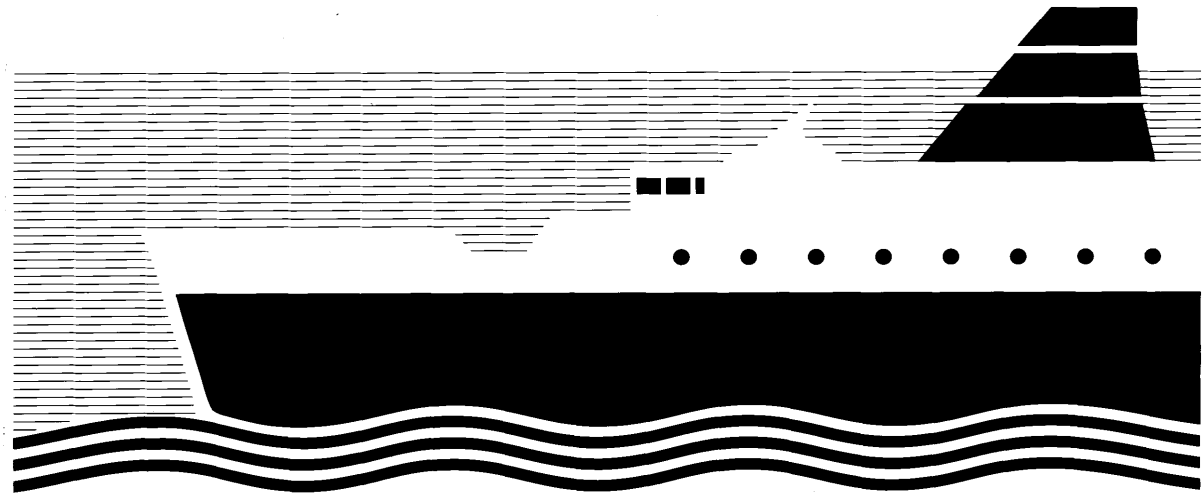
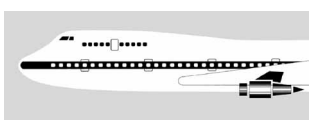
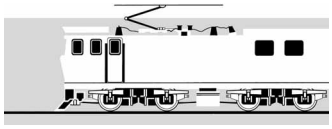


MARINE OCCURRENCE REPORT

04-204 **restricted limit passenger vessel *Freedom III*, grounding, Lake Manapouri** **24 February 2004**


TRANSPORT ACCIDENT INVESTIGATION COMMISSION
NEW ZEALAND

The Transport Accident Investigation Commission is an independent Crown entity established to determine the circumstances and causes of accidents and incidents with a view to avoiding similar occurrences in the future. Accordingly it is inappropriate that reports should be used to assign fault or blame or determine liability, since neither the investigation nor the reporting process has been undertaken for that purpose.

The Commission may make recommendations to improve transport safety. The cost of implementing any recommendation must always be balanced against its benefits. Such analysis is a matter for the regulator and the industry.

Report 04-204

restricted limit passenger vessel *Freedom III*

grounding

Lake Manapouri

24 February 2004

Abstract

Shortly before 0600 on Tuesday 24 February 2004, while on a trip from Manapouri to West Arm across Lake Manapouri, the restricted limit passenger/non-passenger vessel *Freedom III* grounded about 30 m past the South Arm Point West light.

The skipper and 4 passengers were uninjured. The boat suffered damage to its bow, but this did not compromise its watertight integrity.

Safety issues identified were:

- the use of electronic navigation equipment
- training for a Local Launch Operator certificate
- absence of passenger safety briefing.

Safety recommendations were made to the owner of Fish Fiordland Limited to address these issues. Safety recommendations made to the Director of Maritime Safety in TAIC occurrence report 04-202, the grounding of the *Queenstown Princess* in Lake Wakatipu on 13 February 2004, were reinforced in this report.

The *Freedom III*

Contents

Figures

Abbreviations

GPS	global positioning system
hp	horsepower (0.746 kiloWatts)
kg(s)	kilogram(s)
kW	kiloWatt(s)
LED	light emitting diode
m	metre(s)
mm	millimetre(s)
NIWA	National Institute of Water and Atmospheric Research
nm	nautical mile(s)
UTC	co-ordinated universal time
VHF	very high frequency

Glossary

abeam	direction at right angles to the length of a ship
athwartships	transversely across a ship
civil twilight	the period of twilight beginning when the centre of the sun is 6° below the horizon
disequilibrium	unsteadiness, imbalance or loss of equilibrium; often is accompanied by spatial disorientation (a sensation of not knowing where one's body is in relation to the vertical and horizontal planes)
equilibrium	a state of physical balance
horsepower	imperial unit of power
kiloWatt	metric unit of power
loom	when referring to a navigation light, the diffused glow of a light before the light becomes directly visible
sternleg	a propulsion system in which an inboard engine is coupled, through a boat's transom, to an outboard propeller shaft

Data Summary

Vessel Particulars:

Name:	*Freedom III*
Type:	restricted passenger/ non-passenger
Limits:	enclosed water
Safe Ship Management Company:	SGS M&I
Length:	10.1 m
Breadth:	2.73 m
Gross tonnage:	3.5
Built:	1999 by Senator Boats, Napier
Engines and propulsion:	
Main:	Mercury D7.3L D-Tronic LD diesel engine through a sternleg – manufactured 1999
Auxiliary:	Mariner 25 hp 4-stroke outboard
Service speed:	30 knots
Owner/operator:	Fish Fiordland Limited
Number of passengers licensed to carry:	15
Crew:	1 Local Launch Operator
Date and time:	24 February 2004 at about 0550[1]
Location:	Lake Manapouri
Persons on board:	crew: 1 passengers: 4
Injuries:	crew: nil passengers: nil
Damage:	Stem holed and set-in in way of the chain locker. Vessel's watertight integrity remained intact
Investigator-in-charge:	Capt Doug Monks

[1] Times in this report are New Zealand Daylight Time (UTC + 13 hours) and are expressed in the 24-hour mode.

