



Australian Government
Australian Transport Safety Bureau

Collision between the boat *Norma Jean* and the barge *Seatow 61*

Carnarvon, Western Australia | 18 March 2007



Investigation

ATSB Transport Safety Report
Marine Occurrence Investigation
237-MO-2007-237
Final – 3 October 2013



Australian Government
Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY INVESTIGATION REPORT

Marine Occurrence Investigation

No. 237

Final

**Collision between the boat *Norma Jean*
and the barge *Seatow 61***

Carnarvon, Western Australia

18 March 2007

Released in accordance with section 25 of the *Transport Safety Investigation Act 2003*

Publishing information

Published by: Australian Transport Safety Bureau
Postal address: PO Box 967, Civic Square ACT 2608
Office: 62 Northbourne Avenue Canberra, Australian Capital Territory 2601
Telephone: 1800 020 616, from overseas +61 2 6257 4150 (24 hours)
Accident and incident notification: 1800 011 034 (24 hours)
Facsimile: 02 6247 3117, from overseas +61 2 6247 3117
Email: atsbinfo@atsb.gov.au
Internet: www.atsb.gov.au

© Commonwealth of Australia 2013



Ownership of intellectual property rights in this publication

Unless otherwise noted, copyright (and any other intellectual property rights, if any) in this publication is owned by the Commonwealth of Australia.

Creative Commons licence

With the exception of the Coat of Arms, ATSB logo, and photos and graphics in which a third party holds copyright, this publication is licensed under a Creative Commons Attribution 3.0 Australia licence.

Creative Commons Attribution 3.0 Australia Licence is a standard form license agreement that allows you to copy, distribute, transmit and adapt this publication provided that you attribute the work.

The ATSB's preference is that you attribute this publication (and any material sourced from it) using the following wording:

Source: Australian Transport Safety Bureau

Copyright in material obtained from other agencies, private individuals or organisations, belongs to those agencies, individuals or organisations. Where you want to use their material you will need to contact them directly

SAFETY SUMMARY

What happened

At about 0610 on 18 March 2007, in near total darkness, the recreational fishing boat *Norma Jean* departed the Carnarvon boat harbour. About 15 minutes later, *Norma Jean* collided with *Seatow 61*, a barge that was anchored off the port. *Norma Jean* sank almost immediately and all four of its occupants died as a result of the collision.

The ATSB initiated a safety investigation into the collision and, in May 2008, the ATSB's final investigation report (Marine Occurrence Investigation Report No. 237) was released.

In 2010, a coronial inquest into the deaths of the four persons on board *Norma Jean* was held in Carnarvon. During the inquest, evidence that was not provided to the ATSB at the time of the initial investigation was put before the Coroner.

As a result of this information, the ATSB re-opened its investigation into the accident for the purpose of correcting the public record that was contained in the initial safety investigation report. This report is the result of the re-opened investigation and examines all of the available evidence, including that provided at the time of the coronial inquest.

What the ATSB found

The ATSB found that *Seatow 61*'s navigation lights were probably not illuminated at the time of the collision. Furthermore, the intended use of only the barge's navigation lights, not supplemented by illuminating its deck flood lights had not appropriately taken into account its location outside the harbour and the recreational boating activities in the area.

The investigation also determined that *Norma Jean*'s skipper did not identify the barge in time to avoid the collision and that the boat's occupants were not wearing personal flotation devices.

What has been done as a result

The operators of *Sea-Tow 61* have applied luminous 'GlowMax' paint in strips on all their barges and fitted them with bulwark mounted solar powered lights. They have also added a 'Barge Anchoring Procedure' and 'Barge Anchoring Flow Chart' to their safety management system.

The Western Australia Department of Transport has reviewed its operational procedures as a result of this accident, operational experience and ongoing auditing processes.

Safety message

All seafarers should take appropriate action to ensure that their anchored vessels are clearly identifiable at night. Such action should, at times, include the use of lighting that is above the minimum required by the collision regulations.

CONTENTS

SAFETY SUMMARY	iii
THE AUSTRALIAN TRANSPORT SAFETY BUREAU	ix
TERMINOLOGY USED IN THIS REPORT.....	xi
1 FACTUAL INFORMATION	1
1.1 Investigation activities.....	1
1.2 <i>Seatow 61</i>	1
1.2.1 Electrical system.....	2
1.3 <i>Kurutai</i>	4
1.4 <i>Norma Jean</i>	5
1.5 Carnarvon	5
1.6 The accident.....	7
2 ANALYSIS	13
2.1 Introduction	13
2.2 The collision	13
2.3 <i>Seatow 61</i> 's anchoring position	14
2.3.1 Awareness of the anchored barge	17
2.4 Illumination of <i>Seatow 61</i>	17
2.4.1 Illumination of <i>Seatow 61</i> on the morning of 18 March.....	19
2.5 <i>Norma Jean</i> 's speed.....	20
2.6 Safe boating	22
2.6.1 Lookout.....	22
2.6.2 Personal flotation devices	23
2.7 Previous similar accident.....	25
3 FINDINGS.....	29
3.1 Context	29
3.2 Contributing safety factors	29
3.3 Other safety factors.....	30
4 SAFETY ISSUES AND ACTIONS.....	31
4.1 Harbour master guidance.....	31
4.2 Anchoring guidance.....	31
4.3 Lessons learnt	32

APPENDIX B: SHIP INFORMATION.....	33
APPENDIX B: SOURCES AND SUBMISSIONS.....	35

DOCUMENT RETRIEVAL INFORMATION

Report No.	Publication date	No. of pages
MO-2007-237	October 2013	48

Publication title

Collision between the boat *Norma Jean* and the barge *Seatow 61* off Carnarvon, Western Australia, on 18 March 2007.

Prepared By

Australian Transport Safety Bureau
PO Box 967, Civic Square ACT 2608 Australia
www.atsb.gov.au

Acknowledgements

The chart section in this publication is reproduced by permission of the Australian Hydrographic Service. © Commonwealth of Australia 13 October 2002. All rights reserved. Other than for the purposes of copying this publication for public use, the chart information from the chart sections may not be extracted, translated, or reduced to any electronic medium or machine readable form for incorporation into a derived product, in whole or part, without the prior written consent of the Australian Hydrographic Service.

The cover photograph and the photographs used in Figures 1 and 10 are courtesy of the Western Australia Police.

The photograph used in Figure 16 is courtesy of the Carnarvon regional transport officer.

THE AUSTRALIAN TRANSPORT SAFETY BUREAU

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The Bureau is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

Purpose of safety investigations

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated. The terms the ATSB uses to refer to key safety and risk concepts are set out in the next section: Terminology Used in this Report.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

Developing safety action

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues in the transport environment. The ATSB prefers to encourage the relevant organisation(s) to initiate proactive safety action that addresses safety issues. Nevertheless, the ATSB may use its power to make a formal safety recommendation either during or at the end of an investigation, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation.

When safety recommendations are issued, they focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on a preferred method of corrective action. As with equivalent overseas organisations, the ATSB has no power to enforce the implementation of its recommendations. It is a matter for the body to which an ATSB recommendation is directed to assess the costs and benefits of any particular means of addressing a safety issue.

When the ATSB issues a safety recommendation to a person, organisation or agency, they must provide a written response within 90 days. That response must indicate whether they accept the recommendation, any reasons for not accepting part or all of the recommendation, and details of any proposed safety action to give effect to the recommendation.

The ATSB can also issue safety advisory notices suggesting that an organisation or an industry sector consider a safety issue and take action where it believes appropriate, or to raise general awareness of important safety information in the industry. There is no requirement for a formal response to an advisory notice, although the ATSB will publish any response it receives.

TERMINOLOGY USED IN THIS REPORT

Occurrence: accident or incident.

Safety factor: an event or condition that increases safety risk. In other words, it is something that, if it occurred in the future, would increase the likelihood of an occurrence, and/or the severity of the adverse consequences associated with an occurrence. Safety factors include the occurrence events (for example engine failure, signal passed at danger, grounding), individual actions (for example errors and violations), local conditions, current risk controls and organisational influences.

Contributing safety factor: a safety factor that, had it not occurred or existed at the time of an occurrence, then either: (a) the occurrence would probably not have occurred; or (b) the adverse consequences associated with the occurrence would probably not have occurred or have been as serious, or (c) another contributing safety factor would probably not have occurred or existed.

Other safety factor: a safety factor identified during an occurrence investigation which did not meet the definition of contributing safety factor but was still considered to be important to communicate in an investigation report in the interests of improved transport safety.

Other key finding: any finding, other than that associated with safety factors, considered important to include in an investigation report. Such findings may resolve ambiguity or controversy, describe possible scenarios or safety factors when firm safety factor findings were not able to be made, or note events or conditions which ‘saved the day’ or played an important role in reducing the risk associated with an occurrence.

Safety issue: a safety factor that (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and (b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operational environment at a specific point in time.

Safety action: the steps taken or proposed to be taken by a person, organisation or agency in response to a safety issue.

1.1 Investigation activities

On 18 March 2007, the ATSB initiated a safety investigation into the collision between *Norma Jean* and *Seatow 61*. The ATSB investigators attended *Kurutai* and *Seatow 61* while the tug and barge were anchored off Carnarvon. The directly involved crew members were interviewed and copies of relevant documents were obtained including log book entries, statutory certificates, maintenance records, procedures and permits.

Information relating to the accident was also obtained from the New Zealand Transport Accident Investigation Commission (TAIC), Sea-Tow, the Marine Safety Business Unit (MSBU) of the Western Australia Department for Planning and Infrastructure (WADPI), the Bureau of Meteorology (BoM), the Carnarvon Volunteer Sea Rescue (CVSR) and the Western Australia Police (police).

A post-mortem examination of the deceased occupants of the boat was conducted on behalf of the Western Australia Coroner and this information made available to the ATSB.

A MSBU surveyor assessed the damage to *Norma Jean* at the request of the police and a copy of this report was also provided to the ATSB.

Norma Jean's global positioning system (GPS) receiver and echo sounder unit were taken to Fremantle for examination by the police but no data could be retrieved from the units due to the damage caused by their immersion in sea water.

The ATSB's final investigation report (Marine Occurrence Investigation Report No. 237) was released in May 2008.

