MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

ACCIDENT REPORT

SERIOUS MARINE CASUALTY | REPORT NO 15/2017 | JULY 2017

Serious injury to a deckhand on board *Sea Harvester* (N822) Firth of Clyde, Scotland 3 August 2016

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SUMMARY

On 3 August 2016, a deckhand on board the twin rig prawn trawler *Sea Harvester* (N822) was seriously injured after being struck on the head by a steel pole during the recovery of fishing gear that had become caught on an underwater obstruction in the Firth of Clyde, Scotland. The deckhand was knocked unconscious and was transferred by helicopter to the Queen Elizabeth University Hospital in Glasgow. He suffered serious, life-changing injuries and will require medical care for the foreseeable future.

The MAIB investigation identified that:

- The deckhand was struck by a guide-pole that had been propelled from its socket by the force exerted from the port trawl's wire bridle acting in conjunction with the vessel's motion.
- The guide-pole arrangement was not constructed to be weight bearing.
- The injured deckhand was standing in a dangerous position and his head was not protected by a safety helmet.
- Non-compliance with a number of regulatory requirements had the potential to compromise the safety of the vessel and its crew.
- The underwater obstruction caught by *Sea Harvester*'s trawls was possibly the wreck of the fishing vessel *Karen*, and the wreck's position as shown on Admiralty charts might be inaccurate.

A recommendation has been made to *Sea Harvester*'s owners aimed at ensuring the vessel's future safe operation.

Sea Harvester

FACTUAL INFORMATION

Narrative

At 1630[1] on 3 August 2016, the twin rig trawler *Sea Harvester* (N822) was fishing for prawns approximately 7nm north-west of Ailsa Craig, Scotland **(Figure 1)**. On board were the skipper and five deckhands. The vessel was towing towards the north-west at a speed of 3.5 knots[2]. The wind was from the south at about 23kts and the sea was moderate with waves up to 3.2m high.

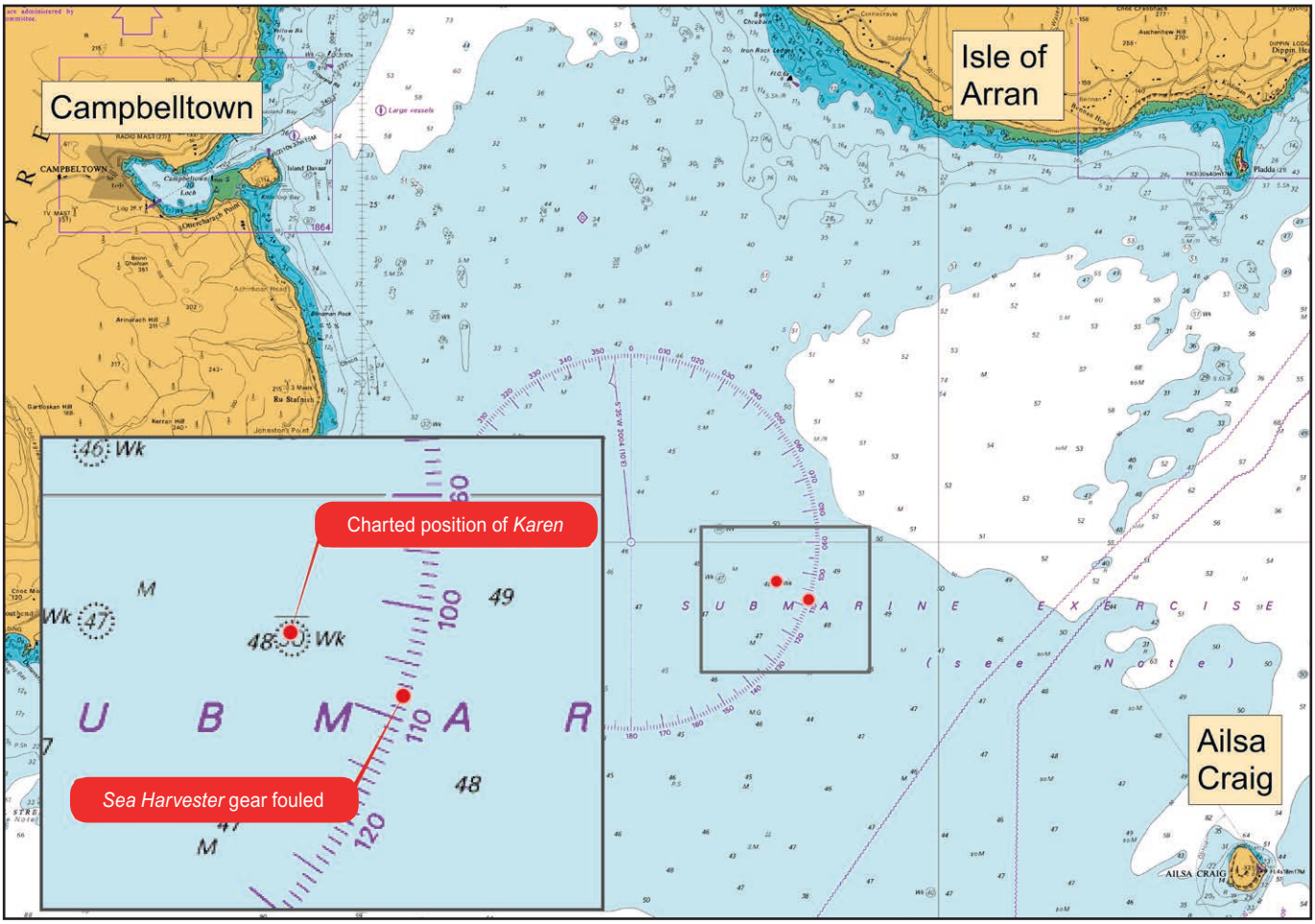

Figure 1: Chart 2126 showing the position of the accident

At 1641, the vessel's speed reduced unexpectedly. The skipper was in the wheelhouse and quickly assessed that the nets had become caught on an underwater obstruction (fastener). He reduced the engine speed and told the deckhands to prepare to haul the nets. The skipper also called the nearby fishing vessel *Bonaventure* (N325) via Very High Frequency (VHF) radio and informed its skipper of the situation. *Bonaventure*'s skipper advised that the fishing gear was probably caught on a wreck.

