Australian Government
Civil Aviation Safety Authority

ADVISORY CIRCULAR
AC 91-09 v1.0

Ditching

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For Flight Operations Regulations commencing on 2 December 2021

Advisory circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.

Advisory circulars should always be read in conjunction with the relevant regulations.

Audience

This advisory circular (AC) applies to all pilots who operate over water.

Purpose

This AC provides advice for pilots and operators how to prepare for, and should it be necessary, execute a ditching. This AC updates and replaces CAAP 253-1(1) on the same subject, which resulted from Australian Transport Safety Bureau (ATSB) Safety Recommendation 20010258, which recommended that the Civil Aviation Safety Authority (CASA) educate the industry on the procedures and techniques that may maximise the chances of survival in a ditching event.

For further information

For further information, contact CASA's Flight Standards Branch (telephone 131 757).

Status

This version of the AC is approved by the Branch Manager, Flight Standards.

Version	Date	Details
v1.0	November 2021	This AC replaces CAAP 253-1(1) – Ditching.

Unless specified otherwise, all subregulations, regulations, Divisions, Subparts and Parts referenced in this AC are references to the *Civil Aviation Safety Regulations 1998 (CASR)*.

Contents

1 Reference material

1.1 Acronyms

The acronyms and abbreviations used in this AC are listed in the table below.

Acronym	Description
AC	advisory circular
AFM	Aircraft flight manual
CASA	Civil Aviation Safety Authority
CASR	*Civil Aviation Safety Regulations 1998*
ELB	Emergency Locator Beacon (for the purposes of this AC, this includes an ELT, Survival ELT, automatic ELT, Personal Locator Beacon, Emergency Positioning Indicating Radio Beacon or similar whether approved or not)
ERSA	En Route Supplement Australia
SARTIME	the time nominated by a pilot for the initiation of SAR action if a report has not been received by the nominated unit.

1.2 Definitions

Terms that have specific meaning within this AC are defined in the table below. Where definitions from the Regulations have been reproduced for ease of reference, these are identified by 'grey shading'. Should there be a discrepancy between a definition given in this AC and the Regulations, the definition in the Regulations prevails.

Term	Definition
Sea state	The general condition of the open sea comprised of two elements; namely wave height and swell.

1.3 References

Legislation

Legislation is available on the Federal Register of Legislation website https://www.legislation.gov.au/

Document	Title
Part 91 of CASR	General operating and flight rules
Part 91 MOS	Part 91 (General Operating and Flight Rules) Manual of Standards 2020

Advisory material

CASA's guidance material is available at https://www.casa.gov.au/publications-and-resources/guidance-materials

Document	Title
AMC/GM Part 91	General operations and flight rules
AMC/GM Part 135	Australian air transport operations (smaller aeroplanes)

Other material

International Civil Aviation Organization (ICAO) documents are available for purchase from http://store1.icao.int/

Document	Title
AIP-ERSA	En-Route Supplement Australia
NZ CAA AC125-2	Ditching - Techniques, Hazards, and Survival: A Basis for Assessing Risk

2 Background

2.1 Ditching

2.1.1 Aeroplane flight manuals may or may not include information about ditching. Ditching capability is often not required for certification, and guidance provided in an AFM is often based on past occurrences and outcomes. This AC provides information gained from experience and considers likely scenarios of possible future events in the Australian smaller aeroplane context. Owners, operators and pilots are urged to consider the material in this AC when planning over-water operations.

2.1.2 A ditching is a controlled emergency landing of an aircraft on water. As a term, it is commonly used only in relation to aircraft that are not designed for water operations (an example of an aircraft designed for water operations would be a seaplane).

2.1.3 Ditching could result from a planned water landing under control, or an unexpected and unprepared forced landing on water after an adverse event. By planning the water contact, the pilot can improve the occupants' chances of surviving the impact and achieving a successful escape. In addition, suitable pre-flight preparation prior to any over water flight will either avoid the necessity of a ditching or greatly improve the outcome of a ditching if it happens.

2.1.4 Statistically, the chances of people on board the aircraft surviving the aircraft's initial contact with the water are high. Historical data indicates that 88% of controlled ditching events result in only a few injuries to pilots or passengers.

2.1.5 Fatalities are more likely to occur due to drowning after ditching if escape from the aircraft is delayed. There are multiple reasons for delayed escapes, such as limited understanding of and familiarity with escape requirements, disorientation, shock, or simply being unable to release seat belts or open emergency exits.

2.1.6 After water entry, the time of survival in water is affected by:

- impact and egress injuries
- the time the aircraft can remain afloat
- exhaustion
- hypothermia/exposure
- life jacket/raft availability
- search and rescue response
- other environmental factors.

3 Considerations

3.1 Why would I consider ditching?

3.1.1 Ditching can occur in any environmental conditions. The breadth of possible circumstances means that there is limited specific guidance relevant for each kind of situation. As a result, ditching an aeroplane is an extremely hazardous manoeuvre. It should **only be considered** where no other feasible option exists.