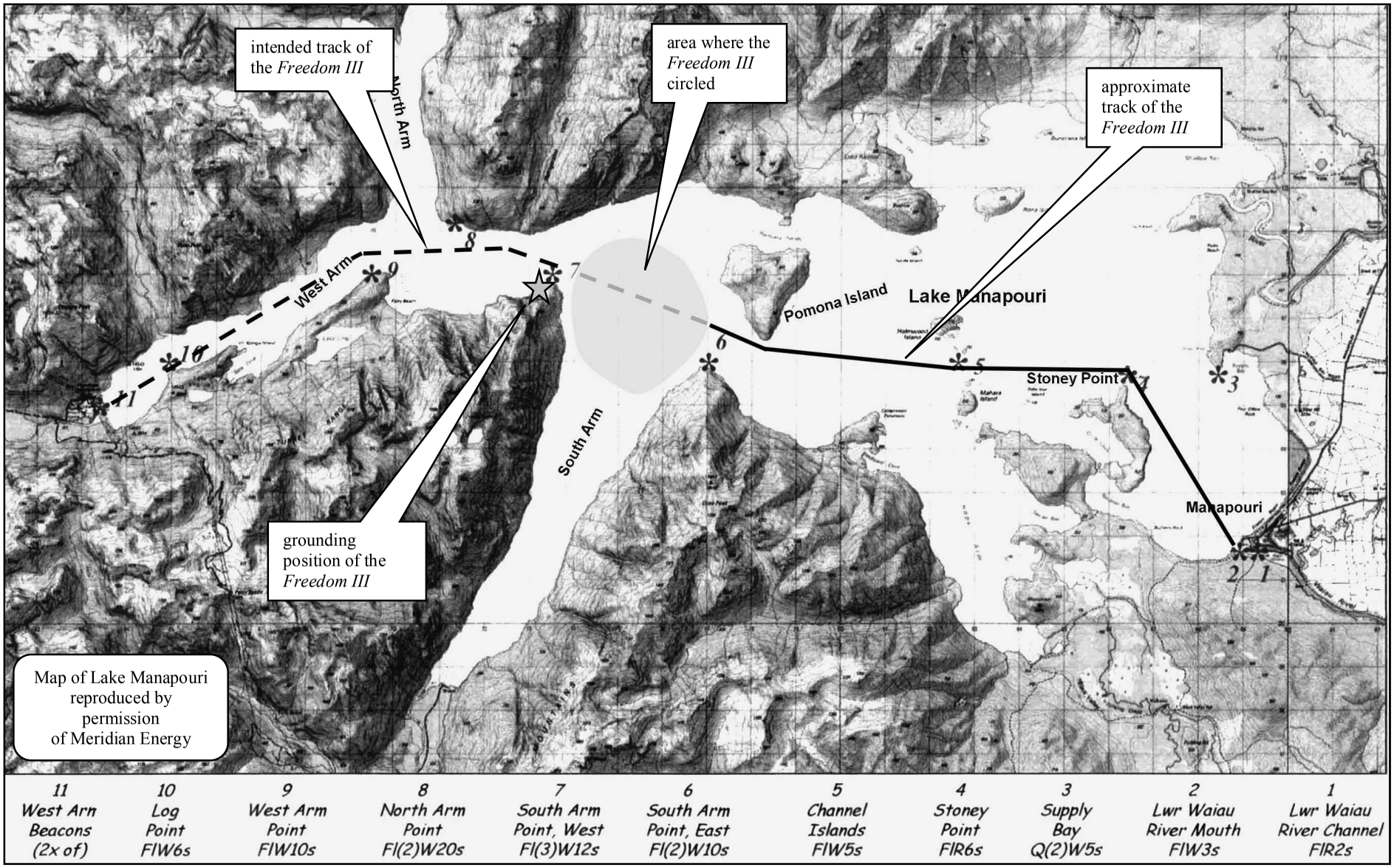


Figure 1
Lake Manapouri

1 Factual Information

1.1 Narrative

1.1.1 On 24 February 2004 at about 0440, the skipper of the *Freedom III* arrived at the wharf in Pearl Harbour, Manapouri. He boarded the boat and did the pre-trip checks. Four passengers to be ferried to West Arm arrived at about 0500. Shortly afterwards, the boat was let go, cleared the berth and proceeded at slow speed down the harbour. As the *Freedom III* cleared the harbour, the wind started to pick up.

1.1.2 Using the radar and the navigational light beacons, the skipper navigated the boat past Stoney Point (see Figure 1), between the Channel Islands and then to the south of Pomona Island.

1.1.3 When abeam of the southern point of Pomona Island, the skipper altered course to head towards the light on the eastern side of the North Arm (see Figure 1, light No. 8). This course gave sufficient clearing distance off the western point of the South Arm. But, as the boat moved into the open water at the central juncture of the 4 arms of the lake, there was a rapid increase in the strength of the wind, which caused the boat to crash into the waves. The skipper slowed the boat to ease its movement, but as the speed reduced the boat sheared rapidly to port.

1.1.4 The boat turned to port through 360° a number of times. It was unclear the number of turns the boat performed; the passengers' thought over 10 and the skipper thought more than twice. During this period the passengers became concerned and offered advice to the skipper. The skipper asked them to look for the navigational light beacons, which they pointed out. After a while, with the help of the passengers the skipper located the South Arm Point West light (see Figure 1, light No. 7) visually and also was able to identify the point on the radar.

