ACCIDENT REPORT

Report on the investigation of

a serious injury to a crew member

on board

Wanderer II

1 mile south-east of Wiay Island,

Outer Hebrides

19 November 2013

MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

LESS SERIOUS MARINE CASUALTY REPORT NO 6/2015 FEBRUARY 2015

Extract from

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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GLOSSARY OF ABBREVIATIONS, ACRONYMS AND TERMS

FISG	-	Fishing Industry Safety Group
kg	-	kilogramme
L	-	registered length
LBP	-	length between perpendiculars
LOA	-	length overall
m	-	metres
mm	-	millimetres
MAIB	-	Marine Accident Investigation Branch
MCA	-	Maritime and Coastguard Agency
MGN	-	Marine Guidance Note
MIN	-	Marine Information Note
MSN	-	Merchant Shipping Notice
rpm	-	revolutions per minute

SYNOPSIS

On 19 November 2013, at about 1530, an 18 year old crewman on board the 16m scallop dredger *Wanderer II* suffered a serious hand injury during a routine dredge emptying operation. Following the accident the injured man was evacuated to hospital by helicopter where, due to the extent of his injuries, his damaged hand had to be amputated.

The junior deckhand had gone to the assistance of the relief skipper, who had been tipping the starboard dredges alone using the trawl winch's starboard whipping drum. The junior deckhand used over three full turns around the whipping drum and was then attempting to surge the tipping rope by pushing against the direction of drum rotation when his hand became trapped.

The MAIB investigation identified that the injured man was untrained in the use of whipping drums and that the vessel's owner, who was also the boat's regular skipper, had not fully informed the relief skipper about the crew's experience and competency. The investigation also concluded that there is a lack of specific guidance or advice on the safe operation of deck machinery used on fishing vessels.

The vessel's owner has made a number of modifications to the vessel following the accident, including converting the whipping drums to enable them to be used as captive drums for the tipping operation.

Recommendations have been made to *Wanderer II*'s owner aimed at further improving the safety of winch operations on board. Recommendations have also been made to the Maritime and Coastguard Agency and the Fishing Industry Safety Group designed to improve guidance on the safe operation of winches and other deck machinery.

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *WANDERER II* AND ACCIDENT

SHIP PARTICULARS	
Vessel's name	*Wanderer II*
Flag	United Kingdom
Classification society	Not applicable
IMO number/Fishing registration	Not applicable/SY378
Type	Fishing vessel – scallop dredger
Registered owner	Privately owned
Manager(s)	Not applicable
Year of build	1972
Construction	Larch planking on oak frames. Carvel construction
Length overall	16.76m
Registered length	15.69m
Gross tonnage	37
Minimum safe manning	Not applicable
Authorised cargo	Not applicable
VOYAGE PARTICULARS	
Port of departure	Kallin, North Uist
Port of arrival	Kallin, North Uist
Type of voyage	Coastal waters
Cargo information	Not applicable
Manning	Three
MARINE CASUALTY INFORMATION	
Date and time	19 November 2013 about 1530
Type of marine casualty or incident	Less Serious Marine Casualty
Location of incident	1 mile ESE of Wiay island, Outer Hebrides
Place on board	Forward deck
Injuries/fatalities	One injured
Damage/environmental impact	None
Ship operation	Fishing
Voyage segment	Mid water
External & internal environment	Wind south-westerly Force 5/6. Sea state moderate < 1m swell. Visibility good. Daylight.
Persons on board	Three

1.2 BACKGROUND

On 15 November 2013, the skipper and owner (skipper/owner) of the scallop dredger *Wanderer II* **(Figure 1)** appointed an experienced relief skipper to command the vessel for an indefinite period to allow him to attend to family matters. The relief skipper spent about an hour on board *Wanderer II* with the skipper/owner, familiarising himself with the vessel and crew.

Figure 1: *Wanderer II*

As part of this familiarisation, the skipper/owner showed the relief skipper the vessel's safety and operational equipment and explained the vessel's pumping systems etc. The skipper/owner also introduced him to *Wanderer II*'s two crew members and explained their roles on deck, the intent being that these roles would not change while the vessel was under the relief skipper's command.

During the familiarisation, the skipper/owner advised the relief skipper to be watchful of the junior deckhand as he was relatively inexperienced and occasionally needed reminding not to stand below suspended loads and to wear his inflatable lifejacket when on deck. The two deckhands were instructed by the skipper/owner to carry out their duties as normal and to assist the relief skipper as required.

1.3 NARRATIVE

1.3.1 Events leading up to the accident

At about 0600 on 19 November 2013 *Wanderer II* sailed from Kallin, North Uist, for its first trip under the command of the relief skipper. They reached the fishing grounds about 40 minutes later and began dredging for scallops. Towing times on the hard seabed averaged about 50 minutes before hauling in and emptying the dredge gear.

During dredge tipping[1] on *Wanderer II*, the skipper would tip the starboard side of gear on his own, while the two deckhands tipped the port side. Although he had not been scalloping for several years, the relief skipper soon got into the routine of tipping dredges again and was able to tip his dredges just as quickly as the two men on the other side.

Wanderer II continued fishing throughout the day. In the afternoon, the sea state started to deteriorate as the wind increased to force 5 gusting 6 by 1500, causing the relief skipper to consider returning to port following the next haul. At around 1530, *Wanderer II*'s dredges snagged on the seabed necessitating their early recovery. This snagging, along with the deteriorating weather, reinforced the relief skipper's decision to cease fishing, but he did not communicate this to the two crew members.

The dredge gear was recovered to the vessel's side as normal and, with *Wanderer II* laying port side to wind with the engine in neutral, the men started dredge tipping. As usual, the two deckhands worked on the port side while the relief skipper tipped the starboard side dredges using the winch's whipping drums **(Figure 2)**. It was usual for the men to have between 1.5 and 2 turns of tipping rope around the whipping drums **(Figure 3)**.

During the tipping operation, the relief skipper's progress was hampered, possibly due to the gusting wind catching on the tipping rope and blowing it off the whipping drum, delaying his progress. The deckhands tipped the port side dredges without any problems, although the junior deckhand noticed that one of the dredges was damaged and indicated this to the senior deckhand, who was at the port whipping drum.

On completion of tipping on the port side, the senior deckhand stowed his tipping rope and made his way aft to inspect the damaged dredge. As he approached the dredge he passed the junior deckhand at the gilson derrick leg and assumed he was going to fetch repair tools. However, as the senior deckhand busied himself with the damaged dredge, the junior deckhand noticed the relief skipper was taking longer than usual to tip his dredges, and went across to the starboard side of the vessel to assist him.

1.3.2 The accident and follow up actions

It is unclear whether the relief skipper asked the junior deckhand to go to the winch, or the junior deckhand told the relief skipper he was going to the winch, to lift dredge number five. In any event, the junior deckhand positioned himself forward of the whipping drum, picked up the tipping rope and applied just over another complete

[1] Tipping: the act of emptying dredges by upending them from the tail of the bag and tipping their catch onto deck.

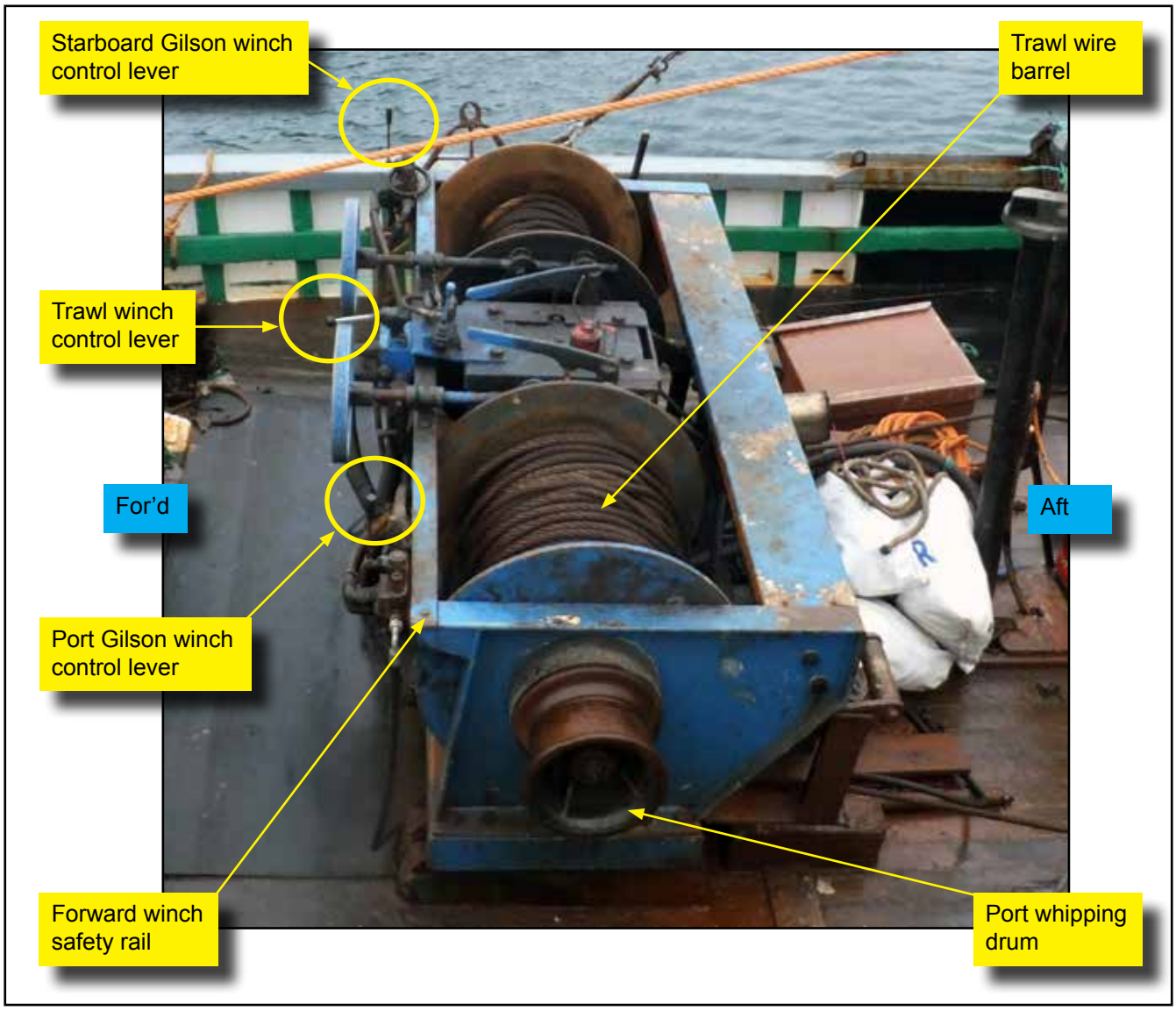


Figure 2: *Wanderer II*'s trawl winch

Figure 3: Starboard whipping drum with 1.5 turns of rope

turn around the whipping drum. Added to the 1.5 turns of rope already present on the drum this created a total of around 3.3 turns from the rope's point of entry to its point of exit. Number five dredge started lifting immediately, without the need to apply any tension to the tipping rope, and it became apparent to the junior deckhand that the dredge was jerking up and down and lifting higher than was necessary for emptying. In an attempt to stop this, he placed his gloved left hand against the rope on the underside of the rotating whipping drum, pushing against the direction of rotation. In doing so, the glove and his hand became trapped between the rope and the drum, causing them to be drawn in and around the whipping drum.