3.1.2 Ditching might be considered in the following circumstances:

- an uncontrollable fire where an immediate landing is the only course of action
- fuel exhaustion where a controlled water landing is a better option than a no-power landing
- engine performance loss or control issue making continued flight unlikely.

3.1.3 If ditching is being considered, it is recommended that pilots should make the decision to ditch early so that there is sufficient time remaining to conduct a cabin / passenger briefing and any cabin preparation that is necessary. This maximises the probability that the ditching can be conducted as a controlled event under power.

3.2 Hazards of ditching

3.2.1 The most significant hazard is the surface conditions. In rough seas, the aeroplane may break up and sink rapidly, leaving little time for escape. If the water is cold and access to a life raft is not available, survival time is limited.

4 Preparation

4.1 Planning for a ditching

4.1.1 After leaving the aircraft, survival is the primary issue to consider until rescue arrives. However, to give the occupants the best chance of survival, a number of important decisions should have already been made.

4.1.2 A planned water landing under control is the most survivable ditching scenario. Preparation of the aeroplane with appropriate survival equipment can take place well ahead of time if over water operations are contemplated.

4.1.3 Piston single-engine aeroplanes are more likely to have to ditch than twin engine aeroplanes. Prescribed single-engine aircraft (PSEA) have greatly increased engine reliability. However, regardless of every conceivable precaution, on occasion, ditching may be the only available option.

4.1.4 The pilot should consider the time at risk; the exposure time spent flying over water should be assessed. Choosing a route that involves minimal distance over water in a vulnerable aeroplane poses less risk than a direct open water crossing.

4.1.5 Planning for the use of emergency / survival equipment should take place before it is installed or loaded onto the aircraft by ensuring that the equipment is regularly maintained, crew are familiar and current with the use of the equipment, and passengers are well briefed prior to departure.

4.2 Survival equipment

4.2.1 Easy access to suitable life jackets is also essential. Not all life jackets are suitable for aircraft use, and not all life jackets are the same. Crew jackets designed to be worn constantly are difficult to put on in flight and should be donned before engine start. Passenger jackets in the airline style are not designed for constant wear. However, they are relatively easy to don when time permits. Life jackets with whistles and lights are preferred. Pilots should familiarise themselves with the location and use of jackets and make use of demonstration articles during passenger briefings. Spare life jackets in an easily accessible location would also be useful.

4.2.2 Chapter 26 of the Part 91 MOS provides the minimum legislative requirements for the carriage of life jackets and life rafts. Section 26.61 of the MOS also provides that where an aircraft is required to carry a life raft under the MOS, it must be stowed and secured so that it can be readily deployed if the aircraft has to ditch. Requirements for air transport operations are contained in Chapter 11 of the Part 121 MOS, Part 133 MOS and Part 135 MOS as applicable to the aircraft performing the air transport operation.

4.2.3 Cold water reduces survival time dramatically. Significant rapid heat loss can occur with water colder than 25 ºC, particularly if wind is present. A life raft can improve survivability under these conditions, and its carriage should be considered even if not required under regulation. The enhanced body protection provided by immersion suits is recommended for extreme cold conditions and, in all cases, woollen clothes retain more

insulating qualities when wet compared to cotton. A great amount of heat is lost from a person's exposed head. In or out of the water, any form of hat or head covering should be used—even a plastic bag will help keep a person's head warm.

4.3 Aspects to consider ahead of time

4.3.1 Planning for the actual water touchdown may be limited by the time available. Some aspects to consider ahead of time, and if feasible, actioned in the event of the emergency, are provided below. Checklists may also assist in recalling the items. A sample checklist that can be customised to individual aircraft or operations is included in this AC.

4.3.2 Cabin preparation:

- Secure loose items.
- If feasible, jettison heavy or loose articles not likely to be needed after landing.
- If feasible and advisable, have passengers dress for cold conditions and stow small useful articles on their person such as caps, gloves, water bottles, torches and even mobile phones, as many modern handheld devices can withstand some immersion in water.
- Don life jackets but do not inflate.
- Identify emergency equipment and review operation (e.g., life raft, ELT etc.)
- Consider unlatching a door, window or exit above expected water level if advisable.
- Occupants should be well strapped in using upper body restraint if possible.
- Protect the head and legs by adopting the crash/brace position.
- Use pillows, blanket rolls or soft baggage as devices to restrain excessive and violent movement of limbs.
- If intending to use a life raft, it is advisable to consider occupants footwear. Soft shoes with rubber or other soft soles and heels are satisfactory, but high heel shoes and ones with hard and angular soles and heels should be discarded.
- If occupants are likely to have to swim, shoes should be discarded.

4.3.3 Distress message:

- Mayday call on most appropriate frequency. Repeat on the international distress frequency 121.5 Mhz.
- Activate any satellite tracking Mayday messaging such as Spidertracks.
- Squawk 7700.

