ACCIDENT REPORT

Report on the investigation of

the capsize and foundering of the prawn trawler

Odyssey (FR 70)

in the North Sea approximately 133 nautical miles south-east of Peterhead, Scotland

on 29 October 2024

MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

VERY SERIOUS MARINE CASUALTY REPORT NO 17/2025 DECEMBER 2025

The United Kingdom Merchant Shipping

(Accident Reporting and Investigation)

Regulations 2012 – Regulation 5:

"The sole objective of the investigation of an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame."

NOTE

This report is not written with litigation in mind and, pursuant to Regulation 14(14) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012, shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes is to attribute or apportion liability or blame.

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For all enquiries:

Marine Accident Investigation Branch
First Floor, Spring Place
105 Commercial Road
Southampton
SO15 1GH
United Kingdom

Email: maib@dft.gov.uk
Telephone: +44 (0)23 8039 5500

Press enquiries during office hours: +44 (0)19 3244 0015
Press enquiries out of hours: +44 (0)30 0777 7878

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

°	-	degrees
°C	-	degrees Celsius
AIS	-	automatic identification system
CCTV	-	closed-circuit television
cm	-	centimetre
DSC	-	digital selective calling
EPIRB	-	Emergency Position Indicating Radio Beacon
FISG	-	Fishing Industry Safety Group
HMCG	-	His Majesty's Coastguard
GM	-	metacentric height
GZ	-	righting lever
kW	-	kilowatt
LCG	-	longitudinal centre of gravity
LPM	-	litres per minute
m	-	metre
m^3	-	cubic metre
MCA	-	Maritime and Coastguard Agency
MGN	-	Marine Guidance Note
mm	-	millimetre
MSIS	-	Marine Survey Instructions for the Guidance of Surveyors
MSN	-	Merchant Shipping Notice
nm	-	nautical mile
PFD	-	personal flotation device
RNLI	-	Royal National Lifeboat Institution
SIB	-	Stability Information Booklet
t	-	tonne

TIMES: all times used in this report are UTC unless otherwise stated.

Image courtesy of Fishing News

Odyssey

SYNOPSIS

On 29 October 2024, the prawn trawler *Odyssey* capsized and sank in the North Sea, approximately 133 nautical miles south-east of Peterhead, Scotland. All six crew members abandoned the vessel to a liferaft and were rescued uninjured by a nearby fishing vessel.

The accident occurred after two high-capacity deck wash pumps had been left running, discharging large amounts of water onto the vessel's unattended weathertight shelter deck. The space had drainage via two tonnage valves and one of these likely became blocked, preventing water from draining overboard. As the water accumulated, the vessel developed a list to starboard, leading to a catastrophic loss of stability and rapid capsize.

Although *Odyssey* met all intact stability requirements, the vessel was at a vulnerable stage of the fishing operation with catch in the hopper and suspended gear. The developing list was initially misinterpreted by the crew as being created by the normal operation of recovering the fishing gear, which delayed their recognition of the flooding until it was too late to take corrective action.

The investigation identified that the risk of flooding from deck wash water was not adequately addressed in regulations, industry guidance or vessel risk assessments. Existing vessels fitted with weathertight shelter decks were not required to have independent pumping arrangements preventing water accumulation in these areas, and operational practices had normalised leaving pumps running unattended. There were no facilities to stop the deck wash pumps remotely and no alarms to alert the crew to the developing hazard.

Odyssey's owner's current vessel has local controls for deck wash pumps and dedicated sump pumps on the shelter deck. The owner has also implemented procedures to ensure deck wash pumps are not left running while unattended.

Recommendations have been made to the Maritime and Coastguard Agency to update regulations and guidance to ensure that vessels with weathertight shelter decks have effective additional measures in place to prevent water accumulation.

SECTION 1 – FACTUAL INFORMATION

1.1 PARTICULARS OF *ODYSSEY* AND ACCIDENT

VESSEL PARTICULARS	
Vessel's name	*Odyssey*
Flag	UK
Classification society	Not applicable
IMO number/fishing numbers	A11476/FR70
Type	Twin rig prawn trawler
Registered owner	Odyssey FR70 LLP
Manager(s)	Not applicable
Construction	John Lewis & Sons
Year of build	1979
Length overall	23.1m
Registered length	21.18m
Gross tonnage	148.0
Minimum safe manning	Not applicable
Authorised cargo	Fish
Persons on board	6

VOYAGE PARTICULARS	
Port of departure	Peterhead, Scotland
Port of arrival	Peterhead, Scotland
Type of voyage	Fishing
Cargo information	Fish
Manning	6

MARINE CASUALTY INFORMATION	
Date and time	29 October 2024 at 0530
Type of marine casualty or incident	Very Serious Marine Casualty
Location of incident	133nm south-east of Peterhead
Place on board	Shelter deck
Injuries/fatalities	None
Damage/environmental impact	Loss of vessel
Vessel operation	Recovering nets
Voyage segment	Fishing
External & internal environment	Light airs, 0.5m swell; sea temperature 12°C; air temperature 12°C; poor visibility with heavy fog banks
Persons on board	6

1.2 NARRATIVE

At about 2000 on 26 October 2024, the twin rig prawn trawler *Odyssey* departed Peterhead, Scotland after six days in dock carrying out repairs and sheltering from poor weather. The vessel then headed for the 'Devil's Hole' fishing grounds, approximately 133 nautical miles (nm) south-east of Peterhead **(Figure 1)**.

Image courtesy of OpenStreetMap

Figure 1: Accident location – 'Devil's Hole' fishing grounds

Odyssey arrived at the fishing grounds early the next morning and completed several tows, attempting to establish if a day or night fishing pattern was most effective. On 28 October, the crew rested during the afternoon and shot nets in the early evening, with the first tow yielding a good catch. At about 2300, the nets were shot again with the crew intending to complete one more tow and then rest during daylight hours.

Recovery of the nets started in the early morning of 29 October, with two deckhands attending the winches on the shelter deck during the recovery of the trawl wires. Once finished, the two deckhands left the shelter deck area to help recover the nets and empty the catch. The deck wash pumps were left running, with water discharging to the shelter deck. The starboard side net was emptied into the hopper and stowed on the drum. At this point the hopper was nearly full, and the crew used a broom to push the catch further into the hopper to make room for the catch from the port side net.

As the port side net's cod end was secured to the top of the hopper's A-frame situated on the starboard side of *Odyssey*'s shelter top deck, ready to be emptied, the skipper noticed that the vessel felt different to normal and had developed a small list to starboard. The skipper assumed that the list was caused by the weight of the catch on the starboard side of the vessel and instructed a deckhand to swing the crane to port to try to counter it. When this did not work, the skipper sent another member of the crew to the engine room to configure the fuel valves for transferring fuel from the starboard to port side fuel tanks. On confirming that the engine room was clear, the skipper switched on the fuel transfer pump from the wheelhouse.