In 2010, a coronial inquest into the deaths of the four persons on board *Norma Jean* was held in Carnarvon. The findings of the inquest were handed down by the Western Australia Coroner on 28 May 2010. During the inquest, evidence that was not provided to the ATSB at the time of the initial investigation was put before the Coroner.

As a result of this information, the ATSB re-opened its investigation into this accident for the purpose of correcting the public record that was contained in the initial safety investigation report. This report is the result of the re-opened investigation and examines all of the available evidence, including that provided to the coronial inquest. While the *Factual Information* section of the report has not changed, the *Analysis*, *Findings* and *Safety Issues and Actions* sections have been revised as a result of the activities carried out as part of the re-opened investigation.

1.2 *Seatow 61*

Seatow 61 (Figure 1) was a 'dumb barge'¹ that was built in 2003 by the Taizhou Sanfu Ship Engineering Company, Jiangsu, China. It had an overall length of 85.43 m, a beam of 24.38 m, a depth of 5.52 m and a deadweight of 6,000 t at a maximum draught of 4.48 m.

¹ A freight vessel that does not have its own means of propulsion and is designed to be towed.

At the time of the accident, *Seatow 61* was owned and operated by Sea-Tow, New Zealand. It was registered in New Zealand, classed with Bureau Veritas (BV) and had been issued with a certificate of survey by the Western Australia Department for Planning and Infrastructure (WADPI).

Figure 1: *Seatow 61* at anchor off Carnarvon



Seatow 61 was normally towed from the bow by a tug using a chain bridle and towing wire. The day shape for a vessel under tow, a black diamond, was permanently attached to the barge's foremast.

The barge was fitted with hydraulic mooring winches and anchor windlasses both forward and aft. It was usually anchored using the stern anchor so that the towing bridle did not foul the anchor cable. The stern anchor was mounted on the port quarter, about 5 m to port of the barge's centreline.

All of the barge's towing, anchoring and mooring operations were performed by the crew of the attending tug.

1.2.1 **Electrical system**

The hydraulic power packs for *Seatow 61*'s mooring winches were powered by a 140 kW diesel generator that was located in the lower level of the forecastle, adjacent to the main switchboard.

A 30 kW diesel generator, mounted in the upper area of the forecastle deck house, was used to provide power to a fuel transfer pump, the main working floodlights and to recharge the electrical system batteries.

The two battery banks, each consisting of four 6 V batteries connected in series had a capacity of 190 Amp-hours. One bank provided the starting power for the 140 kW generator and the second bank provided power for the navigation lights, the small floodlights on the barge's sides and for starting the 30 kW generator.

The electrical system was designed for unmanned operation. The 30 kW generator was normally started and stopped by a timer. At the time of the accident, the timer was set so that the generator would run from 0530 to 0800 and from 1930 to 2230 each day. In the event that the battery voltage dropped below 22 V, a voltage detector relay initiated a start sequence and the generator ran for 2 hours to recharge the batteries (Figure 2).

Figure 2: Generator control devices

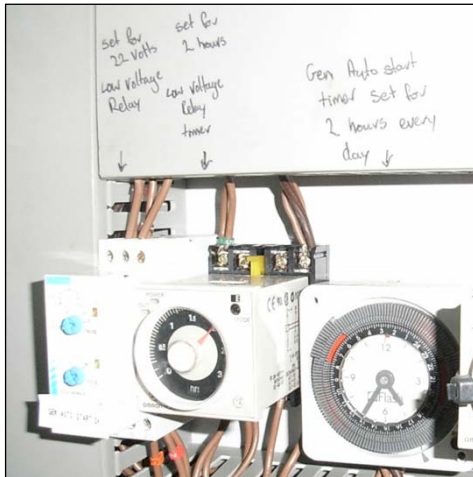


Figure 3: Navigation light timer



Figure 4: Forward mast



Figure 5: Forward anchor lights



The barge was fitted with navigation lights as prescribed by the International Regulations for the Prevention of Collisions at Sea, 1972, as amended (COLREGS). The anchor lights, all around white lights with a minimum visible range of 3 miles,² were located at each end of the barge. Each of the navigation lights units had two individual light globe assemblies (Figures 4 and 5). Each assembly had, as required, a single 40 W globe mounted within a prismatic lens. If an individual light globe failed, the navigation light control panel automatically switched to the second light globe assembly.

The navigation lights were switched on and off by a timer (Figure 3). At the time of the accident, they were set to turn on at about 1900 and turn off at about 0710.

² A nautical mile of 1852 m.

1.3

Kurutai

Kurutai, originally named *Seatow 22*, was built in 1991 by Marine Steel, Auckland, New Zealand. The vessel was renamed *Kurutai* in 2004. It had an overall length of 23.4 m, a beam of 8.4 m, a depth of 4.05 m and a maximum draught of 3.60 m.

Figure 6: *Kurutai*



Propulsive power was provided by two Detroit 16V-149-TI, two stroke, single acting diesel engines, each with an output of 1,400 kW. Each engine drove a fixed pitch propeller via a clutch and reversible reduction gearbox. Combined, the engines gave the tug a bollard pull³ of 30 tonnes.

At the time of the accident, *Kurutai* was registered in New Zealand and owned and operated by Sea-Tow, New Zealand. Maritime New Zealand had issued the tug with a certificate for a non-SOLAS⁴ vessel undertaking an international voyage and a certificate of survey had also been issued by WADPI. The tug was not listed with a classification society.

Kurutai had a crew of one Australian and five New Zealand nationals, all of whom were appropriately qualified to sail on board the vessel.

The master had been at sea since 1993 and had been a tug master for the previous 11 years. He held a certificate of competency, issued in 2005, as master of vessels up to 500 gross tonnage. He had been employed by Sea-Tow since June 2005 and at the time of the accident had been the master of *Kurutai* for about 3 weeks.

The chief engineer had returned to a seagoing career in 2006 after working ashore for several years. He held an engineer class 3 certificate of competency. At the time of the accident, he was part way through his first assignment as *Kurutai*'s chief engineer.

³ A numerical value indicating the maximum pulling force that a tug can exert on a line.

⁴ The International Convention for the Safety of Life at Sea, 1974, as amended.

1.4 *Norma Jean*

Norma Jean (Figure 7) was a privately owned 5.54 m Baron Sportsman glass fibre reinforced plastic (GRP) recreational boat that was built in 1975. At the time of the accident, it was registered with WADPI.

Figure 7: *Norma Jean* after salvage



The boat had an open cockpit area abaft of a small half-cabin with two forward facing seats mounted immediately behind a sloped windscreen. A canvas canopy was mounted above the cockpit.

Propulsive power was provided by a Yamaha 115 HP,⁵ two-stroke petrol outboard motor. The boat was also fitted with a smaller 8 HP Johnson auxiliary outboard motor.

Navigation sidelights were mounted on either side of *Norma Jean*'s cabin, about 1 m above the waterline. A stern light was mounted on the stern rail. A small 12 V fluorescent light was mounted under the canopy to illuminate the cockpit area. The cabin was also fitted with a light.

The boat was fitted with navigation equipment which included a magnetic compass, a Uniden 27 MHz radio, a Furuno global positioning system (GPS) receiver and an Eagle echo sounder. It was also equipped with an emergency position indicating radio beacon (EPIRB) and distress flares.

At the time of the accident, there were four people on board *Norma Jean*; the boat's 78 year old skipper, his wife and two friends. The skipper was an experienced recreational fisherman who had owned *Norma Jean* for about 14 years. He held a West Australian recreational skipper's ticket (RST), which was issued in 2006. He resided in Carnarvon and had fished in Shark Bay for many years.

1.5 Carnarvon

The Port of Carnarvon, Western Australia, (Figure 8) includes all of Shark Bay and extends north to include Cape Cuvier. The port limits are defined in the east by the Australian mainland and in the west by the peninsula of Edel Land and by Bernier,

⁵ One horsepower (HP) = 0.75 kW.

Dorre and Dirk Hartog Islands. The port limits extend from Cape Ronsard in a north north-easterly direction towards Cape Cuvier. The southern part of Shark Bay is divided into two arms by Peron Peninsula. The western arm contains the ship loading wharf at Useless Loop.

Ships may enter Shark Bay from the north through Geographe Channel or from the west through Naturaliste Channel. A pilot is not required for ships entering Shark Bay although pilotage is compulsory for ships loading at Useless Loop. The pilot boarding ground for Useless Loop is 1 mile north of the Denham Channel number one light beacon.

The town of Carnarvon is about 900 km north of Perth, the capital city of Western Australia. It is located on the eastern side of Shark Bay, near the southern entrance of the Gascoyne River. Babbage Island, on the western side of the town, lies between the northern and southern entrances of the Gascoyne River. The one mile jetty on Babbage Island was built in 1904 and was used for a variety of cargoes before being closed in 1994.

The Carnarvon boat harbour basin and entrance channel was dredged to a depth of 3 m with some areas within the harbour being slightly deeper. In July 2003, Teggs Channel was dredged to provide a minimum depth of 3.5 m. The channel and boat harbour have a speed limit of 5 knots.⁶

Information for masters of vessels wishing to anchor off the town of Carnarvon is provided in the Australia Pilot:⁷

The best anchorage is off the N entrance to Gascoyne River on the line of bearing 076° of Babbage Island Light (24° 53' S, 113° 38' E), distant 1¼ miles, in a depth of about 6 m (19 ft) sand.

There is anchorage available off the S entrance to the river on the line of bearing 108 of Mangrove Point (24° 55' S, 113° 3' E) with the Babbage Island Light bearing 016°, distant 1½ miles in a depth of 5 m (16 ft).

Mariners in vessels of deeper draught must anchor some distance offshore.

At the time of the accident, the port of Carnarvon did not have its own port authority and was administered under an agreement with Western Australia Department of Planning and Infrastructure (WADPI) which retained ownership of Carnarvon and six other ports on behalf of the Western Australian Government.

