ACCIDENT REPORT

Report on the investigations into

the loss of the skipper from fv

Discovery

during single-handed fishing operations

3 miles east of Fraserburgh

9 October 2010

and

the loss of the skipper from fv

Breadwinner

while fishing single-handedly

5.5 miles east of Score Head, Bressay

20 January 2011

MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

VERY SERIOUS MARINE CASUALTY REPORT NO 22/2011 NOVEMBER 2011

Extract from
The United Kingdom Merchant Shipping
(Accident Reporting and Investigation)
Regulations 2005 – Regulation 5:

"The sole objective of the investigation of an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005 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 13(9) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005, shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes is to attribute or apportion liability or blame.

Front cover photograph (*Breadwinner*) courtesy of Ian Leask and www.shipnostalgia.com

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INTRODUCTION

In November 2009, three fatal accidents in a very short period of time prompted the MAIB to produce a combined report into the resulting investigations of those accidents in an attempt to "*cast a spotlight on sub-optimal working practices and attitudes to occupational safety that seem to be the norm for some in the industry*"[1]. The report recommended to the Department for Transport and the Maritime and Coastguard Agency that a properly funded plan be developed to address this parlous situation. To the credit of both organisations, the recommendation was fully accepted notwithstanding the challenging financial climate.

It is too soon to assess whether any discernible improvement in the industry's safety record has been made but there appears to be a willingness from all stakeholders to make progress. However, one sector of the fishing industry is perhaps on the margins of our collective consciousness and may gain least benefit from the efforts of the regulators and industry federations. Ironically, these fishermen, the single-handed operators, are the ones at most risk of injury and death.

As in November 2009, a series of serious accidents during the winter months of 2010/11 has brought into sharp focus the risks involved in single-handed fishing operations. These accidents, five in total, resulted in three fatalities, one near fatality, and the loss of a vessel following a collision. All these accidents were entirely avoidable, the common themes being poorly considered working practices and inadequate equipment design.

It has been decided to combine the results of the subsequent MAIB investigations of two of the fatal accidents into a single report to better emphasise the MAIB's concerns. The loss of fishermen from the vessels *Discovery* and *Breadwinner* were tragic events made more so because those involved had either not recognised the hazards they faced, or tolerated them because they were unable to think of a better way of working.

Regulatory surveys and inspections of fishing vessels do not evaluate the operation of the fishing gear and do little to assess the working environment and operational risks faced by the fishermen concerned. Improvements in safety culture are best achieved by the workers concerned but it is extremely hard for anyone to objectively evaluate a system that they are closely involved with unless they have been given specific advice or practical guidance that is relevant to their mode of fishing. There is a clear need for safer fishing gear and better guidance on safe working practices, especially for single-handed fishing operators.

In response to these accidents the Sea Fish Industry Authority intends to commission a study into the design of potting roller systems with respect to use with 'V' shape haulers, and the Scottish Fishing Federation is producing an instructional video on 'Safe Potting'. This report concludes with a recommendation to the Maritime and Coastguard Agency which seeks to extend the guidance contained in its Fishermen's Safety Guide to cover single-handed operators.

STEVE CLINCH
Chief Inspector of Marine Accidents

[1] http://www.maib.gov.uk/publications/investigation_reports/2010/trilogy.cfm, published 2010

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Annex D - Seafish - Small Vessel Risk Assessment - May 2007

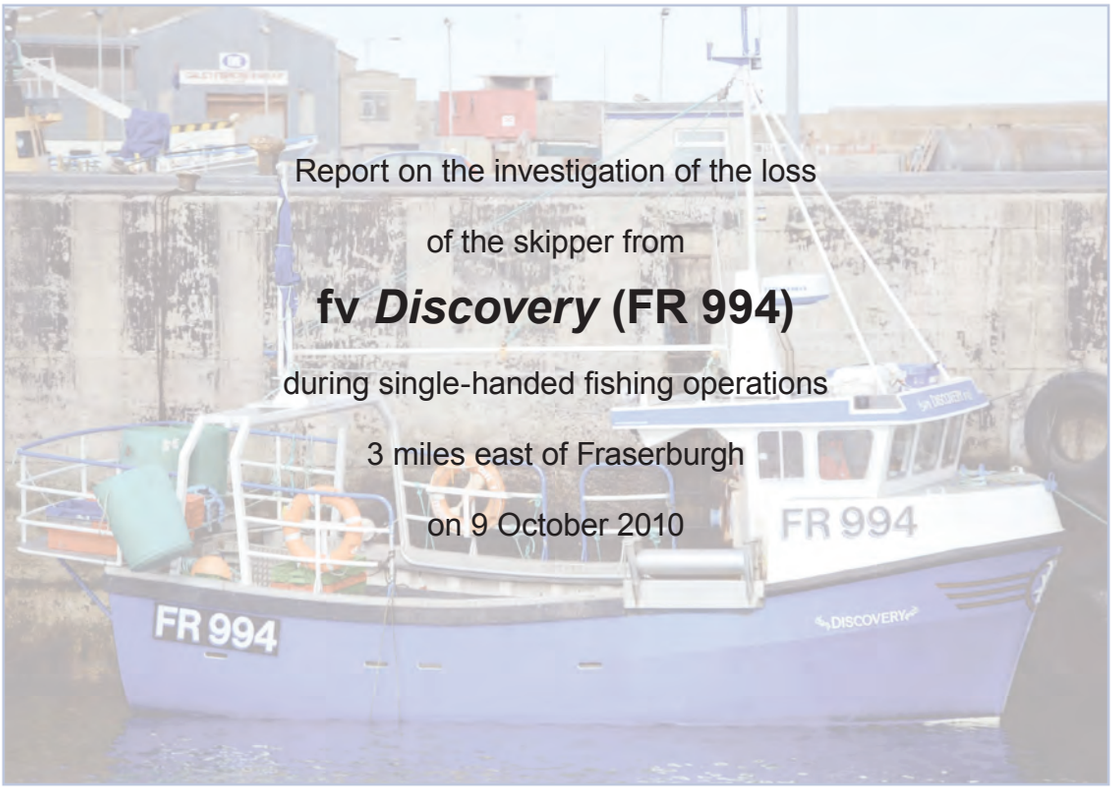
GLOSSARY OF ABBREVIATIONS, ACRONYMS AND TERMS

ALB	-	All Weather Lifeboat (RNLI)
ARCC	-	Aeronautical Rescue Co-ordination Centre
C	-	centigrade
CG	-	Coastguard
Creel	-	An enclosed device where shellfish actively enter and are captured, also known as a pot.
CRT	-	Coast Rescue Team (Maritime and Coastguard Agency)
DfT	-	Department for Transport
EPIRB	-	Emergency Position Indicating Radio Beacon
ETA	-	Estimated time of arrival
FISG	-	Fishing Industry Safety Group
fm	-	Fathom, common nautical measurement of 6 feet or 1.83 metres
FVSO	-	Fishing Vessel Safety Officer
GPS	-	Global positioning system
GRP	-	Glass reinforced plastic
Hd	-	Head
hp	-	horsepower
ILO	-	International Labour Organization
kg	-	kilogramme
kt	-	knot
kts	-	knots
kW	-	kilowatt
Leader	-	A leader of creels is the local terminology for a group of creels or pots and all the gear attached. In other parts of the UK, it may be referred to as a “fleet” or “string.”
LOA	-	Length overall
LOM	-	Lifeboat operations manager

m	-	metre
“Mayday”	-	The international distress signal (spoken)
MCA	-	Maritime and Coastguard Agency
mm	-	millimetre
MOB	-	Man overboard
MRCC	-	Marine Rescue Co-ordination Centre
MSN	-	Merchant Shipping Note
nm	-	nautical miles
PFD	-	Personal flotation device
PLB	-	Personal locator beacon
RAF	-	Royal Air Force
RNLI	-	Royal National Lifeboat Institution
SAR	-	Search and rescue
ScotNI	-	MCA’s Scotland and Northern Ireland region
Seafish	-	The Sea Fish Industry Authority
Sneed	-	Sneed is the local terminology for the rope that connects the creel to the back rope. In other parts of the UK it is known as a leg rope.
SOG	-	Speed over the ground
STCW		International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978, as amended in 1995 and 1997 (STCW Convention)
STW	-	Speed through the water
Surveyor	-	As used in this report, an MCA official trained as either a general Marine Surveyor or a Marine Surveyor (Fishing Vessels)
t	-	tonne
UTC	-	Universal Time, Co-ordinated
VHF	-	Very high frequency

Times: All times used in this report are local unless otherwise stated.

DISCOVERY INVESTIGATION



Report on the investigation of the loss

of the skipper from

fv *Discovery* (FR 994)

during single-handed fishing operations

3 miles east of Fraserburgh

on 9 October 2010

SYNOPSIS

At 1030 on 9 October 2010, the 8.3m potter *Discovery* left Fraserburgh harbour to fish creels along the coast. The skipper, Bruce Pearson, was alone on board. It is most likely that at around 1130, while hauling his first or second creel leader, the part-time fisherman was lost overboard. At 1744, 6 hours later, the coastguard was informed that Mr Pearson was missing. An extensive search was carried out at sea and along the shoreline, but he was not found.

The MAIB investigation revealed that Bruce Pearson might have slipped or tripped as the boat rolled in the confused seas, and then fallen over the side or through the open stern shooting door. It is more likely, however, that while hauling the back rope, the moving creels or back rope knocked or dragged him overboard as the back rope rode out of the hauler in the difficult sea conditions.

The investigation found that back ropes are liable to ride out of a 'V' wheel hauler if they do not lead correctly on to the potting roller. The investigation has also highlighted the hazards faced by fishermen working single-handedly, and their vulnerability to emergency situations.

The skipper did not wear a personal flotation device (PFD) or a lifeline; nor did he have a personal locator beacon (PLB). That he was missing was not discovered until well after his expected survival time had elapsed. Consequently, the extensive search and rescue operation that was carried out was unlikely to have found the fisherman alive.