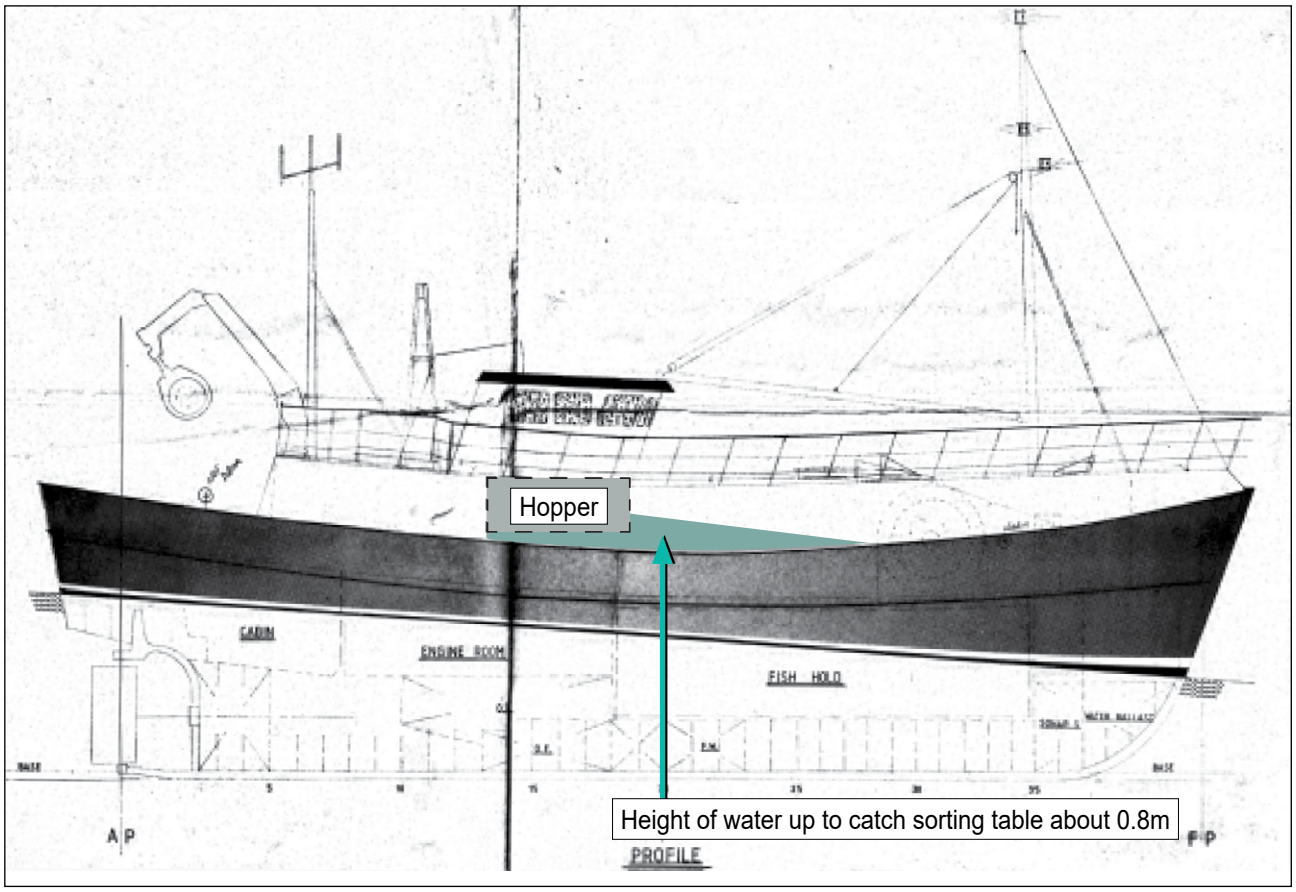
Despite these actions, *Odyssey*'s starboard list continued to develop rapidly to about 15°. A deckhand was sent to investigate and quickly returned, reporting that the shelter deck was flooded with about 0.8m of water up to the catch sorting table on the starboard side and as far forward as the trawl winches and across to the port side **(Figure 2)**. The skipper recognised that the situation was irrecoverable and immediately ordered the vessel to be abandoned. The crew manually deployed the port liferaft canister and two lifebuoys into the water, then jumped into the sea and held onto the canister. The skipper remained in the wheelhouse and attempted to send a digital selective calling (DSC)[1] distress alert, but was unable to reach the radio to activate it due to the rapidly developing list to starboard.

At about 0530, *Odyssey* capsized. The skipper escaped from the port side wheelhouse door, clinging to the side ladder until they ran out of steps and became submerged. They then pushed off and surfaced to join the rest of the crew around the liferaft canister. The skipper instructed one of the crew to pull further on the painter to inflate the liferaft, which was successful, and then all six crew were able to board.

The vessel's Emergency Position Indicating Radio Beacon (EPIRB) self-activated and its alert was detected by His Majesty's Coastguard (HMCG), which instigated a search and rescue (SAR) operation. At about the same time, the skipper of the fishing vessel *Lily Anna*, who had been in contact with *Odyssey*'s skipper shortly before the accident, noticed that *Odyssey*'s automatic identification system (AIS) icon had disappeared from *Lily Anna'*s plotter. *Lily Anna*'s worried skipper then recovered their fishing gear and proceeded to *Odyssey*'s last known position about 3nm away.

[1] A digital alerting system that, on the press of a single button, can send a vessel's identity, position and the nature of its distress to all DSC-equipped vessels and shore stations within range.

Aboard the liferaft, *Odyssey*'s crew heard engine noises and saw the shadow of *Lilly Anna* passing close by through the thick fog. They fired parachute flares and were subsequently recovered with their liferaft on board *Lily Anna*. At 0824, a Norwegian Coast Guard helicopter arrived at the scene and winched a medic down to check on the condition of *Odyssey*'s crew, who were all found to be well. In coordination with HMCG, the crew transferred to the *Grampian Corsair* support vessel later that morning and returned to Aberdeen the following day.



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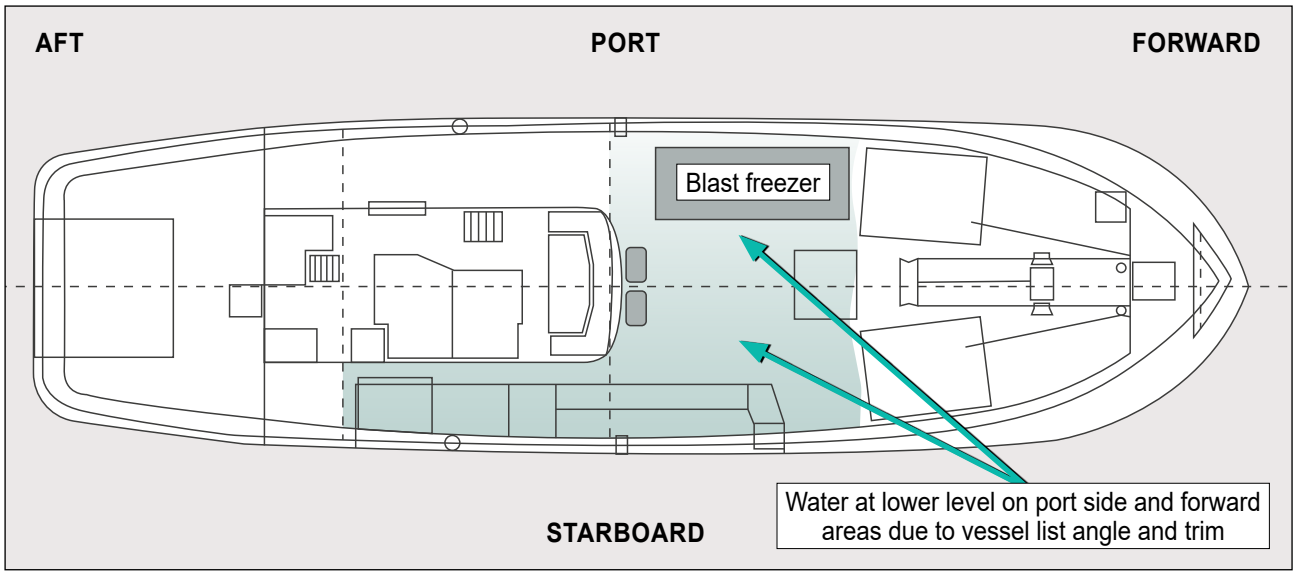

Figure 2: General arrangement, showing the area of flooding

1.3 ENVIRONMENTAL CONDITIONS

At the time of the accident there was almost no wind and a 0.5m swell. Visibility was poor with banks of thick fog passing through the area. The sea and air temperatures were 12°C.

