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Australian Transport Safety Bureau

Collision between *Accolade II* and *Sandgroper*

Off Port Adelaide, South Australia, on 29 February 2020

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Addendum

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Safety summary

What happened

At about 0438 local time on 29 February 2020, in darkness and clear visibility, the inbound fishing vessel *Sandgroper* collided with the outbound self-discharging bulk carrier *Accolade II*, off the entrance to Port Adelaide, South Australia. The collision occurred within port limits shortly after *Accolade II* had exited the Port Adelaide channel and resulted in significant structural damage to *Sandgroper* and minor damage to *Accolade II*. There were no injuries reported on either vessel.

What the ATSB found

The ATSB found that a proper lookout using all available means was not being maintained on board either vessel in the time leading up to the collision. Consequently, neither vessel was aware of the risk of the collision posed by the other until shortly before the collision when it was too late to take effective avoiding action.

Accolade II's bridge team did not have a complete appreciation of the traffic situation and of the risk of collision outside the port channel before the ship exited the channel. In particular, effective use was not made of radar and a dedicated look-out was not posted in darkness.

Sandgroper's skipper initially sighted *Accolade II* while the ship was still in the channel. However, a proper look-out was not subsequently maintained using all available means, including radar and radio. As a result, *Sandgroper*'s skipper was not aware that *Accolade II* had exited the port channel and a close quarters situation with the ship was developing. While *Sandgroper* was not equipped with, nor required to be equipped with, an automatic identification system (AIS) transceiver, had one been fitted, it would have improved the vessel's detectability. That in turn would have increased the chances that the vessel was detected by *Accolade II*'s bridge team in sufficient time to avoid collision.

What has been done as a result

Following this incident *Sandgroper* was fitted with an AIS transceiver.

Accolade II's managers (Inco Ships) advised that a navigational audit of the ship's operations was conducted, which resulted in several recommendations to improve the ship's bridge resource management practices.

Safety message

The safety of fishers and people in small boats continues to be of concern to the ATSB as collisions between trading ships and small vessels on the Australian coast continue to occur. Safety investigations into such collisions have consistently shown that the keeping of a proper lookout by all available means, including radar, radio and AIS, in accordance with the collision regulations could have prevented most of these collisions.

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The occurrence

At about 1100 Central Daylight-saving Time[1] on 28 February, *Sandgroper* (Figure 1) departed its fishing grounds off Kangaroo Island, South Australia and began making its way back to North Arm Marina in Port Adelaide. The vessel was crewed by a skipper and two uncertificated crew (deckhands). The crew had been fishing at sea for the previous week when a hydraulic equipment malfunction resulted in the decision to return to port.

Figure 1: *Sandgroper*

Source: Ashworth Maritime Services

At 0226 on the morning of 29 February, *Sandgroper* was about 13 nautical miles (miles)[2] south-west of Port Adelaide's southern breakwater (Figure 2), on a heading[3] of about 020°, with steering in autopilot mode and a speed of about 5-6 knots. The skipper was on watch in the wheelhouse with the deckhands resting. At about 0300, the skipper handed over the watch to one of the deckhands in order to get some rest. The skipper instructed the deckhand to follow the course plotted on the chart plotter and to wake them if there were any concerns or when arriving at a nominated point marked on the chart plotter near Port Adelaide's port limits. The skipper then lay down to rest on the wheelhouse bunk, aft of the conning position. Both the vessel's very high frequency (VHF) radio units were set to maintain a listening watch on VHF channel 16.[4]

Meanwhile, *Accolade II* was alongside at Adelaide Brighton Cement's K-Berth in Port Adelaide Inner Harbour. The ship was engaged in discharging a cargo of limestone loaded earlier that day at Klein Point, South Australia.

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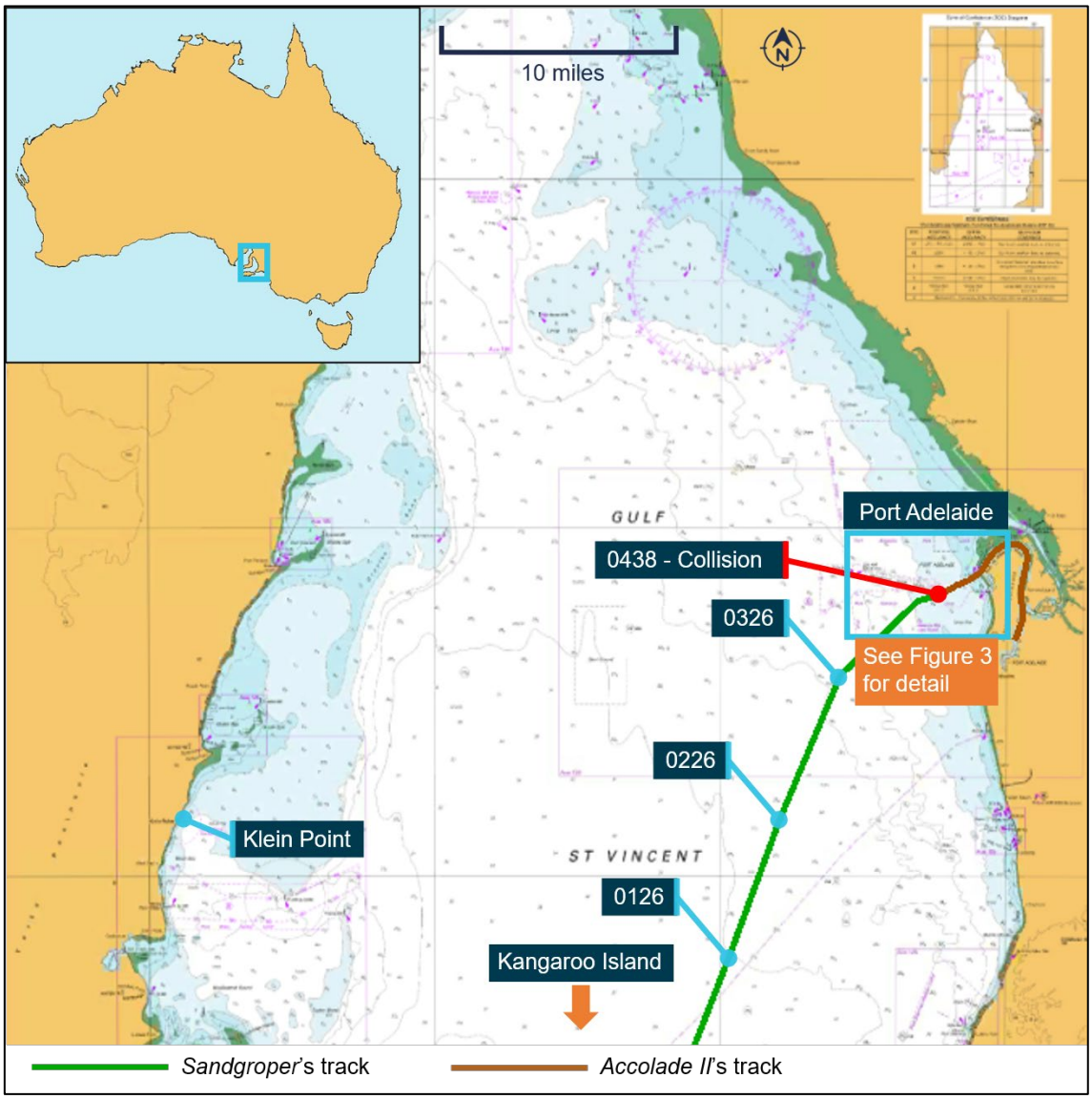
1 Central Daylight-saving Time (CDT): Coordinated Universal Time (UTC) + 10.5 hours.

2 A nautical mile is 1,852 m.

3 The direction of the bow of a vessel expressed in degrees, either magnetic or true. *Sandgroper*'s headings in this report are in degrees by magnetic compass while *Accolade II*'s headings are in degrees by gyro compass.

4 VHF channel 16 (156.800 MHz) is the international distress, safety and calling frequency. All VHF-equipped vessels are required to maintain a continuous listening watch on this frequency at sea.

Figure 2: Section of chart Aus 781 showing key locations and vessel tracks



Source: Australian Hydrographic Office, annotated by the ATSB using electronically recorded data

At about 0230, *Accolade II*'s first engineer woke the chief mate and provided 1-hours' notice for the ship's planned departure at 0330 for Klein Point. The chief mate went up to the ship's navigation bridge (bridge) to complete the bridge pre-departure checklist. The checklist included checking that the ship's radar[5] was on, testing that the ship's whistle was operational and testing engine and steering gear controls. The checks also included confirming that one VHF radio was set to the port's working channel (VHF channel 12), and that the ship's planned departure time of 0330 was reported to the Flinders Ports Communications Tower (communications tower).[6]

At 0255, the chief mate woke the chief integrated rating (IR)[7] and shortly after, the master. By about 0310, the master had made his way to the bridge where he met the chief mate who was on his way down to deal with cargo paperwork and read the ship's draughts. At 0320, cargo discharge was completed, and the ship's departure draught recorded as 3.77 m forward and 4.97 m aft.

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5 *Accolade II* was appropriately equipped with a single radar in accordance with the provisions of the relevant SOLAS regulations in force at that time of its construction

6 The Flinders Ports Communications Tower's call sign was 'Adelaide Outer Harbour'.

7 Integrated ratings are qualified to perform the duties of both an able seaman and an engine rating.

At 0327, the master contacted the communications tower on VHF radio and reported that the ship was departing its berth. The ship's forward mooring station were manned by the chief mate and an IR while the aft mooring station was manned by the chief IR and another IR. By 0329, all mooring lines were cast off and, by 0339, the ship had completed its swing to the north and commenced its outbound passage to Klein Point through the Port Adelaide Inner and Outer Harbours. The crew at the mooring stations were stood down and the chief IR went up to the bridge to assume helmsman duties. The chief mate went back to the accommodation to finalise cargo-related paperwork while the other IRs attended to routine post-departure tasks on deck.

At about the time *Accolade II* was casting off, *Sandgroper* was about 6.8 miles south-west of Port Adelaide's southern breakwater. The fishing vessel was on autopilot, still on a heading of about 020° and a speed of about 5-6 knots, with a deckhand on watch and the skipper resting.

By 0356, *Accolade II* was passing the reporting point at beacon number 39 in the Port Adelaide River at a speed of about 8.9 knots. The master reported passing beacon number 39 to the communications tower on VHF channel 12 and continued the ship's passage with the helmsman steering.

