spare fuel tanks, convertible tops, tarps, etc.) will have to be moved from the deck area. Prepare your fire fighting equipment (extinguishers, pumps, and fire axes). Remember that gasoline tanks, as well as pressurized containers such as propane tanks, divers' bottles, CO_2 extinguishers, and aerosol containers can all explode in the heat of intense fire.

When approaching a vessel on fire:

Stop and Assess

Survey the scene from upwind to determine the location of any survivors; if you don't see survivors onboard, shut down your engines and listen for survivors. Remember, if there is any significant wind, survivors in the water will generally be found upwind of the burning vessel. The captain and crew can point out the characteristics of the fire and identify any flammable hazards. By asking survivors or the coast radio station, try to determine whether or not there are any explosive items on board (propane tanks, compressed air, etc.)

Remember, if there is any significant wind, survivors in the water will generally be found upwind of the burning vessel.

Plan

Once all the details of the scene have been declared then the coxswain/captain can ask for planning input. The crew will suggest plans, and approaches. After careful consideration, the coxswain will describe the plan and assign the tasks along with any emergency procedures. Each crewmember will repeat the tasks and confirm their roles. The coxswain will review any signals and commands before commencing the approach. The coxswain will then describe the plan and assign tasks as necessary.

Some plans would include actions such as:

1. If there are indications that survivors may be in the water, then immediately start a suitable search pattern.

2. Recovering victims from a burning vessel by moving in with protective fog and pulling them off the boat.

3. If the fire is too intense or there is danger from propane tanks, and the victims are wearining lifejackets, get them to jump into the water and swim to a postion where you can safely pick them up.

4. If everyone is recovered, then stand off and keep other vessels clear.

CGA vessels are not equipped nor the crews trained to fight fires at sea. **DO NOT** board a vessel on fire.

10.5 Helicopter Operations

10.5.1 Hoist Operations

If survivors require immediate medical attention, a MEDEVAC may be conducted by a Canadian Forces or US Coast Guard helicopter.

A new Cormorant helicopter (left) beside an old Labrador helicopter

Safety and Hoist Operations

Do not touch the winch wire or the man descending on it until after it has touched down

This position requires one or two crewmembers that prepare the vessel for hoist operations. These operations can include:

- Clearing and securing the decks
- Notify the aircraft of any dangers or hazards
- Patient set-up (if MEDEVAC)
- Ensuring that the patient is protected from the severe effects of helicopter "downwash." If your rescue craft allows, keep the patient in a warm, well-lit area to facilitate a medical assessment by the SARTECH
- Prepare fire fighting gear and PFDs checked and ready
- Prepare lighting and signals (if any)
- First aid gear and stretchers
- Avoid focusing light beams directly on the helicopter.

Only essential crewmembers should be on deck during the hoist operation. PFDs must be worn. Helmets and eye protection should be worn, if available.

Do not touch the winch wire or the man descending on it until after it has touched down.

The patient's medical history, log of his/her vital signs and any first aid treatment provided should be listed and given to the SARTECHs, along with the patient's personal effects.

Positions for hoisting:

The helm's basic responsibilities are:

- Safe manoeuvring of the vessel through the various evolutions
- Manoeuvring the vessel in the event of an emergency with the SAR tech or aircraft
- Lookout ahead for traffic, obstacles, objects in the water
- Control and monitoring of the speed, throttles, engine warnings, electronics, power and signalling/horn (smaller vessels 20m and under)
- Anticipating and warning the crew and helicopter of up and coming manoeuvres

Establish your communications before commencing

Radio/Communication Watch

- Establishing contact with the helicopter and recording the instructions given by the pilot for the hoist operations
- Identify lift area on the rescue vessel and the method of approach
- Relaying messages and instructions from helicopter to vessel coxswain/captain and crew
- Relaying the helm instructions to the helmsman
- Reviewing emergency procedures with the crew
- Listening for communications during the hoist
- Establish hand signals if required by aircrew
- Logging all communication and actions relevant to the vessel or the mission
- Notifying the coxswain if overhearing **PAN PAN, Securité, or a relevant broadcast / radio traffic.**

10.5.2 Air drops

Survival Kit Air Dropable (SKAD)

DND SAR aircraft carry air dropable survival kits that consist of two 10-person liferafts and two survival containers. These kits are referred to as SKADs, and can be dropped either to persons in the water, or to persons wishing to abandon their vessel, but who do not have liferafts. The following deployment procedure is used. When the Department of National Defence SAR aircraft arrive, they will make several passes at approximately 300 to 500 feet to check wind drift.