The deckhands used the trawl winch to heave in the 16mm wire warps and their splits[3] **(Figure 2)**. Two deckhands worked on the aft deck **(Figure 3)** while a third deckhand operated the net drum winch. The other deckhands were also working on deck but were unable to see the deckhands recovering the trawls. One was towards the bow operating the main winch; the other was inside the deck shelter shelling prawns.

[1] All times in this report are UTC (+1).

[2] All headings and speeds in this report are 'over the ground'.

[3] The splits divided the trawl warp into two wires that enabled multi-fishing rig operations.

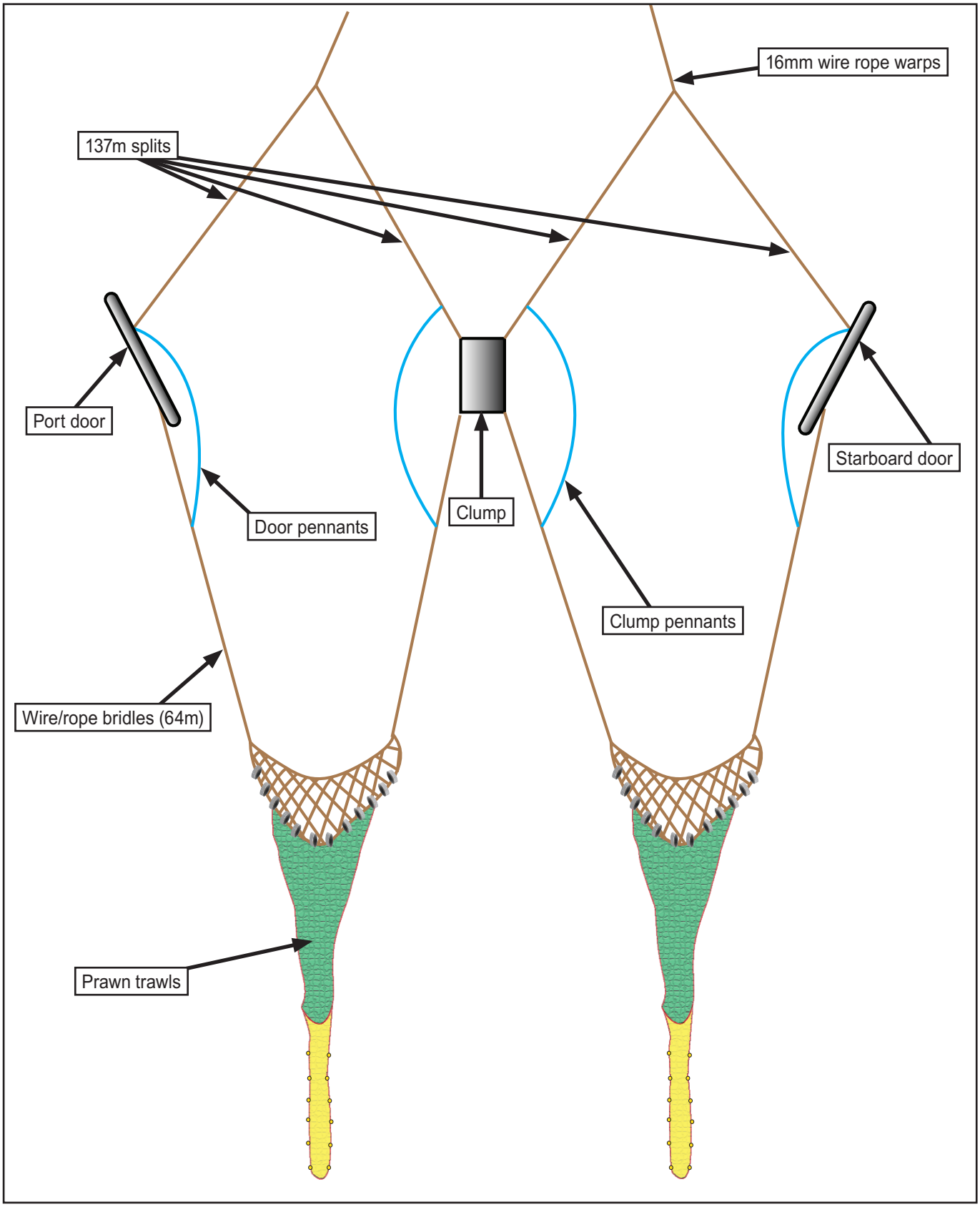

Figure 2: Twin rig gear set-up (not to scale)

Figure 3: Aft deck area showing approximate positions of deckhands

As the warps were heaved on board, the skipper set the engines to 'slow ahead' to keep *Sea Harvester* on a steady heading. He then left the wheelhouse and went to the aft deck. When he arrived, the wires were leading 'up and down', which indicated that the vessel was almost directly above the fastener. The deckhands secured the clump[4] at the stern and then disconnected it from the inner splits.

