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REPORT ON MARINE ACCIDENT – FOUNDERING OF THE FISHING VESSEL LEIF ROALD AFTER GROUNDING AT BRAKAN IN HUSTADVIKA, 17 JANUARY 2015

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This report has been translated into English and published by the Accident Investigation Board Norway (AIBN) to facilitate access by international readers. As accurate as the translation might be, the original Norwegian text takes precedence as the report of reference.

Photo of ferry on the Norwegian west coast: Bente Amandussen

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NOTIFICATION OF THE ACCIDENT

At 22:35 on 17 January 2015, the Accident Investigation Board Norway (AIBN) was notified by the Norwegian Maritime Authority (NMA) that the fishing vessel *Leif Roald* LMXX had run aground at Hustadvika with nine persons on board. The crew were rescued and brought to Vestbase near Kristiansund. Before midnight the same evening, the vessel had sunk at Brakan.

On 18 January 2015, the AIBN informed the NMA and the vessel owner that it would conduct a safety investigation of the accident.

Figure 1: The accident took place at Brakan in the Hustadvika bay. Map: © The Norwegian Mapping Authority

SUMMARY

At 21:24 on 17 January 2015, the fishing vessel *Leif Roald* with a crew of nine ran aground at Brakan, a rocky reef in the Hustadvika bay, while en route from Sandnessjøen to Steinshamn, Harøy. The vessel's Mayday message on VHF channel 16 was heard by Florø Radio and the Joint Rescue Coordination Centre Southern Norway (JRCC-S) as well as by vessels in the vicinity. The crew were able to evacuate to a life raft and were later rescued by two other vessels that took them to Vestbase near Kristiansund.

The investigation has shown that during the decisive minutes before the vessel ran aground, the skipper had his attention on an oncoming northbound vessel and *Leif Roald* no longer followed the course line that had been saved during a previous voyage. The skipper's understanding of the situation during this phase was mainly based on his visual observations, in addition to information from the chart plotter and radar.

The crew had crossed these waters before, and they regarded the voyage from Troms county to Møre og Romsdal county as a routine voyage. Hence, the sea voyage was not subject to further planning and there were no strict wheelhouse procedures en route. The voyage was not plotted on Norwegian nautical charts in paper format, nor were paper charts used while they were sailing. The voyage was checked using a chart plotter and radar, and the navigator's visual observations of the fairway. At the time of the accident, only one of the vessel's two radars was in use and the echo sounder had been switched off.

Hustadvika with its many skerries, rocks and reefs is an unsheltered shallow coastal area directly exposed to the Norwegian Sea. In the AIBN's opinion, a safe voyage in these waters is dependent on careful planning and good situational awareness at all times. The AIBN takes the view that the vessel owner should have established clearer procedures for planning the voyage, made better use of the vessel's other navigational aids en route and posted a lookout when the daylight faded. This could have helped to ensure that a marked reef was not overlooked.

Based on this investigation, the AIBN recommends that the vessel owner establish and implement procedures for planning and safe execution of voyages. In the AIBN's opinion, this accident can also be a lesson to other vessels operating in coastal waters.

1. FACTUAL INFORMATION

The information is based on interviews with the vessel's crew, the JRCC-S's action log, the Norwegian Coastal Administration's AIS log, and information provided by the captain of *M/V Dart*, the Norwegian Coastal Administration, the Norwegian Maritime Authority, the Police, the chart plotter manufacturer and the shipping company.

1.1 Sequence of events

1.1.1 The voyage

On Thursday 15 January 2015, the net vessel *Leif Roald* delivered its catch at Torsken in Troms county. *Leif Roald* had previously fished near Bjørnøya but had started to fish in the coastal waters near Senja in Troms county at the start of 2015.

The vessel left Torsken at around 11:00 on 15 January after unloading its cargo that same morning. *Leif Roald* made a stop in Sandnessjøen and then continued on a southerly course towards Steinshamn on Harøy where it intended to re-rig the net gear before leaving for the Halten Bank to net for saithe. The total distance from Torsken to Steinshamn via Sandnessjøen was around 600 nautical miles.

The vessel intended to sail south to Steinshamn using the inshore route. Where *Leif Roald* had sailed before, it followed the 'old tracks' or previously established routes on the chart plotter (Olex). Where no tracks had been saved, new routes were established. For the voyage across Hustadvika, a previously established route and some 'old tracks' were used.

Norwegian nautical charts in paper format (paper charts) were not used for planning the voyage in advance or plotting positions en route. For the whole southbound voyage, the vessel used the autopilot.

The crew from *Leif Roald* stated that this was reckoned to be a routine voyage. Those who were not on watch had the opportunity to carry out necessary maintenance on board and to get some extra rest before they would resume fishing.

The navigation watches were split between the skipper and navigator. The navigator had the requisite theoretical qualifications, but had not been at sea quite long enough to obtain a navigator's certificate. The navigator also lacked some experience of sailing in these waters, so the watches were planned so that the skipper would take over in the areas thought to be the most demanding to navigate.

In connection with the watch changeover, information was provided about what other traffic was in the vicinity. During periods of reduced visibility en route, another crew member was usually posted as a lookout.

The vessel was underway in the inshore route on Folla when the skipper left it to the navigator to keep watch at 13:00. He returned to the wheelhouse at approximately 19:30. At that time, the vessel had reached the end of Trondheimsleia. The voyage ahead across Hustadvika was not discussed by the two navigators.

The weather conditions on the night of Friday 17 January were normal for the time of year. A south-westerly fresh breeze to moderate gale was observed along with some heavy sea. Visibility was good and no extra watch-keeping had therefore been established that night. The vessel's 3-cm radar was running for the entire voyage.

1.1.2 The grounding

At around 21:15, the skipper in the wheelhouse was joined by one of the fishermen on board. He brought coffee for them both and intended to make a mobile phone call to his family. He did not in any way have the role of a lookout. Among other things, the two of them talked about how far they still had to go to reach their destination, Steinshamn. At this point the chart plotter was zoomed out in order to see the whole area, including the port of arrival (approximately 33 nautical miles as the crow flies).

During this period the vessel was still on autopilot and following the course line on the Olex. According to the skipper they intended to follow a course line between Hestskjær and Brakan. The broken red course line (see Figure 2) is a reconstruction, based on what the skipper believed had been saved on a previous voyage. This was the course line he

originally wanted to follow. There is some uncertainty about when this course line was first saved.