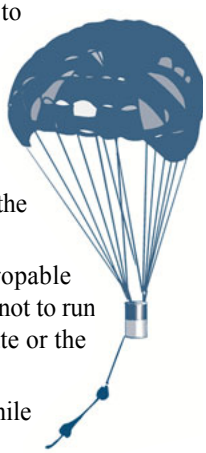
The aircraft will probably drop several smoke canisters to check wind speed and direction, and also to mark the target. Depending on the rate of drift of the target, the air crew will try to lay the kit in a line, either upwind or downwind. All the components of the SKAD are linked by 280 feet of floating poly line. The intent is to allow the target to make contact with this line so that the components may be hauled in. **Do not cut the line**. The rafts inflate in the air once jettisoned out of the SAR aircraft.

If you are operating near a SKAD (i.e. trying to recover survivors from one), be extremely careful not to become entangled in the recovery line. Do not attempt to retrieve components of the kits.

Air Dropable Pump

In the event that a distressed vessel requires emergency pumping assistance to stay afloat, SAR aircraft can either lower a portable pump by hoist, or drop it by parachute. They may also drop it to a rescue vessel for transfer purposes. The following procedure applies to parachute drops:

- The aircraft will make several low passes, dropping smoke canisters to check wind drift direction, and to mark the target
- The pump will be dropped to windward of the target. The air crew will attempt to bracket the target with a 600 foot recovery line that is attached to the pump at one end and to a drogue at the other
- When recovering an air dropable pump, you must be careful not to run afoul of either the parachute or the recovery line
- Do not open the canister while it is still in the water



SAR crews must be familiar with other unit's emergency proceedures.