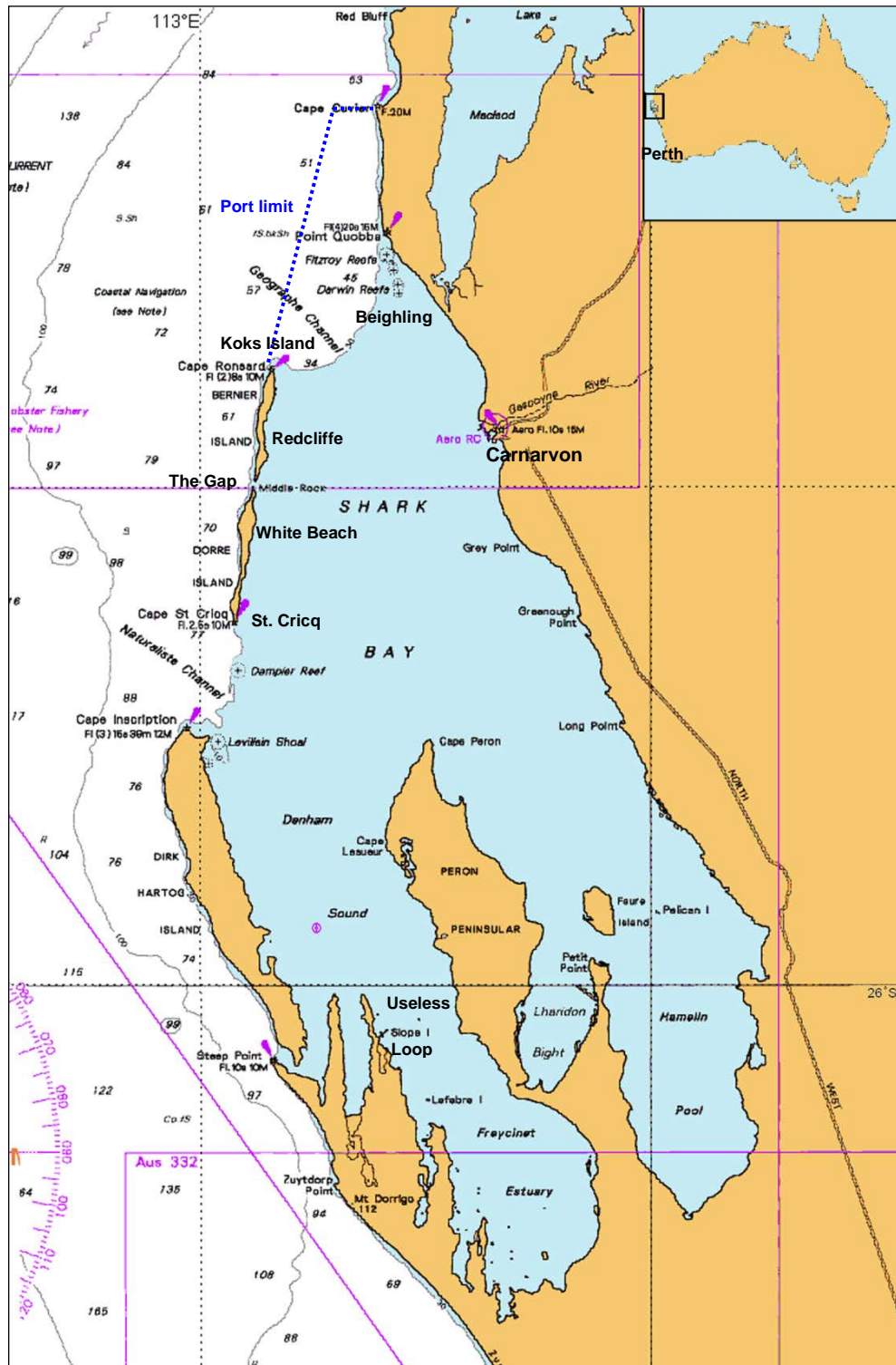
In November 2005, the Manager for Marine Safety and the Environment, a Perth based employee of the Marine Safety Business Unit (MSBU) of WADPI, was gazetted as the harbour master for the port of Carnarvon in accordance with the *Western Australia Shipping and Pilotage Act 1967*. He was a certificated master mariner and had also been gazetted as a pilot for Useless Loop, located within the Carnarvon port limits.

In 2008, the MSBU was moved from the Department of Planning and Infrastructure to the Department of Transport.

⁶ One knot, or one nautical mile per hour equals 1.852 kilometres per hour.

⁷ Australia Pilot Volume I, Admiralty Sailing Directions NP 13, First Edition 2005.

Figure 8: Section of navigational chart Aus 416 showing Shark Bay



1.6 The accident

At 0900 on 6 March 2007, *Kurutai*, towing the empty barge *Seatow 61*, departed Dampier, Western Australia, sailing southwards in an attempt to avoid tropical cyclones George and Jacob that were approaching Dampier.

During the voyage, a strong southerly wind was encountered while the tug and barge were to seaward of Shark Bay. The weather conditions increased the tug's fuel consumption and made it difficult for the tug and tow to make useful headway. On 10 March, *Kurutai's* master contacted the Sea-Tow representative in Perth to enquire about the availability of fuel in the area.

The Sea-Tow representative determined that fuel was available at Carnarvon and, consequently, contacted the harbour master for information about anchoring in the port. After some consultation with colleagues, the harbour master advised the Sea-Tow representative that the barge could be anchored about 3 miles west of the Carnarvon Jetty with anchor lights and shapes displayed in accordance with the COLREGS.

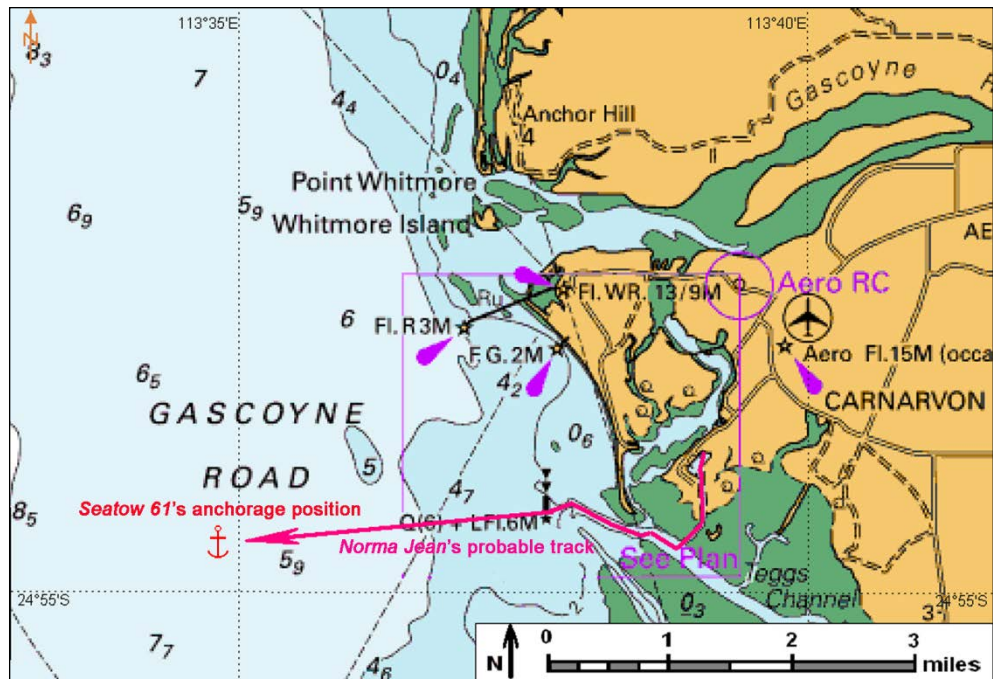
At about 1100 on 11 March, the Sea-Tow representative advised *Kurutai's* master that fuel was available in Carnarvon and that *Seatow 61* could be anchored in Shark Bay, approximately 3 miles west of Carnarvon, while the tug was refuelling in the Carnarvon boat harbour.

Kurutai's master also contacted a local tug operator in Shark Bay to get advice on the best channel to use to enter Shark Bay. He was advised that the tug should enter via Geographe Channel. He received some general local information and was advised that Gascoyne Road, about 3 to 4 miles off Carnarvon, was a suitable anchorage.

At 0904 on 12 March, the Sea-Tow representative advised *Kurutai's* master of the necessary contact details for the WADPI regional office and the fuel company in Carnarvon. After a discussion with the Sea-Tow representative, the master was informed that he could also have some minor repair work done on board the barge while it was anchored off Carnarvon.

At 0935, *Kurutai* and *Seatow 61* entered Shark Bay through Geographe Channel.

Figure 9: Section of navigational chart Aus 747



At 1335, the crew transferred from *Kurutai* to *Seatow 61* to prepare the barge for anchoring. At 1445, the barge's stern anchor was let go and, by 1508, it had been brought up to 6 shackles⁸ of anchor cable, in position 24°54.5'S 113°34.8'E (Figure 9).

The barge's anchor lights were set to operate automatically and the crew returned to *Kurutai* before the tug was anchored about 1 cable⁹ east of the barge.

At about 0700 on 13 March, the Carnarvon WADPI office regional transport officer (RTO) delivered a chart showing the approaches to the channel into the Carnarvon boat harbour to *Kurutai* using his own recreational boat. Due to the limited water depth in the channel, *Kurutai's* transit of the channel would depend on the available height of tide.

At 0800, *Kurutai* left the anchorage for Carnarvon to pick up a contractor who was to prepare a quote for repairs to the radiator fitted to the barge's 140 kW generator. At about 1500, *Kurutai* returned to the barge and, at about 1540, the tug left the barge to return the contractor to Carnarvon. *Kurutai* then remained alongside the jetty in Carnarvon overnight.

On 14 March, *Kurutai's* master signed an arrangement with the RTO for use of the T-Jetty in the boat harbour. The tug's master intended to berth on a casual basis while the crew undertook maintenance and minor repair work on board both the tug and the barge.

At 1450, *Kurutai* sailed from Carnarvon to *Seatow 61*. The tug remained alongside the barge for about 2 hours. During this time, the barge's anchor cable was walked back to its maximum length of 7 shackles and the crew removed the 140 kW generator's radiator for repair. The tug then returned to Carnarvon and, by 1825, was all fast alongside the T-Jetty, where it remained for the next few days.

On 17 March, *Norma Jean's* skipper contacted the local Bureau of Meteorology (BoM) office and requested weather information for 18 March. He stated that he was intending to go across Shark Bay towards 'The Gap' to go fishing. However, he wanted to ensure that the weather would be calm. The weather forecast provided by the BoM for 18 March was ideal.

On 18 March, moonrise was at 0616 and sunrise was at 0728, so it was very dark before the start of morning twilight at 0639. However, since there was almost no cloud cover, the stars provided some light. There was little wind, the tide was flooding, the sea was calm and there was a slight haze above the water.