1.1.5 Once the skipper managed to orientate himself and stop the boat turning to port, he increased speed and steered a course to pass the South Arm Point West light. However, almost immediately after passing that light, the boat again turned rapidly to port and grounded about 30 m past the light. After the grounding, the skipper put the boat into neutral and then astern, but the passengers insisted that he keep the boat alongside the shore until the damage could be properly assessed. The passengers tied ropes to overhanging branches and the skipper stopped the engine. They inspected the damage by torchlight but decided that they should wait until there was sufficient daylight to inspect it fully. While waiting, they checked the engine compartment and other bilge areas, but no water was found.

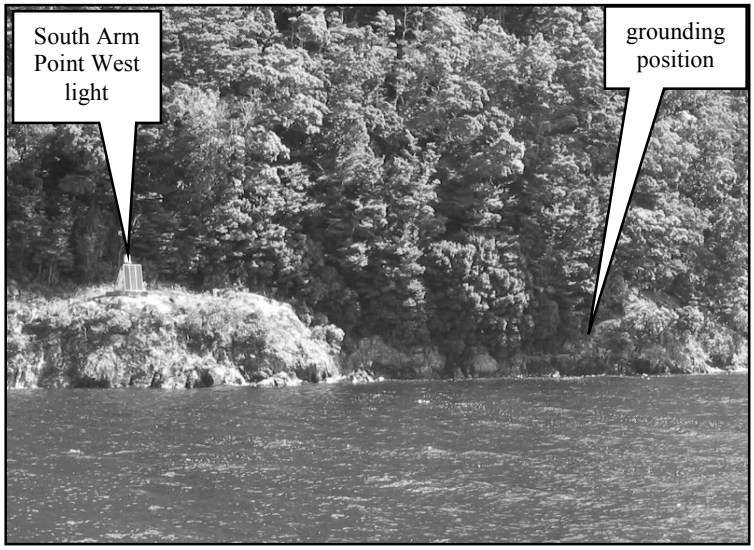


Figure 2
Grounding position in relation to the South Arm Point West light

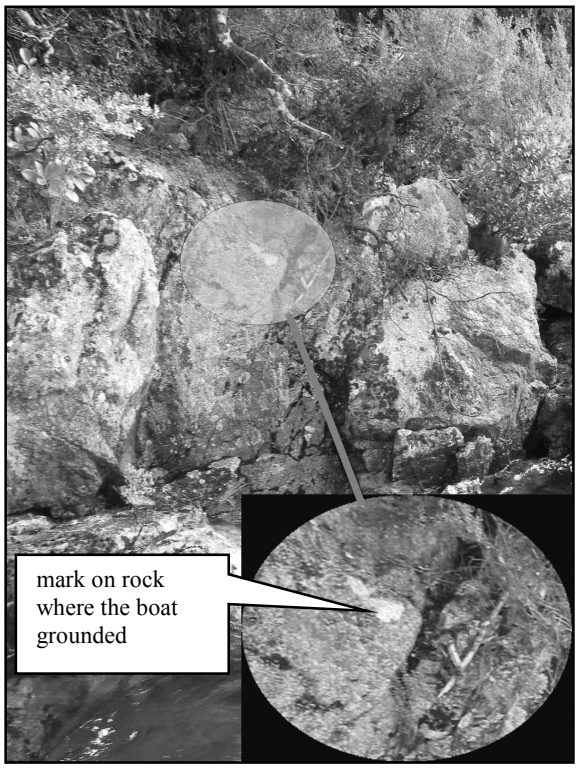


Figure 3
Grounding site, inset showing aluminium mark on rock

1.1.6 At about 0630, there was sufficient light to confirm that damage was confined to the chain locker, a non-watertight compartment in the upper part of the bow. They then let the boat go and started to return to Manapouri.

1.1.7 At about this time, the owner of the *Freedom III* was on the Pearl Harbour wharf ready to take the next trip, scheduled to depart at 0630. Wondering where the boat was, he used a very high frequency (VHF) radio on another boat to call the *Freedom III*. The skipper answered that they were at South Arm but did not indicate that the boat had been aground.

1.1.8 At about 0700, the *Freedom III* arrived back at its wharf in Pearl Harbour, where the owner saw the damage and learnt of the grounding. Later that day the boat was taken from the water and stored in a shed pending investigation and repair.

1.2 Vessel information

1.2.1 Senator Boats of Napier built the *Freedom III* in 1999. It was based on a production boat, the Senator Offshore 970, but its accommodation had been customised for its intended trade. The boat was constructed of aluminium plating of 6 mm thickness for the bottom, 5 mm for the sides and 4 mm for the topsides. It had 3 sealed buoyancy chambers that ensured it would float if swamped or holed in one of those compartments.

1.2.2 The boat was configured to carry up to 15 passengers, with 3 athwartship bench seats on the port side, and a fore and aft bench seat on the starboard side behind the driver's seat at the steering console. There was a cabin with 2 bunks in the forward part. The after deck was large and generally uncluttered except for the hatch over the engine.

1.2.3 The boat was powered by a Mercury D7.3L D-Tronic LD diesel engine, and propelled by a sternleg that could be trimmed. It had a service speed of about 30 knots. It also had an auxiliary 25 hp (18.6 kW) outboard motor.

1.2.4 The console immediately in front of the driver had a radar and echo sounder (see Figure 4). Engine instrument gauges were across the top of the console. Above and in front of the console was a magnetic steering compass. The radar had a dimmer switch to reduce the intensity of the screen, but the instrument lights could only be turned on or off and could not be dimmed. The skipper complained that the instruments caused a lot of backscatter of light which, combined with rain and spray on the windscreen, made visibility forward quite difficult. The passengers observed the skipper adjusting switches and looking out of the side window to get an uninterrupted view forward.

1.2.5 Because the morning was cool, the skipper had the cabin heating, including a blower onto the windscreen, on and the rear cabin door closed, but this made the interior fuggy. The skipper decided against turning off the heating, as he was concerned that the windscreen would fog, further reducing his forward visibility.

