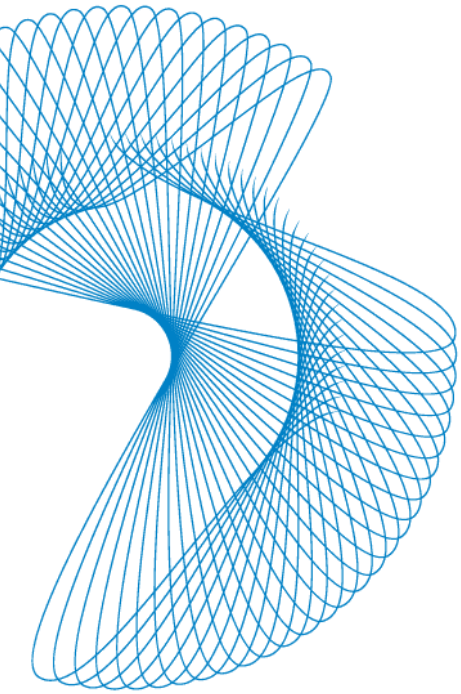
MARITIME NEW ZEALAND



Accident Report

Sinking (1 fatality)

Hard Out

23 February 2008

Maritime New Zealand

Maritime New Zealand (MNZ) is a Crown Entity appointed under section 429 of the Maritime Transport Act 1994, with the responsibility to promote maritime safety, security and the protection of the marine environment.

Section 431 of the Maritime Transport Act sets out MNZ's functions. One of those functions is to investigate and review maritime transport accidents and incidents.

This accident report is published by:

Maritime New Zealand
Level 10, Optimation House, 1 Grey Street
PO Box 27-006, Wellington 6141
New Zealand

2008

This document is available on our website: www.maritimenz.govt.nz

Photograph 1
Photograph of *Hard Out*.

CONTENTS

Photographs

Figures

Appendices

GLOSSARY

TERM	DESCRIPTION
CBES:	Coastguard Boating Education Service.
Distress:	Means that a vessel or person is in grave and imminent danger and requires immediate assistance (Part 88, Maritime Rules).
EPIRB:	Emergency Position Indicating Radio Beacon.
ETR:	Estimated Time of Return.
GMDSS:	Global Maritime Distress and Safety System.
GPS:	Global Positioning System.
Inshore Waters:	Includes Harbour, Sounds, Fiords, Lakes. Defined by NZSM 5823:2005 as *'Where an early rescue may be anticipated'* and previously referred to as *'Sheltered Waters'.*
Knot (kn):	One nautical mile per hour.
MNZ:	Maritime New Zealand is a Crown Entity appointed under section 429 of the Maritime Transport Act 1994 with the responsibility to promote maritime safety and security and the protection of the marine environment and the function to investigate and review maritime transport accidents and incidents.
Nautical Mile (nm):	Measure equal to 1830 metres.
NPBSF:	National Pleasure Boat Safety Forum.
NIWA:	National Institute of Water & Atmospheric Research.
Offshore:	Open Sea. Defined by NZSM 5823:2005 as *'Rougher waters, not in-shore'*.
PFD:	Personal Flotation Device.
PLB:	Personal Locator Beacon. A form of distress beacon.
Pleasure Craft (boat):	Means a ship that is used exclusively for the owner's pleasure or as the owner's residence, and is not offered or used for hire or reward; but does not include: • a ship that is provided for transport or sport or recreation by or on behalf of any institution, hotel, motel, place of entertainment, or other establishment or business; • a ship that is used on any voyage for pleasure if it is normally used or intended to be normally used as a fishing ship or for the carriage of passengers or cargo for hire or reward; • a ship that is operated or provided by any club, incorporated society, trust, or business. (Section 2 Maritime Transport Act 1994)
POB:	Persons on Board.
RCCNZ:	Rescue Coordination Centre New Zealand.
Recreational Craft:	*See Pleasure Craft (boat).*
SAR:	Search and Rescue.
SOLAS:	International Convention for the Safety of Life at Sea 1974.
VHF:	Very High Frequency

1. SUMMARY

1.1 At approximately 1300 hours on 23 February 2008, the recreational vessel *Hard Out* was launched from a boating ramp at Wanganui. *Hard Out* proceeded to sea on a fishing trip. The weather was fine with minimal sea conditions.

1.2 On board the vessel were three males, being the owner, the passenger, and passenger 2.

1.3 On the transit out of the river mouth, the owner of the vessel contacted the local Coastguard, via VHF radio, giving information about the intended trip including a return time of 2000 hours.

1.4 At about 1600 hours, the vessel foundered and the three occupants found themselves in the sea wearing their lifejackets/PFDs. On this day the wave height was recorded by NIWA as being between 190-260mm.

1.5 The occupants of the vessel were unable to alert the search and rescue authorities due to the rapid sinking of the vessel and the absence of any other effective means of communication independent from the vessel.

1.6 The three occupants reportedly attempted to head towards to the shore on several occasions, without success and in the early hours of 24 February (at about 0400 hours), passenger 2 passed away.

1.7 The passenger and the owner decided to remain with passenger 2, but stopped swimming to conserve energy.

1.8 At about 0900 hours on 24 February, the two survivors were rescued by Coastguard, after having spent approximately 17 hours in the water. The body of passenger 2 was also recovered.

1.9 This investigation is concerned with the analysis of causal factors leading to the foundering of *Hard Out*, and the events of the in-water period prior to rescue.

1.10 As a result of the investigation into this matter, MNZ has made several recommendations including:

(a) research to review the seaworthiness of this model of boat,

(b) take steps to review the longevity of the fibreglass commonly used in recreational boats, and

(c) provide further information to the recreational boating community about the use of lifejackets/PFDs, distress communications and in-water survival techniques.

2. NARRATIVE

Events

The following synopsis of events has been summarised from interviews with the vessel owner (the owner), the passenger, and a catamaran skipper (skipper) who observed the vessel when it was fishing. These interviews were conducted by the Police and MNZ in April 2008.

Pre Accident

2.1 On the Monday or Tuesday of the week prior to this accident, the owner and passenger 2 agreed to go on a fishing trip.

2.2 On the Tuesday evening prior to the accident the owner checked the website "Swellnet" citing this as a *"website that has relatively up to date information on the swell and weather conditions".*

2.3 The owner explained that he was monitoring Wanganui and Kapiti Mana as he was undecided on which location he would travel to.

2.4 On the Thursday prior to the trip, he again checked the swell map and the MetService websites and felt that the weather was looking more promising for Wanganui.

2.5 On Friday morning, he checked the websites again and concluded that Wanganui appeared to be the better location on Saturday.

2.6 Prior to leaving on the fishing trip on Saturday 23 February, the owner filled out a 'two minute card' and told his wife that he would be home by 2030 hours.

2.7 The passenger preferred to wear his own lifejacket and retrieved it from his boat, before departing.

2.8 On arriving at the car park, they noted quite a few boats were already there.

2.9 From listening to the radio the passenger learned that the air temperature was about 30°.

2.10 The owner was unsure of the exact time that they launched but believes it was between 1300 and 1330 hours, when he filed a trip report via VHF radio [Radio message with Coastguard]. This included information that they were heading east[1] three nautical miles off the bar, with three POB, and an ETR of 2000 hours.

2.11 At some stage while the occupants of ***Hard Out*** were fishing, a catamaran began fishing around the same area.

2.12 The skipper of the catamaran saw ***Hard Out*** and headed towards it. On his way he noticed some buoys and realised that a longline was in the water. He carried on past the longline buoys toward ***Hard Out*** and stopped about 60 metres away, before drift fishing past ***Hard Out***. When he drifted past ***Hard Out*** a second time he saw somebody pulling up the anchor.

[1] The reference to the heading east is a direct quote from the owner's statement.

2.13 The skipper noted that ***Hard Out*** appeared to be *"sitting very low with his back in the water like when you try to get on a plane, not full throttling it, you know, that kind of thing that just lifts the nose and it was sitting like that for at least I would say two, three hundred metres, before it actually got up onto the plane. So the back was hanging quite low down..."*.

2.14 This was further explained with *"usually a boat, you get out on a plane quite quick, but that one was sitting [stern] down for three four hundred metres at least, not getting on a plane, when it really did get on the plane I couldn't really see…"*.

2.15 The skipper stated that ***Hard Out*** may *(MNZ emphasis)* already have taken on water and was battling to get it out. He explained this by saying that *"even if you go four hundred metres you hardly ever just run with your [stern] down all the time you know, you get up on the plane and then throttle down"*.

2.16 He described the sea conditions on the day as follows: *"It wasn't so rough that you couldn't go onto the plane, you would be on the plane at low speed, once you get on the plane you can throttle back and just sit there, you know, it was like running on its back you know, back down*.....

.....It was not choppy it was I would say actually good, maybe a little swell but no water like breaking or anything like that.. I would say that the swell must have been maybe less than a metre you know a gentle swell. Well because of the wind, the surface was slightly choppy but not white horses and things like that…. Not very, very choppy on top of the swell, but not a very big swell either".

2.17 The owner estimated that it was around 1500 or 1600 hours when the catamaran came alongside and it was shortly after this that he made the decision to retrieve their longlines.

2.18 The passenger later described the conditions on the day as *"certainly better than the weather forecast had suggested."*

2.19 The owner believed that the forecast was for the weather to turn at around 1800 hours. He informed the passenger that he wanted to pull in the two longlines, so he would not be in a position of having to deal with them if the weather did turn. He believed the combined weight of the longline containers was approximately 20 kilograms.

2.20 The owner believes that the passenger was rod fishing, while he stowed away two longlines in the cabin. Around this time the owner considered whether to head for home or whether to head back to where they had fished earlier.

The Swamping

2.21 The owner's comments regarding how the vessel actually sunk were:

"I think probably within the space of five minutes from when the longline was back on board, there was even a first wave come over the back of the boat, that got enough water into the boat that the, the tote tanks were floating, however the motor [the main motor not the auxiliary] was still running...

