

Final report MO-2017-202: Passenger vessel *L'Austral*, grounding,
Milford Sound, Fiordland, 9 February 2017

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Final Report

MO 2017-202
Passenger vessel *L'Austral*,
grounding,
Milford Sound, Fiordland
9 February 2017

Approved for publication: June 2018

Transport Accident Investigation Commission

About the Transport Accident Investigation Commission

The Transport Accident Investigation Commission (Commission) is a standing commission of inquiry and an independent Crown entity responsible for inquiring into maritime, aviation and rail accidents and incidents for New Zealand, and co-ordinating and co-operating with other accident investigation organisations overseas. The principal purpose of its inquiries is to determine the circumstances and causes of occurrences with a view to avoiding similar occurrences in the future. Its purpose is not to ascribe blame to any person or agency or to pursue (or to assist an agency to pursue) criminal, civil or regulatory action against a person or agency. The Commission carries out its purpose by informing members of the transport sector and the public, both domestically and internationally, of the lessons that can be learnt from transport accidents and incidents.

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Important notes

Nature of the final report

This final report has not been prepared for the purpose of supporting any criminal, civil or regulatory action against any person or agency. The Transport Accident Investigation Commission Act 1990 makes this final report inadmissible as evidence in any proceedings with the exception of a Coroner's inquest.

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Citations and referencing

Information derived from interviews during the Commission's inquiry into the occurrence is not cited in this final report. Documents that would normally be accessible to industry participants only and not discoverable under the Official Information Act 1982 have been referenced as footnotes only. Other documents referred to during the Commission's inquiry that are publicly available are cited.

Photographs, diagrams, pictures

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Verbal probability expressions

The expressions listed in the following table are used in this report to describe the degree of probability (or likelihood) that an event happened or a condition existed in support of a hypothesis.

Terminology (Adopted from the Intergovernmental Panel on Climate Change)	Likelihood of the occurrence/outcome	Equivalent terms
Virtually certain	> 99% probability of occurrence	Almost certain
Very likely	> 90% probability	Highly likely, very probable
Likely	> 66% probability	Probable
About as likely as not	33% to 66% probability	More or less likely
Unlikely	< 33% probability	Improbable
Very unlikely	< 10% probability	Highly unlikely
Exceptionally unlikely	< 1% probability	



The *L'Austral* berthing in the port of Dunedin

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Abbreviations

°	degree(s)
Commission	Transport Accident Investigation Commission
ECDIS	electronic chart display and information system
IMO	International Maritime Organization
Ponant	Compagnie des Iles du Ponant

Glossary

blind pilotage	the navigation of a vessel in confined waters in low or restricted visibility, with little or no recourse to the visual observation of objects outside the vessel
bridge wings	the parts of the navigating bridge on both sides of a vessel's wheelhouse that, in general, extend to the vessel's side
con	to control or direct the steering of a vessel
amidships	the wheel is centred so that the rudder lies in the fore and aft line of the vessel
port	the left-hand side of a vessel when looking forward
rate of turn	the rate at which a ship changes direction, expressed in degrees per minute
starboard	the right-hand side of a vessel when looking forward
stern	the back or aftermost part of a vessel
vessel predictor	a line or shape on a vessel's radar or ECDIS that shows the predicted track of the vessel calculated from external inputs of heading, rate of turn, speed
voids	an empty enclosed space on a vessel that is not normally used by the crew
voyage data recorder	equipment fitted on board a ship that records data on the status and operation of various equipment and systems on board
wheel-over	the point at which a ship's wheel is put over to initiate the turning of the vessel

Data summary

Vehicle particulars

Name:	<i>L'Austral</i>
Type:	passenger vessel
Class:	Bureau Veritas
Limits:	SOLAS
Classification:	passenger ship – Unrestricted navigation COMF-NOISE 1, COMF-VIB 1, VeriSTAR-HULL, AUT-UMS (SS), AUT-PORT (SS), MON-SHAFT, CLEANSHIP, ALP (SS), ALM (SS)
Length:	142.1 metres
Breadth:	18 metres
Gross tonnage:	10,944
Built:	2010 by Fincantieri Ancona, Italy
Propulsion:	two fixed-blade propellers driven by four Wärtsilä 8L20 (1,600 kilowatts each) diesel electric engines
Service speed:	16 knots
Owner:	CMA CGM S.A. Compagnie des Iles du Ponant
Operator:	Compagnie des Iles du Ponant, Marseille, France
Port of registry:	Mata Utu, Wallis and Futuna (French international registry)
Minimum crew:	52 – with more than 50 passengers on board
Date and time	9 February 2017 at approximately 0555 ¹
Location	Milford Sound, Fiordland, in approximate position 44° 36'.33S 167° 49'.17E
Injuries	nil
Damage	indentation of the vessel's hull in way of starboard voids 6, 10 and 11 with minor deformation of longitudinal stiffeners. Damage to protective coating along exterior midships length of shell plating and deformation of starboard bilge keel

¹ Times in this report are in New Zealand Daylight Time (Co-ordinated Universal Time + 13 hours) and are expressed in the 24-hour format.

1. Executive summary

- 1.1 At about 0530 on 9 February 2017, the passenger cruise ship *L'Austral* began its entry to Milford Sound with an authorised harbour pilot on board. Because it was dark and there were no external visual navigation aids, the bridge team was using only the ship's electronic navigation systems to conduct the pilotage.
- 1.2 As the ship was making a turn off Dale Point, the pilot lost awareness of exactly where the ship was, the direction in which it was heading and the effects of the wind and tide on the ship.
- 1.3 The *L'Austral* deviated well off the planned track and struck a stony bank near the shoreline of Milford Sound. The ship suffered scraping and indentation of the hull on its starboard side, but the hull was not breached and nobody on board was injured.
- 1.4 The Transport Accident Investigation Commission (Commission) **found** that the ship's crew on the bridge noticed the ship was off its planned track, but did not bring this to the pilot's attention until it was too late to avert the grounding.
- 1.5 The Commission **found** that the bridge team were not making full use of the ship's electronic navigation systems to ensure that the ship stayed on track.
- 1.6 The Commission identified three **safety issues**:
 - the primary means for navigation on board the *L'Austral*, the electronic chart display and information system, was not being used to its full potential as a tool for planning and monitoring the ship's passage, and the crew were not fully conversant with its safety features
 - the standard of bridge resource management on board the *L'Austral* during the Milford Sound pilotage did not meet good industry practice
 - conducting 'blind pilotage' with large ships in confined waters represented risks that had not been fully considered by Environment Southland, the regional authority that regulates maritime activity in the area.
- 1.7 The Commission repeated two **previous recommendations** to the ship's operator (Compagnie des Iles du Ponant) and made one **new recommendation** to Environment Southland to address the safety issues.
- 1.8 The Commission had previously **found** that poor bridge resource management under pilotage was a factor contributing to accidents involving two other ships in New Zealand. Their two reports had made several **recommendations** aimed at improving the standard of pilotage and making the transition of the pilot into the ship's bridge team seamless.
- 1.9 **Key lessons** arising from this inquiry were:
 - a ship's passage plan is more than just the planned track for the ship to follow. Every part of a ship's voyage must be planned and all members of the bridge team be fully familiar with and agree to the plan. This is a cornerstone of good bridge resource management
 - good bridge resource management relies on a culture where challenge is welcomed and responded to, regardless of rank, personality or nationality
 - an electronic chart display and information system is a valuable aid to navigation. However, mariners need to fully understand and be familiar with all aspects of the system, particularly when using it for blind pilotage.

2. Conduct of the inquiry

- 2.1. On 9 February 2017 Maritime New Zealand notified the Transport Accident Investigation Commission (Commission) of the occurrence. The Commission opened an inquiry under section 13(1)b of the Transport Accident Investigation Commission Act 1990, and appointed an investigator in charge.
- 2.2. Contact was established with the Bureau d'Enquêtes sur les Événements de Mer, the French independent safety investigation authority. An agreement was reached that New Zealand would proceed as the Marine Safety Investigating State in accordance with the International Maritime Organization (IMO) Casualty Investigation Code.
- 2.3. On 10 February 2017, after confirming some of the details of the accident, two Commission investigators deployed to Dunedin where the *L'Austral* was due to berth on 11 February 2017.
- 2.4. On 11 February 2017 the investigation team interviewed the master and crew involved and gathered evidence from the vessel. The following day the investigation team interviewed the two Fiordland pilots who had been on the vessel at the time of the occurrence, and gathered more evidence.
- 2.5. In the following weeks the investigation team continued to gather evidence from interested persons and conduct interviews with, including but not limited to, Maritime New Zealand, the vessel's operator (Compagnie des Iles du Ponant [Ponant]), Environment Southland, Port Otago and equipment manufacturers.
- 2.6. On 22 February 2018 the Commission approved the draft report to be circulated to 12 interested persons for comment.
- 2.7. Six submissions were received. The Commission considered the submissions, and changes as a result of those submissions have been included in the final report.
- 2.8. On 20 June 2018 the Commission approved the final report for publication.

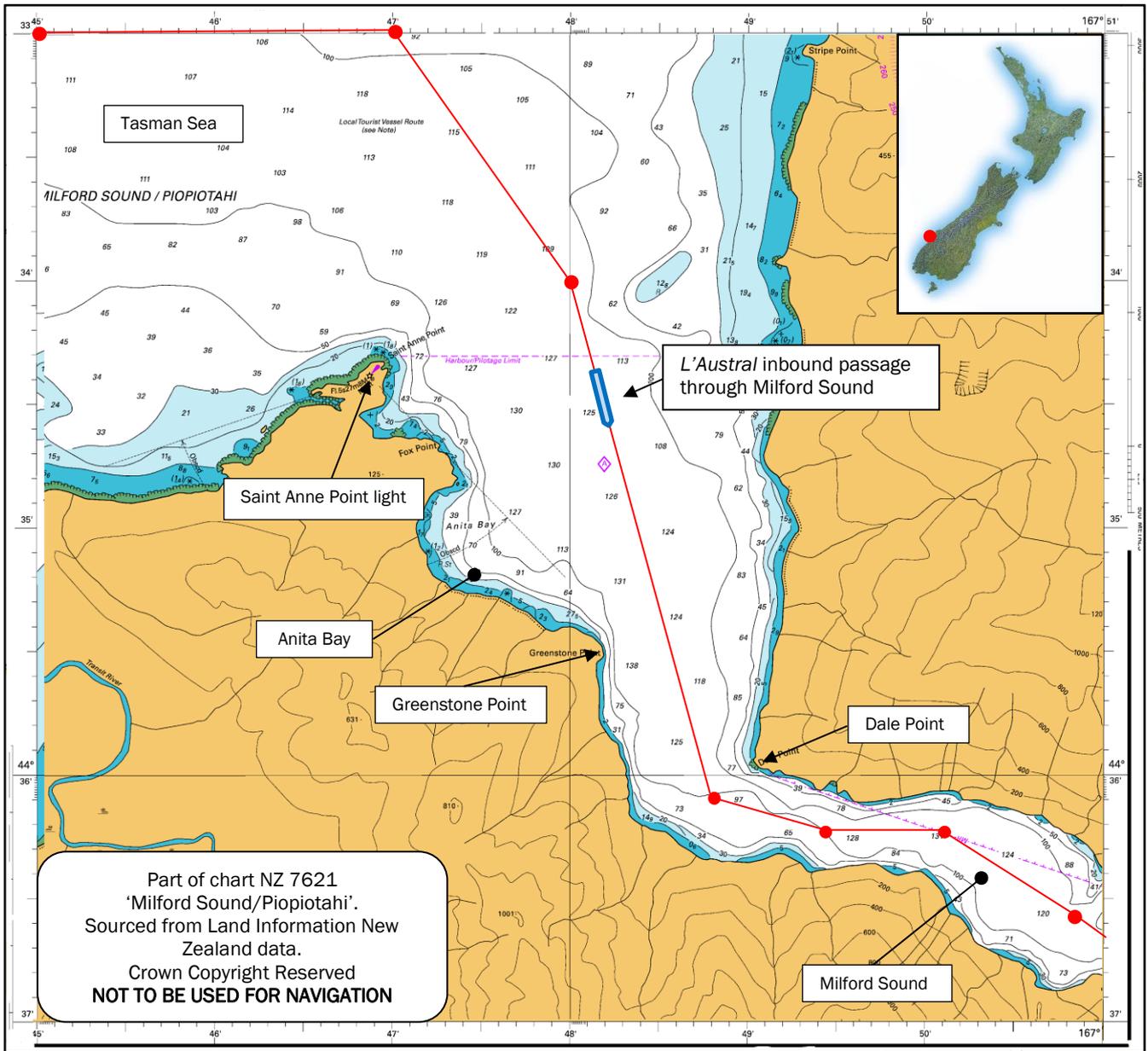


Figure 1
General area of the accident

3. Factual information

3.1. Background

3.1.1. The *L'Austral* is a French-registered passenger cruise ship that was operating a nine-day cruise from Auckland to Milford Sound. The ship stopped at several ports on the east coast of New Zealand, the last of which was Dunedin. From Dunedin the ship travelled through Foveaux Strait to Fiordland, where it transited several other prominent sounds before arriving off Milford Sound, which is part of the Te Wāhipounamu – South West New Zealand World Heritage Area, a UNESCO world heritage site² (see Figure 2).

