Report 97-207

dinghy *Solo*

swamping

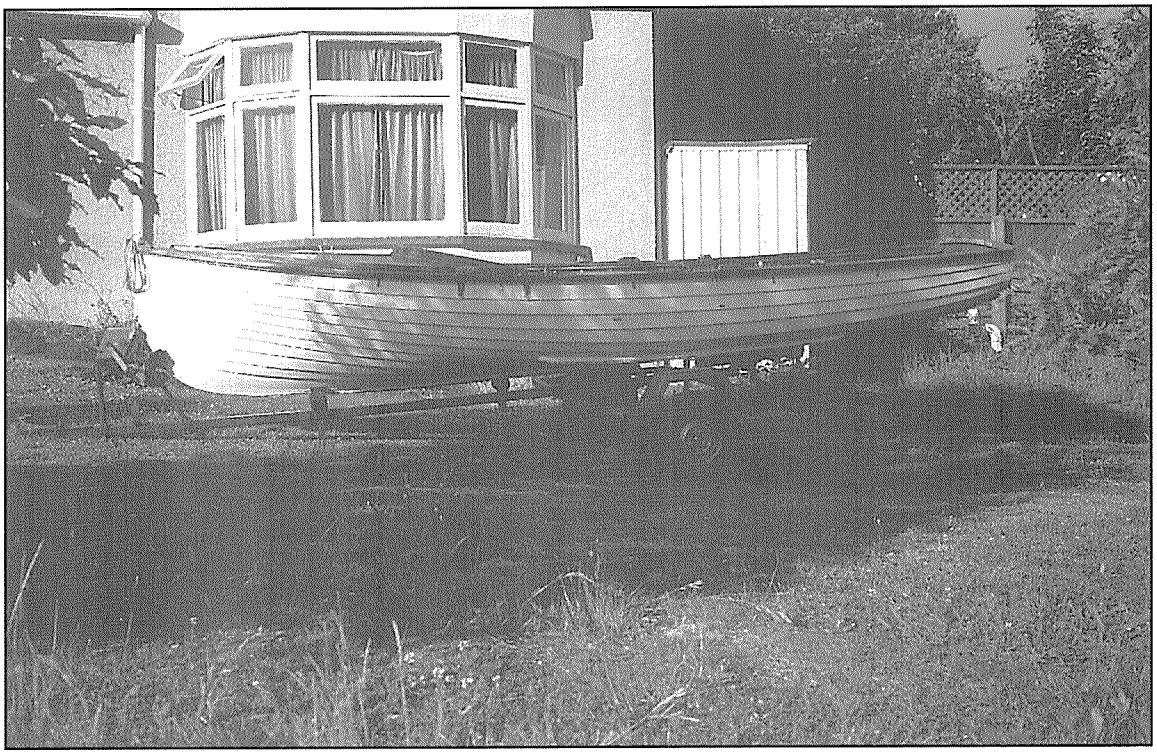
Nelson Harbour

1 December 1997

Abstract

On Monday 1 December 1997, at about 1015, the dinghy, *Solo*, with eleven persons on board, was proceeding on a school trip across Nelson Harbour to Haulashore Island. The boat encountered sea conditions with waves in excess of its freeboard and swamped. There were no injuries.

A safety issue identified was the overloading of the boat for the sea conditions encountered on the trip. Safety recommendations were made to the principal of the school and to the Director of Maritime Safety that any power-driven vessel used for school outings should be one that is operated under a Safe Ship Management system.



***Solo* at owner's residence**

Transport Accident Investigation Commission

Marine Incident Report 97-207

Vessel particulars:

Type:	Clinker-built centreboard sailing dinghy
Construction:	Wooden
Built:	In New Zealand in early 1960s
Class:	Commercial ship[1]
Length:	5.0 m
Beam:	1.6 m
Propulsion:	Sails or outboard 3.35 kW long shaft Silver Century Seagull

Location:	Nelson Harbour between Sealord Marine Rescue Centre and Haulashore Island. Rescue was affected from the main entrance lower lead light beacon (known locally and referred to in this report as the "Three Dolphins")
Date and time:	Monday 1 December 1997, at about 1015[2]
Persons on board:	Crew: 2 Passengers: 9
Injuries:	Nil
Nature of damage:	Nil
Investigator-in-Charge:	Captain John Mockett

[1] For the purposes of this voyage only.
[2] All times in this report are NZDT (UTC + 13 hours) and are expressed in the 24 hour mode.