..as my procedure for longlines is I have the [main] motor running, so that the bilge pump can run the whole time, the pump on it was a dry bearing pump, so you could actually run dry and wouldn't damage the pump. So I just had, I just used to leave it running as when you're pulling in lines there's always water, splashing and fish and all the rest of it, so it was just easier to have the, have the pump going…

… the first wave come over, it dramatically dropped the back of the boat, at that point in time I was at the helm, the [passenger 2] was standing next to me …. [the passenger] was more towards the stern of the boat, probably sort of half way between the cabin and the actual stern…

… then within seconds, a second wave came over and then the water was filling in from going in from the sides of the boat, so at that point I grabbed, my lifejacket, I believe [the passenger] had his one on, [passenger 2] didn't, so I grabbed my other two lifejackets…

2.22 The passenger described the swamping as follows, *….we took a couple of waves into the back of the boat reasonably quick, and soon the boat sank and I feel certain that was, I'm fairly certain that it was four o'clock because I sort of remember thinking at the time that there was about an hour and a half before we'd heard these other boats were due to come back …"*

In-Water period

2.23 The owner described that once they were all in the water, only the bow of the vessel was not submerged. He noted that no one was in a state of panic, but they were probably running on adrenalin, with everyone being level headed.

2.24 His concern was making sure his PFD was secured correctly, and he then turned his attention to ensuring that passenger 2's lifejacket was on as well.

2.25 When describing the PFDs used the passenger explained that passenger 2 was wearing what he considered to be an '*offshore*' lifejacket and the owner was wearing a vest.

2.26 The owner recalled that his cellular phone was in a tube with a sealed screw top lid beneath his seat in the vessel. Following an unsuccessful attempt to retrieve the cellular phone by the owner, passenger 2 managed to dive down and recover the container housing the phone.

2.27 The owner held the container as high out of the water as he could and removed the phone.

2.28 The cellular phone was described as being a flip phone, which when opened *"was bone dry but the screen was black…. however it was, it had a little screen on the outside of the flip phone and that was still working….. so I dialled 111, pressed send and nothing happened…"*.

2.29 After attempting to use the phone for two or three minutes, both screens on the phone went black and the owner, considering it no longer operable, put it back into the dry container.

2.30 The passenger believed they were in about 19 metres of water and they decided that the best option was to swim closer to the river mouth.

2.31 Some time after they began swimming they heard a jetski. The owner thought that he could swim towards it and get its attention, so taking the fourth PFD they had, he swam a short distance from the others and waved the PFD around, hoping to catch the attention of the jetski.

2.32 From that point on they tried to continue towards shore, swimming in that general direction.

2.33 The passenger began having concerns for passenger 2 and explained that they were all working pretty hard to try and get him back to shore.

2.34 Around 1800 to 1900 hours, passenger 2 told the others that he was beginning to get cold. At this stage they were all swimming and the owner gave his baseball cap to passenger 2, thinking that it may help keep him warm.

2.35 The owner described that they decided to "*chill out and wait for eight o'clock to turn round and the boat was missing, it was brilliant conditions out there. The waves would have been a foot height at most, very little wind, the sun was still shining, and we were in, like [passenger 2] was a little bit, he was feeling the cold, nothing serious and [the passenger] and I were, were perfectly fine, we just continued to talk*".

2.36 By nightfall, the passenger believed, that they were not far off shore and by around 2200 hours, could see the breakwater at Wanganui and for most of the night, were fairly close to it.

2.37 When it got dark passenger 2's condition *"really started to deteriorate"* and the owner began to wonder "*where the hell the Coastguard were, and wondering why the hell I hadn't actually seen any other boats that are coming in, because what I'd heard on the VHF from the other boats that were out there, was they were all saying they would be back between 1900 and 2000, which was when our ET [Estimated Time] returns were. We hadn't seen, hadn't even seen a boat, not even a boat in the distance, two planes went over."*

2.38 The owner attempted to wave out at the two planes with the spare PFD, but to no avail.

2.39 The owner described that at one point he could make out individual house windows and could hear waves crashing on the beach, bringing about the belief that they were, at some stage, within 200m of the shore.

2.40 He explained that they had agreed to stick together as a group, as it would be easier for rescuers to find three people in a group than individually.

2.41 The passenger stated *"we were just fighting the current. At one point you could see the water breaking on the rocks that's how close we got, as the latter part of the night wore on just you know despite how hard we swam we actually went backwards further out, but for a large chunk of the evening we were pretty much right in front of the river mouth."*

2.42 The group then continued to swim, with the owner using the navigation beacon at the Wanganui Bar as a reference point and believing that they were staying relatively close to the shore. *"I was sort of basically swimming towards the Castlecliff houses, wasn't long after that that [passenger 2] deteriorated to the respect, to the fact that he could no longer really swim, he was really starting to have some, some effects to it".*

The owner stated *"…at that point [the passenger] decided to put [passenger 2] on his chest so [passenger 2] was lying on [the passenger's] chest and I just grabbed hold of the back of [the passenger's] lifejacket and at this stage, some, at some point between daylight and then [the passenger] must have put the second lifejacket on [passenger 2] as well, or he had it under him as sort of padding just to try and keep him a bit warmer, but I still wasn't actually feeling cold, but I knew that you know [passenger 2] wasn't going to last forever out there, so I was doing everything I could to swim towards the coast".*

2.43 The passenger reported *"[passenger 2's] condition kept deteriorating, he was slipping in and out of consciousness, one point he was fighting with us to take his lifejacket off.* The passenger also described how passenger 2 was affected by the onset of hypothermia and tried to take off his PFD. It was following this that a spare lifejacket from ***Hard Out***, which was also described as an "*offshore"* lifejacket, was slipped beneath passenger 2 to support him.

2.44 During the night the owner was regularly taking on salt water and was continuing to swim as part of the group. The owner explained that they stayed together as a group and held onto each other's PFDs.

2.45 At about 0400 hours, the passenger informed the owner that passenger 2 had passed away. The owner checked passenger 2's pulse and confirmed this was correct.

2.46 The decision was then made to hold on to passenger 2 to ensure his recovery.

2.47 The owner continued to swim for a while and described that he was getting tired. In an attempt to conserve energy he put his arms through the back of the passenger's lifejacket and locked himself on.

2.48 Around this time it is apparent from the owner's statement that hypothermia was beginning to take hold *"I sort of tried to keep moving my legs to keep the circulation going. Probably about, about five o'clock I was actually starting to feel cold, I was getting cramps in my legs and [the passenger] was sort of going through a pretty hard time of it, and I just sort of kept talking to him, … At that point, I don't know if it was, exhaustion or, you know hypothermia kicking in but I was starting to get, I was started to feel like I really needed to go to sleep, and I think I drifted sort of in and out of sleep or in and out of consciousness from there, that sort of started at about six thirty, I remember waking up at one point and asking [the passenger] if he had any firewood, obviously I'd sort of must have been sort of dreaming or whatever that I was in front of a fire..."*

2.49 The passenger stated that very early on 24 February, at around 0630 hours, he had a conversation with the owner regarding the sunrise and from that point on he described his condition as going downhill, "*I must have gone downhill pretty quickly … actually at that point having a bit of trouble breathing and I remember a bit later on he said something to me and I was struggling with breath and cold at that point and I don't remember if I responded to him, and the next thing I sort of remember was I could hear the plane."*

2.50 Around the time of the rescue the passenger described the owner as *"pretty much unconscious"* and he had been vomiting sea water.

3. COMMENT & ANALYSIS

Boating experience & knowledge

3.1 The owner reported that he has been boating since he was six years old. He has owned boats for nine years and *Hard Out* for about 18 months. He had done 25 to 30 sea trips in *Hard Out* and approximately 21 trips on Lake Taupo. On two previous occasions he had approached Wanganui bar and abandoned the trips due to poor conditions.

3.2 The owner stated that he completed a Coastguard VHF Operator's course at the time he purchased *Hard Out*.

3.3 The owner stated that passenger 2 had accompanied him approximately 15 times on trips, but the passenger had not been out on *Hard Out* before. The passenger had fished in his own boat alongside *Hard Out* on one previous occasion.

3.4 Both the passenger and passenger 2 had obtained Coastguard Day Skipper Certificates in 2005. The syllabus of this course covers matters such as search and rescue and trip reporting.

Autopsy

3.5 The autopsy report records the cause of death was drowning, with hypothermia as a possible contributory factor.

3.6 A toxicology report stated that neither alcohol nor drugs were detected.

Environment

3.7 Sunset at Wanganui was 2012 hours on 23 February and sunrise at 0655 hours on 24 February.

3.8 The moon rose at approximately 2058 hours on 23 February and set at approximately 0948 hours on 24 February.

3.9 Tides for Port Taranaki were (Wanganui tides are listed as being 35 minutes after these nominated times):

Date	Low Water	High Water	Height
23/02/08	0604		0.4
23/02/08		1212	3.5
23/02/08	1827		0.4
24/02/08		0031	3.4
24/02/08	0639		0.4
24/02/08		1245	3.4
24/02/08	1901		0.5

3.10 Tides were spring tides, new moon having occurred on 21 February at 1630 hours.

3.11 **Chart NZ4541, Approaches to Wanganui**, gives tidal stream information for a position 0.5 nautical miles west south west of the river breakwaters. This information indicates that the tidal stream was running in a south south easterly direction from 1400 – 1800 hours on 23 February, north north westerly direction from 1930 hours on 23 February to 0030 hours on 24 February, and a south south easterly direction from 0230 hours to 0630 hours on 24 February.

3.12 The maximum spring rate is shown as 0.4 knots.

3.13 **Chart NZ45, Cape Egmont to Rangitikei River** gives tidal stream information for positions approximately 10 miles seaward of Patea and Rangitikei River mouths. This information indicates a coastal tidal stream consistent with that experienced off Wanganui.