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *DISCOVERY* AND ACCIDENT

SHIP PARTICULARS

Flag	British
Classification society	Not applicable
IMO number/fishing number	Not applicable/FR 994
Type	Fishing - creeling vessel
Registered owner	Privately owned
Manager(s)	Privately owned
Construction	Glass reinforced plastic (GRP)
Length overall	8.3m
Registered length	7.7m
Gross tonnage	5.65
Minimum safe manning	Not applicable
Authorised cargo	Not applicable

VOYAGE PARTICULARS

Port of departure	Fraserburgh
Port of arrival	Fraserburgh
Type of voyage	Coastal
Cargo information	Not applicable
Manning	One

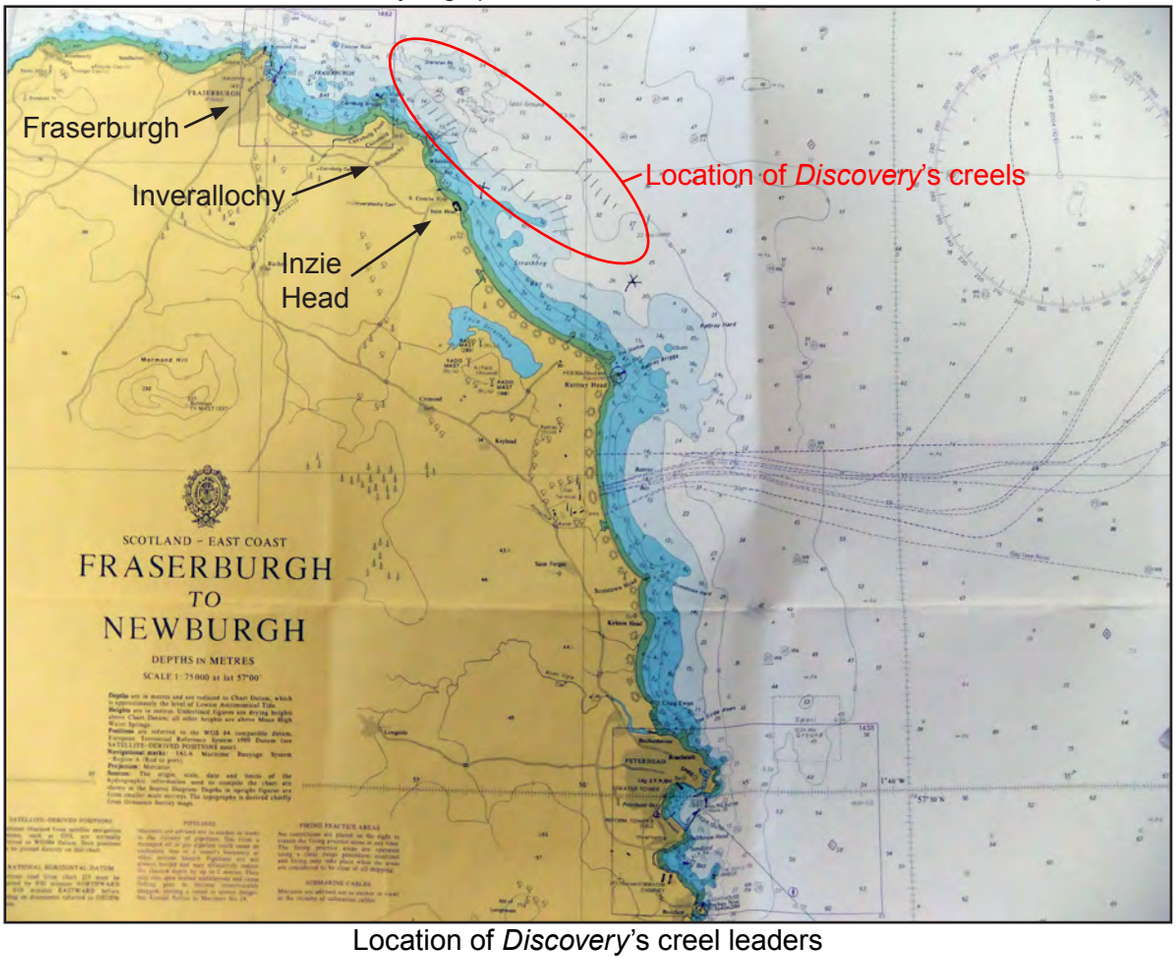
MARINE CASUALTY INFORMATION

Date and time	9 October 2010, around 1130
Type of marine casualty or incident	Very Serious Marine Casualty
Location of incident	3 miles east-south-east of Fraserburgh
Place on board	Over side
Injuries/fatalities	One fatality
Damage/environmental impact	Foundering resulting in total loss
Ship operation	Shooting/hauling fishing gear
Voyage segment	Transit
External & internal environment	Wind - force 4 Visibility - moderate Weather - clear
Persons on board	One

1.2 BACKGROUND

Discovery's owner operated 18 leaders[2] of creels[3] with between 20 and 25 creels per leader to catch lobster and crab using various types of parlour creels. The leaders were located to the east of Fraserburgh between north-east of Inverallochy in the north and to the east of Inzie Head (Hd) in the south **(Figure 1)**.

Figure 1



Location of *Discovery*'s creel leaders

1.3 THE DAY BEFORE THE ACCIDENT

On 8 October 2010, *Discovery*'s owner and his brother, Bruce Pearson, took the vessel out from Fraserburgh to fish the creels. The two men recovered the first leader of creels 0.5nm north-east of Inverallochy, removed the catch, re-baited and then shot the creels away.

The wind was southerly, increasing in strength to Beaufort Force 5 at times. This, combined with the spring tidal conditions, created sea conditions that the owner considered were too rough for him to continue working, so he decided to abort fishing for the day and the two men returned *Discovery* to Fraserburgh harbour.

[2] Leader; a leader of creels is the local terminology for a group of creels or pots and all the gear attached. In other parts of the UK, it may be referred to as a "fleet" or "string."

[3] An enclosed device where shellfish actively enter and are captured, also known as a pot.

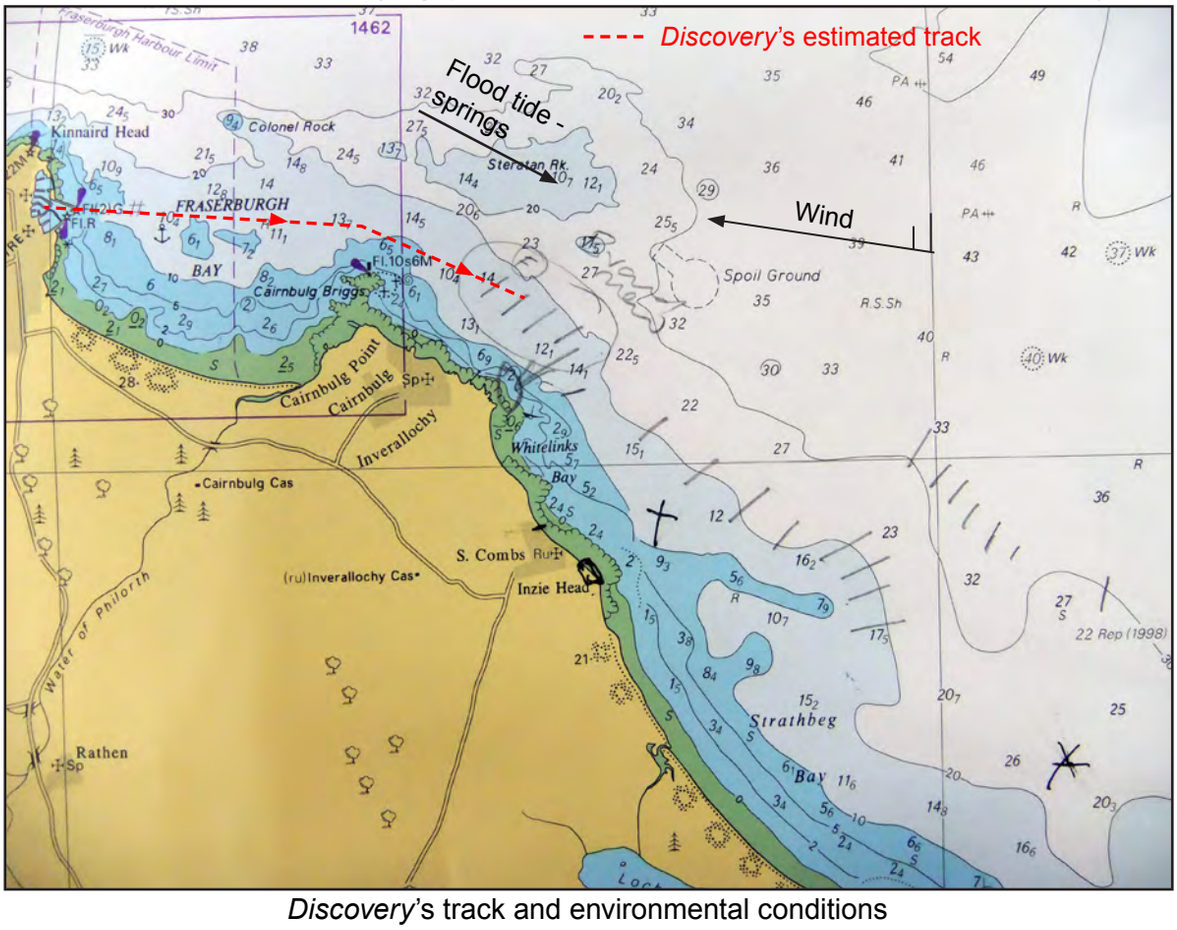
1.4 ENVIRONMENTAL CONDITIONS

On 9 October, the weather was partly cloudy with visibility of around 4nm. The wind was from the east-south-east force 4, with a 1.5m to 2m swell, steepening closer to the shore. At the most likely time of the accident, the spring flood tide was running south-easterly **(Figure 2)**, opposing the wind direction, creating steepened and irregular seas. The water temperature was 11°C.

Ephemeral data was:

- Low water 0739 and 1950
- High water 1356
- Tidal range 3.5m - springs
- Sunset 1820.

Figure 2



Discovery's track and environmental conditions

1.5 THE DAY OF THE ACCIDENT

The owner did not intend to fish on Saturday 9 October, and the person who usually acted as second crewman had taken the day off. The owner's brother, Bruce Pearson, decided to take *Discovery* out to fish alone. Although he had been skipper of the vessel before, this was the first time he had operated *Discovery* single-handedly.

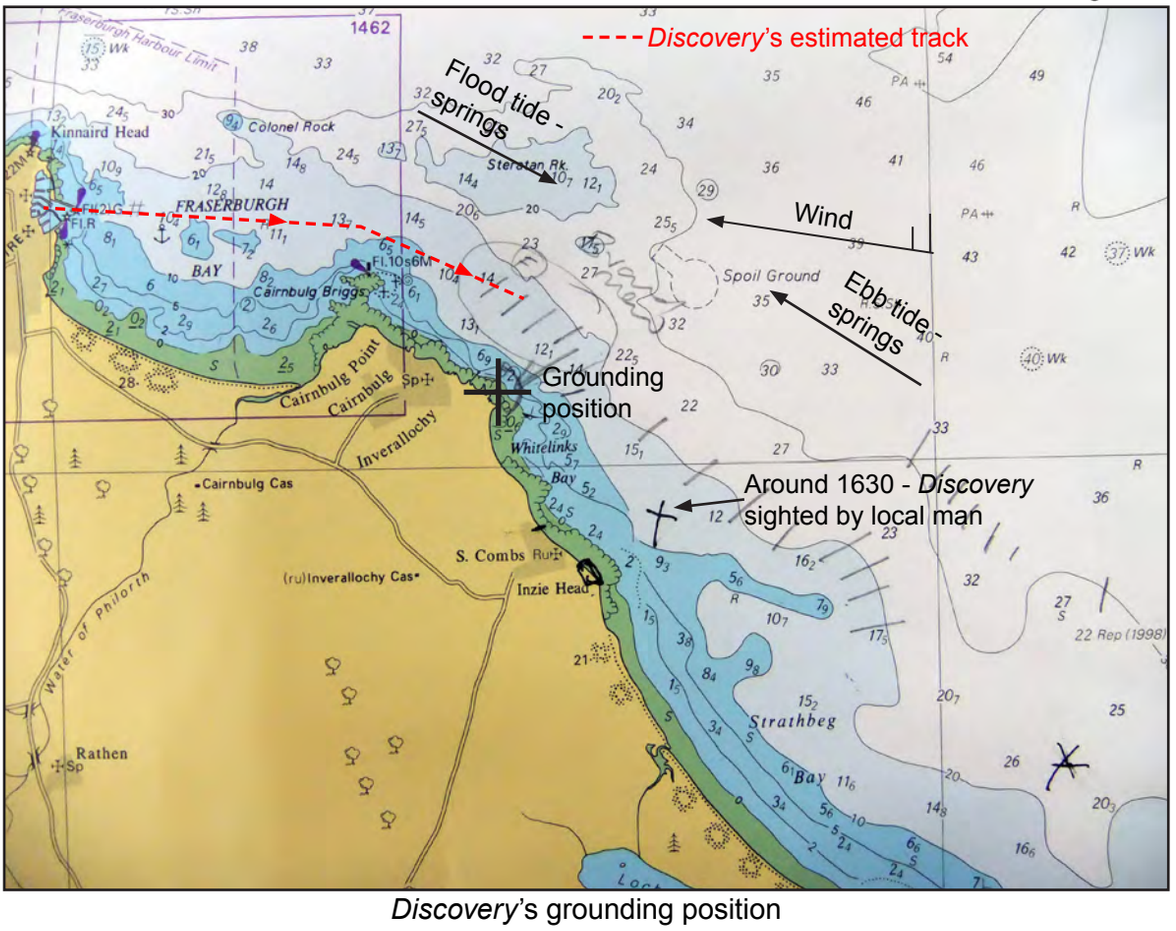
The Fraserburgh Marine Tower watch officer saw *Discovery* leave Fraserburgh Harbour, but did not note the time of her departure. At about 1030, *Discovery* was seen as she headed towards her usual fishing grounds to the east of Inverallochy **(Figure 2)**. The skipper did not have a PFD with him, and was not equipped with a PLB or lifeline.