At about 0415, *Sandgroper*'s deckhand sighted a red light off the port bow and, shortly after, woke the skipper. The deckhand handed over the watch including reporting the sighting of the red light on the vessel's port bow. The deckhand then left the wheelhouse to rest while the skipper made a coffee.

At about 0420, *Sandgroper* entered Port Adelaide's port limits. The weather at the time was fine, with light winds, calm seas, good visibility and no moon. The skipper checked the reported red light and assessed it to be the port sidelight of an outbound ship in the channel. He then identified the ship on the radar display, which was set on a range scale of 3 miles. The skipper assumed the ship would stay in the channel, and at about 0426 or very shortly after, altered *Sandgroper*'s course to starboard to stay out of the channel and avoid giving the impression of heading for the channel and thereby impeding the ship's progress. The skipper then reduced the radar display range scale from 3 miles to 0.125 miles as the vessel progressed towards the port's breakwater.

At about 0428, as *Accolade II* was approaching Port Adelaide's southern breakwater, the chief mate arrived on the ship's bridge. At about 0433, the ship's course was altered to port and it exited the channel between beacons number 13 and 15 at a speed of about 9.1 knots. The master contacted the communications tower and reported that the ship was '…departing at beacon 13.' The master then instructed the helmsman to change the ship's steering from manual to autopilot. The helmsman changed the steering to autopilot and turned off two of the ship's four steering motors, which was the usual practice for the sea passage.

Meanwhile, the chief mate increased the range scale of *Accolade II*'s radar display from 0.75 miles to 3 miles and selected the 'Off Center' function to provide for the maximum view on the display ahead of the ship. *Accolade II*'s radar immediately detected *Sandgroper*. The fishing vessel's radar echo immediately began to paint on the ship's radar display about 1.2 miles off *Accolade II*'s starboard bow, but the chief mate did not notice it.

At about 0434, the chief mate used the radar to select and display the automatic identification system (AIS)[8] target data of two vessels off the ship's port bow. At about the same time, the master dismissed the helmsman who then left the bridge with a radio. At about 0435, the chief mate answered a call on the bridge telephone. The call lasted about a minute before the chief mate went back to familiarising himself with the navigational situation and adjusting bridge equipment, such as dimming lights, in preparation for taking over the watch from the master.

[8] The automatic identification system (AIS) is a very high frequency (VHF) radio broadcasting system which enables AIS equipped vessels and shore-based stations to send and receive identifying information. See the section titled *Automatic identification system* for further information.

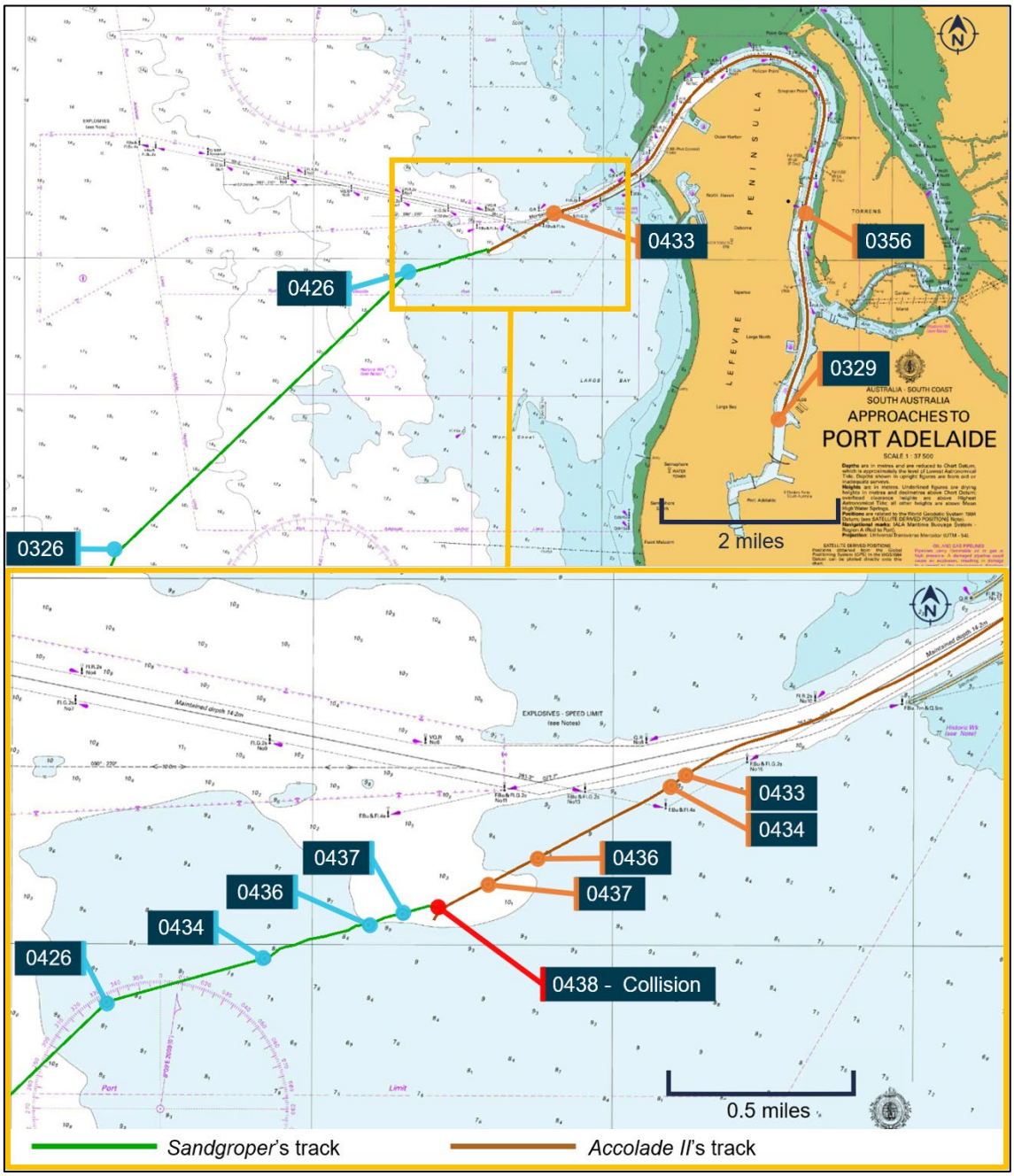
The collision

Just after 0436, the chief mate, who was standing by the steering console on the ship's centreline, sighted a red light fine off the ship's starboard bow. The chief mate crossed to the starboard side of the bridge, got a pair of binoculars to better observe the sighted light and moved to the port side of the bridge to avoid a visual blind sector created by the ship's bucket elevator on deck. Meanwhile, the master, who was also alerted to the red light, crossed to the port side of the bridge to get another pair of binoculars and returned to the centreline. Both officers then recalled seeing both red and green sidelights of the vessel. By this time, *Sandgroper* was about 0.5 miles from the ship.

Just over a minute later, at 0437, *Accolade II*'s radar range scale was reduced from 3 to 1.5 miles. By this time, *Sandgroper* had closed to about 0.25 miles and the master instructed the chief mate to '…go more south…'. The chief mate switched over to manual steering and applied 15° of port rudder helm as the master repeated his instructions to go further south. The master went out on to the starboard bridge wing and their instructions to '...go more south…' became increasingly urgent. The chief mate then applied full port rudder as the ship slowly began turning to port at a speed of about 9.4 knots. The chief mate also attempted to sound the ship's whistle without success.

Meanwhile, on board *Sandgroper*, the skipper unexpectedly saw *Accolade II*'s green sidelight at very close range. The skipper quickly put the vessel's propulsion full astern, but this had little effect. Shortly after 0438, *Sandgroper* collided with *Accolade II*'s starboard side, just forward of midships (Figure 3).

Figure 3: Sections of charts Aus 130 and Aus 138 showing sequence of the collision



Source: Australian Hydrographic Office, annotated by the ATSB using electronically recorded data

At about 0439, the master tried unsuccessfully to call *Sandgroper* on VHF channel 12. Meanwhile, the chief mate recalled the IR to the ship's bridge and handed over the helm. The chief mate then issued helm orders to steady the ship's heading to avoid close quarters situations with the two vessels on the ship's port side. At about 0440, the master reported the collision to the port's communications tower.

Shortly after, *Sandgroper*'s skipper called *Accolade II* on VHF channel 16. The masters of the two vessels then switched over to VHF channel 13 and exchanged details, confirmed that there were no injuries to anyone on either vessel and that neither vessel required assistance. *Accolade II*'s master then reported the collision to the ship manager by phone and, having assessed there was no significant damage, resumed the ship's passage to Klein Point.

Sandgroper's skipper telephoned the vessel's manager to report the collision and was advised to resume its passage. By about 0830 that morning, *Sandgroper* was safely alongside at North Arm Marina.

Sandgroper sustained significant structural damage to the starboard bow (Figure 4) with some minor damage to the vessel's port side as well. Additionally, *Sandgroper*'s anchor was lost from the vessel's bow and was found lodged in *Accolade II*'s deck railings.

Figure 4: Damage to *Sandgroper*

Source: Australian Maritime Safety Authority and Inco Ships

Accolade II sustained relatively minor damage to deck structures and railings on the ship's starboard side as a result of the collision (Figure 5).

Figure 5: Damage to *Accolade II*

Source: Inco Ships

Context

Accolade II

Accolade II is a 108 m, self-unloading bulk carrier of 6,310 gross tonnage, built in 1982 by Carrington Slipways, Newcastle, New South Wales. The ship was owned by Adelaide Brighton Cement and, at the time of the collision, was managed and operated by Inco Ships. *Accolade II* was designed and built for the carriage of limestone from quarries at Klein Point, South Australia, across the Gulf St. Vincent, to Adelaide Brighton Cement's facilities at Birkenhead, situated within Port Adelaide's inner harbour.

Equipment and machinery

Accolade II was a Regulated Australian Vessel (RAV). RAVs are commercial vessels which operate (or can be operated) outside the Australian exclusive economic zone. RAVs are subject to the *Navigation Act 2012* and are generally required to comply with the requirements of international conventions as given effect by the Australian Maritime Safety Authority's (AMSA) marine orders.[9] *Accolade II* was equipped with the navigational and safety equipment required by the International Convention for the Safety of Life at Sea (SOLAS)[10] for a ship of its size and age.