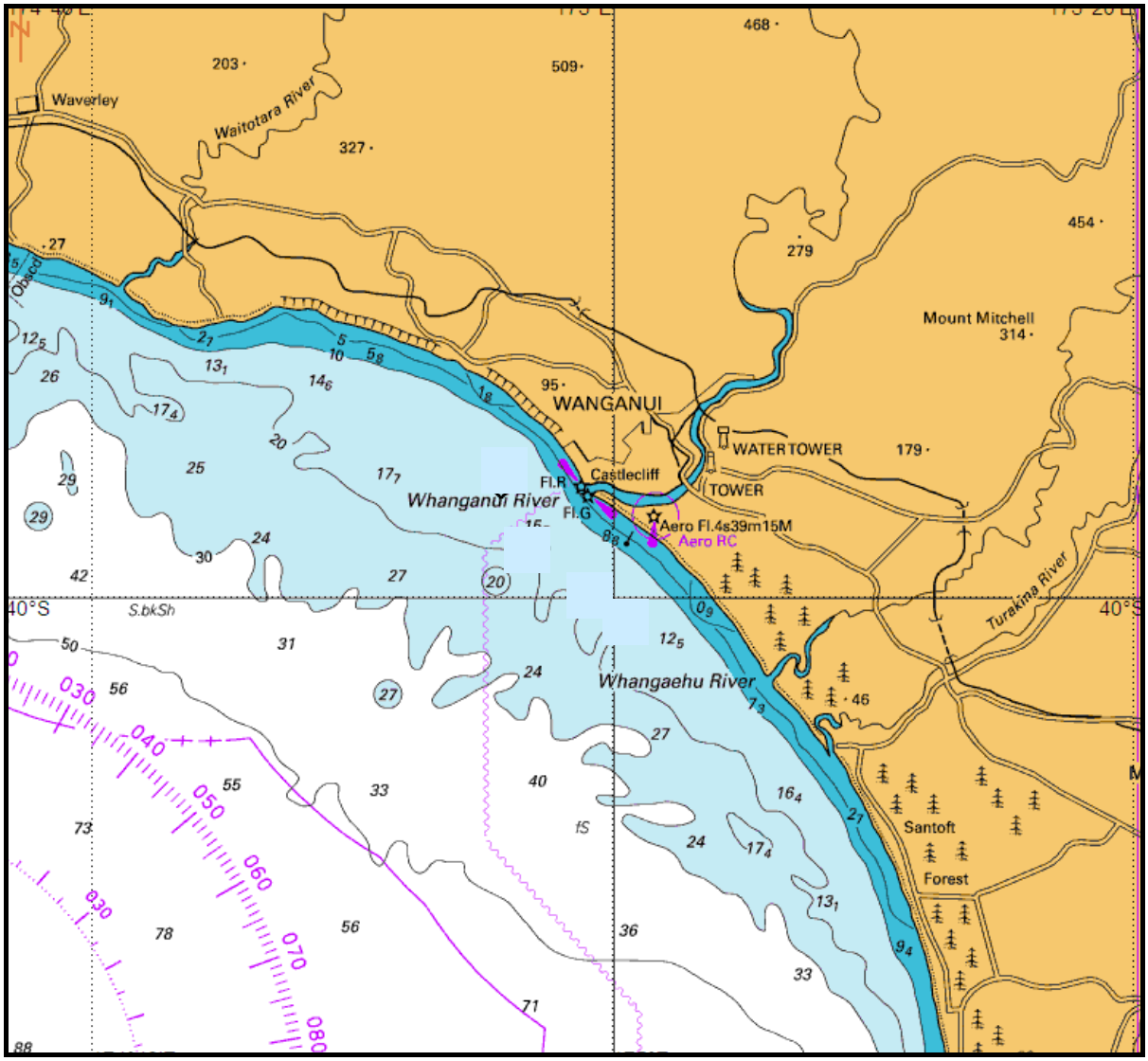


Figure 1
Chart Extract 4541

Weather

3.14 *See Appendix 1 – Weather Forecast off Wanganui 23 February, 2008.*

Summary of the weather & sea conditions

3.15 Wave conditions were reported by NIWA as being 190mm high at the time of the sinking of ***Hard Out*** (at approximately 1600 hours), with a sea surface temperature of 19.5°C *(See Figure 2 - Sea Surface temperature on the day of the accident)*. The recorded maximum significant wave height prior to the sinking was 260mm this was at 1100 hours *(See Appendix 2 - full wave data for 23 February)*. The weather experienced at Wanganui between 1300 hours and 1600 hours on 23 February was winds of 7-8 knots from the south and south south west.

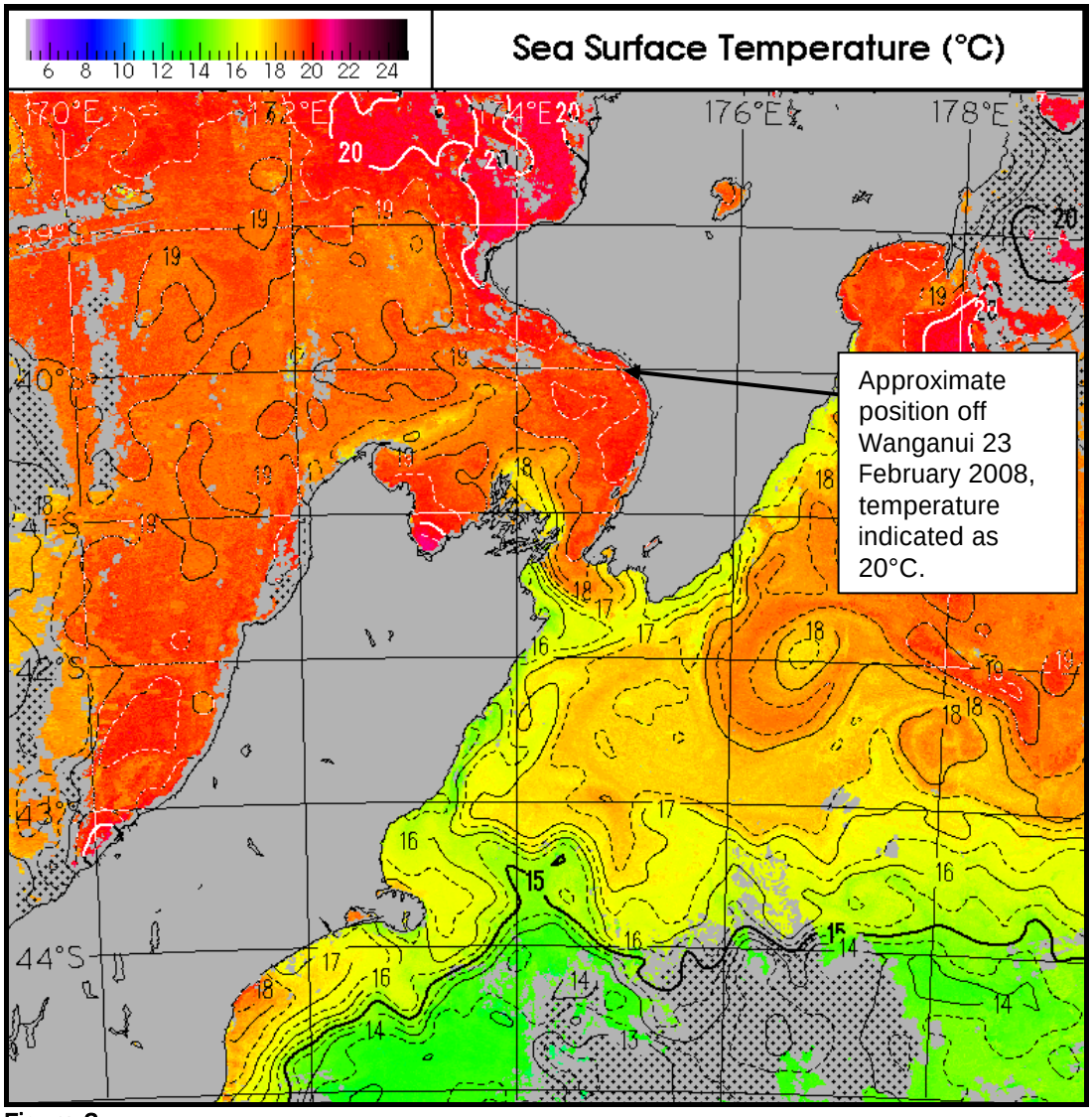


Figure 2
Sea surface temperature in the central New Zealand region on 23 February 2008, from satellite data.
Information supplied by NIWA

Vessel

3.16 MNZ has interviewed the designer and manufacturer of ***Hard Out***. With his detailed knowledge of these vessels, and having viewed several photographs of ***Hard Out***, he is able to positively identify ***Hard Out*** as being a **GlassKraft** Envoy model, which he had designed.

3.17 Inquiries with the manufacturer have confirmed that the boat was built no later than 1981, making it at least 27 years old. The owner stated that the vessel was built in 1989. The agent who sold the vessel to the owner also believed the vessel was built in 1989.

3.18 GlassKraft vessels were manufactured between 1969 and 1981 by Cooke Bros, Christchurch. They are commonly confused with Glasscraft vessels which were manufactured by a different company in Auckland at a later date.

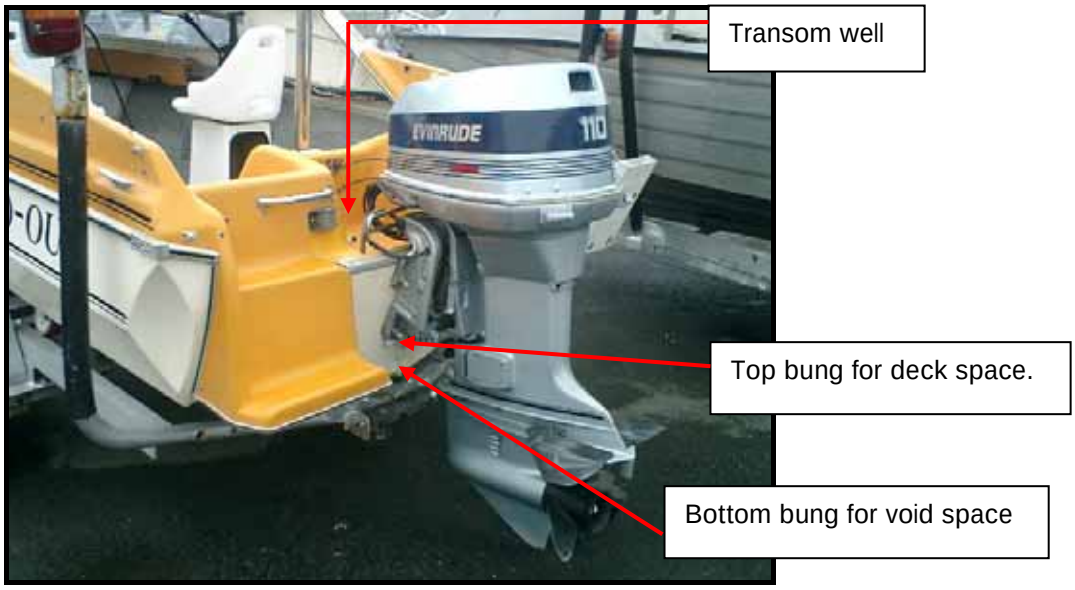
3.19 The investigators consulted the previous owner of ***Hard Out*** and it was her opinion that the boat was seaworthy and in good condition at the time of sale in approximately 2006. She based her opinion on having been out in very rough water in ***Hard Out*** on Lake Taupo, without incident.