1.5.1 Raising the alarm

At around 1600 a local man saw *Discovery* from his house in Saint Combs. The man remembered seeing the boat heading out that morning and assumed that, due to its aspect, the crew were fishing for mackerel rather than creeling.

When the local man looked again, around 30 minutes later, he noticed *Discovery* yawing as she moved north-westerly **(Figure 3)**. The man looked at *Discovery* through his telescope from his second floor window and could not see anybody on board, but did see a creel hanging over the boat's starboard side. He called *Discovery* on his hand-held very high frequency (VHF) radio on channel 8, which was normally used by local fishermen, but got no response. He then called the skipper of the fishing vessel *Duthies* FR 287, who he knew was fishing in the area. *Duthies*' skipper replied that it would take him a long time to reach *Discovery*'s position due to the strength of the tidal flow. The local man then called Fraserburgh Marine Tower and asked the watch officer for the telephone number of *Discovery*'s owner.

Figure 3



Discovery's grounding position

At around 1715 the local man phoned *Discovery*'s owner's home and spoke to the owner's wife. She realised that Bruce Pearson, her brother-in law, must have taken *Discovery* out to fish. She telephoned her husband and informed him of the situation. The owner asked her to telephone the coastguard while he attempted to call his brother's mobile telephone.

At 1744, the owner's wife telephoned the emergency services and was transferred to the Maritime Rescue Co-ordination Centre (MRCC) in Aberdeen, which initiated a search and rescue (SAR) operation. At around the same time, the local man again phoned the Fraserburgh Marine Tower and alerted the watch officer to his concerns for Bruce Pearson. The watch officer phoned the Fraserburgh harbourmaster, who told the watch officer to call the coastguard. The harbourmaster also alerted one of his managers, who was also a Royal National Lifeboat Institution (RNLI) crewman, about the developing situation.

At 1748 the Fraserburgh Marine Tower watch officer phoned the emergency services, to contact the MRCC Aberdeen Coastguard officer, and requested that a lifeboat be sent to *Discovery*'s position.

1.5.2 The search

At 1750, Aberdeen MRCC obtained permission from the RNLI lifeboat operations manager (LOM) to task the lifeboat, and initially paged the crew of the Fraserburgh All Weather Lifeboat (ALB). The Fraserburgh Coast Rescue Team (CRT) were then put on alert, followed by the Peterhead ALB and CRT.

At 1759, MRCC Aberdeen broadcast a "Mayday" relay message by VHF radio. It was around this time that *Discovery* grounded on rocks south of Inverallochy **(Figure 3)**.

At 1804 an Aberdeen MRCC coastguard officer contacted the Aeronautical Rescue Co-ordination Centre (ARCC) at Royal Air Force (RAF) Kinloss to request rescue helicopter assistance. Rescue helicopter R137 from RAF Lossiemouth was tasked to attend at 1806, and an estimated time of arrival (ETA) of 45 minutes was given. R137's height hold system was defective, limiting the helicopter's ability to recover a man in the water.

The MCA estimated that, in water at a temperature of 11ºC, a casualty might be expected to survive for around 4 hours. However, without a PFD and in rough sea conditions this time would have been reduced significantly.

At 1808 the fishing vessel *Duthies* arrived at *Discovery*'s position, but her skipper was unable to get alongside the grounded vessel without putting his own craft at risk.

The Fraserburgh ALB arrived on scene at 1810 and launched an inflatable boat with two crewmen on board. One crewman boarded *Discovery* and searched the boat, but could find no one on board. A few minutes later they returned to the ALB and the inflatable was recovered back on board. The ALB's skipper then started to search for the missing fisherman at sea.

Shortly afterwards, the skipper of a creel boat similar to *Discovery* arrived on the shore close to the grounded boat, and he was able to board *Discovery* from the rocks. He searched for the missing skipper and then considered attempting to salvage the boat by taking her off the rocks under her own power. However, due to the falling tide, the rocky ground, and the sea conditions, he was unable to save the boat, and climbed back ashore.

At around 1845 *Discovery*'s owner arrived, boarded the vessel from the shore and searched for his brother. He reported that the engine compartment had been breached and was partially flooded. All electrical power had been lost. The owner pulled up the creel that was caught on the aft vertical roller **(Figure 4)** and then hauled the last two remaining creels on board by hand to see if the skipper was caught in the back rope.

Figure 4

Location of creel found on *Discovery*'s starboard side

The Peterhead ALB was on scene at 1913 and assisted in the search along with the fishing vessel *Reliance II* and the supply ship *ER Narvik*. The Fraserburgh and Peterhead CRTs continued to search the coastline in the area, assisted by luminous flares fired from the Fraserburgh ALB.

At 2242 the search was called off for the night.

At 0800 on Sunday 10 October the SAR teams resumed their search for Bruce Pearson. A police dive team completed a partial search of the wreck and creels in the area, but were constrained by the swell and tidal conditions. During the morning *Discovery* started to break up on the rocky shore, and at 1320 MRCC Aberdeen terminated the search.

Over the next 3 days *Discovery* was broken up by the wave action on the rocky shoreline **(Figure 5)**.

Figure 5

Wreck of *Discovery* - stern section

1.5.3 *Discovery*'s condition following the accident

When *Discovery* first grounded it was reported that her engine was running, the propulsion was in neutral, the engine-driven hydraulic 'V' wheel hauler (hauler) was turning[4] and the electrical systems, including the chart plotter and VHF radio, were working.

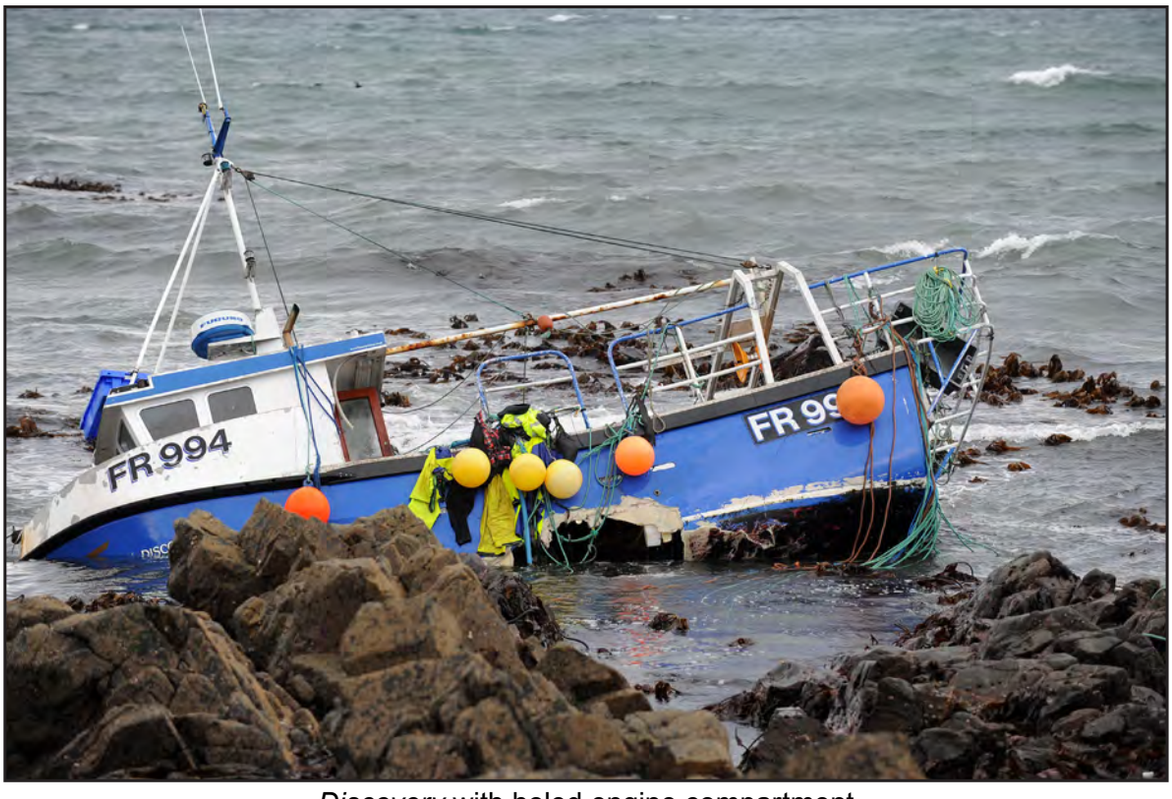
Later, as *Discovery*'s engine room flooded **(Figure 6)**, electrical power was lost, but the engine and the hauler continued to run until the engine was swamped as the vessel started to break up.

There were a few crabs and lobsters held in the storage bins on the vessel's starboard side. A small amount of bait from the first bait box had been used; the remainder were full.

Several ropes were hanging over *Discovery*'s side, with at least one rope hanging loosely around her propeller.

[4] Haulers are used to haul the back rope and creels on board, turning anti-clockwise. Once stopped, the back rope can be easily pulled out of the hauler. Haulers are seldom ever used to veer back ropes.

Figure 6



Discovery with holed engine compartment

1.5.4 Condition of *Discovery*'s fishing gear following the accident

The creel that was caught on the aft vertical roller was the third from the end of the leader. The other two creels that were hauled on board by the owner were full of crab, and therefore had not been cleared of catch before the accident. The chain weight had broken from the connection to the back rope. The lead-weighted buoy rope had parted at its half length and the marker buoys were missing.