The skipper checked the fairway by varying the scale of the chart, while keeping an eye on the radar at the same time. He has explained that he may have failed to get a clear view of Brakan on the chart plotter because of the variation in the scale of the chart.

Shortly before running aground, however, he registered the Litlsvortna rocks approximately 1.5 nautical miles ahead. He wanted to pass them to starboard. At the same time, his attention was focused on a vessel that was approaching from the south. This was the Danish-registered tanker *M/V Dart* (in the following called *Dart*). *Leif Roald* was slightly west of the planned course line, but the skipper chose to maintain course and speed in order to pass *Dart* port-to-port.

At that point the skipper understood the area between *Leif Roald* and Litlsvortna to be free of rocks and reefs etc. and he did not get a radar echo from Brakan.

From the bridge on *Dart* the officer on watch kept an eye on *Leif Roald* as it headed south. *Dart* had also maintained course and speed, as the fairway east of Brakan was considered to be wide enough for passing port-to-port with a vessel the size of *Leif Roald*. From the bridge on *Dart*, the captain observed that *Leif Roald* ran head on onto Brakan.

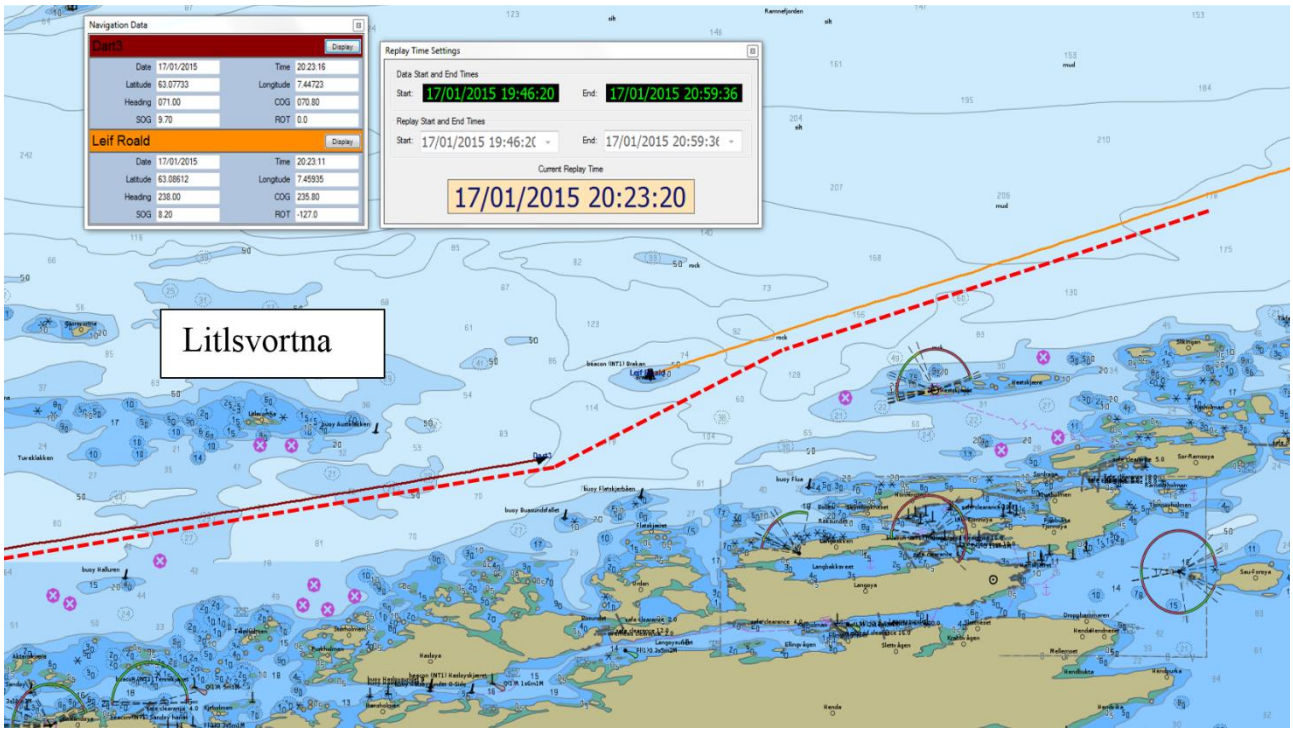

Figure 2: At approximately 20:24 UTC (21:24 local time) the grounding was a fact. The figure shows Leif Roald's course (unbroken yellow line), the planned course line (broken red line) and Dart's course (unbroken magenta line). Map: The Norwegian Coastal Administration. Illustration: Fruholmen Drift AS/AIBN.

1.1.3 The evacuation

When *Leif Roald* ran aground, there was some confusion on board as to what had happened. Initially, the skipper, who had seen no other vessel than the one approaching to port, and who had registered nothing out of the ordinary on the radar, the chart plotter or

the vessel's AIS[1], wondered whether they had collided with an object floating in the sea or a smaller vessel.

It was only when he zoomed in on the chart plotter that he saw Brakan clearly and realised where the vessel had run aground.

Leif Roald's Mayday call on VHF channel 16 was swiftly registered and responded to by Florø Radio.

Dart, which was closest to the grounded vessel, went into position south-east of Brakan. It lit up the area with its floodlights and kept Florø Radio updated. The captain on *Dart* considered launching a dinghy, but decided to remain on stand-by as it became clear that the local SAR vessel was on its way from Kristiansund. This decision was also based on the relatively heavy seas and *Dart*'s loading condition.

On board *Leif Roald*, the main engine was still running. An unsuccessful attempt was made to back off the reef. The skipper gave Florø Radio a brief report on the situation. The crew made it up from the accommodation and were all accounted for. Apart from the skipper, everybody donned a survival suit. These were kept in the wheelhouse. The skipper chose to put on a life vest, as he wanted to be as mobile as possible when launching a life raft on the water.

At one time *Leif Roald* listed so far to port that several of the wheelhouse windows were pressed in. After a while the vessel righted itself a little, but it still had a 30–40 degree list to port. This was an opportunity for the skipper to send up emergency flares, after which he made an attempt to get to the life raft that was stowed on deck. On his way there, he noticed that the net gear had fallen out of the net bin. He saw this as a hazard as there was a risk that he would get snagged. He managed to pass nonetheless, but only to realise that the life raft had already gone overboard and drifted away from the vessel, hanging by its own painter.