At about 0610, *Norma Jean* left the boat ramp in the Carnarvon boat harbour and transited the channel with the skipper, his wife and two friends on board (Figure 9). At about 0620, when *Norma Jean* passed the entrance beacon, the boat's navigation lights and interior cabin light were illuminated. After passing the entrance beacon, the skipper increased the boat's speed.

Norma Jean was last seen at about 0625 on the eastern side of *Seatow 61*. Shortly after this, the boat probably collided with the port side of the barge. However, the collision was not witnessed.

⁸ One shackle equals 90 feet or 27.43 m.

⁹ One cable equals one tenth of a nautical mile or 185.2 m.

At about 1155, a recreational fisherman reported to the Carnarvon Volunteer Sea Rescue (CVSR) that he had found some debris, thought to be from a boat, floating in the water about 5 miles south-southwest of *Seatow 61*. This information was then passed on by the CVSR to the Western Australia Police (police). The CVSR vessel, *Rescue One*, was also despatched to the scene to investigate. At 1255, *Rescue One*'s crew recovered a body from the water about 1 mile south of *Seatow 61*.

The police and CVSR volunteers started checking the number plates of trailers in the car park near the boat ramp to identify which, if any, boats were missing or not accounted for. A full scale search was also started.

At about 1500, the RTO notified *Kurutai*'s master that a boat was missing and some flotsam and a body had been located in the vicinity of the barge. At 1520, *Kurutai* departed from Carnarvon to attend the barge. The tug's master contacted CVSR and reported that he intended to assess the hull of the barge for any marks that might suggest that a collision had occurred, before assisting with the search.

At about 1545, the crew of a local helicopter, which had been engaged in the search, spotted *Norma Jean*'s submerged wreck close to the barge. The police then advised *Kurutai*'s master not to approach the barge.

Figure 10: Impact mark on the hull of *Seatow 61*



At 1610, while *Kurutai* was standing by about 1 cable away from *Seatow 61*, the crew were able to identify an impact mark on the barge's port side (Figure 10) that they had not previously seen.

At about 1830, the Carnarvon coroner instructed the police to protect the accident site, pending a full investigation and, at 1838, a policeman boarded *Kurutai*. The coroner also requested that the barge be better illuminated so, at 1847, *Kurutai*'s crew started the 30 kW generator and switched on the barge's deck floodlights.

At about 1905, after the crew had returned to the tug, *Kurutai*'s master anchored the tug about 1 cable from the barge.

At about 1200 on 19 March, the bodies of *Norma Jean*'s remaining three occupants were recovered from the sunken boat by divers. The boat was then re-floated, using flotation bags, and towed back to Carnarvon. It was then lifted from the water and placed on a flat-bed truck (Figure 11).

Figure 11: *Norma Jean's* recovered wreckage



2.1 Introduction

As previously stated, this report is the result of the ATSB's re-opened investigation following the coronial inquiry. As a result, the analysis part of this report contains both a further consideration of the evidence provided to the ATSB at the time of the original investigation and a consideration of the evidence provided at the time of the coronial inquiry.

The heading structure of the analysis part of this report is significantly different from the report it replaces. Therefore, it is difficult to make a direct comparison between the two reports. While this report contains minor changes in most areas of the analysis, the sections that are significantly different are those concerned with *Seatow 61*'s navigation lights, *Norma Jean*'s speed and boat handling and personal flotation devices.

2.2 The collision

When the tow was disconnected from *Kurutai*, the 20 m forerunner¹⁰ was recovered on board *Seatow 61*. The eye at the end of the forerunner was secured on the deck of the barge. The monkey face,¹¹ joining the bridle to the forerunner, was not secured to the deck but was allowed to hang in the water over the bow. While the disconnected towing arrangement would have provided some drag, it would not have significantly affected the barge's ability to swing on its anchor, or its swinging circle.

Considering the length of the barge, the catenary¹² of the anchor cable and the water depth of about 8 m, the barge would have been able to swing through a circle with a diameter of about 200 m. When viewed from the Teggs Channel entrance beacon, the barge could have been lying anywhere on an arc of the horizon of about 2.5 degrees in a westerly direction.

By 0625 on 18 March 2007, the tide had started to flood and the tidal flow past Carnarvon would have been almost due south up to about 1¼ knots. Since there was almost no wind, the flooding tide would have caused the barge to lie at an angle to its stern anchor cable (Figure 12). Therefore, the barge's stern would have been to the north and its port side would have been facing Carnarvon.

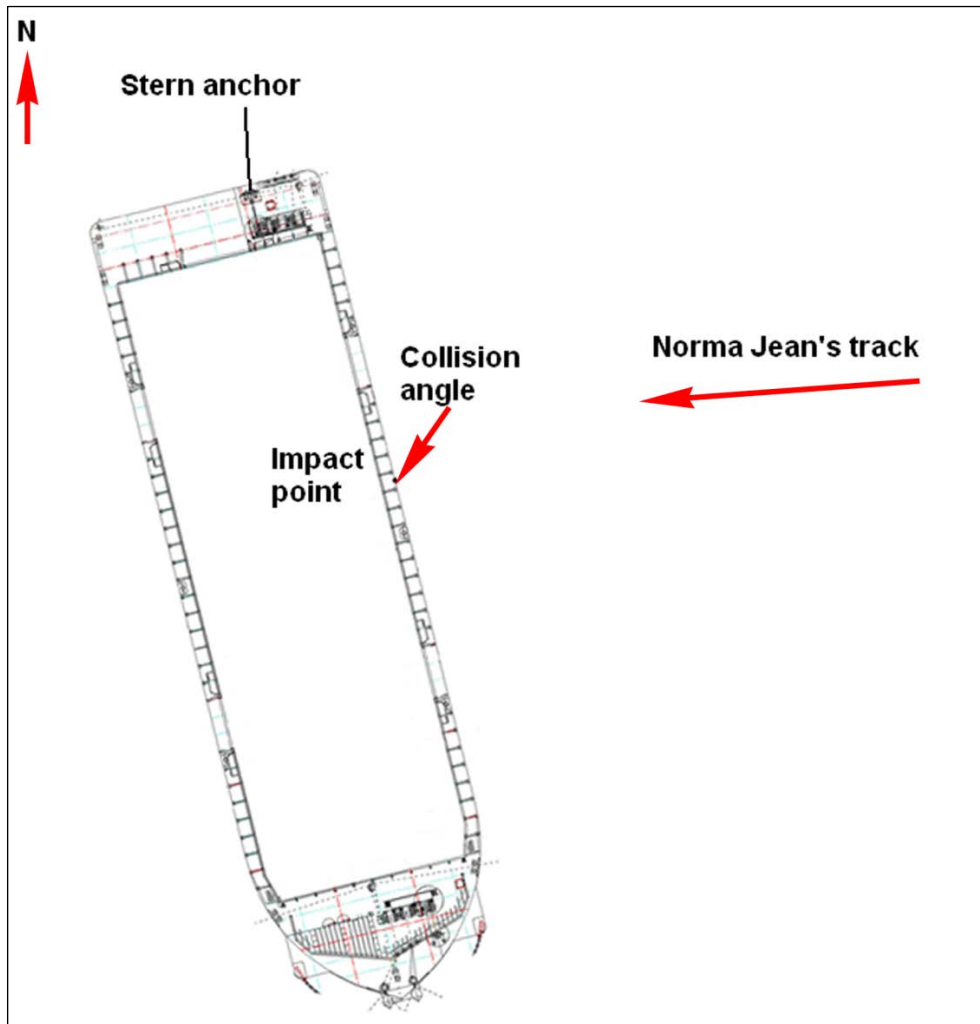
When *Norma Jean*'s skipper called the Bureau of Meteorology (BoM) the night before the accident, he advised them that he intended to cross Shark Bay towards 'The Gap'. The course required to reach 'The Gap' from the Teggs Channel entrance beacon passed directly through the area where *Seatow 61* was anchored.

¹⁰ A length of chain connecting the barge's towing bridle to the tug's towing wire.

¹¹ A triangular steel plate allowing three cables or chains to be joined together using shackles.

¹² The curve of the anchor cable between the seabed and the ship.

Figure 12: Diagrammatic representation of the collision



An inspection of *Norma Jean* following the collision indicated that the most severe impact damage was sustained by the boat's starboard bow, indicating that the boat collided at an oblique angle to the barge's centreline. While it is possible that the barge was lying at a different angle to that suggested above, an analysis of the most probable angle of the barge and *Norma Jean*'s probable course towards 'The Gap' indicates that *Norma Jean* probably changed course immediately before the collision occurred. This suggests that *Norma Jean*'s skipper may have seen the barge in the seconds before the collision and attempted to take avoiding action by altering course to port.

2.3 **Seatow 61's anchoring position**

Ships and fishing vessels have, for over a hundred years, anchored in Gascoyne Roads off Carnarvon. However, there was no designated anchorage position marked on the navigational charts for either Shark Bay or Carnarvon that identified specifically where a vessel should be anchored.

A copy of the Sea-Tow safety management system was kept on board *Kurutai* but it did not contain any procedures or checklists that might provide guidance to the skipper when deciding where to anchor the barge. Therefore, when *Kurutai*'s

master was told by the Sea-Tow representative in Perth that he could refuel the tug in Carnarvon, he referred to the tug's copy of the Australia Pilot for information about entering the harbour. The Australia Pilot stated that the harbour was suitable for small craft and that local knowledge was required.

Kurutai's master did not rely solely on the charts or the Australia Pilot for guidance on where to anchor the barge. He gathered information from a local tug operator and local knowledge that was sought on his behalf from the harbour master.

On 10 March 2007, when the harbour master was contacted by Sea-Tow for advice, he was piloting a ship at Useless Loop and did not have the relevant charts or publications with him, so he contacted a previous harbour master for advice. He was told that a suitable anchorage was 3 miles west of the Carnarvon Jetty (Figure 13). This advice was based on an anchoring position previously used by ships that had anchored awaiting a pilot for the berth at Useless Loop. The anchoring position was not given as a specific bearing and range to a conspicuous landmark or as a latitude and longitude, but was an approximate position. The suggested anchorage position had good holding ground and was conveniently close to the boat harbour.