4.3.4 Timely rescue depends upon the rescue organisation finding the occupants. For this to be most effective, a flight plan with an appropriate SARTIME is essential. Satellite tracking services can shorten SAR alerting time. A mobile phone call to authorities, if within range, could also assist.

4.3.5 If the aircraft has a fixed ELB, activate it prior to water contact. If it is portable, it will need to be found and activated, then placed in a position where it will most likely remain above water after impact and evacuation. Attached to a person's lifejacket or within a life raft would maximise its effectiveness.

5 Where should I ditch?

5.1 Selection of ditching area and direction of approach

5.1.1 The area selected for the ditching will greatly influence the survivability of the impact and affect future rescue prospects. The area should be of a size and shape suitable for an approach in the desired direction. It would be beneficial to touchdown on the water near a location that survivors might be able to swim to. For example, areas near offshore installations or vessels may reduce the time to rescue.

5.1.2 The largest influence on the ultimate outcome, by a considerable margin, is the sea state. Waves or 'sea state' refer to surface disturbances of a local nature generated by the wind and, potentially, interaction with any prevailing current. Waves generated by wind will travel in the same direction as the wind and therefore landing into a local wind will most likely be into the waves.

5.1.3 Swells are a regular waveform produced by distant weather systems over long areas of open water. They may be present with or without wind. Swells often do not align with the local wind and can refract around land features. If swells have sufficient wavelength, there may be room for a small aircraft to touchdown across the swell, into a local wind.

5.1.4 Choice of touchdown direction will be a compromise between reducing the touchdown speed (therefore, energy) and remaining controllable and upright during the impact sequence (improving survivability).

5.1.5 The best touchdown direction will vary with the swell, wind, approach speed and weight of the aircraft. See Figures 1 and 2 in section 6.1.6 below.

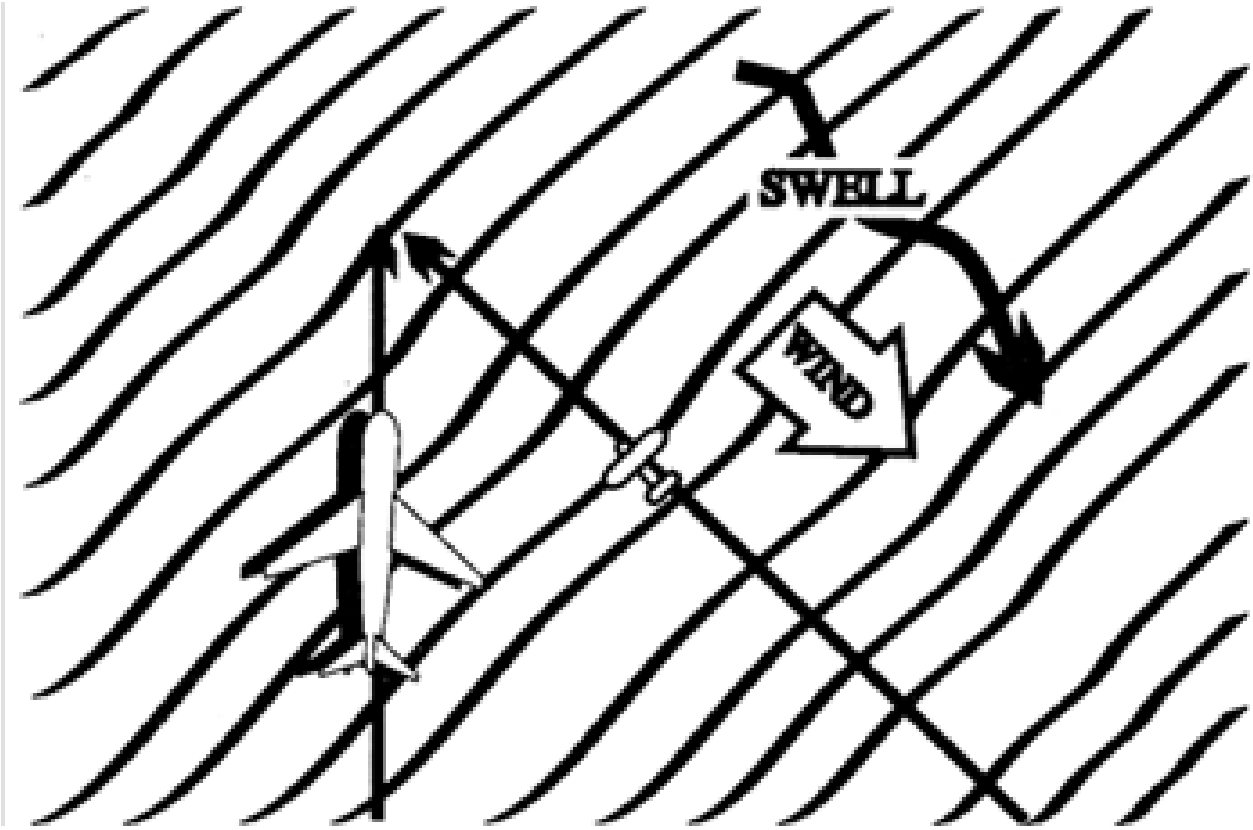
5.1.6 The AFM may contain guidance on wind/sea state criteria and touchdown (landing) direction. If no formal information is available, Table 1 (see below) provides advice on how to determine the wind speed / wave relationships and on touchdown direction.