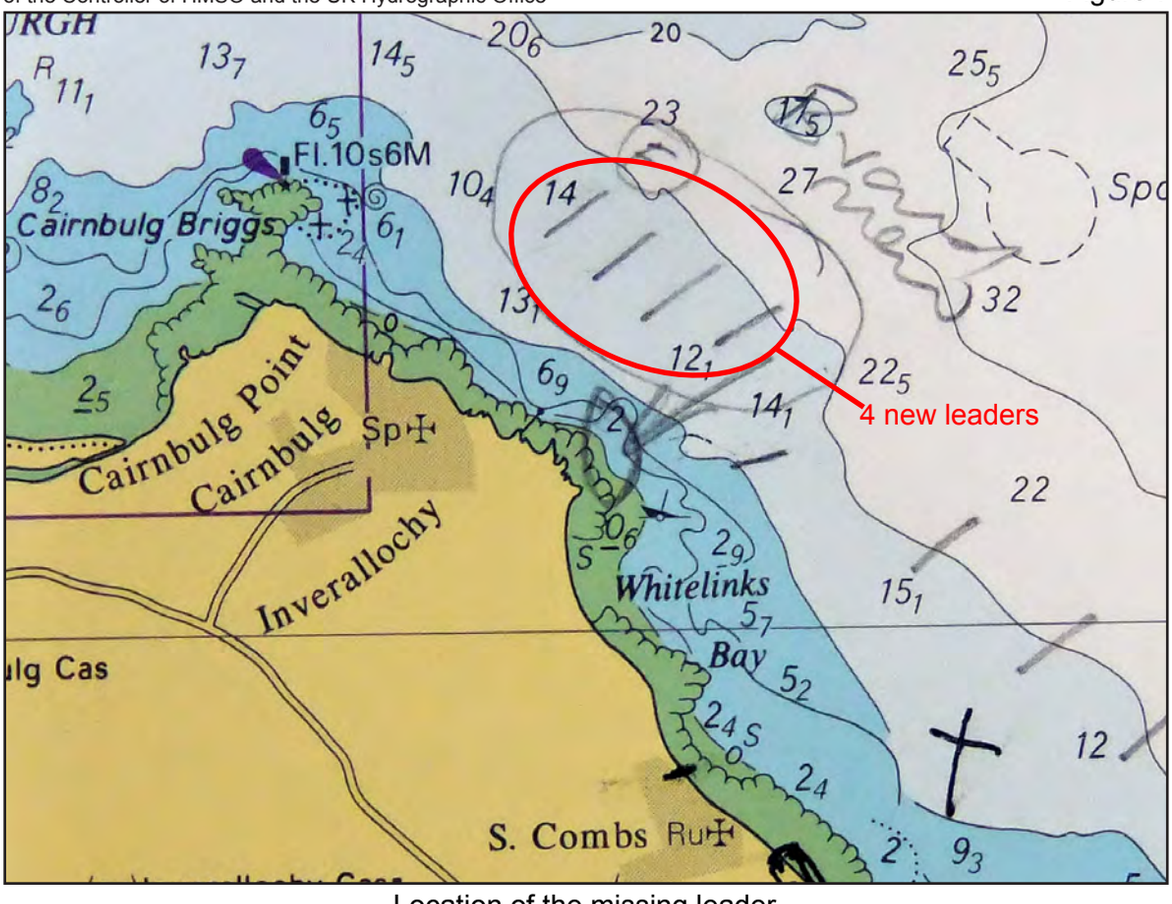
The remaining 17 of the 20 creels of the leader were found stacked on deck ready to be shot. The back rope led to the creel that was caught on the aft vertical roller and then overboard to the two creels that had yet to be recovered and emptied. The leader was one of four new leaders that had been set to the north of *Discovery*'s fishing grounds **(Figure 7)**. However, as the remaining three leaders were recovered after the accident by another vessel, it has not been possible to identify which leader was being hauled when the accident occurred.

1.6 CREW

1.6.1 Bruce Pearson

Bruce Pearson was aged 40 and worked as *Discovery*'s skipper when the owner was unavailable; he also acted as crewman for the owner. His full-time employment was in the offshore industry where he worked 2 weeks on, 2 weeks off. However, he had fished part-time throughout his adult life. Bruce Pearson was 1.83m tall, weighed around 112kg and was a strong swimmer. At the time of the accident it is most likely he was wearing bib and brace oilskins, a rugby shirt, jeans and yellow sea-boots.

Figure 7



Location of the missing leader

He had completed the Seafish courses in Basic Sea Survival, Basic First-Aid and Basic Fire-Fighting and Prevention. He had not completed the Seafish Safety Awareness, Accident Prevention and Risk Assessment course, but in 2005 had completed a course in '*Manual Handling Awareness and Lifting Risks & Safety observation & Risk Assessment*' as part of his offshore employment.

Before the accident, Bruce Pearson had always taken an extra crewman with him when acting as skipper of *Discovery*.

At the time of publication, his body had not been found.

1.6.2 The owner

The owner was 34 years old and was the most regular skipper of *Discovery*. He preferred to work *Discovery* with the help of another crewman, but if neither his brother nor the second crewman were available he was content to fish alone **(Figure 8)**.

He had previously co-owned a creeling boat smaller than *Discovery* but was also an experienced fisherman on larger fishing boats. He had completed all the required Seafish training courses, including Safety Awareness, Accident Prevention and Risk Assessment.

The owner had not carried out any form of risk assessment to evaluate the risks that he or his crew faced when working together or when working single-handedly. He never wore a PFD on board *Discovery*, and had not asked his crew to do so.

Photograph courtesy of the owner

Figure 8

Discovery - fishing single-handedly

1.6.3 The second crewman

The crewman was aged 18 and worked as a share fisherman[5] for the owner, and less frequently for Bruce Pearson, when his college studies permitted. He had worked on fishing boats for the previous 4 to 5 years. He had completed none of the required Seafish courses.

On board *Discovery*, his main task was to recover the buoys and end weights, then bait and stack the creels ready to shoot.

1.7 *DISCOVERY*

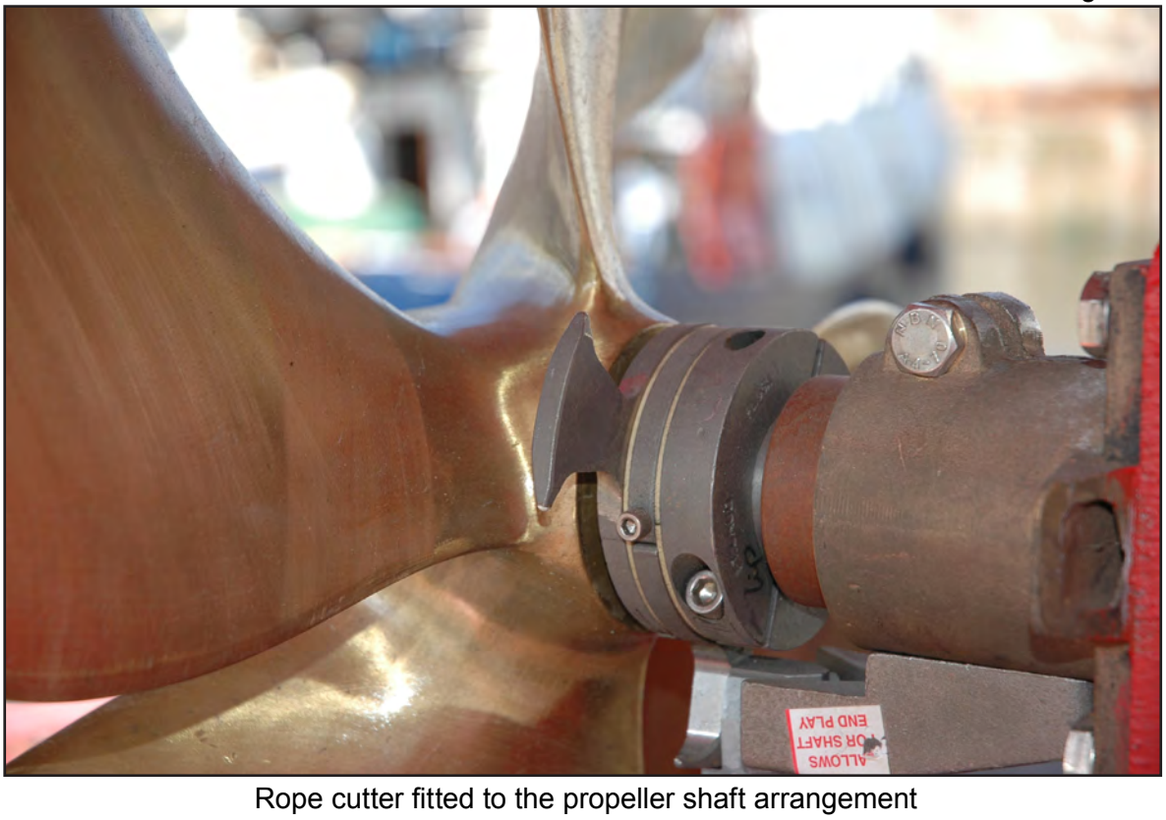
1.7.1 Design and equipment

Discovery was based on a Kingfisher 26 (8.6m) design, with a GRP hull and aluminium wheelhouse. In 2007 it was fitted out to the owner's requirements by Seaway Marine Ltd, in Macduff, Scotland.

The vessel was fitted with a Doosan 88kW engine, which had been downrated to 59kW at the owner's request and gave the vessel a maximum speed of 8 knots (kts). The propeller shaft was fitted with a rope cutter, which was reported to be very effective in service **(Figure 9)**.

Photograph courtesy of Seaway Marine

Figure 9



Rope cutter fitted to the propeller shaft arrangement

[5] Fishermen who earn their wages purely as a share or percentage of the catch.

Discovery was fitted out for creel fishing with the ability to fish for mackerel simultaneously **(Figure 10)**. Additional railings were fitted along the vessel's port side to facilitate the stowage of multiple leaders of creels. The stern was also fitted with an additional stowage area above the transom. The starboard side was fitted with railings from the stern to about a third of the way along the deck. There were no guardrails on the starboard side in the area of the baiting table. The bulwark height in this area was estimated to be about 750mm **(Figure 8)**.

Discovery was fitted with a closable stern shooting door to allow the creels to self-shoot; this door was routinely left open at sea **(Figure 11)**.

The boat was fitted with a 1t capacity hydraulic hauler, driven off the main engine. The creels were hauled over the starboard side via a roller arrangement **(Figure 12)** onto a baiting table. Engine and helm controls were provided above the baiting table. The hauler control beneath the baiting table **(Figure 12)** allowed the hauler to continue turning at the desired speed when left unattended.

Bait and catch were held in large plastic bins on the starboard side of the deck.

1.7.2 MCA inspection

The MCA inspected *Discovery* in February 2009. The minor defects that were noted at that time were promptly rectified by the owner to the MCA's satisfaction.

Photograph courtesy of Seaway Marine

Figure 10

Discovery's fit out at build

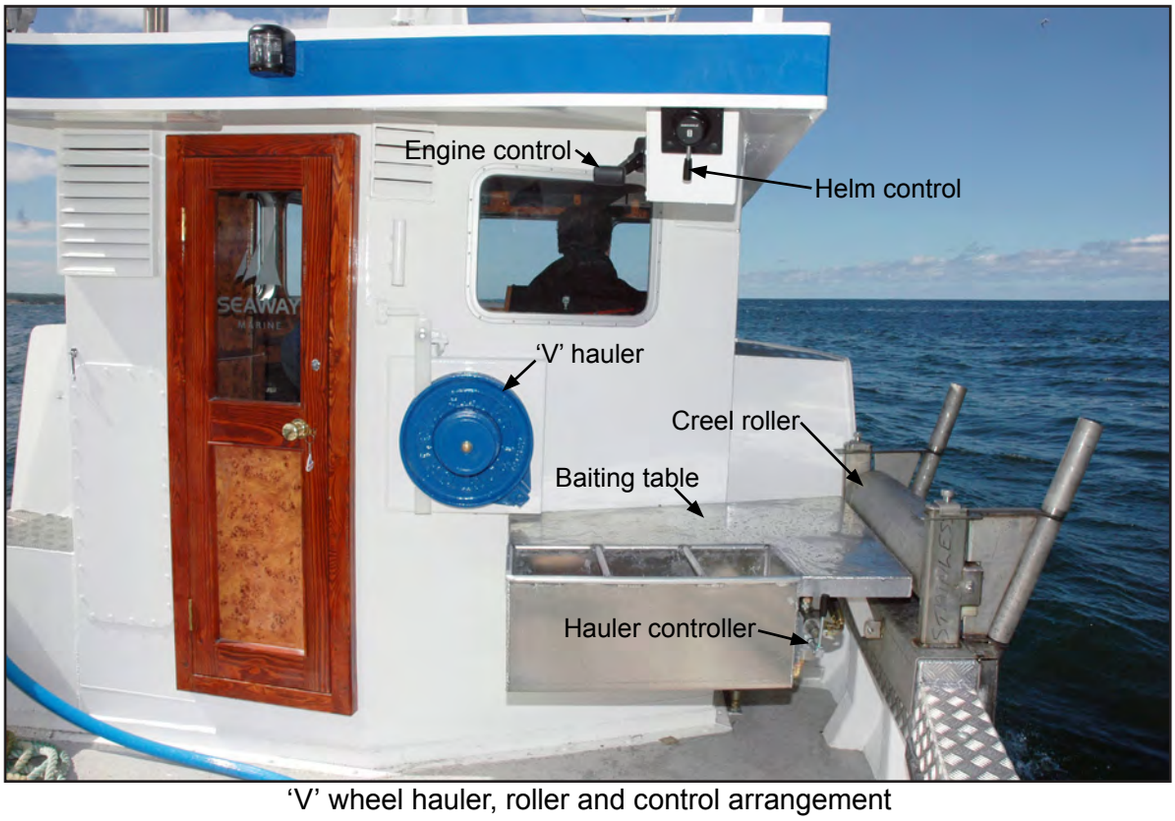
Photograph courtesy of www.steve-ellwood.org.uk