The relief skipper, whose back was towards the winch, became aware of the dredge bar suddenly rising between his legs as the now fouled tipping rope on the whipping drum lifted the dredge gear towards the derrick head. At the same time as the relief skipper jumped clear of the dredge bar, the senior deckhand heard an indistinct shout from the junior deckhand. He looked forward and immediately ran to the winch and stopped it. He then used a knife to cut between nine and ten turns of rope from the whipping drum to release the junior deckhand.

As soon as the junior deckhand had been freed from the winch, the relief skipper notified Stornoway coastguard of the accident by radio while simultaneously heading *Wanderer II* back towards Kallin. Stornoway coastguard tasked search and rescue helicopter *R100*, which was on a training exercise in the Minch, to assist, as it was apparent from the description of the accident that the local hospital on Uist might not have the necessary facilities to deal with the injury.

Despite suffering trauma and intense pain, the junior deckhand remained conscious and talkative throughout the 40 minutes it took *Wanderer II* to reach Kallin, where it arrived at 1630. An ambulance transported the casualty to Uist and Barra Hospital where, following assessment of his injuries, medical staff decided to use *R100* to transfer him to Glasgow Royal Infirmary.

Due to the extent of his injuries, surgeons were unable to save the junior deckhand's left hand.

1.4 ENVIRONMENT

At the time of the accident, the wind was south-westerly Beaufort force 5 or 6, with a lesser sea state due to the slight lee provided by the nearby land. The weather was fine and the sky was clear.

1.5 VESSEL AND OPERATION

Wanderer II was built as a herring ring netter in 1972. The vessel was subsequently converted to a trawler and then later modified for scallop dredging by previous owners. The vessel was rigged to tow six conventional king scallop dredges from a 150mm diameter steel bar on each side of the vessel. In general, the vessel and its equipment appeared to be well maintained and in good condition.

Wanderer II normally operated with a crew of three, the skipper/owner and two deckhands. The vessel fished regularly from Monday to Friday, departing harbour each day around 0600 and returning at around 2130, when the day's catch would be unloaded before the crew retired for the night.

1.5.1 Description of fishing method

As the name of this type of fishing suggests, the gear is dragged along the seabed to dredge up king scallop shellfish. A sketch of a typical arrangement of dredging gear with three dredge bags, known as dredges, is shown at **Figure 4**. *Wanderer II* had six dredges attached to each bar. On each side, the six dredges, the bar and the chain bridles that comprised the dredge gear weighed around 850kg.

Image courtesy of Seafish Guide to Commerical Fishing Gear and Methods of Use

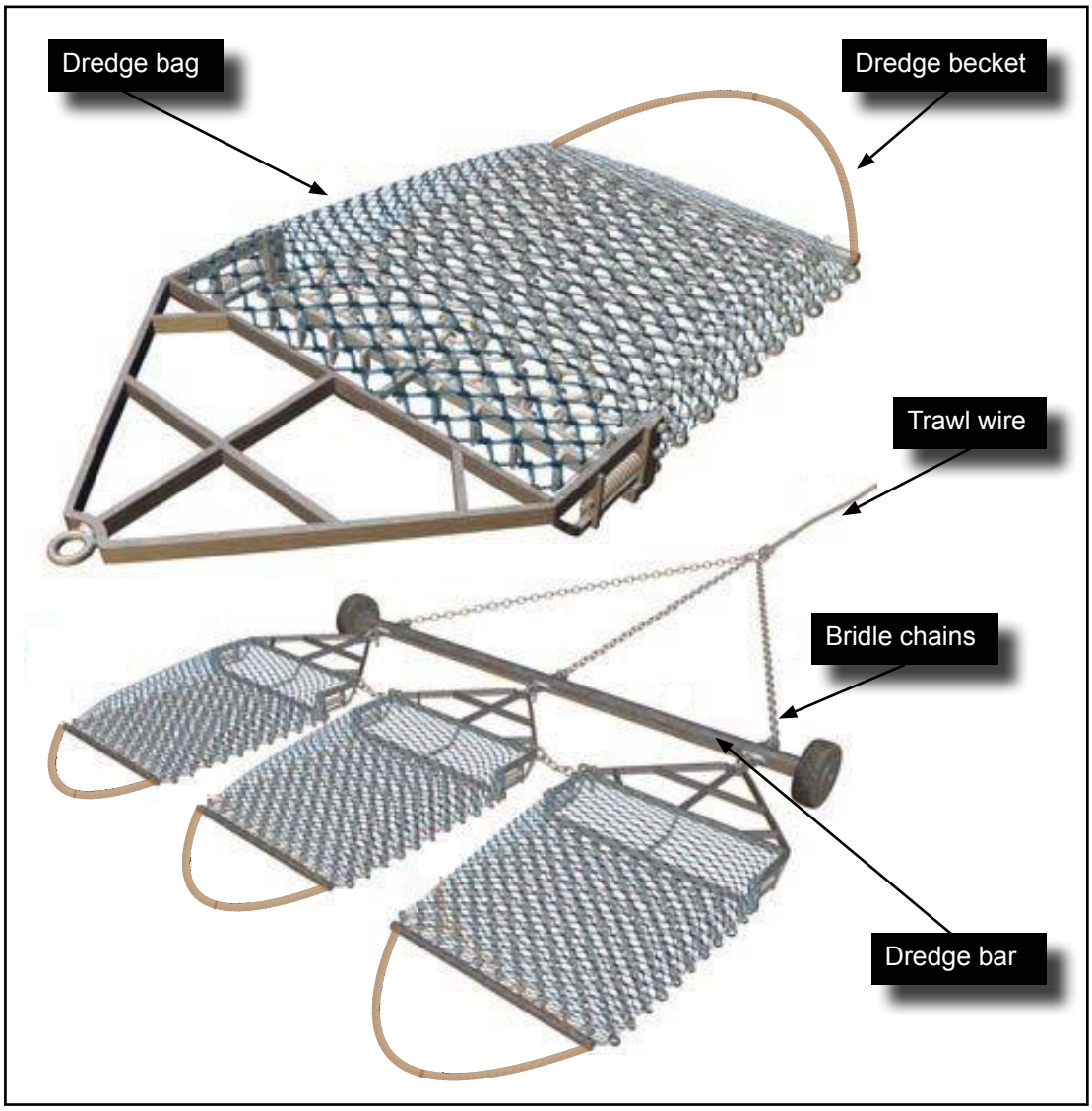


Figure 4: Typical dredging arrangement

When not in use the bars lay on the deck inboard of the port and starboard bulwarks with the dredge bags hanging over the bulwarks in readiness for shooting **(Figure 5)**.

1.5.2 Winches

The hydraulically operated main trawl winch **(Figure 2)** had a core pull of 3.5 tonnes on empty barrels. The 22mm trawl wires were stowed on two barrels, each with its own dog-clutch and hand tensioned band brake. On either side of the winch were whipping drums that were predominantly used for dredge tipping. The control lever

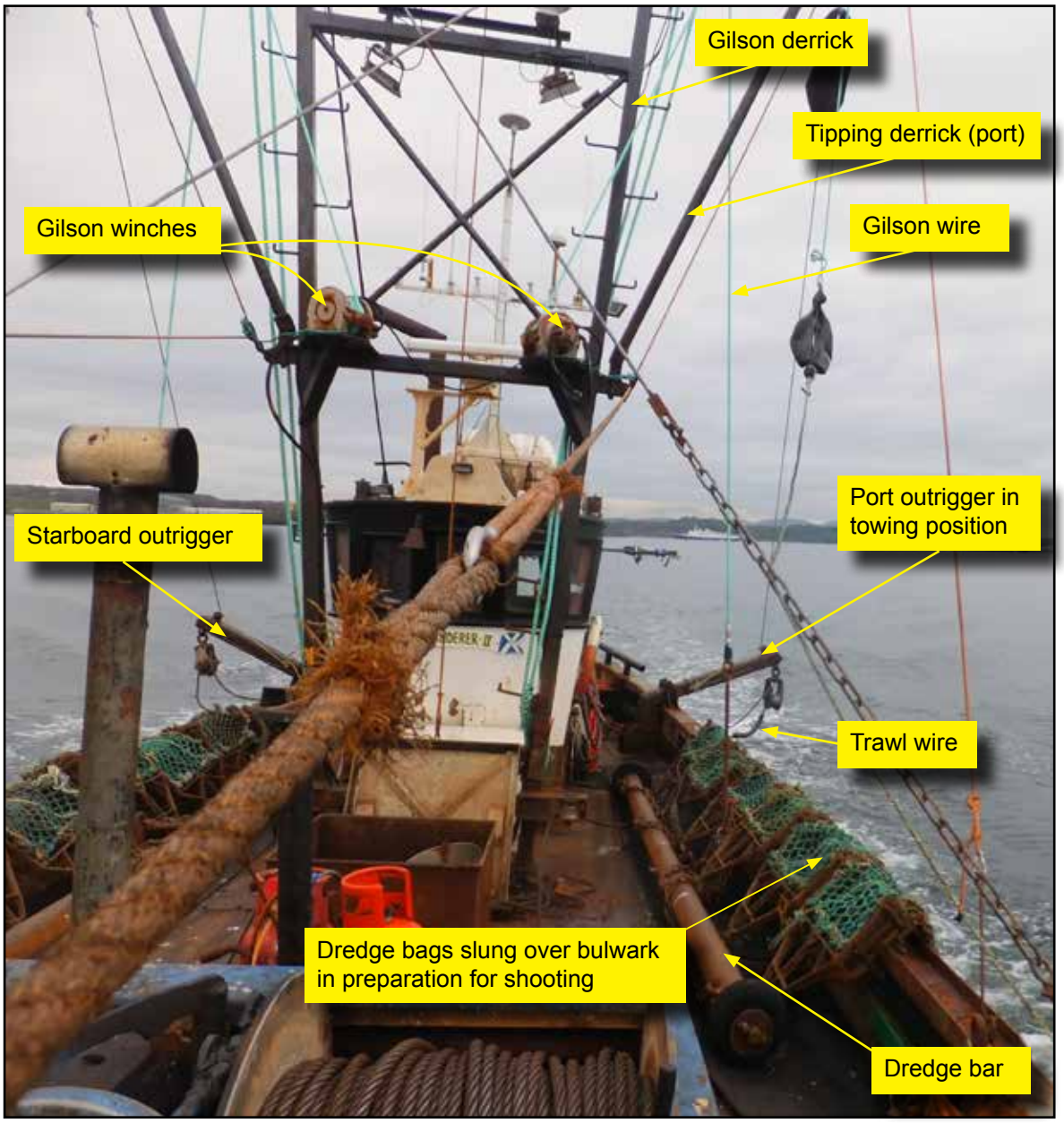


Figure 5: *Wanderer II*'s arrangement and gear on deck

for the winch was centrally placed **(Figure 2)**, around 1.2m from the whipping drums. The control lever was not spring-loaded and could be set to continuously haul or veer without being held in place.