Table 1: Wind versus sea state

Wind Speed	Appearance of Sea	Effect on ditching and suggested landing direction
0-6 kt	Glassy calm to small ripples.	Height very difficult to judge above glassy surface. Ditch parallel to swell.
7-10 kt	Small waves; few (if any) white caps.	Ditch parallel to swell.
11-21 kt	Larger waves with many white caps.	Use headwind component, but still ditch along general line of swell.
22-33 kt	Medium to large waves, some foam crests, numerous white caps.	Ditch into wind on crest, or downslope of swell.

Wind Speed	Appearance of Sea	Effect on ditching and suggested landing direction
34 kt and above	Large waves, streaks of foam, wave crests forming spindrift.	Ditch into wind on crest or downslope of swell. Avoid, at all costs, ditching into face of rising swell.

5.1.7 Figures 1 and 2 illustrate that aircraft with low touchdown speeds should touchdown into the wind; aircraft with high touchdown speeds should choose a compromise heading between wind and swell (with strong wind and swell – land on back of swell).



Source: FAA

Figure 1: Possible touchdown directions adjusted for touchdown speeds

FIG 6-3-1
Single Swell (15 knot wind)

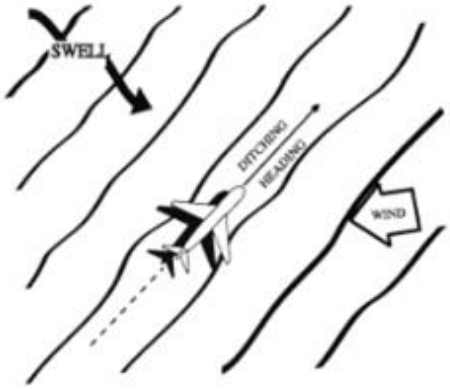


FIG 6-3-2
Double Swell (15 knot wind)

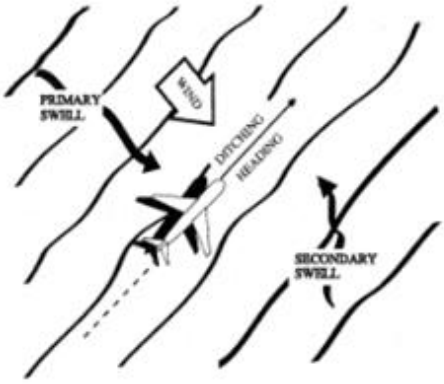


FIG 6-3-3
Double Swell (30 knot wind)

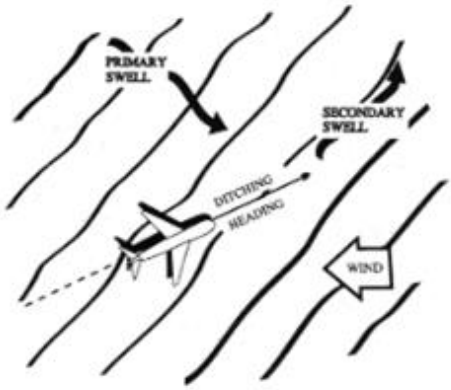


Figure 2: Possible touchdown directions in relation to swell and wind

5.2 Selecting a ditching location for survivability

5.2.1 If the opportunity exists to plan where the aircraft is going to ditch, consider making ease of rescue a consideration. If possible, ditch near a benign shoreline if unable to land on the ground. Ditching in shallow water near a beach may be preferable if insufficient beach area is available due to high tide. On the other hand, ditching near a treacherous shoreline should be avoided. If within range, seek out vessels, and try to ensure that they see the aircraft. Ditch in front of the vessel though not directly in line with its track.

5.2.2 The overall considerations related to survival in order of importance are:

- protection
- location
- water
- food.

5.2.3 The Survival section in the AIP-ERSA provides additional information.

5.2.4 Rapid evacuation in an orderly and organised manner will maximise survivability. This is best achieved if all passengers and crew have been, , comprehensively briefed pre-flight and during the descent phase prior to impact, so that everyone understands what actions to take and their responsibilities.

6 Conducting the actual ditching

6.1 General

6.1.1 At night, the use of lights could be critical. Cockpit lights should be set as low as possible to optimise night vision and carefully consider the use of landing lights or possibly taxi lights. The directional nature of landing lights could cause confusion for the pilot, whereas the more general light provided by taxi lights may prove more satisfactory. If the air is misty (a serious probability if there is blowing spray), the glare of external lights could upset night vision and prove more of a hindrance than a help.

6.1.2 Judging height over water can be extremely difficult particularly when the water is calm or on a very dark night. An aneroid altimeter will be of little use unless there is an accurate altimeter setting. The best device to use is a radio/radar altimeter if available. If all else fails, set up a low rate of descent (less than 200 ft per minute) and wait. This is another good reason for conducting a powered approach if power is available.