Hence, the second raft, stowed on the wheelhouse roof, became their means of rescue. The skipper and one crew member were able to unstrap the raft and launch it on the port side. They cut the painter and pulled the life raft forward and around the bow to the starboard side, to avoid the risk of the vessel's mast dragging down the raft in the event that the vessel listed further to port.

Evacuation was accomplished by the crew jumping into the sea one-by-one and climbing into the raft. The skipper kept count until he, as the last person, untied the raft's painter and jumped into the sea. Once they had all successfully boarded the raft, they were able to get away from *Leif Roald* and Brakan.

1.2 The search and rescue operation

Florø Radio received *Leif Roald*'s distress message on channel 16 at 21:24. The message made it clear that *Leif Roald* had run aground. The vessel had a VHF radio with DSC[2] and GPS[3] positioning, but the DSC function was not activated and all communication

[1] AIS: Automatic Identification System. For electronic identification and/or exchange of vessel information.
[2] DSC: Digital Selective Calling. A standard for sending pre-programmed digitalised messages, ship-to-ship and to onshore bases. In a situation of distress, it is possible to activate a DSC alert button to transmit the vessel's position and identity on VHF channel 70, which is reserved for vessels in distress.
[3] GPS: Global positioning system (satellite navigation system)

was registered on channel 16. There was some uncertainty in the beginning concerning the vessel's call signal and position. The exact position was confirmed by *Dart*. Florø Radio sent the message on to the JRCC-S, where it was registered as an event in the 'distress phase' at 21:26.

The JRCC-S scrambled a Sea King SAR helicopter from Ørlandet base at 21:27 and called on the rescue vessel *RS Erik Bye* to leave Kristiansund and head for the stated position.

Dart remained in position close to the grounded vessel and sent situation reports to Florø Radio and Rogaland Radio, which conveyed the information to the JRCC-S.

In the course of the first 20 minutes, it had been communicated to the JRCC-S that the *Hurtigruten* coastal express steamer *M/S Kong Harald* and the supply vessel *M/S Troms Arcturus* would both be able to reach the grounded vessel by 22:00.

The Sea King helicopter from Ørlandet had approximately one hour's flight from take-off at 21:30. Nordmøre Emergency Medical Communication Centre's (AMK Nordmøre) air ambulance helicopter had taken off from Ålesund with divers on board at 21:45, and communicated the expected time of arrival to be approximately 22:24.

The dive/service vessel *Fosna Poseidon* left Kristiansund at the same time as the rescue vessel. It had also been in port in Kristiansund and had picked up the distress message.

At 22:13 *M/S Kong Harald* communicated that all nine persons on board *Leif Roald* had been observed as having successfully boarded a life raft. By this time, the two vessels that had set out from Kristiansund had arrived at Brakan. The JRCC-S therefore considered it most expedient for these vessels to pick up the shipwrecked crew directly.

At 22:16 *Fosna Poseidon* sent the message that it had taken six persons on board, while the other three were on board *RS Erik Bye*. Both vessels returned to Kristiansund where the rescued crew were set ashore at Vestbase's area and sent on to undergo a medical check.

All other resources were demobilised and the rescue operation concluded at 22:45.

1.3 Weather and sea conditions

1.3.1 Weather forecast for Hustadvika in the evening of 17 January 2015[4]

Wind direction and speed: North-north-westerly fresh breeze, 8-9 m/sec.

Temperature: 5.5 °C

Good visibility (>5 nautical miles)

Wave height: 1-1.5 m

Light conditions: In this position, sunset on 17 January occurred at 15:38 and civil twilight at 16:39.

[4] http://www.yr.no

1.3.2 Observed weather in the evening of 17 January 2015

Dart noted the following weather and sea conditions at Brakan: south westerly wind, moderate gale, some heavy sea, very good visibility.

The wind direction deviates somewhat from the one forecast by yr.no, but concurs with the information provided by the skipper on *Leif Roald*.

1.3.3 Tide

According to the Norwegian Mapping Authority's website www.sehavniva.no and tide graph for Hustadvika, it was about one hour before high tide (191 cm above the chart datum) when *Leif Roald* ran aground.

Figure 3: Brakan, November 2014, around high tide. A provisional navigational installation is in place to the right of the old beacon, as was also the case at the time of the accident. Photo: The Norwegian Coastal Administration (NCA)

1.4 The crew

The crew of nine consisted of a Norwegian skipper/owner, a polish navigator/cook, a Norwegian fisherman, a Norwegian fisherman/engineer and five polish fishermen. On 17 January during the day, the crew, with the exception of the skipper and navigator, had been busy cleaning the engine room. They had the evening off.

1.4.1 Skipper/owner

1.4.1.1 *Qualifications and experience*

Skipper/owner, Norwegian, born 1966. Master Fisherman Class B certificate, last renewed in February 2011 and valid until February 2016.

He attended a safety course for fishermen in 1993 and subsequently took an STCW-95 'gap closing' course for deck officers (90 hours) in connection with renewing his Master Fisherman certificate in September 2005. He had sailed along this stretch of the Norwegian coast several times before, and he thought he had crossed Hustadvika once a year, but this had been in spring and autumn.

1.4.1.2 *Other*

The skipper was tested by the police for blood alcohol content when he came ashore. The test was negative.

A check by the skipper's telecommunications provider of the skipper’s mobile phone records showed no activity at the time of the accident.

1.4.2 Polish navigator/cook

Navigator/cook, Polish, born 1987. Five years' maritime education from Gdynia Maritime Academy, needed approximately another eight weeks’ time of service on board, in order to obtain a navigator's certificate. Had previously been on board the vessel owner's other fishing vessels, and had crossed Hustadvika twice before.

Hired through the same crewing agency as the other Polish crew, the navigator/cook signed on *Leif Roald* for the first time in Tromsø on 12 January 2015.

1.4.3 Norwegian crew

The two Norwegians were both employed as fishermen, but one had the additional task of engineer/mechanic on board. Both were experienced fishermen, knew the vessel well and had attended the mandatory safety course.

1.4.4 Foreign crew

The other five Polish crew members were hired as fishermen or combined deck crew/fishermen. All of them were experienced fishermen with several previous trips on board *Leif Roald*.

They were hired through a crewing agency in Poland, which subsequently confirmed that all crew hired through them are guaranteed to hold valid fire and safety certificates as required for their positions. The common working language on board was English.