Figure 11

Discovery showing closable stern door arrangement

Photograph courtesy of Seaway Marine

Figure 12



'V' wheel hauler, roller and control arrangement

1.7.3 Fishing gear

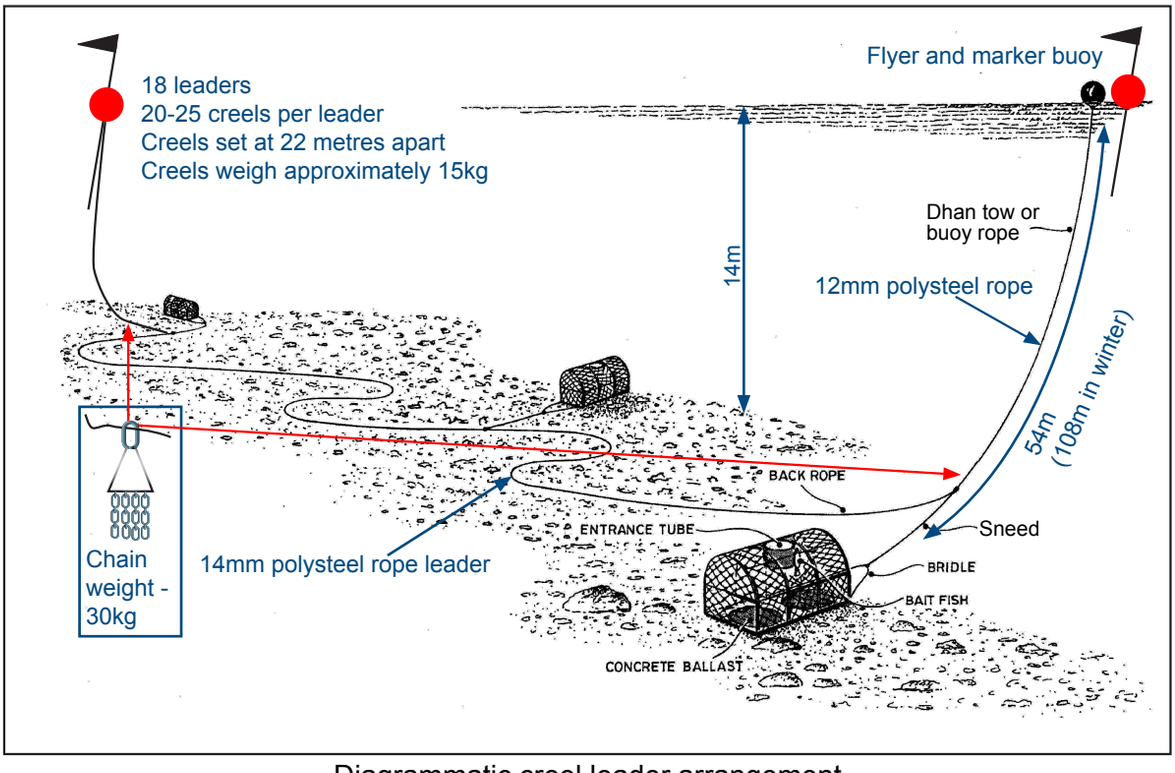
The owner laid creels to catch lobster, brown crab and velvet crab using various types and size of parlour creels. He operated 18 leaders of creels with between 20 and 25 creels per leader; each creel weighed, on average, 15kg when empty. The creels were set in depths between 12m and 38m of water between 0.5nm and 3nm from the coast.

The creels were located to maximise catch, taking into consideration the forecast weather. The leaders were generally laid further offshore in winter than in summer.

Each creel was secured by a 1.83m (1fm) length of sneed[6] to the back rope at intervals of 22m (12fm) **(Figure 13)**. Each end of the back rope was connected to a 30kg chain weight to anchor the gear to the rocky bottom. The chain weight was connected to a leaded buoy rope of either 54m (30fm) in summer, or 108m (60fm) in winter. The buoy rope was marked by a marker buoy and a smaller flyer buoy to enable the gear to be located and recovered.

Image courtesy of Seafish

Figure 13



Diagrammatic creel leader arrangement

1.7.4 Hauling operations

In normal operations, the skipper would manoeuvre the boat to pick up the marker buoys at one end of the leader of creels. The crewman or, if working single-handed, the skipper himself, would haul the buoys on board. The marker buoys were stowed and became the last items to be shot away. The buoy line was fed through the 'V' wheel of the hauler and pulled on board. The chain weight was then recovered and laid on the deck. The back rope was then hauled on board and allowed to coil freely below the hauler.

[6] Sneed is the local terminology for the rope that connects the creel to the back rope. In other parts of the UK it is known as a leg rope.

The skipper arranged the hauling operation to ensure that the back rope led onto the hauler correctly. Where possible, this was by using the hauler to pull the boat towards the creels against the resistance of wind and/or tide so that the back rope led forward, towards the boat's bow. If this was not possible, a balance of engine power and steering was needed to maintain the boat's heading relative to the leader of creels. The back rope was kept in position by the forward vertical roller so that it did not come out of the hauler while the creels were being brought on board.

Once 22m of back rope was hauled on board, the first creel would be pulled over the roller and onto the baiting table and the sneed was cleared from the hauler. The creel was then emptied of catch and debris, re-baited **(Figure 8)** and stowed on the deck ready to be shot away again. The process was repeated until all the creels, the second end weight, and the buoys were recovered.

The first creel was stowed at the forward end of the deck on the port side. Subsequent creels were stowed in a pattern, three creels across and two high **(Figure 8)**. The next six creels were stowed in the same pattern immediately behind the first row. Finally the chain weight, the buoy rope, and then the two buoys were recovered and placed aft close to the stern shooting door so that the whole leader was ready to be shot away again.

Hauling is a physically demanding task as each creel is man-handled from the table to the deck and the chain weights are moved into position ready to shoot. It is made more complicated if the boat has to be manoeuvred in difficult sea conditions to maintain its attitude relative to the leader of creels.

1.7.5 Shooting operations

When *Discovery* was in the required position and ready to shoot away, the marker buoy and chain weight would be dropped over the stern. The crew would then move to the wheelhouse, clear of the deck. The boat's way through the water, of around 7kts, would pull the creel closest to the stern overboard through the open stern door. The skipper would then record this position on his electronic plotter. Thereafter, the creels would shoot freely over the stern due to the drag of the gear already in the sea. Once all the creels were overboard the second chain weight and the marker buoys would then self-deploy, and the position of the last creel in the leader would be recorded by the skipper.

1.8 CREEL FISHING

1.8.1 Guidance

MAIB's Analysis of UK Fishing Vessel Safety 1992 to 2006[7] identified that, of the 65 fatalities resulting from persons going overboard at sea during the period of the study, nearly a third occurred on creeling/potting vessels[8], generally when crew had become entangled in ropes during shooting.

[7] The MAIB Analysis of UK Fishing Vessel Safety 1992 to 2006, published November 2008

[8] The terms 'creeling' and 'potting' are used interchangeably in the fishing industry depending on regional preferences. 'Creeling' has been used throughout this report for consistency.

As a result of the MAIB's study, Seafish agreed to produce an *Industry Advisory Note on Potting Safety* for broad dissemination to the fishing industry. This was published in April 2010 **(Annex A)**, and further amended in 2011. This *Advisory Note* identified the main hazards that can result in fatalities or serious injuries **(Figure 14)** as being: crewmen becoming snagged in rope when shooting; creels shooting out of sequence; trips and falls; vessels being overloaded; crew being struck by creel or anchor at the davit block during hauling; fatigue; crew competence and single-handed operations.

With regard to operating creeling vessels single-handedly, the guide stated that:

> *'…This practice may increase the risk of accidents and certainly reduces the chances of rescue should an accident occur'*

The note also provided guidance on safe creeling practices, which included ways in which hazards could be reduced, such as the use of:

- Detachable creels (toggle system) instead of fixed sneeds
- Back rope pounds or divisions
- Creel self-shooting systems
- Automatic hauler stops
- Rollers for hauling instead of an open block and davit.

1.8.2 Creeling (potting) rollers

Over the last decade, the use of rollers has become popular on creeling vessels throughout the UK, particularly on boats based in the north-east of Scotland.

In 2001 the Seafish Technical Information Service published Technical Information Sheet No. 2001/02/MS 'Potting Roller' **(Annex B)**.

Rollers have an advantage over conventional open block arrangements in that the manual effort of lifting creels inboard is eliminated, thereby reducing crew fatigue. The creels pass over the roller directly on to the table, and only have to be lifted once for stacking, ready for shooting **(Figure 8)**.

To enable the vessel to be controlled while hauling, the roller should be mounted well forward on the vessel's rail and in a reasonably horizontal attitude **(Figure 15)**. The 'V' in the wheel of the hauler is biased towards the forward vertical roller of the roller assembly in order to give the correct lead onto the hauler **(Figure 16)**. It is also beneficial to set the hauler well inboard from the horizontal roller, so that if the back rope does lead from further aft, it is less likely to lead onto the hauler at a large angle **(Figure 15)**. The Seafish information sheet stated that *'If the angle is too great the rope will climb out of the hauler'*. Increasing the distance between the hauler and roller reduces the variation in the angle that the back rope can lead onto the hauler.

The length of the horizontal roller must be sufficient for the size of the creels being used. However, as the back rope leads aft on the horizontal roller, it reaches a point when the angle of the back rope becomes too great and the rope will 'climb out' of the 'V' in the rotating wheel of the hauler **(Figure 16)**.

Extract courtesy of Seafish

Figure 14

Pot fishing hazards

The main potting hazards that may result in a fatality or serious injury include:

- **Snagged in rope when shooting**

A loop or bite of rope caught around a limb during shooting will result in serious injury or death. The limb is likely to be severed or the person will be dragged overboard and, even if wearing a lifejacket, likely to be pulled down by the weight of pots attached to the rope. Accidents have also occurred due to a loop of rope snagging a pot and carrying it overboard, striking a crewman on its passage.

- **Pots out of sequence**

Stacking pots in a rigid sequence is essential where pots remain attached to the back rope and all involved in the shooting operation need to be totally certain of the sequence. Problems can occur if a pot is stacked out of sequence to enable it to be repaired prior to shooting, or if the vessel motion causes stacked pots to fall. Should an incorrect pot be selected, the correct pot will be pulled from the stack as the back rope tightens and 'fly' across the deck, quite likely striking the man holding the incorrect pot at the rail.

- **Trips and falls**

The most common accident in any workplace, but on a fishing vessel it can be fatal if the person falls overboard and in potting, a simple trip and fall could be disastrous during the shooting operation.

- **Vessel overloading**

The overloading of a fishing vessel with pots, either by having too many on a string or when moving strings to new fishing grounds, can put the vessel at risk of capsize and foundering, and her crew at risk of drowning.