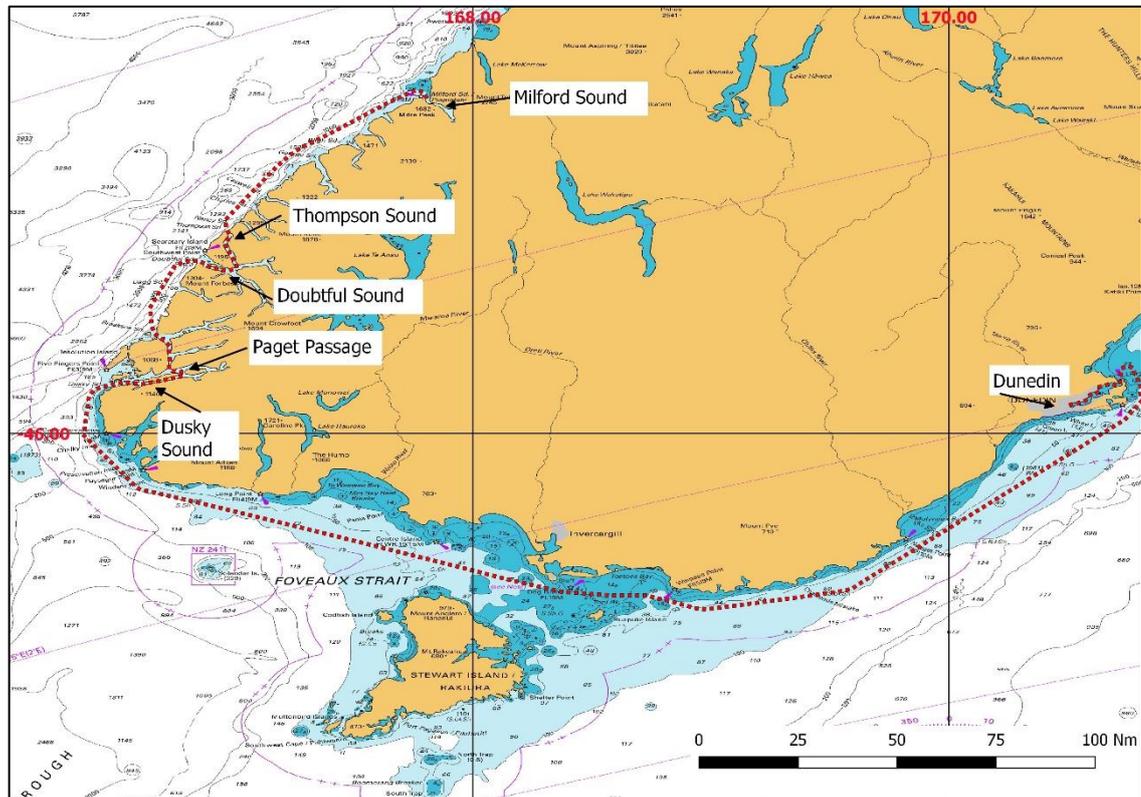


Figure 2
Extract of chart showing route of the *L'Austral*

- 3.1.2. On 7 February 2017 the *L'Austral* departed the port of Dunedin with two Port Otago licensed pilots on board. Both pilots were also licensed by Environment Southland regional council to pilot ships through various sounds within Fiordland, including Milford Sound. The second pilot was on board to observe the first pilot (the pilot) take the ship through Cook Channel and Paget Passage in Dusky Sound, as the second pilot had never taken ships through either of those passages.
- 3.1.3. The pilot conducted the pilotage from the *L'Austral's* berth in Dunedin to below the 'Halfway Islands' near Port Chalmers, where the second pilot took over the pilotage for the lower harbour transit. Once clear of the lower harbour the second pilot handed the con³ to the ship's crew for the passage to Fiordland.
- 3.1.4. At about 1400 on 8 February the vessel arrived off the entrance to Dusky Sound, where the con was handed back to the pilot. The *L'Austral* entered Dusky Sound under his direction.
- 3.1.5. The pilot took the vessel through Cook Channel and Paget Passage, with the second pilot observing. The second pilot then took the con for the transit through Acheron Passage and

² A UNESCO World Heritage Area is a conservation area of extraordinary cultural and environmental significance.

³ Responsibility for conducting and directing the ship.

out into the Tasman Sea via Breaksea Sound, where he handed the con back to the ship's crew for the short passage to Doubtful Sound.

- 3.1.6. The second pilot resumed the con outside Doubtful Sound and took the vessel into Doubtful Sound and into Thompson Sound. The two pilots shared the con of the vessel as it cruised up and down Thompson Sound while dinner was served. The second pilot then took the con for the voyage out of the northern entrance of Thompson Sound. At about midnight he handed the con back to the ship's crew for the trip around to Milford Sound.

3.2. Narrative

- 3.2.1. At about 0525 on 9 February the pilot arrived on the navigating bridge as the *L'Austral* was rounding Saint Anne Point (see Figure 1). The pilot discussed with the officer of the watch the speed required and rate of turn⁴ as the ship rounded Dale Point. At 0531 the master arrived on the navigating bridge and the pilot and master, together with the officer of the watch, conducted their information exchange and agreed on the passage plan for entering Milford Sound.
- 3.2.2. The speed of the *L'Austral* was increased to 12 knots and at 0536 the pilot took the con of the vessel from the officer of the watch.
- 3.2.3. At 0550:45 the pilot ordered the turn into Milford Sound around Dale Point with a 2° rate of turn to port⁵ (see Figure 3). In the following two and a half minutes the pilot ordered successive increases in the rate of turn through 5°, 10°, 15° and 20° to port (see Figure 3).
- 3.2.4. At 0553:20, as the pilot ordered a 20° rate of turn to port, the vessel was south of the intended course and drifting farther south away from the intended track.
- 3.2.5. At 0554:20 the pilot ordered a 30° rate of turn to port.

⁴ The rate at which the ship changes direction, expressed in degrees per minute.

⁵ The left-hand side of the vessel when looking forward.

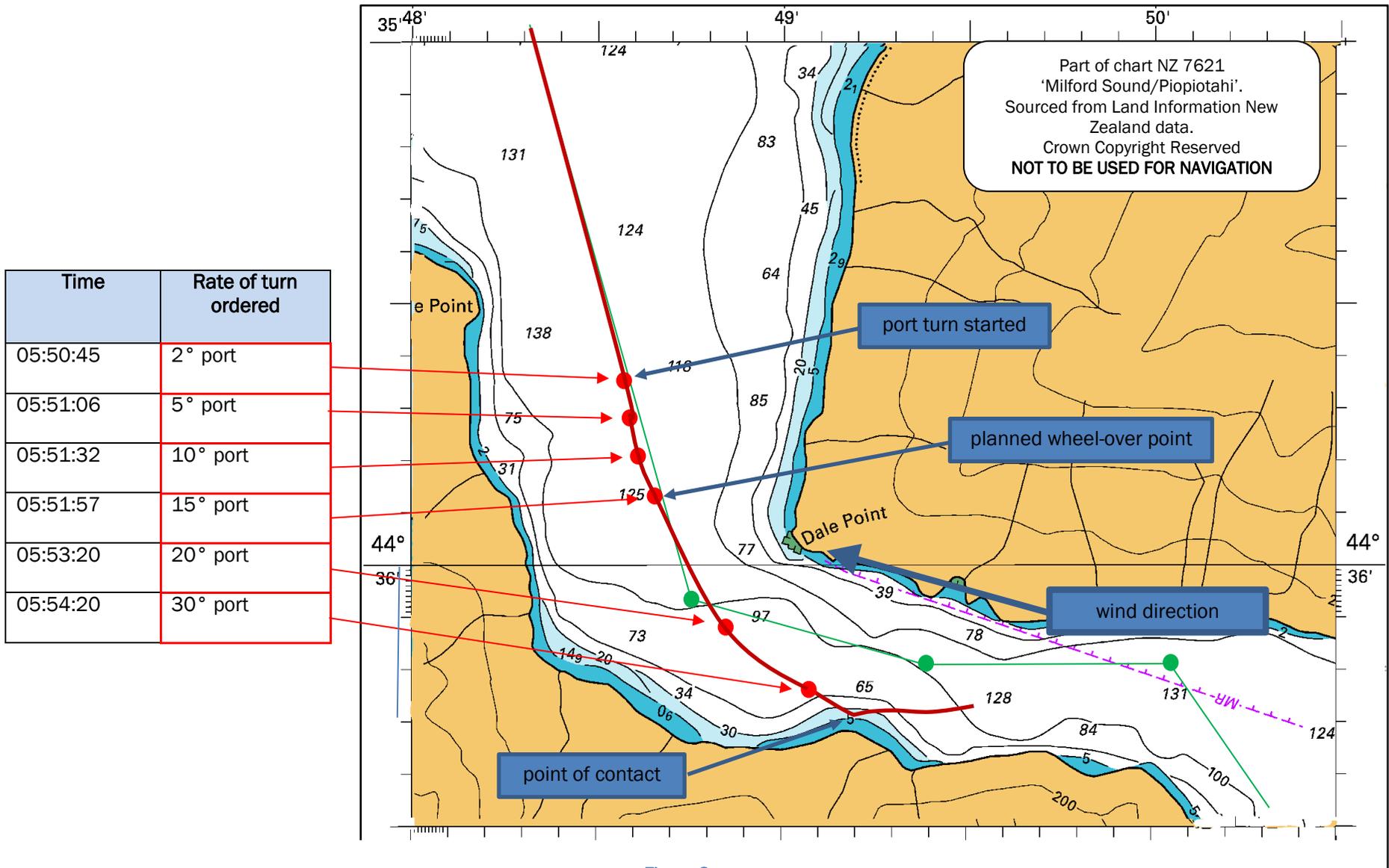


Figure 3
 The L'Austral's course around Dale Point with rates of turn as ordered

- 3.2.6. At some time after the pilot ordered a 30° rate of turn to port, the officer of the watch became aware that the vessel was close to the shoreline of Milford Sound. He moved to the starboard⁶ bridge wing⁷ and looked aft to see if the stern⁸ of the vessel was clearing the shoreline. The master also went to the starboard bridge wing, and when he realised how close the vessel was to the shoreline he exclaimed to the pilot, “L’arriere – L’arriere” (meaning “the stern” in French) from his position at the bridge wing. At 05:54:40 the *L’Austral* collided with a stony bank that extended from the shoreline. As the vessel cleared the bank the pilot ordered amidships⁹ on the wheel and then a helm order of 20° to starboard in an attempt to carry the stern of the vessel away from the shoreline.
- 3.2.7. The pilot conned the vessel into the middle of the sound while the master and the remainder of the bridge followed a vessel-grounding checklist from the Contingency Plan and Emergency Manual. While this was happening the pilot continued to con the *L’Austral* to the position agreed on for the passenger transfer operation, which took place after the vessel anchored.