1.4 *ODYSSEY*

1.4.1 Overview and layout

Odyssey was a steel-hulled twin rig stern trawler built in 1979 in Scotland. The vessel was owned by Odyssey FR70 LLP. The skipper, who was one of the owners, ran and managed the vessel on a day-to-day basis. *Odyssey* operated as a prawn trawler and had on board facilities for freezing and storing the catch, enabling later export. The catch from the cod end was landed into a hopper located on the shelter top deck's starboard side. It was then sorted and processed in a three-quarter-length weathertight shelter covering the main deck, which had been retrofitted to the vessel in 1996. The fish hold below the main deck was divided into fresh wet fish storage in the forward section and frozen prawn storage in the aft section. The wheelhouse was on the top deck. The mess room and galley were located midships and aft in the deckhouse on the main deck. The engine room and crew cabin were located aft of the fish hold below the main deck **(Figure 3)**.

1.4.2 The fishing operation

Odyssey worked on a rotation of 8 days at sea and 2 days to 3 days in port. While fishing, the vessel would operate a day or a night routine dependent on the quality of the catch. The duration of each tow was 5.5 hours to 6 hours, and sorting the catch took about 4 hours.

Once the crew had finished sorting the catch in the weathertight shelter deck area, two deckhands would supervise the recovery of the trawl wires onto the winches. They would then go onto the shelter top and aft deck to assist with net recovery and to empty the catch into the hopper **(Figure 3)**. The shelter deck would be left unattended for about 40 minutes during this operation.

After sorting, prawns were frozen in the blast freezer and stored in the frozen section of the fish hold. Any white fish were stored on ice in the cold section of the fish hold.

1.4.3 Crew

Odyssey operated with six crew members. The skipper had worked in the fishing industry for most of their career, with occasional breaks to serve in the offshore sector on oil and gas platforms. The skipper held a UK Class 2 Fishing Certificate of Competency, obtained in 1990.

The five other crew members were all Filipino nationals, four of whom had worked on *Odyssey* in rotation for several years. One crew member had not attended the mandatory safety awareness and risk assessment course for fishermen with over two years' fishing experience. The rest of the crew had completed all the required training.

For illustrative purposes only: not to scale

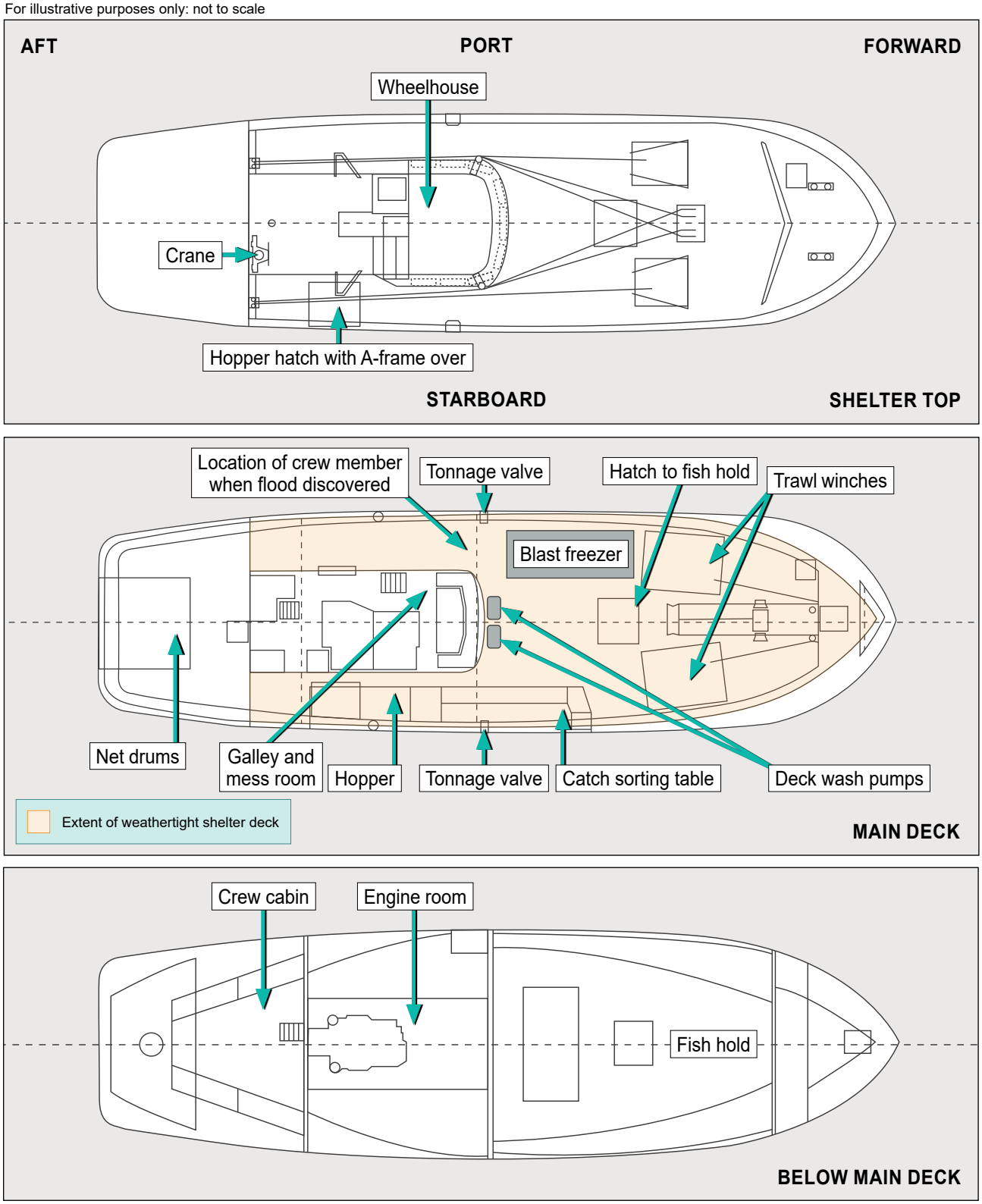

Figure 3: Vessel layout

1.4.4 Risk assessment and drills

The skipper had completed handwritten risk assessments. Generic flooding risks were addressed but did not include hazards associated with the buildup of wash water in the shelter deck. Drills were carried out regularly, including abandon ship and liferaft deployment. Records of the completed risk assessments and drills were kept on board *Odyssey* and were lost with the vessel.

1.4.5 Modification history

Odyssey had undergone several modifications in its lifetime, including:

- 1996 – addition of the weathertight shelter covering the main deck forward of the deck house, known as the shelter deck.
- 2018 – addition of a blast freezer on the shelter deck to process frozen prawns, modifications to the fish hold to accommodate frozen catch and additional permanent ballast to maintain stability compliance;
- 2020 – semi-enclosure of the aft deck to provide additional protection to the crew; replacement of one of two deck wash pumps with a new model;
- 2021 – replacement of the second deck wash pump with a new model;
- 2024 – upgrade of the net drums to larger models.

1.4.6 Safety equipment

Except for the skipper who was in the wheelhouse, each crew member was wearing an inflatable personal flotation device (PFD) at the time of the accident. There were seven lifejackets for abandon ship purposes stowed in the cabin on the lower deck. At the last survey, the Maritime and Coastguard Agency (MCA) had recommended that the abandon ship lifejackets were moved to an easily accessible area above the waterline, but these were still stored in the crew cabin at the time of the accident.