- **Struck by pot or anchor at the davit block**

Failure to stop the hauler can result in a pot, or perhaps an anchor, hitting the davit block and possibly swinging over the top to strike the crewman.

- **Fatigue**

Not a potting specific hazard but fatigue is a common hazard in the catching sector. Working in a physically demanding job for long hours ultimately leads to fatigue, and this increases the risk of an incident occurring. Anecdotal evidence from industry suggestions many more pots are being worked than 10-15 years ago and in many cases have doubled. This will undoubtedly increase levels of fatigue within the sector.

- **Crew competence**

Owing to reduced or static levels of income in the sector it may be more difficult to attract and retain experienced and competent crew. Inexperienced crew are more likely to be involved in an accident.

- **Operating single-handed**

Problems with recruitment and low returns force more fishermen into working single-handed. This practice may increase the risk of accidents and certainly reduces the chances of rescue should an accident occur.

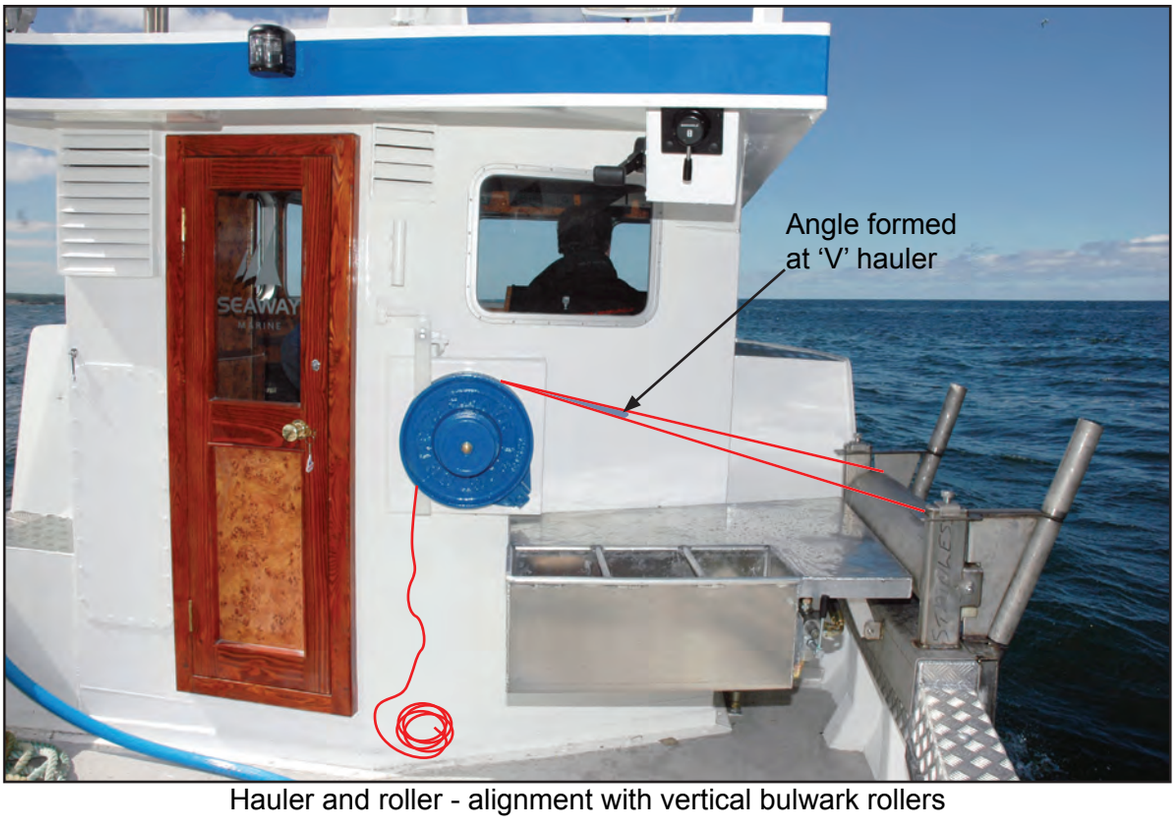
These hazards do occur and injuries and deaths can be the result.

Seafish - Pot fishing hazards

Another risk of hauling using the roller system is the danger of a creel flying up and over the roller if the hauler control is left unattended while the hauler is running. The Seafish guidance states that, when hauling, *'Do not leave the hauler control unattended'*.

Photograph courtesy of Seaway Marine

Figure 15



Hauler and roller - alignment with vertical bulwark rollers

© Davie Tait

Figure 16

Alignment of 'V' wheel hauler onto bulwark roller

1.8.3 Fraserburgh creeling vessels

Discovery's layout and fishing arrangement, including the creeling roller, was similar to that of several other vessels based in Fraserburgh, many of which were operated single-handedly. Both vessels shown in **Figure 17** were fitted with roller arrangements for hauling. The boat shown at **Figure 17a** was fitted with an additional roller guide just before the hauler to prevent the back rope from riding out of the hauler when the back rope led from aft **(Figure 18)**. The boat shown in **Figures 17b** and **17c** was similar to *Discovery* and was not fitted with an additional roller guide.

There is significant anecdotal evidence to indicate that, when hauling without an additional vertical roller guide, the back rope was likely to ride out of the hauler whenever the back rope started to lead aft. It was evident in the boats that were examined that the lead of the back rope needed to be controlled carefully to prevent the back rope from coming off the narrow hauler wheel while under tension **(Figure 19)**.

1.8.4 The risks associated with working single-handedly on creeling vessels

When hauling creels, the lone fisherman must control the vessel's propulsion and rudder to counter tide and wind, control the hauler speed, empty the creel of catch, re-bait, and then stack prior to the next creel arriving over the roller. Additionally, he must maintain an effective lookout and ensure that the vessel is clear from navigational hazards. The lone fisherman must also observe the actual and forecast weather and tidal conditions to consider their impact on his ability to fish.

Fishing becomes more difficult as the wind speeds and tidal flows strengthen, which increases both the motion of the boat in the sea and the boat-handling skills required to maintain position while hauling creels. In these circumstances, the potential for the back rope to ride out of the hauler, a stack of creels to fall over, or any other problem with the boat or fishing gear, increases. The lone fisherman needs to be able to either avoid or manage all of these potential situations.

When working at sea, there is always a risk of falling overboard. A lone fisherman who is not physically attached to the boat, such as by a lifeline, will quickly become separated from it, leaving no one to manoeuvre the boat and assist him back on board or raise the alarm.

1.8.5 Personal flotation devices

Numerous different designs of PFDs[9] are available. PFDs keep the conscious wearer's head higher above the water and dramatically increase their survival time. PFDs are available in fixed buoyancy or self-inflation types, and can be worn separately, or incorporated into a fisherman's bib and brace oilskins.

Without a PFD, a person in the water can quickly tire and drown; their survival time is reduced further in colder water and rougher seas.

[9] Personal flotation device is the generic term for equipment such as lifejackets and buoyancy aids. Whereas a lifejacket is designed to support an unconscious person face-up with their mouth and nose clear of the water, a buoyancy aid simply gives support in the water to a conscious swimmer. The unconscious casualty has no guarantee of floating face-up when wearing a buoyancy aid.

Hauler and rollers on potters similar to *Discovery*

Figure 18

Vertical guide fitted to a potter similar to *Discovery*

Figure 19

Back rope led to hauler without using vertical guide

1.8.6 Personal locator beacons

When activated, a PLB will transmit a radio signal that allows the wearer's location to be identified by potential rescuers. There are several types of PLBs available, some of which have been designed specifically for fishermen.

1.9 RISK ASSESSMENT

The Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997 require employers to make a suitable and sufficient assessment of the risks to the health and safety of workers arising in the normal course of their activities. Guidance on these regulations and on the principles of risk assessment is contained in Marine Guidance Note (MGN) 20 M+F[10], though this does not make it a requirement that risk assessments should be written down. The Fishing Vessels Code of Practice for the Safety of Small Fishing Vessels (MSN 1813 (F), also known as the Small Vessel Code) section 4.5 states that *"It is not a requirement that risk assessments be written, nevertheless, the MCA strongly recommends that such assessments be written"*. The MCA's M Notices are available on its website[11], and will be made available in hard copy on request. The Small Vessel Code inspection regime requires the inspecting officer to establish whether a risk assessment has been carried out.

Seafish provides fishermen with guidance for completing risk assessments on all sizes of vessels. Their '*Small Vessel Safety Guidance Booklet*' (see section 1.10.2 and **Annex C**) contains a '*Standard Risk Assessment Form*' for netting, potting, long lining and jigging. However, the additional risks of single-handed fishing by these methods are not considered.

Seafish also provides a '*Small Vessel Risk Assessment*' **(Annex D)** which is intended to help identify risks that have the potential to cause harm to crew members by using a simplified four-step guide.

1.10 GUIDANCE FOR OPERATIONAL PRACTICES

1.10.1 Fishermen's Safety Guide

The MCA (and its predecessor organisations) has published a Fisherman's Safety Guide for over 30 years. This document has been refreshed every few years, with the iteration that was relevant at the time of these accidents being the '*Fishermen's Safety Guide – A guide to safe working practices and emergency procedures for Fishermen*', published in 2008. This has been endorsed by the UK Fishing Industry Safety Group (FISG) and contains useful guidance on sea safety and emergency procedures, including a dedicated section on *Potting and Creeling*. However, it contains no specific guidance on the additional hazards of single-handed working. Following publication, copies of the guide were sent to each owner of over 15m UK registered fishing vessels, and it was made available on the MCA's website. Guides were also handed to owners of small fishing vessels during vessel inspections.

[10] MGN 20 (M+F). Implementation of EC Directive 89/391. Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997.

[11] http://www.dft.gov.uk/mca/

1.10.2 Seafish guidance

In May 2007, Seafish published a '*Small Vessel Safety Guidance Booklet*' for vessels less than 15m in length that contains a list of questions that owners or skippers should consider in order to assess the safety of their fishing operations and their emergency preparedness **(Annex C)**. The *Small Vessel Safety Guidance Booklet*, Seafish's *Potting Safety Assessment* of 1999, and the *Industry Advisory Note on Potting Safety* (see section 1.8.1 and **Annex A**) are all available on the Seafish website[12] or in paper format on request.

1.10.3 External evaluation

Between 2005 and 2007 the MCA's Scotland and Northern Ireland region (ScotNI) dedicated a Fishing Vessel Safety Officer (FVSO), with a fishing background, to facilitate safety discussions and assist fishermen on over 15m vessels with hazard identification and control.

The MAIB's Analysis of UK Fishing Vessel Safety highlighted that this was a valuable intervention as it removed the mystique from risk assessment procedures and empowered crew members to evaluate safe working operations.

At the time of the Safety Study, the MCA indicated that this successful service would be extended to all regions. However, the service was terminated in 2007 due to financial constraints, and has not been reinstated.

Following the cessation of the MCA's FVSO initiative, Seafish staff assisted fishing vessel crews with reviewing their working procedures, and between February 2007 and March 2008, 170 vessel crews were helped with this process. Seafish assistance was made possible by EU and UK Government funding; however this was withdrawn in March 2008 after which the service ceased.

1.10.4 Safety awareness campaign

In 2001 the MCA carried out a safety awareness campaign consisting of posters displayed in areas where they would be visible to fishermen, such as harbour offices and Fishermen's Missions. The posters highlighted the dangers associated with potting/creeling and single-handed fishing operations, and included checklists for safe operations.

1.11 INTERNATIONAL DEVELOPMENTS

The International Labour Organization (ILO)[13] Convention No. 188 on Work in the Fishing Sector (2007) will apply to all fishing vessels engaged in commercial fishing operations when it comes into effect.