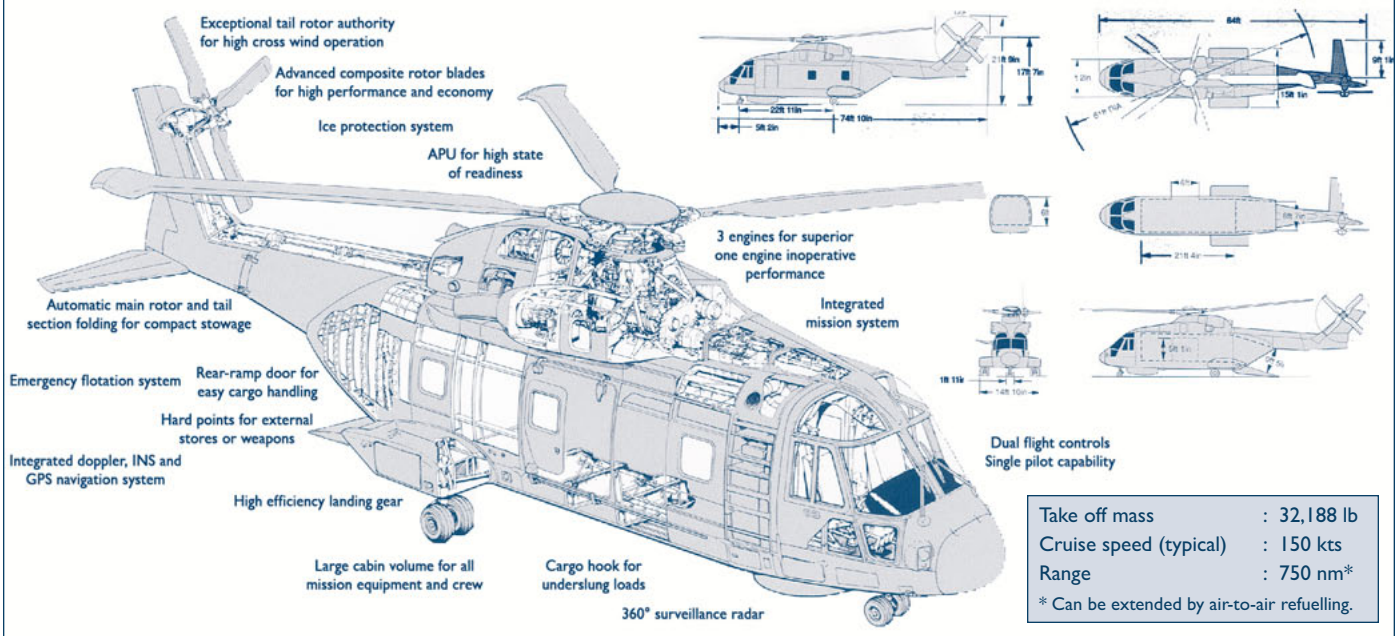
10.5.3 Aircraft Emergencies

Aircraft Engine Failure

In the event of aircraft engine failure, the aircraft will break away to the nearest safe area. If a person is on the hoist at this time, the aircraft commander will sever the hoist cable and drop the person into the sea, simultaneously making a decision as to whether to land the aircraft itself in the sea. If such a landing is made, the first priority for the surface vessel crew is to manoeuvre the vessel to avoid damage or injury from the helicopter rotors while picking up the person cut free from the hoist, and assisting the rest of the crew of the aircraft as required.

Entering the Aircraft

The aircraft crew will abandon the craft utilising an on-board inflatable raft for flotation. When approaching the aircraft, wait until the rotors stop turning. When alongside the aircraft, look for guidance from the crew or obvious markings indicating an emergency exit. If the exit is partially submerged do not open it unless you are prepared to flood the aircraft. Most DND helicopters have a door that is best used in ditchings; use of this door should retain the watertight integrity of the aircraft, which may be lost if other emergency entrances are opened. However, if necessary, either the emergency exit door, or the escape window panels may be released by means of external pull tapes. Either the pilot's or co-pilot's side windows in the cockpit may be released by first pressing the button on the side window's external handle to activate the spring-loaded emer gency release handle. Turn this handle to release the side window.



Canadian Forces EH-101 Cormorant Search and Rescue Helicopter

10.6 Boarding a Vessel

Occasionally during search and rescue operations a SAR vessel must come alongside a vessel underway and transfer gear, people, and/or patients. Some vessels such as tugs, cruise ships in confined waters or vessel in heavy chop must maintain some steerage way in order to be a stable platform for transfer Rigid Hull Inflatables are best suited for this operation because of the tubes. But other vessels can do this with careful preparation and a smooth hand at the wheel.

Boarding a vessel underway is not a task to be taken lightly. Only an experienced coxswain backed up by an experienced crew should perform this manoeuvre.

WARNING

Never cross the bow of an oncoming vessel!

Critical Dangers

The greatest dangers in this operation exist when the rescue vessel gets too close to the bow or loses power and is caught by the stern wave. This can result in a person falling overboard or the vessel broaching. The waves of different hull designs can vary. If the two waves are close together this can make the approach difficult and other options should be explored (e.g. do not approach).