1.5 The vessel

Figure 4: Leif Roald while fishing at the Halten Bank in 2014. Photo: Freddy Silden

The fishing vessel *Leif Roald* was delivered as build no 121 from Aas Mek. Verksted AS at Vestnes in January 1983. The vessel had a length overall of 24 metres and had a gross weight of 167 tonnes. The vessel was rigged as a netting vessel.

Leif Roald was sold on to the current owner in September 2007. From 10 September 2007 until 14 January 2008 the owner was registered as Leif Roald AS. On 14 January 2008, the vessel was reregistered to Fruholmen Seafood AS and, on 17 December 2014, it was reregistered to Fruholmen Drift AS.

The fishing vessel trade certificate was last endorsed on 19 November 2013 for the trade area: sea fishing II within Sea area A1-A2. The certificate was valid until 30 June 2016. An intermediate survey of the hull and engine had been conducted on 29 October 2014. No items were outstanding under official orders as of 17 January 2015.

1.6 The shipping company

The ownership company Fruholmen Seafood AS was formed in 2009 and is registered in Tromsø with two employees. As of 17 January 2015, Fruholmen Drift AS operated three fishing vessels: *Leif Roald*, *Nesholmen* and *Svenør*.

In 2010, a consultancy firm was hired by the owner to prepare a training manual for the vessel based on the ISM[5] Code. The manual was available in English on board. After the incident, the training manual was also made available to the AIBN.

1.7 Description of the fairway

1.7.1 Hustadvika

Hustadvika is a stretch of open sea along the fairway between Molde and Kristiansund in Møre og Romsdal county. The waters are shallow with many islets, skerries and reefs and offer no protection against the Norwegian Sea. The lighthouses at Kvitholmen and Bjørnsund mark the northern and southern approach, respectively. There have been a number of shipwrecks at Hustadvika[6].

Sailing directions for Hustadvika can be found in *Den norske los* ('The Norwegian Pilot'). The information reproduced below concerns a northbound voyage, but the information about the Brakan reef gives no room for misinterpretation, regardless of whether one is northbound or southbound:

> *Once you have passed **Austklakken** at Litle Sortna, steer N of Hestskjær lighthouse and either side of Brakan iron beacon. Braken is level with the sea at high tide, but emerges as a black rock of some size at low tide. From Hestskjær going E towards Kristiansund, the fairway is free of rocks etc. provided that you do not get too close to shore and keep clear of the reefs further out.*[7]

The Norwegian Coastal Administration's review of the fairway statistics shows that that there were five groundings at Brakan between 1992 and 2015. The incident with *Leif Roald* was the sixth.

1.7.2 The navigational installation at Brakan

For many years, there has been a navigational installation at Brakan in the form of a three-legged iron structure, marked as a beacon on the nautical charts (see Figure 5).

In 2012, the Norwegian Coastal Administration Mid-Norway started the work on getting new foundations in place for a light beacon at Brakan. The work had to be postponed in 2012 and 2014 because of unfavourable weather conditions. The Coastal Administration Mid-Norway wanted to complete the light beacon at Brakan during the first half of 2015, as soon as the conditions and their own work schedule would permit. The light beacon was completed in July 2015, after the grounding (see section 1.10).

[5] ISM: International standard for safety management
[6] *Store norske leksikon*, Norwegian encyclopaedia
[7] Excerpt from *Den Norske los*, volume 4, Stad – Rørvik, seventh edition, page 193.