The skipper saw that the pennant[5] attached to the starboard trawl door was close to the propeller and told one of the deckhands, Aurelian Dinu, to hold it clear. As the skipper then made his way to the wheelhouse to take *Sea Harvester*'s engine out of gear, the door pennant became caught in the propeller and the engine stopped. Shortly after, the lug connecting the inner port bridle to the clump failed and the port clump pennant parted **(Figure 4)**.

Sea Harvester's skipper realised that the propeller was fouled by the pennant so he took the engine out of gear. He then re-started the engine in order to provide power to the winches. The skipper also again called *Bonaventure* via VHF radio and advised its skipper that *Sea Harvester* would require a tow after its gear had been recovered. The skipper was aware that, due to the starboard door pennant fouling the propeller and the inner bridle on the port side having parted, the starboard trawl would have to be hauled on board using only its inner bridle and the port trawl would have to be hauled on board using its outer bridle.

The inner bridle on the starboard trawl was connected to the starboard net drum and the bridle and net were heaved on board. On completion, the port trawl door was secured on board and disconnected.

[4] The clump was a centre weight from which the inner bridle of each trawl was towed.

[5] A short wire cable or chain between the bottom end of the split and the top end of the bridle, which allows the trawl door or clump to be disconnected when hauling and reconnected when shooting.

The port trawl's outer bridle was then connected to the port net drum. *Sea Harvester* was rolling heavily and lying broadside to the sea with the result that the port trawl's outer bridle led over the stern and to starboard. To bring the lead of the bridle and the net perpendicular to the net drum, the guide-pole on the starboard side of the aft gunwale was moved to the centreline socket **(Figure 5)**.

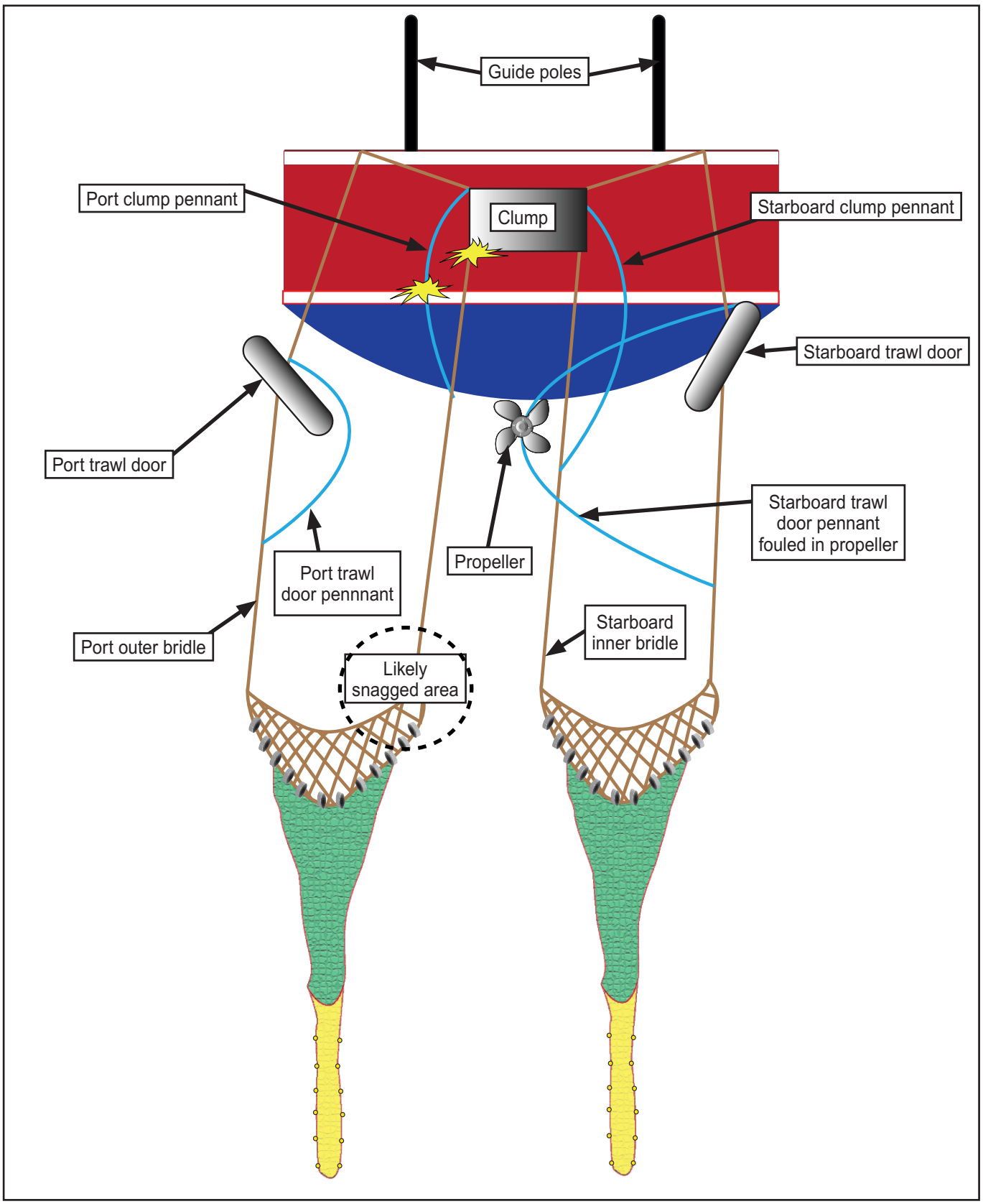

Figure 4: Showing starboard pennant in propeller and failure of port inner pennant and bridle (not to scale)