Two dedicated hydraulic gilson winches were fitted by the lower cross bar of the main gilson derrick frame **(Figure 5)**. These were used for lifting the complete dredge gear inboard and outboard during hauling and shooting and were controlled by spring-loaded levers mounted on either side of the forward safety rail on the main trawl winch **(Figure 2)**.

1.5.3 Shooting operation

To shoot the dredge gear, each side was lifted in turn from the deck by the gilson winches. These winches were normally operated by the senior deckhand. Once above the bulwark the dredge gear was lowered outboard and the tension taken on the trawl wires. This enabled the gilson hooks to be disconnected by the junior deckhand and skipper from positions near the outriggers **(Figure 6)**.

Figure 6: Gilson hook being removed from the dredge bridle by the port outrigger in preparation for shooting

The dredge gear was then lowered clear of the vessel and the skipper would power the vessel ahead. Having confirmed that the dredge gear was positioned properly astern of the vessel, the deckhands would move forward to take control of the trawl winch barrel brakes. Following instruction from the skipper the deckhands streamed the dredge gear to the seabed using the brakes to control the trawl wires as they free-wheeled from the barrels until the required length of trawl wire was payed out.

1.5.4 Hauling and tipping operation

When recovering the dredge gear, the senior deckhand would haul in the trawl wire with the winch until the dredge bar bridles reached the outriggers. The skipper and junior deckhand then attached the gilson hooks and the dredge bars were lifted inboard by the senior deckhand using the derrick mounted gilson winches. Once at a suitable height above the gunwale, the dredge bars would be lowered to the deck and bowsed-in if required, leaving the dredge bags hanging outboard of the bulwark in preparation for tipping **(Figure 7)**.

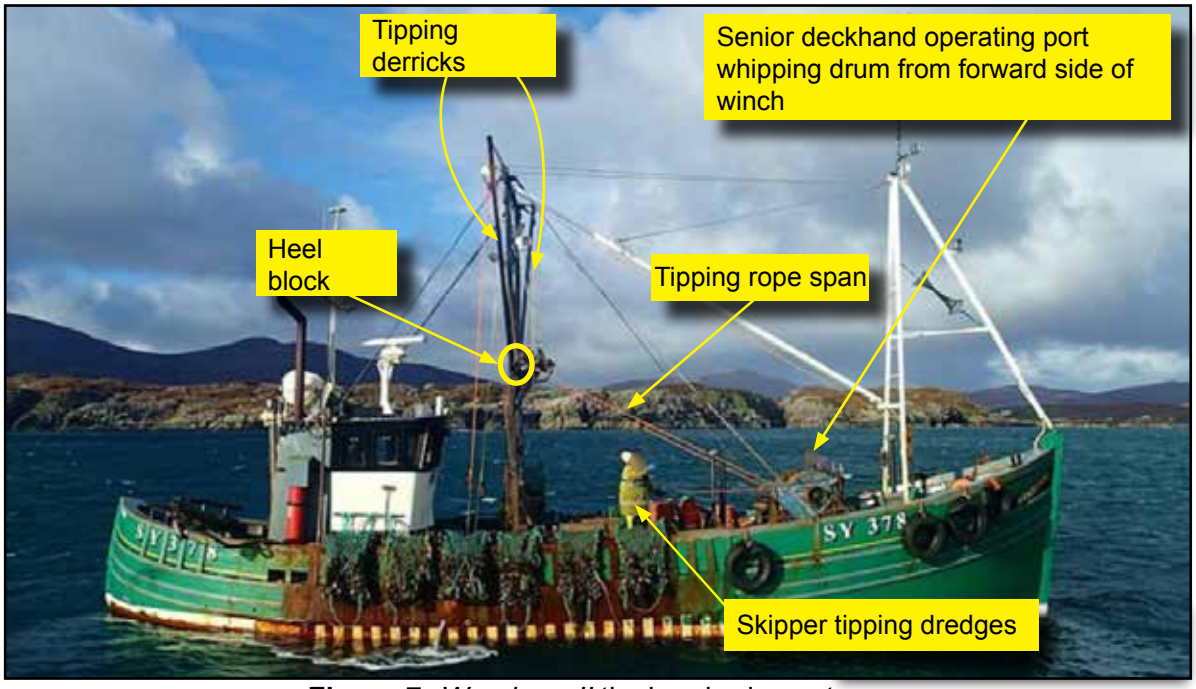
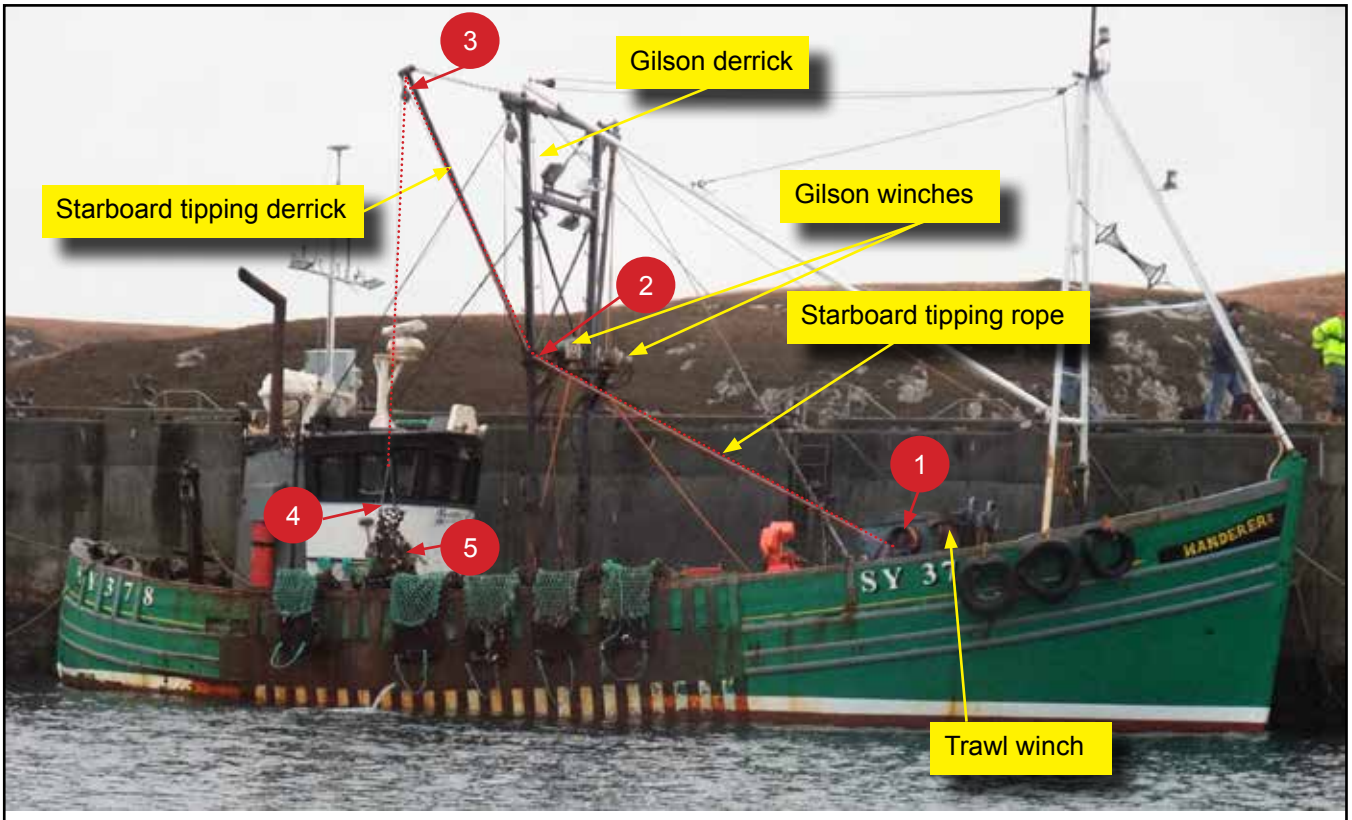


Figure 7: *Wanderer II* tipping dredges at sea

Dredge tipping was carried out by the two deckhands working in partnership on the port side while the skipper tipped the starboard dredges on his own. 18mm polyethylene tipping ropes led from 600mm long hooks, up to self-positioning tipping derricks attached to the main derrick and then from the heel blocks of these derricks some 6m forwards towards the whipping drums on either side of the trawl winch **(Figure 8)**. With the trawl barrel dog-clutches disengaged, the senior deckhand set the whipping drums to rotate continuously at a speed of about 24 revolutions per minute (rpm) before he moved to attend the port side tipping rope. Tipping commenced from forward at dredge No.1 and worked aft towards dredge No.6 on each side simultaneously. It was the junior deckhand's role to hook the tipping rope hook into the lifting strop, or becket, on the tail of the dredge bag on the port side. This enabled the senior deckhand to invert the dredge bag by applying tension to the tipping rope, which had two turns around the whipping drum, from his position forward of the whipping drum. The junior deckhand would then shake any remaining scallops and debris from the inverted bag before moving aft to the next dredge bag.