3.3. Accident damage

- 3.3.1. The post-grounding checks revealed that the hull had not been breached. The master ordered a visual underwater dive survey of the vessel’s hull.
- 3.3.2. The dive survey revealed that the vessel’s hull was indented along the starboard side for about 65 metres. These indentations occurred in void¹⁰ numbers 6, 10 and 11. In the void spaces minor deformation of longitudinal stiffeners had occurred.
- 3.3.3. The external protective coating along a section of the hull had been scraped off and the starboard bilge keel¹¹ had been deformed along part of its length, but it had not detached from the hull (see Figure 4).

⁶ The right-hand side of a vessel when looking forward.

⁷ The parts of the navigating bridge on both sides of a vessel’s wheelhouse that, in general, extend to the vessel’s side.

⁸ The back or aftermost part of a vessel.

⁹ The wheel is centred so that the rudder lies in the fore and aft line of the vessel.

¹⁰ An empty, enclosed space on a vessel that is not normally used by the crew.

¹¹ Either of two keel-like projections extending lengthwise along a vessel’s bilge, one on each side, to retard rolling.



Figure 4
Damage to the starboard side of the hull and bilge keel

3.4. Vessel details

- 3.4.1. The *L'Austral* is a cruise vessel built by Fincantieri, Ancona in Italy in 2010. It is owned by CMA CGM S.A. in France and operated by Ponant.
- 3.4.2. The *L'Austral* had a length overall of 142.1 metres and a breadth of 18 metres. It had a maximum draught of 4.9 metres. The vessel was powered by four Wärtsilä 8L20 1,600-kilowatt diesel electric generators driving two asynchronous electric motors, each driving a single fixed-pitch propeller. The *L'Austral* was fitted with a single 800-kilowatt bow thruster and dual Becker rudders¹².
- 3.4.3. The *L'Austral* was equipped with the range of navigational equipment standard for the type of vessel, including an electronic chart display and information system (ECDIS) and a backup system that was compliant with international and Flag State rules and regulations. This configuration meant that the vessel could use the ECDIS as its primary method of navigation and was not required to carry paper charts. However, the vessel was equipped with a full folio of paper charts that were used in conjunction with the ECDIS.

3.5. Personnel

- 3.5.1. The *L'Austral* had 156 crew on board. The safe manning certificate required it to have a minimum of 52 crew.
- 3.5.2. The master had been at sea for 25 years and had obtained his STCW (Standards of Training, Certification and Watchkeeping for Seafarers) II/2 certificate of competency limited to ships with less than 15,000 gross tonnes. The master had worked for the operator for 22 years, during which time he had implemented the operator's safety management system. He had also been the training manager for two years.
- 3.5.3. The officer of the watch held an STCW II/1 certificate of competency, unlimited, for both deck and engine room operations. He was on his second contract with Ponant on the *L'Austral* and had been on board the vessel since 7 January 2017.
- 3.5.4. The pilot had been a pilot for Port Otago since 1994 and had completed more than 5,000 acts of pilotage. Since 2006 the pilot had completed approximately 200 pilotages into and out of Milford Sound, including approximately 20 pilotages during the hours of darkness. He had also completed pilotages during periods of reduced visibility. Over the years the pilot had, on several occasions, completed 'blind pilotage'¹³ training for Port Otago in a vessel simulator. The pilot had been externally audited on behalf of Environment Southland during January 2017.
- 3.5.5. The second pilot, after several years at sea, had been a pilot in Gladstone, Australia for approximately four years before becoming a pilot in Port Otago in July 2016. He had gained his licence for Port Chalmers and Dunedin at the end of November 2016 and gained his licence to conduct pilotages in Milford, Dusky and Doubtful Sounds at the end of January 2017.

3.6. Port details

- 3.6.1. Environment Southland is the regional council with responsibility for navigational safety in Fiordland. It is responsible for the Southland Navigation Safety Bylaws 2009 as revised in December 2015, which govern safe navigation practices on the rivers, lakes and sea, out to the 12-nautical-mile limit of the Environment Southland region.

¹² Spade-type rudders with flaps. The Becker-type rudder has a moving flap on the trailing edge. When the rudder moves, a mechanical linkage diverts the flap to a higher angle to maximise the sideways thrust. Either 45° or 65° maximum rudder angles can be specified for bigger and faster rudders.

¹³ The navigation of a vessel in confined waters in low or restricted visibility, with little or no recourse to the visual observation of objects outside the vessel.

- 3.6.2. The majority of the fiords that are accessible to cruise vessels have been designated compulsory pilotage areas for vessels over 500 gross tonnes under Maritime Rules Part 90, Pilotage.
- 3.6.3. Environment Southland has a deed of agreement with the New Zealand cruise ship industry that permits cruise ships to enter certain fiords. Pilotage is provided for the fiords by two companies: Fiordland Pilotage Services (a subsidiary of Port Otago); and South Port (the commercial operator of the port of Bluff).
- 3.6.4. Environment Southland has a safety management system for cruise ships in Fiordland that was developed in accordance with the New Zealand Port and Harbour Marine Safety Code (2016). It includes:
- the Safety Management System Plan
 - the deed
 - the pilot training and proficiency plan for Fiordland pilotage areas
 - the Fiordland pilots' instructions and standard operating procedures
 - the New Zealand Police's Fiordland/Coastal Passenger Ship Emergency Plan.

3.7. Environmental conditions

- 3.7.1. Low tide for Freshwater Basin (at the head of Milford Sound) on 9 February 2017 was at 0437, about one and a half hours before the *L'Austral* grounded. High water was predicted to be at 1029, about four and a half hours after the time of the grounding. The predicted rate of tidal flow near the entrance to Milford Sound was negligible (less than 0.5 knots).
- 3.7.2. The wind outside the entrance to Milford Sound was described as south-south-easterly at 10-15 knots. In the entrance to Milford Sound the wind (from the voyage data recorder¹⁴ readout) was mainly south-easterly at about 25 gusting to 35 knots. The visibility was good but with overcast sky. Due to the completely overcast sky and the location, there was little to no ambient light.

3.8. Blind pilotage

- 3.8.1. Navigating in little or no ambient light and with no visual navigation aids increases the risk of incidents and accidents occurring. Blind pilotage is the navigation of a vessel in confined waters in low or restricted visibility with little or no recourse to the visual observation of objects outside the vessel.
- 3.8.2. In blind pilotage the visual aspect is either removed or unreliable, so reliance falls onto electronic and other navigational aids. The use of an ECDIS and radar becomes more important, and the passage plan loaded onto these aids must be accurate, utilised and followed to ensure a successful outcome.

3.9. Passage planning

- 3.9.1. The IMO's Resolution A.893(21), Guidelines for Voyage Planning, adopted on 25 November 1999, states the following for voyage (passage) planning:
- 1.1 The development of a plan for voyage or passage, as well as the close and continuous monitoring of the vessel's progress and position during the execution of such a plan, are of essential importance for safety of life at sea, safety and efficiency of navigation and protection of the marine environment.
 - 1.2 The need for voyage and passage planning applies to all vessels. There are several factors that may impede the safe navigation of all vessels and additional factors that may impede the navigation of large vessels or vessels carrying hazardous cargoes. These factors will need to be taken into account in

¹⁴ equipment fitted on board a ship that records data on the status and operation of various equipment and systems on board.

the preparation of the plan and in the subsequent monitoring of the execution of the plan.

- 1.3 Voyage and passage planning includes appraisal, i.e. gathering all information relevant to the contemplated voyage or passage; detailed planning of the whole voyage or passage from berth to berth, including those areas necessitating the presence of a pilot; execution of the plan; and the monitoring of the progress of the vessel in the implementation of the plan.

A more detailed explanation of the guidelines can be found in Appendix 4.

3.10. Bridge resource management

- 3.10.1. Bridge resource management is an important concept for ensuring that a ship keeps to the agreed passage plan. Bridge resource management was adopted in the early 1990s by the maritime industry as a safety and error management tool. It has since become an integral part of crew training and is included in the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers developed by the IMO (see Appendix 5).
- 3.10.2. Bridge resource management is described as the effective management and utilisation of all resources, human and technical, available to a bridge team, to help ensure the safe completion of the vessel's voyage.
- 3.10.3. Some essential aspects of bridge resource management are good closed-loop communications¹⁵, participants sharing the same understanding of a planned passage, and maintaining situational awareness.
- 3.10.4. Good communication is a particularly important aspect of good bridge resource management. It involves talking and agreeing on the plan; clear closed-loop communication in conducting the plan; and a clear and concise challenge and response if the ship is deviating from the agreed plan.

¹⁵ A technique used to avoid misunderstandings. When the sender gives a message, the receiver repeats it back. The sender then confirms the message, usually by using the word 'yes'. When the receiver incorrectly repeats the message back, the sender will say "negative", or something similar, then repeat the correct message.

4. Analysis

4.1. Introduction

- 4.1.1. A vessel grounding, for however short a time, is a serious occurrence that can potentially cause damage to the vessel and the environment.
- 4.1.2. The passage into Milford Sound requires large alterations of course with little margin for error, which meant it was important for the transit to be managed and monitored carefully by the bridge team.
- 4.1.3. For a successful harbour transit:
 - the passage plan should be accurate and agreed by the entire bridge team (which includes the pilot), then
 - the team should agree on how the passage plan will be conducted, then the position of the ship should be closely monitored against the agreed plan, and
 - any deviation from the plan should be challenged and either rectified or accepted.
- 4.1.4. The ship's crew and the pilot involved held the required qualifications and were current for the task. Notwithstanding this, the ship deviated from the planned track and grounded on the shoreline.
- 4.1.5. The following analysis discusses why on this occasion the vessel grounded. In doing so it raises three safety issues:
 - the primary means for navigation on board the *L'Austral*, the ECDIS, was not being used to its full potential as a tool for planning and monitoring the ship's passage, and the crew were not fully conversant with its safety features
 - the standard of bridge resource management on board the *L'Austral* during the Milford Sound pilotage did not meet good industry practice
 - conducting blind pilotage with large ships in confined waters represents risks that had not been fully considered by Environment Southland, the regional authority that regulates maritime activity in the area.

4.2. What happened

Passage planning

- 4.2.1. Environment Southland's Fiordland Pilots Standard Operating Procedures contained the standard operating procedures and safety management information for pilotage in Fiordland.
- 4.2.2. The procedures included information on the recommended route for entering Milford Sound. This information included written directions, a course card, and chartlets for entering Milford Sound (Figure 5 and see Appendix 1).
- 4.2.3. The *L'Austral's* passage plan (see Appendix 3) was similar to that contained in the Fiordland Pilots Standard Operating Procedures, with a track that kept the vessel close to the centre of the waterway. The pilot and the bridge team agreed to use the ship's passage plan, which had been loaded into the ship's navigation equipment. From this perspective there was no issue with the passage plan. It was accurate and agreed to by the entire bridge team.