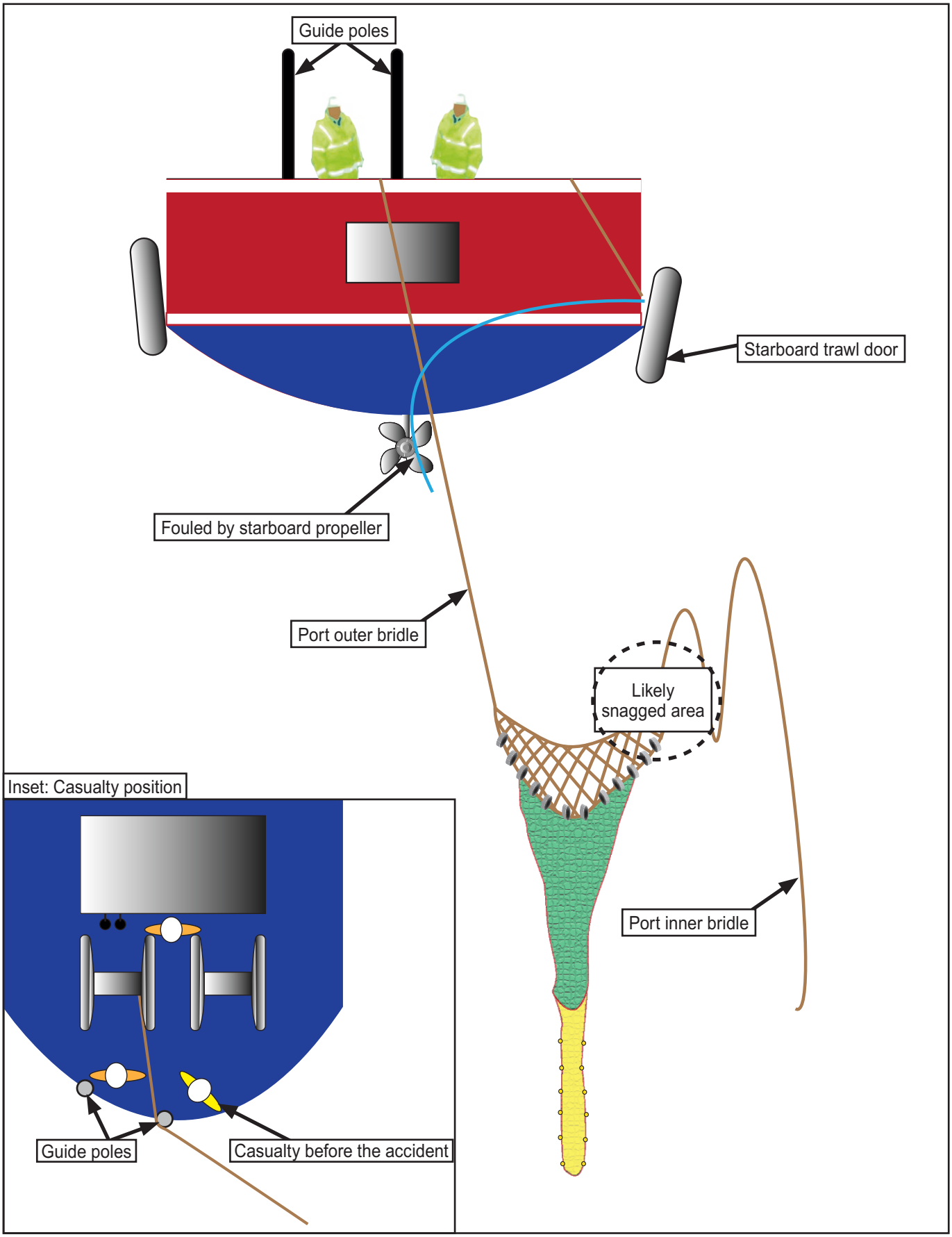

Figure 5: Port trawl retrieval (not to scale)

The two deckhands working on the aft deck were Aurelian Dinu, who was standing on the starboard side of the centreline guide-pole, and a Ghanaian national, who was standing to port. As the port outer bridle and net were winched on board, the deckhands guided them onto the port net drum. The lead of the fishing gear was still to starboard, around the guide-pole on the centreline. As the fishing gear was being recovered the guide-pole was seen to move upwards inside its socket and Aurelian periodically pushed it back down.

The port net was recovered on board and was seen to have a damaged panel, which the skipper assumed was where the trawl had been snagged. He also assumed that, as the water depth was 46m and the length of the port inner bridle remaining in the water was 64m, it would be recovered without difficulty. Consequently, he returned to the wheelhouse and requested *Bonaventure*'s skipper manoeuvre his vessel into position to take a tow.

However, the bridle remained under significant tension around the centreline guide-pole, and the deckhands could only heave it in when it slackened as *Sea Harvester*'s stern dipped into wave troughs. At approximately 1710, the centreline guide-pole suddenly bent and released from its socket. It struck Aurelian on the left side of the top of his head and he immediately fell to the deck. As he did so, his head hit the base of the starboard gallows **(Figure 3)**. It is reported that the guide-pole was lost overboard after striking the crewman.

Post-accident actions

Aurelian Dinu lay unconscious on the aft deck and was bleeding from his head. The other two deckhands in the vicinity immediately alerted the skipper and then moved Aurelian to the galley, where they laid him on a mattress. They also removed his oilskins and boots while trying to stop his bleeding. The skipper informed *Bonaventure*'s skipper of the situation and he alerted Belfast Coastguard. At 1721, the Royal National Lifeboat Institution (RNLI) Campbeltown all weather lifeboat (ALB) and rescue helicopter R999 were tasked to assist.