Odyssey was equipped with two eight-person inflatable liferafts, located on the shelter top deck. Both had been serviced in 2024. Only one of the liferafts was deployed during the abandonment and there was no evidence that the second floated free.

1.4.7 Bilge and pumping arrangements

Odyssey was equipped with bilge sensors in the engine room and the fish hold, that sounded alarms in the wheelhouse when activated. Two of the three bilge pumps located in the engine room were electric, each with a capacity of 350 litres per minute (LPM), and one was belt-driven from the main engine with a capacity of 150 LPM. Additionally, there was a submersible pump in both sections of the fish hold, each with a capacity of 350 LPM. No bilge alarms were activated on the day of the accident.

Bilge suctions were located in the engine room and fish hold. There was no direct suction from the shelter deck, but there were ‘slush wells’ in the deck that drained to the engine room bilges. The slush wells had in-line valves between decks that were kept closed unless required.

1.4.8 Shelter deck

Odyssey's weathertight shelter deck[2] enabled the catch to be processed in a sheltered environment and it was accessed via an alleyway on the vessel's port side. There was a catch sorting table on the starboard side of the shelter deck that was about 80cm high and connected to the hopper by a conveyor belt. The shelter deck had three external side openings: two tonnage valves, one each on the port side and starboard side at deck level, and an offal chute on the starboard side that extended to the height of the catch sorting table **(Figure 3** and **Figure 4)**. The forward end of the shelter deck housed the two trawl winches and the hatch leading down to the fish hold, which was kept closed when not in use. Closed-circuit television (CCTV) was installed and set up so the trawl winches could be monitored in the wheelhouse.

While there were no previous accounts of water accumulating on *Odyssey*'s shelter deck on the day of the accident or otherwise, the investigation was provided with anecdotal reports of tonnage valves on other vessels becoming blocked and leading to the build-up of water.

Image courtesy of Graham Buchan Innes (MarineTraffic)

Figure 4: Starboard side openings

[2] A fully enclosed superstructure built over the freeboard deck, fully protected from water ingress and the elements in any sea conditions. A vessel's weathertight shelter forms part of its buoyant structure and therefore contributes to intact stability calculations. Consequently, there are strict regulations about the number and size of openings, such a tonnage valves.

1.4.9 Tonnage valves

A tonnage valve **(Figure 5)** was a non-return flap valve installed in permitted openings in the side of weathertight shelter decks. Designed to drain water from the deck while preventing water ingress from outside, tonnage valves were fitted with a counterweight to ensure the valve functioned up to heeling angles of 15°, and a hand-operated, screw down spindle that enabled them to be shut completely. Tonnage valves were required to be shut when not in use as a vessel's intact stability was only valid when the weathertight shelter's structure remained secure.

Odyssey's crew regularly monitored the status of the tonnage valves to ensure they moved freely. The vessel's tonnage valves were always left free to open, even when not in use for water freeing. The MCA had found six deficiencies in *Odyssey*'s tonnage valves during routine surveys and inspections conducted before 2019, ranging from the valves being *stiff* to being totally seized and requiring replacement.

Figure 5: Example tonnage valve

1.4.10 Deck wash pumps

Odyssey was equipped with two electric deck wash pumps that were used for washing the catch and keeping the deck clear of sand and mud. The deck wash pumps had a combined theoretical capacity of 2,100 LPM at their installed head height. Deck wash pump 1 was a 4 kilowatt (kW) centrifugal pump with a maximum output of 46m³ per hour (767 LPM). Deck wash pump 2 was a 5.5kW centrifugal pump with a maximum output of 80 m³ per hour (1,333 LPM).

Both deck wash pumps were installed at the aft end of the shelter deck near the deckhouse bulkhead. Pump 2 was used solely for deck wash water, but pump 1 could be configured to pump the bilges. When either or both pumps were running, the wash water continuously pumped onto the deck via a discharge that had no local method of isolation. Additional hoses led to the offal discharge chute and the hopper, but both of these were shut off at the time of the accident. The deck wash pumps were operated via switches located in the engine room, and there were no emergency or remote stops.

The crew kept both deck wash pumps running throughout the fishing operation to maximise the available wash water as it was perceived that prawn fishing produced a lot of mud. The pumps were also left running during net recovery when the shelter deck was unattended. The vessel's crew did not know the power or capacity specifications for either of the deck wash pumps.

1.4.11 Stability Information Booklet

At the time of the accident *Odyssey* complied with all the intact stability criteria specified in Merchant Shipping Notice (MSN) 1872 (F) Amendment 1[3]. The vessel had most recently been subjected to an inclining test[4] in March 2024, in the presence of a consultant surveyor and MCA representative. On receipt of the resultant report, the MCA advised it would require *full approval* due to changes in the lightship[5] displacement and longitudinal centre of gravity (LCG). At the time of the accident all checks had been completed and the new Stability Information Booklet (SIB) was awaiting a final stamp and issue.

The vessel had previously been inclined in March 2020, after which a new SIB was produced and underwent cross-checking by the MCA. *Odyssey*'s extant SIB, approved in May 2020, included an MCA-endorsed stability supplement containing the March 2024 incline test report and results. *Odyssey*'s SIB and the supplement issued while awaiting the final issued 2024 SIB contained the seven conditions for intact stability required by MSN 1872 (F) Amendment 1, all of which had been met. In line with MCA policy, *Odyssey* was required to undergo an incline test at each renewal of its 5-yearly Fishing Vessel Certificate due to low margins on one of the required intact stability conditions.

The working instructions section of *Odyssey*'s 2020 SIB highlighted the danger of water on deck and the importance of ensuring the vessel's freeing ports were clear:

> *Loose water on deck can cause a significant loss of stability due to its ability for transverse movement. Freeing ports and scuppers should be regularly checked for obstructions that may impair their operation.*

The unpublished 2024 SIB further stated:

> *In the event of a build-up of water occurring in the processing spaces, the water supply should be stopped immediately until the deck has been cleared.*

And:

> *In conditions 3, 4 and 6 the hopper should be loaded with caution, and emptied quickly before re-commencing fishing operations as stability may otherwise be dangerously reduced.*

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[3] SN 1872 (F) Amendment 1: The Code of Safe Working Practice for the Construction and Use of Fishing Vessels of 15m Length Overall to less than 24m Registered Length.

[4] A physical test conducted with the subject vessel afloat and in a known, lightly loaded condition. Known weights are moved by known distances across the deck in sequence and the resultant angle of heel measured to calculate the metacentric height (GM), which determines the vessel's stability and centre of gravity. The vertical centre of gravity position and the vessel's stability characteristics can then be derived by calculation.

[5] The total weight of a vessel without any variable loads such as crew, catch, fuel, fresh water or ballast.

1.4.12 Stability assessment

The investigation commissioned a stability assessment of *Odyssey* from the University of Southampton's Wolfson Unit for Marine Technology and Industrial Aerodynamics (Wolfson Unit) to determine the likely cause of the capsize and foundering. This was achieved by modelling the vessel in its likely pre-accident condition and then applying different levels of floodwater to the shelter deck.

The investigation determined the likely loaded condition at the time of the accident using the 2024 SIB and witness accounts. This included a quantity of about 0.5 tonne (t) of frozen prawns from the current and previous fishing runs. Immediately before the floodwater was discovered, the vessel had between 0.25t and 1t of catch in the hopper on the shelter top deck's starboard side; the port side net was hanging over the hopper from the A-frame with a similar quantity of catch in it; and the crane was fully extended and swung out to the vessel's port side.