Starboard dredge tipping rope leading from: whipping drum 1, to heel block 2 upwards towards tipping derrick head block 3 and down to dredge becket 4 of dredge No 5

Figure 8: *Wanderer II*'s derrick and tipping arrangements

The skipper tipped the starboard side dredge bags on his own. The method adopted was to apply 1½ turns of rope to the constantly rotating whipping drum **(Figure 3)**, and allow it to surge freely until he pulled on it to increase tension, causing the rope to grip on the drum. Using this method he was able to hook in the tipping rope to the dredge becket, pull on the rope to raise the dredge and, while surging the rope on the whipping drum with one hand, shake the raised dredge bag with the other. He would work his way aft, always leaving the 1½ turns of rope to surge on the whipping drum, tipping all six dredges in this manner. By the time he had reached dredge

No.6 he was adjusting the tension of the rope turns around the whipping drum from a distance of about 7.5m **(Figure 9)**. The system on board *Wanderer II* was identical to the one the relief skipper had operated on his own scallop dredger several years previously and is commonly adopted throughout the UK scallop dredging industry.

Figure 9: *Wanderer II* tipping dredges with the skipper operating the starboard whipping drum from a distance

1.6 CREW DETAILS

1.6.1 Skipper/owner

The 41 old skipper/owner of *Wanderer II* had owned the vessel for just over a year. Prior to that he had skippered it for shore-based owners. He had also owned and skippered various other fishing vessels in his 22 years at sea.

The skipper/owner held all the mandatory training certification for a vessel the length of *Wanderer II*: specifically, the MCA endorsed Sea Fish Industry Authority (Seafish) training in Basic Sea Survival, Basic First Aid, Basic Fire Fighting and Safety Awareness. Additionally, he held a non-mandatory Seafish awarded Skippers Certificate for under 16.5m fishing vessels operating less than 20 miles from a safe haven.

It was the skipper/owner's practice to take all steaming and towing watches. The skipper/owner also acted as engineer and carried out most of the vessel's routine maintenance.

On the week commencing 18 November the skipper/owner needed to take time off due to family circumstances. Concerned that his crew would lose wages, he located an experienced relief skipper to operate *Wanderer II* until his return.

1.6.2 Relief skipper

The relief skipper was a 40 year old career fisherman who had been fishing since the age of 17. He had owned fishing vessels and employed various methods of fishing over the years. In particular, he had been skipper and owner of a scallop

dredger from 2002 to 2009. The relief skipper held all the mandatory training certification and had also completed non-mandatory refresher training in Safety Awareness.

1.6.3 Senior deckhand

The 33 year old senior deckhand was a qualified mechanic who had only recently gone to sea as a share fisherman[2], joining *Wanderer II* as a deckhand 4 months before the accident. He had little prior experience in fishing and held certification in Basic Sea Survival, Basic First Aid and Basic Fire Fighting, but he had not yet attended training in Basic Health and Safety.

1.6.4 Casualty

The 18 year old junior deckhand was the youngest crew member on board *Wanderer II*. He had been on board for 5 months as a share fisherman and had sailed previously for a brief job evaluation with a view to taking up the post when a position became available on *Wanderer II*. He held all the mandatory training certification.

On joining *Wanderer II* the junior deckhand had been given a safety induction and his roles and tasks had been explained and demonstrated. His onboard training and work involved most aspects of hauling and shooting the dredge gear and handling the catch. However, he had not received any training in operating the winches and it was not his role to use them. His experience in this area was restricted to controlling the brake tension of a dredge wire as it was shot from the trawl barrel under the forward momentum of the vessel.

The skipper required his crew to wear inflatable lifejackets when working near the bulwarks. Occasionally the junior deckhand had to be reminded by the skipper/owner to wear his lifejacket, and also to keep clear of overhead loads when lifting took place from the derricks.

1.7 TRAINING

Since January 2005 all new entrants to the UK fishing industry are required to have completed safety training in: Basic Sea Survival, Basic Fire-fighting, Basic First Aid and Basic Health and Safety within 3 months of starting work as a fisherman. In addition, all experienced fishermen (those who have more than 2 years' service working on board fishing vessels) must also have completed Safety Awareness training. The first three training courses are to prepare fishermen to react to marine emergencies, whereas Health and Safety and Safety Awareness training is aimed at preventing undesirable incidents occurring in the first place. Other than this reactive and preventative safety training, there is no requirement for fishermen to attend mandatory operational training courses as part of their training.

Voluntary Apprenticeship in Sea Fishing schemes have recently been developed for novice fishermen, with operational experience gained through both shore and sea-based training. The Apprenticeship is a minimum year-long programme which produces "competent deckhands". However, most new entrants to the fishing industry are trained 'on the job' at sea, as was the case on *Wanderer II*, with novices

[2] Share fisherman: a fisherman whose wages are derived from a share of the catch proceeds.

gradually gaining knowledge and being given more responsibility progressively. The pace of knowledge exchange is generally set by the skipper and the trainee, and after a period of time trainees become competent at all deck work.

1.8 CURRENT GUIDANCE FOR WINCHES AND SCALLOP DREDGING

The fishing industry does not benefit from its own equivalent to the MCA's *Code of Safe Working Practices for Merchant Seamen*, which must be carried on all merchant ships. Instead, written guidance is available in the form of MCA Merchant Shipping Notices (MSN) Marine Information Notes (MIN) and Marine Guidance Notes (MGN). Although some essential information is available in these documents and may find its way to skippers and owners, it is rare for these documents to be made available to deckhands on fishing vessels.

MSN 1770 (F), *The Fishing Vessels Code of Safe Working Practice for the Construction and Use of 15 metre length overall (LOA) to less than 24 metre registered length (L) Fishing Vessels*, requires that, on all vessels built on or after 23 November 1995, and vessels of 18m length between perpendiculars (LBP) and over, constructed before that date, crew should be trained in the use of hauling equipment and that it should be fitted with emergency stop facilities and provide protective devices to minimise contact with bare ropes. In view of its length and age, *Wanderer II* was exempt from these requirements.

MGN 415 (F) *Fishing Vessels: The Hazards Associated with trawling, Including Beam Trawling and Scallop Dredging* **(Annex A)**, provides guidance on the safe operation of fishing vessels engaged in these types of fishing. Despite describing many of the hazards of scallop dredging, this document does not refer to the dangers involved when using whipping drums, other than to note the need for beam trawler crews to guard against riding turns developing and, when dredging, the person in control of the winch should not be tipping dredges at the same time.

In 2008, the MCA also produced in booklet form the *Fishermen's Safety Guide*, which was revised in 2010. This did not contain the level of detail found in the *Code of Safe Working Practices for Merchant Seamen*, but it did contain practical advice on the operational aspects of fishing. A copy of the *Machinery* section is at **Annex B**. In particular, this includes the following relevant statements:

- *Keep your* clothing*, especially cuffs and gloves well clear of a warping* (whipping) *drum, and if your hands are too close, a sudden surge can drag you into the turning drum.*

- *Only experienced persons should operate the deck machinery*.

- *Have new persons on the vessel been trained and made aware of the dangers before being allowed to control the machinery*?

Publications such as the IMO Code of Safety for Fishermen and Fishing Vessels, 2005, and the somewhat dated Trawlerman's Handbook are examples of reference material that include fishing operations. They are, however, not commonly found on fishing vessels.

1.9 RISK ASSESSMENT

1.9.1 Regulatory guidance

European Directive EEC 89/391 introduced various measures to encourage improvements in the safety and health of workers; in the UK, these were enacted in *The Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997*. These regulations require employers to ensure the health and safety of workers and other persons on board a vessel, so far as reasonably practicable, by the application of certain principles, which include:

- the avoidance of risks;
- the evaluation of unavoidable risks;
- taking action to reduce identified risks.

These regulations also require that:

A suitable and sufficient assessment shall be made of the risks of the health and safety of workers arising in the normal course of their activities or duties… The assessment shall also, *extend to the risks to health and safety of other persons on board…*

Further advice on the practical implementation of these regulations is contained in MGN 20 (M+F). This notes that the basis of all safety measures should be an assessment by the employer of any risks to health and safety from work activities, and the annex to the MGN contains useful guidance on the conduct of such an assessment.

MSN 1770(F) further summarises the need for a health and safety risk assessment, stating that: *A health and safety risk assessment should be used to satisfy the obligation of providing information to crew members of the measures taken for their own protection.*

1.9.2 Templates for risk assessments

In September 1999, Seafish introduced a *Fishing Vessel Safety Folder* to assist fishermen to comply with the 1997 Regulations. Developed with the help of the Fishing Federations and endorsed by the MCA, the Safety Folder included a series of forms that could be used as a template for completing a written risk assessment for various methods of fishing and vessel operations. Each form included prompts detailing possible hazards that could be encountered. The Folder was updated in 2007 and again in 2011. More recently a live on-line version has been made available on Seafish's[3] internet website.

[3] www.safetyfolder.co.uk

1.9.3 *Wanderer II*'s risk assessment

Wanderer II had a partially completed risk assessment utilising the Seafish Safety Folder pro-forma. With reference to the hazards of beam trawling and dredging, a dedicated entry regarding, *becoming caught in wire/rope entering the winch leading to injury* [sic] was not completed. A control measure for the hazards to new crew working on board was entered as, *"Teach them all risks before we start fishing"* [sic].

1.10 SIMILAR ACCIDENTS

Winch related accidents resulting in maiming or death are not uncommon in the UK fishing industry. Similar serious accidents include:

1.10.1 FV *Danielle*

In 2006 a deckhand on board the 29m scallop dredger *Danielle* was dragged into a whipping drum while attempting to tip dredges using the same method as that used by the skipper of *Wanderer II*. As a result of the accident the deckhand on *Danielle* had his arm amputated.

The MAIB investigation[4] made recommendations to:

The operators of *Danielle* regarding emergency winch stop facilities and the arrangement of the framework near the whipping drums.

The MCA to[5]:

1. Provide details of hazards associated with whipping drums in its next revision of MGN 265 (F).

2. Introduce a facility within the fishing vessel survey and inspection regime to enable recording of vessels' risk assessment status.

3. Expand upon advice for minimum levels of medical stores, highlighting to fishermen that they have the discretion to carry more than the minimum requirements.

The Sea Fish Industry Authority to:

Provide practical onboard guidance in completing risk assessment.

As a consequence of recommendation 1 above, to the MCA, MGN 265 (F) was replaced by MGN 415 (F) **(Annex A)** in July 2010. Paragraph 6.7 of MGN 415 (F) warned:

> *It is important to guard against riding turns and, whenever possible, the same person should not be tasked with controlling the winch and "tipping" the dredges at the same time.*

Paragraph 8.1, bullet 2 noted:

[4] MAIB report 5/2007.