Sea Harvester was still effectively anchored by the port bridle. To release the bridle, the wire was slackened and then disconnected from the port trawl wing on the net drum. The skipper then advised *Bonaventure*'s skipper that he was no longer caught on a fastener. He also called Belfast Coastguard to expedite the helicopter evacuation due to the apparent severity of Aurelian's injuries. The coastguard advised that R999 was assisting with a mountain rescue and would need to refuel before it could transit to the scene.

By 1733, a tow line had been passed from *Bonaventure* to *Sea Harvester* and the vessels started to head towards Campbeltown. The ALB arrived on scene about 20 minutes later and transferred an RNLI medic and a National Health Service paramedic onto *Sea Harvester*. Aurelian was assessed and was rated '3' on the Glasgow Coma Scale[6] and needed to be evacuated as soon as possible. However the sea was too rough to transfer him to the ALB.

At 1806, the tow was transferred from *Bonaventure* to the ALB to enable a faster passage towards Campbeltown. R999 arrived on scene at 1840 and Aurelian was winched from *Sea Harvester* by stretcher into the helicopter. He was then taken to the Queen Elizabeth University Hospital in Glasgow, where he arrived at 1937.

[6] The Glasgow Coma Scale is used to describe the level of a person's consciousness following a traumatic brain injury. The scale is from '3' (severe) to '15' (mild).

Injuries

Aurelian Dinu suffered a head injury **(Figure 6)** with multiple contusions. Following an emergency craniotomy[7] and the evacuation of contusions, he later had a cranioplasty[8] and a feeding tube inserted. Aurelian's injuries left him faecally incontinent and with a urinary catheter in situ. He was totally dependent on all care and was unable to follow commands.

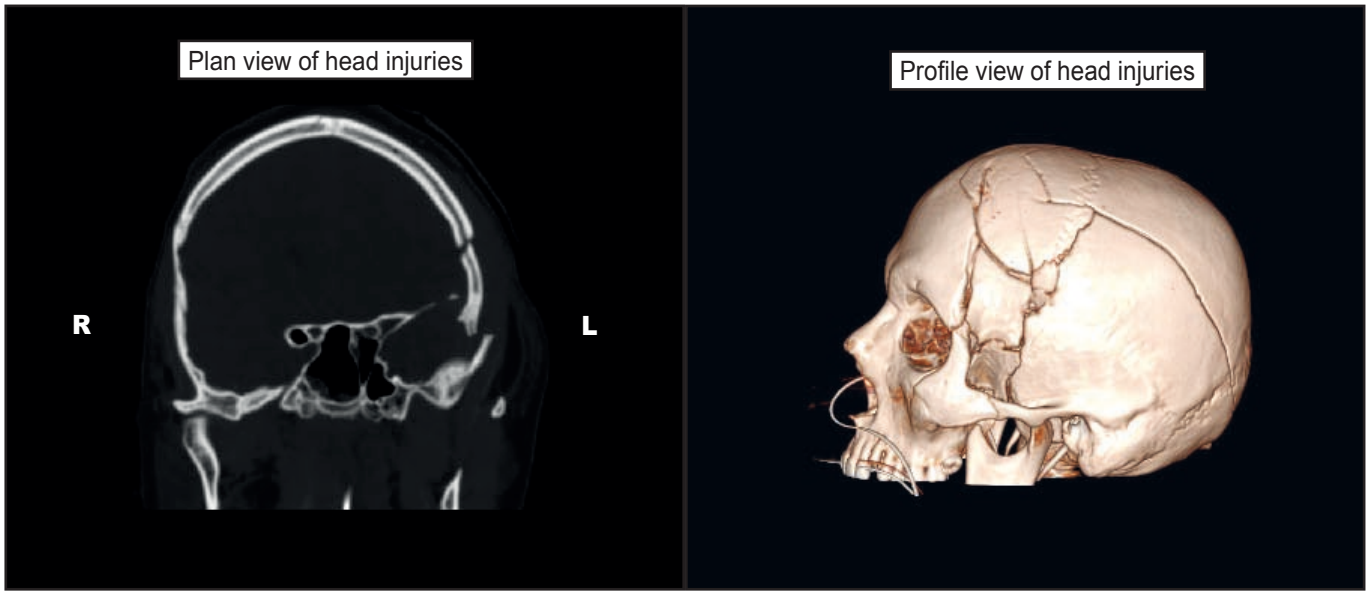

Figure 6: Casualty's injuries

Vessel

Sea Harvester was built as a traditional wooden hulled Scottish seiner in 1968 at Herd and McKenzie shipyard, Buckie. It was later converted to twin rig stern trawling with the addition of towing gallows, a net drum and a power block **(Figure 3)**. The port and starboard prawn trawls **(Figure 2)** were towed with 16mm wire rope warps. Each warp was attached to two 137m wire splits; the inner split led to the clump and the outer splits to the trawl doors. The trawl nets were connected to the trawl doors and the clump by combination (wire/rope) bridles, which were 64m in length and were sheathed with rubber at the net end.

When hauling, steel guide-poles **(Figures 3, 4** and **5)** were used to guide the port and starboard trawls onto the split net drum. Two poles were carried, which were usually fitted into the two outer sockets on the top of the gunwale at the stern. The third socket, located on the centreline, was not usually used. The sockets were 230mm deep with an internal diameter of 54mm.

Following the accident, the guide-pole that remained on board was inspected. The pole weighed 15.5kg and was 1089mm in length. Its diameter was 50mm, but this reduced to 44mm for the last 207mm at one end.

Ownership and crew

Sea Harvester was based in Ardglass, Northern Ireland, and was co-owned by its skipper. The other co-owner was based ashore and also shared the ownership of eight other Ardglass based vessels with their skippers, to whom he passed the responsibility for the vessels' safe operation. *Sea Harvester*'s skipper and the vessel's co-owner also owned *Bonaventure*. They had experienced difficulty in recruiting local fishermen to work as deckhands on board either vessel.