The ship's navigation equipment included a single radar, automatic identification system (AIS), gyrocompass, differential GPS and a bridge navigational watch alarm system.[11] *Accolade II* was also fitted with a Japan Radio Company (JRC) JCY 1850 simplified voyage data recorder (VDR).[12] The ship's primary means of navigation was paper charts although it was also fitted with a chart plotter.[13]

The ship's propulsion was provided by twin Fuji Diesel 6LG32X dual-fuel propulsion engines that used compressed natural gas as their main fuel, although they could also be operated with marine gas oil.

Radar

Accolade II was equipped with a single JRC JMA-5312-6 X-Band[14] radar with automatic radar plotting aid (ARPA) and automatic target acquisition capability as well as data input from the AIS and GPS units.

SOLAS regulations prescribed radar carriage requirements for ships based on their gross tonnage. Most modern merchant ships of *Accolade II*'s size were required to be equipped with two radars. However, *Accolade II* was subject to the provisions of SOLAS regulations that were in force at that time of its construction, which only required that ships of 1,600 gross tonnage and upwards be fitted with a single, type-approved radar. The regulations allowed for ships constructed before 1 July 2002 to be fitted with equipment which fulfilled the requirements prescribed in the relevant regulations in force prior to 2002.

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9 Marine Orders, also described as regulatory instruments or legislative regulations, are legal instruments made by AMSA pursuant to powers under Commonwealth legislation.

10 The International Convention for the safety of Life at Sea, 1974, as amended.

11 A mandatory system, the bridge navigational watch alarm system (BNWAS) automatically alerts the master or another qualified officer if the officer of the watch becomes incapable of performing the officer of the watch's duties for any reason such as falling asleep or becoming otherwise incapacitated.

12 A voyage data recorder is designed to collect and store data from various shipboard systems in compliance with SOLAS requirements. A simplified voyage data recorder is similar to a voyage data recorder but does not store the same level of detailed data.

13 A device used in marine navigation that integrates GPS data with an electronic navigational chart. It displays the electronic chart along with the position, heading and speed of the ship.

14 An x-band radar operates at a frequency of about 10 GHz and its fine resolution makes it useful for collision avoidance.

Crew

Accolade II was manned and operated by a crew of nine in compliance with the ship's AMSA-issued minimum safe manning document. The ship's complement included two deck watchkeeping officers—a master and a chief mate—as well as three integrated ratings, a chief engineer, two first engineers and a cook. The ship's crews operated on a 3-week roster and most personnel had been assigned to the ship for several years. Crew changes were staggered so that different crew began their 3-week duty periods at different stages of the 3-week roster period.

The master had about 32 years of seagoing experience and held an Australian master's (unlimited) certificate of competency. The master had worked exclusively on *Accolade II* for the previous 6.5 years and had joined the ship 16 days before the collision. The master's usual rank on board was as chief mate (with over 10 years' experience in the rank) but he had acted in the role of master several times in the past, usually for about a week at a time. In this instance, he was acting in the role of master for the last week of his 3-week roster period. The master also held a marine pilotage exemption certificate (PEC) for Port Adelaide. The PEC was endorsed for night navigation and allowed the master to navigate *Accolade II* in the waters of Port Adelaide's Inner and Outer harbours at any time without the need to take on a pilot.

The chief mate had about 15 years of seagoing experience, held a Philippines master's (unlimited) certificate of competency and the equivalent Australian certificate of recognition. The chief mate had about 8 years' experience in the rank, had worked exclusively on *Accolade II* for the previous 5 years and had joined the ship 2 days before the collision. The chief mate did not hold a PEC for Port Adelaide.

Operations

Accolade II generally conducted a daily return voyage between Port Adelaide and Klein Point.

The ship's operations routinely involved a departure from Port Adelaide in the early hours of the morning with the exact time of departure varying depending on when cargo discharge was completed. The chief mate was usually woken about an hour before completion of cargo discharge/departure with the master usually woken about half-an-hour before departure. The chief mate assisted with unmooring operations, following which the master piloted the ship out of the harbour.

On exiting the channel, the chief mate usually took over the watch for the 4-hour sea voyage to Klein Point. The master returned to the bridge when the ship was approaching Klein Point and berthed the ship with the chief mate's assistance. Once alongside, the chief mate was stood down while the master managed cargo loading operations, which usually took about 4 hours.

The chief mate was recalled for departure and then kept the sea watch for the passage back to Port Adelaide. The master returned to the bridge and took over the watch just before the ship entered the Port Adelaide channel (near beacon number 13). The chief mate then assisted with bringing the ship alongside and with mooring operations. Once alongside, both the master and chief mate stood down while the ship's cargo was discharged, which usually took about 8 hours.

Sandgroper

Sandgroper is a steel-hulled trawler built in 1978 in Johnsonville, Victoria. The vessel was owned by Pescatore Di Mare and, at the time of the collision, managed and operated by Southern Fisheries Group. The vessel operated out of the Government-owned North Arm Marina, a commercial fishing harbour located in a narrow channel off the Port Adelaide river, south of Torrens Island.

At the time of the collision, *Sandgroper* was a class 3B domestic commercial vessel (DCV) and was equipped with navigational and safety equipment required for an 'existing' class 3B DCV.[15]

The trawler's wheelhouse was equipped with a Furuno 1942 Mark-2 radar, GPS, echo sounder and two VHF radios, both with dual watch capability. *Sandgroper* was not equipped with AIS or VDR, nor was it required to be (see the section titled *Automatic identification system)*. Additionally, the trawler was equipped with a vessel monitoring system (VMS)[16] required by the Australian Fisheries Management Authority (AFMA).

Sandgroper was crewed and operated by a crew of three – a skipper and two uncertificated crew – in compliance with the applicable conditions in the vessel's AMSA-issued Certificate of Operation. The skipper had over 28 years' seagoing experience and held an Australian master's (<24 m, near coastal) certificate of competency as well as a marine engine driver's (Grade 3, near coastal) certificate of competency. The skipper had operated out of Port Adelaide for more than 20 years.

International regulations for preventing collisions at sea

The look-out

The International Regulations for Preventing Collisions at Sea, 1972, as amended (COLREGs) provide internationally-agreed rules and measures to prevent collisions. The COLREGs generally apply to all vessels at sea, including fishing vessels. The COLREGs include requirements for keeping a look-out, assessing risk of collision with other vessels as well as the conduct and responsibilities of vessels in preventing collisions.

With respect to keeping a lookout, Rule 5 of the COLREGs (Look-out), states:

> Every vessel shall at all times maintain a proper look-out 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 of the risk of collision.

The rules required that a lookout be kept not only by sight and hearing, but by all available means including radar, AIS, and information from other sources such as port radio broadcasts and ship-to-ship or ship-to-shore calls.

The 'prevailing circumstances and conditions' include various factors that should be considered when keeping an effective lookout. While not explicitly identified in the rule on the look-out, many of these factors were identifiable elsewhere within the COLREGS. For example, Rule 6 (Safe speed) listed several factors that were also relevant to the keeping of a lookout. Factors relevant to keeping an effective lookout include the:

- state of visibility and time of day (day, night or twilight)
- background lights (shore lights or back scatter from own lights)
- expected traffic in the area (open sea, coastal passage, port or harbour)
- traffic density, including concentrations of fishing and other vessels
- characteristics, efficiency and limitations of radar (including its range and any interference)
- constraints imposed by the radar range scale in use.

Other relevant factors include the availability, type, capability, and limitations of the AIS units of the vessels involved, available local knowledge and information, and the availability of traffic information via radio (ship-to-ship calls, all ship broadcasts and schedules). A number of the

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[15] An 'existing' vessel is essentially one that was constructed or, for construction of which design approval was lodged or approved, before 1 July 2013. For a more detailed definition of an 'existing' vessel, see Section 22 of Marine Order 503 (Certificates of survey — national law) 2018.

[16] The vessel monitoring system (VMS) includes cameras and other equipment to monitor the position, course and speed of a vessel.

factors listed above are interrelated. For example, the use of radar significantly enhances keeping a lookout, particularly during darkness or when visibility is restricted by fog, rain or other conditions.

The COLREGs made specific mention of the proper use of radar equipment to obtain early warning of the risk of collision. The regulations also warned against making assumptions based on scanty information. The keeping of a proper lookout enables the risk of collision to be assessed in sufficient time for early and appropriate action to be taken.

Navigation lights

The COLREGs also described the requirements for vessels to exhibit specific lights (navigation lights) from sunset to sunrise. These lights were generally dependent on vessel length with some additional lights required depending on the type/purpose of the vessel or under certain circumstances and conditions.

Accolade II was required to display a white masthead light forward, a second masthead light abaft of, and higher than the forward one (mandatory for vessels 50 m or more in length), sidelights, and a stern light.

Sandgroper was not engaged in fishing at the time of the collision and therefore was required to display a single masthead light, sidelights and a sternlight.

At the time of the incident, both *Accolade II* and *Sandgroper* were probably displaying the required navigation lights for power-driven vessels of their size while underway. Additionally, neither vessel was displaying other lights, such as working lights or deck lights, that could obscure or be mistaken for regulation navigation lights or otherwise be an impediment to sighting and identifying navigation lights.

Signals to attract attention

The COLREGs required that vessels carry equipment to make sound signals for manoeuvring and warning purposes as well as to attract attention. Depending on size, a vessel may be required to carry a whistle, a bell and/or a gong.[17]

Accolade II was equipped with a pneumatic whistle fitted on the main mast. The whistle could be operated from six different locations, including from buttons on the bridge and bridge wings. *Accolade II*'s chief mate reported that when he attempted to sound the ship's whistle to attract *Sandgroper*'s attention before the collision, he probably did not hold the button down long enough for it to sound. *Accolade II* was also equipped with an Aldis lamp[18] that was not used to attract attention because of the lack of available time.

Sandgroper was equipped with a manually operated horn. However, no attempt was made to use it, probably due to the rapid sequence and unexpected nature of the collision.

Accolade II's look-out

Accolade II's safety management system (SMS) included procedures for the navigation and operation of the ship. The procedures stated that the collision regulations as well as other international and local regulations relating to safe navigation were to be strictly complied with. They also noted that the primary reference documents for the operation of the ship at sea included:

- the COLREGs

[17] A whistle means any signalling appliance capable of producing the required signals and is generally used by vessels to make manoeuvring and warning signals and to attract attention. The bell and gong are used to warn of vessels at anchor and vessels aground.