6.2 Aeroplane ditching

6.2.1 Power

6.2.1.1 Having power available assists in positioning the aeroplane accurately and in the correct configuration, so plan to ditch while power is available.

6.2.2 Weight

6.2.2.1 A lower weight means a lower minimum approach speed and lower energy at touchdown. If jettisoning weight is feasible, this should be attempted. If fuel can be consumed, this will also assist.

6.2.3 Configuration for aeroplanes

6.2.3.1 Many AFMs will include advice on the most appropriate configuration and should be followed if it exists. It is preferable to impact the water at the minimum approach speed under full control, which means an adequate margin above the stall should be maintained. Some AFMs may recommend a flap setting less than full and a steady descent with no flare.

6.2.3.2 If no guidance exists, it is recommended that the gear remain up, the flaps full, and speed at a minimum. In all cases, the desired configuration should be adopted at a safe height and the aeroplane trimmed to allow concentration on selection of the touchdown point. If at night, a lower nose attitude may be useful to allow landing lights to illuminate the surface.

6.2.4 Touchdown point

6.2.4.1 The following points are integral for the selection of the touchdown point:

- Use remaining power to reduce ROD to minimum.

- If there is no manufacturer guidance, select an attitude for minimum sink rate.
- Wings level with the water surface on top of or on the back of a swell, not on the face of a swell.
- No yaw if possible; straighten nose if crosswind exists, but avoid lowering a wing.
- In extreme winds in a small aeroplane, it may be preferable to ditch into wind on the back of a swell.
- Be ready to add some power to adjust the touchdown point to account for random wave action.
- Be prepared for a violent impact. There will probably be two or more impacts—the undercarriage or tail end of the aeroplane followed by the forward fuselage. Occupants should wait for the aircraft to come to a complete stop before unfastening seat belts.

6.3 Touchdown - behaviour of an aeroplane on impact

6.3.1 The overall design and configuration of an aeroplane has a significant influence on how it will behave during the impact sequence. Aeroplanes with fixed undercarriages strike the water wheels first. This will most likely cause a violent nose down pitch, with the aeroplane ending up in a near vertical position with the nose buried under the water. If the fuselage structure remains intact, the aeroplane can either remain in this position or settle back to parallel with the water surface. If the aeroplane is vertical, it is likely that injuries may occur when releasing seat belts and the time that the aeroplane remains afloat may be limited. Opening a forward door to escape may cause rapid water entry.

6.3.2 If the aeroplane has retractable undercarriage that is selected up for impact, the aeroplane's tail area will most likely contact first, followed by a violent pitch down. If sufficient energy is dissipated by the first contact, the subsequent pitch down may be less severe. Some AFMs advocate a flat approach with minimal flare, or moderate flap setting to avoid a severe pitch down tendency.

6.3.3 If the aeroplane comes to rest upright with the fuselage intact, high-wing aeroplanes may quickly assume an attitude where most of their fuselage and the occupants are under water. Low-wing aeroplanes are more likely to keep the fuselage above water if they come to rest upright. How long either type remains in that position before sinking is dependent on many variables.

7 After ditching

7.1 General

7.1.1 Plan for the worst with planning should focussing on ‘it could happen to me’. This means proper preparation by taking into account reasonably foreseeable outcomes and putting strategies in place to minimise their impact on survivability.

7.1.2 Survival is a complex issue; however, there is some evidence to indicate that 50% of those that survive the ditching could be rescued. It is advisable to seek out specialised training appropriate to anticipated operational and climatic conditions.

7.2 Orientation of the aircraft

7.2.1 For an aeroplane, it is likely to end up in a nose down vertical position after impact. Opening a forward door in these circumstances to escape may cause rapid water entry. Planning for this circumstance should include consideration of which exit might be opened prior to and after impact and briefing passengers on precautions when releasing seat belts. Any briefing should consider the prospect that the pilot may not be able to assist due to their prominent position where impact forces may be concentrated. An able-bodied passenger near an accessible exit would be the best resource for survivability in this situation.

7.2.2 Helicopters, particularly those not fitted with emergency flotation systems, are vulnerable to becoming inverted in orientation due to their high centre of gravity (engine, transmission and rotor) and poor seakeeping performance.

7.3 Escape from the aircraft

7.3.1 Timely escape will increase survivability and whether this is achieved is highly dependent on prior planning and briefings. Aircraft occupants are likely to be in shock and disoriented. Often, an accident survivor may remain immobile without actioning an escape plan until prompted. A prior briefing should involve asking any person capable, after impact, to issue evacuation commands in a loud voice and assist less able passengers.

7.3.2 If water is rapidly entering the aircraft, it is important that passengers do not inflate life jackets until clear of the structure. If an exit or door is not open, water pressure from submerged exits or doors may render opening impossible. The briefing should include instructions to open a door and to wait until inflow subsides, if possible, before exit.