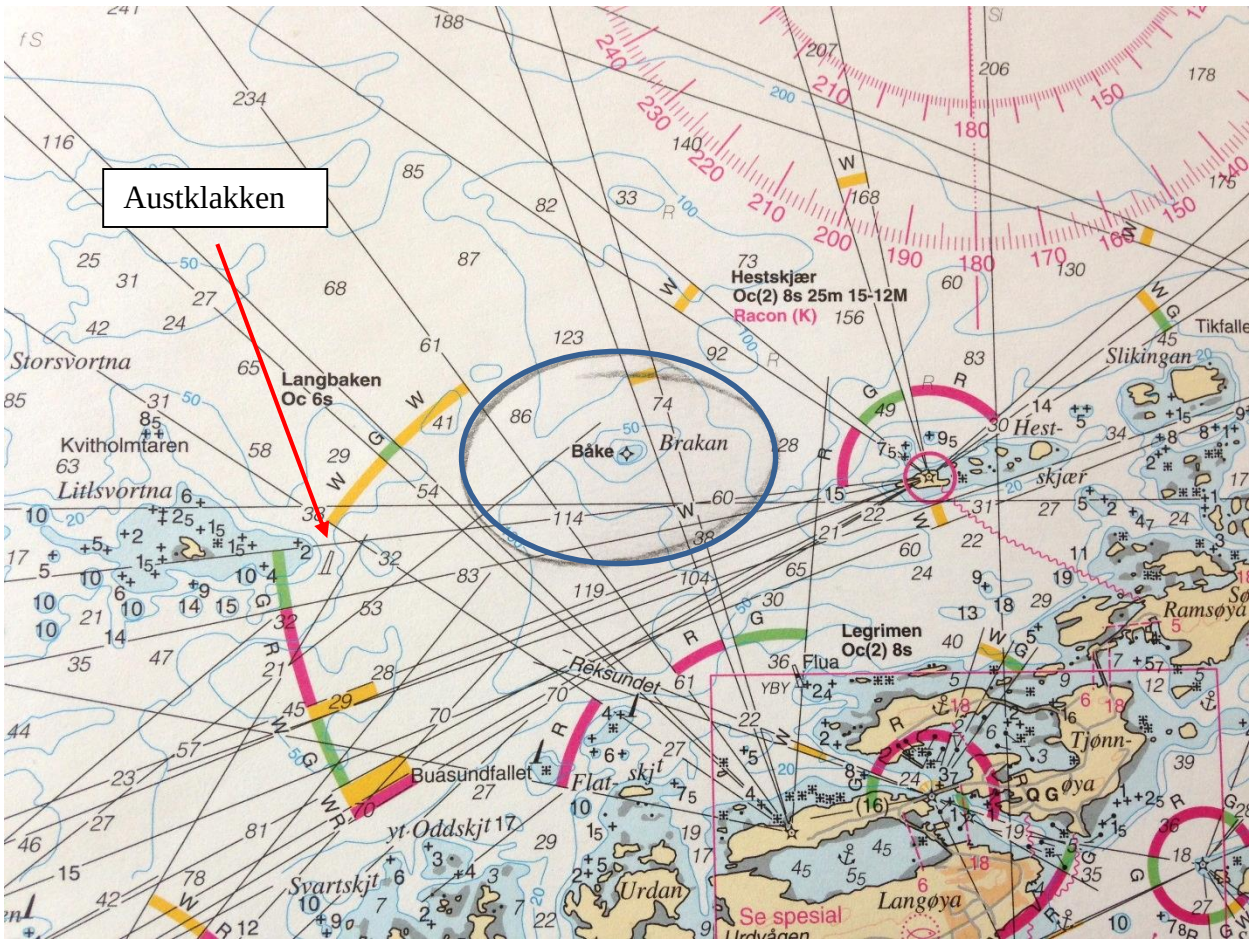

Figure 5: Section of Nautical Chart No 35, the Brakan reef (marked with a blue ring by the AIBN) is marked with a beacon symbol. The red buoy east of Litlsvortna is Austklakken (marked with text and a red arrow by the AIBN). Map: © The Norwegian Mapping Authority. Illustration: AIBN

1.8 Navigational aids and net gear

1.8.1 Navigational aids on board

- Norwegian nautical charts in paper format, the whole series covering the Norwegian coast was renewed 19 November 2013.
- Echo sounder.
- NAVTEX receiver.
- Furuno 1250 3-cm radar with ARPA[8].
- Furuno 10-cm radar.
- Two electronic Furuno fluxgate compasses, one of which was connected to the autopilot. The other was a backup for the autopilot.
- Standard compass.

[8] ARPA: Automatic radar plotting aid. Capable of calculating other vessels' tracks and speed in order to calculate the target's closest point of approach and thus decide whether there is a risk collision.

- Furuno universal AIS.

- Olex chart plotter with software 6.4 and digital vector maps from the German company Chart World International and the Norwegian Mapping Authority's nautical charts from 2006.

1.8.2 Navigational aids used on board immediately before the vessel ran aground

- Olex chart plotter with GPS and AIS receiver, which could be displayed together on a connected 19 inch screen of the make Olorin.

- Furuno 1250 3-cm radar with ARPA function.

- Furuno electronic compass connected to the autopilot, and a standard compass.

1.8.3 How the navigational aids were used

The vessel was on autopilot and the courses were verified by means of the chart plotter. The echo sounder was turned off on 17 January in the evening because the skipper found the light it emitted disturbing at night. The vessel's 3-cm radar was running and was set to 1.5 nautical miles immediately before the vessel ran aground.

The navigator who relieved the skipper had sailed the same waters a couple of times before, on board another fishing vessel owned by the same company. She also followed previous course lines / voyage tracks. She varied the scale on the chart plotter and the distances on the radar. Now and again she noted the vessel's GPS position in the log.

Neither of the navigators had attended a type-specific course to learn about the possibilities/limitations or recommended use of the chart plotter. Nor were there any requirements for such formal training.

The vessel's trading certificate was, among other things, based on the vessel carrying up-to-date nautical sea charts in paper format of the trade area for which it was approved.

The skipper stated that when the vessel was approaching Brakan from the north, he had varied the scale on the chart plotter when crossing Hustadvika.

Figure 6 shows a small-scale Chart World chart of the area in the scale 1:500 000 (overview chart).

Figure 7 shows a large-scale Chart World chart in the scale 1:50 000 (detailed chart).

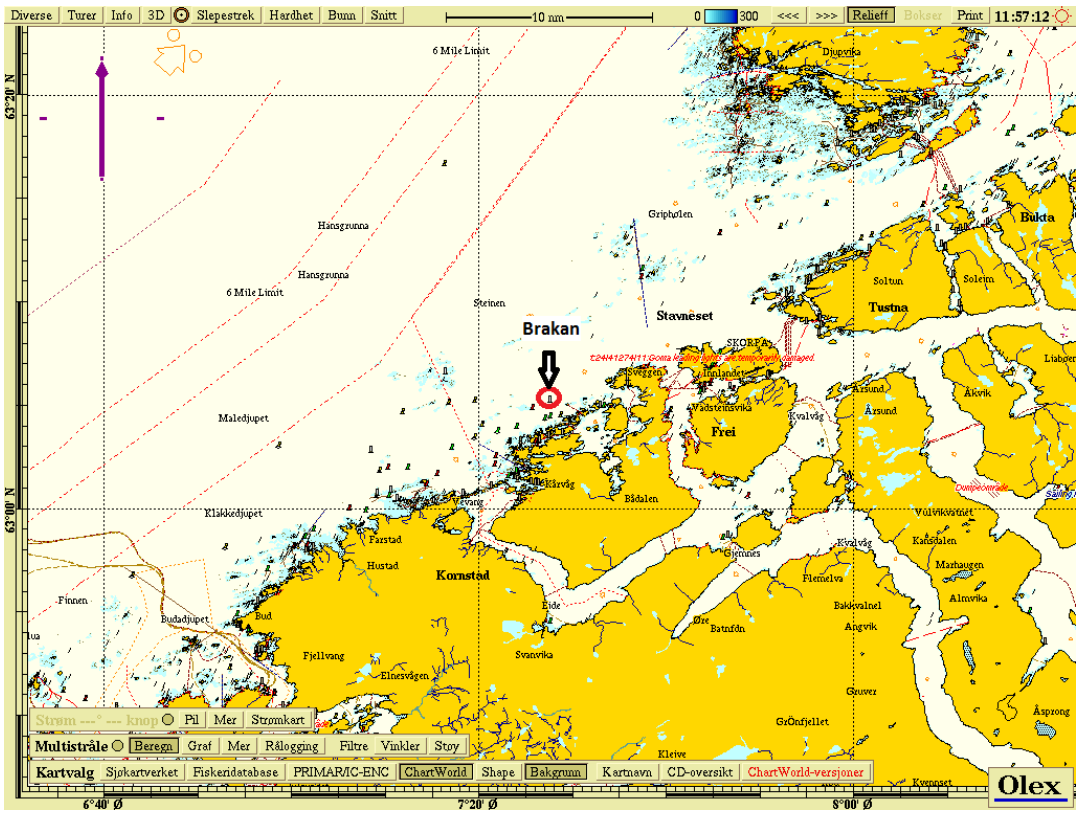

Figure 6: Olex chart plotter with Chart World chart in the scale 1:500 000. Brakan is marked with a red ring and text by the AIBN. Illustration: Olex AS/AIBN