[18] A hand-held electrically operated signal lamp.

- Standards of Training, Certification and Watchkeeping for Seafarers (STCW) Code[19]
- AMSA's Marine Order 28 (Operations standards and procedures)[20]
- Master's standing orders
- Bridge Procedures Guide[21]

Together, these documents and publications, referenced in *Accolade II*'s procedures, comprehensively dealt with the subject of watchkeeping and the look-out.

The STCW Code provided mandatory watchkeeping standards applicable to 'seagoing ships' and required that a proper lookout be maintained at all times in compliance with the COLREGs. The Code required that the lookout be able to give full attention to lookout duties and not be assigned or undertake any duties which could interfere with that task. It also clarified that the duties of a lookout and helmsperson on a ship are separate. While the Code permitted the watchkeeping officer to be the sole lookout in daylight (in good conditions), it implied that a separate, dedicated lookout was to be posted in darkness.

Accolade II's master's standing orders made it clear that during the hours of darkness, the minimum manning requirement for the bridge was a qualified watchkeeping officer and one integrated rating (IR) as a lookout. The orders also clarified that the lookout should not be assigned any other tasks, although they could be absent from the bridge for brief periods to perform tasks such as a fire and safety round.

The Bridge Procedures Guide is a publication that aims to reflect best practice on subjects such as passage planning and watchkeeping, including on the subject of the look-out, and is widely used internationally to support shipboard safety management systems. The guide and its content are consistent with the requirements of COLREGs and the STCW Code.

On the morning of the collision, when *Accolade II* departed the berth at about 0339, the ship's bridge was manned by a watchkeeping officer (the master) and a helmsman (an IR). The pilot-exempt master (with the helmsman steering) navigated the ship in darkness within the confines of the Port Adelaide River for about 50 minutes before the chief mate joined them on the bridge at about 0428. As such, for the duration of the ship's passage within the harbour in darkness, there was no separate, dedicated look-out posted as required.

Once on the bridge, the chief mate performed a number of tasks to become familiar with the navigational situation in preparation for taking over the watch. While the chief mate was pre-occupied with these tasks, the IR (helmsman) was dismissed from the bridge instead of being retained as a dedicated look-out.

Events and conditions on board Accolade II

On departure from the berth, *Accolade II*'s radar display was centred, north-up and in relative motion mode on a 0.75 nautical mile (mile) range scale. A variable range marker (VRM) was turned on and set to a range of 1.005 miles, but no electronic bearing line (EBL) was turned on. The radar's heading input was sourced from the gyrocompass while speed input was from the GPS. The radar's functionality allowed the ship's passage plan waypoints to be input to display the ship's planned track, but this was not used. Target vectors were set to 'True' for a duration of 3 minutes.[22] The 'Trails' function was off. This function displays the recent history (or past track) of a target as an echo trail or afterglow, making it conspicuous while distinguishing it from

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[19] International Maritime Organisation, The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978, as amended, IMO, London.

[20] Marine Order 28 (Operations standards and procedures) 2015 provides for the safe navigation and operation of vessels by giving effect to provisions of the STCW Convention and STCW Code.

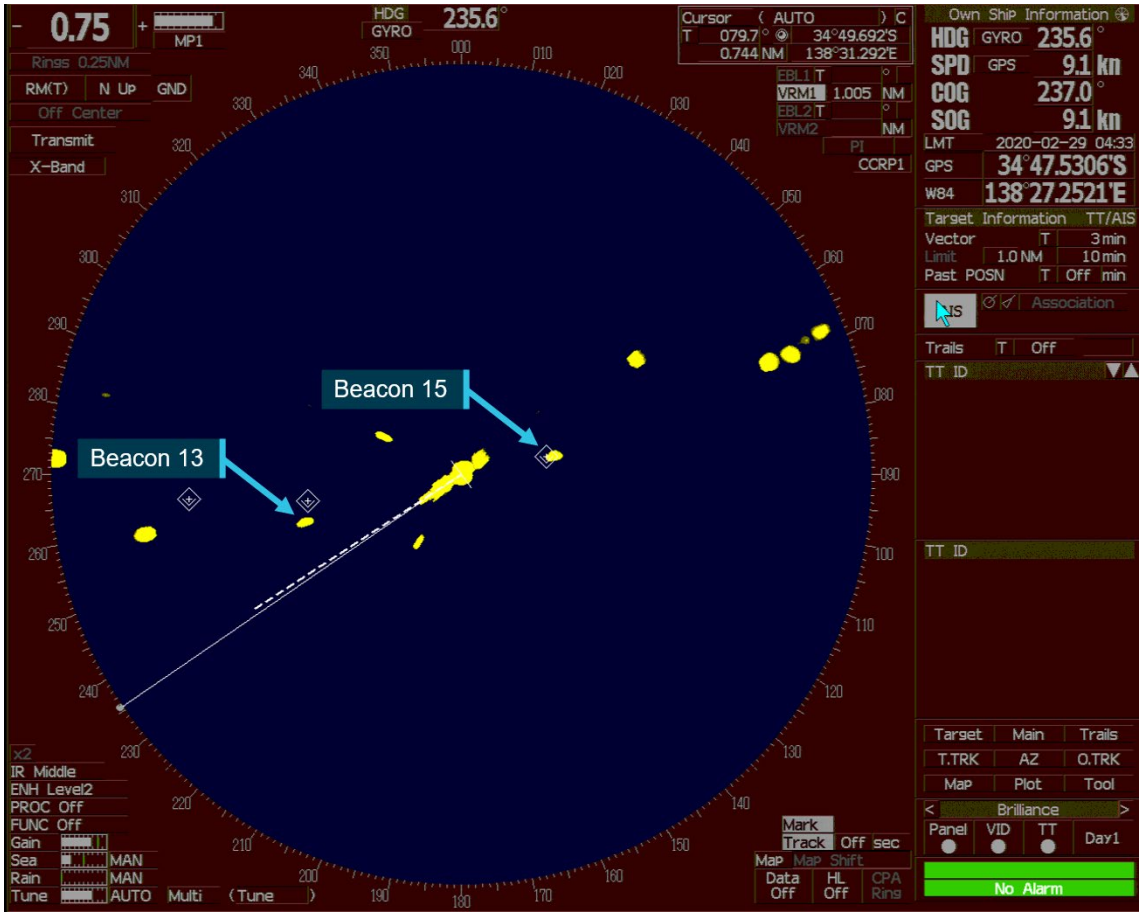
[21] International Chamber of Shipping 2016, Bridge Procedures Guide, Marisec Publications, London.

[22] A true vector represents the predicted true motion of a target for a specified period of time, showing course and speed with reference to the ground or sea. The direction of a true target vector indicates the true course of the target and its vector length is proportional to the target's speed.

inconsistent echoes, such as from sea clutter or from stationary targets such as beacons (depending on whether true motion trails or relative motion trails have been selected).[23].

During the bridge pre-departure checks, the cursor was moved to the right of the display, over the AIS information menu item (Figure 6). The cursor's position and other radar settings remained unchanged for *Accolade II*'s passage through Port Adelaide River and channel.

Figure 6: Set-up of *Accolade II*'s radar as it exited the channel at 0433



The radar image at 0433 shows Accolade II departing the channel with the radar settings unchanged from the ship's departure. Note that the radar display was centred on a 0.75 mile range scale and that Sandgroper's radar echo was not visible with these settings.

Table 1 and Figure 7 below provide a brief sequence of the events leading up to the collision referenced against relevant radar and audio data from the ship's VDR.[24]

Table 1: Sequence of events referenced against *Accolade II*'s VDR radar and audio data

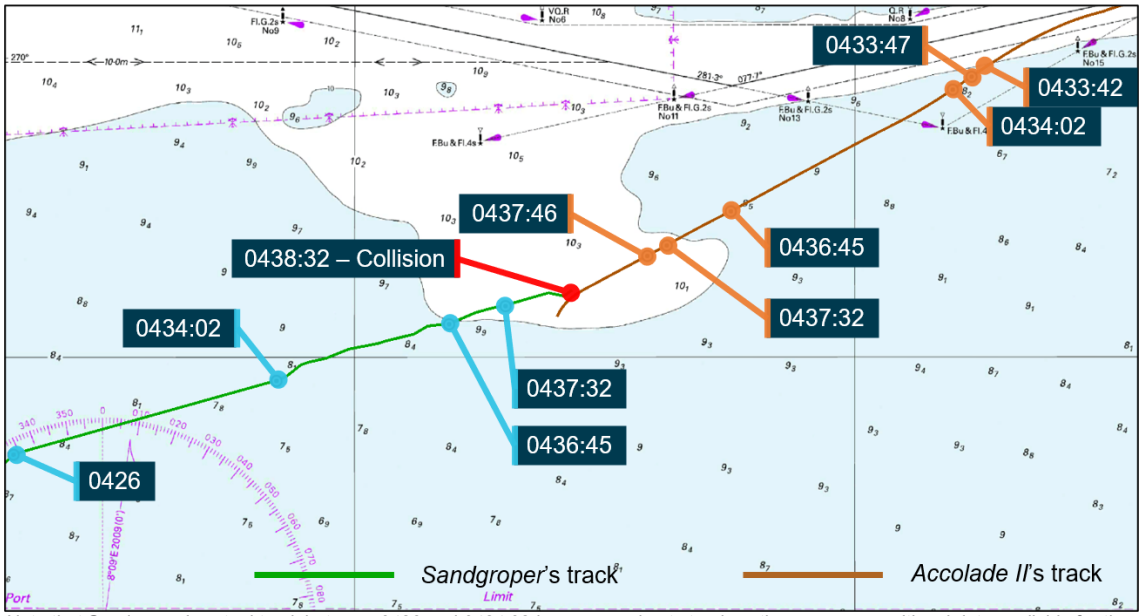
Time	Event/action
0357	• *Accolade II*'s master reported passing beacon number 39 to tower
0428	• Chief mate arrived on bridge and engaged in general conversation with master and helmsman
0433:42	• *Accolade II*'s master reported exiting channel between beacons number 13 and 15 (Figure 6)
0433:47	• Radar display range scale increased from 0.75 miles to 3 miles
0434:02	• 'Off Center' view selected • *Sandgroper*'s radar echo appeared at a range of about 1.2 miles (Figure 8)

[23] Relative motion trails depict the trails of a target relative to the own ship and therefore, if the own ship is moving, the system plots trails of fixed targets as well as moving targets. True motion trails depict the absolute motion trails of a target irrespective of the own ship's position and therefore, do not depict trails for fixed targets.