3.20 The boat dealer who sold the boat to the owner was of the opinion that ***Hard Out*** was also of sound condition at the time of sale.

3.21 ***Hard Out*** was designed with two skins; the outer "v" shaped hull and an inner deck. When interviewed, the manufacturer stated the inner deck was strong enough to float the boat should the outer hull be damaged. The boat was originally supplied with a purpose built trailer.

3.22 The void space between the hull and deck was fitted with a bung in the transom to drain the void if required.

3.23 There was also a bung in the transom fitted just above the level of the interior deck level to drain the interior of the boat when hauled out of the water. In addition, there was a drain hole in the transom well to drain any water that may slop in *(See Photograph 2 - showing the transom and bungs).*



Photograph 2
Hard Out **-** transom position of bungs indicated above.

3.24 The owner reported that he had replaced both bungs when he purchased the vessel, because the top bung had started to perish and he believed that it was not sealing too well. He also indicated that he had put silicone around the new bung *"to make sure it was all ok"*.

3.25 The owner pressure tested the bungs to check the water tight integrity of the vessel. He stated:

"to check the new bungs were the correct ones, we pressure tested the hull. And there was no, no leaks in it at all". The test was completed "about six months ago" (this is in reference to the accident date of 23 February 2008).

3.26 The owner described how the test was conducted as follows:

"Dropping off the trailer so the boat's facing down and you fill the hull up with water and you put the bungs back in and you just lift it the other way, and that puts the pressure back onto the, back of the boat and if water drips out you know that your bungs aren't sealed. The hard part is drying them out again".

3.27 This method of testing may have stressed the hull and transom causing possible fractures. The fractures may have been latent and become active when the boat was flexing in a seaway causing the void space to flood. This view is supported by the manufacturer.

3.28 To determine with some accuracy the possibility of fractures occurring from this method of pressure testing, it is necessary to establish the exact amount of water used during the pressure test and which space was filled during the described test methods. Unfortunately this could not be confirmed.

3.29 The owner reported that he had undertaken some minor structural alterations, which included moving the speed log fitting and repositioning it. The old (blind) mounting holes where the speed log was fitted were filled with two part epoxy.

3.30 The new position of the log was sealed with silicone. The manufacturer has stated that the repairs/modifications were reasonable and would not be likely to have caused any defects in the hull.

3.31 The owner had the engine professionally maintained. It was last serviced in Easter 2007. The battery was approximately 18 months old. The agent who sold the boat confirmed that the engine had been serviced by them.

3.32 The owner reported that the builder's plate indicated a maximum horsepower of 140 or 150 and a maximum load of five persons. The owner had done a trip with four persons on board and the boat handled well. He normally carried a maximum of three persons on board when fishing.

The Swamping

3.33 ***Hard Out*** has not been recovered, and it must be emphasised that this inevitably compromises the investigation into the events that may have caused it to sink.

3.34 Without the recovery of the vessel the exact reason for it sinking could not be determined with certainty.

3.35 At the time ***Hard Out*** was swamped, the boat was reportedly drifting with the stern to the wind and sea. Although the weather conditions were reported as being largely benign, such a positioning of the vessel would mean that the most vulnerable part of the boat would have been exposed to the prevailing weather conditions.

3.36 The stern of *Hard Out*, as with most small boats, would have had the lowest area of freeboard. This was due to the design of *Hard Out* and the combined weight of the main and auxiliary outboard engines. In addition, the combined weight of the passengers, fishing gear and anchor weights would have had the overall effect of reducing the freeboard.

3.37 The flat transom would have had the effect of lifting waves, resulting in them slopping over the outboard and into the transom well, which reportedly occurred on the day of the accident.

3.38 The owner stated that he had the engine running and was relying on his ability to power the boat ahead should there be any problem with waves slopping over the transom. In the events as described by the owner and passenger, the owner did not have sufficient time to engage the engine between the first and second waves coming over the transom well and flooding into the main deck area.

3.39 The second wave swamped the boat, which resulted in loss of mechanical power and subsequent sinking.

3.40 Such is the age of the vessel the plans and specifications are no longer in existence. Had these been available, it would have been possible to calculate the approximate volume of water required to sink *Hard Out*.

3.41 These calculations would help to establish whether or not any other factor may have reduced the freeboard of the vessel sufficiently to allow the ingress of waves as reported by the owner.

3.42 The manufacturer estimated that it would take approximately 88 gallons (324 litres) of water to sink *Hard Out*.

3.43 The likelihood of a 190-260mm wave (as per NIWA wave data, paragraph 3.15) breaching the transom would have been significantly increased, if the freeboard of the vessel had already been reduced through the ingress of water, through the outer hull, into the void space.

The passenger, in commenting on the draft report, stated that in his view the waves that came over the stern were larger than other waves on the day.

3.44 This ingress could unknowingly occur, with the water possibly draining to some extent as the vessel was shifted periodically, but nevertheless resulting in an overall reduction in freeboard and loss of buoyancy.

3.45 There are a multitude of reasons and scenarios that could result in water entering the void space through the outer hull. The list is not exhaustive, but includes such things as:

- the deterioration of the 27 year old fibreglass,
- a latent fracture,
- a loose or missing bung,
- a hole caused through striking a semi-submerged object or
- a leaking repair.

3.46 The manufacturer of ***Hard Out*** was asked to comment on the events described by the owner and passenger leading to the sinking. He expressed doubt that a 300mm chop would produce waves sufficient to sink the vessel and indicated that in his opinion a "*pretty big wave*" would have been required to get enough water in to sink it. As the weather conditions did not match such a scenario he expressed the view that the occupants of the ***Hard Out*** may have *"gone boating without the bungs in."*

3.47 The owner was approached by MNZ to provide further information relating to his actions/inactions with the bungs prior to launching. In commenting on the draft report the owner stated the *"bungs were in".*

In-water period prior to rescue

Lifejackets

3.48 A lifejacket is a device that when used in the water, is designed to provide specific buoyancy, so as to position and maintain an unconscious person's head and airways clear of the water. There are various types of lifejackets on the market, which are outlined in this report.

3.49 Lifejackets, if properly worn and in good condition, provide much more support than a PFD and are purposely designed for in-water sea survival.

3.50 The additional buoyancy provided by the lifejacket will make it easier to maintain an in-water sea survival position. The resulting reduction in use of energy is important in a sea survival situation.

3.51 Lifejackets are rated to provide either 100 (EN395 standard[2]) or 150 (EN 396 standard) Newtons (N) of buoyancy. The buoyancy ratings are intended for different sea areas and conditions.

3.52 The 100 N lifejacket has a buoyancy of no less than 100 N for the average adult and is intended for use in relatively sheltered waters, such as small lakes or harbours where the conditions can be expected to be calm. It is not designed for use in the open sea, or areas known to be rough, such as a large lake.

3.53 The 150 N lifejacket is intended for offshore use (open sea) and is fitted with retro reflective tape, whistle and an optional light on some lifejacket brands. For buoyancy, these lifejackets can be made from inherently buoyant material or gas operated chambers.

3.54 Another type of lifejacket, known as SOLAS lifejackets, are obligatory on commercial ships and are intended for emergency use in all weather conditions. SOLAS lifejackets are equipped with retro reflective tapes, whistle, light and some are also fitted with splash hoods to keep the head and airways protected in rough sea conditions.

Personal Flotation Devices (PFDs) & Buoyancy Aids

3.55 There are many types of buoyancy aids on the market, commonly known as Personal Flotation Devices (PFDs). The buoyancy aid is a device made from inherently buoyant material that helps the wearer remain afloat in the water.

[2] British standard for Lifejackets and personal buoyancy aids – Lifejackets – 100 N

3.56 Buoyancy aids are intended to help the wearer stay on the surface by supplying additional buoyancy to the person's body. They are generally designed for use in sheltered waters, where the shore and help, if needed, is close to hand.

3.57 Buoyancy aids are not designed to the same standard as lifejackets and not intended to be used in a sea survival situation as they provide less buoyancy to the wearer. They will not support the wearer's head if rendered unconscious, that is, bring the person into a stable position in the water keeping their airways clear.

3.58 Buoyancy aids are generally designed to supply 50 N (EN 393 standard[3]) of buoyant support to the person wearing the aid.

Standards

3.59 NZ Standard 5823:2005 defines lifejackets and buoyancy aids as follows:

- Category 401 – Open-Waters Lifejacket
  - Used on pleasure vessels going overseas. As well as the conventional constructed PFD, many inflatable lifejackets meet this standard. This lifejacket is designed to turn an unconscious person face up in the water.
- Category 402 – Inshore-Waters Personal Flotation Device (PFD)[4]
  - This type of PFD does not allow the wearer to tilt forward of vertical, but is not guaranteed to hold an unconscious person's mouth clear of the water. It has less buoyancy than type 401, but this makes it more comfortable to wear continuously. It is probably the most common PFD used on board pleasure vessels in New Zealand.
- Category 403 – Buoyancy Vest
  - No collar is fitted and it has lower buoyancy than a lifejacket. It is designed for use in aquatic sports, such as dinghy sailing and is fitted with retro reflective tape.
- Category 404 – Buoyancy Aid Wet Suit
  - A wet suit with added buoyancy
- Category 405 – Buoyancy Garment
  - Similar to type 403, but is not required to be fitted with retro reflective tape.

3.60 Key factors in the correct use of a lifejacket or buoyancy aid are:

- A buoyancy aid, or lifejacket will only be effective if:
  - The right category and model is used in accordance with the manufacturer's instructions and the intended area of use, namely open sea or inland/sheltered waters.
  - The right size of lifejacket or aid is chosen according to the weight and size of the person wearing it.
  - It is donned in accordance with the manufacturer's instructions.
  - It is worn at all times while in the sea.

[3] The standards set for the manufacture of buoyancy aids.