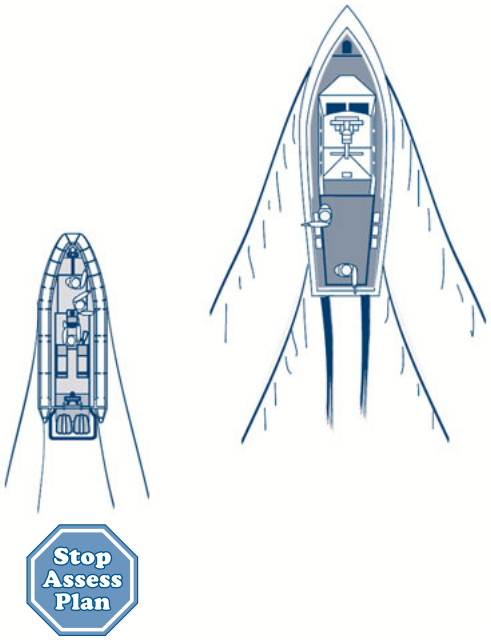
The coxswain will avoid getting too close to the bow or over top of the bow wake when close alongside. This can throw you into the bows. **Never cross the bow of an oncoming vessel**! The stern of the target vessel presents a danger, especially when it is moving fast. A large wake can be dangerous. If the propellers ventilate in the white water and lose thrust, your boat can be turned broadside to the wake and capsized. This can only occur if the stern wave is particularly steep. If you are coming alongside a lar ge vessel, watch out for overboard discharges and any gear slung out the side of the vessel.

10.6.1 Stop and Assess (Pacing)

When pacing the target vessel, approach from behind on one side, while allowing for plenty of sea room. Move over the two wakes and move up alongside the vessel approximately twenty metres away. Carefully match the throttles so that the target vessel is not gaining or losing on your station. From this position the crew can perform a Stop Assess and Plan, the stop means to keep a relative station at a constant safe distance from the vessel. Often this position puts your vessel just ahead of the other's bow wake. Maintain this distance while the throttles are matched. The coxswain should be carefully watching the target vessel's wake for grade.

Some things to note during the Assessment SAP:

- ⇛ Wake properties
- ⇛ Hull and deck shape
- ⇛ Obstructions: overboard discharge, jagged ends or gear hanging
- ⇛ Rail breaks and hand holds
- ⇛ Vessel's heading is a clear path
- ⇛ Number of people on board and their behaviour
- ⇛ Vessel's handling behaviour and steady course line



Maintain station alongside vessel in order to complete a SAP

After the visual assessment the vessel must be contacted by VHF or verbally. The Rescue vessel will ask for permission to board and announce the side on which they are boarding. The driver of the vessel will be given instructions to maintain speed or adjust speed accordingly. The coxswain will also brief the operator of the target vessel on what action to take in the event of an emergency (MOB).

10.6.2 Plan

Once the crew has declared all the scene features then the coxswain will call for planning input. The crew will suggest plans and then the coxswain will des - cribe the plan and assign the tasks along with any emergency procedures. Each crewmember will repeat the tasks and confirm their roles. The coxswain will review any signals and commands before commencing the approach.

Suggested Signals and Commands

- ⇛ Board the vessel
- ⇛ Stand by
- ⇛ Hold on (we are getting out of here)
- ⇛ Initiate radio or verbal communications
- ⇛ MOB

10.6.3 Approaching to Board

- ➡ Maintain the 20-metre distance and drop back over the bow wave so you are between the two wakes
- ➡ Work up between the wakes towards the boat.
- ➡ Slowly ferry in towards the after quarter of the target vessel while keeping your vessel parallel (use short strokes of the wheel and move sideways)
- ➡ Once inside the bow wake and a couple of feet away, stop and match the speed. Be aware of the wake current effect. You will feel a repelling force that will suddenly turn to a suction just before you make contact
- ➡ Softly steer the bow into the gunwale of the target vessel (beware of sharp edges and rough surfaces on the target vessel)
- ➡ As the bow touches the gunwale add helm and power to the outside engine to keep it there
- ➡ While alongside keep using the throttles to maintain the position on the side of the vessel