Conduct of the ship

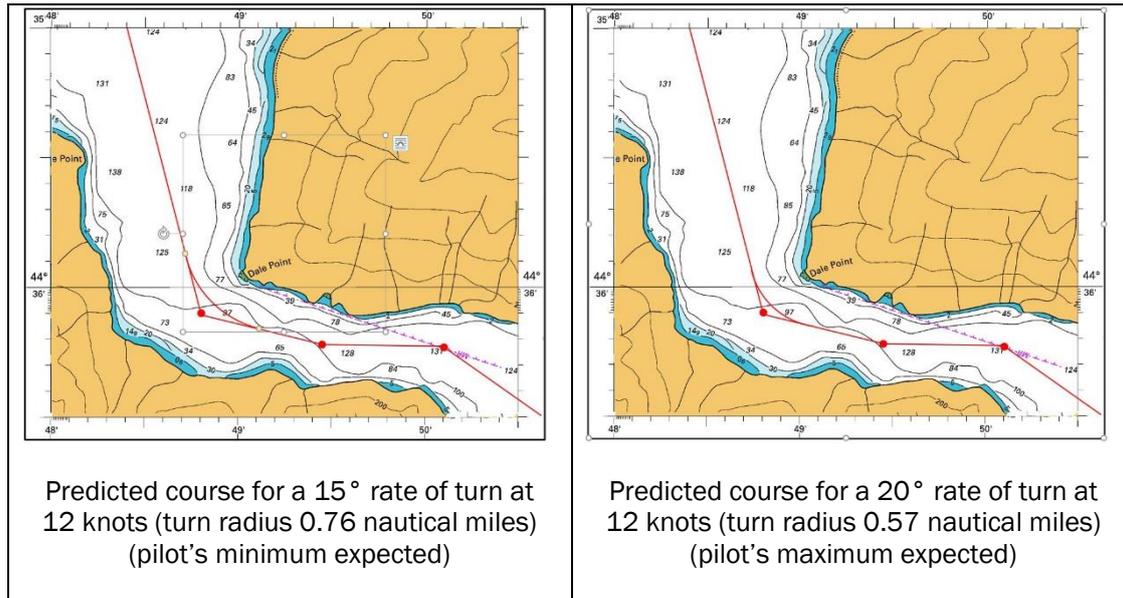


Figure 5
Chartlets showing typical tracks for rounding Dale Point

- 4.2.4. When the master arrived on the bridge, the master/pilot information exchange took place with the officer of the watch close-by while still maintaining the navigational watch. The pilot informed the master that he would require a vessel speed of 12 knots when they approached the turn at Dale Point and that the rate of turn would be between 15° and 20° to achieve the turn. These rates of turn would give turn radii of 0.76 and 0.57 nautical miles respectively (see Figure 5).
- 4.2.5. The rate-of-turn indicator on the helmsman's steering console was believed to be functioning correctly. However, the remote rate-of-turn indicator at the centre-front of the bridge was behaving erratically, deviating several degrees either side of the true value. This was a long-standing issue that the company had been working with the equipment manufacturer to rectify.
- 4.2.6. The crew had not activated the vessel predictor function on either the ECDIS or radars. This function would normally provide a predicted outline of where the ship would be at a predefined interval in future. The function relies on input on the ship's speed over the ground and its rate of turn. Given the erratic performance of the rate-of-turn indicator, the function would likely have been of limited use to the bridge team.
- 4.2.7. It is likely that the helmsman was the only person who had a reliable rate-of-turn indicator available. This was going to make it difficult for the rest of the bridge team to check if the correct rate of turn was being achieved by the helmsman. The unreliability of the rate-of-turn equipment questions the efficacy of conducting the pilotage based on the rate of turn, instead of issuing helm orders to maintain the desired track.
- 4.2.8. At about 0536 the pilot assumed the con of the vessel from the officer of the watch and continued on track as the speed of the vessel increased to the requested 12 knots. At approximately 0550 the pilot ordered a rate of turn of 2° to port when the vessel was still about 2.3 cables¹⁶ from the designated wheel-over¹⁷ position for the turn off Dale Point (see Figure 2). The helmsman acknowledged the order and confirmed once he had the ship at the correct rate of turn.

¹⁶ One cable is one 10th of a nautical mile or 185.2 metres.

¹⁷ The point at which a ship's wheel is put over to initiate the turning of the vessel.

- 4.2.9. The pilot later explained that he preferred to start his turns slowly and gradually increase the rate of turn. This was a departure from the agreed passage plan, which had a designated point at which the turn would begin. None of the ship's crew challenged the early turn.
- 4.2.10. According to the helmsman he was achieving the rate of turn ordered by the pilot from the initial 2° and through the successive 5°, 10° and 15° as read from the rate-of-turn indicator on the steering column before him.
- 4.2.11. By the time the pilot ordered the 15° rate of turn to port the ship was at the designated wheel-over position, but it was slightly starboard of the planned track in spite of the turn to port having been initiated more than one minute earlier (see Figure 2). One explanation for this is that the easterly wind, which was gusting up to 25 knots, was pushing the ship towards the southern shoreline.
- 4.2.12. Soon after the *L'Austral* passed the wheel-over position, the pilot ordered a 20° rate of turn to port. The ship briefly regained the planned track, but then again deviated further and further to starboard of it. A series of alarms sounded from the radar and the ECDIS, alerting the bridge team that the ship was deviating from the planned track. None of these alarms caused any of the bridge team to voice their concern over the progress of the ship in the turn.
- 4.2.13. The master said that he noticed the ship deviating significantly from the planned track, and that instead of voicing his concern as he was standing next to the pilot he made a hand gesture in the dark for him to turn further to port. According to the master, the pilot acknowledged his gesture. The pilot said that he did not see the gesture. The pilot then asked the helmsman to confirm the ship's heading. At about 0554 the master went to the starboard bridge wing and saw how close the ship was to the shoreline. The master exclaimed to the pilot "L'arriere – L'arriere" (meaning "the stern" in French) from his position at the bridge wing.
- 4.2.14. At about the same time, the pilot noticed that the *L'Austral* had deviated far from the planned track and took further corrective action by ordering a 30° rate of turn to port. The pilot then ordered the helm to amidships then 20° to starboard in an attempt to prevent the stern and propellers striking the seabed.
- 4.2.15. At 0554:45 the starboard side of the *L'Austral* struck the stone bank on the south side of Milford Sound.
- 4.2.16. The chain of events that led to the *L'Austral* grounding began when the pilot initiated the turn earlier than expected. The conduct of the pilotage appeared to have been somewhat focused on what the required rate of turn was in order for the ship to follow the planned track in the turn, rather than focusing on strictly following the planned track by altering the rate of turn to counter other influences that were affecting the ship, such as wind and tide.
- 4.2.17. The tracks were clearly displayed on all of the bridge equipment that the bridge team were monitoring. It is likely that the pilot became overly focused on the rate of turn, which he would have had difficulty monitoring given the faulty equipment. As a result, he lost situational awareness as to where the ship was, where it was heading, and what other factors were influencing its progress.
- 4.2.18. The bridge team were not paying sufficient attention to monitoring the progress of the ship against the agreed plan. This is discussed in the following section.

Monitoring

Safety issue – The primary means for navigation on board the L'Austral, the ECDIS, was not being used to its full potential as a tool for planning and monitoring the ship's passage, and the crew were not fully conversant with its safety features.

- 4.2.19. In order for a bridge team to monitor the progress of a ship, there first must be agreement on the plan, which includes the agreed track and the speed at which the ship will travel along it.

There also must be agreement on what is considered an acceptable deviation from the plan before a challenge¹⁸ is made.

- 4.2.20. As mentioned above, there was agreement on the planned track. However, there was no agreement on how far off the planned track the ship would be allowed to deviate.
- 4.2.21. The approaches to and transits of Milford Sound were restrictive for a ship the size of the *L'Austral*. Even a small deviation would have put the ship at risk of grounding. Therefore the ship's speed and progress along the planned track would need to have been closely monitored and even the slightest deviation scrutinised, talked about and rectified.
- 4.2.22. An ECDIS with a radar overlay was the prime method being used to monitor the *L'Austral*'s track. The IMO described an ECDIS in Performance Standards for Electronic Chart Display and Information Systems (ECDIS) (IMO Resolution A.817(19)) as:
 - ... a navigation information system which, with adequate back up arrangements, can be accepted as complying with the up-to-date chart required by regulation V/19 & V/27 of the 1974 SOLAS Convention¹⁹, by displaying selected information from navigation sensors to assist the mariner in route planning and route monitoring, and by displaying additional navigation-related information if required.
- 4.2.23. User-defined safety settings are a safety function when using an ECDIS. A failure to enter the correct safety settings can allow a vessel to enter unsafe waters without alerting the operator. To achieve a safe passage plan, users of ECDISs must understand how to determine accurately the correct value for a safety setting (see Figure 7).

¹⁸ 'Challenge' is the bridge resource management term used for raising an alert or questioning the actions or inactions of persons, or anything that might seem out of the ordinary.

¹⁹ The International Convention for the Safety of Life at Sea.

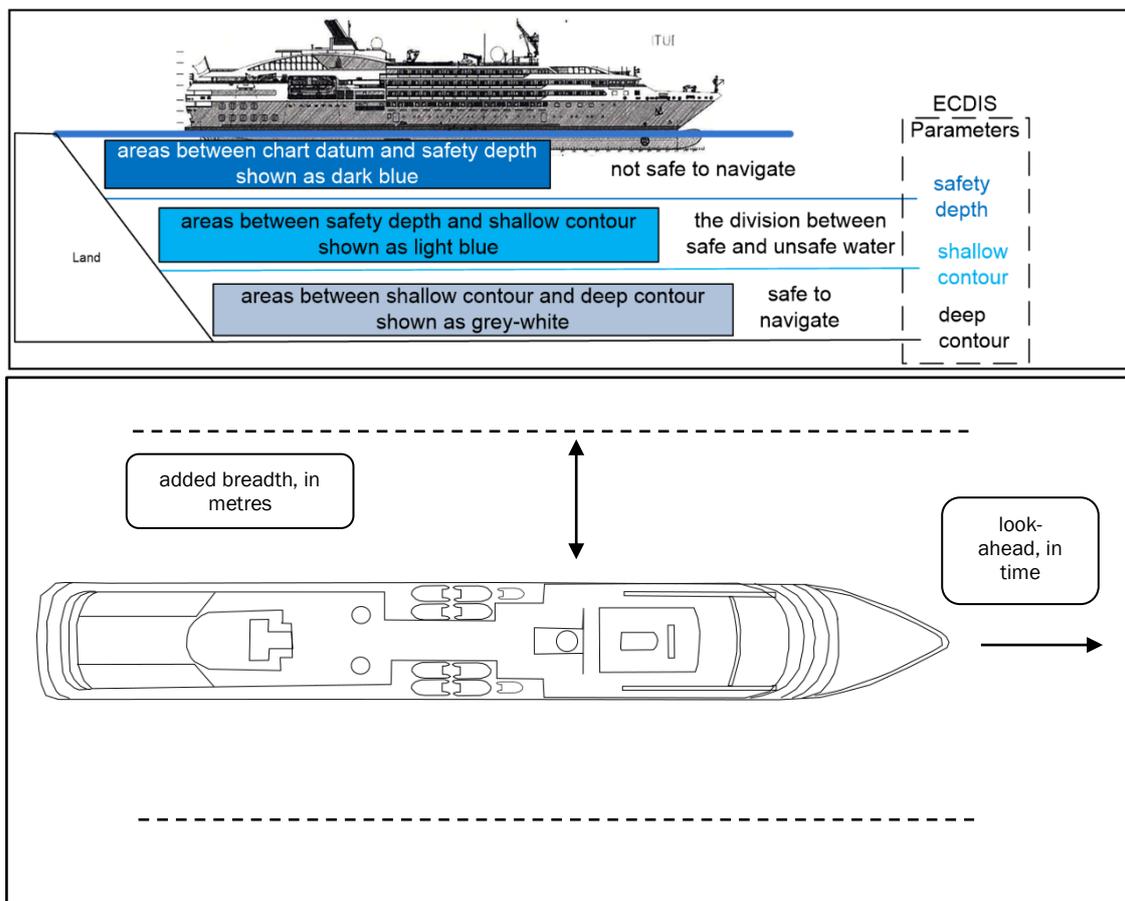


Figure 6
Diagram showing ECDIS safety parameters

4.2.24. IMO specifications required an ECDIS to trigger certain alarms for the following conditions:

- if the vessel is predicted to cross the safety contour within a user-specified time
- if the vessel is predicted to cross the boundary of a prohibited area or an area for which special conditions exist within a specified time
- if the vessel deviates off course by a specified amount from the planned route; cross-track distance
- if the vessel continues on its present course over a user-defined time or distance and is predicted to pass closer to an object that is shallower than the safety contour or an aid to navigation.