7.3.3 For certain flights, it is mandatory to wear a life jacket over water. If a ditching is occurring during a flight where this was not required, and an occupant was not wearing a life jacket at the point of touchdown, make sure it is collected before exiting the aircraft and donned as soon as possible. Do not inflate it inside the aircraft—it will almost certainly seriously impede exit. Collect and deploy life rafts if available. Collect all signalling equipment, spare life jackets and survival gear on board; ideally, it should all be combined in suitable grab bags.

7.3.4 At night, if they do not distract flight crew, consider activating cabin lights.

7.4 Actions after impact

7.4.1 When the aircraft comes to rest, if life jackets are not worn, locate them and don them. Do not inflate. Exercise caution releasing seat belts if the aeroplane is in an unusual attitude, but do not delay. Collect any other survival and signalling equipment available and leave the aeroplane. Once outside, inflate the life jacket as soon as possible.

7.4.2 If a person does not have a life jacket, improvised floating objects such as cushions, plastic bottles, boxes, polystyrene pieces, even plastic bags inflated like a balloon should be gathered and utilised. Sharing buoyancy using spare life jackets is useful.

7.4.3 Activate any personal ELB immediately. Some are designed to float upright with an aerial vertical. Secure this type to a person by the line. Some are designed to be attached to a person or a jacket and activated.

7.4.4 If a life raft is available

7.4.4.1 Attach the life raft to the aeroplane by a line and deploy it. Pulling on the tether will normally inflate the raft, but this can vary. In high winds and rough water, it is possible to lose the life raft as it deploys as it literally blows away. It is preferred to release the raft on the downwind side so it is not punctured by aircraft structure, and occupants can drift towards it.

7.4.4.2 Enter the raft ensuring that any footwear and other items of apparel do not represent a risk to the fabric of the life raft. Take all survival equipment and any other articles which could be of use (e.g. blankets, warm clothes, rope – such as aircraft tie downs etc.), but also consider the weight of this equipment and the buoyancy of the life raft. Immediately locate the tool to cut the tether in case the aeroplane sinks without warning.

7.4.4.3 Once everyone is on board the life raft with the selected equipment, detach the life raft from the aeroplane and move clear. Ensure the raft's sea anchor is deployed as soon as practical, inflate the floor and erect the canopy to provide added protection. Attach at least one person to the raft just in case it overturns—it will make reboarding easier. Bail out the water and use the sponge provided to dry the inside of the raft. Ensure the buoyancy chambers are fully inflated; a hand pump is provided for the purpose. The chambers should be firm but not rigid; do not over inflate.

7.4.4.4 Normally, the pilot in command should assume the role of leader and assign duties. Apply first aid to any injured person. Make the occupants as comfortable as possible. Consider expected wait time until search and rescue services arrive and plan the conservation of resources accordingly. With a group of people, it is advisable to instigate a shift system to keep a lookout for searching aircraft and shipping. There should always be somebody performing this essential task.

7.4.4.5 Prepare the signalling equipment to ensure that it is readily available if a search aircraft or passing ship arrives in the search area. Review how to use the equipment and, in the case of devices such as heliographs, practise using them. Remember that, in the wide expanse of the ocean, an individual or even a life raft is extremely difficult to find.

7.4.4.6 Make every effort not to become seasick; vomiting will accelerate the adverse effects of dehydration. Seasickness tablets may be a useful item for the survival pack. Keeping personnel adequately hydrated is always an important physiological aspect of survival.

7.4.5 If no life raft is available

7.4.5.1 If a life raft is not available, enter the water and move away from the aircraft; attempt to keep close to other people and assist those in need as best as possible. Make every effort to stay together including connecting each other together by a line if available. Tie down ropes would be useful in such circumstances. Ensure that survival and signalling equipment are attached to a person.

7.4.5.2 In cold water, the largest threat is losing body heat. As quickly as possible, perform any manual tasks before your hands become too cold to function properly. Keep as warm as possible by adopting the Heat Escaping Lessening Position (HELP) as shown in Figures 3 and 4. Hold the inner sides of your arms against the sides of your chest and fold your arms in front of you to keep the cold water from freely circulating all around your arms. Hold your thighs together and raise them slightly to protect the groin, again with the objective of reducing water circulation around critical parts of the body.

7.4.5.3 If with others, huddle together in small groups of three or four with the sides of your chests and lower bodies pressed close together as shown in Figure 5. Place children in the middle of the huddle. In rough conditions or at night, keep all survivors together in one group. In all cases, do not swim to retain body heat; such exercise and associated blood flow will only accelerate the heat-loss process. If there is a strong swimmer in the group, consider swimming to a shore, but only for distances of up to 1.5 km. Otherwise, wait for rescue unless no one is aware of the predicament. In such cases, survivors will need to consider the most effective course of action based on their capabilities.