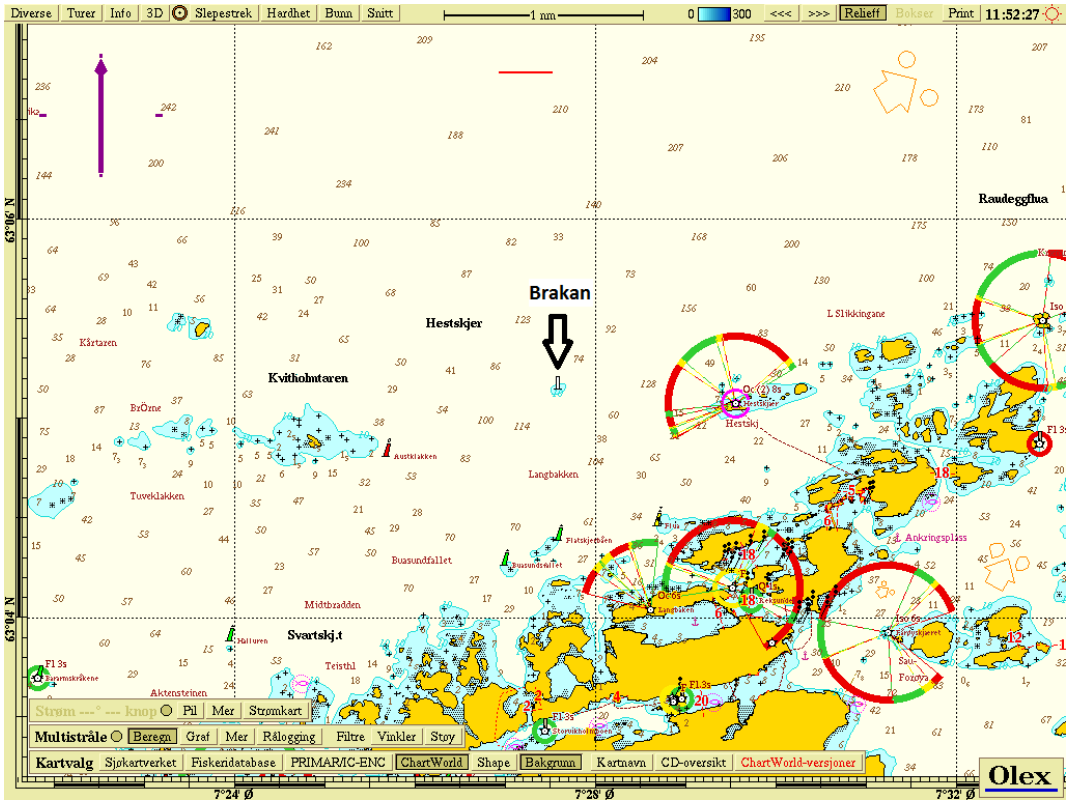

Figure 7: Olex chart plotter with Chart World chart in the scale 1:50 000. Brakan is marked with an arrow and text by the AIBN. The figure also shows how depth contours are marked in blue. Illustration: Olex AS/AIBN

The manufacturer of the chart plotter confirms that depth contours[9] which identifies shallows and seamarks cannot be deselected for any scale of presentation of the charts, suited for navigation purposes. However, the symbol for one's own vessel can appear disproportionately large compared with the seamark symbols, when zoomed out on a small-scale electronic nautical chart. If the electronical chart plotter is not used for navigation purposes but e.g. is used for a general large overview of a whole country, depth contours and seamarks will disappear, while own vessel's symbol will always remain.

1.9 Relevant rules and regulations

The following rules and regulations are relevant to the investigation of this accident:

1.9.1 Regulation of 13 June 2000 No 660 on the construction, operation, equipment and surveys of fishing vessels of 15 m in overall length (LOA) and upwards

In order to be issued with a trade certificate, the vessel must have been approved pursuant these Regulations which set out requirements for, among other things, navigation equipment, nautical instruments and publications that must be kept on board.

1.9.2 Regulations of 22 December 2011 No 1523 on qualification requirements and certificates for mariners (Regulations on Qualifications etc. for Mariners)

The minimum requirement is for one certified navigator who also holds a valid radio certificate for the vessel's trade area. The requirement for an engineer depends on the vessel's engine power. All crew members must have attended approved and up-to-date safety courses for fishermen. Anyone who operates a fishing vessel regardless of size is responsible for crewing the vessel with sufficient certified personnel to undertake the voyage and fish safely.

1.9.3 The Regulations of 25 June 2003 No 787 concerning hours of work and rest on board fishing and hunting vessels

If a vessel has only one certified navigator on board, it must, in principle, drop anchor or be moored at a quay for a total of 10 hours a day in order to meet the requirements for hours of work and rest.

1.9.4 The Regulations of 30 June 1987 No 580 on deck and engine watches on board Norwegian fishing and hunting vessels

These regulations describe the fundamental principles to be observed on the bridge, including planning of navigation and posting of lookouts.

[9] Depth contour: plotted depth curves on a chart, marked in a different colour from other waters on the chart.

1.10 Implemented actions

1.10.1 The Norwegian Coastal Administration (NCA)

The Norwegian Coastal Administration completed the navigational installation at Brakan on 15 July 2015. The beacon is now equipped with a light (white light)[10].

Figure 8: The beacon at Brakan was first lit on 15 July 2015. Photo: The Norwegian Coastal Administration (NCA)

1.10.2 The shipping company

The vessel owner has informed the AIBN that an approved ECDIS system is currently installed on board the vessel they use for fishing at the fishing grounds. The system is of the type Tecdis, and comes with two separate screens and hardware so that the vessel can be exempted from the requirement for carrying up-to-date nautical paper charts on board. The electronic chart portfolio can now be updated in accordance with *Etteretninger for sjøfarende (EFS)* / Notices to mariners, by downloading updates from the internet / received by email.

The skipper/owner has informed the AIBN that he will attend a type-specific ECDIS user course.

[10] Characteristics of the light beacon at Brakan: Character Iso W 2 s, Character time 1+1, Luminous intensity 17.5 cd, Reach 3.2 nm.