[24] The VDR saved radar images every 15 seconds. Therefore, times for some of the events or radar user-actions in this report could have occurred up to 14 seconds earlier than described.

	• Chief mate selected AIS target data of a vessel on *Accolade II*'s port side
0434:26	• Helmsman dismissed from bridge
0434:47	• Chief mate selected AIS target data of a second vessel on *Accolade II*'s port side • *Sandgroper*'s radar echo was now at a range of 1 mile from *Accolade II*
0434:55	• Chief mate answered bridge phone
0435:56	• Chief mate completed phone call
0436:45	• Chief mate reported sighting a 'small fishing vessel' to master • *Sandgroper*'s radar echo indicated that the vessel was now at a range of 0.5 miles
0437:32	• Radar display range scale decreased to 1.5 miles • *Sandgroper*'s radar echo indicated that the vessel was now at a range of 0.25 miles
0437:46	• Master ordered the chief mate to 'go more south…'
0438:02	• Ship's heading began to alter to port (Figure 9)
0438:32	• *Sandgroper* collided with *Accolade II*.

Figure 7: Section of chart Aus 138 showing events leading up to collision

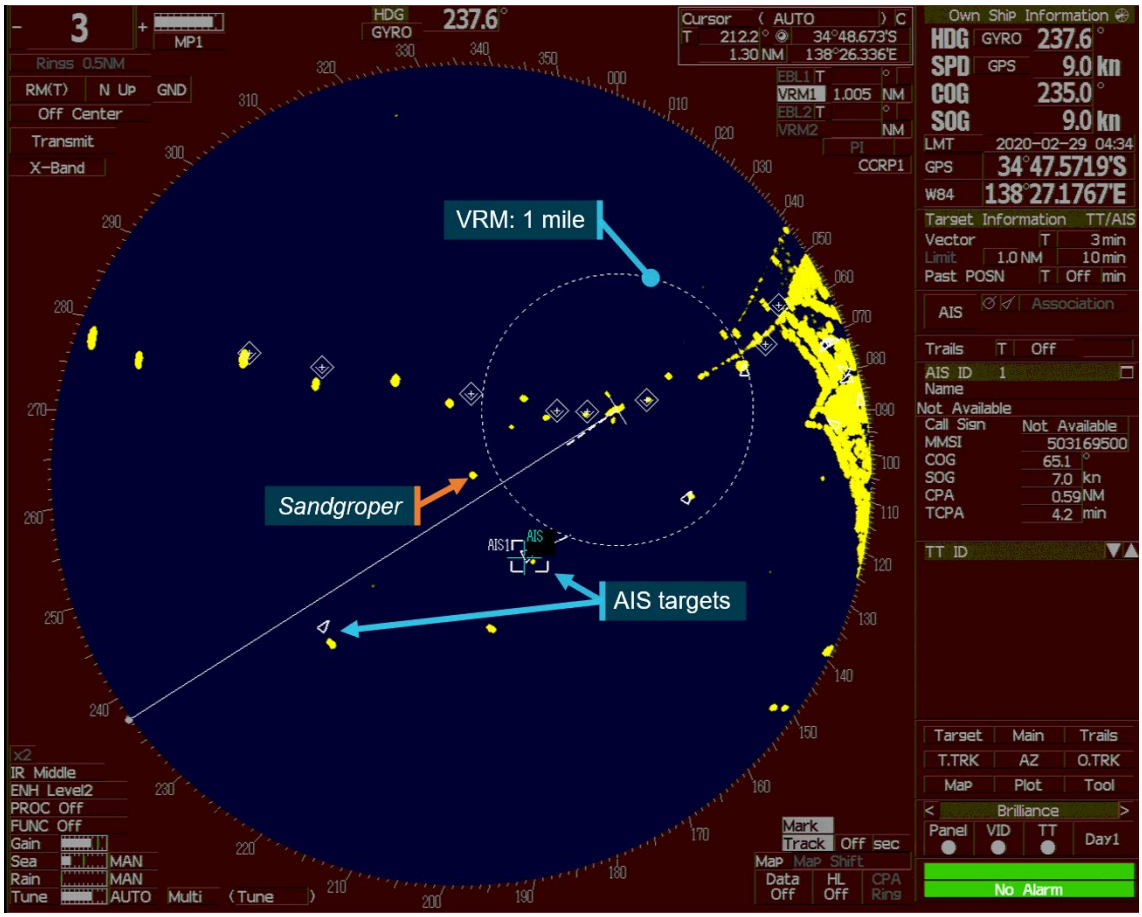


Note that Sandgroper's actual track between 0426 and 0434:02 is an approximate track as there was no positional data available for the vessel between these times
Source: Australian Hydrographic Office, annotated by the ATSB using electronically recorded data

Sandgroper first appeared on *Accolade II*'s radar display at about 0433 (Figure 8). However, no one on the bridge detected the fishing vessel until about 3 minutes later when the chief mate sighted its port sidelight. In those 3 minutes, the chief mate was pre-occupied with tasks such as adjusting radar settings, acquiring AIS icons of vessels on the radar, dimming lights and getting accustomed to the darkness in preparation to take over the watch.

About 1 minute of the chief mate's time was taken up attending to a phone call. Meanwhile, the master recalled concentrating on navigating the ship clear of the channel and beacons (rather than checking outside the channel for traffic, either visually or using the radar). The master may have been experiencing a degree of cognitive tunnelling, which is an inattentional blindness where one becomes overly focused on some variable other than the present environment (Mack and Rock, 1998; Most, 2010).

Figure 8: *Sandgroper*'s first appearance on *Accolade II*'s radar at 0434:02

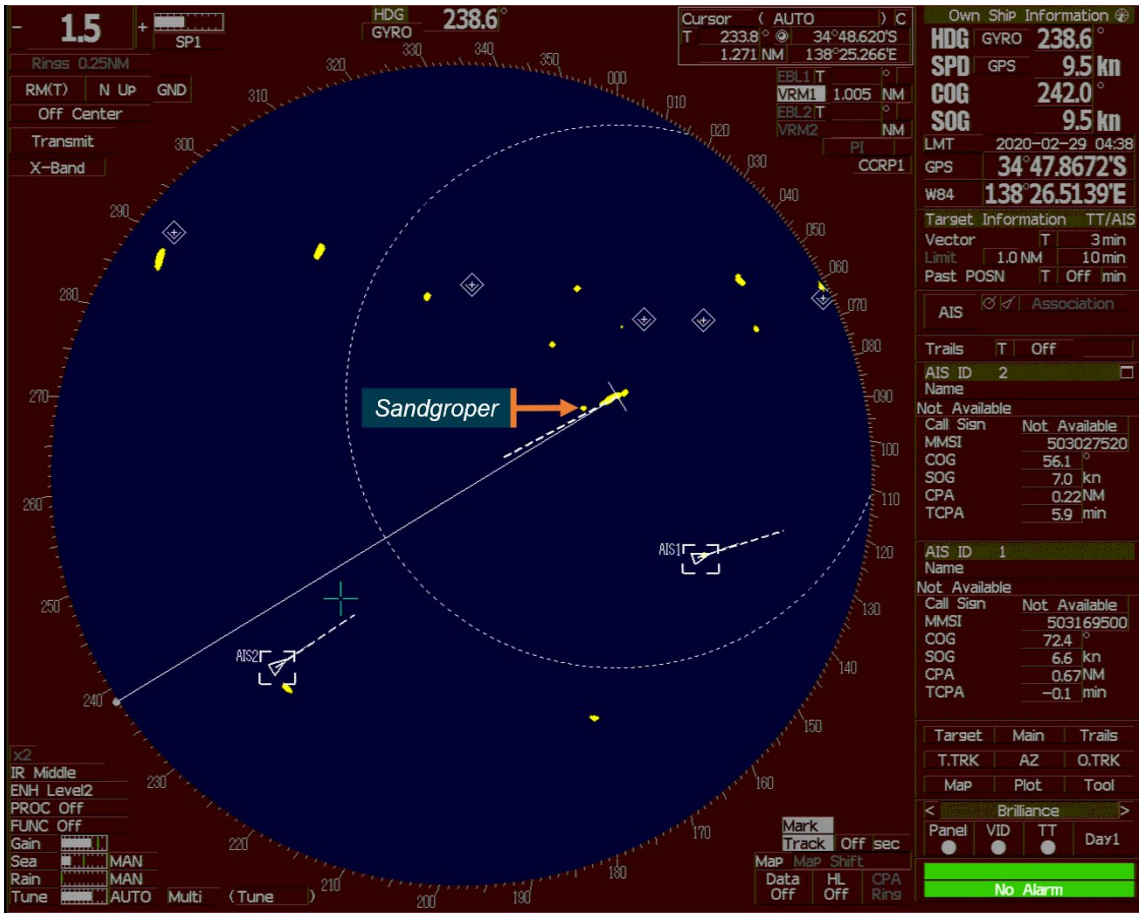


The radar image at 0434:02 shows that as soon as the range scale was increased from 0.75 miles to 3 miles and the 'Off Center' view was selected, Sandgroper's radar echo immediately became visible on the radar display.
Source: *Accolade II*'s VDR, annotated by the ATSB

Additionally, the repetitive nature of the ship's voyage may have induced a sense of complacency in the ship's officers. One behavioural definition of complacency is trending behavioural variation that eventually exceeds safety boundaries (Hyten and Ludwig, 2017). This variation can be influenced by habituation. The master and chief officer had both worked on *Accolade II* for several years, executing the same voyage almost daily, to the point where it became a highly practiced activity.

Highly practised activities become automatic and require less attention than new or slightly practiced activities. Automatic processes occur without intention, taking place without effort. When a person is using automated processing (sometimes referred to as being on autopilot), they are sometimes 'out of the loop'. It is recognised that to have good situational awareness, a monitoring operator needs to be 'in the loop', in order to notice anomalies.