[4] During the course of the investigation it was found that MNZ's Advisory Circular Rule Part 91 in relation to 91.2 Definitions, Type 402 Inshore Lifejacket is not in accordance with NZS 5823:2005.

3.61 All those on board ***Hard Out***, (at the start of the trip and when crossing the bar), wore some form of lifejacket/PFD, which is good practice. Later in the day, they reportedly removed their lifejackets/PFDs when it became hot. When ***Hard Out*** sank the lifejackets/PFDs were readily available and were quickly donned by the occupants.

Lifejackets/PFDs on ***Hard Out*** on the day of the accident

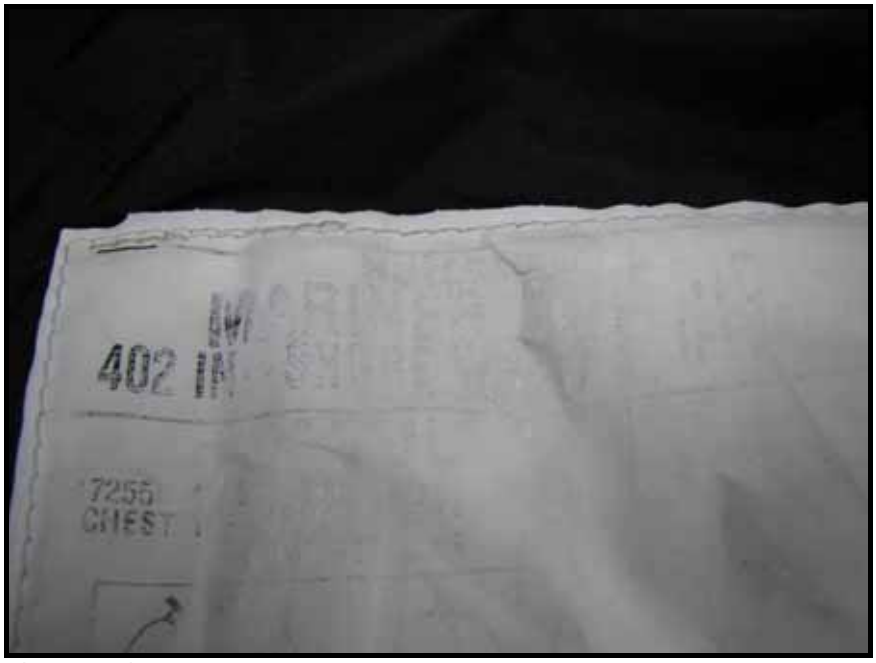
3.62 The passenger wore a Hutchwilco Mariner Classic, adult large, of New Zealand Category 402 (*See Photographs 3, 4 & 5 – Passenger's PFD).*

Photograph 3 – Passenger's PFD

- Hutchwilco Mariner Classic, adult large of New Zealand category 402.

Photograph 4 – Passenger's PFD

- Showing brand and size label on inside



Photograph 5 – Passenger's PFD

- Label on the inside of the lifejacket. The lifejacket is marked '402 In-Shore waters'

3.63 These photographs of the passenger's PFD, confirm that it is Category 402 designed for inshore waters, defined by NZSM 5823:2005 as a location *'Where an early rescue may be anticipated'* and was previously referred to as *'Sheltered Waters'.* This PFD is not the correct jacket for use in open sea.

3.64 The owner was wearing a Body Glove Personal Flotation Device Category 405 *(See Photographs 6, 7 & 8 – Owner's PFD)*.

Photograph 6 – Owner's PFD

Photograph 7 – Owner's PFD

- Inside Label

Photograph 8 – Owner's PFD

- Magnified view of inside label

3.65 The PFD worn by the owner was designed to be worn on the body when the wearer is at risk of short term immersion in water.

3.66 This PFD is not designed for offshore or open waters where early rescue may not always be expected *(refer to paragraph 3.63)*.

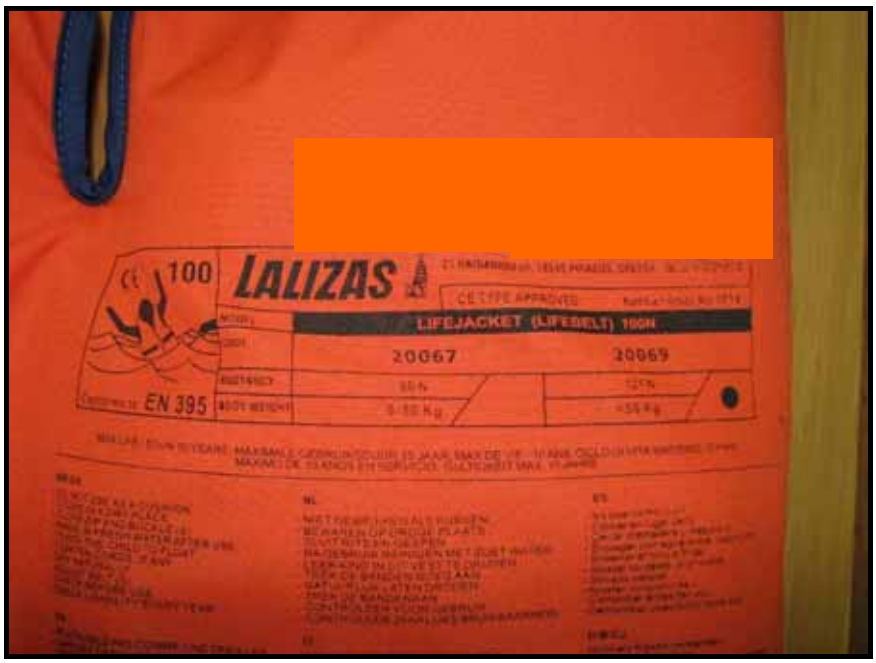
3.67 The PFD worn by passenger 2 was a LALIZAS 100 N (*See Photograph's 9 & 10 – showing Passenger 2's PFD).*

3.68 New Zealand Standards and European Standards differ in their definition of the attributes of a lifejacket.

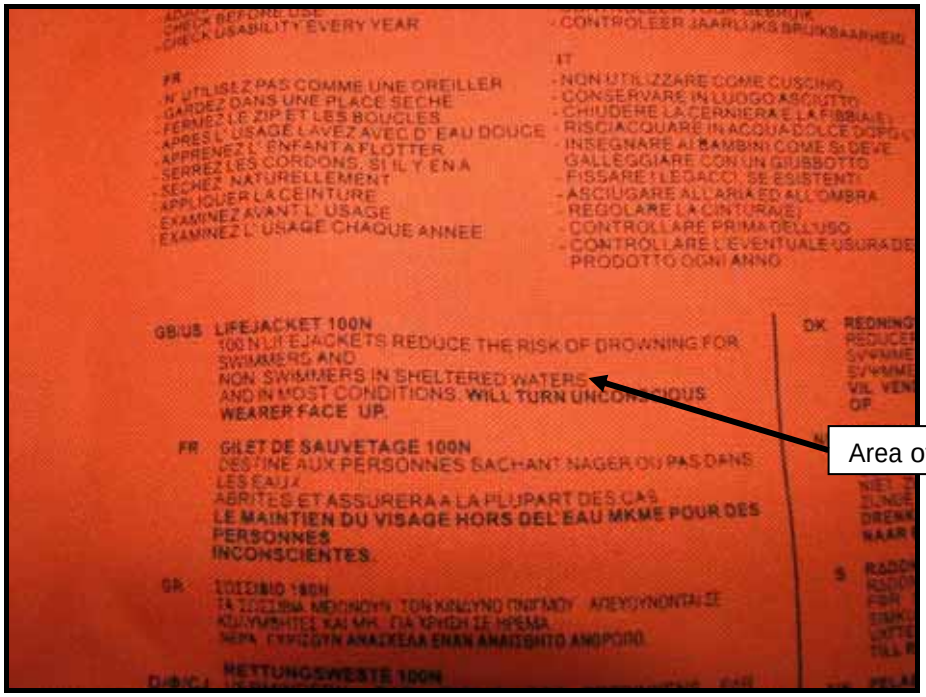
3.69 The European Standard EN395 (the PFD worn by passenger 2) calls a buoyancy aid with 100 N a lifejacket.

3.70 The comparative New Zealand standard for a lifejacket refers to the device as having to exceed 100 N plus 10%. The term lifejacket is commonly used to describe all forms of buoyancy aids. It should be noted that although the common term may be lifejacket, it may be a buoyancy aid which does not reach the specified standards for a lifejacket.

Photograph 9 – Passenger 2's PFD



Photograph 10 – Passenger 2's PFD



Photograph 11 – Passenger 2's PFD

- Area of use

3.71 The PFD worn by passenger 2 was designed for the average adult and is intended for use in sheltered waters. Using either the European Standard or the New Zealand Standard, this PFD is not designed for use in open seas *(See Photograph 11 - area of use.)*

3.72 On ***Hard Out*** there was an additional PFD which was retained by the occupants when they were in the water. This PFD was used as additional support for passenger 2.

3.73 The additional PFD was an older AK1 model kapok filled lifejacket, manufactured in the 1970s *(See Photographs 12 & 13 – additional PFD)*.

Photograph 12 – Additional PFD

Photograph 13 – Additional PFD

3.74 The manufacturer recommends that this PFD is periodically checked to ensure fabric and fittings are in good condition. This is to ensure that water ingress is not present which would result in the saturation of the kapok and reduce its buoyancy.

Summary

3.75 None of the PFDs used by the occupants of ***Hard Out*** on the day of the accident were suitable for the open-waters in which ***Hard Out*** was situated when it sank.

3.76 It appears from the owner's statement that he held an honest belief that the PFDs worn by himself and passenger 2 were *"Offshore Lifejackets".* This highlights the importance of checking the labelling on a PFD to ensure it is appropriate for its intended use.

3.77 Notwithstanding these comments the PFDs worn by the owner and the passenger contributed to their lives being saved.

In commenting on this section, the passenger stated that matters relating to the definition of inshore waters or sheltered waters is not clear. He also pointed out that the information provided by various agencies about the different types of buoyancy aids requires clarification.

Hypothermia

3.78 The term "Hypothermia" refers to deep body or core cooling. The body core consists of the vital organs, which includes the heart, brain, lungs and abdominal organs. To remain in good health these are kept at a constant temperature of 36.9°C. When the core temperature drops to 35°C a person is considered to be suffering from hypothermia.