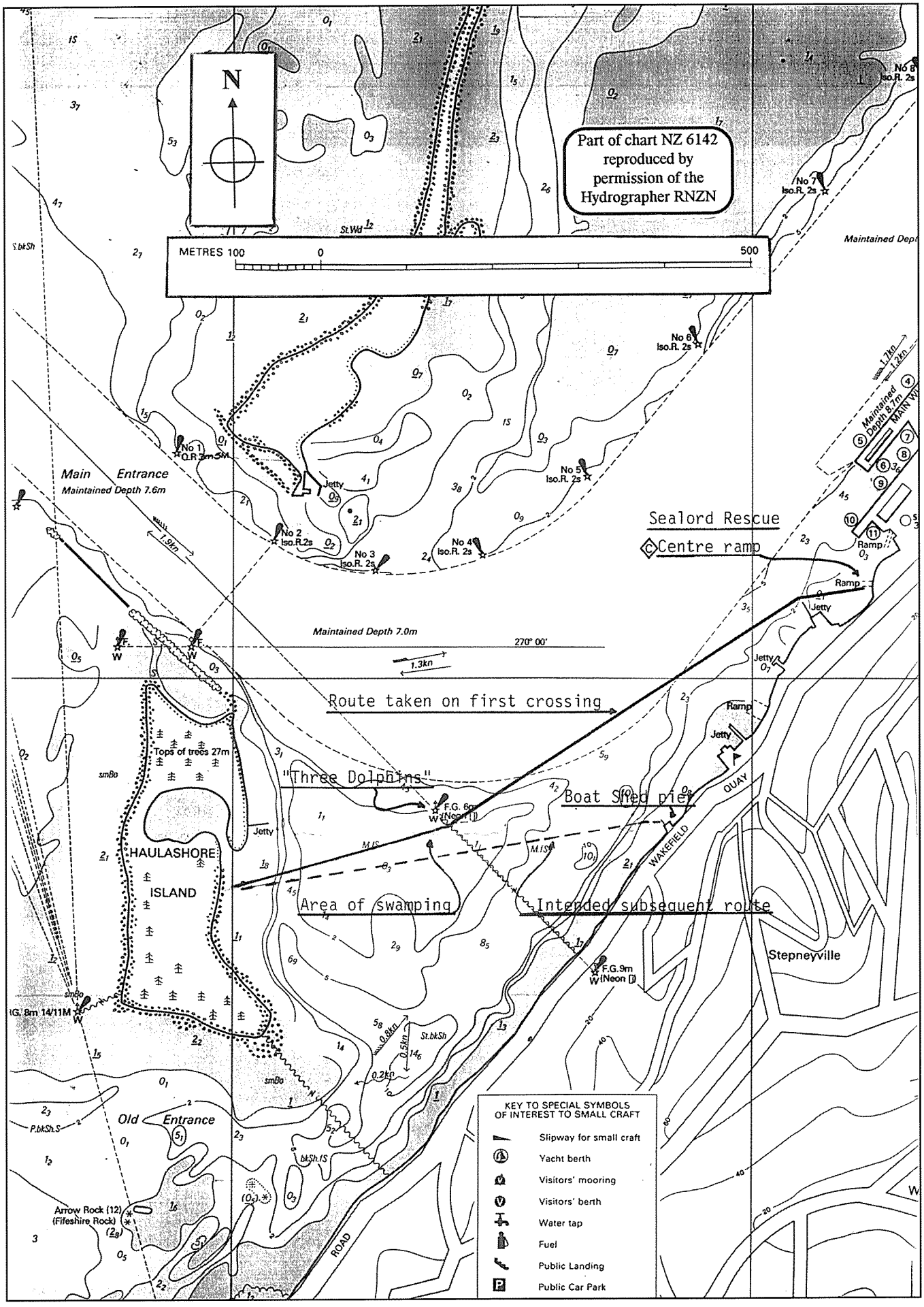


Figure 1
Extract of Chart NZ 6142 showing Nelson Harbour

1. Factual Information

1.1 History of the trip

1.1.1 An educational school trip had been arranged by Hampden Street School in Nelson several weeks prior to the incident. The group making the trip was to consist of 38 children, 2 teachers and a number of parent helpers. The trip was to be a day excursion onto Haulashore Island in Nelson Harbour. (See Figure 1)