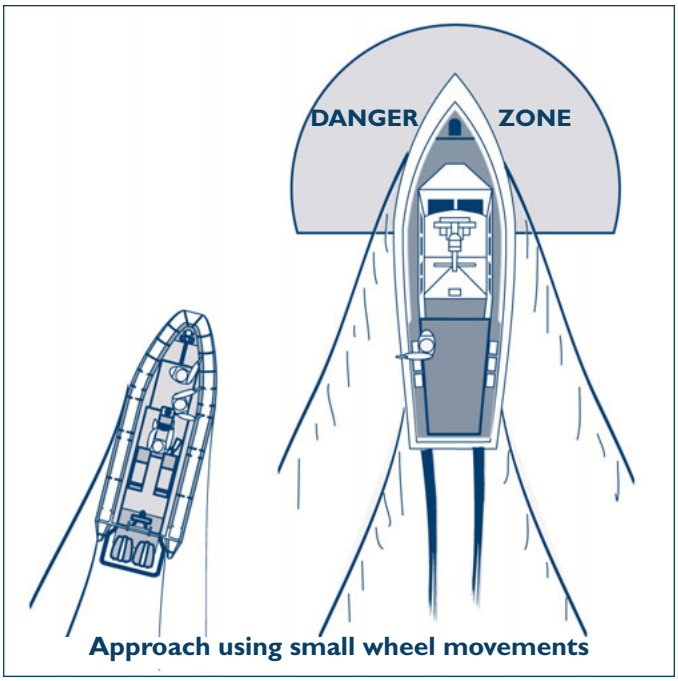
10.6.4 Boarding

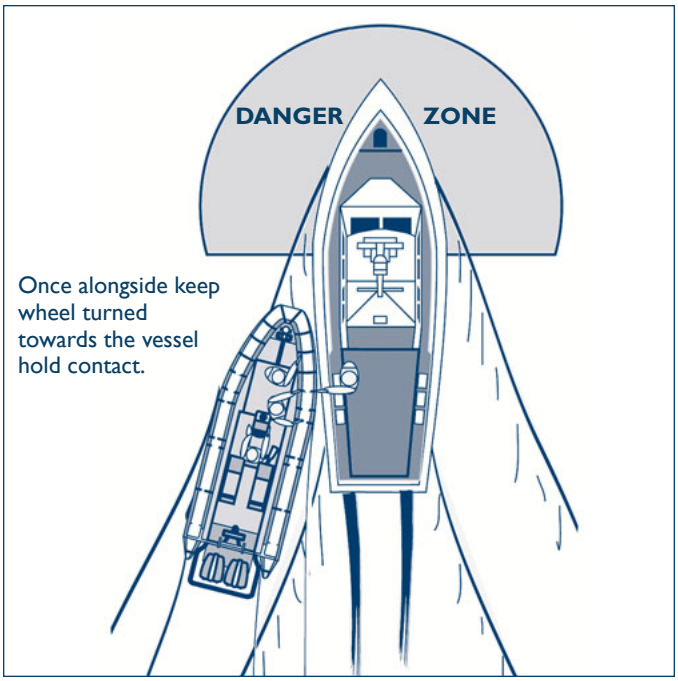
The helm is responsible and will signal the boarding party to board when it is safe to do so. When boarding, people should move quickly on to the vessel and not hesitate once they have stepped off the SRU. The helm or lookout will keep a lookout for seas or objects approaching. If a big sea does come through, stop people from passing on or off the target vessel and beware of any sharp edges as the your vessel' s fenders or tubes rub against the hull.

10.6.5 Departing

When ready to pull away from the target vessel check behind you and your vessel path to ensure there is no traffic or obstructions. The driver should straighten out the wheel and add power to move the bow away Do not turn away sharply until you have broken contact with the vessel. Then give a turn of the wheel and accelerate way from the vessel sideways.

Stay well clear of the bow! (danger zone)





10.7 Seaplanes

Occasionally the vessel involved as casualty is a sea plane. This can involve making a landing on water, because they have run out of fuel, or have lost power. In calm water they can make a controlled landing, but in any wind this may end up as a crash.

If you are called to a seaplane on the water which is afloat normally, approach carefully (assuming the engines are not working) avoiding causing any damage to the wings, tail or floats, and take instructions from the pilot as to best way to set up a tow. A towing waiver is required. One method suggested of towing a seaplane is to take the tow rope around all the struts where they attach to the float and then back forward to secure as a large bowline knot.