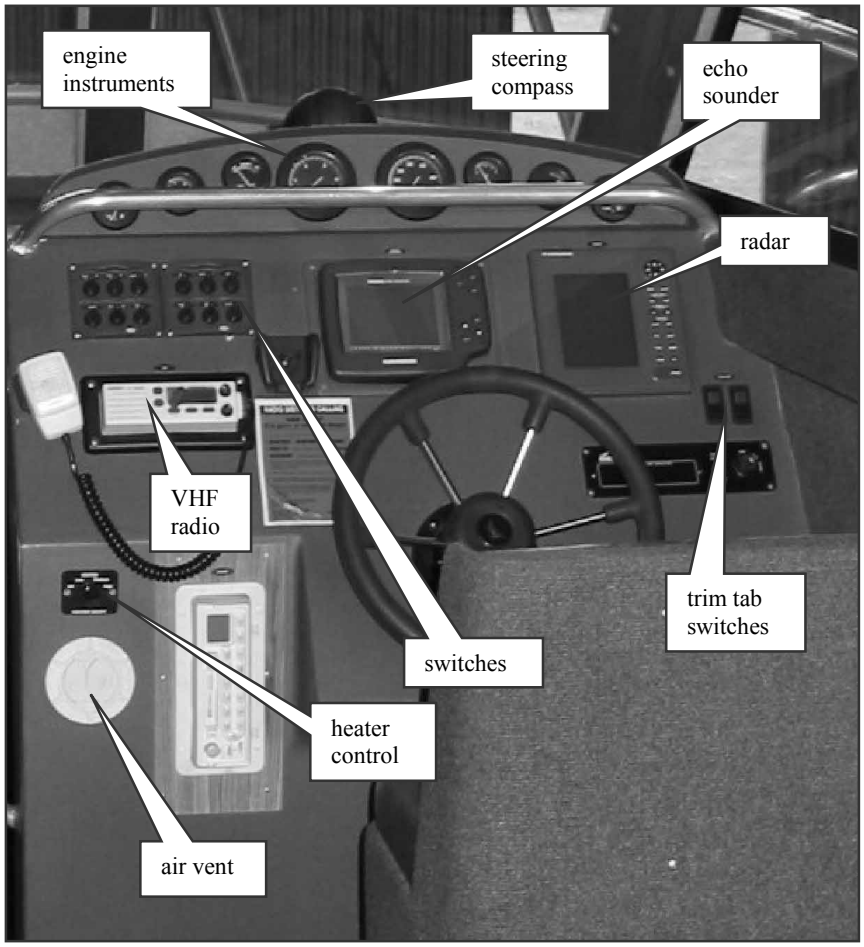


Figure 4
Steering console and instruments

1.2.6 The boat was fitted with electro-hydraulic trim tabs (see Figure 5). The trim tabs were used to assist the boat to attain the plane at a lower speed, and could also be used to maintain an even keel when there was unequal weight distribution. The trim tabs were plates fitted to and hinged at the transom in line with the bottom of the boat. They were each controlled by a hydraulic ram that lowered and raised the trailing edge. Two rocker switches on the steering console controlled the hydraulic rams (see Figure 6); down for trim tab down and up for trim tab up. To correct the longitudinal attitude of the boat, the trim tabs were used together to raise or lower the bow. However, they could be used independently to correct a list caused by an athwartship weight imbalance. There were no trim tab position indicators, so the operator could determine the position of the trim tabs only from the behaviour of the boat.