4.2.25. The vessel's passage plan included safety parameters that had been uploaded into the vessel's ECDIS. The operator's safety management system required that the ECDIS safety parameters, or the "antigrinding [sic] settings" be adapted to the type of navigation: offshore, coastal or port approach. However, permanent safety parameters had been set in the *L'Austral* ECDIS regardless of the phase of the ship's voyage (see Figure 7). Not changing safety parameters to match the mode of navigation degraded the usefulness of the ECDIS as a system for monitoring the progress of the ship in a confined channel.

ECDIS PERMANANT ANTIGROUNDING SETTINGS	
Safety depth	10m
Safety height	35m
Shallow contour	6m
Deep contour	20m
Look ahead	12 min
Added Breadth	300m

Figure 7
Diagram showing permanent ECDIS safety parameters on board the *L'Austral*

- 4.2.26. The entrance to Milford Sound is both narrow and deep. The water is 50 metres deep to within approximately 140 metres of the shoreline where the *L'Austral* grounded. The entrance is approximately 540 metres wide at its narrowest point. Using the ECDIS permanent safety parameters, the added breadth would have alarmed even when the vessel was in the centre of the channel; the safety depth would not have alarmed until the vessel was close to the shoreline; and the look-ahead would have been in a state of alarm before the ship entered the pilotage limit.
- 4.2.27. Some of the safety parameter settings did alarm as the ship deviated well off the track. However, none of these alarms was acted upon and none was brought to the pilot's attention.
- 4.2.28. The ECDIS would have been a useful aid to navigation when entering Milford Sound had the chosen parameters been set appropriately and adhered to. It could have warned the bridge team that the vessel was not where they wanted it to be and focused the master's and pilot's attention on preventing the vessel grounding.
- 4.2.29. Regardless of the ECDIS alarm settings, it was readily apparent from looking at the ECDIS and radar that the ship was deviating significantly from the planned track.
- 4.2.30. On 9 January 2017, one month before this accident, *L'Austral* was involved in another accident when it struck an uncharted rock when it was being manoeuvred close inshore around the sub-Antarctic Snares Islands. In its report on that accident, the Commission recommended that the operator review its procedures for the setting up, training in and ongoing support for ECDISs on all of its ships. The recommendation is equally applicable to this accident.
- 4.2.31. The use of the ECDIS and other electronic navigation aids was important because it was dark and there were little or no external aids to guide the ship down the channel. This situation called for blind pilotage techniques to be used, which is discussed in the following section.

Findings

1. The *L'Austral* made contact with the shoreline while making a turn in Milford Sound because the harbour pilot lost situational awareness as to where the ship was, where it was heading, and what other factors were influencing its progress.
2. The master and officer of the watch both noticed that the *L'Austral* had deviated substantially from the planned track, but neither spoke up until it was too late to prevent the ship grounding near the shoreline.
3. The planned track for the pilotage into Milford Sound was appropriate and agreed by all persons in the bridge team. However, there was no discussion on how the conduct of the pilotage would be undertaken and how far from the planned track the ship would be allowed to deviate.

4. The bridge team agreeing to use a rate-of-turn method for conducting the pilotage when the rate-of-turn-indicator on board the *L'Austral* was faulty was likely a factor contributing to the accident.
5. The ship's crew were not totally familiar with, and did not use all of the safety features of the ECDIS, the ship's primary electronic navigation system.

4.3. Blind pilotage

Safety issue: Conducting blind pilotage with large ships in confined waters represented risks that had not been fully considered by Environment Southland, the regional authority that regulates maritime activity in the area.

- 4.3.1. There are no visual navigation aids in Milford Sound to assist navigators in monitoring the position and progress of their ships. Consequently, during periods of restricted visibility or during the hours of darkness, navigators must revert to blind pilotage techniques.
- 4.3.2. The pilot had conducted approximately 200 acts of pilotage into and out of Milford Sound, of which 20 had been during the hours of darkness. The pilot had also undertaken regular simulator training for blind pilotage into and out of Port Otago. However, at the time of the accident he had not conducted simulator training for blind pilotage into Milford Sound, nor did Environment Southland's Pilot Training Programme and Proficiency Plan²⁰ require him to have done so.
- 4.3.3. Because during blind pilotage there are no outside cues to help pilots maintain 'spatial' awareness, the pilots rely totally on their ships' electronic navigation systems. Therefore, pilots must have faith that the equipment they are provided with is accurate, is working correctly and can be relied upon. They must also use such equipment to good effect.
- 4.3.4. On this occasion the pilot and the assistant pilot were unsure about the reliability of the *L'Austral's* rate-of-turn indicator, which resulted in a lack of confidence in the equipment. The pilot was equally concerned about the reliability of the ECDIS vessel predictor, which was fed data from the rate-of-turn indicator.
- 4.3.5. As part of the master/pilot information exchange, the master is expected to inform the pilot if there are any defects with the navigational equipment on board the vessel. The rate-of-turn indicator was an important piece of equipment and the master should have informed the pilot of any previous issues and that it was not functioning correctly, particularly as the pilot had briefed the bridge team that he intended to use rate of turn for making the turn off Dale Point.
- 4.3.6. Information on the status of the bridge equipment was sourced from the ship operator. It showed that the rate-of-turn indicators and repeaters had suffered technical problems during the previous six months. From August 2016 until October 2016 the rate-of-turn indicators had been unreliable. In October they had been turned off. In November the defect had been identified and the rate-of-turn indicators were deemed to be "working with the assistance of technical services".
- 4.3.7. In his submission on the report, the master said that he was not aware that the rate-of-turn indicator was not functioning correctly when the ship was entering Milford Sound. From the pilots' comments and the data downloaded from the ship's voyage data recorder, it was almost certain that the rate-of-turn indicators were not functioning reliably at this time. The ship predictor image on the radar and ECDIS was moving erratically on the screen.
- 4.3.8. However, the rate-of-turn indicators were not absolutely required in order to navigate blind. As previously mentioned, the ECDIS and radar had important features and techniques that could have assisted in maintaining the agreed track down Milford Sound. These were either not

²⁰ Environment Southland Pilot Training Programme and Proficiency Plan, Fiordland Pilotage Areas (revised 16 May 2012).

programmed or not used by any of the bridge team. As a result, the pilot lost awareness of how the turn off Dale Point was progressing.

- 4.3.9. As the relevant regional council, Environment Southland may regulate the ports, harbours and water in the Fiordland region, as well as maritime-related activities²¹. This includes the regulation of marine operations for cruise ships.
- 4.3.10. The increasing frequency, scale and duration of cruise ship traffic through Fiordland means that appropriate measures need to be in place to mitigate the risks posed by blind pilotage. In addition, Milford Sound is not the only passage where blind pilotage is relied on.
- 4.3.11. The Commission recommends that Environment Southland review its current risk assessment for the area and consider what measures could be introduced to improve navigational safety within the Fiordland region. These could include: the provision of more navigational aids; ensuring training and currency for pilots in blind pilotage techniques; and prohibiting night navigation of certain passages if considered necessary.

Findings

- 6. The darkness and absence of visual navigation aids outside the ship meant that the bridge team were totally reliant on the ship's electronic navigation aids and systems (referred to as blind pilotage). However, the bridge team were not making full use of the available equipment to ensure that the ship stayed on track.
- 7. Environment Southland had not taken sufficient measures to reduce the risk of large ships having to conduct blind pilotage in the confined waters of Fiordland.

4.4. Bridge resource management

Safety issue: The standard of bridge resource management on board the L'Austral during the Milford Sound pilotage did not meet good industry practice.

- 4.4.1. Many of the prerequisites for good bridge resource management had been met before the pilotage act began. Unlike most acts of pilotage, where a pilot boards a ship and begins piloting almost immediately, the pilot had been on board the *L'Austral* for two days. He had worked with the bridge team during several acts of pilotage within Fiordland and had had the opportunity to become familiar with the bridge equipment.
- 4.4.2. The pilot and the vessel's bridge team were working from the same passage plan, which closely followed the passage plan prescribed in the Fiordland Pilots Standard Operating Procedures. From the data downloaded from the voyage data recorder it can be heard that when the pilot came onto the bridge before taking the con of the *L'Austral* there was positive engagement between the bridge team and the pilot.
- 4.4.3. The master/pilot information exchange was carried out in good time and included the officer of the watch, who was in audible range. The information exchange was carried out prior to entering each fiord and the proposed route was discussed and agreed upon. The master, pilot and bridge team all shared a common understanding of the route to be taken. The pilot was heard to reiterate that he "welcomed questions and challenges on any aspect".
- 4.4.4. As part of the master/pilot information exchange, an accurately completed pilot information card (see Appendix 2) provides the pilot with much of the essential information he requires for the passage and any manoeuvres that may be carried out. This information can be supplemented by discussions with the master and bridge team. A copy of the International Chamber of Shipping's Bridge Procedures Guide Annex A2 is provided in Appendix 6; it can be

²¹ Maritime Transport Act 1994, section 33C.

considered industry good practice and follows the recommendations of IMO Resolution A.601(15), Provision and Display of Manoeuvring Information on Board Ships.

- 4.4.5. Nevertheless, the grounding still occurred. In the lead-up to the grounding, one of the key elements was absent, that of challenge and response. As the *L'Austral* deviated south of the agreed track nobody on the navigating bridge verbally questioned the pilot as to his intentions, at a time when he had lost situational awareness and most needed an intervention or challenge from the crew.
- 4.4.6. The officer of the watch was monitoring the vessel's position and realised that the vessel was straying from the agreed track. However, he was not confident enough to question the pilot when the master was also on the bridge.
- 4.4.7. On 9 January 2017, one month before this accident, the *L'Austral* had been involved in another accident when it struck an uncharted rock while being manoeuvred close inshore around the sub-Antarctic Snares Islands. The master had had the con of the vessel and another officer of the watch indicated she had not been confident questioning the master's instructions.
- 4.4.8. This and the previous accident indicated that putting effective bridge resource management into practice was not routine. With at least two watch-keeping officers on board showing a reluctance to question the master, any intervention on the pilot's actions was effectively left to the master.
- 4.4.9. However, the master did not intervene when the pilot lost situational awareness, except to gesture in the dark that the ship should be further to port. In his submission on the draft report, the master commented that he had had every confidence in the pilot and that it "would not [have been] appropriate for him to override the pilot's command". Leaving any intervention to when the ship had deviated so far off course that it was about to strike the shoreline is an indication that the concept of bridge resource management was not fully understood. The objective of bridge resource management is to achieve safe navigation and not allow a situation to develop to the point where the communication is centred on minimising the damage once a grounding has become inevitable.
- 4.4.10. Subordinate officers being reluctant to question a superior or the person in command or control of a ship is symptomatic of what is often referred to as a 'power-distance relationship'. Such a relationship is a deterrent to subordinates challenging the actions of a superior, even if those actions or inactions are detrimental to the safe navigation of the ship. A power-distance relationship is a major threat to the performance of a bridge team.
- 4.4.11. In its report on the previous grounding involving the *L'Austral*, the Commission recommended that the operator review its safety management system to ensure a better standard of bridge resource management on board. The recommendation is equally applicable to this accident.
- 4.4.12. The Commission has found poor bridge resource management under pilotage to be a factor contributing to accidents involving two other ships in New Zealand²². The reports make several recommendations aimed at improving the standard of pilotage and making the transition of a pilot into a ship's bridge team seamless.

Finding

- 8. At the time of this and a previous accident, the reluctance of the bridge team to question the person in command or control of the ship was preventing effective challenge and response, a fundamental aspect of good bridge resource management.