1.1.2 With the principal's agreement, two teachers organised the trip for 1 December 1997 . The teachers completed a risk management plan as required by school policy. Parental consent was obtained for each child to participate in the trip. Parents were also requested to assist with road transport from the school to the launching ramp at Sealord Rescue Centre.

1.1.3 The school accepted an offer from one of the parent helpers for the use of his boat, *Solo*, to ferry the party to Haulashore Island. The owner of *Solo* had regularly accompanied school trips as a parent helper over a period of many years; he had two children of his own at the school and was a member of the Board of Trustees. For the purposes of this trip, he considered he was acting as a parent helper as his son was included in the trip.

1.1.4 The teachers left the verification of the suitability of *Solo* for use on the trip and its seaworthiness to the owner of the boat.

1.1.5 *Solo* had been out of the water for 19 months and stored in the owner's garage. The owner had caulked the hull planking, fitted a new spark-plug in the engine and filled the tank with fresh fuel before putting *Solo* into the water for a sea trial two days prior to the school trip. The repairs proved to be watertight but other small areas of water ingress were identified, which the owner repaired.

1.1.6 On the evening of 30 November 1997, one of the teachers organising the trip contacted the boat owner. The weather forecast was favourable and they agreed that the trip should go ahead subject to a final appraisal of the actual conditions on the following morning.

1.1.7 On the morning of 1 December 1997, the owner listened to the 0730 local coastal weather report on Fifeshire FM Radio which indicated favourable conditions and forecast the south-westerly wind to ease later in the morning. Fifeshire FM Radio receive the coastal marine forecast information from MetService.

1.1.8 At about 0830, the owner drove to the harbour and visited the Sealord Rescue Centre and the Nelson Yacht Club from where he was able to view the intended route and he noted that there was no swell but the wind was disturbing the sea surface.

1.1.9 The owner returned home and contacted the school. He and the teachers agreed that, given the prevailing sea conditions and the favourable forecast for the remainder of the day, the trip should go ahead.

1.1.10 The wind recorded by MetService at 0900 on 1 December 1997 was 28 km/h from the south-west. The forecast was for a mostly fine day with the wind easing. High tide was at 1153. Witnesses stated that the sheltered waters of the harbour were calm but there was a slight chop around the harbour entrance and inshore of Haulashore Island.

1.1.11 The owner, together with his 19-year-old daughter as crew and his 16-year-old son as a helper, took *Solo* to the Sealord Marine Rescue Centre ramp where they launched the boat and awaited the school party.

1.1.12 After launching, the owner checked *Solo* and found the second repairs to be watertight although there was slight water ingress through the bottom planking. The owner considered that this was not untoward and normal for clinker-built boats.

1.1.13 The school party, of 2 teachers and 36 children, made its way from Hampden Street to the Sealord Marine Rescue Centre. In addition to the owner, his daughter and son, there were 5 parent helpers, one of whom was an experienced boat person.

1.1.14 The whole party could not be taken to the island on *Solo* on a single trip but had to be split into groups. To maximise the time available on the island and therefore the value of the school outing, the least possible number of trips across the harbour was desirable.

1.1.15 The decision was made by the owner and the teacher-in-charge that one adult and as many children as could be comfortably seated would be taken on each trip. The group setting out on the first trip comprised the owner and his daughter as crew, one teacher and eight children as passengers. Everyone on board was seated and wearing a lifejacket. The lifejackets had been supplied by the parents of one of the children at school and were all relatively new and in good condition.

1.1.16 Each of the passengers had their own day pack with them and the teacher had some additional items of support equipment. The packs and equipment were stowed in the centre of the boat. The loading was supervised by the owner and the parent helper who was an experienced boat person.