2. ANALYSIS

2.1 Introduction

In its analysis, the AIBN relies on the documentation of the sequence of events in the AIS tracking information from the Norwegian Coastal Administration, the descriptions provided by those who were directly involved and the reported observations on board *Dart*. The vessel was seaworthy and in certified condition when it grounded on 17 January 2015.

The analysis has sought to clarify and understand how and why *Leif Roald* ran aground, given the available navigational aids on board. The skipper's situational awareness, navigation procedures and planning are essential factors in this connection. This will be discussed further in sections 2.2, 2.3 and 2.4.

The AIBN does not consider the fact that there was only one certified navigator on board *Leif Roald* to have had any material impact on the sequence of events. The mate had worked regular sea watches so that the skipper had had a sufficient period of rest before he took over the watch in the evening of 17 January. However, the AIBN questions the way the rest of the crew were used. This is discussed in section 2.5.

The whole crew escaped the accident without any serious physical injuries. The survival suits were in an easily accessible place in the wheelhouse, and the whole crew evacuated to a life raft after sending a distress message. Less than an hour passed from the vessel ran aground until the crew were picked up by vessels participating in the rescue operation. Both the evacuation and the rescue operation appear to have been efficient and coordinated, and the AIBN has therefore found it unnecessary to give further consideration to this in its analysis.

2.2 Situational awareness

The point of departure for the AIBN's analysis is that the navigator shall have access to the requisite up-to-date nautical charts, fairway descriptions, lists of lights and beacons, tide tables and other nautical publications as necessary for the planned voyage.

The execution of a safe voyage in complex waters depends on the person(s) set to navigate the vessel having the necessary situational awareness[11]. The most important preconditions for achieving and maintaining a good situational awareness are careful planning of the voyage and that the information flow is challenged and verified en route. Any deviations from the planned route must be properly handled. In the AIBN's opinion, one aid to necessary situational awareness is the use of multiple navigational aids, both in the planning phase and en route.

The skipper had many years' experience of sailing in Norwegian coastal waters and expressed that he felt that the combination of his own knowledge of the fairway and use of the vessel's chart plotter guaranteed a safe journey. If in doubt about the vessel's

[11] 'Situation awareness is the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning and the projection of their status in the near future' (quote from Endsley 1988, p. 97, in Monika Martinussen and David Hunter 'Aviation Psychology and Human Factors', 2008).

position, he had previously stopped completely in order to verify the vessel's position. The navigation procedures are discussed in more detail in section 2.3.

Just before the grounding, one of the other crew members came up into the wheelhouse. At that point in time, the vessel had entered a navigationally challenging stretch of sea. Among other things, the two of them talked about how far they still had to go to reach their destination, Steinshamn. In that connection they changed the scale on the chart plotter so that they had their point of arrival in view (approximately 33 nautical miles as the crow flies).

The variation of the chart scale may explain why Brakan was overlooked. The AIBN also believes that the skipper, while navigating the demanding fairway just before Brakan, may have been further distracted by the presence of a colleague in the wheelhouse whose primary purpose was not to support the navigation.

The skipper did not visually observe the reef before the grounding was a fact. Given that his situational awareness did not extend to Brakan straight ahead on the course line, he did not look out for the seamark that was installed on the reef (see Figure 2).

The beacon was not fitted with a light and it was dark when the vessel ran aground. As from 15 July 2015, the navigational installation on the Brakan reef is in operation with a white flashing light and a reach of 3.2 nm. The AIBN assumes that the skipper could have had a stronger situational awareness of the fairway if this light beacon had been in operation on 17 January 2015.

In the evening of *Leif Roald*'s grounding there were some heavy seas and ocean swells that broke across the reef at Brakan. The AIBN cannot say with any certainty whether it would have been possible to observe the area of the reef break, but believes that the posting of a dedicated lookout would have increased the possibility of noticing the seamark. This is discussed in section 2.5.

In its investigation, the AIBN found that more could have been done to identify the risks associated with the voyage across Hustadvika in the planning phase, something that could have led to greater awareness on the part of the skipper on entering this part of the fairway. This will be discussed further in section 2.4.

2.3 Navigation procedures

The voyage was not followed on the paper charts, neither by plotting positions based on radar bearings nor based on GPS positions. The voyage was checked using the chart plotter and radar, and the navigator's visual observations of the fairway. The second radar was not in operation and the echo sounder was turned off.

Given that the vessel's course and position were not challenged, verified or cross-checked en route, the navigators lacked an optimum understanding of the fairway conditions.

Apart from stating that the skipper was responsible for well-organised sea watches on board, the vessel's training manual provided few practical details on how they should be organised.

The investigation found no evidence to show that this voyage was planned and performed in a substantially different manner from other voyages along the Norwegian coast.

Based on the interviews, the AIBN has formed the impression that the crew saw themselves first and foremost as experienced fishermen who were performing a coastal voyage in order to re-rig their nets before resuming active fishing. The AIBN is of the opinion that the vessel owner should have had more focus on and given priority to including detailed navigation procedures in its operations management system.

The AIBN believes that the ECDIS installation that the owner has started to use on board the fishing vessel *Nesholmen*, requires all users to familiarise themselves with the possibilities and limitations of the system, and the level of awareness it requires. It is true that an ECDIS navigation solution that ensures electronic updating of the nautical chart database exempts the vessel from carrying updated paper charts, but it does not exempt from planning, control, use of other navigational aids and watch-keeping.

2.4 Planning and control of the voyage

In the AIBN's opinion, the planning of a voyage of around 600 nm along the Norwegian coast requires the use of all available navigational aids.

Paper charts, fairway descriptions, lists of lights and beacons, tide tables and other nautical publications were all available for the planning of this sea voyage. However, the route planning of the southbound voyage was based on the chat plotter's stored course lines and tracks from previous voyages, and on plotting new courses en route where they lacked course lines or tracks for the fairway. Positions were irregularly registered en route, and were sporadically jotted down in the log without being plotted on the charts. The vessel headed south immediately after unloading its cargo in Torsken.

Hustadvika is well-mapped and thoroughly described in *Den Norske Los*, and a number of sector beacons and seamarks have been established showing the main navigation channel through these waters. As far as the AIBN has been able to ascertain, the crew were generally informed about the seamarks, including about sector beacons along the coast, but they had little focus on making use of them in the voyage planning or en route.