[7] A craniotomy is the surgical removal of part of the bone from the skull to expose the brain.

[8] A cranioplasty is the surgical intervention to repair cranial defects.

Sea Harvester's skipper was a 34-year-old UK national. He was a career fisherman and held a Second Hand Special Certificate of Competency issued in the Republic of Ireland. He also held a UK certificate of equivalent competency that allowed him to skipper UK registered fishing vessels. The skipper had co-owned and worked on board *Sea Harvester* since February 2016. During the investigation, it was apparent that the skipper's knowledge of the regulatory requirements relevant to the operation of his vessel was limited.

The deckhands comprised four Romanian nationals and a Ghanaian. Of these, three of the Romanian nationals, including Aurelian Dinu, had not completed any of the mandatory Seafish training courses[9]. The Ghanaian crewman had completed STCW[10] training in personal survival, firefighting, first-aid and personal safety and social responsibility, but he had not completed a Seafish safety awareness course. All of the deckhands were employed as share fishermen[11] and had worked on board *Sea Harvester* for between 1 week (deckhand shelling prawns) and 6 months (Aurelian Dinu). The deckhands did not routinely wear lifejackets or helmets when working on deck.

Aurelian Dinu was a 30 year old Romanian national who had previously worked on board cruise ships and held an STCW deck officer's certificate issued in Romania. Aurelian had also worked on board *Bonaventure* for 5 months and joined *Sea Harvester* in February 2016. He was considered by the skipper to be dependable and acted as the vessel's mate. Aurelian spoke good English and translated the skipper's instructions for two of the other Romanian deckhands, who did not speak English.

Operating pattern

Sea Harvester typically dredged for scallops in the Irish Sea during the winter and trawled for prawns in the Firth of Clyde during the summer. When fishing for prawns, the vessel sailed from Ardglass on a Monday morning and returned on a Friday evening. It trawled during daylight hours and remained in Campbeltown overnight. On 3 August 2016, *Sea Harvester* sailed from Campbeltown at 0330.

Vessel inspection

Sea Harvester was required to comply with The Code of Safe Working Practice for the Construction and Use of 15 Metre Length Overall to Less than 24m Registered Length Fishing Vessels (MSN 1770 (F)). The Code required vessel's to be surveyed by the Maritime and Coastguard Agency (MCA) every 5 years for the issue of its UK Fishing Vessel Certificate (UK FVC), with a mid-term inspection to verify it was still in compliance with the Code. In addition, the owners were required to carry out self-certification annually and on change of ownership.

Sea Harvester was surveyed by the MCA on 4 July 2013 for issue of its UK FVC.

An MCA inspection on 9 August 2016 following the accident identified 15 deficiencies. These included:

- Annual self-certification not completed since March 2014.
- Additional lifesaving equipment required.
- Line throwers expired May 2014.
- Handheld VHF not operational.
- Admiralty chart not corrected.

[9] New entry fishermen must complete basic safety courses in sea survival, elementary first-aid; fire-fighting and health and safety. Fishermen with 2 years of experience must also complete a 1 day safety awareness course run by the Sea Fish Industry Authority (Seafish).

[10] International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978, as amended.

[11] Share fishermen are paid a share of the profits from the catch rather than a wage.

- No official logbook.
- No record of training/drills on board.
- Risk assessments not seen.
- Crew certification not available.
- Crew not present/drills not done.

The inspection required most of the deficiencies, including the lack of risk assessment, to be completed before the vessel sailed and that the rectification of the deficiencies be confirmed in writing. The MCA did not require to be informed in writing of the completion of the annual self-certification.

Underwater obstruction

On 22 January 2014, the fishing vessel *Karen* (CN88) foundered 11nm south-east of Campbeltown after colliding with the fishing vessel *Sapphire Stone* (B221)[12]. The position of the wreck (55°19.41N 005°19.22W) was reported by Belfast Coastguard to the United Kingdom Hydrographic Office (UKHO) the following day and was subsequently included on Admiralty charts **(Figure 1)**. The wreck was not considered to be dangerous to surface navigation and its position was not verified.

The wreck's position had been manually input onto *Sea Harvester* and *Bonaventure*'s chart plotters, but these positions were not the same as the position shown on the Admiralty charts. The position of *Karen* on *Sea Harvester*'s chart plotter **(Figure 7)** was about 0.5nm to the north-east of the charted position and about 0.5nm to the north of the position in which its gear caught the fastener (55°14N 005°18.38W). The position of the wreck input onto *Bonaventure*'s chart plotter coincided with the position of the fastener. The sources of the positions input on to the chart plotters are not known.

Recent similar accident

In April 2016, a crewman was lost overboard from the fishing vessel *Apollo* (INS 179)[13] as a result of a guide-pole[14] suddenly and violently being pulled from its housing as the vessel was hauling its fishing gear in rough seas. The investigation found no evidence to suggest that the pole hit the crewman. It was concluded that the sudden noise of the pole being pulled out and falling to the deck, combined with the movement of the vessel, probably caused him to lose his grip and fall.

ANALYSIS

Injury mechanism

Aurelian Dinu was struck on the left hand side of his head by a guide-pole that had been seated in a socket sited on the centreline at the top of the gunwale on *Sea Harvester*'s stern. The severity of Aurelian's injuries reflect the weight of the pole and the forces involved.