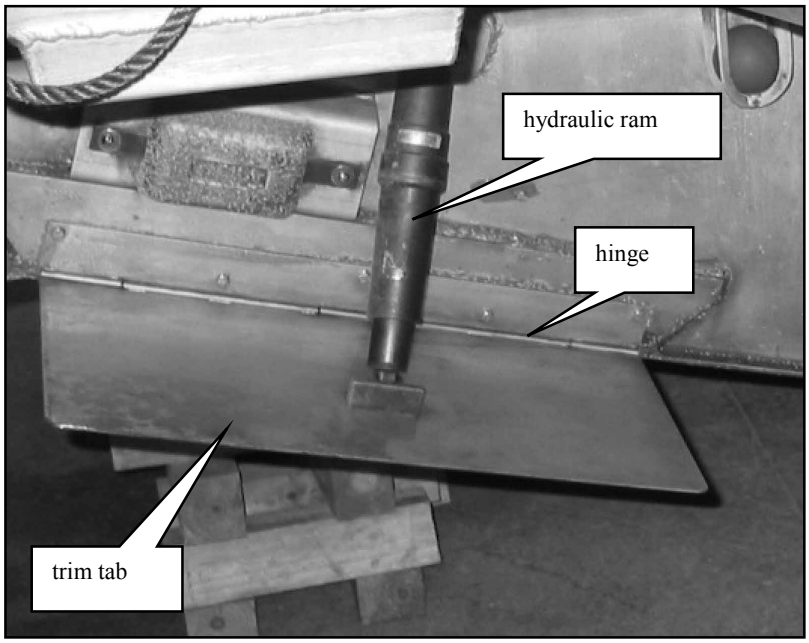


Figure 5
Port trim tab in the fully down position

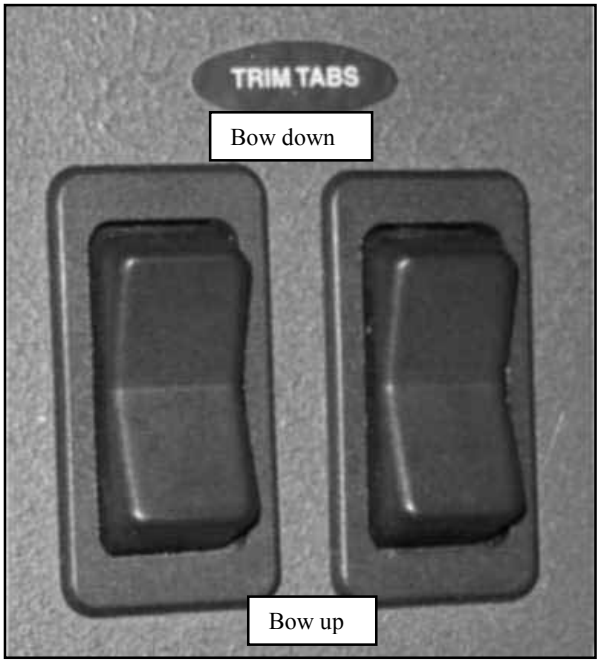


Figure 6
Trim tab switches

1.2.7 The *Freedom III* was under Safe Ship Management with SGS M&I. A safe ship management certificate was issued on 30 January 2004 and, subject to periodic inspections and audits, was valid until 29 January 2008. The boat was certified to carry 15 passengers in the enclosed water limit of Lake Manapouri. It was also certified to carry up to 1000 kg of cargo, but passengers and cargo could not be carried at the same time.

1.2.8 The safe ship management manual contained the requirement that a briefing be given to passengers on the operation of the boat, safety procedures, "No Go" areas of the boat, fire muster station, man overboard procedure and other relevant housekeeping matters. The passengers did not receive a briefing on the accident trip nor had they on other trips they had

done in the recent past under the command of the skipper or the owner. The owner and the skipper said they thought that the passengers were aware of the operation of the boat and its safety equipment because they were regular travellers on the boat.

1.3 Topography and navigation on the lake

1.3.1 Lake Manapouri, New Zealand's deepest lake, was surrounded by high mountain ranges. The shore on the western part of the lake was generally steep-to except at the heads of the arms. The eastern shore was relatively low lying. The Waiau River flowed into the north-east corner of the lake and out of the south-east corner, past Pearl Harbour, a naturally sheltered haven. Manapouri township lay between the 2 parts of the Waiau River. The lake was about 15 nm in an east/west direction and about 8 nm north/south at its extremities. The voyage between Pearl Harbour and West Arm was just over 16 nm.

1.3.2 In 1969 an underground hydro power station was built at West Arm, with its discharge in Deep Cove, Doubtful Sound, about 5.5 nm away. The Wilmot Pass, linking West Arm with Doubtful Sound, was initially constructed to allow machinery landed at Deep Cove to be transported to the power station, but was now used predominantly to transfer tourists wishing to cruise on Doubtful Sound.

1.3.3 There was a moderate concentration of small passenger boats operating on the lake, ferrying workers to the power station, and passengers and operators to cross over Wilmot Pass to Doubtful Sound. In addition, operators like Fish Fiordland took hunters and anglers to remote parts of the lake.

1.3.4 The lake had 11 navigational light beacons on prominent points and islands between Manapouri and West Arm. They were a mixture of incandescent and high-intensity light emitting diode (LED) lights that were installed and continue to be maintained, through sub-contractors, by Meridian Energy. All the lights were powered by batteries that were charged by solar panels. All the lights in the main body of the lake were white with the exception of Stoney Point, which was red. The white lights had differing light/dark characteristics.

1.3.5 As part of programmed maintenance, the lights were inspected and maintained annually, which last took place between 9 and 14 January 2004. All the lights were found to be operating normally at the start of the inspection but still required some maintenance. The contractor prepared a comprehensive maintenance report on the condition of the lights and the maintenance that he had carried out. At the time of the grounding none of the lights was reported as unlit.

1.3.6 When navigating on the lake at night both the owner and the skipper used the radar to ensure they cleared the relevant points. The skipper's practice was to use the 2-mile range on the radar to identify the next point and then reduce to 1-mile as he approached that point before reverting to the 2-mile range to find the next point. There was a course card on the boat showing the compass courses to steer between the relevant points for the trip between Manapouri and West Arm and return.

1.3.7 After the accident, the skipper initially said that he had grounded close to the West Arm light (Figure 1, light No. 9), about 2.5 nm further west than the actual grounding position. The passengers were convinced that they had grounded 30 m past the South Arm Point West light (Figure 1, light No. 7) because they could see the loom of the light while they were alongside the shore. The passengers' assertion was confirmed when broken branches and an aluminium mark were found about 30 m west of South Arm Point West light (see Figure 3). The skipper subsequently agreed that this was the grounding position.

1.4 Minimum crewing and personnel information

1.4.1 Maritime Rules Part 31B Crewing and Watchkeeping Offshore, Coastal and Restricted (Non-Fishing Vessels) required the skipper of a vessel of less than 20 m, carrying fewer than 99 passengers, to have a Local Launch Operator certificate endorsed for the area of operation (where more than 50 passengers were carried an extra crew person was required). The *Freedom III* was less than 20 m and licensed to carry 15 passengers.

1.4.2 A Local Launch Operator certificate was the minimum qualification required by a skipper of a passenger vessel. The certificate needed to be endorsed for a particular vessel and area of operation. The Director of Maritime Safety was able to endorse the certificate with a combination of vessels and areas up to a total of 6 endorsements.

1.4.3 The syllabus for the Local Launch Operator certificate did not include the practical use of radar, but there was a theoretical section on the use of radar for collision avoidance. Inshore Launch Master, the next higher qualification to the Local Launch Operator, was the first requiring practical knowledge of radar, with a candidate required to pass a 4-day restricted radar course.