Figure 9: *Accolade II*'s radar display immediately before collision at 0438:02



Source: *Accolade II*'s VDR, annotated by the ATSB

Bucket elevator

The cargo system on board *Accolade II* comprised a single hold, two longitudinal scraper conveyors, a transverse scraper conveyor, a shuttle belt conveyor and a bucket elevator. The bucket elevator was located on the starboard side, just forward of midships. The 2 m wide elevator extended about 8.5 m above the ship's main deck. This created a visual blind sector across the view of the sea surface as seen from the ship's bridge (Figure 10).

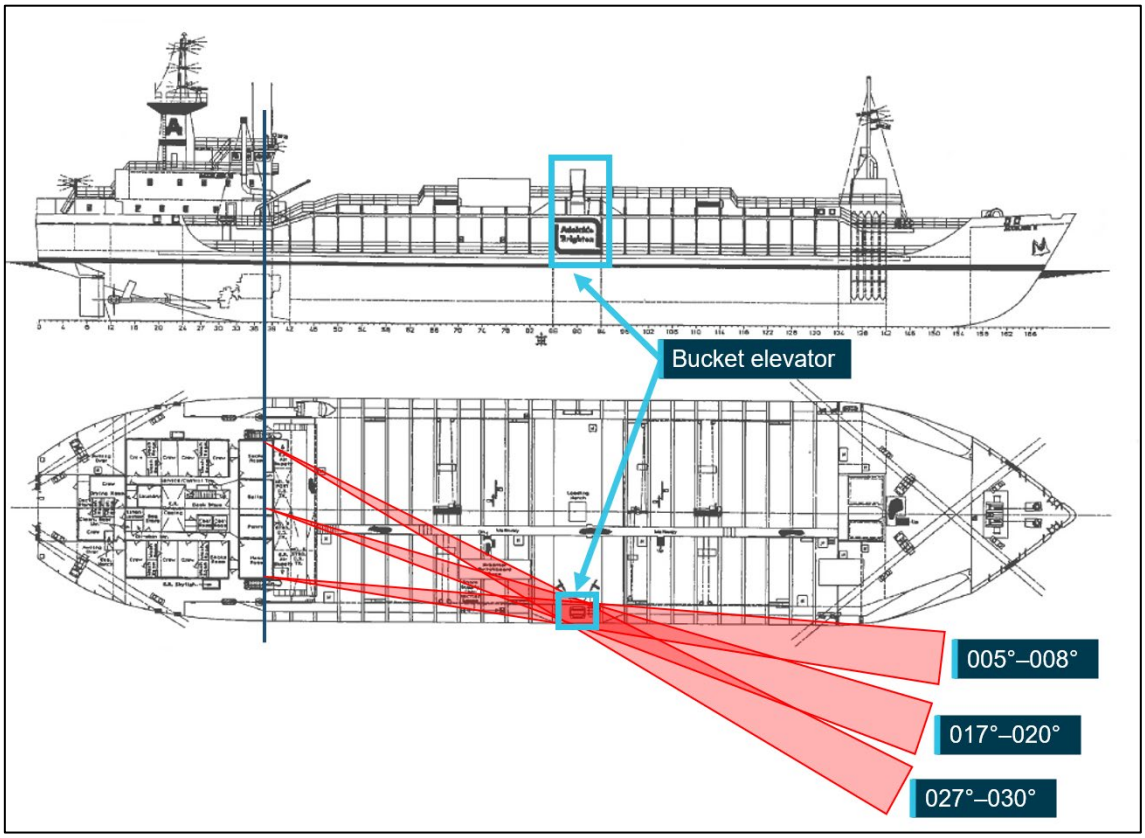
SOLAS regulations required that any blind sector caused by cargo gear outside of the wheelhouse forward of the beam that obstructs the view of the sea surface as seen from the conning position, should not exceed 10°. Additionally, SOLAS stated that each individual blind sector obstructing the view of the sea surface from the conning position, forward of the bow to 10° on either side, should not exceed 5°.

Figure 10: Views from different positions on *Accolade II*'s bridge

Source: Inco Ships, annotated by the ATSB

The visual blind sector created by the bucket elevator was estimated to be about 5-7°. An ATSB analysis of the blind sector assessed that it probably covered an arc of about 3° when viewed from the bridge. Observers at different locations on the bridge would experience a blind sector across a different arc of relative bearings on the starboard bow. Figure 11 shows the arcs of blind sectors for an observer standing on the port side, centreline, and starboard side.

Figure 11: Bucket elevator visual blind sectors



Source: Inco Ships, annotated by the ATSB

The bucket elevator had been documented in several of the ship's annual navigational audits as a known visual obstruction. As such, the blind sector created by the elevator was a known factor that the ship's crew were aware of and one they routinely allowed for.

While *Sandgroper* might have been temporarily visually obscured by the bucket elevator, it did not pose a significant impediment to detecting the vessel if an effective visual lookout had been kept. The blind sector would only have affected observers near the starboard extremities of the ship's bridge with visibility for observers elsewhere on the bridge unaffected. In any case, the bucket elevator had no effect on the performance of the ship's radar.[25]

Sandgroper's look-out

Sandgroper's SMS included procedures on passage planning and watchkeeping which stated that the COLREGs were to be complied with at all times.

Sandgroper's skipper was alerted to the presence of *Accolade II* by the deckhand's sighting of the ship's red sidelight. The skipper assessed that the ship was in, and would remain within, the channel. Due to that expectation, the potential for collision with the ship was probably not anticipated. *Sandgroper*'s skipper may have been experiencing an expectation bias in expecting *Accolade II* to continue down the channel. Expectation bias can occur when an individual's expectations about an outcome influence the perception of one's own or others' behaviour (Williams and others 2012).

The skipper reported that following the course alteration and reduction of the radar range scale (from 3 miles to 0.125 miles), no vessels were sighted either visually or on radar until the collision. At the reduced radar range scale, the skipper would only have been able to see radar echoes within about 230 m around the vessel. The skipper also reported that the presence of lights on the shoreline made it difficult to visually distinguish *Accolade II*'s navigation lights.

Sandgroper was within port limits when *Accolade II*'s master broadcast the message to the communications tower that the ship was exiting the channel at beacon number 13. *Sandgroper*'s skipper did not hear this VHF broadcast as a listening watch on channel 12 was not being maintained. Although the vessel was equipped with two VHF radio units, a listening watch was being maintained only on VHF channel 16 as was the skipper's usual practice. The port rules did not require fishing vessels to report to the communications tower and the skipper could not recall any past communications or interaction with the tower.

Automatic identification system

The automatic identification system (AIS) is a maritime communications device that uses the VHF radio frequency band to transfer data, including a vessel's course, speed and other dynamic and static data. The system enables AIS-equipped vessels and shore-based AIS stations to send and/or receive identification information that, in addition to the AIS unit, can be displayed on an electronic chart and compatible radar. The information received can be used to assist the watchkeeper in making a full appraisal of the situation and of the risk of collision.

The Australian Maritime Safety Authority (AMSA) is responsible for the safety of domestic commercial vessels (DCVs). Under the National Law,[26] the National Standard for Commercial Vessels (NSCV) set out the standards for vessel survey, construction, equipment, design, operation, and crew competencies for DCVs.

The NSCV required that class 3B vessels carry an AIS Class B receiver/transmitter unit. However, 'grandfathering' arrangements allowed older DCVs (built before July 2013) to continue to operate under the requirements that existed before the introduction of the National Law and NSCV. As an 'existing vessel' built in 1978, *Sandgroper* was not required to have an AIS unit fitted to comply with survey requirements, and an AIS unit was not fitted on the vessel at the time of the collision.

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[25] The ship did have a radar blind sector radar however this was located aft of the ship, mostly likely caused by the ship's main mast.

[26] In 2013, the National System for Domestic Commercial Vessel Safety was introduced in Australia under the Marine Safety (Domestic Commercial Vessel) National Law Act 2012 (National Law).

Use of AIS for collision avoidance

The use of AIS can enhance situational awareness and can assist in target tracking. AMSA considers the use of AIS to transmit accurate data and to locate targets as a way to keep a proper lookout. AMSA also encouraged operators to help improve the detectability of their vessels by transmitting AIS data.[27] However, it is also important to note the use of AIS cannot replace the need for a visual lookout. Additionally, AIS target tracking data should be treated with caution for collision avoidance for which radar plotting data and compass bearings of targets remain the primary assessment tools.[28]

Fatigue

Fatigue has been defined as decreased capability to perform mental or physical work, produced as a function of inadequate sleep, circadian disruption, or time on task (Brown, 1994). Factors that contribute to fatigue-impaired work performance include:

- the duration of a duty period
- inadequate sleep
- circadian effects
- the type or nature of the task being undertaken (workload)
- the work environment.

Fatigue can have a range of effects on human performance, such as decreased short-term memory, slowed reaction time, decreased work efficiency, reduced motivational drive, increased variability in work performance, and increased errors of omission (Battelle Memorial Institute, 1998).

An AMSA safety awareness bulletin[29] summarised fatigue among seafarers as follows:

> The nature of vessel operations means seafarers are exposed to conditions which lead to fatigue. Insufficient sleep, night work, irregular and long working hours, monotonous tasks, high work demands are all frequently present in seafaring jobs. These are the primary factors that lead to fatigue. The need to manage the risk of fatigue - both at the individual and management level - is critical.

The ATSB has also highlighted the issue of fatigue through previous investigation findings and specific publications, including for the fishing vessel sector.[30]

Accolade II

The crew on board *Accolade II* were required to comply with the rest hour requirements of the STCW Code (as given effect by AMSA's Marine Order 28). The ship's SMS included a procedure that defined fatigue, provided guidance on recognising the signs of fatigue and reflected the rest hour requirements of the STCW Code.

The SMS also required crew to record their daily hours of work and rest on board. The rest hour records for *Accolade II*'s master and chief mate showed that their rest hours complied with the minimum rest hour requirements of the STCW Code. While self-assessment of fatigue is not a reliable indicator of alertness, both reported feeling very alert and well rested.

The sleep environment on the ship was reportedly comfortable and hence suitable for achieving restorative rest. A review of the ship's voyage reports for January and February 2020 showed at

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[27] Australian Maritime Safety Authority, 2020, Marine Notice 6/2020 Reducing the risk of collisions at sea, Canberra, Australia.

[28] Maritime and Coastguard Agency, 2016, Marine Guidance Note (MGN) 324 (M+F), Navigation: Watchkeeping Safety – Use of VHF Radio and AIS, Southampton, United Kingdom.