[5] Recommendations 2007/117, 2007/118, 2007/119.

Emergency stop buttons to be fitted so the operator of the equipment can reach them without endangering themselves by leaning across the equipment or risking any other hazard.

As a consequence of its recommendation, the Sea Fish Industry Authority secured Financial Instrument for Fisheries Guidance (FIFG) funding and delivered onboard advice and guidance in completing risk assessments to 244 fishing vessels between April 2006 and March 2008. *Wanderer II* was not one of those vessels.

1.10.2 FV *Constant Friend*

On 17 December 2013 a deckhand became ensnared in the whipping drum during dredge tipping on board the Manx registered scallop dredger *Constant Friend*[6], resulting in the amputation of one of his arms and serious injury to the other.

The ensuing investigation by the Isle of Man Ship Registry identified dangers associated with the working operation and made non-targeted recommendations regarding winch controls, drills and risk assessment.

1.10.3 FV *Ronan Orla*

On 31 March 2014 the skipper of the single-handed scallop dredger *Ronan Orla* was fatally injured after becoming caught in the vessel's whipping drum. At the time of this report the circumstances surrounding the accident were being investigated by the MAIB.

[6] *Serious injury on board Manx-registered fishing vessel Constant Friend (PL 168)* available at: http://www.gov.im/ded/shipregistry/formsdocs/reports/casualty.xml

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 occurring in the future.

2.2 THE ACCIDENT

Because the relief skipper was taking longer than normal to tip the starboard dredges, the junior deckhand crossed the deck to assist him. It is unclear what delayed the relief skipper's tipping operation on this occasion. A plausible proposal, that could not be confirmed, was that the gusting wind blew a turn of rope off the whipping drum which required the relief skipper to go and reposition it, thus slowing the process. Whatever the reason, the slight delay was instrumental in the junior deckhand going to assist him. However, as a result of his lack of training and experience, the junior deckhand attempted to lift the dredge bag using over three full turns on the whipping drum, causing the dredge to snatch up and down without him applying any tension to the tipping rope.

When a rope under load is applied to a whipping drum the load lifts when enough turns of the rope are applied, or with fewer turns and the application of external tension to the tail of the rope. Between the points of surging and positive lifting, if no external tension is applied to the rope, the weight of the load overcomes the friction between rope and drum causing the rope to surge (slip) and the load to drop. Upon dropping, the drum can act (snatches) upon the now slack rope causing the load to rise again and the process is repeated until either a turn of rope is removed from the drum or external tension is applied to assist the lifting process.

An experienced winch operator would have immediately recognised the problem and cast off a turn or two of rope from the drum. However, in an attempt to surge the rope and reduce the snatching of the dredge, the junior deckhand placed his left hand below the drum and pushed back on the rope turns and the direction of drum rotation. This led to his gloved hand becoming caught and drawn around the drum. The winch control lever was now beyond the trapped junior deckhand's reach, requiring a colleague to run forward and stop the winch.

2.3 THE TIPPING OPERATION

2.3.1 Deck layout

Wanderer II had been modified a number of times over its 42-year life. The modification to scallop dredging required the installation of amidships fixed gilson derricks for lifting the heavy dredge gear inboard and outboard. Additional self-positioning tipping derricks **(Figure 7)** were fitted halfway up the main derrick legs to accommodate dredge tipping. The tipping ropes led directly from heel blocks on the tipping derricks over 6m forward to the whipping drums. There were no guides or fairleads in the span to keep the rope leading directly to the whipping drum.

The relief skipper's dredge tipping process was delayed, possibly due to the effect of wind acting upon the tipping rope. Suitably placed guides would reduce the potential for such effects or other displacement of the rope.

The greater the distance between a winch drum and its first rope guide the more chance there is of the rope fouling the drum, developing a riding turn or being accidently displaced from the drum. Consequently, leads or guides should be placed as close as practicable to whipping drums to help maintain a fair lead that keeps ropes in position.

The junior deckhand could not reach the winch control, positioned 1.2m from the whipping drum that he was drawn into. Had there been remote stops adjacent to the whipping drums it is possible that he could have stopped the winch and possibly saved his hand. MSN 1770 (F) mandates and MGN 415 (F) recommends fitting remote emergency stops to winches, although there is no obligation for them to be installed on vessels such as *Wanderer II*, that are under 18m in length and built before 23 November 1995. Neither is there a requirement for vessels structurally or mechanically modified since that date (as *Wanderer II* was) to comply; this is a shortcoming within the regulation. Nevertheless, where winches are set to rotate with the controls unattended, all vessel owners should give serious consideration to fitting emergency stops or, where this is not practicable, modify the operation to ensure that someone is always stationed at the winch control.

2.3.2 Dredge tipping operation

Like many scallop dredging vessels, the dredge tipping operation on *Wanderer II* was carried out with the winch whipping drums set to rotate at a fixed speed, with no dedicated operator at the winch controls ready to stop the winch in an emergency. Dredge tipping was carried out by two crewmen on the port side and by the skipper on his own on the starboard side.

The skipper's operation required him to control the rope on the whipping drum from as far away as 7.5m with one hand, while shaking the dredge bag with the other hand. Operating a whipping drum, especially from such a distance, at the same time as shaking catch out of a dredge bag is dangerous as it requires the operator's attention to be divided. Further, should a riding turn develop, unless the operator was able to stop the winch quickly, the fouled rope would continue to lift the dredge gear towards the derrick head until the rope parted or a derrick component rendered, with resultant damage and possible injury. This type of distant, single person dredge tipping operation is not uncommon in the scallop dredging fleet, despite it being advised against in MGN 415 (F). The accident resulting in an arm amputation on board *Danielle* **(section 1.10.1)**, occurred during such an operation.

The dredge tipping method used by the two deckhands, where one man operates the whipping drum while the other shakes the dredge bags, is considered safer than the single-handed method as each person can give undivided attention to his task. However, this is only safer if the operator is trained, experienced and follows best practice by keeping his hands clear of the drums and ensuring he is able to immediately stop the winch in the event of a riding turn developing. The junior deckhand was neither trained nor experienced in using a whipping drum.

Both methods of dredge tipping require just enough turns of rope on the whipping drum to lift the dredge bag and its contents when manual tension is applied, yet allow the rope to surge freely when the tension is removed. The number of turns required on a whipping drum depend upon the load being lifted or pulled – the greater the load, the more turns required. However, in view of the friction generated

between the rope and the drum, more than three turns should only be applied to a whipping drum in exceptional circumstances, with extreme caution and with a dedicated operator ready to stop the winch immediately.

Unfortunately, very little advice exists for fishermen on the specific hazards of deck machinery; such knowledge is usually gained from the more experienced crew when working on board their vessels. Where this knowledge is not shared in this way, fishermen often learn lessons the hard way, to their extreme cost.

2.3.3 Alternative methods of dredge tipping

To make the dredge tipping operation safer and more efficient the industry has adopted a number of alternative methods, these include:

- Converting the whipping drums to captive drums, where the tipping rope is wound onto the drum. This allows a dedicated winch operator to simultaneously lift or lower both the port and starboard dredges using the winch controls, reducing the need for contact between the crew and moving ropes or winch drums.

- Fitting several dedicated captive winches for gear lifting, bowsing-in and tipping operations, removing the need for any contact between the crew and winch drums, while still requiring the dredge bags' beckets to be hooked on manually.

- Fully automated tipping systems where there is no contact between the crew and the ropes, winch drums or the scallop dredges.

While the latter two methods require significant financial investment and their retrofit may not be practicable on existing vessels, the conversion to captive drums can be straightforward and cost effective.

2.4 ONBOARD MANAGEMENT

2.4.1 Vessel familiarisation

Before taking temporary command of *Wanderer II,* the relief skipper was given vessel familiarisation by the skipper/owner. This familiarisation concentrated on equipment and running maintenance.

For a skipper to operate a vessel effectively an understanding is required, not only of the vessel and its equipment but, equally importantly, the people who operate the equipment.

Although the relief skipper was aware that the junior deckhand's role did not include working on the whipping drum, he was not specifically told by the skipper/owner that he was not trained or experienced in its use. Had he been so informed he could have ensured that the junior deckhand did not take control of the whipping drum.

2.4.2 Training

The mandatory safety training completed by the junior deckhand before joining *Wanderer II*, was not intended to provide him with any of the skills required for deck operations. He had been trained on board *Wanderer II* in all deck operations, except the use of the winches under power, and was not allowed to operate the whipping drums when under the command of the regular skipper.

The use of the whipping drums is a deceptively simple looking operation that is, potentially, extremely dangerous and experience in their operation should be gained under guided supervision. The junior deckhand's actions of assisting the relief skipper in a task that he had no training or experience in, no matter how well intentioned, were instrumental in his accident. The relief skipper was unaware of the junior deckhand's inexperience and therefore had no reason to prevent him from assisting at the whipping drum.

Operating the tipping rope on the whipping drum was a task that the regular skipper had not yet trained the junior deckhand in. It is important that skippers ensure that inexperienced deckhands are acutely aware of the dangers of attempting to develop their skills without the agreement and supervision of their more experienced co-workers.

The lack of available guidance to deckhands on board fishing vessels is also a barrier to learning. Where a deckhand on a merchant vessel can refer to a vessel's copy of the *Code of Safe Working Practices for Merchant Seamen*, in order to gain a better understanding of an operation, such accessible guidance is seldom available to fishermen.

2.4.3 Communications

Professionals in any industry take pride and pleasure in working with other professionals, where competence and skill can be regularly demonstrated without the need for verbal exchange. However, this can only develop through repetition, experience and team working. With the introduction of a new skipper, such efficient team working had yet to develop on board *Wanderer II*.

Due to a lack of communication, gaps in knowledge and understanding resulted in assumptions being made:

- The skipper/owner assumed that the two deckhands would carry out their usual duties, and only their usual duties, as normal.
- The relief skipper assumed the junior deckhand was competent in operating the whipping drum.
- The junior deckhand assumed that he was capable of operating the whipping drum.
- The senior deckhand assumed the junior deckhand was going to collect dredge repair equipment when they passed each other just before the accident took place.

Communication is a crucial part of safe working, and helps minimise assumptions that are the precursor to many accidents.