1.4.4 The skipper of *Freedom III* was male and was 67 years of age. He had worked on Lake Manapouri and in Doubtful Sound for over 40 years and had driven a variety of small boats engaged in charter work and live deer recovery. At the time of the grounding he worked for 2 different operators, the owner of *Freedom III* and another that ran charters and kayak cruises. He held a Local Launchman's licence, equivalent to a Local Launch Operator certificate, which was issued on 23 December 1999. The licence was endorsed for Lake Manapouri and the vessels *Adventurer 1, Adventurer 2, Sylvester* and *Tweety*. At the time of the accident, the licence was not endorsed for *Freedom III*, but it has been added since.

1.4.5 A Local Launch Operator certificate was required to be renewed every 5 years. The candidate was required to supply proof of 6 months sea service on vessels endorsed on his certificate, a "Fit and Proper Person" declaration and an administration fee of $96. Where candidates were over 65 years of age they had to have a medical certificate issued by their own doctor.

1.4.6 About 8 months before the grounding the owner of *Freedom III*, in order to ease his workload, asked the skipper to work for him on a casual basis. The skipper had carried out a number of familiarisation trips and the owner had shown him the operation of the boat, its engines and instruments. There were no familiarisation check lists or check trips, but the skipper had carried out between one and 7 trips a week over the 8-month period. He had operated at night and day in all weathers. The owner said that the feedback he had received from passengers about the skipper's performance had all been positive.

1.4.7 The majority of the work undertaken by *Freedom III* was transporting passengers and cargo between Manapouri and West Arm. The skipper was very familiar with the route across the lake and the conditions that could be expected.

1.5 Climatic conditions

1.5.1 The weather on the day of the accident was reported by the skipper to have started fine and calm but had rapidly deteriorated as they left the shelter of Pearl Harbour. The wind had increased from the north-west with overcast skies and occasional showers.

1.5.2 The passengers confirmed that it was dark and that the wind had risen significantly after they had passed between the Channel Islands and were heading towards Pomona Island.

1.5.3 There was a National Institute of Water and Atmospheric Research (NIWA) weather station located at the Manapouri Aerodrome, which was to the north of the town and close to the eastern edge of the lake. It recorded the following weather during the morning of 24 February:

Time	Wind Direction (°T)	Wind Speed (km/h (knots))	Gust Speed (km/h (knots))	Temp (°C)	Rain (mm)	Lifting Condensation Level[2] (ft)	Barometric Pressure (hPa)
0300	330	11 (5.9)	26 (14.0)	9.0	0.4	733	997.7
0400	290	15 (8.0)	28 (15.1)	9.0	0.8	800	998.7
0500	290	20 (10.8)	44 (23.8)	7.6	0.4	967	1000.1
0600	300	11 (5.9)	32 (17.3)	7.0	0.8	667	1001.2
0700	340	13 (7.0)	20 (10.8)	7.0	1.0	567	1002.3
0800	010	6 (3.2)	30 (16.2)	7.1	0.6	467	1003.0

1.5.4 The weather station was about 11 nm to the east of the grounding position, so the recorded data may have differed from the actual weather experienced on the lake, but it does demonstrate the trend of the weather and that the wind increased around 0500. There were showers during the period and the condensation level suggested cloud was likely at a fairly low level.

1.5.5 The owner of the *Freedom III* said that in the area where the 4 arms of the lake met, the mountainous terrain caused the wind to eddy, making its direction unpredictable and the resultant waves confused.

1.5.6 Restricted visibility caused by fog, rain or snow was often experienced on Lake Manapouri.

1.5.7 On 24 February 2004, sunrise at Manapouri was at 0718, with civil twilight commencing about 30 minutes earlier. The moon had set at 2234 on 23 February and was not due to rise until 1108.

1.6 Injuries, damage and post accident inspection

1.6.1 The skipper and passengers had medical examinations soon after returning to Manapouri. Other than minor contusions they were found to have no injuries.

1.6.2 When the boat grounded, the bow rose up the rock face. The stem was dented and holed, but only in the chain locker, a non-watertight compartment. The impact caused the engine to move forward, damaging its mountings.

1.6.3 The forward movement of the engine brought it into contact with the main isolating switch for the "house" batteries, cutting off the electricity supply except that for the starter motors and essential engine circuits.

1.6.4 When the boat was inspected after it was taken from the water, the trim tab on the port side was found in the fully down position, as shown in Figure 5. The broken isolating switch prevented the trim tabs being moved.

1.6.5 The skipper said that he had used the trim tabs during the morning trip but could not recall how or when he had adjusted them.

[2] Lifting condensation level is the level at which air should condense and cloud form if the air is forced to rise via mechanical means such as mountains or hills. Derived from the difference between the dry-bulb and dewpoint temperature.

1.7 In-water trials

1.7.1 Another Senator Offshore 970, fitted with a power plant, propulsion system and trim tabs similar to the *Freedom III*, was used to test how the handling of the boat was affected by having one tab extended fully while the other was retracted.

1.7.2 On 8 April 2004, off Foxton Beach, a number of manoeuvres were tried with the trim tabs set as found on the *Freedom III*. The weather conditions were a 10 to 12 knot wind with slight sea, less than those experienced on the night of the accident. With the wind on the starboard bow, the boat travelling at about 28 knots in a straight line and the wheel amidships, the throttle was eased to give a speed of about 15 knots. The boat immediately started to turn to port and the speed of the turn increased until the boat had the wind on the stern, when the rate of turn eased but the boat continued to turn through 360°. Another run was made and the speed reduced to 10 to 12 knots; on this occasion the boat again turned to port but at a much slower rate.

1.8 Fatigue and medical factors

1.8.1 The skipper worked on a casual basis for 2 operators. His work periods were on an "as required" basis, so were erratic. The following table itemises his work periods for the 5 days before the accident.