²² Report MO-2016-202, *Azamara Quest*, Grounding in Tory Channel; and Report MO-2016-204, Grounding of bulk carrier *Molly Manx* in Dunedin.

5. Findings

- 5.1. The *L'Austral* made contact with the shoreline while making a turn in Milford Sound because the harbour pilot lost situational awareness as to where the ship was, where it was heading, and what other factors were influencing its progress.
- 5.2. The master and officer of the watch both noticed that the *L'Austral* had deviated substantially from the planned track, but neither spoke up until it was too late to prevent the ship grounding near the shoreline.
- 5.3. The planned track for the pilotage into Milford Sound was appropriate and agreed by all persons in the bridge team. However, there was no discussion on how the conduct of the pilotage would be undertaken and how far from the planned track the ship would be allowed to deviate.
- 5.4. The bridge team agreeing to use a rate-of-turn method for conducting the pilotage when the rate-of-turn-indicator on board the *L'Austral* was faulty was likely a factor contributing to the accident.
- 5.5. The ship's crew were not totally familiar with, and did not use all of the safety features of the ECDIS, the ship's primary electronic navigation system.
- 5.6. The darkness and absence of visual navigation aids outside the ship meant that the bridge team were totally reliant on the ship's electronic navigation aids and systems (referred to as blind pilotage). However, the bridge team were not making full use of the available equipment to ensure that the ship stayed on track.
- 5.7. Environment Southland had not taken sufficient measures to reduce the risk of large ships having to conduct blind pilotage in the confined waters of Fiordland.
- 5.8. At the time of this and a previous accident, the reluctance of the bridge team to question the person in command or control of the ship was preventing effective challenge and response, a fundamental aspect of good bridge resource management.

6. Safety issues

- 6.1. The primary means for navigation on board the *L'Austral*, the ECDIS, was not being used to its full potential as a tool for planning and monitoring the ship's passage, and the crew were not fully conversant with its safety features.
- 6.2. The standard of bridge resource management on board the *L'Austral* during the Milford Sound pilotage did not meet good industry practice.
- 6.3. Conducting blind pilotage with large ships in confined waters represented risks that had not been fully considered by Environment Southland, the regional authority that regulates maritime activity in the area.

7. Safety actions

General

- 7.1. The Commission classifies safety actions by two types:
- (a) safety actions taken by the regulator or an operator to address safety issues identified by the Commission during an inquiry that would otherwise result in the Commission issuing a recommendation
 - (b) safety actions taken by the regulator or an operator to address other safety issues that would not normally result in the Commission issuing a recommendation.

Safety actions addressing safety issues identified during an inquiry

- 7.2. Since the accident Environment Southland has:
- required all Fiordland pilots to have completed, within the past three years, refresher blind pilotage training as a prerequisite to any hours-of-darkness pilotage
 - programmed a general navigation safety assessment of the increasing number of visiting cruise ships to Fiordland, to include hours-of-darkness pilotage and the provision of extra navigational aids.
- 7.3. Since the accident Port Otago, as the parent company of Fiordland Pilot Services, has:
- sent all its Fiordland pilots on a three-day blind pilotage refresher training course, with two days focusing on Milford Sound and other passages in Fiordland and one day focusing on blind pilotage in Stewart Island
 - issued the pilots with their own portable pilotage units²³ loaded with the appropriate charts for Fiordland and Stewart Island.

Safety actions addressing other safety issues

- 7.4. Since the accident the ship operator has sent an email to all masters informing them of the recommendations and lessons learnt from this incident:
- The Master is in command of the ship at all times with only one exception: when transiting through the Panama Canal. Therefore, it is always the duty of the Master and officer of the watch to keep a situational awareness of all activities of the pilot. Although the pilot is most knowledgeable about local waters, it is the responsibility of the Master/officer of the watch to verify position through proper use of charts, radars and other position fixing devices and follow local rules on speed and routing.
 - Voyage planning is crucial in all situations including when pilots are on board. Sufficient time should be allowed for proper communication between the Master, pilots and officer of the watches. This voyage plan should include every important activity starting from the embarkation of the pilot, in and out of the berth, and finally the disembarkation of the pilot.
 - If the pilot is to command tugs and/or personnel at a berth in a language that is foreign to the crew, the Master must demand that the pilot communicates with the Master and/or officer of the watch in a common language.
 - When the piloted voyage is taking the vessel through narrow waters, you should mark “wheel-over” points either on the chart or at the radar screen in order to know when you are reaching “points of no return”. This helps to allow the pilot, Master, and/or officer of the watch to keep a better situational awareness.
 - The ship’s crew is normally the most knowledgeable regarding the manoeuvring capabilities of the ship. Detailed descriptions of the ship’s manoeuvring characteristics should be communicated during the voyage planning stage. In addition, the Master

²³ Compact, portable electronic display systems that give easy access to relevant navigational information, including charted data, and may include access to local real-time data.

and/or officer of the watch should communicate manoeuvring capabilities during the voyage, as necessary. The Master and officer of the watch should never feel hesitant to discuss these matters with the pilot if they feel it necessary to do so.

- Ensure that the vessel is equipped with the necessary updated charts for the intended voyage. It is not sufficient to rely on the pilot to provide this information.
- The officer of the watch should always closely monitor the activities of the pilot. Many times, the pilot will not necessarily communicate with the officer of the watch regarding the vessel and/or voyage. The officer of the watch should not hesitate to communicate with the pilot on any relevant matters regarding the vessel or the voyage.
- The officer of the watch should not only be diligent with regard to his duties to ensure the pilot's orders are properly followed but also to monitor the pilot's activities. If the officer of the watch has concerns regarding the pilot's activities, he should contact the Master immediately.
- The vessel should have clear procedures and instructions to Masters and officers of the watch on what to do with a pilot on board. These should be included as part of the ship safety management system (SMS).
- Bridge resource management is an important activity to ensure safety. Any bridge resource management training should include how to handle the change in communication, command, and control when a pilot takes over navigation of the ship.

7.5. In addition to the email, the ship operator forwarded a publication produced by the P&I Club, Gard AS²⁴, that provided guidance to masters on the relationship between the pilot and the bridge team.

²⁴ A Norwegian protection and indemnity club that provides marine insurance to its members.

8. Recommendations

General

- 8.1. The Commission may issue, or give notice of, recommendations to any person or organisation that it considers the most appropriate to address the identified safety issues, depending on whether these safety issues are applicable to a single operator only or to the wider transport sector. In this case, recommendations have been issued to the operator and Environment Southland.
- 8.2. In the interests of transport safety, it is important that these recommendations are implemented without delay to help prevent similar accidents or incidents occurring in the future.

Previous recommendations

To the operator

- 8.3. The Commission investigated a previous grounding involving the *L'Austral* when the ship was manoeuvring close to the shore while retrieving the ship's rigid-hulled inflatable boats.
- 8.4. The recommendations considered that:
 - the portion of the voyage plan to recover the ship's rigid-hulled inflatable boats was not well planned in accordance with the IMO standards and the guidelines given in leading industry publications
 - the *L'Austral* inadvertently encroached an exclusion zone and an area the master had intended to avoid because the ship's position was not being adequately monitored
 - the standard of bridge resource management on board the *L'Austral* did not meet good industry practice.

On 28 February 2018 the Commission recommended that the Directeur D'exploitation at Ponant review the safety management system on board the *L'Austral* and upgrade it to ensure that the standards of voyage planning, standards of navigation and level of bridge resource management meet the requirements of the International Maritime Organisation and follow the guidelines in leading industry publications. (002/18)

On 15 March 2018, Ponant replied, in part:

Ponant's Voyage Planning procedure was reviewed on 15 December 2017. This new procedure has been communicated to all Captains.

Specific BRM training sessions provided by the French Marine Academy have been rolled out, starting from January 2017. To date 21 Ponant officers have undergone the training, 13 more are scheduled to undergo this training in 2018.

- 8.5. Taking into consideration that:
 - the operator's system for providing and managing the provision of an ECDIS on board the *L'Austral* did not meet the intent of the IMO standards
 - the ECDIS was the primary means of navigation on board the *L'Austral*, yet the operating crew were not fully familiar with the capabilities and the limitations of the equipment, and were not making best use of it.

On 28 February 2018 the Commission recommended that the Directeur D'exploitation at Ponant review the procedures for the setting up, training in and ongoing support for ECDISs on all of its ships, and ensure that all comply with mandatory requirements and that the ships' crews are fully conversant with good industry practice for the use of ECDISs. (003/18)

On 15 March 2018, Ponant replied, in part:

Ponant has also started obtaining additional ECDIS training session program for its officers. Eleven officers received this training in 2016 and 2017 and we plan to train 15 more during 2018.

We also plan to develop a specific Ponant's ECDIS training with e-learning methods, we are in the process of researching the best way of doing this. We intend to complete this by the end of 2018. We will provide TAIC with an update once we have completed this internal training program.

New recommendations

To the Chief Executive of Environment Southland

- 8.6. Environment Southland manages navigational safety within the Fiordland region and is committed to undertaking and regulating marine operations for cruise ships within its area. The increasing frequency, scale and duration of cruise ship traffic through Fiordland will increase the risks. Milford Sound is not the only passage where blind pilotage can be a necessity.

There are a number of measures that the regional council could take to better manage the risks to navigation safety within Fiordland, including: the provision of more navigation aids; better training and currency for pilots in blind pilotage techniques; and even prohibiting night navigation of certain passages if that were felt necessary.

On 22 June 2018 the Commission recommended that the Chief Executive of Environment Southland review the risk assessment for safe navigation within Fiordland and take the necessary action(s) to mitigate the risk of large cruise ships frequently transiting narrow passages with limited room for manoeuvring and with pilots on board during the hours of darkness or in other conditions of restricted visibility. [017/18]

On 6 July 2018, the Chief Executive of Environment Southland replied:

Environment Southland is committed to ensuring that its navigation safety responsibilities for Fiordland and the Southland region as a whole are managed appropriately.

Navigatus Consulting have been contacted by Environment Southland to provide an overall risk assessment of the increasing number of cruise ships scheduled to visit Fiordland; this risk assessment is due for completion 31 July.

Dependant upon the outcome of the cruise ship risk assessment, further work may be required to be undertaken to properly address the final recommendations from the Commission.

It is envisaged that Council will be in a position to confirm by 30 September 2018, whether or not they have been able to fully implement the final recommendations.