It is likely that if there are passengers on board, that he request they disembark into the rescue boat. It has been known for the rescue boat to bring out fuel to allow the plane to have some fuel in her tanks to make the take off and short trip to safety.

For a seaplane crash, as already mentioned for helicopters above, you are looking for fuel on the water. If the floats stay intact, the aircraft may be upside down below the surface with the floats supporting the weight of the aircraft. As with a capsized boat, the primary task will be look for survivors.

10.8 Log Entries

In addition to the usual deck entries, the following information should be added to your vessel log during a search and rescue mission:

- Ship's name
- Names of SAR crew
- Time tasked by JRCC or Coast Guard Radio
- Time of departure
- Time and brief content of SAR radio communications
- ETA on-scene
- Actual time of arrival on-scene
- Description of search objects
- Type of search pattern and areas searched
- On-scene weather report
- Information on the distressed vessel
- Time of stand down
- Time of arrival at home base or port
- JRCC incident number

An accurate and complete log will assist during operations, by making information easier to recall and transfer (e.g. during crew hand-over).

- Name, address and phone number of owner and/or operator;
- Number and names of persons on board (POB)
- Vessel name
- Vessel description, make and model, engine type
- Vessel license or registry number

An example of a CCGA Vessel's Log is on the next page.

WX: CREW:
SS: *2m* WIND: *15-20 kts* SKY: *pt cldy* *Allison, Brady, Corchoran*

TIME HEURE	ACTIONS AND RADIO MESSAGES SENT/RECEIVED MESSAGE RADIO TRANSMIS/REÇUS	COM
1020	To VAS for JRCC dep base Pt. Grey area training 2 hrs.	
	Total Crew 3//Rgr	BH 04A
1100	To VAS secured Cowards Cove monitoring 16/04A	BH 04A
1118	Frm VAS report of swimmer off Pt. Atkinson, can you Check	
	and advise//Rgr underway ETA 6 mins//Rgr	BH 04A
1123	Mayday Relay VAS 24 ft PC on fire Ferguson Pt. 3 POB	
	Observed abandoning//Rgr ETA 8 mins proceeding//Rgr //	
	and we transiting Pt Atkinson, no swimmer sited//Rgr	BH 16
1130	To VAS Mayday on scene see 2 Persons water no site of third beginning	
	recovery//Rgr CGC Osprey enroute// Rgr have in site 1 mile south//Rgr	BH 04A
1131	Frm Osprey: Mayday copied ur last, recover people water We commence	
	vicinity search//Rgr alongside casualty one	BH 04A
1134	To Osprey/VAS: Mayday 2 casualties aboard, adult males. Injury	
	assessments slight, treating for cold. Advise 3rd Person female,	
	brown hair light blue T shirt.//Rgr Put casualties aboard Osprey,	
	join up for parallel track// Rgr //VAS checks pass to JRCC	BH 04A
1135	Frm Osprey To VAS Auxiliary 06: Mayday 2 males aboard Osprey	
	CCG Osprey Auxiliary 06 commencing parallel track, track East west	
	cable track space, creeping north//VAS Rgr Aux 06 checks	BH 04A
1141	To Osprey Mayday Target 030 degrees relative distance 200 feet.	
	Proceeding//Rgr we see your target//rgr	BH 04A
1143	To Osprey Mayday Casualty aboard, hypothermic//Rgr	
	We come alongside, transfer Osprey//Rgr	BH 04A
1146	To VAS from CGC Osprey: 3 casualties aboard, we transport Kitsilano base,	
	request EHS. Vancouver Fire boat 3 attacking Vessel afire,	
	Auxiliary 06 to stand by fire boat//VAS Rgr Auxiliary 06 checks	BH 04A
1148	Frm VAS: Mayday. PC afire Seelonce fini.	BH 16
1151	To VAS: Stood down from fireboat, vessel extinguished. Commercial assist	
	will take undertow. Incident nr?// Rgr POO-1832//R we return Pt. Grey.	BH 04A