After some consideration, the harbour master decided to allow the barge to anchor in Gascoyne Roads in a position 3 miles west of Carnarvon. He then contacted the Western Australia Department of Planning and Infrastructure (WADPI) regional office in Carnarvon and informed the regional transport officer (RTO). He did not actively seek any information from the RTO about Carnarvon vessel traffic and the RTO did not offer any. As a result, the harbour master was not apprised of the recreational boating traffic that could be expected to navigate in the proposed anchorage area for the barge.

While the harbour master was aware of the shipping movements within the port and the commercial fishing fleet that operated from Carnarvon, he was not as familiar with the patterns of the local recreational boating traffic that operated out of the Carnarvon boat harbour.

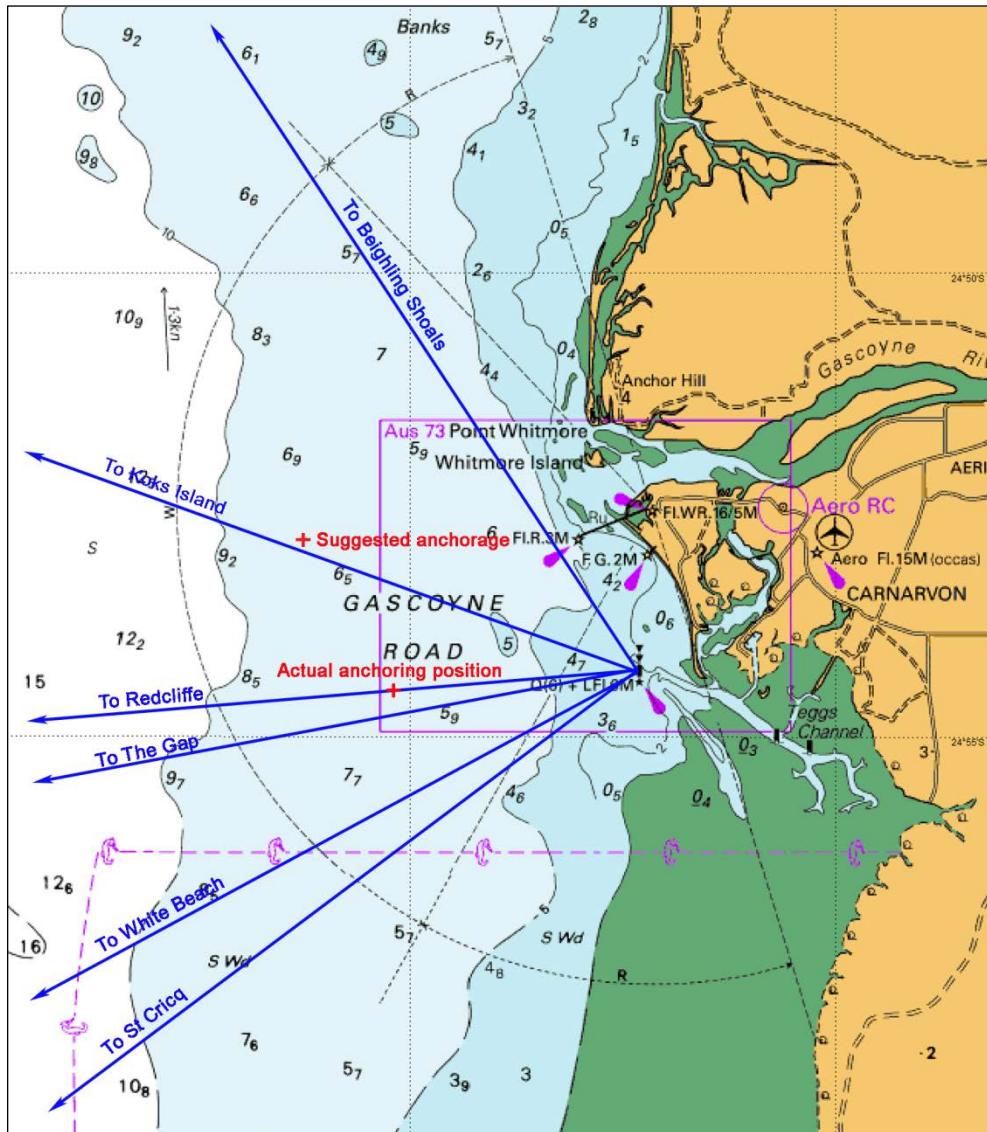
The harbour master had based his decision on the barge's anchoring position on the assumption that it would only remain unattended for a short period of time while the tug was being refuelled in Carnarvon. He was not aware that the barge would remain unattended for a period of several days because the decision to undertake repair work was not made until after the barge had been anchored off Carnarvon.

On 14 March, *Kurutai's* master informed the RTO that the tug would remain alongside in Carnarvon for several days when the berth was booked for the tug. He fulfilled his obligations by discussing his intentions with the RTO, the person he believed to be the local harbour master. The harbour master, based in Perth, was not told of the revised plans and, therefore, was unable to reconsider his advice with respect to anchoring and lighting of the barge.

On 18 March, because of the near ideal weather conditions, there were about 50 recreational boats operating out of Carnarvon. About 30 of these boats had notified Carnarvon Volunteer Sea Rescue (CVSR) of their departure and their estimated return time. Of these boats, 30 per cent were heading across the bay to either 'The Gap' or 'Redcliffe' (Figure 13). The course to both of these destinations passed through the area in which *Seatow 61* was anchored. Therefore, based on the traffic patterns observed on 18 March, the barge's anchored position exposed it to the risk

of collision with about 30 per cent of the recreational traffic that departed from the boat harbour.

Figure 13: Section of chart Aus 747 showing the two anchorage positions, popular fishing destinations and the approximate tracks towards them



The loss of local knowledge for Carnarvon, in the form of a local resident harbour master, had been offset by the presence of the RTO who could provide the particular local information that the Perth based harbour master may require. According to the Harbour Master’s Operational Manual:

While discharging their routine duties, harbour masters should consult regularly with port users, other local professionals, Department regional officers and officers from other Agencies in order to gain the benefit of local knowledge and experience.

The WADPI’s Marine Safety Business Unit (MSBU) serviced its customers in regional areas through a partnership arrangement with the regional transport offices. The details of this partnership arrangement were specified in the Service Level Agreement (SLA) between the MSBU and the WADPI’s Regional Services Branch (RSB). With regard to this accident, the only service requirement in the

SLA that had any potential bearing was a requirement for the Regional Transport Office to:

Provide timely information concerning known or potential navigational hazards.

There was no specific requirement for an RTO to assist the harbour master in making decisions about a regional port in which the RTO may have more local knowledge. As such, the SLA did not provide adequate guidance to either the harbour master or the RTO to ensure that they worked cooperatively to mitigate navigational risks in the port. Furthermore, neither the SLA nor the Harbour Master's Operational Manual provided any guidance relating to the identification of hazards within the port or the assessment of the risks associated with those hazards.

2.3.1 Awareness of the anchored barge

When a designated anchorage has been declared in a port, the navigational charts for the area are amended and a notice to mariners is issued to advise all vessel operators of the information. In this instance, there was no designated anchorage for Carnarvon. Consequently, local recreational boating skippers were not aware of a particular location in Gascoyne Roads where they could, at times, expect to encounter an anchored vessel.

While *Seatow 61* had been anchored off Carnarvon for about a week, *Norma Jean's* skipper may not have been aware of its presence because he had not been out in his boat for several months. While one of his passengers was a volunteer radio operator with the CVSR, he had been working from home, not the CVSR base, during the period of time that the barge was at anchor off the port. Therefore, he too may not have been aware of its presence.

Local notices to mariners are used to warn or advise boat skippers of navigational hazards, such as floating logs or altered channel markers, which may affect safe navigation within the port. The warnings were issued by the MSBU and were published in the local newspaper, broadcast by the BoM office with the routine coastal weather forecast and provided by CVSR if a skipper called on the radio.

The presence of the barge was sufficiently unusual that the RTO took a photograph of it while he was taking a chart out to *Kurutai* on the morning of 13 March. Its presence outside the boat channel, while strictly speaking not a navigational hazard, was sufficiently unusual that it would have been worthwhile notifying the local recreational boating skippers to its presence.

However, despite it being unusual for a barge to anchor off Carnarvon, the MSBU did not consider it necessary to issue a notice to mariners to advise recreational boat skippers that it was anchored off the port.

2.4 Illumination of *Seatow 61*

The International Regulations for the Prevention of Collisions at Sea, 1972, as amended (COLREGS), describe the requirements for the illumination of an anchored vessel. Rule 20 (b) of the COLREGS states:

The Rules concerning lights shall be complied with from sunset to sunrise, and during such times no other lights shall be exhibited, except such lights as cannot be mistaken

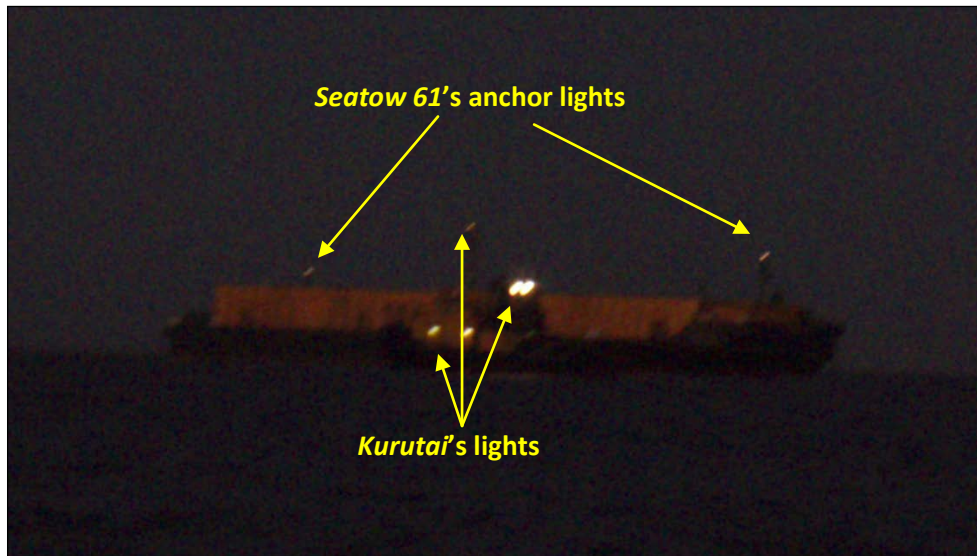
for the lights specified in these Rules or do not impair their visibility or distinctive character, or interfere with the keeping of a proper look-out.