1.1.17 The owner estimated that the freeboard of *Solo* on completion of loading and departure from the ramp was in the region of 300 to 350 mm. He stated that he had considered this to be sufficient for the sea conditions at the ramp and for the conditions in the areas of the harbour visible from the ramp. As the whole route was not visible, he and one parent helper went to the Boat Shed Pier at about 0940 to view the latter part of the route and considered that the conditions had remained suitable for the trip.

1.1.18 *Solo* departed the Sealord Rescue Centre ramp at about 1000 and the owner headed out towards Haulashore Island, passing to the south-east of the Three Dolphins. (See Figure 1)

1.1.19 The remainder of the group watched the departure of *Solo* and then moved to observe from the Boat Shed Pier, from where the subsequent trips to the island were to be made. From the Sealord Rescue Centre the trip was just under 1 km whereas from the Boat Shed Pier it was only a little over half that distance.

1.1.20 The owner and the teacher on board and parent helpers on shore all stated later that they had the impression that the wind strength and the resulting sea increased during the 15 minute passage from the Sealord Rescue Centre ramp. The owner stated that the boat was "probably overloaded" for the conditions encountered in the area of the swamping.

1.1.21 The incoming tide passes through the main entrance cut and also through the old entrance to the south of Haulashore Island. These two tidal flows meet to the south of the Three Dolphins between the mainland and Haulashore Island and the tidal eddies create an area of disturbed water. With a south-westerly wind this area is frequently choppy during the flood tide. Witnesses stated that on the morning of the incident, this area was affected by choppy conditions with waves up to 500 mm, whereas the area to the north of the Three Dolphins was relatively calm.

1.1.22 Once past the Three Dolphins, *Solo* encountered choppy conditions with waves estimated by the owner as up to 500 mm. Some of these waves began to break over the side of the boat. As the water came into the boat, it settled deeper in the water, reducing the freeboard, which in turn allowed even more water to enter. The passengers began to bail using the boats bailer and several plastic containers that were in the boat.

1.1.23 One wave washed over the outboard motor which consequently stopped. *Solo* broached, turning side on to the wind and sea which caused even more water to enter the boat. The passengers continued bailing but were unable to keep pace with the ingress of water.

1.1.24 As the *Solo* was swept along by the wind and tide the owner realised that he would be unable to restart the motor so he shipped the rudder and, by using the wind drift, was able to steer towards the Three Dolphins, which he estimated was 20 to 30 m away.

1.1.25 The Three Dolphins was a six metre high wooden structure comprising four pylons below a platform. On the platform was a large white triangular shape on top of which was a light. It was the lower of two leads to guide vessels through the main entrance to the harbour.

1.1.26 As the *Solo* was driven towards the Three Dolphins, bailing continued and all the occupants, except one, remained seated. The exception was a child, who, under instruction from the owner, stood in the boat raising and lowering her arms in the manner recognised to indicate distress.

1.1.27 The group watching from ashore realised that *Solo* was in trouble and when this was confirmed by the distress wave, the teacher with the group called the Police and requested assistance. This call to the Police was timed at 1017 and was the first of several from various concerned onlookers.

1.1.28 By the time the owner managed to get *Solo* to the Three Dolphins, it had swamped. Several packs, spare lifejackets and other pieces of equipment were floating around the area and drifting up the harbour.

1.1.29 Once alongside the Three Dolphins, the owner and his daughter steadied *Solo* while the children climbed the ladder and collected on the platform. The remaining packs and other equipment were also handed up to the platform. The children were joined by the teacher. Unaware that their plight had already been noticed, they continued to wave to attract attention.

1.1.30 The owner tied *Solo* to the pylons. He remained standing on the underwater structure, to fend the boat off as it was on the windward side and being buffeted against the structure.

1.1.31 A local yachtsman, who had been working with his wife at the yacht club, noticed *Solo* getting into difficulties. The couple went to the marina, boarded their own launch and proceeded out into the harbour to assist. When they arrived at the scene *Solo* was already alongside the Three Dolphins and they made up to the north side of the platform in preparation to evacuate the passengers.

1.1.32 Meanwhile two Police constables, alerted by the telephone call from the teacher with the group on shore, commandeered another launch and crew from the marina and proceeded to the scene at full speed.