3.79 During an in-water sea survival period, conservation of body heat and energy is paramount to ensure that the person in the water has the maximum possible survival time.

3.80 Several factors affect survival times and the onset of hypothermia:

Initial immersion or cold shock: When the body is subject to cold water immersion there is a great risk of drowning within the first three minutes. This is due to the fact that the body when it first falls into cold water reacts by involuntary gasping and shivering[5]. As the body's skin begins to cool, muscles tense and shiver; this produces more body heat, but results in a loss of dexterity and motor control. During this period there is a greater risk of water entering the airways resulting in drowning. It can also cause a person to have a heart attack. After three minutes the body starts to adjust to the cold water immersion and control of the body function is regained. As the sea surface temperature on the day of the accident was about 19.5°C the occupants were not subject to cold water immersion.

Sea conditions: The rougher the sea the more chance there is that a person may drown due to water entering the airways. As the sea conditions on the day of the accident were calm, the risk of drowning was minimal as long as the airways were kept clear of the water.

Age & Fitness: In general terms, the fitter the person is the more chance of in-water survival.

Young children cool quicker than adults. As the occupants were adults age is not considered a factor in this accident.

Clothing: The more clothing worn the better insulated the person is in the water. On the day of the accident, the three occupants entered the water wearing minimal clothing, namely, t-shirts and shorts. This is understandable given the weather conditions on the day – hot and sunny. This however put them at a disadvantage as water conducts body heat away up to 26 times faster than air of the same temperature.

As clothing acts as a barrier to heat loss whilst in the water, the lack of clothing worn by the occupants is considered to be relevant.

Body Build: The fat layer beneath the skin acts as an important insulator against heat loss. Consequently a fit, heavier built, person may survive longer in cold water than a fit person of slight build.

Swimming: Attempting to swim is not effective for the maintenance of body heat when immersed in cold water for the following reasons:

- Exercise causes the skin blood vessels to dilate (open up) resulting in a greater heat loss than production, thus resulting in heat loss and the onset of hypothermia. In-water survival techniques recommend that swimming is kept to a minimum.
- Swimming will use valuable energy, which could be better used in keeping the body warm. Once the energy levels fall fatigue may then become a factor reducing the in-water survival time.

[5] In water below 15°C the effects of immersion become significantly life threatening and the lower the temperature, the more severe the symptoms of cold shock.

- Swimming can cause water to enter the airways, this can result in the onset of drowning by filling the lungs with water.

Recommended In-Water Survival Swimming Techniques:

If a person needs to swim it is recommended that the following techniques are used:

- Swim on your back using arms only as a mean to propel through the water. Do not use legs as a means to propel as leg muscles use a lot of energy thus resulting in an individual becoming exhausted quickly. For maximum heat conservation cross your legs. If the sea condition is such that water is splashing over the airways it is paramount that the airways are covered by whatever means are available. If the lifejacket/PFD is fitted with a splash hood this should be donned immediately, or alternatively the use of a cupped hand covering the airway is another option.

- Two persons; swim in a line on your back with the forward person putting their feet under the armpits of the other person. Both persons use their arms to propel through the water. As with a single person do not use legs as a means of propulsion. If the sea conditions are such that the airways are being exposed to water, each person can use their opposite arm for swimming, namely one uses the right the other the left as a means of propulsion. The free hand can be used to cover the airways for protection.

- Three persons; the same as two namely the lead person's feet under the armpits of the second person, the second person's feet under the armpits of the third person. Swim together using arms only as a means of propulsion, protect the airway if needs be.

Alcohol: Alcohol was not a factor in this accident.

In-water period: The longer a person is in the water the more exposed that person is to the onset of hypothermia. The owner and passenger stated that the boat sank at about 1600 hours and that passenger 2 passed away at about 0400 hours, this gives a total of 12 hours in the water. The owner and passenger were rescued at about 0900 hours, which was approximately 17 hours in the water.

3.81 The biggest risk for the three persons in the water was the onset of hypothermia, which would have resulted in the deep body temperature falling, and a lapse into unconsciousness and death. This may occur in two ways:

- drowning through incapacitation, and/or
- cardiac arrest.

3.82 The autopsy report stated that the cause of the death was drowning, with hypothermia as a possible contributory factor.

3.83 The owner and passenger were both treated for hypothermia.

3.84 It is not clear what sea survival techniques, if any, were employed by the persons in the water.

3.85 It does appear that all three of them made, understandably, a considerable effort to swim to shore.

3.86 During an in-water sea survival period conservation of body heat and energy is paramount to ensure that the person in the water has the maximum possible survival time.

3.87 For conservation of body heat several methods can be used depending on the number of persons in the water. For a single person the Heat Escape Lessening Posture (HELP) can be used. This is achieved by placing the arms across the chest to protect the axillae (armpits), and flexing the legs to protect the groin area. If present, wear headgear and remain still in the water. The HELP position will result in a 50% increase in survival time *(See Figure 3 – HELP position).*

Figure 3
Showing HELP

3.88 If there are two or more the "HUDDLE" position is recommended to conserve heat loss. This again results in a 50% increase in survival time *(See Figure 4 - HUDDLE position).*

Figure 4
Showing HUDDLE position

3.89 It appears that once the occupants of *Hard Out* found themselves in the water they were not prepared for an extended in-water survival situation.

Ability to Indicate Distress

3.90 It is always good practice to assess the associated risk with any recreational activity and develop a contingency plan to mitigate such risks. In the maritime environment, if you find yourself in the water, one of the key factors to survival is the ability to communicate your position to emergency services by the fastest means available. This will aid the search and rescue services not only to know that you are in distress, but also to direct the appropriate resources to the distress position.

3.91 There are several methods of communicating distress, such as:

Very High Frequency (VHF) Radio (portable or fixed):

VHF radio is a good way of relaying a distress message to the emergency services when one is close to the land. However, there are some disadvantages. If it is a fixed radio, and the boat sinks rapidly, there may not be time to transmit a mayday call. Once the boat has sunk, the radio is rendered inoperable.

This was the case with the sinking of *Hard Out*. Portable VHF radios may be kept on the person and used in the water, however, they need to be waterproof and have sufficient range to communicate with the SAR services. Given the close location to shore in this accident a hand held VHF would have been useful in alerting the distress situation.

Cellphone:

Cellphones are an option, however, if the phone is not protected from the water it will fail.

Use of a cellphone is also reliant on the cellphone range and network.

Cellphones are not designed for maritime emergencies and the use of such may be difficult in a dynamic environment such as a choppy seaway.

Maritime Distress Flares (rocket, hand held & smoke):

These are a good option. Red rocket flares are so designed that they can be used both day and night. Whilst they do not pinpoint a person's location, they give a general search area if seen by a passing ship or person ashore. They should not be used if an aircraft is in the immediate vicinity. Burning time is about 40 seconds: visibility up to 15km during the day and up to 40km at night.

Hand held flares are good for indicating a distress position for approaching SAR craft by sea and air and they do pinpoint a person's position by way of the red flare's illumination.

Smoke flares are for daylight signalling use. They are a good means of pinpointing a location by way of a bright orange smoke signal, but are of no use during the hours of darkness.

Hand Held Signal Equipment: Hand held strobe lights are an option. They are visible 2.4kms to 3kms at night. In these circumstances they may possibly have been visible from shore and to another vessel or aircraft in the vicinity.

Distress Beacons: With the advent of modern communication under the GMDSS, the use of an emergency beacon, such as a 406 MHz PLB or a 406 MHz EPIRB is a reliable way of alerting search and rescue services that a person is in distress and requires immediate assistance.

Some EPIRBs and PLBs are equipped with a GPS input[6]. The GPS position is sent with the distress beacon signal thus providing the SAR services with a pinpoint geographical location of the distress position. EPIRBs and PLBs are readily available for recreational or commercial use in New Zealand.

3.92 One of the functions of GMDSS is to monitor beacon distress frequencies via satellite. It is a 24/7 operation and operates worldwide. A brief explanation of how the system works is:

1. A distress beacon is activated.
2. The signal is transmitted to the nearest sub-orbital satellite. These can be satellites that remain in stationary position over the same area of the earth's surface or those that are constantly circling the earth in polar orbits.
3. The signal is transmitted from the satellites to the nearest local user terminal (LUT). These are placed around the globe, to ensure signals are received almost immediately.
4. The signal is passed to RCCNZ.
5. RCCNZ mobilises rescue resources and directs them to the coordinates of the signal.

3.93 If the beacon is using the 406 MHz signal the system consists of four geostationary satellites located above the equator at intervals of approximately 120° of longitude. The satellites can "see" from approximately 70° North to 70° South.

3.94 If, however, an EPIRB/PLB has the GPS input, RCCNZ will receive notice of activation and the position within approximately 10 minutes of it being activated *(See Figure 5 – Diagram of COSPAS-SARSAT System Overview).*

3.95 The satellites process 406 MHz signals only, and will detect a transmission, if it is not shielded by terrain or other medium, the instant a 406 MHz EPIRB is activated. RCCNZ will receive processed information within approximately four minutes of activation. If no position is available, RCCNZ may have to wait until a LEOSAT satellite transits the area before positional information is obtained.

[6] This PLB uses a GPS to pinpoint the distress position to within 100 metres, thus giving the SAR a direct position to go to.

Figure 5
Diagram showing how the system works.

Costs of PLBs/EPIRBs

PLBs

3.96 The following is an indication of retail prices in May 2008.

406 PLB	
Manual	$620
Integral GPS, Manual	$699
Integral GPS, Manual + strobe	$750
Manual + water activated	$695

EPIRBs

3.97 The following is an indication of retail prices in November 2008.

Water activated/manual, integral GPS	$849
Non GPS manual activated	$285 upwards (depending on model)

Photograph 14
A PLB with GPS input readily available in New Zealand. The mobile phone is a size comparison.

Hard Out's ability to indicate distress

3.98 ***Hard Out*** was equipped with:

- non marine car flares,
- fixed VHF radio,
- cellular phone,
- a boat survival package, which was about one year old. The owner stated that in the package was a flare. The owner was not sure what type of flare, however, he did state that it was not a rocket flare but a strike flare[7].

3.99 The non marine flares were stored in the cabin and were reportedly not accessible when the boat was swamped. The non marine flares may not have been of much use if accessible as they are not designed to be used in a marine environment.