Rule 30 of the COLREGS goes on to state that:

- (a) A vessel at anchor shall exhibit where it can best be seen:
 - (i) in the fore part, an all-round white light or one ball;
 - (ii) at or near the stern and at a lower level than the light prescribed in subparagraph (i) an all-round white light.
- (b) A vessel of less than 50 metres in length may exhibit an all-round white light where it can best be seen instead of the lights prescribed in paragraph (a) of this Rule.
- (c) A vessel at anchor may, and a vessel of 100 metres and more in length shall also use the available working or equivalent lights to illuminate her decks.

This means that *Seatow 61* was required to display one forward and one aft anchor light from sunset to sunrise. Since the barge was less than 100 m in length, additional deck lights could be used to illuminate the decks but their use was not mandatory.

Figure 14: Tug and barge at 0711 on 13 March



The photograph taken by the RTO on the morning of 13 March (Figure 14) shows the navigation lights displayed on board *Seatow 61* at that time. This arrangement of lights met the COLREG requirements specified in Rule 30. However, the lights were set to automatically switch off at 0712, about 18 minutes before sunrise and, hence, did not strictly meet the requirements of Rule 20 (b).

Furthermore, Rule 2 of the COLREGS, 'Responsibility' states:

- a) Nothing in these Rules shall exonerate any vessel, or the owner, master or crew thereof, from the consequences of any neglect to comply with these Rules or of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case.
- b) In construing and complying with these Rules due regard shall be had to all dangers of navigation and collision and to any special circumstances, including the

limitations of the vessels involved, which may make a departure from these Rules necessary to avoid immediate danger.

It can be argued that this was a ‘special case’, considering that the barge would be unattended for an extended period of time in an area that was traversed frequently by a high volume of small boat traffic. Therefore, the barge’s crew probably should have taken further precautions to ensure that the barge could be clearly seen at night, like switching on deck lighting.

The 24 V batteries, which were set to automatically recharge twice daily, provided power for the navigation lights and some small deck floodlights. These floodlights could have been switched on, and left on. While these lights would have consumed more power than the navigation lights, the 30 kW generator was set up so that it would have started automatically when necessary to maintain the battery bank voltage.

After the accident, the main cargo-working floodlights were switched on at the request of the Coroner. While the generator had to run continuously to provide power to these lights, they effectively illuminated the barge.

2.4.1 Illumination of *Seatow 61* on the morning of 18 March

The navigation light system on board *Seatow 61* was designed so that it would operate automatically for extended periods of time, such as during long voyages under tow.

Kurutai’s crew stated that, on 12 March, the barge’s navigation light system was switched on when they anchored it. Then, on the morning of 13 March, the RTO observed that the navigation lights were illuminated when he delivered a chart to *Kurutai*’s skipper (Figure 14).

However, when questioned at the coronial inquest, 18 recreational fishermen who had been on board various boats that departed the Carnarvon boat harbour on the morning of 18 March 2007 stated that they did not see any lights displayed on the barge.

Some of these individuals expected the barge to be ‘brightly lit up’ and, hence, may not have been looking for two small navigation lights. One conceded that he may have confused the lights with stars and others may have encountered the barge after the lights had switched off at 0712. However, the sheer number of these statements means that they cannot be ignored.

A professional fisherman also stated that, on the night of 17 March, he identified the barge on his vessel’s radar. He then tried to look for it with binoculars, but could not identify any navigation lights. He asked the deckhand to look, but he too could not see any lights. Eventually, the fishing vessel passed south of the barge at a range of about 200 to 300 m and the skipper shone a search light on the barge, but he still could not see any illuminated navigation lights.

On 24 March, the ATSB investigators tested the barge’s navigation lights and their electrical control system. They found that they operated as designed. They also inspected the barge’s batteries and found them to be in good condition. The tests did not identify any intermittent fault that may have resulted in the lights not being illuminated on the morning of 18 March.

The investigators also interviewed *Kurutai*'s crew; who stated that no maintenance or repair work had been undertaken on the barge's navigation lights, or associated electrical systems, between the time that they were switched on, on 12 March, and the time of the tests on 24 March.

The ATSB's tests and the information provided by *Kurutai*'s crew suggest that *Seatow 61*'s navigation lights should have been illuminated when *Norma Jean* collided with the barge. However, the tests were carried out 6 days after the accident and, therefore, cannot be relied upon as a reliable test that the lights were illuminated on the morning of 18 March.

While there is no evidence that suggests so, it is possible that a crew member had inadvertently switched off the lights sometime after they were seen by the RTO on 13 March or that an intermittent fault resulted in them not being illuminated on the morning of 18 March.

However, regardless of whether the *Seatow 61*'s navigation lights were on, or not, the barge was not appropriately lit for the area in which it was anchored. Very few large vessels anchor off Carnarvon and most of the vessels that had done so in the past were ships that had their deck lights on while anchored, or fishing vessels that were normally brightly lit by their working lights. As a result, *Norma Jean*'s skipper, like many other recreational skippers using the port, probably expected a vessel at anchor outside the harbour to be brightly lit up and, hence, conspicuous.

2.5 ***Norma Jean*'s speed**

There were no witnesses to the collision and no information could be downloaded from *Norma Jean*'s electronic navigational equipment after the boat was recovered. Therefore, there is no definitive way to determine the precise speed that *Norma Jean* was travelling at when it collided with *Seatow 61*.

According to the witnesses that saw *Norma Jean* on the morning of 18 March, the boat departed from the ramp at about 0610. Travelling at the channel speed limit of 5 knots, it would have passed the entrance beacon at about 0620. In order to cover the 2.6 miles between the entrance beacon and the barge in the 5 minutes to 0625, the boat would have had to travel at a speed of about 30 knots.

However, the accuracy of this calculation cannot be relied upon with any certainty because *Norma Jean* may not have been travelling at the speed limit while in the channel, the distance the boat had to travel between the entrance beacon and the barge (2.6 miles) was relatively short and the times used were drawn from estimates provided by various witnesses.

At the time of the coronial inquest, a number of witnesses provided an estimation of *Norma Jean*'s minimum planing¹³ speed. These estimates ranged from 12 to 20 knots. Two witnesses also provided evidence in relation to the routine boating habits of *Norma Jean*'s skipper. They both stated that the skipper usually followed the posted speed limits in the channel and then increased the boat's speed to get it up on the plane once he had passed the channel entrance beacon. One witness stated that he would then travel to the designated destination at a speed of about

¹³ The speed at which a boat lifts out of the water so that it is gliding over the water rather than pushing through it.

20 knots. The other stated that he would normally travel at a speed of about 15 knots.

Figure 15: *Norma Jean's* damaged bow



The last person to see *Norma Jean* on the morning of 18 March stated that the boat passed the channel entrance beacon at a speed of about 10 to 15 knots. The engine throttle setting was then increased and the boat lifted up onto the plane. It then 'took off into the distance' at an estimated speed of about 20 knots.

Norma Jean was examined by ATSB investigators and an independent surveyor following the collision and subsequent recovery. The examinations showed that the boat had suffered substantial damage (Figure 15) as a result of the collision.

In the surveyor's inspection report, he noted that:

The forward part of the bow is missing from the stem aft for approximately 0.5 m on the port side and approximately 1.0 m on the starboard side. The bow guardrail was found bent and forced aft. The foremost part of the foredeck, complete with the cross shaped Samson post, was found separated from the remaining foredeck, facing aft and tangled with the bent bow guardrail and the collapsed forward part of the bimini type awning support structure...

The 115 hp Yamaha outboard motor was found in the tilt down position for normal operation. The power lever or throttle was found to be in the full ahead position. The underwater sequence of the police video also shows the power lever in the full ahead position prior to the recovery of the vessel.

The throttle lever position indicates that *Norma Jean* may have been travelling at, or near, its full speed¹⁴ at the time of the collision. However, it is also possible that the throttle lever was knocked forward by the skipper during the collision and that

¹⁴ While there is no available evidence that details *Norma Jean's* maximum speed, Yamaha published engine performance data that showed that a similar type of boat, of about the same loaded weight, powered by a similar outboard motor, was capable of a maximum speed of about 34 knots.

its position after the collision is not indicative of the boat's speed at the time of the collision.

The forensic pathologist who performed the post-mortem examinations of the four deceased occupants from *Norma Jean* found that the three passengers died as a result of immersion (drowning); and that two of them sustained other non-fatal injuries. He also found that the boat's skipper died as a result of significant internal injuries, caused by severe chest/abdominal trauma. He described the skipper's injuries as 'the type of injury we commonly see in people who die in motor vehicle type crashes'.

Norma Jean was on the plane when the boat was last seen and, therefore, it is possible that it was travelling as slow as 12 knots (estimated minimum planing speed) or as fast as 34 knots (estimated maximum speed). However, when all of the available evidence is considered, it is more likely that the boat was travelling at a speed of about 20 knots.

2.6 Safe boating

The COLREGS '...apply to all vessels upon the high seas and in all waters connected therewith navigable by seagoing vessels' and, thus, applied to both *Seatow 61* and *Norma Jean*.

At the time of the collision, *Norma Jean*'s skipper held a recreational skipper's ticket (RST). To qualify for an RST, he had to be examined against the contents of the RST guidebook, which included a simple explanation of the COLREGS, emphasised the need to maintain an effective lookout and stated, in several places, the need to reduce a boat's speed if visibility is reduced or if the boat is travelling at night. Therefore, the skipper should have been aware of his responsibilities with respect to the COLREGS and these basic safe boating procedures.

2.6.1 Lookout

Rule 5 of the COLREGS, 'Look-out', states that:

Every vessel shall at all times maintain a proper lookout by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and the risk of collision.

While travelling at a speed of about 20 knots, it would have been extremely difficult for *Norma Jean*'s skipper to identify the unlit anchored *Seatow 61* in the near total darkness before morning twilight in time to avoid collision.

However, a number of other fishermen that passed by the barge that morning stated that, when they were close by the barge, they identified its dark silhouette. These fishermen slowed their boats, took some time to consider what they had identified and then steered around it.

The last person to see *Norma Jean* before the collision stated that the skipper was standing up and looking over the top of the boat's windscreen. As previously discussed, the evidence also suggests that the skipper may have seen *Seatow 61* and turned his boat at the last moment in an attempt to avoid the collision. While this evidence indicates that *Norma Jean's* skipper was keeping a lookout, the fact that the collision occurred indicates that the lookout was ineffective given the circumstances.