9. Key lessons

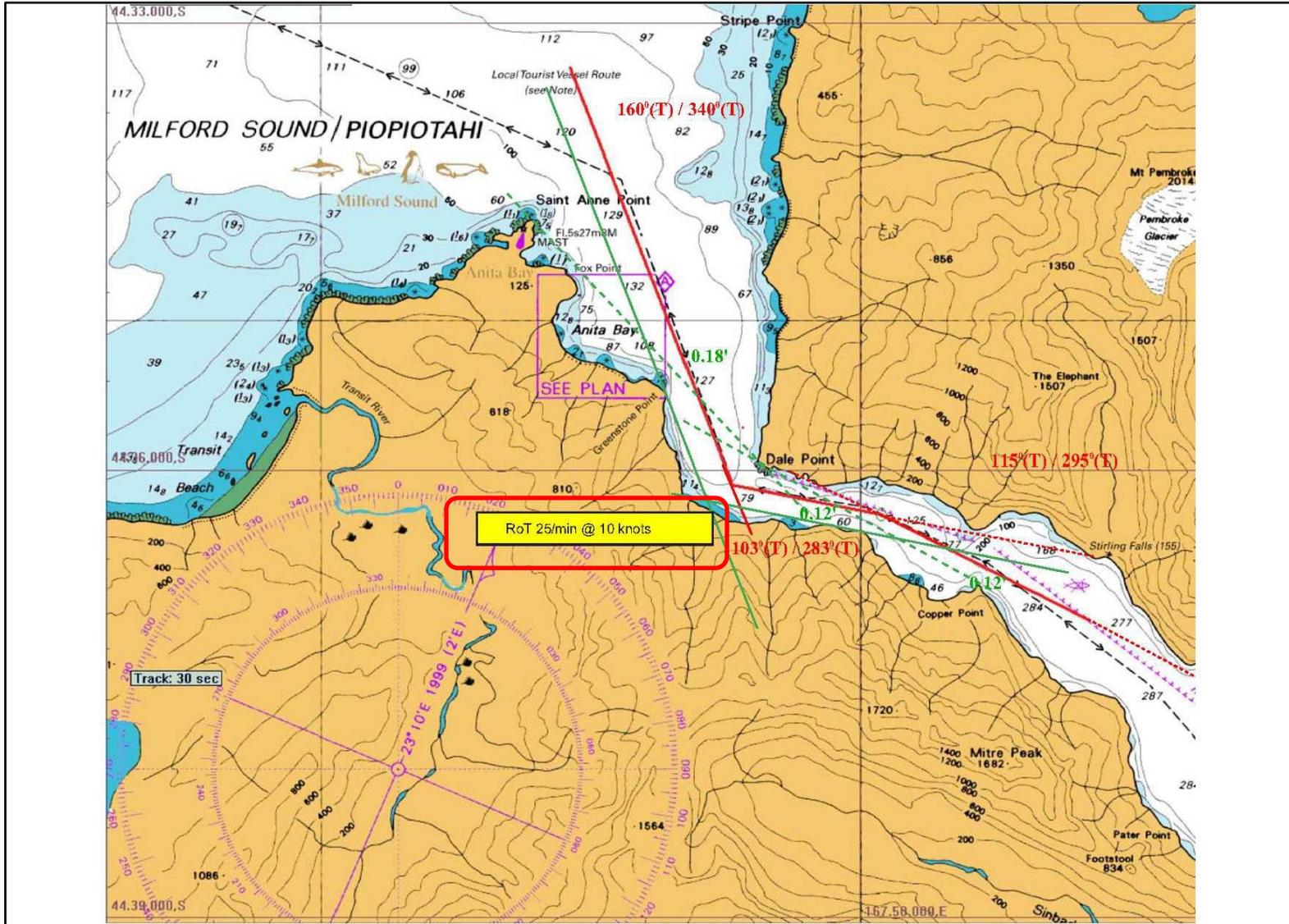
- 9.1. A ship's passage plan is more than just the planned track for the ship to follow. Every part of a ship's voyage must be planned and all members of the bridge team be fully familiar with and agree to the plan. This is a cornerstone of good bridge resource management.
- 9.2. Good bridge resource management relies on a culture where challenge is welcomed and responded to, regardless of rank, personality or nationality.
- 9.3. ECDIS is a valuable aid to navigation. However, mariners need to fully understand and be familiar with all aspects of the system, particularly when using it for blind pilotage.

Appendix 1: Extracts from Fiordland Pilots, Pilotage Standard Operating Procedures (2012)

Milford Sound

Way Point	Lat/Long	Course	Speed knots	Distance NM	Parallel Index object/range	Wheel Over object/range/bearing	Radius NM	ROT [rate of turn] °/min	Remarks
		090°	15		St Anne Pt 1.0'	St Anne Pt 136° (Dale Pt opens)	1.5	10	coast ahead r = 2.5'
WP 1	44° 33.3' S 167° 47.3' E	160°	10	3.0	Greenstone Pt 0.15'	off Greenstone Pt (gap opens)	1	10	maintain PI: 0.1' to Dale Pt
WP 2	44° 36.1' S 167° 48.8' E	103°	8	1.0	ps coast 0.1'	Copper Pt r = 0.9'	1	8	natural lead: Stirling Falls ahead
WP 3	44° 36.3' S 167° 50.2' E	115°	8	1.2	Copper Pt (sb) 0.1'	off Copper Pt	1	8	
WP 4	44° 37.0' S 167° 52.1' E	140°	8	2.8	variable Master's orders				remain sb of Snd for turn over ps
WP 5				0.5	turn off Harrison Cove (1.0' width available)		0.4	2.5V	Master's orders (V= ship's speed)
					turn off Sinbad Gully (0.6' width available)		0.25	4V	
WP 4	44° 37.0' S 167° 52.1' E	308°	10	2.8	mid Sound	Copper Pt r = 0.5'	1	10	
WP 3	44° 36.3' S 167° 50.2' E	295°	10	1.2	mid Sound	off Copper Pt	1	10	Natural lead: Dale Pt ahead
WP 2	44° 36.1' S 167° 48.8' E	283°	10	1.0	Dale Pt 0.1'	Dale Pt r = 0.8'	1	10	keep Dale Pt tight on sb bow
WP 1	44° 33.3' S 167° 47.3' E	340°	10	3.0	Greenstone Pt 0.15'	off St Anne Pt	1	10	
		270°	15		St Anne Pt 1.0'				

Milford Sound



3.5 Directions for transiting Milford Sound

Charts NZ7622 “Milford Sound to Sutherland Sound”, and NZ7621 “Milford Sound”

For vessels arriving from overseas the pilot will board about 2-3 miles WNW of Saint Anne Point or in a position mutually agreed by radio.

Fishing floats may be encountered in the approaches to Milford Sound.

Approaching Dale Point a convenient “wheel-over” point may be with Dale Point and Copper Point in transit. At 10 knots a rate of turn of 10 degrees per minute is recommended, but the rate of turn and position must be constantly monitored as the vessel may be deflected from her intended track, especially in northerly winds. Wind shear may be experienced rounding Dale Point and accelerated wind speeds are common between Dale Point and Copper Point. Once past Copper Point, the vessel may depart from the indicated track for sightseeing, but always remembering that local tourist vessels navigate within the Sound in a clockwise direction i.e. they keep to the port side. Kayakers and other recreational users may also be encountered.

The effect of the “Day Breeze”, generally encountered in Milford Sound during the afternoon, must be taken into account, especially if it is intended to stop to embark/disembark passengers. Milford Port Control may be contacted on VHF 14.

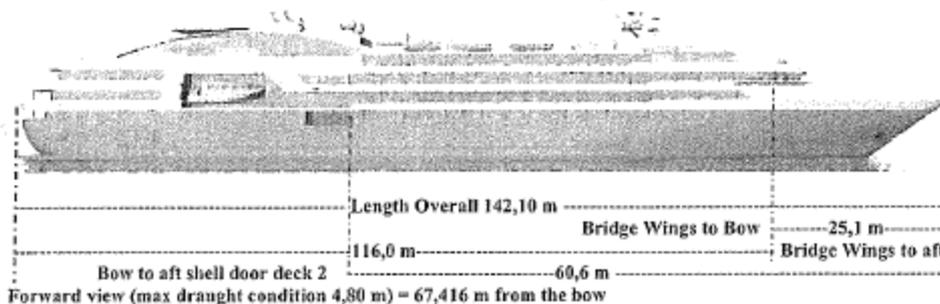
Appendix 2: Ponant, Manual of Operations – Pilot Card

 PONANT	MANUAL OF OPERATIONS	LA-OPS-2.10 FORM
L'AUSTRAL	PILOT CARD	Version 1 / 2015-03-01 Page 1 of 2

Ship's Name	: L'AUSTRAL	Flag	: FRENCH
Call Sign	: FLTU	Port of registry	: Mata Utu
Deadweight	: 1 441 T	Displacement	: 7 520 T
Net tonnage	: 3 427 UMS	Gross Tonnage	: 10 944 UMS
M.M.S.I.	: 578 000 700	IMO no.	: 9502518
Owner	: Compagnie du Ponant	Year Built	: 2009

SHIP PARTICULARS

LENGTH OVERALL (LOA) : 142,1 m	MAX. DRAFT : 4,90 m
MOULDED BREADTH : 18,00 m	ANCHOR CHAIN PORT : 10 SHACKLES
MAX. AIR DRAFT : 29,00m	ANCHOR CHAIN STBD : 10 SHACKLES
MOULDED DEPTH : 6,70 m	



Engine Particulars

Type of Engines :	2 x asynchronous motors	Maximum Power :	2 x 2300 kW
Manoeuvring Engine Order	RPM / Lever	Speed (Knots)	
Full Ahead	186 / 10	17,4	
Half Ahead	112 / 6	10,2	
Slow Ahead	74 / 4	6,8	
Dead Slow Ahead	37 / 2	3,5	
Dead Slow Astern	25 / 2	1,3	
Slow Astern	50 / 4	2,6	
Half Astern	73 / 6	3,9	
Full Astern	113 / 9	6,5	
Steering particulars			
Rudders :	2 x Becker	Maximum angle :	45 °
Hard over to hard over :	21" (with one unit)	Bow thruster :	800 kW



LA-OPS-2.10 FORM	MANUAL OF OPERATIONS	LA-OPS-2.10 FORM
L'AUSTRAL	PILOT CARD	Version 1 / 2015-03-01 Page 2 of 2

PILOTAGE – Check List

<u>This checklist is to be completed by the Master or officer on watch upon arrival of the pilot on the Bridge.</u>	
1. The pilot is informed of ship's heading, speed, engine setting and draught.	✓
2. The Pilot is informed of position of life saving appliances provided on board for his use.	✓
3. Details of proposed passage plan have been discussed with pilot and agreed with Master.	✓
• Radio-communications and reporting requirements.	✓
• Bridge watch and crew stand-by arrangements.	✓
• Deployment and use of tugs.	N/A
• Berthing/anchoring arrangements.	N/A
• Expected traffic during transit.	✓
• Pilot change over arrangements if any.	✓
• Tide, currents, wind force/direction, visibility expected during pilotage.	✓
4. Pilot card and ship's particulars have been handed to the pilot.	✓
5. The responsibilities within the bridge team for the pilotage have been defined and are clearly understood.	✓
6. The language to be used on the bridge between ship, pilot and shore have been agreed.	✓
7. The correct lights, flags and shapes are being displayed.	✓
8. Others: i.e. basic information for use of the RADARS (mode) and VHF (change of channels).	✓

Port	Date	Master	Pilot
MILFORD SOUND	09 Feb 2017		
<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; border-radius: 50%; padding: 5px;">ARRIVAL</div> <div style="border: 1px solid black; border-radius: 50%; padding: 5px;">DEPARTURE</div> </div>		Name/Signature	Name/Signature
			

Appendix 4: SOLAS Chapter V, Regulation 34 – Safe navigation and avoidance of dangerous situations, and Resolution A.893(21) Guidelines for Voyage Planning

- 1 Prior to proceeding to sea, the master shall ensure that the intended voyage has been planned using the appropriate nautical charts and nautical publications for the area concerned, taking into account the guidelines and recommendations developed by the Organization*
- 2 The voyage plan shall identify a route which:
 - .1 takes into account any relevant ships' routing systems;
 - .2 ensures sufficient sea room for the safe passage of the ship throughout the voyage;
 - .3 anticipates all known navigational hazards and adverse weather conditions; and
 - .4 takes into account the marine environmental protection measures that apply, and avoids, as far as possible, actions and activities which could cause damage to the environment.

Resolution A 893(21) Annex

DRAFT GUIDELINES FOR VOYAGE PLANNING

1. Objective

- 1.1 The development of a plan for voyage or passage, as well as the close and continuous monitoring of the vessel's progress and position during the execution of such a plan, are of essential importance for safety of life at sea, safety and efficiency of navigation and protection of the marine environment.
- 1.2 The need for voyage and passage planning applies to all vessels. There are several factors that may impede the safe navigation of all vessels and additional factors that may impede the navigation of large vessels or vessels carrying hazardous cargoes. These factors will need to be taken into account in the preparation of the plan and in the subsequent monitoring of the execution of the plan.
- 1.3 Voyage and passage planning includes appraisal, i.e. gathering all information relevant to the contemplated voyage or passage; detailed planning of the whole voyage or passage from berth to berth, including those areas necessitating the presence of a pilot; execution of the plan; and the monitoring of the progress of the vessel in the implementation of the plan. These components of voyage/passage planning are analysed below.