[29] Australian Maritime Safety Authority, 2017, Maritime Safety Awareness Bulletin, Issue 5, March 2017, Canberra, Australia.

[30] Australian Transport Safety Bureau, 2004, Safety Bulletin 04 – Fatigue and fishing crews, Canberra, Australia.

least two instances in each month when the ship's sailing was delayed to ensure compliance with rest hour requirements. The reports also showed no voyage on 27 February 2020 (2 days before the collision), with the day marked as a 'Reset day'.

FAST analysis

A roster analysis of the master and chief mate's work and rest times was conducted using the Fatigue Avoidance Scheduling Tool (FAST) bio-mathematical model to assess fatigue/alertness, and the effect on performance.

The FAST analysis showed that while there may have been a slightly higher fatigue risk for the chief mate, overall, the analysis did not appear to show that levels of fatigue likely to influence performance were present for either the chief mate or the master. The accuracy of the analysis was influenced by the nature of the ship's fatigue management system. The recorded hours of rest indicated rest opportunity and not the exact hours of sleep, which had to be estimated.

Sandgroper

As a DCV, *Sandgroper* and its crew were not subject to the minimum rest hour requirements of the STCW Code. There were no prescribed minimum hours of rest and no requirement to record hours of rest. However, AMSA's Marine Order 504[31] required that 'the risk of fatigue of the master and crew' be considered, among other factors, when determining the number of crew required to safely carry out a vessel's operations. The AMSA website also provided guidance on managing crew fatigue on DCVs including practical information on the causes, effects and management of fatigue and its risks. Owners and masters were advised to take all practicable steps to ensure the safety of the vessel and crew, and that the crew were to be involved in the management of fatigue and the risks to safety.

Sandgroper's SMS included some basic information on managing crew fatigue and required the skipper to manage crew fatigue. Guidance for crew stated they were to try and achieve 7–9 hours of sleep in every 24 hours.

Sandgroper's AFMA fishing logs showed that the crew usually shot their fishing gear from about 0230-0430 and hauled the gear between 0930-1330 with rest opportunity obtained in between these times. This meant there was a total of about 18 hours of rest opportunity in every 24-hour period.

On the night before the collision, the skipper reported resting from about 1700–2300 followed by taking the watch until about 0300. The skipper then handed the watch to the deckhand and slept for about an hour until woken shortly after 0415.

Sandgroper's skipper self-reported feeling '…well rested as far as a fisherman gets rest' and alert. The skipper reported consuming at least one cup of coffee after waking that morning.

FAST analysis

The accuracy of the FAST analysis for *Sandgroper*'s skipper was influenced by the absence of recorded hours of work and rest, and no reliable record of sleep obtained in the days preceding the collision. The analysis was conducted based on estimates of sleep obtained and the AFMA fishing logs. Overall, the analysis did not appear to show that levels of fatigue likely to influence performance were present for the skipper.

Summary

Based on the available evidence, it was considered unlikely that levels of fatigue likely to influence performance were experienced by either vessel's crew. However, there were several relevant risk

[31] Australian Maritime Safety Authority, 2018, Marine Order 504 (Certificates of operation and operation requirements — national law) 2018, Canberra.

factors present that were conducive to an environment in which fatigue could develop or that could have increased the chances of crew being fatigued.

Port Adelaide

Port Adelaide is the main port of South Australia handling a range of cargo including grains and seeds, limestone, containers, dry and wet bulk, vehicles, and general cargo. The port was owned and operated by Flinders Ports which was formed in 2001 when the Flinders Ports consortium successfully acquired seven ports that were privatised by the South Australian Government.

Port Adelaide port rules

Flinders Ports' published rules for Port Adelaide that were intended to inform commercial users of the port of their responsibilities for the safe navigation of vessels within the port. The rules did not specifically define a 'commercial user' but, according to Flinders Ports, it did not include fishing and recreational vessels.

The rules documented three entry and exit points for the channel—at the entrance beacon, beacon number 5 and beacon number 9—depending on the vessel's draught. Fishing vessels and recreational vessels could enter/exit the channel at any point. While *Accolade II*'s entry/exit point between beacons 13 and 15 was not among those listed, the ship was allowed the liberty of entering/exiting the channel at this location owing to its long history of operating in the port and its generally shallow draught.

At the time of the collision, Port Adelaide was not authorised as a Vessel Traffic Service (VTS) Authority. A VTS is established to improve the safety and efficiency of vessel traffic and to protect the environment. Ports may apply to establish a VTS when the volume of traffic or degree of risk justifies the service. Port Adelaide operated a communications tower (Flinders Ports Communications Tower) that kept a 24/7 listening watch on VHF channels 16 and 12. Channel 12 was used for ship/shore operations, information, transit advice and ship-to-ship traffic.

Flinders Ports rules required all pilots, masters and exempt masters to communicate with the tower at designated reporting points on channel 12. The rules also stated that vessels should monitor VHF channel 12 at all times in port limits for information.

Flinders Ports clarified to the ATSB that the port's reporting requirements and the requirement to monitor the port's working channel (channel 12) within port limits only applied to commercial vessels. As such, fishing vessels and recreational vessels were not required to report nor were the rules regarding a listening watch on channel 12 applicable to them.

Port Adelaide VTS

On 4 December 2020, about 8 months after the collision, Port Adelaide was authorised as a VTS authority with a new call sign of 'Adelaide VTS'. Adelaide VTS was authorised to provide services, including a traffic organisation service (TOS). The TOS is a service to prevent the development of dangerous marine traffic situations and to provide for the safe and efficient movement of vessel traffic within the declared VTS area.

Adelaide VTS required all vessels over 150 gross tonnage (or where there was no gross tonnage, vessels 35 m or greater in length) to participate in the VTS. The rules required all commercial vessels to comply with VTS reporting requirements and Adelaide VTS can request any other vessel in the coverage area to participate. However, fishing and recreational vessels were generally not required to report.

While VTS rules stated that all vessels were to maintain a listening watch on VHF channels 12 when within or approaching Port Adelaide port limits, Flinders Ports advised that the rule only applies to commercial vessels. However, all vessels, including fishing and recreational vessels were encouraged to monitor the channel through the port's safety outreach programs to educate and inform the public. The South Australian Department of Planning, Transport and Infrastructure (DPTI) also published a recreational boating safety handbook and boating safety advice, which

included material on radio communication and listed channel 12 as among the channels usually used for port communications.

Rules in other ports

Local rules covering operations within port waters vary depending primarily on the port's specific risk profile and resources. The applicability of the various rules also varies from port to port but are usually applied on the basis of factors such as vessel type, length or tonnage. Consequently, in each port, certain rules apply to vessels meeting certain defined criteria and not to others as the following examples show.

The Port of Fremantle, Western Australia, required all vessels 35 m or greater in length and all commercial vessels, regardless of length, to participate in the VTS when operating in the coverage area. It required all vessels navigating within port limits or at an anchorage within the port to maintain a continuous listening watch on the port's working channel.

The Port of Melbourne, Victoria, required all vessels 50 m or greater in length to report at designated points/times and maintaining a continuous listening watch on the VTS working frequency. Non-recreational vessels less than 50 m in length (including fishing vessels) were required to watch the VTS working frequency and to report to VTS if 35 m or greater in length. Recreational vessels less than 50 m in length and equipped with VHF radio were required to watch the VTS working frequency when operating in port waters.

The ports of Weipa and Cairns in Queensland required all vessels, whether commercial or recreational, to maintain a listening watch on channel 16 and, if equipped, channel 12 while within the ports' pilotage areas. Additionally, all ships greater than 24 m in length had to obtain approval from VTS before entering, leaving or manoeuvring within the pilotage area and all ships between 10 and 24 m in length were required to advise VTS before entering, leaving or manoeuvring within the port's pilotage area.

The Port of Darwin, Northern Territory, although not serviced by a VTS, required all vessels of 20 m or greater in length, vessels carrying more than 12 passengers and certain other vessels to participate in the port's traffic organisation service. Other vessels were encouraged to participate voluntarily.

As evident from the examples above, port rules and their applicability vary depending on various factors and there was nothing unusual in the content or applicability of Port Adelaide's rules.

Similar occurrences

Over the last 30 years, at least 68 collisions between trading ships and small vessels have been reported to the ATSB or its predecessor. Of these, at least 40 have been investigated. The failure to keep a proper and effective lookout and/or take early and effective avoiding action in accordance with the COLREGs were recurrent contributing factors that could have prevented most of these collisions.

Collisions between large trading ships and small vessels, particularly fishing vessels, continue to occur off the Australian coast. In these collisions, a fishing vessel, being significantly smaller than a ship, almost always comes off worse and sometimes with severe consequences. For example, the 2000 collision between *Star Sea Bridge* and the fishing vessel *Sue M*, off Evans Head, New South Wales, and the 2003 collision between *Asian Nova* and the fishing vessel *Sassenach* off Townsville, Queensland, both resulted in the loss of life and of the vessels themselves.

While the measures in place to prevent such collisions might appear straightforward, the recurrence of similar contributing factors indicates that further effort is required from operators and crews to implement these measures. In addition to its safety investigation reports into collisions, the ATSB has published a number of safety bulletins to highlight collision risks and educate all seafarers. These documents and other safety information about marine safety issues are available on the ATSB website.

Safety analysis

Introduction

At about 0438 local time on 29 February 2020, in darkness and clear visibility, the inbound fishing vessel Sandgroper collided with the outbound self-discharging bulk carrier *Accolade II*, within port limits, about 1.5 NM south-west of the entrance to Port Adelaide, South Australia. The collision resulted in significant structural damage to *Sandgroper* and minor damage to *Accolade II*. Neither vessel identified that a risk of collision existed with the other until it was too late for effective avoiding action to be taken.

Look-out

Accolade II

In the time leading up to the collision, both the master and chief mate were occupied with tasks demanding much of their attention. The master was focused on navigating clear of the shipping channel while the chief mate was busy with various activities, including preparation to take over from the master. There was no dedicated look-out who could devote their full attention to sighting and reporting targets, including *Sandgroper*. As a consequence, the master and chief mate only sighted the fishing vessel moments before the collision.