Witnesses who saw *Norma Jean* depart the boat harbour at about 0610 on 18 March stated that *Norma Jean's* cabin light was on. This evidence was supported by an examination of the boat following the collision which revealed that the cabin light switch was in the on position.

The cabin light would have increased the level of illumination within the boat, decreasing the skipper's sensitivity to dim light sources outside the boat. The illumination within the boat probably also reflected off various surfaces within the boat's cockpit, including the windscreen, reducing the skipper's ability to discriminate external objects from their background.

It took *Norma Jean* about 15 minutes to travel from the comparatively well lit harbour area to the location where *Seatow 61* was anchored. This brief amount of time and the use of the boat's interior light would have limited the skipper's visual adaptation to the dark. Dark adaptation occurs when the human visual system is adjusted for efficient response in dim illumination.¹⁵ Pupils in the eyes dilate and the light receptors in the retinas increase their sensitivity so that the threshold of vision improves with an increase in time spent in the dark.

Research also suggests that older adults (*Norma Jean's* skipper was 78 years old), even in the absence of any eye disease, have significant difficulty seeing objects under low illumination and at night.¹⁶ Therefore, it is likely that, even in the best of circumstances, the skipper would have had difficulty identifying the dark hull of the barge from the dark background at night.

While *Norma Jean's* skipper was probably looking out at the time of the collision, the speed of the boat, the light sources within it and an incomplete visual adaptation to the dark may have reduced his ability to maintain an effective lookout in the near total darkness.

2.6.2 Personal flotation devices

Norma Jean was equipped with a personal flotation device (PFD) for each of the boat's occupants in accordance with Western Australian legislation. However, when they were recovered from the water following the collision, none of them were wearing a PFD.

In the 2004 report *National Assessment of Boating Fatalities in Australia 1992 – 1998*, Dr. Peter O'Connor stated that people who survived fatal boating incidents were more than two times more likely to have been wearing a PFD. In the report, Dr O'Conner also stated that;

¹⁵ A Dictionary of Psychology, 2001, Oxford University Press.

¹⁶ Jackson, G., Owsley, C., & McGwin Jr, G. (1999). Aging and dark adaptation. *Vision Research*, 39(5), 3975-3982.

If PFD use increased to 75%, 5 lives could be saved, with a cost saving to the Australian community of nearly \$8 million per year. The saving of 5 lives per year would reduce the annual boating death toll by 13% based on the current annual toll: a very substantial reduction. The benefit of an increase in PFD use would accrue most substantially to recreational boaters who comprise the vast majority of those killed.

On 28 May 2010, when the Western Australia Coroner handed down his findings in relation to his investigation, he commented that:

This case has highlighted the importance of increasing the availability and use of modern, fitted lifejackets which do not impede movements, particularly in the case of children, non-swimmers and all those on board boats at night.

In Australia, the rules governing the use of a PFD vary from state to state. In Tasmania, it is compulsory to wear a PFD when on board a recreational boat of less than 6 m in length that is in motion. Other states, take a more specific risk focused approach. Some states mandate that PFDs shall be worn at times of heightened risk, like when crossing a bar, and others leave the decision on when the use of a PFD is necessary to the discretion of individual skippers.

While, at the time of this accident, it was compulsory for all recreational boats operating in unprotected waters of Western Australia to carry an approved PFD for each person on board, there were no rules governing when the PFDs should be worn. However, the use of PFDs was encouraged through public statements like the following, which could be found in the RST handbook:

Besides wearing them in emergencies, you also enhance safety if you wear life jackets in the following circumstances:

- at the first sign of bad weather;
- between sunset and sunrise or during restricted visibility;
- when operating in unfamiliar waters;
- when operating with a following sea;
- when boating alone (this is especially recommended);
- at all times on children under 10 years; or
- if you are a poor swimmer.

Practise putting them on in the dark and in the water – it is harder than you think!

The three occupants that were trapped inside *Norma Jean* and sank with the boat would have probably died even if they had been wearing a PFD at the time of the collision. However, the fourth, who died as a result of immersion¹⁷ and was found floating in the water some 8 hours later, may have survived if he was wearing a PFD.

Norma Jean was carrying a PFD for each of its occupants when it collided with *Seatow 61* in near total darkness, a situation that had been identified as a time of heightened risk. However, neither the skipper nor his passengers had heeded the advice that was aimed at encouraging recreational boat users in Western Australia to wear PFDs at times of heightened risk.

¹⁷ Commonly referred to as drowning.

2.7 Previous similar accident

At 0200 on 16 October 2002, the barge *Seatow 17* was anchored off Tarakohe, New Zealand with the tug, *Seatow 22* (now *Kurutai*), alongside. The anchor lights on both the tug and the barge were illuminated and a small spotlight was used to illuminate the after end of the barge.

The barge was positioned just south of the line of the leads, about 0.9 miles from the harbour entrance. The tug was secured on what was, at the time, the seaward side of the barge.

Seatow 22's master instructed the watchkeepers to use the tug's searchlight to warn fishing vessels, which were expected to depart Tarakohe in the early morning, of the barge's presence.

At about 0510, the fishing vessel *Alfred* departed from Tarakohe harbour. After clearing the harbour, the skipper increased the boat's speed to about 8.5 knots and, about 10 minutes later, set the boat on a compass heading of 298° before switching the steering to auto-pilot. He could see a light on his port bow which he thought was another fishing vessel. About 5 minutes later, he went to the back of the wheelhouse to make some tea.

Shortly afterwards, *Alfred* collided with *Seatow 17* and immediately began to sink. One crew member became entangled with the vessel's rigging and could not be freed before the vessel sank. His body was not recovered until after the boat was refloated on 19 October.

Maritime Safety Authority of New Zealand (MSA)¹⁸ conducted an investigation into the accident. *Alfred*'s skipper was prosecuted for operating a vessel in a manner causing unnecessary danger or risk to other persons and for breaching maritime rules pertaining to collision avoidance and lookout. The draft MSA report¹⁹ included the following recommendations to Sea-Tow:

It is recommended that Sea Tow Ltd immediately instruct their Masters that when it is deemed necessary to anchor off the port of Tarakohe, they are to anchor to the south of the inner harbour (wharf approach) leads and be mindful of weather which may cause the barge to swing north of this line. This information is to be promulgated to the Harbourmaster of Tarakohe who in turn shall disseminate this information to all users of the port.

It is recommended that Sea Tow Ltd investigate immediately the feasibility of illuminating the hull of the barge when at anchor.

Despite the circumstances of the accident and the MSA investigation, Sea-Tow did not implement any measures that might mitigate the risk of another similar accident. The company did not alter the lighting on board its barges, did not make any changes to its safety management system (SMS) and did not disseminate information about the accident throughout the Sea-Tow fleet.

¹⁸ The Maritime Safety Authority of New Zealand has since changed its name to Maritime New Zealand.

¹⁹ Maritime Safety Authority Accident Investigation report number 02 3021, *Alfred & Seatow 17*.

Consequently, on 13 March 2007, when *Kurutai*'s master anchored *Seatow 61* off the port of Carnarvon, he was not aware of the details of this earlier accident and did not have any particular guidance available with respect to anchoring the barge and illuminating it while it was at anchor.

In submission, Sea-Tow stated:

In our view it is not appropriate for you to refer to the earlier incident in New Zealand. Our reasoning for this is set out below:

- a) Following the incident Maritime New Zealand (MNZ) investigated and prepared a draft report;
- b) MNZ then decided to prosecute the skipper of the fishing boat which collided with the barge. The skipper was found guilty after a defended hearing and fined;
- c) As far as can be ascertained by Sea-Tow, MNZ did not circulate the draft report to Sea-Tow for comment as is part of the normal procedure and MNZ did not issue recommendations to Sea-Tow;
- d) Sea-Tow would dispute many of the factual findings in the draft MNZ report and would have taken this up with MNZ as part of the usual consultation process however it was not given the opportunity in this case;
- e) We understand the final report has not been issued by MNZ.

As can be seen from the above Sea-Tow was not given the opportunity to comment on the MNZ draft report and, so far as we understand, the report does not contain recommendations.

For those reasons, reference to the MNZ report should, in our view, be deleted from your report as should the reference to the recommendations made to Sea-Tow as no recommendations were made.

In our view to refer to the New Zealand incident in the way that you have is to unfairly criticise Sea-Tow and is quite improper.

In response to this comment, Maritime New Zealand stated that:

In accordance with MSA policy (which is currently under review), neither a draft nor a final report would have been provided in this case due to the decision of the Director of MSA to prosecute the Skipper of *Alfred*. This is because the information contained therein would have been superseded by the findings of the court.

Following the completion of the legal process, and in the event of a request being made for a copy of the original draft report, copies are made available with a header note explaining that the investigation of the accident has resulted in a prosecution and that the report has not been distributed to affected parties for comment as the information it contains has been superseded by the findings of a court.

For the above reasons, MSA did not provide a draft report to Sea-Tow or formally issue recommendations or issue or publicly release a final report.

A further submission from Maritime New Zealand stated:

Nevertheless, while MSA's report and recommendations were not formally circulated, they were discussed with management of *Seatow*, and the view of the company at the time was that additional lighting of the barge above the requirements of the COLREGS and New Zealand's domestic Maritime Rules was not possible or practical.

The Nelson District Coroner conducted a coronial inquest into the fatality that occurred as a result of the accident in 2006 during which he referred extensively to the MSA investigation report. In his findings, the coroner stated that:

[21] Given the above information it is to a degree somewhat surprising that no action was taken against the Sea Tow organisation as it is clear that its actions contributed to the accident.

[22] The Maritime Safety report recommended that Sea Tow Limited investigate the feasibility to illuminate the hulls of their barges when at anchor and this court pursuant to section 15 (1) b of the Coroners Act also recommends that this action be implemented and by the actions of the Tasman District Council and this authority is commended for its actions on this matter.

The Nelson District Coroner's findings were finalised on 2 November 2006 and copies were sent to Maritime New Zealand, the Tasman District Council and Sea-Tow. However, Sea-Tow did not provide any further advice to its tug masters with respect to the illumination of a barge while anchored or alter its policies or procedures, in keeping with the recommendations, before the 18 March 2007, when *Norma Jean* collided with *Seatow 61*.