The pole was propelled from its socket by the force exerted by the port bridle acting in conjunction with the vessel's motion. Although the socket in which the guide-pole was seated was 230mm deep, the pole was not secured. The pole's diameter, which might have been reduced by wear similar to the pole remaining on board, allowed it to rotate and to move upwards. Indeed, the pole had to be pushed down and re-seated by Aurelian several times before the accident.

[12] MAIB investigation report 20/2014.

[13] MAIB investigation report 23/2016.

[14] Referred to as a 'shooting pole' in the *Apollo* investigation report.

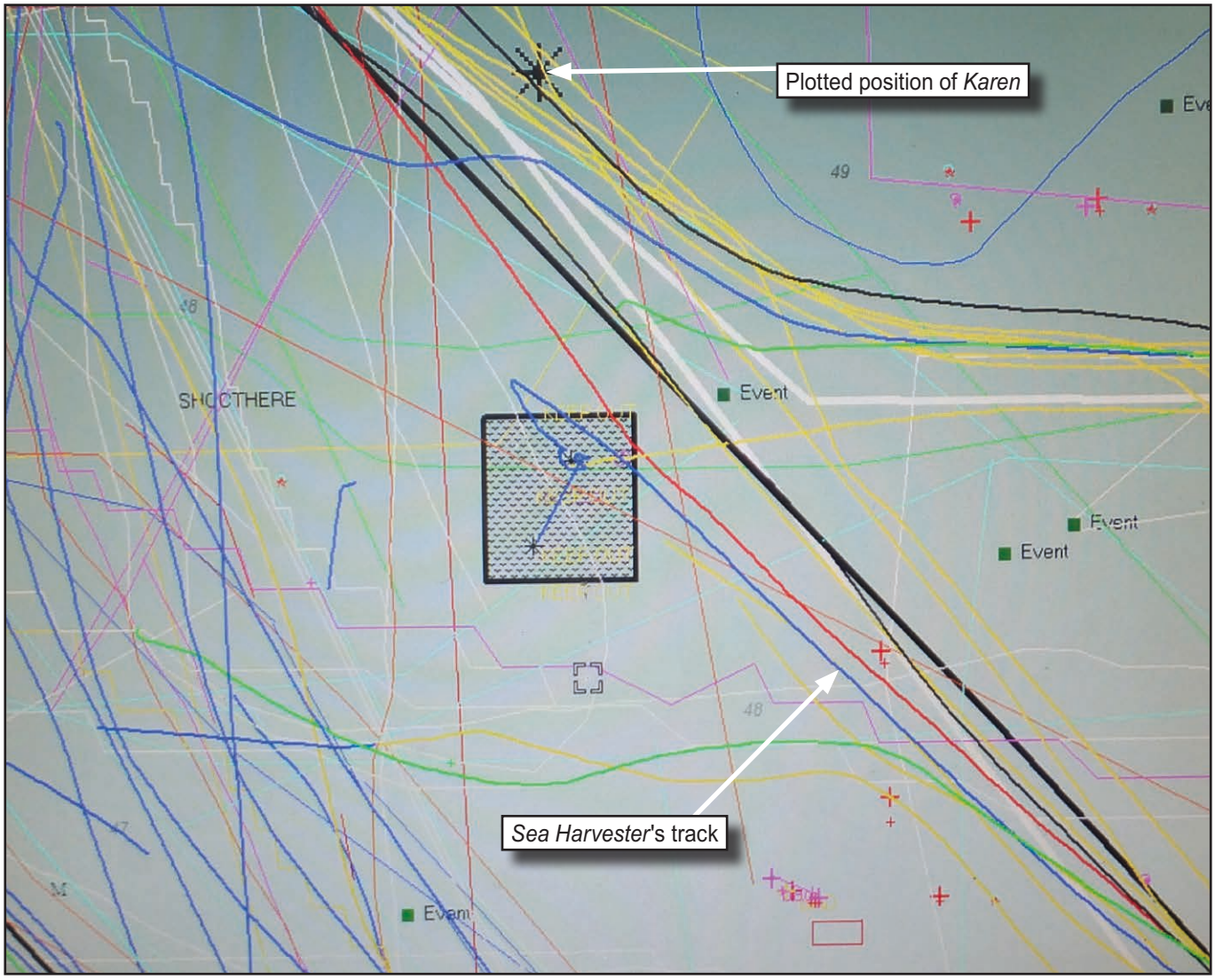

Figure 7: Image of *Sea Harvester*'s plotter

When *Sea Harvester*'s skipper returned to the wheelhouse to arrange a tow, the situation appeared to be under control, with both nets on board. The damage to the port net had indicated that it was the net that had become caught on the fastener, and only the port inner bridle made of rope and wire remained in the water. For the bridle to remain tensioned, it too must have become fouled on the underwater obstruction after the loose end dropped to the seabed when the lug on the trawl door failed and the door pennant parted.

Guide-poles

Guide-poles are used on board many fishing vessels to keep nets perpendicular to the net drum when being hauled. They are intended to 'guide' the nets and, similar to roller fairleads, they are more effective when they are designed to rotate. Some guide-poles fitted to newer vessels are of more robust construction and are designed specifically for the task. However, those fitted to many older vessels, such as *Sea Harvester* and *Apollo*, are not constructed to bear heavy loads.

It is evident that the vulnerability of the guide-poles was not fully recognised by *Sea Harvester*'s deckhands, who had probably only previously used them with the fishing gear under tow and leading almost directly astern. However, the conditions and circumstances on the day of the accident were far from usual and, when significant load came on the centreline guide-pole, induced by the tension in the port bridle, the crew did not recognise the severity of the risk and they remained in potentially dangerous positions.