Specialist stability software used a combination of previous models obtained by the investigation and data from the 2024 SIB supplement to create a digital model of *Odyssey*. All seven mandatory conditions were checked against the 2024 SIB report and results to verify the model's accuracy. The vessel's crane was integrated into the model using data obtained from the manufacturer to determine its effect on stability when in use.

The Wolfson Unit report's executive summary stated:

> *A digital stability model of F/V Odyssey was developed from data supplied by MAIB and validated against the latest hydrostatics and stability information available for the vessel. Subsequently, various features were modelled to enable the loss analysis, including the shelter space, the onboard crane, the catch hopper and the A-frame. The starboard side tonnage valve and fish gut chute were also input to the model as potential downflooding points, to enable calculation of their freeboard and angle of immersion.*
>
> *Initially, the stability was assessed over a range of conditions representing the vessel's probable loading near the time of its loss, assuming between 0.25 and 1t catch in the hopper and between 1.25 and 2t suspended from the A-frame. These initial calculations assumed no flood water in the shelter. At 2t suspended load, the vessel failed the intact stability criteria declared in its latest stability information book. At the other loading conditions assessed, the vessel complied with the stability criteria by a small margin.*
>
> *Subsequently, the stability was assessed at the probable loading condition at the time of the accident, with catch in the hopper and suspended load in the middle of their respective ranges, and at various levels of flood water in the shelter.*
>
> *These calculations indicate that, as the shelter flooding increases, the vessel's starboard list increases and so does its vulnerability to additional heeling moments. With 12m³ flood water in the shelter, both the starboard tonnage valve and the fish gut chute would become immersed and the vessel's predicted equilibrium heel angle would exceed 20 deg. Such large heel angles would potentially result in loose onboard weights such as catch, gear etc. shifting to the low side, thus exerting an additional heeling moment. With 32m³ flood water in the shelter, a heeling moment of ~40 tm[6] (ie equivalent to 12.5 tonnes shifting by 3.2 metres, or half the beam) would overwhelm the vessel.*

[6] Tonne metre – the moment created by a force of 1t acting at a distance of 1m from a pivot point.

The Wolfson Unit's report concluded that:

> *4m³ of flood water would cause the immersion of the tonnage valve[7], whilst the fish gut chute would maintain a positive freeboard. With 12m³ shelter flooding, the tonnage valve would be approximately 800mm underwater and the fish gut chute would be at the equilibrium waterline.*

And that:

> *The digital stability model exhibits an angle of loll[8] when the shelter is flooded. Since the model has a small initial list to starboard in that condition, any flood water would accumulate to starboard, further increasing the equilibrium heel.*

1.5 REGULATION AND GUIDANCE

1.5.1 General

Odyssey was built and modified to meet the requirements outlined in the Fishing Vessels (Safety Provisions) Rules 1975. At the time of the accident the vessel was required to comply with MSN 1872 (F) Amendment 1 and met the definition of an 'existing vessel', which allowed access to certain grandfather[9] clauses.

1.5.2 Bilge pumping requirements

In line with MSN 1872 (F) Amendment 1, *Odyssey* was required to have at least two separate bilge pumps with a minimum total capacity of 16.5m³ per hour and an efficient means for removing water from any compartment below the weather deck (excluding tanks). MSN 1872 (F) Amendment 1 required new vessels with watertight compartments into which processing or wash water was introduced to:

> *…be provided with an independent pumping capability, regardless of whether scupper valves or similar are fitted. The pumps shall have a capacity of at least 1.5 times the wash water supply. Where pumping arrangements are intended to cater for solid waste, discharge shall be arranged via local sumps with pumps suitable for pumping fish waste products.*

This requirement for additional pumping arrangements became mandatory in 2017 when MSN 1872 (F) was published, but did not apply to *Odyssey* as an *existing vessel*.

1.5.3 Shelter deck arrangements

On watertight and weathertight integrity, the MCA's Marine Survey Instructions for the Guidance of Surveyors (MSIS) 27[10] specified the requirements for water freeing from weathertight shelters.

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[7] Calculations indicated that the tonnage valve would submerge at a heel angle of 7.3°.

[8] The position a vessel takes when it is in an unstable condition with a negative metacentric height, causing it to heel over to either port or starboard.

[9] A provision that allowed existing vessels to continue to comply with older regulations after new ones had been introduced.

[10] MSIS 27 Survey and Inspection of Fishing Vessels: Chapter 2, section 2.23.

Odyssey's shelter deck was expected to have a maximum of two deck-level openings, one on each side. Each opening was to have maximum dimensions of 250mm by 150mm and be fitted with a tonnage valve. MSIS 27 highlighted that surveyors:

> *…should ensure that the shelter remains intact at all times such as to provide the assumed contribution to the stability of the vessel.*

Further, that:

> *Difficulties have arisen on some vessels fitted with such shelters in regard to disposal of trash and wash water and this has led to several instances of holes being cut in the shelter sides.*

The solutions proposed for acceptable means of disposal included using a trash pump, a bulwark level chute with flap valves and upper closure, or disposal through the aft end of the shelter. Any waste or offal chutes were required to include an automatic valve with a local means of closure. There was no regulation or guidance on the specification and disposition of wash water pumps installed on shelter decks.

1.5.4 Tonnage valves

The requirements for tonnage valves outlined in MSIS 27 Chapter 2 stated that:

(a) an automatic non-return valve should be fitted at the shell. Valve to be balanced and capable of remaining closed at 15° heel. In order to fulfil the required functions, the fitting should be similar to a storm valve, i.e. with flap hinged at upper edge such that the angle of the seat and weight of the flap ensures that the valve remains closed until 15° heel preferably without need for external balance weights, and provides positive non-return operation (commonly referred to as a tonnage valve). The valve should be of steel, bronze or other ductile material and of substantial construction having regard to its function as part of the weathertight superstructure;

(b) the gross size of opening should not exceed 250mm x 150mm.

(c) the bottom of the opening in way of the valve should not be submerged in still water in any anticipated condition of loading at an angle of heel less than 10°.

(d) the operating spindle should not be less than 600mm above the deck. Positive means of securing the valve in the closed position should be fitted in association with the extended spindle.

(e) a notice to be provided above the valve indicating that it should be kept securely closed except when in use. Similar reference should be made in the Stability Booklet.

(f) only one valve on each side of vessel may be fitted.

1.5.5 Stability

Chapter 3 of MSN 1872 (F) Amendment 1 required *Odyssey* to be supplied with approved stability information to the satisfaction of the MCA, covering all conditions of service for which the vessel was intended. Annex 3 expanded on this requirement, detailing the seven stability conditions that must be calculated to represent each stage of a voyage.

The SIB was required to provide 'working instructions' that included statements about the quick stowage of catch below deck and the potential effect of water build-up on deck. MSN 1872 (F) Amendment 1 also required vessels to be *sufficiently stable when intact in the conditions of service for which they are intended* and for each condition to meet the intact stability requirements of the curve of righting levers (GZ). MSN 1872 (F) Amendment 1 further required that the skipper *shall take the precautionary measures necessary to maintain adequate stability of the vessel*.

To verify that a vessel's approved SIB remained current, MSIS 27 required that a lightship survey was conducted every 5 years. A change of 2% or more in the vessel's lightship weight or a 1% or greater change in the LCG would indicate a potential reduction of the vessel's stability reserves and therefore a need to measure the new lightship displacement and centre of gravity position through a new inclining test. Additionally, a vessel with low margins in one or more of its seagoing conditions would require an incline test and a new approved SIB.

1.5.6 Flooding guidance

The MCA's Fishermen's Safety Guide highlighted the danger of free surface effect caused by loose water *rushing from side to side* and the need to *Keep all scuppers and freeing ports clear at all times*. The guide also emphasised the risk of swamping the working deck, which can raise the effective centre of gravity and *reduces the freeboard and so increases the vulnerability of further swamping*.