The AIBN is under the impression that the navigators also did not discuss the voyage ahead in any detail or get the paper charts out to check the course across Hustadvika in connection with the watch change in the evening on 17 January.

The shipping company had not prepared any detailed written instructions on how to plan and perform a voyage. The voyage in question is therefore seen as representative in relation to the vessel's previous operations.

2.5 Use of the crew resources

The skipper had extensive experience of fishing in Norwegian waters and knew the coast well. The mate had some experience of the fairway through which they were sailing. The skipper/owner had arranged for the vessel to sail around the clock by using an extra navigator. However, no use was made of other crew resources to support navigation in this demanding fairway.

At the time of the watch changeover in the evening, the vessel was entering a part of the fairway that, in the AIBN's opinion, should have prompted the navigators to be extra watchful. One solution would have been to use two navigators in the wheelhouse on this

part of the voyage, another would have been to post a lookout. However, the skipper chose to navigate alone.

The deck crew worked day shifts and had the evenings off to get a good period of rest before resuming fishing. Greater focus on the challenges involved in crossing Hustadvika after dark might have led to the organisation of a watch scheme to cover the need for a lookout. This option was not utilised as the skipper had not identified any need for extra manning in connection with the crossing of Hustadvika.

3. CONCLUSION

The investigation has shown that during the decisive minutes before the vessel ran aground, the skipper had his attention on an oncoming vessel at the same time as the vessel no longer followed the course line saved during a previous voyage. As a result, the skipper's situational awareness did not extend to the reef that lay straight ahead.

3.1 Material findings of importance to safety

a) The owner had not established or implemented clear procedures for voyage planning or for how the vessel's crew and navigational aids were to be used en route to keep control of the voyage. These factors can partially explain why a known and marked reef was overlooked.

3.2 Investigation results

3.2.1 Situational awareness

a) The variation of the chart scale may explain why Brakan was overlooked.

b) Given that the skipper's situational awareness did not extend to Brakan straight ahead on the course line, he neither visually nor on the radar looked out for the seamark that was installed there.

c) While navigating the demanding fairway just before Brakan, the skipper may have been further distracted by the presence of a colleague in the wheelhouse.

3.2.2 Navigation procedures

a) Given that the vessel's course and position were not followed on the nautical chart en route, the navigators lacked an optimum understanding of the fairway conditions.

b) Apart from stating that the skipper was responsible for well-organised sea watches on board, the vessel's training manual provided few practical details on how they should be organised.

c) The voyage was regarded as a routine voyage and it was not carried out in a substantially different manner from other similar voyages that the vessel had made along the Norwegian coast.

3.2.3 Planning and control of the voyage

a) Hustadvika is a challenging part of the fairway to navigate, and careful planning and good situational awareness are required to ensure a safe voyage here.

b) The plan for the voyage was to use the chart plotter's stored course lines and tracks from previous voyages.

c) The crew were generally well informed about the seamarks, including about sector beacons along the coast, but it seems that they had little focus on making use of them in the planning or during the voyage.

d) Nautical sea charts, fairway descriptions, lists of lights and beacons, tide tables and other nautical publications that were available on board were not used for the purpose of planning the voyage, identifying dangers to navigation or determining what course to take.

e) In connection with the watch changeover in the evening of 17 January, the navigators did not discuss the voyage ahead. Nor did they use paper charts to check the chosen course for crossing Hustadvika.

3.2.4 Utilisation of crew resources

a) No extra crew was used on the bridge in connection with crossing Hustadvika. An extra crew member actively participating in the navigation and/or posted as a lookout might have challenged the skipper's decision to stay on course for Brakan.

3.2.5 Evacuation and rescue operation

a) The fact that the survival suits were kept in the wheelhouse may have contributed to preventing loss of life.

b) The crew handled the situation after the grounding within the available time window, so that nobody sustained any serious physical injury.

4. SAFETY RECOMMENDATIONS

The investigation of this marine accident has identified one area in which the Accident Investigation Board Norway deems it necessary to submit a safety recommendation for the purpose of improving safety at sea.[12]

Safety Recommendation MARINE No 2016/01T

The fishing vessel *Leif Roald* ran aground at Brakan, Hustadvika on 17 January 2015. The shipping company had not established or implemented clear procedures for voyage planning or for how the vessel's crew and navigational aids were to be used en route. These factors can partially explain why a clearly marked reef was overlooked.

The Accident Investigation Board Norway recommends that the shipping company establish and implement procedures for planning and safe execution of voyages.

Accident Investigation Board Norway
Lillestrøm, 2 March 2016

[12] The investigation report is submitted to the Ministry of Trade, Industry and Fisheries, which will take necessary action to ensure that due consideration is given to the safety recommendations.

DETAILS OF THE VESSEL, THE VOYAGE AND THE ACCIDENT

The vessel	
Name	*Leif Roald*
Flag state	Norway (NOR)
Class society	Unclassed
Call signal	LMXX
IMO number	8406494
Type	Fishing vessel rigged for netting
Building yard	Aas Mek.Verksted AS
Build number	121
Build year/year of delivery	1983/1985
Owner	Fruholmen Drift AS
Construction material	Steel
Main engine	Cummins
Engine power, main engine	470 BHP
Gear system	Finnøy
Propeller system	Finnøy
Length overall (LOA)	24.00 metres
Width	7.00 metres
Draught	3.50 metres
Gross tonnage	167.00
Net tonnage	66.00
Life rafts	2, located on the port side of the deck and on the starboard side of the wheelhouse roof, respectively.
Survival suits	10, kept in the wheelhouse
Life jackets	11, kept in the dayroom
The voyage	
Port of departure	Sandnessjøen
Port of arrival	Steinshamn, Harøy
Type of voyage	Coastal waters
Cargo	In transit / without cargo
Persons on board	9
Information about the accident	
Date and time	17 January 2015 at 21:25 LT
Type of accident	Totally wrecked vessel
Place/position where the accident occurred	Brakan, Hustadvika North, N 63 05.1 / E 007 27.6
Injuries/deaths	No serious personal injuries.
Damage to vessel/the environment	The vessel has sunk, no environmental releases requiring an oil-spill response operation.
Vessel operation	En route along the coast between two Norwegian ports.
Environmental conditions	Fresh breeze, some heavy swells, night darkness, no moonlight but good visibility, no precipitation.