3

FINDINGS

3.1 Context

At about 0610 on 18 March, in near total darkness, the recreational fishing boat *Norma Jean*, with four persons on board, departed the Carnarvon boat harbour. About 15 minutes later, *Norma Jean* collided with *Seatow 61*, a dumb barge that was anchored off the port. *Norma Jean* sank almost immediately and all four of the boat's occupants died as a result of the collision.

From the evidence available, the following findings are made with respect to the collision between *Norma Jean* and *Seatow 61*. They should not be read as apportioning blame or liability to any particular organisation or individual.

Safety issues, or system problems, are highlighted in bold to emphasise their importance. A safety issue is an event or condition that increases safety risk and (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and (b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operating environment at a specific point in time.

3.2 Contributing safety factors

- *Seatow 61* was anchored off Carnarvon in accordance with the harbour master's advice. However, neither the harbour master nor the regional transport officer appropriately considered the hazard that the anchored barge might pose to local recreational boats.
- **The guidance material provided to support the harbour master and the regional transport officer in carrying out their respective roles did not ensure that they worked cooperatively to identify navigational risks in the port and promulgate safety information with the aim of mitigating those risks. [Safety Issue]**
- *Seatow 61*'s navigation lights were probably not illuminated on the morning of 18 March when *Norma Jean* collided with the barge.
- The total reliance on navigation lights to alert seafarers to the barge's presence in the hours of darkness did not reflect all the reasonable precautions that could have been taken. For example, given the volume of recreational boat traffic in the area where the barge was anchored, its visibility should have been enhanced by switching on the deck flood lights.
- **Sea-Tow New Zealand's safety management system did not provide adequate guidance to tug masters with respect to safely anchoring a barge and leaving it unattended. [Safety Issue]**
- **Sea-Tow New Zealand did not have a procedure or system which ensured that the lessons learnt from accidents and incidents were shared with the company's seagoing staff. As a result, the tug master was not aware of recommendations that had been made following a previous similar accident involving one of the company's vessels. [Safety Issue]**

- While *Norma Jean*'s skipper was probably looking out at the time of the collision, the speed of the boat, the light sources within it and an incomplete visual adaption to the dark probably restricted his ability to maintain an effective lookout in the near total darkness.

3.3 Other safety factors

- At the time of the collision, *Norma Jean*'s skipper and the other occupants of the boat were not wearing personal flotation devices.

4

SAFETY ISSUES AND ACTIONS

The safety issues identified during this investigation are listed in the Findings and Safety Actions sections of this report. The Australian Transport Safety Bureau (ATSB) expects that all safety issues identified by the investigation should be addressed by the relevant organisations. In addressing those issues, the ATSB prefers to encourage relevant organisations to proactively initiate safety action, rather than to issue formal safety recommendations or safety advisory notices.

All of the directly involved parties were provided with a draft report and invited to provide submissions. As part of that process, each organisation was asked to communicate what safety actions, if any, they had carried out or were planning to carry out in relation to each safety issue relevant to their organisation.

4.1 Harbour master guidance

Number:	MO-2007-237-SI-01
Issue owner:	Western Australia Department of Transport
Type of operation:	Marine – Port operations
Who it affects:	Port operators

Safety issue description:

The guidance material provided to support the harbour master and the regional transport officer in carrying out their respective roles did not ensure that they worked cooperatively to identify navigational risks in the port and promulgate safety information with the aim of mitigating those risks.

Proactive safety action taken by: Western Australia Department of Transport

While the Department reiterates that the regional transport officer does not fulfil the role of a harbour master or act as a deputy for the harbour master, the procedures in question were reviewed in the process of achieving ISO 9001 accreditation. The procedures are currently being reviewed again as part of the process of achieving ISO 4801 and 14001 accreditation and from experience with their use.

Action number: MO-2007-237-NSA-016

ATSB comment:

The ATSB is satisfied that the action taken by the Western Australia Department of Transport addresses this safety issue.

4.2 Anchoring guidance

Number:	MO-2007-237-SI-02
Issue owner:	Sea-Tow New Zealand
Type of operation:	Marine – Anchoring
Who it affects:	Tug and barge operators

Safety issue description:

Sea-Tow New Zealand’s safety management system did not provide adequate guidance to tug masters with respect to safely anchoring a barge and leaving it unattended.

Proactive safety action taken by: Sea-Tow New Zealand

The company has added a ‘Barge Anchoring Procedure’ and ‘Barge Anchoring Flow Chart’ to its safety management system.

Luminous ‘GlowMax’ paint has been applied in strips on all of the company’s barges and they have been fitted with bulwark mounted solar powered lights.

ATSB comment:

The ATSB is satisfied that the action taken by Sea-Tow New Zealand addresses this safety issue.

4.3

Lessons learnt

Number:	MO-2007-237-SI-03
Issue owner:	Sea-Tow New Zealand
Type of operation:	Marine – All
Who it affects:	All owners and operators

Safety issue description:

Sea-Tow New Zealand did not have a procedure or system which ensured that the lessons learnt from accidents and incidents were shared with the company’s seagoing staff. As a result, the tug master was not aware of recommendations that had been made following a previous similar accident involving one of the company’s vessels.

Proactive safety action taken by: Sea-Tow New Zealand

The company has developed and implemented a system that ensures information gained from incidents is shared with the staff on board all vessels. Copies of the ATSB’s final investigation report, the Western Australia Coroner’s report and the report into the collision between *Alfred* and *Sea-Tow 17* were provided to all Sea-Tow tugs.

Action number: MO-2007-237-NSA-018

ATSB comment:

The ATSB is satisfied that the action taken by Sea-Tow New Zealand addresses this safety issue.

APPENDIX B: SHIP INFORMATION

Seatow 61

Official Number	876405
Flag	New Zealand
Port of Registry	Auckland
Classification society	Bureau Veritas
Ship Type	Dumb barge
Builder	Taizhou Sanfu Ship Engineering Company, China
Year built	2003
Owners	Sea-Tow Limited
Ship managers	Sea-Tow Limited
Gross tonnage	2772
Net tonnage	832
Deadweight (summer)	6000 tonnes
Summer draught	4.48 m
Length overall	85.43 m
Length between perpendiculars	81.94 m
Moulded breadth	24.38 m
Moulded depth	5.52 m
Crew	Nil

Norma Jean

Registration Number	35539
Flag	Australian
Place of Registration	Western Australia
Vessel Type	'Baron Sportsman' half cabin runabout
Construction	Glass fibre reinforced plastic
Year built	1975
Length overall	5.54 m
Engine	Yamaha 115 outboard petrol engine
Persons on board	Four

APPENDIX B: SOURCES AND SUBMISSIONS

Sources of Information

Bureau of Meteorology

Carnarvon coroner's office

Carnarvon Volunteer Sea Rescue

Marine Safety Business Unit (MSBU) of the Western Australian Department for Planning and Infrastructure

Maritime New Zealand

New Zealand Ministry of Justice

Sea-Tow Ltd

Transport Accident Investigation Commission (TAIC), New Zealand

Western Australia Police

Western Australia Department of Planning and Infrastructure (WADPI)

References

Admiralty Sailing Directions, Australia Pilot, Volume I, First Edition, 2005, as amended.

Australian Seafarer's Handbook, First Edition 2004, as amended.

BASI (1991), 'Limitations of the See-and-Avoid Principle', reprinted by ATSB in 2004

Dictionary of Psychology, 2001, Oxford University Press.

Findings of the Coroner I R Smith in the matter of an inquest into the death of Michael Patrick Bowler, 2 November 2006.

International Regulations for the Prevention of Collisions at Sea, 1972 as amended.

Jackson, G., Owsley, C., & McGwin Jr, G. (1999). *Aging and dark adaptation*. Vision Research, 39(5), 3975-3982.

Maritime Safety Authority Accident Investigation report number 02 3021, *Alfred & Seatow 17*.

National Assessment of Boating Fatalities in Australia 1992 – 1998, Dr. Peter O'Connor, 2004

Record of investigation into the death of *Norma Jean's* occupants, Western Australia Coroner, 28 May 2010

Transcript of the inquest into the death of *Norma Jean's* occupants, Western Australia Coroner, 17 to 26 May 2010

Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the Transport Safety Investigation Act 2003, the ATSB may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. Section 26 (1) (a) of the Act allows a person receiving a draft report to make submissions to the ATSB about the draft report.

The original draft report was sent to the next of kin of the occupants of *Norma Jean*; the Carnarvon Coroner; the Western Australia Police; Sea-Tow in Perth and New Zealand; Transport Accident Investigation Commission; Maritime New Zealand; Kurutai's master; the regional transport officer in Carnarvon; the Manager for Marine Safety and the Environment (the harbour master for Carnarvon); the General Manager Marine Safety, Marine Safety Business Unit of the Western Australian Department for Planning and Infrastructure; the Protection and Indemnity (P&I) solicitor for Sea-Tow; and the Australian Maritime Safety Authority.

Submissions were received from two of the next of kin of the occupants of *Norma Jean*; Transport Accident Investigation Commission; Maritime New Zealand; and Kurutai's master. The regional transport officer in Carnarvon, the harbour master for Carnarvon and the General Manager Marine Safety, Marine Safety Business Unit of the Western Australian Department for Planning and Infrastructure made a joint submission. Sea-Tow in New Zealand made a submission through their P&I solicitor. All submissions received have been included and/or the text of the report was amended where appropriate.

The draft report of the re-opened investigation was sent to the next of kin of the occupants of *Norma Jean*, Sea-Tow New Zealand, the General Manager Marine Safety - Marine Safety Business Unit of the Western Australian Department of Transport, the Australian Maritime Safety Authority and the Coroner.

Submissions were received from the Australian Maritime Safety Authority, the Marine Safety Business Unit of the Western Australian Department of Transport and Sea-Tow New Zealand.

The submissions were reviewed and where considered appropriate, the text of the draft report was amended accordingly.

Australian Transport Safety Bureau

24 Hours 1800 020 616

Web www.atsb.gov.au

Twitter @ATSBinfo

Email atsbinfo@atsb.gov.au

Investigation

ATSB Transport Safety Report

Marine Occurrence Investigation

Collision between the boat *Norma Jean* and the barge *Seatow 61*
Carnarvon, Western Australia, 17 March 2007

237-MO-2007-237

Final – 3 October 2013