Section 6 provided guidance on hull damage, taking on water and sinking and highlighted several risks, including:

- *Flooding occurs unnoticed*
- *Vessel stability compromised due to water coming into the vessel leading to rapid capsize*

The control measures to minimise these risks included:

- *Be aware of the impact of water in a compartment or compartments on stability*
- *Have an action plan to deal with flooding; when to abandon ship should be considered*
- *Check unattended spaces regularly*
- *Ensure non-return valves are operational and not jammed open, never remove them*
- *Ensure freeing ports are clear and in appropriate locations*

Section 6 also provided a flood action plan template that included generic examples of what steps to take in a flooding event. There was no specific guidance on deck wash or water freeing from weathertight shelters.

Marine Guidance Note (MGN) 165 (F) – Fishing Vessels: Risk of Flooding provided guidance on bilge systems, including the regular testing of bilge alarms to facilitate early detection and additional equipment that might be carried to assist with clearing floodwater. MGN 165 (F) did not highlight the risks of flooding from wash water pumps or specifically identify shelter decks as an area of interest.

The Fishing Industry Safety Group (FISG)[11] Home and Dry online safety campaign[12] included various safety guidance videos on its website, including the dangers of loss of stability and free surface effect. Similarly, the Royal National Lifeboat Institution (RNLI) provided guidance on flooding and stability on its website and in online videos. None of these resources highlighted the risks of wash water or internal flooding on shelter decks.

1.6 SIMILAR ACCIDENTS

1.6.1 *Louisa* – foundering, with loss of three lives

On 9 April 2016, the 17m creel vessel *Louisa* foundered while anchored in Mingulay Bay, Outer Hebrides, Scotland, resulting in three fatalities (MAIB Report 17/2017[13]). The vessel flooded overnight, and the crew remained unaware because bilge alarms had been silenced. The investigation found that the likely cause of the flooding was a deck wash hose, the pumps for which had been left switched on. *Louisa*'s owners were recommended to conduct formal risk assessments appropriate to the vessel's anticipated range of activities.

1.6.2 *Angela* – capsize and foundering

On 6 February 2000, the 17m twin rig stern trawler *Angela* foundered when the weathertight shelter deck flooded shortly after the catch was recovered into the hopper (MAIB Report 14/2001[14]). The possible causes of the flooding included wash water accumulation with a blocked tonnage valve or a seized open tonnage valve that allowed water to flood in from outside when the vessel heeled over.

1.6.3 *Njord* – capsize and foundering

On 6 March 2022, the 26.56m stern trawler *Njord* capsized and foundered while processing a large haul of fish. All eight crew members entered the water, one of whom lost his life before he could be rescued (MAIB report 2/2025[15]). The vessel experienced progressive flooding after the weight of fish in the net, which was secured to the vessel's side, caused it to list sufficiently for downflooding to occur.

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[11] The FISG was set up with the goal of zero preventable deaths on fishing vessels and includes the MCA, fishermen's associations, RNLI and Shipbuilders & Ship Repairers Association.

[12] Home and Dry is a safety campaign and website run by FISG to share vital fishing safety information and guidance with fishers.

[13] https://www.gov.uk/maib-reports/sinking-of-vivier-creel-boat-louisa-with-loss-of-3-lives

[14] https://www.gov.uk/maib-reports/capsize-and-sinking-of-twin-rig-trawler-angela-78-miles-east-north-east-of-peterhead-scotland

[15] https://www.gov.uk/maib-reports/capsize-and-sinking-of-fishing-vessel-njord-with-loss-of-1-life

SECTION 2 – ANALYSIS

2.1 AIM

The purpose of the analysis is to determine the contributory causes and circumstances of the accident as a basis for making recommendations to prevent similar accidents from occurring in the future.

2.2 OVERVIEW

Odyssey capsized and foundered after the weathertight shelter deck was flooded by the vessel's deck wash pumps that continued to discharge water onto the unattended shelter deck. By the time the crew realised there was a problem, it was too late to save the vessel. The analysis will examine the accident, weathertight shelters, on board operations and the abandonment.

2.3 THE ACCIDENT

2.3.1 Stability

Before *Odyssey* capsized, floodwater was observed to have accumulated to the top of the catch sorting table within the shelter deck **(**see **Figure 2)**. There had been no indication of flooding elsewhere on the vessel as the engine room was checked and no bilge alarms had sounded. The hopper contained catch from the starboard side net and the port side net was hanging from the A-frame ready to be emptied. The crane was fully extended to the port side to counter the developing list to starboard.

Stability modelling indicated that as little as 4m³ of water on the shelter deck created a loss of stability, reducing the vessel's ability to recover and increasing the vulnerability to capsize. As the vessel listed unsecured items likely shifted to starboard, further increasing the heeling moment. Additional water could also have entered through the offal discharge chute as it became submerged. It was calculated that 32m³ of floodwater would produce an overwhelming heeling moment, enough to capsize the vessel. *Odyssey*'s operational condition at the time raised its centre of gravity, reducing the metacentric height and the area under the righting arm curve **(Figure 6)**. This in turn shortened the time and volume of water required to capsize the vessel. *Odyssey* complied with the intact stability requirements in MSN 1872 (F) Amendment 1 as demonstrated by the recent stability assessment conducted after the structural modifications were carried out. This was confirmed by the stability assessment carried out by the Wolfson Unit during the investigation. While the SIB highlighted the risks associated with a full hopper and the importance of stowing catch promptly, there was probably little scope to increase the speed of that part of the operation.

Odyssey capsized and foundered after a significant amount of water accumulated on the shelter deck, creating an overwhelming heeling moment and catastrophically reducing the vessel's stability.