1.1.33 On arrival at the Three Dolphins, the Police ascertained that all members of the group were accounted for and that there were no injuries. The Police then transferred to the first launch to assist the owner of *Solo* with the evacuation of personnel from the platform.

1.1.34 The Police requested the crew of the second launch to collect the articles that were floating around the scene while the transfer of personnel was being carried out.

1.1.35 Having transferred all the personnel and belongings from the Three Dolphins, the first launch took *Solo* in tow and returned it to the Sealord Rescue Centre, where the owner rowed it ashore. The children and their teacher were taken to the marina and landed with their belongings.

1.2 Boat information

1.2.1 *Solo* was a white pine clinker-built centreboard sailing dinghy built in New Zealand in the early 1960s. The owner had purchased the boat in 1976.

1.2.2 *Solo* was 5.0 m long with a beam of 1.6 m. It was an open boat with no cabin fitted but there was a small covered area at the forward end. For added buoyancy polystyrene blocks were fitted under each of the side seats and an inflated inner tube was stowed under the forward covered area.

1.2.3 There were bench seats along each side; at the stern and two athwartships. The owner estimated that there was sufficient seating for up to 13 persons.

1.2.4 *Solo* was a sailing dinghy but on the incident trip, the mast and the sails were not carried. Propulsion and directional control was by a single 3.35 kW long shaft Silver Century Seagull outboard motor. A rudder was carried in the boat but not shipped. There was also a set of oars in the boat.

1.2.5 The owner later stated that during previous family outings with *Solo*, the capabilities of the boat had been tested and that when swamped it would submerge to the waterline but would not sink.

1.2.6 *Solo* was normally stored on a trailer in the garage at the home of the owner.

1.3 Personnel information

1.3.1 The boat owner had no professional marine history but he held a Boat Masters Certificate. He had owned *Solo* for over 20 years and had operated it both under power and sail throughout that period as a family pleasure craft. Over a period of many years, he had crewed on various keel yachts and other craft.

1.3.2 The owner's daughter had several years experience of boating, particularly in *Solo.* She held a New Zealand Day Skipper Certificate from the Coastguard Education Service.

1.3.3 The two teachers who planned and accompanied the trip were not experienced boat persons. They had both been on many school field trips. The one who remained on shore was the school senior teacher.

1.4 Survey and legislation information

1.4.1 *Solo* was a private boat that previously had been used only for the owner's pleasure. As such, it was defined as a pleasure craft and there was no requirement that it be surveyed.

1.4.2 When *Solo* was provided on behalf of the school for the transportation of the group making the educational trip, according to the Maritime Transport Act 1994, because it was power-driven it was then defined as a commercial ship even though there was no hire or reward agreement between the owner and the school.

1.4.3 The Maritime Transport Act 1994 gives the following definitions:

> "Pleasure craft" means a ship that is used exclusively for the owner's pleasure or as the owner's residence, and is not offered for hire or reward; but does not include -
>
> a) 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:
>
> b) A ship that is used on any voyage for pleasure if it is normally used or intended to be used as a fishing ship or for the carriage of passengers or cargo for hire or reward:
>
> c) A ship that is operated or provided by any club, incorporated society, trust or business.
>
> "Commercial ship" means a ship that is not -
>
> a) A pleasure craft; or
>
> b) Solely powered manually; or
>
> c) Solely powered by sail.

1.4.4 At the time of the incident, neither local nor national legislation required that a commercial vessel under 6 m in length had to be surveyed. However, under Safe Ship Management legislation effective 1 February 1998, such a vessel is required to be entered into a safe ship management system and in that process needs to be surveyed.

1.4.5 School policy for education outside the classroom, which was dated 21 November 1997, dictated among other things that:

- Trips that took the students further than half a kilometre from school required a "risk management" plan.
- A ratio of supervision, when the trip was on water, of one adult to four children was required.

1.4.6 A risk management plan was completed for this trip. The plan identified risks under the categories of people, resources/equipment and environment. The management of the identified risks and actions to be taken in the event of emergencies was addressed. The plan identified the individual needs of certain children in addition to the requirements of the group as a whole.