7.4.5.4 Figure 6 illustrates the expected survival times at various water temperatures for reference.

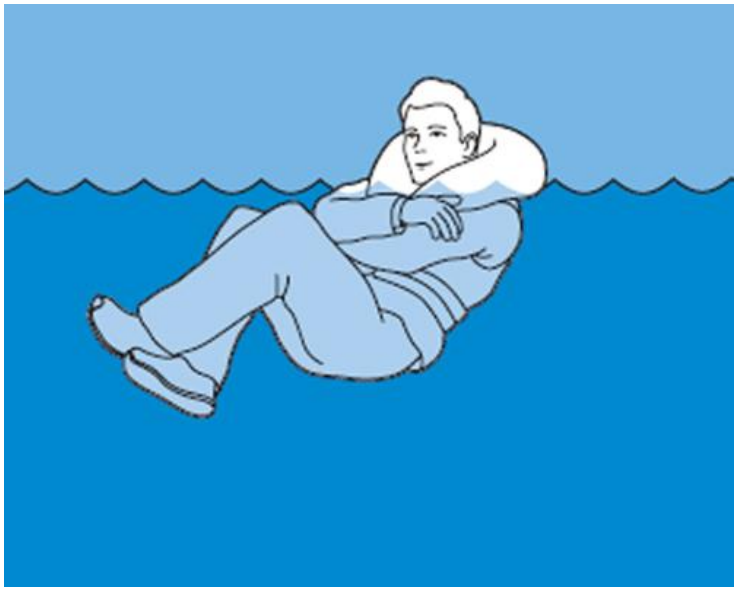


Figure 3: Heat Escape Lessening Position (HELP)
Source: Maritime NZ

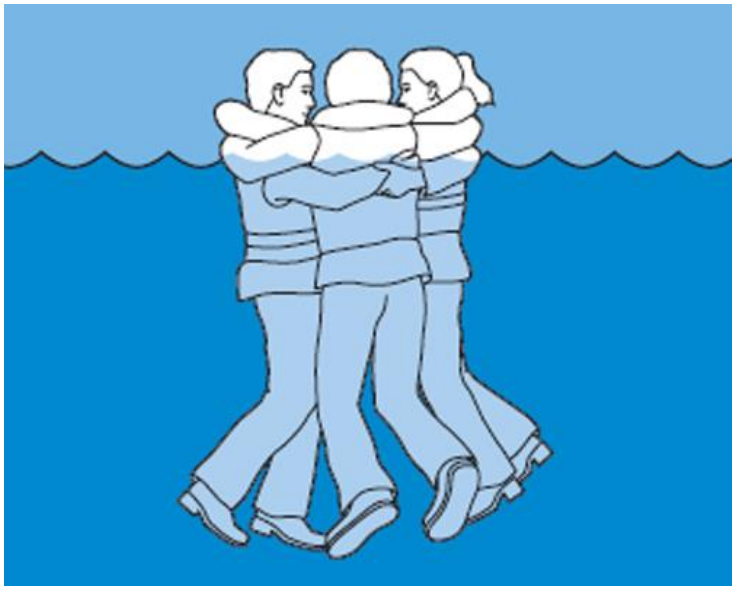


Figure 4: Small group huddle
Source: Maritime NZ

Figure 5: Large group huddle
(Source NATSAR Manual)

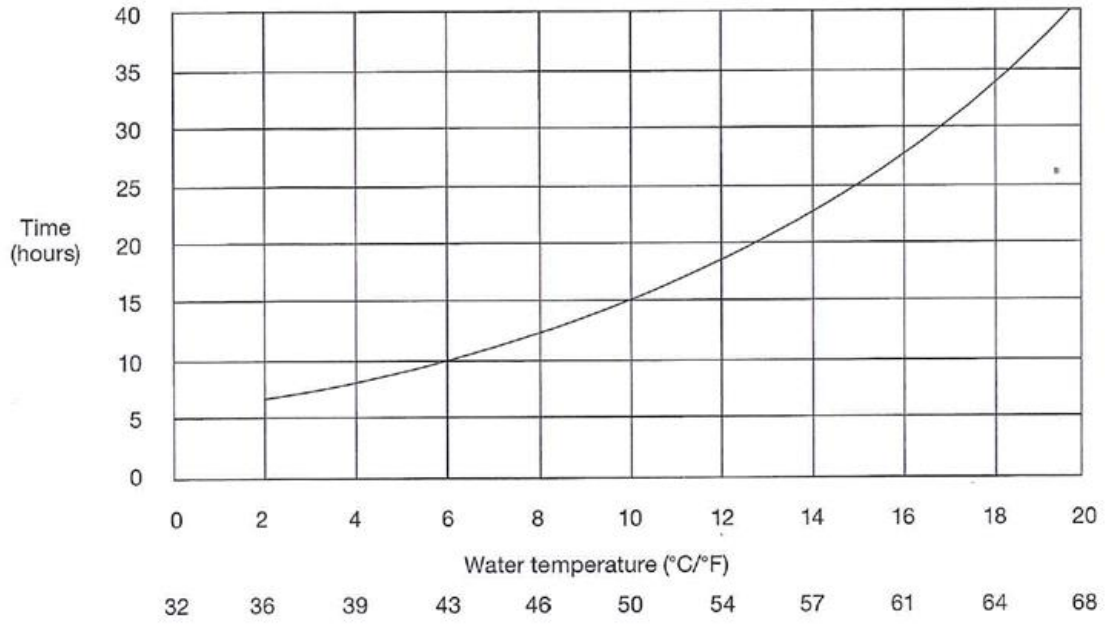


Figure 6: Upper limit of survival time for people wearing normal clothing at various water temperatures Source: NATSAR Manual