2.4.4 Risk assessment

Formal risk assessment has been required in the fishing industry for about 17 years. *Wanderer II*'s risk assessment in the Seafish Safety Folder was only partially completed. Crucially, the dangers of winch operations, while included in the Safety Folder under the title of beam trawling and dredging, had not been addressed by the vessel's skipper/owner.

The dangers to inexperienced crew had been considered and the control measure adopted was to: *Teach them all risks before we start fishing* [sic]. However, in the junior deckhand's case this had not been implemented, despite him having been on board for almost 6 months. It is recognised that the skills learning process is gradual and that it is not practicable to expect everyone to be taught or acquire all the necessary skills immediately. However, this fact had not been reflected in the relevant control measure.

Where vessels are operating with a small crew it is desirable that all crew members are trained in all aspects of deck operations as soon as is practicable, for both safety and efficiency. However, until this training is completed, good communication, supervision and monitoring are essential and should be reflected in the relevant control measures.

The partially completed Safety Folder was not discussed during the handover between the owner and relief skipper and the deckhands were unaware of its contents. It is important to include crew members in the risk assessment process, even when it is not recorded. Not only does this enable all concerned to exchange safety ideas, but it also promotes inclusion and ownership of the resulting operational practices.

2.5 PERSONAL PROTECTIVE EQUIPMENT

The crew of *Wanderer II* wore polyvinyl chloride (PVC) gloves supplied by the vessel's skipper/owner to protect against the numerous sources of abrasion and cuts encountered on scallop dredgers.

The casualty's gloves were a gauntlet type, non-slip material and in good condition. It is highly probable that the properties of the glove enabled the tipping rope to gain purchase on the casualty's hand when he placed it on the rope around the rotating whipping drum. This might not have occurred had the junior deckhand been using his bare hands. However, it would be impractical to carry out dredging operations in bare hands and, even then, bare hands should not be applied to a rotating drum.

There have been numerous accidents in all industries where clothing has been caught in moving machinery, resulting in tragic circumstances. This accident again highlights the dangers of such circumstances. It is essential that clothing should be close fitting and kept well clear of moving machinery at all times, and that no body part should come into contact with moving machinery.

SECTION 3 - CONCLUSIONS

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

1. The junior deckhand's lack of training and experience resulted in him using the whipping drum in an unsafe manner. [2.2]

2. The junior deckhand could not reach the winch control, positioned 1.2m from the whipping drum that he was drawn into, and there was no other emergency stop. [2.3.1]

3. Due to its age and length, *Wanderer II* was exempt from the requirements to fit remote emergency winch stops. [2.3.1]

4. There is no requirement within MSN 1770 (F) for vessels constructed before 23 November 1995, but modified since that date, to fit remote emergency winch stops during the modification. [2.3.1]

5. Dredge tipping on the starboard side was carried out by the relief skipper on his own, standing some distance from the winch and its operating controls. [2.3.2]

6. During dredge tipping there was no dedicated operator at the winch control ready to stop it in an emergency. [2.3.2]

7. The relief skipper had not been specifically told that the junior deckhand was not experienced in using the whipping drum. [2.4.1]

8. A lack of communication and exchange of information between the crew resulted in incomplete knowledge and understanding, and caused assumptions to be made. [2.4.3]

9. Vessel familiarisation for the relief skipper did not include a review of the onboard risk assessment. [2.4.4]

3.2 OTHER SAFETY ISSUES CONTRIBUTING TO THE ACCIDENT

1. Very little dedicated advice exists on the specific hazards of deck machinery for fishermen, with knowledge generally handed down through onboard vocational learning. [2.3.2, 2.4.2]

2. *Wanderer II*'s risk assessment in the Seafish Safety Folder was only partially completed and, while a control measure for the dangers to inexperienced crew had been addressed in the folder, it had not been implemented. [2.4.4]

3. The deckhands were unaware of the contents of the Safety Folder. [2.4.4]

4. The gloves the junior deckhand was wearing as Personal Protective Equipment were appropriate for the environment he was in, but possibly increased the likelihood of his hand being caught by the tipping rope when he placed his hand on the rope around the rotating whipping drum. [2.5]

SECTION 4 - ACTIONS TAKEN

The Maritime and Coastguard Agency is currently revising the Code of Safe Working Practices for the construction and use of 15 metre length overall to less than 24 metres registered length Fishing Vessels.

The owner of *Wanderer II* has:

1. Placed rope guides on the main winch aft of the whipping drums to help keep the ropes in place during the tipping operation **(Figure 10)**.

2. Complied with the spirit of MSN 1770 (F) in minimising the crew's contact with bare ropes and warps, by modifying the whipping drums **(Figure 11)**, enabling them to become captive drums. By fastening each tipping rope to the whipping drums the ropes are now heaved or veered using the winch control lever, thus removing the need for hauling and surging on a continuously rotating drum. This enables two men to hook on the dredge beckets and shake the catch from the dredges as they are hoisted simultaneously.

3. Extended the dredge beckets **(Figure 12)** by attaching an additional single strop, which is threaded through the dredge top netting after emptying, and remains there during towing. This enables the dredges to be hooked on from inboard the bulwark, thus removing the need to reach outboard for the becket using an extended hook.

4. Fitted fall preventer tackle **(Figure 13)** to the derricks to provide additional crew security when the entire dredge gear is suspended overhead.

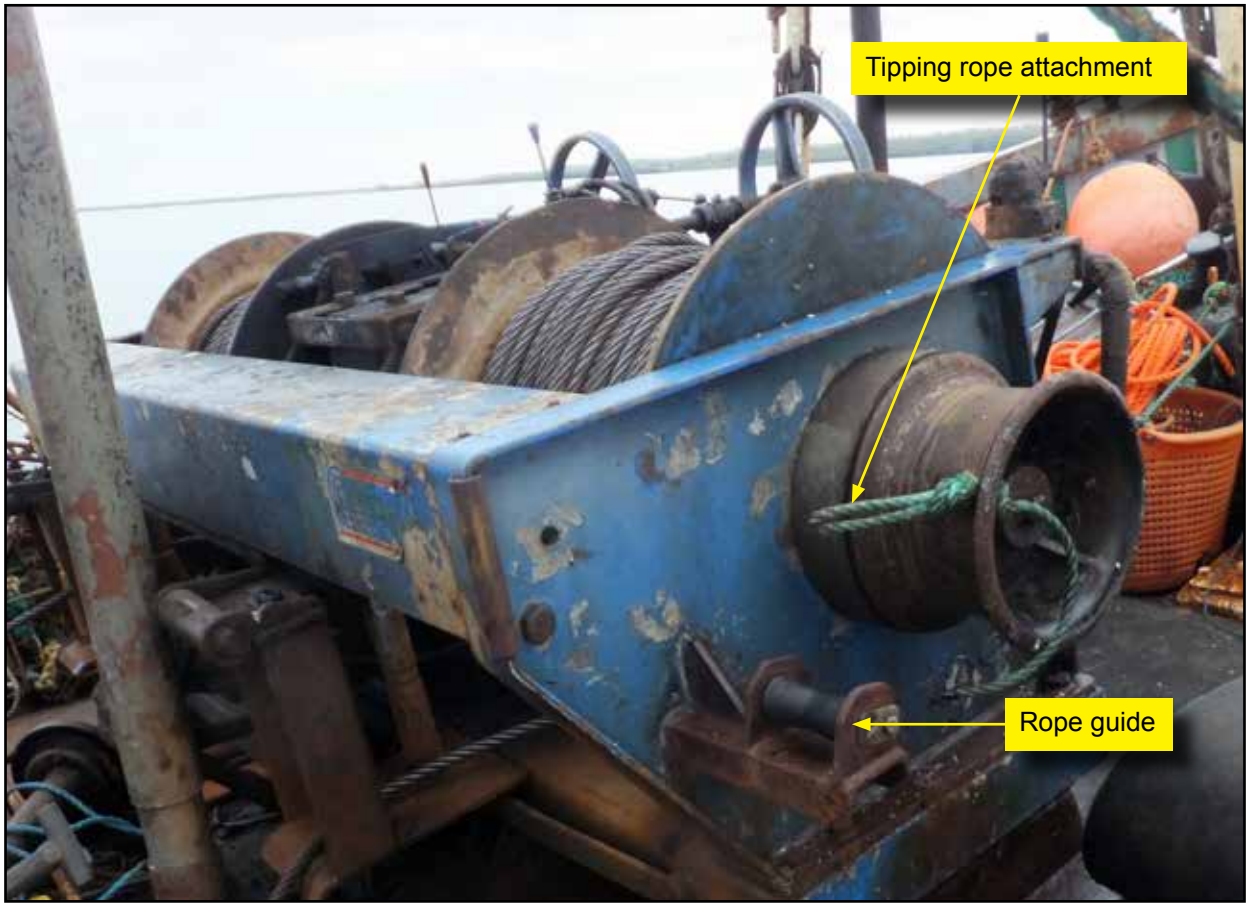


Figure 10: Rope guide and attachment to whipping drum after modification

Figure 11: Whipping drums modified to captive drums, enabling both tipping ropes to be heaved or veered simultaneously without manual contact