1.4.7 The risk management plan identified the following equipment that was required on the trip:

- water bottle for each child
- additional water
- warm clothing
- blankets
- sun hat and sun block for each child
- cellphone
- first aid kit
- medicines specific to certain children
- lifejackets for all persons.

1.4.8 The risk management plan identified the following required actions:

- a minimum of two teachers to accompany the trip
- a child/adult ratio of 4 : 1
- experienced boat persons to accompany the trip
- one person to be first aid qualified
- the completeness of the first aid kit to be checked
- the cellphone to be re-charged prior to the trip
- the boat to be checked prior to the trip
- crossings to be observed from ashore
- the use of the yacht club ramp in the event of a boat failure.

2. Analysis

2.1 It is unlikely that any of the school staff or the owner of *Solo* were conversant with the details of the Maritime Transport Act. Consequently they would not have realised that in using *Solo* for the transportation of the school party, the definition of the boat changed from Pleasure Craft to Commercial Ship.

2.2 Because *Solo* had not previously been used or defined as a commercial vessel, no guidelines for the limitation of the number of passengers had been considered.

2.3 It would have been more appropriate for the school to have had an independent assessment made of the suitability of the boat rather than rely solely on the owner. However, the owner was the most experienced boat person involved with the trip and was well known to the teachers, who trusted his ability to operate the boat and to assess the loading for the trips across the harbour.

2.4 The use of private vehicles to transport the school party to the Sealord Rescue Centre is not analagous to the use of a private pleasure craft. Road vehicles must have a Warrent of Fitness, be fitted with seat belts, be registered and any driver must be suitably qualified but private vessels are not subject to any similar safety requirements.

2.5 The use of *Solo* meant that, because of its capacity compared to the size of the group, several trips had to be made to the island. This placed a degree of pressure on the owner and the teachers to fit as many passengers as was practicable on each trip in order to have the greatest available time on the island.

2.6 When loading any vessel, consideration should be given, not only to the conditions at the time and place of departure, but also to any conditions which may be encountered during the passage. As the whole route was not visible from the Sealord Rescue Centre ramp, it would have been prudent for the owner to have loaded his boat to a lesser extent for the first crossing. The planned subsequent departures from the Boat Shed Pier would have had the advantage of a full visual appraisal for each crossing.

2.7 The availability of seating was used as a guide to the number of passengers carried. This guideline had a certain degree of credence for the manner in which the boat was being operated on the day of the incident, but was not entirely appropriate because *Solo* was a sailing dinghy and seating was provided to allow occupants alternative positions when sailing.

2.8 Regardless of the method used to determine the number of passengers carried, the over-riding limiting factor for safe loading should have been the resulting freeboard.

2.9 The freeboard of 300 to 350 mm, as estimated by the owner, was not sufficient to stop water ingress over the side of the boat when confronted with waves estimated to be 500 mm high. The loading of the boat to this extent was the main contributory factor in the swamping.

2.10 The repairs made to the boat before and after the sea trial appear to have been effective in stopping major ingress of water through the hull of the boat. The slight ingress of water through the bottom planking, which the owner thought to be normal for clinker-built boats, was not a contributory factor in the swamping.

2.11 The decision by the owner not to carry the mast or sails for this trip maximised the available space on the boat. The lack of sails was not a contributory factor in the swamping.

2.12 Although taking on water, *Solo* was making progress towards Haulashore Island. The failure of the outboard motor caused *Solo* to turn side on to the wind and sea and was a contributory factor in the swamping.

2.13 Once the outboard motor had failed, it was appropriate that the owner make for the Three Dolphins which was the closest point of refuge. The use of the rudder to control the movement of the boat as it was swept along by the wind was the most effective option available to the owner.

2.14 The distress wave, as performed by one of the children, was appropriate to the circumstances and was instrumental in alerting the teacher ashore to the problem. The early recognition that *Solo* was in difficulty and the call for assistance, led to the speedy rescue of the group from the Three Dolphins.

2.15 The risk management plan, particularly those aspects dealing with the observation of the passage, boat failure and emergency response, was appropriate and properly addressed the required actions for the group on shore and the those on board *Solo*.

2.16 The additional buoyancy fitted in *Solo* meant that although swamped it was unlikely to have sunk and had the mishap occurred in another part of the passage, the oars could have been shipped to propel the boat to the nearest refuge.