Personal protective equipment

MGN[15] 311 (F) *Working and Protective Gear for Fishermen* lists safety helmets and lifejackets as essential PPE for fishermen during hauling and shooting operations. However, in common with the crews on board many UK registered fishing vessels, *Sea Harvester*'s crew did not routinely wear either, despite working on deck with heavy loads and tensioned wires in rough seas. In this case, the degree of protection that would have been afforded by the wearing of a safety helmet is uncertain. Nonetheless, some protection, no matter how limited, could have potentially reduced the severity of the horrific, life-changing injuries that Aurelian sustained.

Compliance

Sea Harvester's owners' use of deckhands, who had not completed mandatory safety related training courses and, in some cases, could not speak or understand English, was a commercial expedience taken in response to the unavailability of local, trained, fishermen. The deficiencies identified by the MCA following the accident, particularly with respect to risk assessment and annual self-certification, further reflect the vessel's owners' limited knowledge of, or disregard for, the applicable regulation. Without suitably trained fishermen, risk assessments to identify and mitigate hazards, or self-certification to confirm that safety equipment was compliant with the relevant checklist for the vessel's size, both vessel and crew safety were compromised.

Annual self-certification

In June 2015, following numerous instances where annual self-certifications were either not completed or not available for inspection, the MAIB recommended the MCA to:

> *Amend Marine Guidance Note 502(F) The Code of Practice for the Safety of Small Fishing Vessels to require owners of under 24m fishing vessels to submit copies of their annual self-certification declarations to the regulator.*[16]

The MCA rejected the recommendation on the grounds that its 10 year Fishing Vessel Strategy was to encourage fishermen to take on more responsibility for their safety. However, as evidenced by this case, without such a requirement the completion of annual certificates is likely to remain inconsistent and the potential value of annual self-certification to fishing vessel safety will remain unrealised.

The fastener

It is possible that the underwater obstruction caught by *Sea Harvester*'s trawls was the wreck of the fishing vessel *Karen* **(Figure 1)**, the position of which had not been formally verified by survey. The obstruction was within 0.5nm to the south-east of the wreck's chartered position, and it coincided with the position of the wreck input into *Bonaventure*'s chart plotter, which had probably been based on local knowledge passed on by word of mouth.

If the obstruction was *Karen*'s wreck, then the position of the wreck input into *Sea Harvester*'s chart plotter, which did not coincide with either its charted position or the position shown on board *Bonaventure*, was also inaccurate. Consequently, instead of passing 0.5nm to the south of the wreck as *Sea Harvester*'s skipper intended **(Figure 7)**, the vessel passed directly over it.

The circumstances of the case highlight the benefits of all hydrographic information shown on the charts and manually input onto chart plotters being accurate and up to date. Although *Karen*'s wreck was not dangerous to surface navigation, it was a hazard to fishermen and its position warrants verification.

[15] Marine Guidance Note.

[16] MAIB investigation report 12/2015 (*Ronan Orla*) - Recommendation 2015/129.

CONCLUSIONS

- The deckhand was struck by a guide-pole that had been propelled from its socket by the force exerted by the port trawl bridle acting in conjunction with the vessel's motion.

- The guide-pole arrangement was not constructed to be weight bearing.

- The injured deckhand was standing in a dangerous position and his head was not protected by a safety helmet.

- Non-compliance with a number of regulatory requirements had the potential to compromise the safety of the vessel and its crew.

- The underwater obstruction caught by *Sea Harvester*'s trawls was possibly the wreck of the fishing vessel *Karen*, and the wreck's position shown on Admiralty charts might be inaccurate.

ACTION TAKEN

MAIB actions

The **Marine Accident Investigation Branch** has:

- Issued a flyer to the fishing industry to highlight the safety issues identified in this report.
- Informed the UKHO of the potential inaccuracy of the position of the wreck of the fishing vessel *Karen* shown on Admiralty charts.
- Requested the MCA verify the position of the wreck.

Actions taken by other organisations

Sea Harvester's owners have:

- Modified the securing arrangement for *Sea Harvester*'s guide-poles to reduce the likelihood of them dislodging when hauling.
- Reviewed similar arrangements on other vessels they own together.
- Completed a health and safety risk assessment.

RECOMMENDATIONS

The **owners of *Sea Harvester*** are recommended to:

2017/129 Take steps to promote the safe operation of their vessels, taking into account, among other things, the importance of:

- Crew training.
- The provision and use of personal protective equipment
- Regulatory compliance.

Safety recommendations shall in no case create a presumption of blame or liability

SHIP PARTICULARS	
Vessel's name	*Sea Harvester*
Flag	United Kingdom
Fishing numbers	N822
Type	Twin rig prawn trawler
Registered owner	Private ownership
Manager(s)	Not applicable
Year of build	1968
Construction	Wood
Length overall	19.97m
Registered length	19.06m
Gross tonnage	73t
Main engine	Diesel - Caterpillar 3408C-TA
Power	Permanently de-rated to 221kW
VOYAGE PARTICULARS	
Port of departure	Campbeltown, Scotland
Port of arrival	Campbeltown, Scotland
Type of voyage	Coastal
Cargo information	Not applicable
Manning	6
MARINE CASUALTY INFORMATION	
Date and time	3 August 2016 at approximately 1710 (UTC +1)
Type of marine casualty or incident	Serious Marine Casualty
Location of incident	55° 19.14 N 005° 18.38 W
Place on board	Aft deck
Injuries/fatalities	One
Damage/environmental impact	None
Ship operation	Fishing/hauling
Voyage segment	Mid-water
External & internal environment	Wind: Southerly up to 23 knots. Maximum wave height: 3.2m. Tidal stream:183° at 0.6kt
Persons on board	6