ILO 188 establishes minimum international standards for people working in the fishing sector. It covers issues such as risk assessment, safe manning levels and hours of rest, and will challenge the current exemptions in EU and UK legislation that exist for share fishermen.

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[12] www.seafish.org

[13] The ILO formulates international labour standards in the form of Conventions and Recommendations. These set minimum standards of basic labour rights, including fair working conditions.

Article 13 of the convention requires States to adopt laws, regulations or other measures requiring fishing vessel owners to ensure that:

- their vessels are sufficiently and safely manned for the safe navigation and operation of the vessel and under the control of a competent skipper;

- risk evaluation in relation to fishing is conducted, as appropriate, with the participation of fishers or their representatives.

In May 2008 it was decided that EU Member States should endeavour to ratify ILO 188 as soon as possible, and preferably before 31 December 2012. The UK is working towards implementation in consultation with the fishing industry through the FISG Operations Group.

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 LOCATION OF THE ACCIDENT

The actual events that took place on board *Discovery* prior to the accident cannot be established with certainty. However, by examining the state in which the boat, its equipment and fishing gear were found, the most plausible sequence of events that day can be determined. It is assumed that the settings of the boat's equipment and configuration of the fishing gear remained the same from the time Bruce Pearson was lost overboard until the boat was boarded after it grounded.

After the accident, *Discovery*'s hauler was found turning but with the back rope no longer connected. The third from last creel was hanging on the potting roller, and the last two creels were still overboard with catch inside. This indicates that the skipper was approaching the end of a haul at the time of the accident.

As the tide flooded in the morning and ebbed later in the afternoon, the usual practice would have been to start working from the closer, northern end of the grounds, and to work southwards during the day in the same direction as the tidal stream. The boat would then have been able to return to port on the ebb tide. The leader found on board was one of four new leaders placed by the owner at the most northerly end of *Discovery*'s fishing grounds, indicating that the skipper was working at the northern end of the fishing grounds at the time of the accident.

It is considered unlikely that the skipper would have fished the most northerly of the four leaders as this had been worked the day before; it is more likely that he started on the next leader to the south-east.

The amount of bait used from the bait boxes and the number of crabs found in the storage bins indicated that the skipper was probably hauling his first leader of the day when the accident happened. It is also possible, but less likely, that the accident happened when he hauled his second leader of the day, a little further to the south-east of the first.

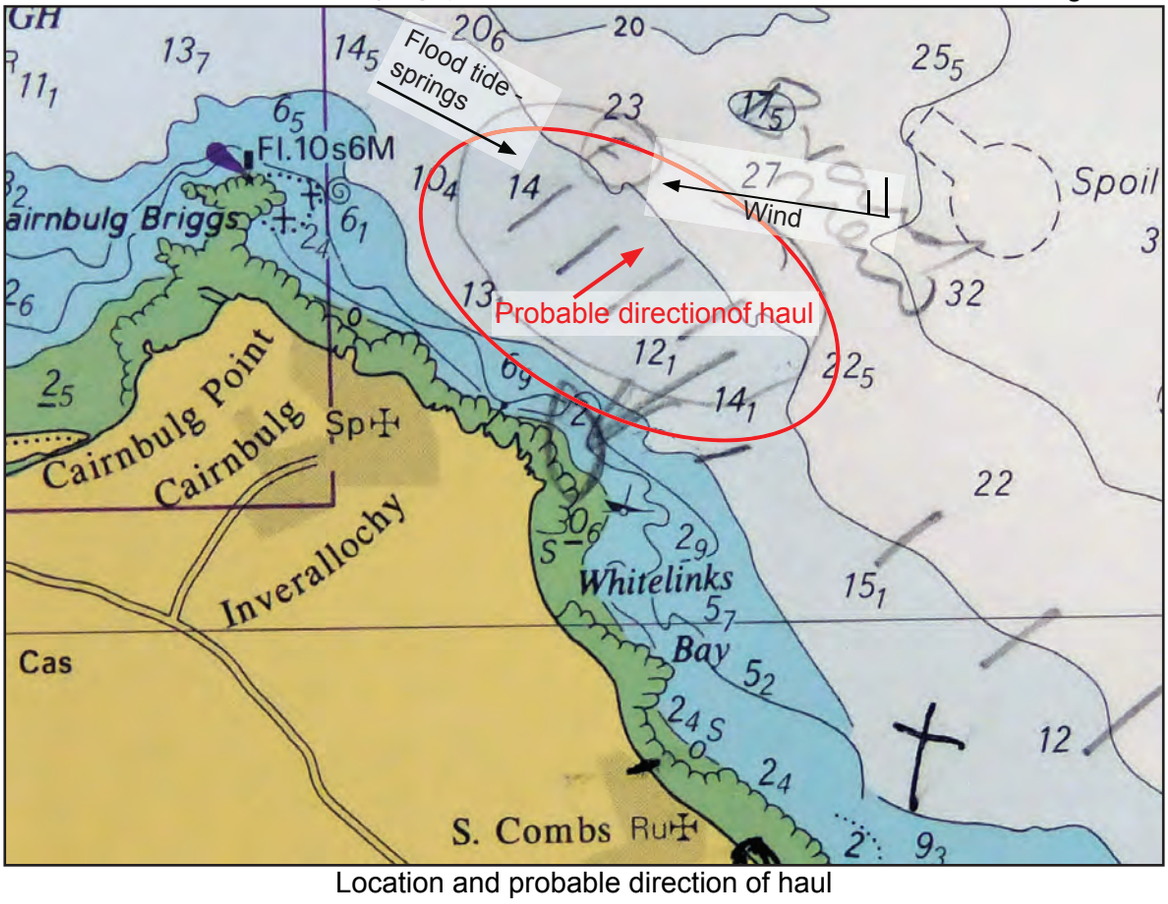
2.3 THE MOST PROBABLE SEQUENCE OF EVENTS PRIOR TO THE ACCIDENT

At around 1030 on 9 October 2010, once clear of Fraserburgh harbour, *Discovery* was seen heading east towards her usual fishing grounds. At a speed of 7kts, with the benefit of the strong flood tide, the skipper would have arrived at the fishing grounds 3nm away at about 1050.

At around 1100, 10 minutes before the maximum tidal flow, Bruce Pearson probably started to haul the second leader from the north, his first haul of the day. He is likely to have picked up the leader from its southern end and then hauled in the marker buoys and bottom weight. As the creels were hauled, he would have removed the catch from each creel, placed the crabs in the bins on deck and re-baited the creels

with the bait from the bait boxes. The skipper would then have stowed the creels on deck ready to be shot through the stern shooting door. This process would have taken him around 30 minutes. The leader was laid across the direction of wind and tide and, as it was hauled in, *Discovery* would have rolled and pitched. This would not only have made working on the deck difficult, but would also have made it harder to control the boat's attitude and therefore the lead of the back rope onto the hauler **(Figure 20)**.

Figure 20



Location and probable direction of haul

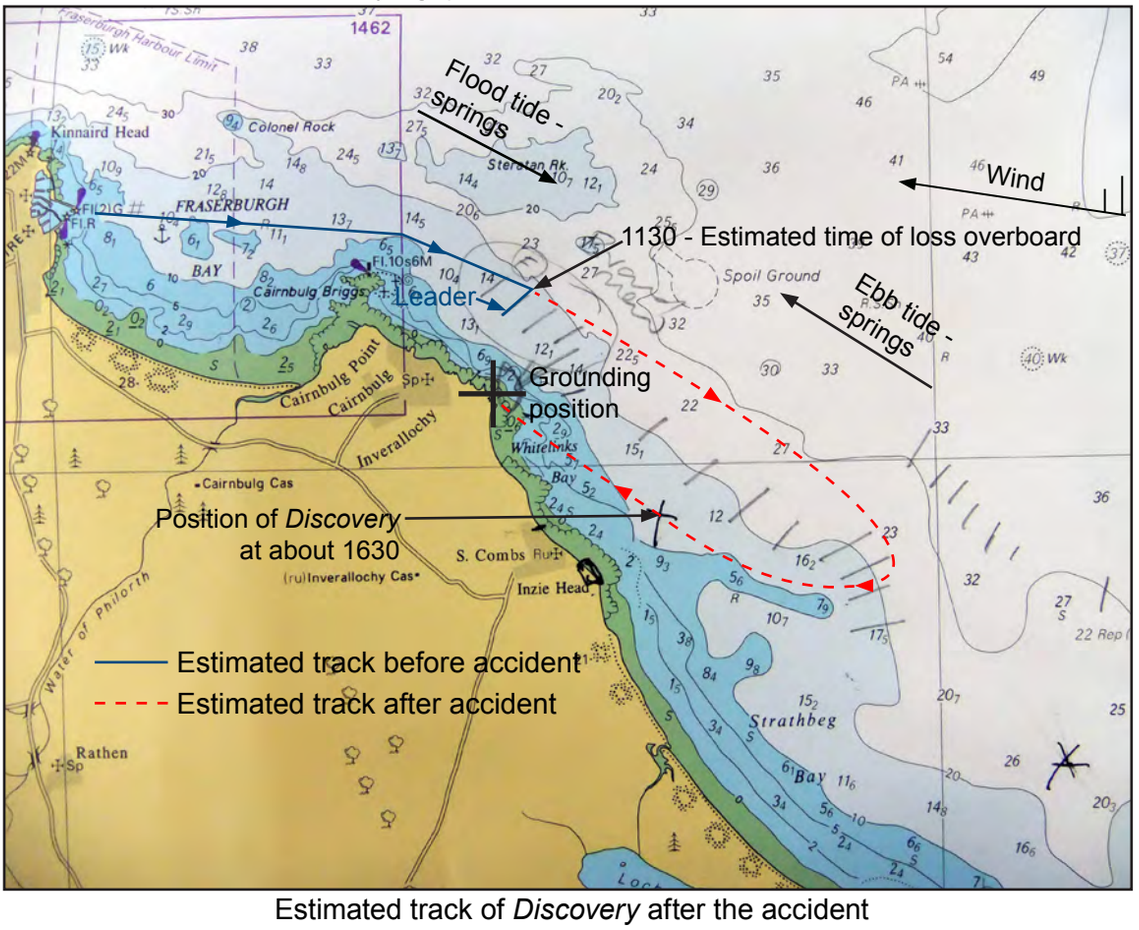
It is considered most likely that Bruce Pearson was lost overboard at around 1130, as the third from last creel of the first leader of the day was being hauled on board. Although it is less likely, due to the small amount of catch on board, if Bruce Pearson had been hauling the second leader the accident would have occurred about 30 minutes later.

The tidal flow would have quickly swept the skipper away from the boat because it was anchored by the remaining creels. Without a PLB, his need for assistance and his location were unknown to anyone else and, despite being a strong swimmer, in the sea and swell conditions that day he would have quickly tired.

Discovery would have drifted with the spring flood tidal flow to the south-east, its progress restricted by the creels dragging on the seabed. Both the bottom weight and the buoy rope parted from the back rope, probably from snagging as the vessel drifted closer to the shore.

At around 1400 the tide turned and *Discovery* would have drifted back to the north-west on the ebb tide. The easterly wind would have set the boat towards the shore, causing *Discovery* to ground at about 1800 **(Figure 21)**.

Figure 21



Estimated track of *Discovery* after the accident

2.4 THE ACCIDENT TRIGGER

The intact back rope was found off the hauler with the hauler still turning. For this to occur the back rope must have released itself, or been released, from the hauler. It is not desirable for the back rope to be released from the hauler during hauling as this could lead to the uncontrolled release of the creels back overboard. As it would have been very unusual for the skipper to have taken the back rope off the hauler, it is much more likely that the back rope rode out of the rotating hauler before he could intervene.