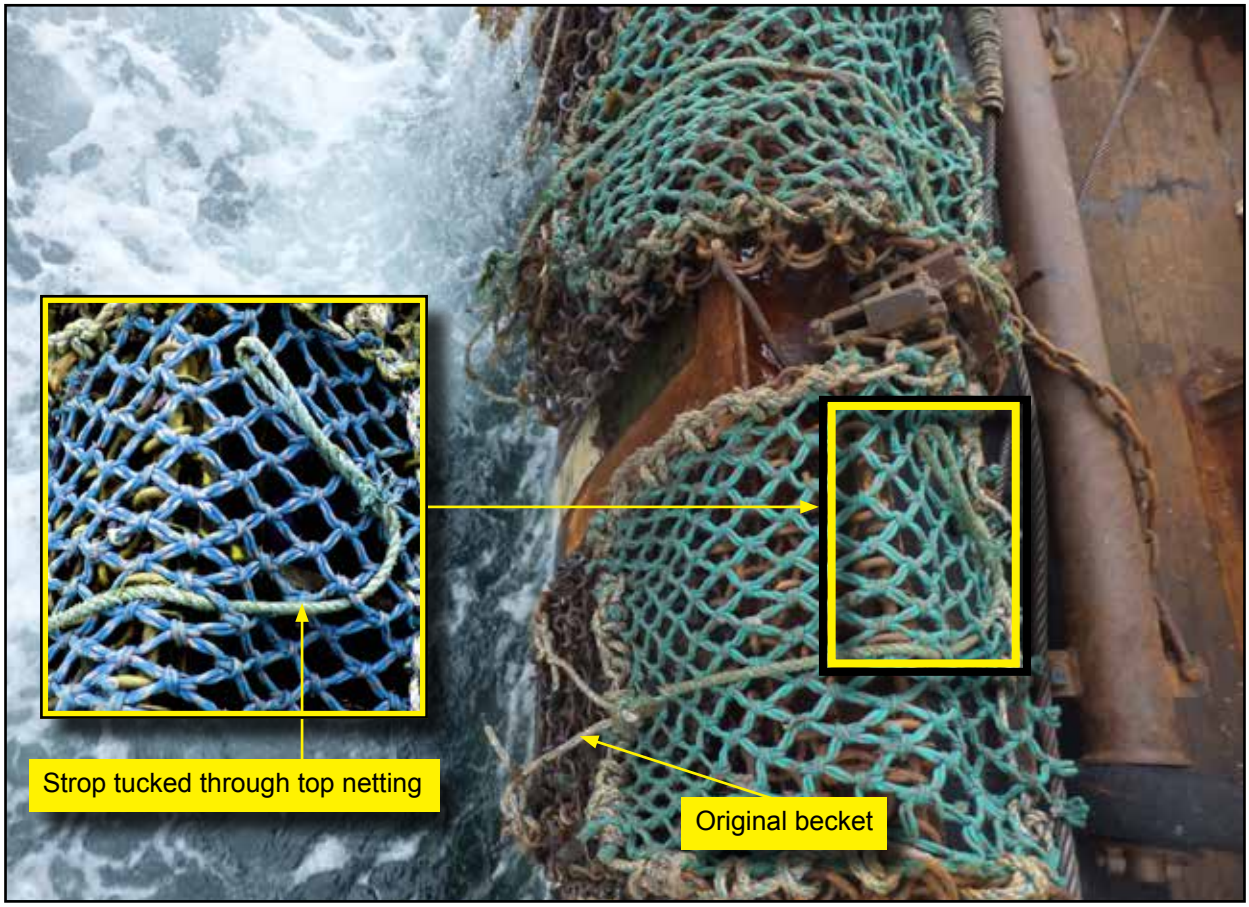


Figure 12: Dredge becket and extended strop

Figure 13: Fall preventer tackle between derrick and dredge gear

SECTION 5 - RECOMMENDATIONS

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

2015/109 Review and amend MGN 415 to include guidance on the safe operation of winch whipping drums.

2015/110 In developing the revised Code of Safe Working Practice for the Construction and Use of 15 metre length overall to less than 24 metres registered length Fishing Vessels, ensure that the safe operation of winches is properly considered, including that:

- Hauling and hoisting gear shall be controlled by a dedicated winch operator;
- The winch operator shall give exclusive attention to that task and not carry out any other tasks while operating the equipment;
- Appropriate safety devices, including emergency stop facilities, are within easy reach of personnel using the equipment.

Such provision should be applied to all vessels constructed, and all existing vessels that are substantially structurally or technically modified, from the date the revised Code is introduced.

The **Fishing Industry Safety Group (FISG)** is recommended to:

2015/111 Publicise the dangers of fishing vessel deck machinery and promote safe working practices by the production and promulgation of multi-media training aimed at deckhands.

The skipper/owner of *Wanderer II* is recommended to:

2015/112 Improve the safety of deck operations by:

- Emphasising the need for crew members to communicate explicitly with each other in the event of any change to routine operations.
- Ensuring that winch controls are permanently manned when the winch is operating under power.

2015/113 Consolidate recent modifications to the vessel's operation as a consequence of this accident by:

- Reviewing and updating the vessel's risk assessment safety folder.
- Ensuring the risk assessment is shared and discussed with crew members regularly.

Annex A

MGN 415 (F) Fishing Vessels: The Hazards Associated with Trawling, including Beam Trawling and Scallop Dredging

Maritime and Coastguard Agency

MARINE GUIDANCE NOTE

MGN 415 (F)

FISHING VESSELS: The Hazards Associated with Trawling, including Beam Trawling and Scallop Dredging

Notice to all Owners,Operators,Crews,Managers,Gear Fitters,Shipbuilders and Designers

This notice replaces MGN 265(F).

Summary

This Note provides general guidance on the safe operation of fishing vessels engaged in trawling and twin beam trawling, including scallop dredging with derricks or booms.

Key Points

- Only those people fully experienced in handling the vessel and its fishing methods should be in charge of a watch;
- Everyone must be aware of what to do in an emergency;
- All loose gear must be restrained and secure;
- The Risk assessment must be undertaken and everyone must read it. In particular crew should be aware of:
  - Keeping out of rope bights and away from working machinery;
  - Never to stand in line with tensioned rope or wire;
  - Good communications between skipper and winch operator; or
  - Everyone being on deck in their lifejackets during gear recovery with all watertight and weathertight openings closed.
- All winch operators must be trained and experienced and the same person must not control the winch and be tipping the dredges at the same time;
- Emergency buttons must be within easy reach of operators so they do not have to reach them over machinery;
- Hauling and lifting gear must be inspected and maintained;
- Newly acquired vessels or those with structural alterations should have their stability appraised;
- Warp Tension Monitoring equipment can help detect excess loads;
- The condition of weak links in trawls must be checked whenever nets are on board;
- If snagged gear cannot be freed without hazarding the vessel, it should be released.

1.0 The Dangers of Trawling

1.1 The nature of trawling, especially beam trawling, can result in serious accidents occurring at sea. Analysis of casualty data has shown that human error, failure of equipment, snagging of gear and loss of stability are recurring factors.

1.2 This notice provides general advice on safety matters related to the operation of fishing vessels. It is the responsibility of the owner and skipper to ensure that all procedures in use whilst fishing are suitable for the vessel, its equipment and its mode of fishing.

1.3 A video titled “Level Headed” looking at the risks involved in beam trawling is available from the Maritime and Coastguard Agency by telephoning 02380 329100, or from EC Group at the address given below, by quoting the name of the video and MCA/216 .

1.4 Further advice is also contained in the Fishermen and Safety Guide (quoting MCA/034) which can be obtained from EC Group at:

EC Group
Europa Park
Magnet Road
Grays
Essex
RM20 4DN
Telephone number: 0845 603 2431
Email address: mca@ecgroup.co.uk

2.0 Before going to Sea

Knowing the vessel

2.1 The skipper should ensure that only persons who are fully experienced in handling the vessel and competent in its fishing methods are in charge of a watch. All watch keepers and engineers should be aware of conditions that can reduce the stability reserves of the vessel including the use of fuel, stowage of fish and the effects of entrapped water when scuppers are restricted by debris or gear. Watertight and weathertight doors should always be closed when at sea. They may be opened to pass through and then be closed again.

2.2 All crewmembers should be made aware of the procedures to follow in the event of an emergency, these should include ensuring the tight dogging of watertight and weathertight doors and hatches to spaces which are needed to maintain the stability of the vessel. They should be made aware of the location and correct operation of all safety related equipment on board the vessel.

2.3 Know the position and the operation of the quick release gear.

2.4 Has bigger gear been fitted than that allowed for in the stability book.

3.0 Whilst at Sea

3.1 Loose gear should be restrained and secured. In particular booms, beams, nets, trawl doors and attached chains should always be securely lashed when not in use, even in fine weather. This safe working practice also helps to prevent inadvertent loss of gear, injuries to crew and the blockage of freeing ports and scuppers due to loose gear. It also reduces the dangers of sinking following a snagging with open hatches and doorways.

3.2 Watertight and weathertight doors and hatches should be kept closed at sea when not in use. This reduces the number of vital tasks that need to be completed in the event of an emergency. They should not be left open to assist in ventilation. Inadequate ventilation should be rectified by improvements to the ventilation system. If possible, openings for winches or winch wires should be positioned well above the weather deck.

4.0 When Shooting and Recovering Gear

4.1 Crew working on deck should be aware of the dangers of equipment failure and the simple precautions they should take to avoid injury. These include keeping out of the bights of ropes and keeping away from working machinery unless directly involved in its operation.

4.2 Sudden rolling of the vessel followed by a heavy list may arise when hauling or towing equipment fails or a load is lost from one side. This may happen whilst clearing sand, stone or weed from a trawl that is clear of the seabed.

4.3 Methods of restraining the net prior to release should not cause crew members to become fouled in bights of lifting ropes. Crew members are also reminded never to stand in line with any tensioned rope or wire which can break and whip back with fatal results. Sharp course alterations should be avoided whilst lifting the cod end.

4.4 On vessels where the winch controls are on deck, or poorly placed within the wheelhouse, care should be taken to ensure good communications are maintained between the skipper and the winch operator, especially if the skipper has only a restricted view of the winch operator. This is particularly important on smaller vessels with powerful winches where they may be less time to react to a dangerous situation. If problems occur the load should be lowered as quickly and safely as possible to the deck or onto the seabed.

4.5 Be aware of the additional risk from use of dog-clutch type winches. Dog-clutch winches should always be de-clutched when fishing as they cannot be disengaged when under load.

4.6 Wire attachments to drums should be able to be released quickly. A rope tail to the winch may be cut easily and no load comes on it if three turns remain on the drum.

5.0 When Recovering Fouled or Fastened Gear

5.1 It is clear from speaking to experienced fishermen that there are no standard answers on what action a Skipper should take when a vessel is restricted by snagging on a fastener. Only the experience of the Skipper and his correct actions at the time and in the circumstances experienced will result in success.

5.2 Recovery of fouled gear can impose extra loads on wires and machinery, particularly in adverse weather conditions. Failure of either may result in excessive rolling or a dangerous list to the vessel.

5.3 The vessel’s stability reserves may be seriously reduced when hauling on fouled gear with the winches working hard. Additionally winches should not be braked and used in conjunction with a vessel’s motions to free fouled gear; a heavier than normal swell may be sufficient to bring about the vessels capsize in this condition. Engaged Dog-clutch winches are particularly hazardous in these circumstances.

5.4 Unusual or potentially dangerous operations should always be carried out under the supervision of the skipper.

5.5 There should be an emergency means for the fast release of snagged gear.

6.0 Additional Considerations for Beam Trawling

6.1 A recent study undertaken with the co-operation of the fishing industry has emphasised the particular risks of beam trawling. Appropriate precautions should be taken to ensure safe fishing. The study emphasised a number of other important safety issues.

6.2 Even with the increased stability reserves that are required for beam trawlers, the vessel's stability may not be adequate in some sea conditions when recovering the fishing gear and catch with the derricks raised.