3.100 The fixed VHF was rendered inoperable when the boat was swamped.

3.101 The boat survival package was reportedly not accessible.

3.102 The cellular phone was in a watertight container but that protection was lost when the container was opened.

3.103 As a consequence, when the occupants of ***Hard Out*** were in the water they were unable to communicate their distress to SAR services.

3.104 Once the SAR operation had been launched they had no means of attracting the attention of the SAR services.

[7] The full contents of the pack was not explored during the interview conducted by MNZ and the Police. MNZ is unable to provide further comment on what was in the boat's survival pack and the condition of it.

Action taken by the owner of *Hard Out* prior to departure

3.105 The following actions taken by the owner prior to departure of *Hard Out* were prudent.

2 Minute Form

3.106 The owner had a magnetic '2 minute form' which he left on his fridge at home. Next to it was a "Post It" note with trip details and ETR. The owner's wife was advised to ring the Coastguard if he had not phoned her within 30 minutes after the ETR, which she did.

3.107 The '2 minute form' contains basic details of the boat, details of the trip and the owners cellular phone number.

3.108 The original concept of the form was that it should be left on the car's windscreen at the launching ramp. The owner, however, was concerned that the form indicated to dishonest persons the expected time of the owner's return.

Trip Report

3.109 The owner gave a trip report to Wanganui Coastguard radio before crossing the bar.

Expectations of persons involved in the accident

3.110 According to the owner, when he did a VHF operators course in 2006, he was told that trip reports were crucial and always to give them. The owner was under the impression that, if an arrival trip report (that had been recorded prior to departure) was not closed out, that within 10 minutes of that recorded time the boat would be considered missing.

In that event the Coastguard would radio the boat and, if no reply, other boats in the vicinity to ascertain if it had been seen. If no information was forthcoming the boat would be considered overdue and a SAR would be activated. This is not a correct understanding of the actions that Coastguard would take.

3.111 The owner was also of the view that if an arrival trip report was not closed[8] out by the boat owner and it resulted in an unnecessary SAR situation the owner may be charged with the cost of the SAR.

3.112 The passenger said he had a similar understanding of trip reports from the Day Skipper course he had completed. He also expected that the Coastguard would inspect the car park and find the ute and boat trailer. The trailer had the boat's name on it and also the owner's cell phone number.

MNZ Radio Handbook for Coastal Vessels – Trip Reports

3.113 The handbook is published by MNZ and contains information on giving voyage or trip reports which states in part:

"Ship stations are encouraged to give coastal stations details of their voyages in a trip report (TR), to facilitate possible search and rescue operations.

[8] Closing out an arrival TR simply means that the boat owner contacts the local Coastguard station who the call was logged with and informs them that the vessel and occupants have returned safely after the trip.

The TR comprises:

On departure:

- *The abbreviation TR*
- *Name and call sign of the ship*
- *Port of departure*
- *Port of arrival and, if possible, estimated time of arrival (ETA)*
- *Number of persons on board*

On arrival:

- *The abbreviation TR*
- *Name and call sign of ship*
- *Port and, if possible, estimated time of departure (ETD)*

Every effort should be made to call notifying arrival at a safe anchorage or at the end of the voyage. However, unless a vessel is reported as overdue the absence of a closing TR will not initiate a search or other follow up action".

Coastguard – Trip Reports

3.114 Nationally, the standard manner for Coastguard units to deal with TR's is in keeping with the MNZ Radio Handbook for Coastal Vessels.

3.115 Wanganui Coastguard Radio statistics show that they logged 3411 TRs in the year ending February 2008, but they have no statistics on how many of those TR's were not closed. The Coastguard analysis of emergencies for the same year shows 14 overdue boats. Two of those resulted in searches; one of which was ***Hard Out***.

Wanganui Coastguard Operating Procedures

3.116 The following procedures for unclosed TRs were provided to MNZ by Wanganui Coastguard Unit.

"Conditional upon:

(a) Sea conditions
(b) Wind conditions
(c) State of Tide
(d) Weather forecast

Operator will attempt to contact overdue boat by VHF radio within 10-15 mins of the boat's estimated time of return, but if conditions pose no problems, MAY leave contact for 15 – 20 mins.

If no reply to call plus a repeat call, operator will call approx. every 5-10 minutes.

If boat is listed on the CG Boat register, an attempt will be made to call on mobile phone. If no answer, a message will be left.

If still no radio contact, an "All Stations" call will be put out asking for any info re overdue boat – e.g. has anybody in the vicinity of where the overdue boat was fishing, seen the boat or seen it return to the ramp.

If home phone number is known (from CG boat register) this will be called and it will be confirmed either that the boat is back (skipper forgot to cancel his TR on return) or has not returned home. There may not be an answer.

If able to leave a message, this will be done with a request to telephone the radio operator as soon as possible.

If no affirmed sightings, radio operator will contact persons living near to the ramp from where the boat trailer will be, to see if a vehicle and trailer is there with Rego No. as listed in the CG Boat register. If, however, the boat is NOT on the CG boat register, little can be done until it can be ascertained that a boat has not returned to the ramp from which they launched.

At this stage, the radio operator would contact the Police and give them a sit rep, and also contact the CG Rescue boat duty skipper and give him a report on the situation.

Should there, however, be only one boat trailer left at the ramp park, the rego no. will be telephoned to the Police with a request that they ascertain the owner and supply the radio operator with the owner's phone number. This will then be contacted, and any further info. relayed to the Police.

In most cases, the duty radio operator will contact an off-duty operator to assist with monitoring the channel. This is necessary because normal radio traffic still needs to be attended to."

3.117 The Wanganui Coastguard Unit has specific procedures for unclosed TRs relating to those trips registered with the Coastguard. It is not clear whether ***Hard Out*** was registered with the Coastguard on the day of the accident.

The Wanganui Volunteer Coastguard made these comments on the draft report:

a) The owner believed he had registered his boat with Wanganui Volunteer Coastguard;

b) ***Hard Out*** was not in fact registered with Wanganui Volunteer Coastguard;

c) ***Hard Out's*** VHF call sign was registered on the national call sign database. The registration of the call sign was processed through CBES.

Coastguard Boating Education Service (CBES) VHF Course

3.118 CBES run marine radio courses for VHF Operators Certificate and Marine Radio Operators Certificate. CBES produce a student's manual which is common to both courses. The section of the manual dealing with TRs is reproduced below.

"COASTGUARD RADIO SERVICES

Trip Reports (TRs)
A trip report is a message that you pass to a coast station by radio to advise them of your intended boating activity or voyage. The recorded information is then available to help identify your location and provide other details if search and rescue is required. In most cases if you fail to close your TR, a search will not necessarily be instigated, however always close your TR when you arrive/return safely from your trip.

Trip Report Format (having established communications):

- *Name and callsign of your boat*
- *Point of Departure*
- *Destination, route and ETA*
- *Number of people on board (POB)*

Note: you can break up a TR if you are going fishing; one TR to the fishing area, then another when you depart again with an updated ETA.

Example:
Establish communications before you pass the "TR' information, either with an initial call on Channel 16 (for Maritime Radio), or direct on a Coastguard or other duplex repeater channel:

- *"Coastguard Radio (up to 3 times), this is Seabird ZMQ 8088 (up to 3 times) for a TR. Over"*
- *"Seabird ZMQ 8088, Coastguard Radio - go ahead"*
- *"Coastguard Radio this is Seabird, departing from Westhaven Marina, destination Gulf Harbour via some fishing at Tiritiri, ETA Gulf Harbour 1800 this evening, 4 POB. Over"*
- *"Thanks Seabird, I have all that copied. Coastguard Radio out"*

Note: Always close your TR when you arrive at your destination.

Closing Your TR on arrival:
Establish communications, advising that you'd like to close your TR, then:

- *"Coastguard Radio (up to 3 times), this is Seabird ZMQ 8088 (up to 3 times) to close a TR. Over"*
- *"Seabird ZMQ 8088, Coastguard Radio - go ahead"*
- *"Coastguard Radio, this is Seabird ZMQ 8088. We have arrived at Gulf Harbour. We'd like to close our TR Over"*
- *"Thanks Seabird, I have all that copied. Coastguard Radio out"*

Note: Lodge your TR with the most appropriate coast station;
- *Generally Maritime Radio for extended coastal or offshore trip*
- *For local/day trips the local Coastguard, private coast station/user group or local port authority may be the better option".*

Boating Safety Strategy

3.119 The "Boating Safety Strategy: 2007 Review of the New Zealand Pleasure Boat Safety Strategy" was published in March 2008. It is the work of the NPBSF which involves 16 organisations with an interest in recreational boating. Although the report was published after the accident, parts of the report are pertinent to this accident. The Conclusions and Recommendations of this report are reproduced here. A full copy of the report can be found on the MNZ website (www.maritimenz.govt.nz).

3.120 Conclusions supported by the NPBSF that are pertinent to this report are as follows:

Conclusions

*"**2. Mandatory carriage of communications equipment***
The statistical analysis of fatal boating accidents from 2000 to 2006 indicated that the ability to communicate distress following an immersion-type accident has become just as important as wearing lifejackets in preventing fatalities. While many boats already carry a means of communication, every recreational craft needs an effective method of signalling for help, particularly those prone to capsize. In many cases, providing a reliable form of communication involves little extra cost.

3. Fitted buoyancy to provide level flotation
The safety benefit of having a craft that floats level following a capsize is very apparent. Even if it cannot be righted, a craft that remains horizontal provides a better platform for survivors, permits retrieval of essential equipment from under the boat and creates a much larger target for rescuers.

The NPBSF members endorsed work already done by some builders of small craft and supports further initiatives by designers and builders for level flotation in all craft and supports further initiatives by designers and builders for level flotation in all craft under 6m. The NPBSF believes that MNZ, Coastguard and the Marine Industry Association (MIA) should work with industry to encourage level flotation as an option in all new boats and promote this safety feature to potential recreational craft purchasers.

3.121 Recommendations made by the NPBSF that are pertinent to this report are as follows:

Recommendations

Mandatory carriage of communications equipment*: making it mandatory for all craft to carry at all times an effective means of communicating distress that is appropriate to the situation and that, in the case of vessels under 6m in length, remains effective after immersion.*

Level flotation*: developing and implementing voluntary industry standards for vessels under 6m, with further research and development into retrofitting level flotation in existing pleasure boats."*

3.122 MNZ supports these recommendations.

4. CONCLUSIONS

Hard Out

4.1 It must be reiterated that without the recovery of ***Hard Out*** the exact cause of the sinking could not be accurately determined.