2. Appraisal

- 2.1 All information relevant to the contemplated voyage or passage should be considered. The following items should be taken into account in voyage and passage planning:
 1. .1 the condition and state of the vessel, its stability, and its equipment; any operational limitations; its permissible draught at sea in fairways²⁵ and in ports; its manoeuvring data, including any restrictions;
 2. .2 any special characteristics of the cargo (especially if hazardous), and its distribution, stowage and securing on board the vessel;
 3. .3 the provision of a competent and well-rested crew to undertake the voyage or passage;
 4. .4 requirements for up-to-date certificates and documents concerning the vessel, its equipment, crew, passengers or cargo;

²⁵ Navigable water in a channel, harbour or river.

5. .5 appropriate scale, accurate and up-to-date charts to be used for the intended voyage or passage, as well as any relevant permanent or temporary notices to mariners and existing radio navigational warnings;
 6. .6 accurate and up-to-date sailing directions, lists of lights and lists of radio aids to navigation; and
 7. .7 any relevant up-to-date additional information, including:
 - .1 mariners' routeing guides and passage planning charts, published by competent authorities;
 - .2 current and tidal atlases and tide tables;
 - .3 climatological, hydrographical, and oceanographic data as well as other appropriate meteorological information;
 - .4 availability of services for weather routeing (such as that contained in Volume D of the World Meteorological Organization's Publication No. 9);
 - .5 existing ships' routeing and reporting systems, vessel traffic services, and marine environmental protection measures;
 - .6 volume of traffic likely to be encountered throughout the voyage or passage;
 - .7 if a pilot is to be used, information relating to pilotage and embarkation and disembarkation including the exchange of information between master and pilot;
 - .8 available port information, including information pertaining to the availability of shore-based emergency response arrangements and equipment; and
 - .9 any additional items pertinent to the type of the vessel or its cargo, the particular areas the vessel will traverse, and the type of voyage or passage to be undertaken.
- 2.2 On the basis of the above information, an overall appraisal of the intended voyage or passage should be made. This appraisal should provide a clear indication of all areas of danger; those areas where it will be possible to navigate safely, including any existing routeing or reporting systems and vessel traffic services; and any areas where marine environmental protection considerations apply.

3. Planning

- 3.1 On the basis of the fullest possible appraisal, a detailed voyage or passage plan should be prepared which should cover the entire voyage or passage from berth to berth, including those areas where the services of a pilot will be used.
- 3.2 The detailed voyage or passage plan should include the following factors:
 8. .1 the plotting of the intended route or track of the voyage or passage on appropriate scale charts: the true direction of the planned route or track should be indicated, as well as all areas of danger, existing ships' routeing and reporting systems, vessel traffic services, and any areas where marine environmental protection considerations apply;
 9. .2 the main elements to ensure safety of life at sea, safety and efficiency of navigation, and protection of the marine environment during the intended voyage or passage; such elements should include, but not be limited to:
 - .1 safe speed, having regard to the proximity of navigational hazards along the intended route or track, the manoeuvring characteristics of the vessel and its draught in relation to the available water depth;
 - .2 necessary speed alterations en route, e.g., where there may be limitations because of night passage, tidal restrictions, or allowance for the increase of draught due to squat and heel effect when turning;
 - .3 minimum clearance required under the keel in critical areas with restricted water depth;
 - .4 positions where a change in machinery status is required;
 - .5 course alteration points, taking into account the vessel's turning circle at the planned speed and any expected effect of tidal streams and currents;
 - .6 the method and frequency of position fixing, including primary and secondary options, and the indication of areas where accuracy of position fixing is critical and where maximum reliability must be obtained;
 - .7 use of ships' routeing and reporting systems and vessel traffic services;
 - .8 considerations relating to the protection of the marine environment; and
 - .9 contingency plans for alternative action to place the vessel in deep water or proceed to a port of refuge or safe anchorage in the event of any emergency necessitating abandonment of the plan, taking into account existing shore-based emergency

response arrangements and equipment and the nature of the cargo and of the emergency itself.

- 3.3 The details of the voyage or passage plan should be clearly marked and recorded, as appropriate, on charts and in a voyage plan notebook or computer disk.
- 3.4 Each voyage or passage plan as well as the details of the plan, should be approved by the ships' master prior to the commencement of the voyage or passage.

4. Execution

- 4.1 Having finalized the voyage or passage plan, as soon as time of departure and estimated time of arrival can be determined with reasonable accuracy, the voyage or passage should be executed in accordance with the plan or any changes made thereto.
- 4.2 Factors which should be taken into account when executing the plan, or deciding on any departure therefrom include:
 - .1 the reliability and condition of the vessel's navigational equipment;
 - .2 estimated times of arrival at critical points for tide heights and flow;
 - .3 meteorological conditions, (particularly in areas known to be affected by frequent periods of low visibility) as well as weather routing information;
 - .4 daytime versus night-time passing of danger points, and any effect this may have on position fixing accuracy; and
 - .5 traffic conditions, especially at navigational focal points.
- 4.3 It is important for the master to consider whether any particular circumstance, such as the forecast of restricted visibility in an area where position fixing by visual means at a critical point is an essential feature of the voyage or passage plan, introduces an unacceptable hazard to the safe conduct of the passage; and thus whether that section of the passage should be attempted under the conditions prevailing or likely to prevail. The master should also consider at which specific points of the voyage or passage there may be a need to utilize additional deck or engine room personnel.

5. Monitoring

- 5.1 The plan should be available at all times on the bridge to allow officers of the navigational watch immediate access and reference to the details of the plan.
- 5.2 The progress of the vessel in accordance with the voyage and passage plan should be closely and continuously monitored. Any changes made to the plan should be made consistent with these Guidelines and clearly marked and recorded.

Appendix 5: Seafarers' Training, Certification and Watchkeeping Code, Chapter II, Table A-II/1

Table A-II/1

Specification of minimum standard of competence for officers in charge of a navigational watch on ships of 500 gross tonnage or more

Function: Navigation at the operational level

Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
<p>Maintain a safe navigational watch</p>	<p><i>Watchkeeping</i></p> <p>Thorough knowledge of the content, application and intent of the International Regulations for Preventing Collisions at Sea, 1972, as amended</p> <p>Thorough knowledge of the Principles to be observed in keeping a navigational watch</p> <p>The use of routeing in accordance with the General Provisions on Ships' Routeing</p> <p>The use of information from navigational equipment for maintaining a safe navigational watch</p> <p>Knowledge of blind pilotage techniques</p> <p>The use of reporting in accordance with the General Principles for Ship Reporting Systems and with VTS procedures</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience;</p> <p>.2 approved training ship experience</p> <p>.3 approved simulator training, where appropriate</p> <p>.4 approved laboratory equipment training</p> <p>Assessment of evidence obtained from one or more of the</p>	<p>The conduct, handover and relief of the watch conforms with accepted principles and procedures</p> <p>A proper look-out is maintained at all times and in such a way as to conform to accepted principles and procedures</p> <p>Lights, shapes and sound signals conform with the requirements contained in the International Regulations for Preventing Collisions at Sea, 1972, as amended, and are correctly recognized</p> <p>The frequency and extent of monitoring of traffic, the ship and the environment conform with accepted principles and procedures</p> <p>A proper record is maintained of the movements and activities relating to the navigation of the ship</p>

	<p><i>Bridge resource management</i></p> <p>Knowledge of bridge resource management principles, including:</p> <p>.1 allocation, assignment, and prioritization of resources</p> <p>.2 effective communication</p> <p>.3 assertiveness and leadership</p> <p>.4 obtaining and maintaining situational awareness</p> <p>.5 consideration of team experience</p>	<p>following:</p> <p>.1 approved training</p> <p>.2 approved in-service experience</p> <p>.3 approved simulator training</p>	<p>Responsibility for the safety of navigation is clearly defined at all times, including periods when the master is on the bridge and while under pilotage</p> <p>Resources are allocated and assigned as needed in correct priority to perform necessary tasks</p> <p>Communication is clearly and unambiguously given and received</p> <p>Questionable decisions and/or actions result in appropriate challenge and response</p> <p>Effective leadership behaviours are identified</p> <p>Team member(s) share accurate understanding of current and predicted vessel state, navigation path, and external environment</p>
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Appendix 6: International Chamber of Shipping, Bridge Procedures Guide – Annex A2 Pilot Card

A2 PILOT CARD

SHIP PARTICULARS			
Name:		Call Sign:	
Displacement:	DWT:	Year Built:	
Length:	Beam:	Bulbous Bow:	
Draught Fwd:	Draught Aft:	Draught Amidships:	
Air Draught:	Port Anchor: Shackles	Stbd Anchor: Shackles	
1 shackle = 27.4m/15 fathoms			
MAIN ENGINE			
Type:	Max Power:	Max Power:	HP
	kW		
	RPM/Pitch	Loaded Speed (kts)	Ballast Speed (kts)
Full Ahead:			
Half Ahead:			
Slow Ahead:			
Dead Slow Ahead:			
Dead Slow Astern:			
Slow Astern:			
Half Astern:			
Full Astern:			% ahead power
Engine Critical RPM:	Maximum Number of Consecutive Engine Starts:	Time from Full Ahead to Full Astern:	
Time Limit Astern:		Minimum Steering Speed:	

STEERING		
Number of Propellers:	Direction of Turn:	Propeller Arrangement:
Time from Hard-Over to Hard-Over:		Rudder Angle for Neutral Effects:
Thrusters (Positions and Power):		Steering Characteristics:
EQUIPMENT CHECKED AND READY FOR USE		
Anchors:		Cleared Away: YES/NO
Compasses:		
Compass Error:		
Speed Log:		Doppler: YES/NO Speed: Water/Ground Axis: Single/Dual
Echo Sounder:		
GNSS:		Type:
ECDIS:		
X-Band Radar:		ARPA: YES/NO
S-Band Radar:		ARPA: YES/NO
VHF (Including Handheld):		
Steering Gear:		Number of Power Units In Use:
Engine Telegraphs:		
Rudder/RPM/ROT Indicators:		
Mooring Winches and Lines:		
Navigation Lights:		
Whistles:		
EQUIPMENT OPERATIONAL DEFECTS		
OTHER IMPORTANT DETAILS		

Reference: IMO Resolution A.601(15) Provision and Display of Manoeuvring Information On Board Ships

Master:..... Date:.....



**Recent Marine Occurrence Reports published by
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MO-2014-203	Fatal injury, Purse seine fishing vessel, <i>Captain M. J. Souza</i> , 24 August 2014
MO-2015-202	Containership <i>Madinah</i> , loss of person overboard, Lyttelton Harbour entrance, 2 July 2015
MO-2016-202	Urgent recommendation: Cruise ship <i>Azamara Quest</i> , contact with Wheki Rock, Tory Channel, 27 January 2016
MO-2011-202	Roll-on-roll-off passenger ferry <i>Monte Stello</i> , contact with rock, Tory Channel, Marlborough Sounds, 4 May 2011
MO-2014-201	<i>Dream Weaver</i> , flooding due to structural failure of the hull, Hauraki Gulf, 23 February 2014
MO-2010-206	Coastal container ship <i>Spirit of Resolution</i> , grounding on Manukau Bar, Auckland, 18 September 2010
MO-2014-202	Lifting sling failure on freefall lifeboat, general cargo ship <i>Da Dan Xia</i> , Wellington, 14 April 2014
11-204	Container ship MV <i>Rena</i> grounding, on Astrolabe Reef, 5 October 2011
13-201	Accommodation fire on board the log-carrier, <i>Taokas Wisdom</i> , Nelson, 11 July 2013
13-202	Bulk carrier, <i>IDAS Bulker</i> , pilotage incident Napier, Hawke's Bay, 8 August 2013
12-202	Fishing vessel <i>Torea</i> , collision with uncharted rock, Foveaux Strait, 24 August 2012

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