Date	Time	Destination	Duration of trip
19-Feb-04	1530	West Arm	2 hours
20-Feb-04	0630	West Arm	2 hours
20-Feb-04	1130	West Arm	2 hours
22-Feb-04	0630	West Arm	2 hours
23-Feb-04	1900	West Arm	2.5 hours

1.8.2 The hours the skipper worked were not onerous but they did tend to be early in the morning or late afternoon/evening. On the day before the grounding, the skipper estimated that he got home shortly after 2130 and got to sleep at about 2230.

1.8.3 On the morning of 24 February, the skipper awoke at about 0430, and went straight to the boat where he arrived by 0440. He said that he had a restless sleep due to concern about not waking when his alarm clock sounded. He did not eat anything in the morning but did have a cup of coffee. In the week before the accident the skipper estimated that he had an average of about 7 hours sleep each night.

1.8.4 At the time of the accident the skipper was wearing bifocal spectacles to correct vision impairment and bilateral hearing aids to compensate for a profound hearing loss.

1.8.5 After the accident, the skipper underwent a medical examination, which confirmed the deterioration of his auditory and ocular senses. However, when wearing the sensory aids the skipper had only slight residual impairment.

1.8.6 Other than the hearing and sight impairments the skipper was in good health. The medical examiner found no symptoms of any condition that would cause the skipper to have sustained any sudden incapacitation. The medical examiner was of the opinion that the history of the skipper not eating anything before the trip may have exacerbated the fatigue caused by his restless sleep during the night.

1.8.7 The vestibular system is that part of the inner ear concerned with balance and body orientation. A person who is rotated at speed, particularly under degraded visual conditions, will experience

a degree of disorientation or dizziness due to the intense stimulation of the vestibular apparatus of the inner ear. The skipper said that he experienced sensations of disorientation during and immediately after the rapid turns to port, although those sensations rapidly eased.

1.8.8 The skipper was referred to a consultant ear, nose and throat surgeon to confirm the extent of his hearing loss and also to check vestibular function. The consultant's conclusion was that the skipper's hearing loss was severe and was probably consistent with noise-induced hearing loss, together with hereditary hearing loss and presbyacusis (hearing loss that accompanies aging). The hearing loss had remained static since his last examination in 2000. His vestibular function appeared to be normal.

2 Analysis

2.1 When the *Freedom III* encountered increasing waves in the juncture of the 4 arms of the lake, the skipper appropriately slowed down. However, the reduction in speed apparently caused the boat to lose directional stability and turn to port to the extent that several circles were made. The movement caused the skipper to become disorientated and lose situational awareness.

2.2 At the time the boat was circling, there would have been little, if any, natural light as there was no moon and the weather was overcast with showers. The resulting very dark night meant that the skipper was not able to orientate himself with the horizon or mountain tops.

2.3 The loss of control was probably caused by the position of the trim tabs, which were found after the accident with the port tab fully extended and the starboard one retracted. This was probably the position the trim tabs were in before the accident as they would not have been able to move after the isolating switch for the house batteries was damaged in the impact. In the short time between the skipper regaining control and the grounding he probably did not adjust the trim tabs.

2.4 The trim tabs provided lift at the stern of the boat, but they also induced drag, particularly as speed decreased. Having only the port tab extended would have caused that side to lift but also would have caused drag on that side and exerted a turning moment to port.

2.5 In calm or slight wave conditions the operator would usually be aware of the position of a trim tab from the attitude of the boat, but when the wave conditions were rough it was difficult to determine their position. The varying speeds of the boat would have exacerbated the situation.

2.6 The deviation of the boat's head caused by the trim tab or the wave conditions independently might have been manageable by the skipper, but in concert the turning moment was sufficient to create a large rapid deviation and cause the skipper to lose situational awareness.

2.7 The preponderance of navigational beacons with white lights could make their individual identification difficult, particularly if, as in this case, a boat was turning rapidly and the observer had become disorientated. However, the lights did each have individual characteristics and an experienced operator on the lake ought to have been able to differentiate between them.

2.8 The skipper's disorientation was underscored by his confusion over the grounding position. He obviously had not used the radar to its best advantage; neither had he used the compass. Either would have indicated the boats departure from the desired course and alerted him to the rate of turn of the boat.

2.9 Navigation on the lake was largely carried out “by eye”. Navigational light beacons had been installed to improve safety during night operations. Weather that reduced visibility such as rain, snow and fog was often experienced and required operators to use radar to navigate. Consequently, the skipper would not normally be expected to lose situational awareness, even on a dark night in adverse weather conditions.

2.10 After numerous 360° turns, the skipper did manage to find out where he was and resumed the passage towards West Arm. However, almost immediately after passing the light on the western side of the South Arm the boat again turned rapidly to port and grounded.

2.11 The trim tab probably continued to exert thrust on the port side, and when the skipper turned the wheel to alter course around the light it caused a faster rate of turn than the skipper was expecting and brought the boat towards the shore before he had time to register the danger and take avoiding action.

2.12 Additionally, the skipper may have been so relieved to have found out his position and resume the voyage that he relaxed to such an extent that he lost awareness and didn't register that when he altered course to port around the light, the boat turned very rapidly under the ongoing influence of the port trim tab and weather on the starboard bow. The combination of fatigue compounded by missed meals may well have exacerbated the skipper's loss of attention.

2.13 When the boat turned rapidly several times through 360°, not fully under command and in conditions of reduced visual orientation cues, the skipper would have experienced disorienting stimuli. This would have led to loss of equilibrium in the semi-circular canals in his inner ear.

2.14 Once the skipper regained control of the boat his inner ear function appeared to have made a recovery. However, a lesser degree of disequilibrium may have persisted for some time. The skipper may not have realised that he was suffering a continued disequilibrium and therefore would not have been alerted to the need to pay greater attention to cross-referencing his perceived location and heading with visual and instrument information.

2.15 It is possible that after regaining control, the skipper conned the boat based on illusory information about his position and direction of travel. This would have explained why he did not realise that the boat was heading towards the shore.