6.3 No beam trawler should be operated without fully experienced beam trawler crew in charge of the vessel and in control or mentoring of the winchman.

6.4 All winch operators should be fully trained on the job and be experienced in the whole operation.

6.5 The skipper's understanding of how the stability is affected during fishing operations can be enhanced by the ready availability, in the wheelhouse, of simplified stability information. In general the lower the weight or place of attachment the better.

6.6 A beam trawler at sea with gear deployed can behave differently to vessels using other fishing methods. The fishing gear has a damping effect on the roll of the vessel. This damping effect masks the signs that indicate the vessel's true stability state. A longer than usual roll period indicates reduced stability.

6.7 It is important to guard against riding turns and, whenever possible, the same person should not be tasked with controlling the winch and "tipping" the dredges at the same time.

7.0 Risk assessment

7.1 Under the 1997 Health and Safety legislation, a thorough safety risk assessment should be carried out before fishing operations are commenced. The Seafish safety folder includes a risk assessment questionnaire that is excellent for this purpose. Guidance on carrying out risk assessment is also contained in Marine Guidance Note 20 (M+F).

8.0 What the Owner should do

8.1 The owner should take into consideration the following suggested requirements, as appropriate, which is by no means an exhaustive listing:

- Crew should be fully trained and both experienced in beam trawler methods and familiar with the vessel and its operation. This training may have to be undertaken as familiarisation on board.

- Emergency stop buttons to be fitted so the operator of the equipment can reach them without endangering themselves by leaning across the equipment or risking any other hazard.

- Bridge control of winches to include warp and topping lift as well as control of the engines.

- Bridge control or a suitable alternative method for the release or lowering of derrick head blocks. This will enable controlled lowering of the point of

suspension of the load from the head of the derrick down to the shoulder block. This can prevent a dangerous list or capsize occurring if the gear picks up an abnormal load.

- Warp-tension monitoring equipment.

- Sounding equipment that can reduce the possibility of the trawl snagging or picking up excess loads of sand and shells or snagging an obstruction on the bottom.

- Past experience of safe working with gear of similar sizes and weight.

- Particular care when working on fishing grounds where the features of the sea bed are not known.

- Past experience of safe working with a vessel whose structure, weight distribution and stability characteristics are similar.

- Avoiding the use of systems with dog clutch winches. These winches often take considerable time to de-clutch and re-clutch preventing a rapid response to sudden load changes. Operators should be aware of these additional risks. Dog clutch winches should be always be de-clutched when trawling.

- The normal operation of the vessel is unsafe if a crew member has to work upon, or reach outboard of, a gunwhale rail. If there is an exceptional requirement a safety harness should be worn and a safety helper should be provided. Ideally the gear and operation should be designed or modified to avoid this.

- That all of the lifting or hauling gear has been maintained and inspected and is in good order

8.2 Owners should note that possession of approved stability is no guarantee of satisfactory operation during fishing operations. An assessment of safety for beam trawling should be based on three principles:

1. **History –** Generally a beam trawler will continue to operate safely if it has a history of safe operation and its operating profile remains substantially unchanged. This includes factors such as the vessel's characteristics, its gear, the fishing grounds, its crew and the worst weather conditions in which the vessel operates;

2. **Stability –** On vessels new or newly acquired, or after structural alterations, before working with a new arrangement of fishing gear, an appraisal should be made of the vessel's stability during fishing operations. Such information should supplement the relevant sailing conditions that are contained in the approved stability book. For normal fishing operations the worst case is generally shown to be when the vessel is recovering her gear and catch; and.

3. **Control –** Control generally means control of winches in addition to engines and helm. A skipper's ability to respond and the speed of response is enhanced by full and immediate access to these separate controls which ideally should be located on the port and starboard sides of the wheelhouse.

9.0 General Operations

9.1 Every effort should be made to avoid an excessive list by ensuring uneven loads are kept to a minimum during recovery of gear.

9.2 When hauling on snagged gear, this should ideally be carried out with the warp load acting as low and as close to the vessel's side as is possible and not from the derrick head. The lifting of the unsnagged net, well of the bottom, will ensure that the weight distribution is maintained and reduce the possibility of snagging or twisting about the snagged warp.

9.3 Generally when gear is stuck fast on an obstruction such as a rock or wreck, the vessel is stopped and hauled back over the obstruction. It is possible that the gear on the free side may be raised to act as a counterbalance to the snagged gear however this is a dangerous operation and capsize may occur if the snagged gear is suddenly released. All crew members should be advised when gear recovery operations commence and when they are completed. During recovery, they should all be on deck with their lifejackets with all watertight and weathertight openings closed.

9.4 Great care should be exercised during adverse weather conditions where there is a significant swell or tidal current. These conditions can impose a sudden increase in the loads on the trawl warps and the forces exerted upon the vessel.

9.5 Vessels sometimes pick up excess loads of sand, rocks, shells, weed or man-made debris from the sea bed. Without warp-tension monitoring equipment it can be difficult to detect excess loads on the gear. Subtle indications may come from an extra strain on the winch, changes in vessel handling or steering, or from increased engine exhaust temperatures.

9.6 For beam trawlers the use of a "weak link" near to the cod end can increase the chances of capsize during trawling or gear recovery operations. The problem will arise if a "weak link" parts in one of the trawls when both trawls are laden and at or near the sea surface. The condition of these weak links is therefore very important and these should be inspected whenever the nets are onboard. Care should be taken when cleaning heavy debris from nets and all crew members should be advised whenever an abnormal load has been trawled. In this situation they should be on deck with their lifejackets. Both trawls should have a freefall quick release.

9.7 Experienced skippers apply a range of methods to clear fouled gear of debris however care should be taken when raising heavy loads as this can have serious effect on the stability of the vessel. A vessel's centre of gravity rises proportionally to the magnitude of the weight that is being lifted and the vertical positioning of the derrick head lifting block. Vessels become less stable as the centre of gravity is raised so if there are any doubts about the ability of the vessel to raise a load safely, then the lift should not be attempted. Always remember that with fouled gear that the hazards increase as the vessel size decreases. Always consider the consequences of the practice of steaming out sand from the net. Sand can be steamed out of the net but with the excess weight if gravel is present, the cod end may break causing a distinct weight imbalance.

9.8 It is important that all watertight and weathertight doors and hatches are closed and freeing ports are checked free and clear, before the recovery operation takes place. Unless this is done, and if the vessel heels suddenly, it is possible that water may downflood into the hull and this, if unchecked, will invariably lead to capsize and the loss of the vessel.

9.9 If snagged gear cannot be freed without hazarding the vessel, the safe course of action is to release the gear, mark it with a buoy and leave it until conditions improve or a more capable vessel can recover it.

9.10 All those involved in the catching operation should fully understand their role and be familiar with the equipment that is in use.

10.0 Experience and Training

10.1 It is essential that all crew members are aware of the particular risks of beam trawling. Special training by experienced beam trawler fishermen is essential, the crew should have time to become accustomed to the work and equipment and be supervised appropriately during all aspects of the trawling.

11.0 Stability Information

11.1 It is recommended that the weights and positions of fishing gear and the lengths of beams and derricks should be recorded in all future revisions of beam trawler stability information. Changes in fishing gear can have significant and detrimental effects on a vessel's stability and unless such changes are investigated their effects on stability will remain unknown.

More Information

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Extract from Fishermen’s Safety Guide

Machinery

Machinery is very unforgiving – treat it with respect.

Is the deck machinery in good working order? Do brakes and clutches work properly for a safe and efficient operation? Are the guide rollers worn and in need of replacement? Repair broken or damaged controls immediately. Are adequate tools and spares carried on board?

Think about the equipment on the vessel; can it be made safer by the addition of a guard or other safety measures? If in doubt about the reliability of any of your equipment employ a specialist. Test warning alarms and emergency stops.

Never remove guards or safety devices from equipment. If they have to be removed for maintenance purposes put them back immediately afterwards.

Operations

Only experienced persons should operate the deck machinery.

Have new persons on the vessel been trained and made aware of the dangers before being allowed to control the machinery?

Do you know the safe load of machinery?

Do not be tempted to overload machinery.

Is there a clear system of signals in place to communicate with the operator? The person should stand clear and give signals in a clear unmistakable manner. Do not rely on shouted instructions as they can easily be confused.

Always complete the task; secure the winch and close down machinery before you leave – the job is not finished until the area is made safe.

Can the operator clearly see the operation and that the crewmen, handling the winch, trawl doors and other operations, are stood clear before operating the winch? If not, a clear systems of signals needs to be established to ensure the safety of the crew.

Do not get in the way of the person operating the winch and do not distract his attention by unnecessary 'chit-chat' or behaviour.

Hauling Gear

Is the winch adequately guarded? A hand rail or a simple guard could be sufficient to prevent someone being caught up in the winch. Is there

danger from the moving warps? Could a frayed wire snag on oilskins and pull a hand or foot into the sheave? Can you prevent such risks by a guard or a barrier? Many vessels now fit separate winches for these tasks, which is now much safer and usually gives a more efficient operation.

Keep your clothing, especially cuffs and gloves well clear of a warping drum, and if your hands are too close, a sudden surge can drag you into the turning drum.

Vee wheel type line and pot rope haulers should never be operated without the 'stripper knife' piece correctly fitted. This knife is to eject the slack rope out of the vee section and without it, the free rope can be carried around the hauler; dragging you into it.

Remain close to the controls when hauling pots and be ready to stop as the pot emerges from the water. Leaving the controls can result in a pot hitting the davit block and striking you. This is especially a danger with anchors and weights.

Lifting Gear

Stand well clear when deck cranes are being used; they can move in many planes and the operator may cause it to move in a direction that you do not expect. Will your lifting and towing gear cope with expected loads? Know the safe working load of deck cranes and do not exceed it.

Do not simply tie a piece of rope to lift items. Vessels should carry proper slings and shackles which are suitable for the load.

A lifted load may swing; use a steadying rope – NOT your hands.

Great care is needed when positioning the net into the power block as men can be easily struck by the power block or knocked overboard. The crane operator must ensure that the men at the rails are aware before moving or operating the power block.

After use the deck crane must be returned to its stowed position with the power block securely located in a purpose designed rest.

Manual handling

Lifting baskets, boxes of fish and other heavy or awkward items can easily result in injuries unless great care is taken and correct techniques are used.

Never bend your back over the load when lifting heavy weights. Stand with your feet a little apart, and keep your back straight.

Marine Accident Report