4.2 As previously mentioned, there are many reasons and scenarios that could result in water entering the void space through the outer hull. The list is not exhaustive, but includes such things as:

- the deterioration of the 27 year old fibreglass,
- a latent fracture,
- a loose or missing bung,
- a hole caused through striking a semi-submerged object, or
- a leaking repair.

4.3 MNZ investigators have considered each of the possible factors which may have contributed to the sinking of ***Hard Out***. Without the vessel, the investigators are unable to reach a definitive conclusion as to whether any, all, or a combination of the above factors were contributory.

4.4 ***Hard Out*** was an old boat, at best 27 years old. It has not been possible to confirm the complete maintenance history of the vessel.

4.5 From the statements made by all of the persons spoken to and mentioned in this report, it is reasonable to conclude that ***Hard Out*** was in good condition.

4.6 It is not possible to rule out the likelihood that pressure testing conducted by the owner may have unknowingly stressed the hull and transom. This may have resulted in the void space being flooded, causing the boat to sit low in the water with an overall loss of buoyancy and freeboard.

In commenting on the draft report the owner stated that the pressure testing did not, in his opinion, stress the hull or transom.

4.7 The events as described by the owner and passenger suggest that ***Hard Out*** was stern to the weather and that although the conditions were benign, the vessel's reserve buoyancy succumbed to water ingress.

Preparedness

4.8 This accident illustrates the danger of using recreational vessels of this size and type in the open sea and the need to be prepared for an emergency situation. If a vessel sinks and the occupants find themselves in the water it is paramount that the appropriate emergency equipment is carried and is readily available to maximise the chance of rescue and survival.

4.9 ***Hard Out*** and the occupants were not adequately prepared for an emergency situation.

Trip Reports (TRs)

4.10 Whilst a TR is a valuable means for reporting a boat's intention for the day, it should not be solely relied upon as a mechanism for triggering a SAR. It is the responsibility of all recreational boat owners to ensure that they have other means of indicating distress. If an emergency situation transpires early in the trip, one would be left relying on the expiration of their TR before a SAR is commenced.

4.11 The actions taken by the owner of ***Hard Out*** prior to departure with regard to the two minute form and the TR information were the actions of a prudent and responsible person.

Emergency Equipment

4.12 Both means of communication carried on the vessel failed. The vessel sank so rapidly, that the VHF radio could not be activated and the cellular phone, albeit in a waterproof container, did not operate.

4.13 If any of the following had been available upon the sinking of ***Hard Out***, a SAR response could have been co-ordinated almost immediately after the foundering, which may have greatly increased the survival chances of passenger 2:

- EPIRB or PLB – particularly one with integral GPS,
- hand held VHF – either waterproof or kept in a waterproof covering which permits its use without removal,
- marine distress flares.

4.14 If the following had been available once the SAR was activated it would have increased the chances of the SAR vessel's attention being directed towards the occupants in the water:

- marine distress flares, such as hand held flares, rocket flares or smoke flares,
- strobe light,
- hand held water proof torch,
- whistle.

Lifejackets & Buoyancy Aids (PFDs)

4.15 The investigation shows that none of the occupants in the water were wearing the correct PFDs for the area of operation. Although the PFDs provided buoyancy in benign weather conditions, if the PFDs had been of a higher standard, it may have lessened the energy expended to maintain buoyancy. PFDs form part of the vessel's emergency equipment and should be of an appropriate design for the area of operation.

4.16 Once in the open sea the PFD is, in effect, the support craft for the individual. Therefore, the more support, the easier it is to maintain an in-water survival position. The easier it is to maintain the in-water survival position the less energy is used, thus increasing the chance of combating hypothermia.

Hypothermia

4.17 It was a hot day and the occupants were forced to abandon *Hard Out* with virtually no warning. Once in the water they were not well dressed and the lack of clothing put them at a disadvantage. Extra clothing, if worn, would have been an advantage in terms of the in-water survival time.

4.18 The three occupants spent much of the night swimming towards the shore. Swimming would have consumed energy, encouraged accidental swallowing of seawater and increased water movement over their bodies and through their clothing. The action of swimming was ultimately ineffectual and is most likely to have contributed to the onset of hypothermia.

5. RECOMMENDATIONS

5.1 It is recommended that MNZ:

(a) undertake research to review the seaworthiness of all remaining boats of this model to ensure there are no inherent design failures, which could place other people at risk, and

(b) take steps to review the longevity of the fibreglass commonly used in recreational boats to determine the effects of age and exposure to the weather.

(c) review its Advisory Circulars and other educational material relating to the use of lifejackets/PFDs to ensure they are up to date.

5.2 It is recommended that MNZ take steps to ensure that the recreational boating community is better informed about the following safety measures:

(a) the safe use of lifejackets/PFDs. The information should highlight the importance of using the correct lifejacket/PFDs for the area of use. In addition the information should clearly state the categories of lifejackets/PFDs and their intended use as per the Advisory Circular, Maritime Rule Part 91, Navigational Safety.

(b) the best methods available for indicating a distress situation, noting that relying on one form of communication in a distress situation may not work.

(c) the correct methods of in-water survival techniques.

(d) the effects of hypothermia and the steps that can be taken to reduce the onset of hypothermia.

(e) the need to be prepared for any emergency situation, and the value of assessing the associated risks and implementing contingency plans to mitigate such risks.

(f) the proper method for pressure testing vessels of this type to check for possible leakages.

5.3 It is recommended that the New Zealand Coastguard Education Service bring this report to the attention of all attendees of future courses especially the marine VHF and Day Skipper courses.

5.4 It is recommended that this report be forwarded to the National Pleasure Boat Safety Forum (NPBSF).

VESSEL INFORMATION

Ship Type:	GlassKraft, deep V planing launch with cabin
Engine:	Evinrude 110hp V4, manufactured prior to 1981, 98 hours use. Electric start. Johnson 6hp, manufactured 2007.
Built By:	Cooke Brothers Ltd
Construction Material:	Fibreglass, double skin
Length Overall (m):	5.1
Radio:	Fixed VHF

APPENDIX 1

Weather Forecasts

MARINE WEATHER BULLETIN FOR NEW ZEALAND COASTAL WATERS FORECAST ISSUED BY METEOROLOGICAL SERVICE OF NEW ZEALAND AT 0038HRS 23-FEB-2008 VALID UNTIL MIDNIGHT TONIGHT 23-FEB-2008

STEPHENS
GALE WARNING IN FORCE
Northeast 25 knots, but 40 knots in the west. Sea very rough in the west. Northwest swell rising to 3 metres in west and 1 metre elsewhere. Fair visibility in rain in the west.

OUTLOOK FOLLOWING 3 DAYS:
Northeast easing Sunday morning 30 knots west of Cape Egmont to Farewell Spit with very rough sea easing and 15 knots elsewhere. Becoming Sunday evening southwest 15 knots in the west and northwest 15 knots elsewhere. Becoming early Monday northwest 25 knots everywhere and changing later Monday southwest, then easing early Tuesday 15 knots. Moderate northerly swell in west easing Sunday. Moderate southwest swell developing Monday.

MARINE WEATHER BULLETIN FOR NEW ZEALAND COASTAL WATERS FORECAST ISSUED BY METEOROLOGICAL SERVICE OF NEW ZEALAND AT 0423HRS 23-FEB-2008 VALID UNTIL MIDNIGHT TONIGHT 23-FEB-2008

STEPHENS
GALE WARNING IN FORCE
Northeast 25 knots, but rising to 40 knots in the west this morning. Sea very rough in the west. Northwest swell rising to 3 metres in west and 1 metre elsewhere. Fair visibility in rain in the west.

OUTLOOK FOLLOWING 3 DAYS:
Northeast easing Sunday morning 30 knots west of Cape Egmont to Farewell Spit with very rough sea easing and 15 knots elsewhere. Becoming Sunday evening southwest 15 knots in the west and northwest 15 knots elsewhere. Becoming early Monday northwest 25 knots everywhere and changing later Monday southwest, then easing early Tuesday 15 knots. Moderate northerly swell in west easing Sunday. Moderate southwest swell developing Monday.

MARINE WEATHER BULLETIN FOR NEW ZEALAND COASTAL WATERS FORECAST ISSUED BY METEOROLOGICAL SERVICE OF NEW ZEALAND AT 1248HRS 23-FEB-2008 VALID UNTIL MIDNIGHT 24-FEB-2008

STEPHENS
GALE WARNING IN FORCE
Northeast 25 knots but 40 knots west of a line Cape Egmont to Farewell Spit, easing to 25 knots in west in the morning. Becoming westerly 20 knots Sunday afternoon and evening. Very rough sea in the west, easing. Northwest swell 3 metres in west and 1 metre elsewhere. Poor visibility in rain in the west, spreading east in the morning, then easing Sunday evening.

OUTLOOK FOLLOWING 3 DAYS:
Northwest 25 knots with rough sea, change Tuesday morning southwest 20 knots, change Tuesday afternoon southeast 20 knots. Moderate southwest swell developing Monday, easing Wednesday.

MARINE WEATHER BULLETIN FOR NEW ZEALAND COASTAL WATERS FORECAST ISSUED BY METEOROLOGICAL SERVICE OF NEW ZEALAND AT 1525HRS 23-FEB-2008 VALID UNTIL MIDNIGHT 24-FEB-2008

STEPHENS
GALE WARNING IN FORCE
Northeast 25 knots but 35 knots west of a line Cape Egmont to Farewell Spit, easing to 25 knots in west in the morning. Becoming westerly 20 knots Sunday afternoon and evening. Very rough sea in the west, easing. Northwest swell 3 metres in west and 1 metre elsewhere. Poor visibility in rain in the west, spreading east in the morning, then easing Sunday evening.

OUTLOOK FOLLOWING 3 DAYS:
Northwest 25 knots with rough sea, change Tuesday morning southwest 20 knots, change Tuesday afternoon southeast 20 knots. Moderate southwest swell developing Monday, easing Wednesday.

APPENDIX 2

NIWA Wave Data