2.16 The medical examinations of the skipper confirmed that he did have visual and aural sensory deterioration but when wearing corrective aids his senses were only slightly below normal. His vestibular functions were normal, so he would have been no more at risk of becoming dizzy or disorientated than the average person. However, the speed of the turns to port may well have been sufficient to cause an average person to become disorientated.

2.17 Skippers of passenger vessels should be able to navigate safely in all weathers using all aids available. A relatively large number of passenger vessels operated on the lake, often in restricted visibility, making the skippers' reliance on radar for collision avoidance and navigation essential. Maritime Rules Part 31B stipulated the minimum manning for vessels of less than 20 m and carrying up to 99 passengers was one person holding a Local Launch Operator certificate (an additional crewman was required where more than 50 passengers were carried). To gain such a certificate no practical training in the use of radar or other electronic navigation aids was required. Consequently, the skipper had had no formal radar training. The fitting of radar and other electronic navigation aids was becoming more prevalent in restricted limit passenger vessels and skippers should be well trained in their use.

2.18 The skipper had gained his Local Launchman's licence in December 1999 and so had not had to renew it at the time of the accident. Consequently, he had not had to have a medical examination.

2.19 The passengers were regular travellers and as such the skipper assumed they had been given safety briefings in the past and were aware of the safety procedures and equipment on the boat; this was not the case. It is hard to imagine travelling on a commercial aeroplane without a safety briefing being given to the passengers, no matter how often they fly. A safety briefing on passenger vessels is equally vital.

2.20 This accident was the second of 2 groundings within 2 weeks (see TAIC occurrence report 04-202) that occurred at night on an enclosed limit passenger vessel fitted with radar. On each

occasion the skipper had not been trained in the use of radar and consequently did not use it effectively to assist in navigating the vessel.

2.21 At the time of the accident the skipper's Local Launchman's licence was endorsed for Lake Manapouri but had not been endorsed for the *Freedom III*. This appears to be more of an administrative oversight and was not a contributing factor to the cause of the grounding.

3 Findings

Findings are listed in order of development and not in order of priority.

3.1 The loss of control of the *Freedom III* in the middle of the lake was probably caused by a combination of a reduction in speed and the unequal position of the trim tabs.

3.2 The loss of control and subsequent circles caused the skipper to become disorientated and lose situational awareness.

3.3 Although the skipper regained control and continued the voyage, he was probably still suffering a degree of disorientation in the short time before the grounding.

3.4 Following a restless night the skipper was probably suffering acute fatigue, which would have added to his disorientation. Having eaten nothing in the morning would have exacerbated this situation.

3.5 The wind was sufficiently strong to generate waves large enough to require the skipper to reduce speed and there were showers that would have reduced his visibility. In this way the weather did contribute to the accident.

3.6 The *Freedom III* should have been able to handle the conditions prevailing at the time of the accident.

3.7 The skipper did not make effective use of the boat's radar to assist his navigation. However, the training for the certificate he held had not included any practical training in the use of electronic navigation aids.

3.8 The skipper held the appropriate certificate to command the *Freedom III*, but the certificate was not endorsed for the *Freedom III* as was required. The incomplete certification did not contribute to the accident.

3.9 The absence of a passenger safety briefing had no effect on the cause or outcome of this accident, but had the potential to leave the passengers wondering what to do.

3.10 There were no serious injuries to the passengers or skipper and the damage to the boat did not compromise its watertight integrity.

4 Safety Actions

4.1 Following the accident the owner of Fish Fiordland Limited installed on the *Freedom III* a combined global positioning system (GPS) and chart plotter to assist the navigation of the vessel by complementing the radar. Signage had also been placed around the boat to identify the stowage positions of life saving appliances and actions to be taken in the event of an accident.

4.2 The skipper was retrained, particularly in the use of radar. He had also practised using the new GPS and chart plotter.

5 Safety Recommendations

Safety recommendations are listed in order of development and not in order of priority.

5.1 Following the grounding of another restricted limit passenger vessel, at night on a lake (TAIC occurrence report 04-202, *Queenstown Princess*, grounding, Lake Wakatipu), the Commission recommended to the Director of Maritime Safety that he:

037/04 develop the restricted radar course to include other forms of electronic navigational aids, such as global position systems and echo sounders.

038/04 revise the syllabus for Local Launch Operator and other relevant marine qualifications to include a practical electronic navigation aid component similar to but shorter than the revised restricted radar course referred to in safety recommendation 037/04.

055/04 conduct a cost benefit analysis into the requirement that applicants renewing their Local Launch Operator's certificate, who have not had practical electronic navigation aid training, should attend such a course before a new certificate is issued.

The safety recommendations are equally applicable in this case, so no further recommendations relating to the training of Local Launch Operators have been made to the Director of Maritime Safety. On 25 July 2004, the Maritime Safety Authority accepted the above recommendations, subject to funding being secured from the Ministry of Transport in the financial year 05/06.

5.2 On 13 September 2004 the Commission recommended to the owner of Fish Fiordland Limited that he:

5.2.1 develop a comprehensive standard passenger safety briefing to include the position of life saving apparatus, actions in the case of an emergency and identifying hazardous areas on the boat. (056/04)

5.2.2 fit trim tab indicators. (057/04)

5.3 On 27 September 2004 the owner of Fish Fiordland Limited supplied a copy of a newly adopted passenger safety briefing to the Commission. The briefing included all the aspects covered in safety recommendation 056/04.

5.4 On 18 September 2004 the Commission sighted the trim tab indicators that the owner had fitted to the vessel.

5.5 On 28 September 2004 the Commission accepted that the safety recommendations 056/04 and 057/04 had been fully implemented and recorded them as “Closed – acceptable”.

Approved on 22 September 2004 for publication

Hon W P Jeffries
Chief Commissioner

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