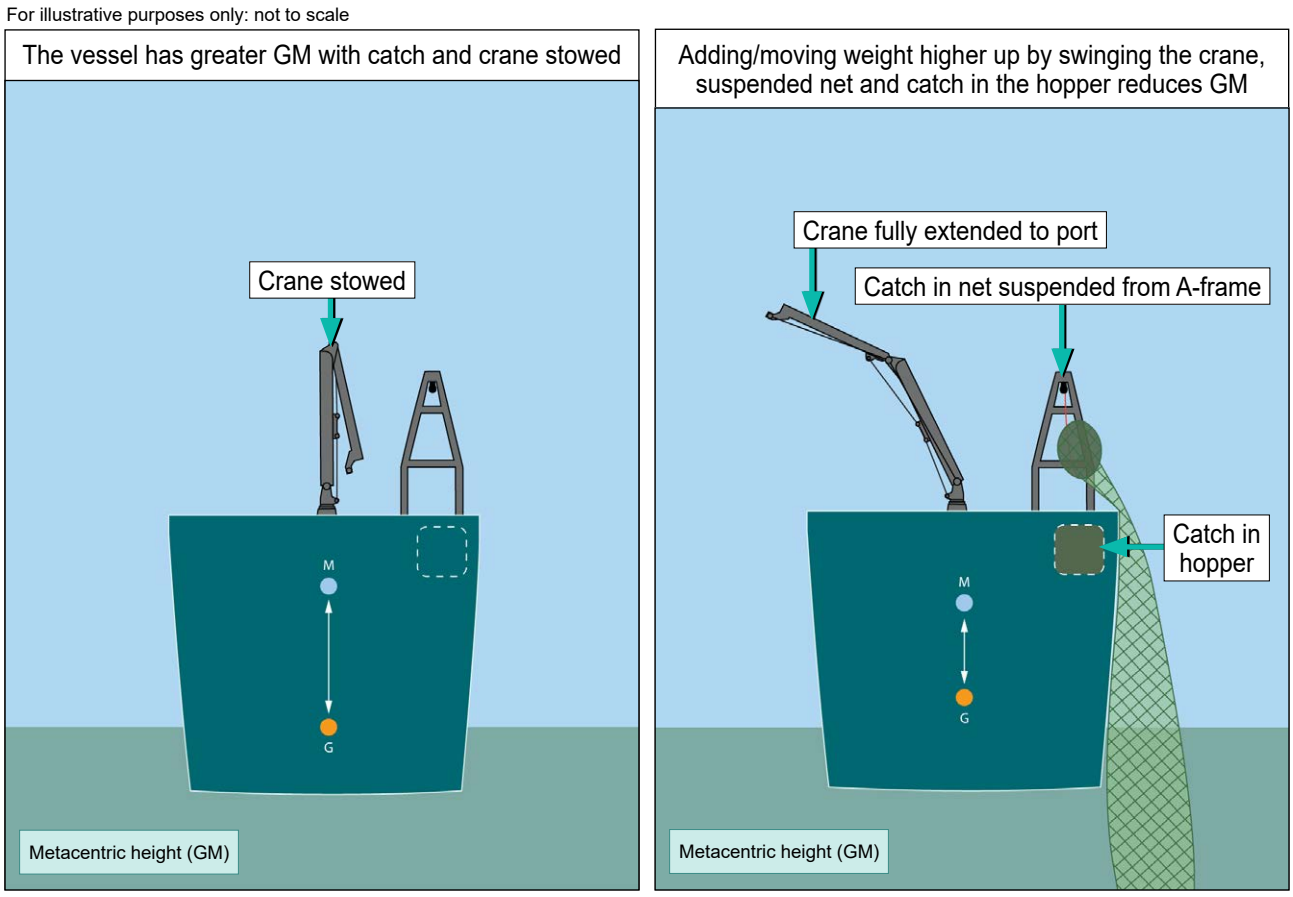

Figure 6: Reduction in GM due to operational condition

2.3.2 Shelter deck vulnerability

To contribute to the vessel's buoyancy and intact stability *Odyssey*'s shelter deck was designed to be weathertight as required by MSN 1872 (F) Amendment 1. This meant that the shelter deck had limited drainage, with only one tonnage valve on each side. The space could be pumped via the engine room bilges, but this required manual intervention to open the slush well drain valves that were located in the engine room.

The shelter deck complied with the regulations as it could normally drain through the tonnage valves or via the vessel's bilge system, which met the MSN 1872 (F) Amendment 1 requirements for pumping capacity. However, with only one tonnage valve on each side of the space, a significant heel meant that only one opening was available for free drainage. Any reduction in the capacity of that opening could lead to water accumulation on deck. Modern vessels mitigate this risk by fitting auto-starting sump pumps with a capacity at least 1.5 times that of the wash water. *Odyssey*, built to earlier standards and exempted by 'grandfather' clauses in MSN 1872 (F) Amendment 1, lacked such measures. Additional safeguards, such as bilge alarms, remote pump stops, clear signage, or operational procedures, could have improved detection and response, reducing the likelihood of the flooding going unnoticed; however, these were not required by any regulation or suggested in any guidance.

Odyssey's shelter deck had limited drainage, which made it vulnerable to flooding and left little tolerance for any restriction or blockage of the tonnage valves before water started to build up.

2.3.3 Tonnage valves

Odyssey's shelter deck openings were fitted with tonnage valves designed with a one-way flap to allow water to drain freely from the deck but stop water flooding in from the outside. The valves could be manually closed.

When the flood was discovered *Odyssey*'s skipper estimated that the vessel was heeled over approximately 15° to 20°, which corresponded to about 12m³ of floodwater. This indicated that *Odyssey* had less than 10 minutes before capsizing from the deck wash pump capacity alone, which aligns with the accident's timings. There was no evidence to suggest that the tonnage valves were defective or shut as the crew had not previously observed any water accumulation on the shelter deck. The crew had always operated with the valves open and they had been regularly maintained. Although previous MCA surveys and inspections had found several instances of compromised tonnage valves on board *Odyssey*, these had not occurred in the last 5 years or been observed at the most recent survey. It is therefore likely that a loose item on the shelter deck blocked or partially obstructed the opening enough to allow the deck wash water to accumulate **(Figure 7)**, similar to the accident on board *Angela*.

Figure 7: Example of a tonnage valve blocked by a loose object

The starboard tonnage valve likely became fully or partially blocked by a loose item on the shelter deck. This meant that water was unable to drain freely, causing it to build up and compromise the vessel's stability.

2.3.4 The deck wash pumps

Odyssey was equipped with two very powerful deck wash pumps with a combined theoretical capacity of up to 2,100 LPM. There was no way to stop the flow of water with the pumps running, which meant that water was continuously being discharged onto the shelter deck.

The crew left both pumps running during fishing operations because they believed more water was better for rinsing away the significant quantities of mud involved in prawn fishing. While the size of the pumps was usual for the type of vessel, running both at the same time meant that the volume of water needed to capsize the vessel accumulated faster. The investigation calculated that, with the tonnage valve obstructed, it would take as little as 2 minutes for the vessel to lose stability and start listing to starboard, 6 minutes to reach the approximate level described when the flood was discovered and 16 minutes for *Odyssey* to capsize. This gave the crew very little time to notice the hazard and take effective action to save the vessel.

Running both high-capacity deck wash pumps continuously significantly increased the risk of *Odyssey* capsizing by accelerating water accumulation on the shelter deck, leaving the crew with minimal time to respond.

2.3.5 Risk of flooding

The flooding risk assessments and drills that had been completed on board *Odyssey* did not address the risk of flooding of the shelter deck from wash water. The crew had no reason to anticipate the accumulation of water as it had always drained freely in the past and, combined with the inconvenience of having to go to the engine room to switch the pumps off and on, this meant that leaving the pumps running unattended became normal practice.

Despite warnings in the SIB, the crew had limited understanding of the potential output of water from the deck wash pumps and how these volumes translated into extra weight and free surface water on the shelter deck. This was possibly due to the lack of industry or regulatory guidance in publications such as the Fishermen's Safety Guide and MGN 165 (F) on the danger of flooding from wash water. While the awaited 2024 SIB did have some detail on what to do in the event of wash water build-up, it was not extant at the time of the accident. The effectiveness of the safety measures advised in the SIB also relied on the shelter deck being occupied or another system being in place to alert the crew; similar to *Louisa*, neither of these was the case at the time of *Odyssey*'s accident..

The crew probably underestimated the flooding risk from deck wash pumps due to normalised practices, limited awareness of the pumps' potential output, and a lack of guidance, leaving them unaware of the risk and unprepared for water accumulation on the shelter deck.

2.3.6 Crew response to the flooding

Odyssey had developed a starboard list during net recovery, but this was considered normal for that part of the operation as the hopper was located on that side of the vessel. The skipper's response was to swing the crane out to the port side and to transfer fuel to the port side. It was only when these actions failed to have the desired effect, and the list continued to develop, that the skipper realised something must be seriously wrong. In effect, and similar to the *Njord* case, the fishing operation masked the developing loss of stability as the list was assumed to be caused by landing the catch. By the time the flood was discovered, the skipper judged it was too risky to send anyone down to the engine room to switch off the deck wash pumps or open the bilge drain valves to enable pumping from the shelter deck. As there was no way to remotely stop the pumps or drain the space from the relative safety of the wheelhouse as this was not a requirement under any applicable regulations, the skipper decided that the only safe action was to abandon the vessel.