8 Rescue

8.1 Survivor actions

8.1.1 If survival equipment is dropped into the water, use it. It will often consist of two or more attached packs. If a life raft has been dropped, climb on board the life raft, investigate what equipment has been provided, and use it as instructed.

8.1.2 When rescue services arrive, do not stop signalling until it is certain that they have made contact. Once survivors are sure they have been seen, do the following:

- stop signalling
- if in a life raft remain seated and do not stand up
- wait for the rescuers to initiate the rescue; do not do anything on your own initiative
- if a helicopter is making a winching rescue, **do not reach out for the cable** and do nothing until instructed by the winch person
- do as instructed; the rescue teams are the experts.

9 Conclusion

9.1 Summary

9.1.1 Most ditching events will be more survivable with the appropriate equipment, adequate planning and structured logical actions.

9.1.2 Make sure the aircraft is equipped appropriately, and the flight is planned carefully. Ensure the aircraft is fully maintained, the weather is suitable, and preferably carry extra discretionary fuel for any overwater flight.

9.1.3 Vital life-saving actions:

- If there is the need to ditch, use your pre-planned checklist and carry out the instructions.
- Employ the survival advice gained from previous training.
- Plan and prepare for the worst.

Appendix A

Suggested pilot checklist

A.1 Suggested pilot checklist

A.1.1 Before long over-water flights, review plans for ditching and subsequent survival, establish what rescue services are available and how to optimise their usefulness.

A.1.2 The following suggested checklist is provided for consideration and customisation. It is not designed for specific aircraft or any specific operation. Operators are recommended to make their own checklist that includes the considerations raised previously and the general information provided in this checklist:

a. Plan to ditch using power if available.
b. Look for likely rescue sources—ships, shorelines.
c. Make Mayday calls, for the correct format—refer to the ERSA, set transponder code to 7700.
d. Study the wind and sea surface, then make a plan of action for the direction of the ditching manoeuvre.
e. For aeroplanes - burn off or jettison fuel, if possible, to ensure the aeroplane is as light as practicable.
f. Jettison any freight and other unnecessary heavy objects if possible.
g. Brief all crew and passengers, covering their actions and responsibilities before and after the ditching event, including the use of a life jacket.
h. Ensure all survival equipment is readily accessible, including ELBs.
i. Ensure there are no loose objects anywhere in the cockpit or cabin.
j. Conduct pre-landing checks and leave undercarriage up unless it is advised to do otherwise.
k. For aeroplanes - select an intermediate amount of flap to optimise lift, but not providing high drag unless advised otherwise.
l. Wedge open some doors or hatches (depending on aircraft type and manufacturer suggested procedures).
m. Assess the wind, swell and wave direction to decide on the final direction of ditching.
n. Set up the final approach not below 500 ft above the surface.
o. For aeroplanes - unless the aircraft manufacturer recommends the contrary, if possible, accurately judge the height of the aeroplane above the water, ensure rate of descent is less than 200 ft per minute, round out at the usual flare height and hold off until impact, wings parallel with the sea surface (level for a calm surface).
p. After the aircraft stops immediate post-impact movement, vacate, taking all necessary gear.
q. Only inflate the life jacket when outside the aircraft.

Appendix B

Sample briefings

B.1 Suggested adaptable briefings

B.1.1 Below is a list of suggested adaptable briefings:

a. "Attention - we will be ditching in XX minutes. Please remove any sharp objects and place them in a seat pocket. Collect and stow any moveable items near you. Gather and don any clothing that may assist you in the water. Locate any useful items such as water bottles, first aid kits, phones and torches and stow them in your pocket or a bag you can retrieve in the seat pocket."

b. "Remove your life jacket from its pouch and put it on. Locate the tag that inflates it, but do not inflate it yet. Only inflate it when clear of the aircraft. Retrieve the safety on board card and review where the exits are. They are XXXXXXX. Review the brace position. It is XXXXXXX."

c. "Fasten your seatbelt as tight as possible and tighten the shoulder harness. I will announce when to assume the brace position. Expect two or more impacts. After the aeroplane stops, undo your seatbelt, but be cautious if we are in an unusual attitude. Make your way to the best exit and leave the aeroplane. ONLY WHEN CLEAR OF THE AIRCRAFT, inflate your life jacket by pulling on the toggle."

d. "Brace Brace Brace".

e. "Unfasten seat belts".

f. "Evacuate by XXXXX door / exit".