Accolade II's radar offered an additional means of detecting *Sandgroper* at an early stage. However, the radar's initially small display range scale setting did not allow for an appreciation of the situation outside the channel before the ship exited it. Further, when the scale was eventually adjusted to one more conducive to detecting *Sandgroper*'s presence, the chief mate focussed on the automatic identification system (AIS) icons of two other vessels displayed on the radar display at the expense of *Sandgroper*'s radar echo. In addition, useful radar tools such as the trails function, which could have made *Sandgroper*'s radar echo more conspicuous and increased the chances of the vessel being detected were not used.

In summary, *Sandgroper* was not detected by anyone on board *Accolade II* until it was too late for effective avoiding action to be taken. Had better use been made of the radar or a dedicated lookout been posted as required, it would have increased the chances of detecting *Sandgroper* early and allowed more time to take action to avoid collision.

Sandgroper

Sandgroper's skipper sighted *Accolade II* early when it was in the channel and assumed, not unreasonably, that it would remain in the channel. On that basis, the skipper altered *Sandgroper*'s course to keep clear of the ship. However, the skipper then paid little attention to the ship and its movement probably due to expectation bias that the ship would follow the channel. Further, the radar range scale was reduced to the minimum and an effective visual lookout by sight was also not maintained.

While there was no explicit requirement for fishing vessels to monitor Port Adelaide's VHF radio working channel, *Sandgroper* was equipped to do so. Had the skipper monitored the working channel, it might have provided forewarning that *Accolade II* was exiting the channel at beacon number 13 (contrary to the skipper's assumption), and to the developing close-quarters situation.

Sandgroper's radar and VHF radio were both available means that could have enhanced the skipper's look-out and allowed for an improved appreciation of the situation. However, neither was used effectively to maintain a proper look-out. Consequently, *Sandgroper*'s skipper was not aware of the risk of collision until collision was imminent and it was too late for effective avoiding action.

Automatic identification system

Sandgroper was not fitted with an automatic identification system (AIS) transceiver unit, nor was it required to be. Had an AIS unit been fitted, it would almost certainly have improved the detectability of the fishing vessel and made it more conspicuous on *Accolade II*'s radar and chart plotter. The evidence in this case shows that *Accolade II*'s chief mate readily acquired and monitored the AIS icons of two other vessels on the radar display but not *Sandgroper*'s radar echo, which should have been of immediate concern.

In addition, the fitting of an AIS unit with a display on board *Sandgroper* would have given its skipper the means to detect *Accolade II*'s AIS-transmitted data thereby enhancing situational awareness and augmented the keeping of a proper look-out.

Findings

ATSB investigation report findings focus on safety factors (that is, events and conditions that increase risk). Safety factors include 'contributing factors' and 'other factors that increased risk' (that is, factors that did not meet the definition of a contributing factor for this occurrence but were still considered important to include in the report for the purpose of increasing awareness and enhancing safety). In addition, 'other findings' may be included to provide important information about topics other than safety factors.

These findings should not be read as apportioning blame or liability to any particular organisation or individual.

From the evidence available, the following findings are made with respect to the collision between *Accolade II* and *Sandgroper*, off Port Adelaide, South Australia, on 29 February 2020.

Contributing factors

- A proper lookout by all available means was not maintained on board *Accolade II*. In particular, radar was not used effectively, and the dedicated lookout required in darkness was not posted. Consequently, *Accolade II*'s watchkeepers were not aware of *Sandgroper*'s presence or of the risk of collision until shortly before the collision when it was too late to take effective action.
- After initially sighting *Accolade II*, *Sandgroper*'s skipper did not maintain a proper lookout or assess the risk of collision using all available means, in particular the radar and radio. As a result, the skipper only saw the ship when collision was imminent and unavoidable.

Other factors that increased risk

- *Sandgroper* did not have an automatic identification system (AIS) transceiver fitted, nor was one required to be fitted. An AIS transceiver would have improved the vessel's detectability and enhanced the ability of its crew to keep a proper look-out.

Other findings

- *Accolade II*'s bucket elevator did not pose a significant impediment to the ability of the ship's watchkeepers to detect *Sandgroper*.

Safety action

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues. The ATSB expects relevant organisations will address all safety issues an investigation identifies.

Depending on the level of risk of a safety issue, the extent of corrective action taken by the relevant organisation(s), or the desirability of directing a broad safety message to the marine industry, the ATSB may issue a formal safety recommendation or safety advisory notice as part of the final report.

All of the directly involved parties are invited to provide submissions to this draft report. As part of that process, each organisation is asked to communicate what safety actions, if any, they have carried out or are planning to carry out in relation to each safety issue relevant to their organisation.

The initial public version of these safety issues and actions will be provided separately on the ATSB website on release of the final investigation report, to facilitate monitoring by interested parties. Where relevant, the safety issues and actions will be updated on the ATSB website after the release of the final report as further information about safety action comes to hand.

Safety action not associated with an identified safety issue

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. All of the directly involved parties are invited to provide submissions to this draft report. As part of that process, each organisation is asked to communicate what safety actions, if any, they have carried out to reduce the risk associated with this type of occurrences in the future.

Additional safety action by Southern Fisheries Group

Southern Fisheries Group advised the ATSB of the following safety action taken in response to the collision:

- *Sandgroper* was fitted with an automatic identification system
- Skippers and crews were provided with education on Port Adelaide River traffic
- All crew are now required to be on watch when approaching port.

Additional safety action by Inco Ships

Accolade II's managers (Inco Ships) advised the ATSB that, following the collision, a navigational audit was undertaken to assess the performance and effectiveness of the ship's bridge team and bridge resource management. Inco Ships advised that the audit resulted in several recommendations to improve *Accolade II*'s bridge resource management practices.

General details

Occurrence details

Date and time:	29 February 2020 – 0438 CDT	
Occurrence class:	Serious incident	
Occurrence categories:	Collision	
Location:	Off Port Adelaide, South Australia	
	Latitude: 34º 47.905' S	Longitude: 138º 26.421' E

Ship details

Name:	*Accolade II*	
IMO number:	8012425	
Call sign:	VM2776	
Flag:	Australia	
Classification society:	Lloyd's Register	
Departure:	Port Adelaide, South Australia	
Destination:	Klein Point, South Australia	
Ship type:	Self-discharging bulk carrier	
Builder:	Carrington Slipways, Newcastle, New South Wales	
Year built:	1982	
Owner(s):	Adelaide Brighton Cement	
Manager:	Inco Ships	
Gross tonnage:	6,310	
Deadweight (summer):	8,417 t	
Summer draught:	6.016 m	
Length overall:	108.63 m	
Moulded breadth:	23.02 m	
Moulded depth:	5.73 m	
Main engine(s):	2 x Fuji Diesel 6LG32X	
Total power:	2,460 kW	
Speed:	11.5 knots	
Injuries:	Crew – 0	Passengers – 0
Damage:	Minor damage	

Name:	*Sandgroper*
Unique vessel identifier	431992
Call sign:	W5S
Flag:	Australia
Departure:	Port Adelaide, South Australia
Destination:	Port Adelaide, South Australia
Ship type:	Fishing vessel (Trawler)
Builder:	Keith Bond, Johnsonville, Victoria
Year built:	1978

Owner(s):	Pescatore Di Mare	
Manager:	Southern Fisheries Group	
Length overall:	19.80 m	
Moulded breadth:	6.00 m	
Moulded depth:	2.50 m	
Main engine(s):	Detroit 8V92 2-stroke diesel	
Total power:	179.04 kW	
Injuries:	Crew – 0	Passengers – 0
Damage:	Substantial damage to bow and stabiliser arm.	

Sources and submissions

Sources of information

The sources of information during the investigation included:

- the master and chief mate of *Accolade II*
- the skipper and deckhand of *Sandgroper*
- Inco Ships
- Adelaide Brighton Cement
- Southern Fisheries Group
- Australian Maritime Safety Authority
- Australian Fisheries Management Authority
- Flinders Ports
- Ashworth Maritime Services
- Lloyd's Register.

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Submissions

Under 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. That section allows a person receiving a draft report to make submissions to the ATSB about the draft report.

A draft of this report was provided to the following directly involved parties:

- the master, chief mate, owner and manager of *Accolade II*
- the master, deckhand and manager of *Sandgroper*
- Australian Maritime Safety Authority (AMSA)
- Flinders Ports.

Submissions were received from AMSA and *Accolade II*'s managers (Inco Ships). The submissions were reviewed and, where considered appropriate, the text of the report was amended accordingly.

Glossary

AFMA	Australian Fisheries Management Authority
AIS	Automatic Identification System
AMSA	Australian Maritime Safety Authority
ARPA	Automatic Radar Plotting Aid
ATSB	Australian Transport Safety Bureau
CDT	Central Daylight Time
COLREGs	The International Regulations for Preventing Collisions at Sea, 1972, as amended
DCV	Domestic Commercial Vessel
DPTI	South Australian Department of Planning, Transport and Infrastructure
EBL	Electronic Bearing Line
FAST	Fatigue Avoidance Scheduling Tool
IMO	International Maritime Organization
IR	Integrated Rating
JRC	Japan Radio Company
MO	Marine Order
NSCV	National Standard for Commercial Vessels
PEC	Pilotage Exemption Certificate
RAV	Regulated Australian Vessel
SA	South Australia
SMS	Safety Management System
SOLAS	The International Convention for the safety of Life at Sea, 1974, as amended
STCW	Standards of Training, Certification and Watchkeeping for Seafarers
VDR	Voyage Data Recorder
TOS	Traffic Organisation Service
VHF	Very High Frequency
VMS	Vessel Monitoring System
VRM	Variable Range Marker
VTS	Vessel Traffic Service

Australian Transport Safety Bureau

About the ATSB

The ATSB is an independent Commonwealth Government statutory agency. It is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers.

The ATSB's purpose is to improve the safety of, and public confidence in, aviation, rail and marine transport through:

- 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, as well as participating in overseas investigations involving Australian-registered aircraft and ships. It prioritises investigations that have the potential to deliver the greatest public benefit through improvements to transport safety.

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

Purpose of safety investigations

The objective of a safety investigation is to enhance transport safety. This is done through:

- identifying safety issues and facilitating safety action to address those issues
- providing information about occurrences and their associated safety factors to facilitate learning within the transport industry.

It is not a function of the ATSB to apportion blame or provide a means for determining 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. The ATSB does not investigate for the purpose of taking administrative, regulatory or criminal action.

Terminology

An explanation of terminology used in ATSB investigation reports is available on the ATSB website. This includes terms such as occurrence, contributing factor, other factor that increased risk, and safety issue.