3. Findings

Findings and any safety recommendations are listed in order of development and not in order of priority.

3.1 The loading of *Solo* was excessive for the sea conditions that were encountered on the day of the incident.

3.2 The swamping of *Solo* was caused by the freeboard being inadequate for the sea conditions which it encountered.

3.3 The risk management plan for the trip followed school policy, was adequately detailed, and when used in response to the emergency, resulted in the swift rescue of the group.

3.4 Although the requirements of the risk management plan were completed, the boat owner's close association with the school and the role that he played in the incident trip, meant it would have been prudent for the school to have had an independent assessment of the suitability of the boat.

3.5 When *Solo* was supplied on behalf of the school, it became a commercial ship under the provisions of the Maritime Transport Act 1994.

3.6 Because *Solo* was under six metres in length, there was no requirement for it to have been surveyed under the Maritime Transport Act 1994, nor to have had it inspected under the Nelson District Council Plan.

3.7 Under Maritime Rules that have come into force since the time of the incident, *Solo*, regardless of its length, would have to have been surveyed as part of a safe ship management system if supplied by, or on behalf of, an institution such as a school.

4. Safety Recommendations

4.1 It was recommended to the principal of Hampden Street School that:

4.1.1 For future educational trips involving the transportation of a school party over water, any power-driven vessel supplied by, or on behalf of, the school should be one that is operated under a safe ship management system. (007/98)

4.2 The principal of Hampden Street School responded as follows:

4.2.1 Hampden Street School Board of Trustees decided on 17 March to adopt the Transport Accident Investigation Commission's final safety recommendation 007/98. Implementation will be immediate.

4.3 It was recommended to the Director of Maritime Safety that he:

4.3.1 Liase with the School Trustees Association and the New Zealand Principals Federation to advise them that when a power-driven vessel is supplied by or on behalf of a school for transport, sport or recreation, that vessel is a commercial ship and should be operated under a safe ship management system and the other relevant provisions of the Maritime Transport Act 1994 and its associated Rules and Regulations. (008/98)

4.4 The Director of Maritime Safety responded that he agreed with the safety recommendation and would implement it as soon as practicable.

15 April 1998

Hon W P Jeffries
Chief Commissioner

Glossary of marine abbreviations and terms

aft	rear of the vessel
beam	width of a vessel
bilge	space for the collection of surplus liquid
bridge	structure from where a vessel is navigated and directed
bulkhead	nautical term for wall
cable	0.1 of a nautical mile
chart datum	zero height referred to on a marine chart
command	take over-all responsibility for the vessel
conduct	in control of the vessel
conning	another term for "has conduct" or "in control"
deckhead	nautical term for ceiling
dog	cleat or device for securing water-tight openings
draught	depth of the vessel in the water
EPIRB	emergency position indicating radio beacon
even keel	draught forward equals the draught aft
freeboard	distance from the waterline to the deck edge
free surface	effect where liquids are free to flow within its compartment
focsle	forecastle (raised structure on the bow of a vessel)
GM	metacentric height (measure of a vessel's statical stability)
GoM	fluid metacentric height (taking account the effect of free surface)
GPS	global positioning system
heel	angle of tilt caused by external forces
hove-to	when a vessel is slowed or stopped and lying at an angle to the sea which affords the safest and most comfortable ride
Hz	hertz (cycles)
IMO	International Maritime Organisation
ISO	International Standards Organisation
kW	kilowatt
list	angle of tilt caused by internal distribution of weights
m	metres
MSA	Maritime Safety Authority
NRCC	National Rescue Co-ordination Centre
point	measure of direction (one point = 11¼ degrees of arc)
press	force a tank to overflow by using a pump

SAR	Search and rescue
SOLAS	Safety Of Life At Sea convention
sounding	measure of the depth of a liquid
SSB	single-side-band radio
statical stability	measure of a vessel's stability in still water
supernumerary	non-fare-paying passenger
telegraph	device used to relay engine commands from bridge to engine room
ullage	distance from the top of a tank to the surface of the liquid in the tank
VHF	very high frequency
windlass	winch used to raise a vessels anchor