The developing list was initially misinterpreted as being motion associated with *Odyssey*'s normal fishing operation, which delayed recognition that the vessel was flooding.

2.3.7 Vessel abandonment

Following the skipper's timely decision to abandon ship, five of the six crew members entered the water with a liferaft canister and two lifebuoys. About 2 hours later, all six crew members were rescued from the inflated liferaft by a nearby fishing vessel.

The crew's emergency preparedness due to regular drill practice likely helped them understand what to do. They were able to deploy the port liferaft canister but could not immediately inflate it due to confusion about the length of the painter. However, the crew had been wearing their PFDs and were carrying lifebuoys when they jumped into the water so managed to float and withstand the potential cold shock from the sea temperature. Once resurfaced, the skipper was able to instruct the crew to keep pulling the painter to inflate the liferaft. The skipper was not wearing a PFD as they had been working in the wheelhouse; however, the abandon ship lifejackets were stored below in the crew cabin despite a recommendation from the last MCA survey to move them to an easily accessible area above the waterline. Although the skipper managed to safely swim to the liferaft, their lack of PFD left them vulnerable to succumbing to cold water shock.

The timely decision to abandon *Odyssey* enabled the crew to manually deploy the port liferaft, which was critical to their survival. The starboard liferaft was never recovered and likely became entangled during the capsize, meaning that, had the order to abandon ship been delayed, the crew might not have had access to a liferaft.

*Lily Anna'*s skipper acted quickly to recover the nets and investigate *Odyssey*'s disappearance from its last location on the vessel's AIS display. This meant that *Odyssey*'s crew were rescued from the water at least an hour before other search and rescue assets were able to reach them.

Odyssey's crew successfully abandoned the vessel thanks to favourable weather, their emergency preparedness and the skipper's astute recognition that the situation was irrecoverable.

SECTION 3 – CONCLUSIONS

3.1 SAFETY ISSUES DIRECTLY CONTRIBUTING TO THE ACCIDENT THAT HAVE BEEN ADDRESSED OR RESULTED IN RECOMMENDATIONS

1. *Odyssey* capsized and foundered after water accumulated on the weathertight shelter deck, creating an overwhelming heeling moment and catastrophically reducing the vessel's stability. [2.3.1]

2. *Odyssey*'s shelter deck had limited drainage, which meant it was vulnerable to flooding and left little tolerance for any restriction or blockage of the tonnage valves before water started to accumulate. [2.3.2]

3. The starboard tonnage valve likely became fully or partially blocked by a loose item on the shelter deck. This meant that water was unable to drain freely, causing it to accumulate and compromise the vessel's stability. [2.3.3]

4. Running both high-capacity deck wash pumps continuously significantly increased the vessel's risk of capsizing by accelerating water accumulation on the shelter deck, leaving the crew with minimal time to respond. [2.3.4]

5. The crew probably underestimated the flooding risk from the deck wash pumps due to normalised practices, limited awareness of pump output and a lack of guidance, leaving them unaware of the risk and unprepared for water accumulation on the shelter deck. [2.3.5]

6. The crew successfully abandoned the vessel thanks to favourable weather, emergency preparedness and the skipper's astute recognition that the situation was irrecoverable. [2.3.7]

3.2 OTHER SAFETY ISSUES DIRECTLY CONTRIBUTING TO THE ACCIDENT

1. The developing list was initially misinterpreted as being motion associated with the normal fishing operation, which delayed recognition that the vessel was flooding. [2.3.6]

SECTION 4 – ACTION TAKEN

4.1 MAIB ACTIONS

The **MAIB** has issued a safety flyer to the fishing industry **(Annex A)**.

4.2 ACTIONS TAKEN BY OTHER ORGANISATIONS

Odyssey FR 70 LLP's current vessel has:

- local controls for the deck wash pumps; and
- dedicated sump pumps in the weathertight shelter, in line with MSN 1872 (F) Amendment 1.

In response to this accident, the company has implemented procedures to ensure that deck wash pumps are never left running when the deck is unoccupied.

SECTION 5 – RECOMMENDATIONS

The **Maritime and Coastguard Agency** is recommended to:

2025/148 Update Merchant Shipping Notice 1872 (F) Amendment 1 to ensure that existing vessels without the independent pumping capability outlined in 4.3.2.1 (iii) have additional measures in place to adequately address the risk of water accumulation on weathertight shelter decks due to blocked, seized, or shut tonnage valves or other water freeing arrangements.

2025/149 Update its Marine Survey Instructions for the Guidance of Surveyors and relevant aide-memoires to:

- Ensure that the additional measures required for vessels without the independent pumping capability outlined in MSN 1872 (F) 4.3.2.1(iii) are adequately assessed during survey and inspection.

- Ensure that all vessels without independent pumping capabilities have an adequate shelter deck flooding risk assessment that includes mitigations for wash water build up.

2025/150 Provide guidance on the additional measures that can be implemented to adequately address the risk of water accumulation on weathertight shelter decks caused by blocked, seized, or shut tonnage valves or other water freeing arrangements.

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

MAIB safety flyer to the fishing industry

MAIB

MARINE ACCIDENT INVESTIGATION BRANCH

SAFETY FLYER TO THE FISHING INDUSTRY

Capsize and foundering of the prawn trawler *Odyssey* (FR 70) in the North Sea, approximately 133 nautical miles south-east of Peterhead, Scotland on 29 October 2024

Image courtesy of Fishing News

Odyssey

Narrative

At 0530 on 29 October 2024, the twin-rig prawn trawler *Odyssey* capsized and foundered while in the late stages of recovering nets. The six crew abandoned the vessel into a liferaft and were rescued by a nearby fishing vessel.

At the time of the accident, five crew members were working on deck recovering and emptying the nets into the hopper and the skipper was in the wheelhouse. Noticing that the vessel felt different to normal and was developing a list to starboard, the skipper sent a member of the crew below to investigate. The crew member found that the weathertight shelter deck was flooding rapidly.

Odyssey continued to rapidly list to starboard, leaving the crew with no choice but to abandon the vessel as it capsized.

Safety lessons

1. Recovering fishing gear is a vulnerable time for a fishing vessel. Not only is stability reduced as weight is distributed higher on board, but the normal movements of the vessel may disguise the fact that a serious situation is unfolding. In the early stages, *Odyssey*'s crew mistook the developing list due to flooding as normal vessel movements during the fishing operation.

2. The investigation found it likely that the shelter deck drainage had become blocked. It is critical that shelter decks are kept free of any loose items that might interfere with drainage through tonnage valves or other water freeing arrangements. Even a partial blockage could be enough to allow water to build-up rapidly.

3. The crew regularly left the deck wash pumps running and discharged to the deck. The pumping capacity of a vessel's deck wash pumps should not be underestimated. At the time of the accident, both pumps were discharging up to 2,100 litres of water per minute onto the shelter deck. This is equivalent to the weight of a large car every minute. The investigation calculated that it would take 16 minutes for the vessel to capsize if the water was prevented from draining away and continued to accumulate at this rate.

4. While the crew had considered flooding scenarios and practised regular drills, the risk posed by the deck wash pumps had not been considered. Skippers should take the time to assess the risk from wash water on their own vessels and ensure that adequate control measures are in place.

5. *Odyssey*'s shelter deck was regularly left unattended with the deck wash pumps running. Fishing vessel crews should ensure that pumps are switched off before leaving a space unattended, even if water usually drains effectively.

This flyer and the MAIB's investigation report are posted on our website: www.gov.uk/maib

For all enquiries:
Marine Accident Investigation Branch
First Floor, Spring Place
105 Commercial Road
Southampton
SO15 1GH

Email: maib@dft.gov.uk
Tel: +44 (0)23 8039 5500

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