The third from last creel of the leader was found hanging by its bridle from the aft vertical roller. The creel was either placed there by the skipper, or the creel bridle became caught on the roller, either before or during the accident. It would be unusual for a skipper to place a creel on a vertical roller as the force acting on the boat, created by the creels anchored to the bottom, could damage it. If the backrope needed to be secured, the easiest and more seamanlike solution would have been to take an extra turn of line around the hauler and then stop the hauler. It is therefore most likely that the creel bridle caught on the aft roller as the third from last creel was pulled back overboard after the back rope released from the hauler.

2.5 POSSIBLE ACCIDENT SCENARIOS

It is likely that one of the following scenarios led to the skipper falling overboard.

2.5.1 Fall overboard at the hauling position

Bruce Pearson could have slipped, tripped or overbalanced, and then fallen overboard as the boat rolled in the confused seas without him having made any contact with the creels or back rope. The skipper would have spent most of his time on deck at the hauling position while working the creels, where the gunwale height was only around 750mm. Most of the gunwale had railings that provided additional protection from falling overboard, except for the area aft of the baiting table. The skipper was a taller and heavier than average man; this would have increased his risk of falling over the gunwale.

Discovery was fitted with a roller system that allowed the creels to be hauled inboard directly on to the baiting table. This system reduced the risk of falling overboard when compared with the more traditional open block arrangement where the fisherman needs to lean outboard to pull in each creel.

As there was no need for the skipper to routinely lean overboard, it is unlikely that he simply fell overboard, without an additional causal factor.

2.5.2 Fall overboard through open stern door

The stern shooting door was routinely left open at sea and provided no protection from falling over the stern at deck level. However, there was a storage area fitted over the stern at gunwale height, and this provided some protection by keeping the crew away from the open stern door, and providing them with an effective hand-hold.

During hauling operations, the skipper would have spent most of his time at the baiting table. However, he would have moved closer to the stern as he stacked the creels ready to shoot.

Open stern doors are most hazardous when shooting; crewmen risk being caught in the back rope, or by the creels as they shoot through the open stern door.

As the skipper was most likely hauling rather than shooting at the time of the accident, it is unlikely that he fell overboard through the open stern door.

2.5.3 Attempting to free a fouled propeller

Discovery was found at low water with a rope wrapped loosely around the propeller. The rope's purpose was unknown, but it was not the leader being worked at the time of the accident as this was found intact and clear of the propeller.

Discovery's propeller shaft arrangement was fitted with a rope cutter, which in the past had always been effective in clearing a fouled propeller. When first boarded after the accident, *Discovery*'s engine was found running, with the gearbox in neutral. Had the propeller been fouled such that the rope cutter could not free it, the rope would almost certainly have stopped the engine. It is unlikely that the skipper would have tried to clear a fouled propeller with the engine running.

Further, the distance from the deck at the stern to the propeller was too great for the skipper to have had any realistic chance of reaching it in order to clear a rope, a fact he would have been fully aware of.

It is therefore very unlikely that *Discovery*'s propulsion was disabled by a fouled propeller, or that the skipper fell overboard while attempting to clear it.

2.5.4 Knocked or pulled overboard by creels released under tension during hauling

The conditions on the day of the accident would have put considerable tension on the back rope as the hauler pulled *Discovery* along the leader of creels across wind and tide, with the propeller in neutral. If the boat turned to port due to the forces acting on it from the hauler, wind and tidal flow, the back rope would have moved aft on the potting roller, allowing it to ride out of the hauler. If the skipper was stacking a creel towards the stern of the boat, away from the controls, or if he became distracted for any other reason, he might not have noticed the change in the boat's heading or the position of the back rope on the roller.

If the back rope did ride out of the hauler, the creels would have been quickly pulled back overboard as the boat drifted in the tidal flow and wind, away from the creels that remained on the seabed. The skipper would have then needed to regain control of the boat using the engine and hauler controls located at the baiting table. This would have placed him in the path of the free running creels at the open part of the starboard side. In this location he was vulnerable to being knocked or dragged overboard by the moving creels or back rope.

It is considered most likely that the accident occurred because the back rope led aft on the potting roller; the back rope then rode out of the hauler and the creels were free to be pulled back overboard as *Discovery* drifted with the wind and tidal flow. The skipper was then either knocked or dragged over the starboard side by the creels or back rope, probably as he tried to regain control of the deteriorating situation.

2.6 CREELING ROLLERS

Creeling rollers are generally designed to operate with the boat being hauled towards the creels on the seabed, with the back rope leading onto the hauler from the forward end of the roller. In certain conditions the boat's steering and propulsion may be required to maintain the heading and assist with the pull of the hauler.

If the back rope does lead aft onto, or towards the aft vertical roller under sufficient tension, it is likely to ride out of the 'V' in the wheel of the hauler due to the angle subtended at the rotating hauler being too great.

The lead of the back rope is usually monitored and controlled by the crewman standing at the engine, rudder and hauler controls close to the baiting table.

When a fisherman is operating single-handedly it is not possible for him to continuously watch the angle of the back rope while lifting the creels along the deck to stack them. The more creels that are hauled on board, the further from the controls the crew member must move while stacking, increasing the likelihood of the back rope moving aft on the hauler during his absence. Any other task that takes the skipper away from the controls while hauling will have the same effect.

The tendency for back ropes to ride out of haulers when the lead of the rope moves aft on the potting roller is well known to some fishermen who use this system. Consequently, some owners have redesigned their hauling systems to include an additional vertical guide. This guide, placed between the potting roller and the hauler, close to the hauler, prevents the angle of the back rope increasing when the back rope leads aft, and removes the risk of the rope riding out of the hauler **(Figure 18)**.

Discovery was not fitted with an additional guide, therefore the tensioned back rope was liable to ride out of the hauler when the back rope led aft onto the aft vertical roller.

Further investigation is needed to identify whether the fitting of an additional vertical guide, or another design solution, would remedy this weakness in potting roller design. Modifications to both new and existing boats should be considered and the results promulgated widely to the industry.

2.7 RESCUE EFFORT

It is most likely that the rescue was initiated around 6 hours after the skipper was lost overboard; he had little chance of swimming to the shore in the spring tidal flow, rough seas and a sea temperature of 11ºC.

Once the search and rescue operation was initiated, the extensive effort was unlikely to find the skipper alive, despite the best endeavours of those involved.

BREADWINNER INVESTIGATION

Photograph courtesy of Ian Leask and www.shipnostalgia.com

Report on the investigation of the loss of the skipper from

fv *Breadwinner* (WY 367)

while fishing single-handedly

5.5 miles east of Score Head, Bressay, Shetland

on 20 January 2011

SYNOPSIS

On 20 January 2011, at approximately 1100, Neil Smith, the skipper of the creel fishing boat *Breadwinner*, was dragged overboard and drowned while shooting prawn creels. The boat was being operated single-handedly, so no one could assist the skipper when he became trapped in a creel leader rope. The boat was found on rocks almost 24 hours later. Mr Smith's body was recovered 8 days later, entangled in a leader of creels.

The accident happened during a normal shooting operation, which the skipper had carried out routinely for many years. The creels were laid using a 'self-shooting' system, which obviated the need for anyone to be on deck during the entire shooting process. However, there were no control measures on *Breadwinner* to separate crew members from the fishing gear during shooting operations if it became necessary for someone to leave the protection afforded by the wheelhouse.

SECTION 3 - FACTUAL INFORMATION

3.1 PARTICULARS OF *BREADWINNER* AND ACCIDENT

SHIP PARTICULARS

Flag	British
Classification society	Not applicable
IMO number/Fishing number	Not applicable/WY 367
Type	Fishing - creeling and scallop dredging
Registered owner	Neil Smith
Manager(s)	Neil Smith
Construction	Wood - carvel planked
Length overall	9.4m
Registered length	9.4m
Gross tonnage	15.29
Minimum safe manning	Not applicable
Authorised cargo	Not applicable

VOYAGE PARTICULARS

Port of departure	Lerwick
Port of arrival	Lerwick
Type of voyage	Coastal
Cargo information	Not applicable
Manning	One

MARINE CASUALTY INFORMATION

Date and time	20 January 2011, about 1100
Type of marine casualty or incident	Very Serious Marine Casualty
Location of incident	5.5 miles east of Score Head, Bressay, Shetland Isles
Place on board	Over side
Injuries/fatalities	One fatality
Damage/environmental impact	Grounding resulting in total loss
Ship operation	Shooting/hauling fishing gear
Voyage segment	Transit
External & internal environment	Wind - force 5/6 Visibility - moderate Weather - clear
Persons on board	One

3.2 ENVIRONMENTAL CONDITIONS

On the day of the accident, the wind in the area was from west-north-west, force 5 or 6; boats in the locality reported that it was at the upper end of that range. At the calculated time of the accident, the tide was running south-south-east at about 0.3 knot (kt). The sea surface temperature was 7ºC.

3.3 NARRATIVE OF EVENTS

Breadwinner **(Figure 22)** sailed from Lerwick at 0637 on 20 January 2011 with only her skipper, Neil Smith, on board. After clearing the land, he took *Breadwinner* east from Score Head, Bressay Island, for the fishing grounds where he had laid 5 leaders[14] of 70 creels[15]. He would have aimed to arrive at the first leader to be hauled at daybreak.

Photograph courtesy of Ian Leask and www.shipnostalgia.com

Figure 22

Breadwinner

Neil Smith hauled, cleaned, re-baited and shot creels throughout the morning. At 1054 *Breadwinner* was shooting at just over 3kts steering by autopilot in a northerly direction, with the wind and seas just forward of the port beam. A few minutes later Mr Smith became entangled in the gear and was dragged overboard.

Breadwinner continued to shoot into the north, but once all the creels had run the marker buoys jammed behind the trawl winch keeping the leader of creels tethered to the boat. *Breadwinner* dragged the creels behind her for several hours until about 1500, when the buoy rope parted. Once adrift from the creels, *Breadwinner* continued on her northerly course. At 1731 an unidentified vessel travelling at a speed of just over 3kts was observed on the radar screen of the seine netter *Tranquility* LK 63; this turned out to be the unmanned *Breadwinner.* About 23 minutes later *Breadwinner* ran aground on Grif Skerry near Whalsay.

[14] Leader; a leader of creels is the local terminology for a group of creels or pots and all the gear attached. In other parts of the UK, it may be referred to as a “fleet” or “string.”

[15] An enclosed device where fish actively enter and are captured, also known as a pot.

3.3.1 Initial search and vessel location

At 2105 *Breadwinner* was reported overdue by the skipper of *Dianne Maxwell* BH 152, who became concerned after he could not see the vessel alongside when he returned to Lerwick after his day's fishing. Shetland coastguard (CG) immediately took action to try and locate the missing vessel. As *Breadwinner* was known to sometimes operate from harbours other than Lerwick, the search included shore patrols checking harbours around the islands. The CG search and rescue (SAR) helicopter, R102, was tasked to search an area between its Sumburgh base and Bressay Island, which included the coastline by Levenwick, not far from Neil Smith's home. His family became aware of the SAR helicopter in their area and, having established that a search was underway for *Breadwinner*, contacted Shetland CG and provided information regarding the skipper's likely fishing area.

The following morning, R102 located *Breadwinner* aground and partly submerged **(Figure 23)** on Grif Skerry. Nearby were her inflated liferaft and an inflated lifejacket. Due to the poor weather conditions and sea state, R102 was unable to winch a man down to the vessel. The coxswain of a Royal National Lifeboat Institution (RNLI) lifeboat was directed to the wreck site and, as soon as conditions permitted, lifeboat crewmen boarded the stricken craft. The steering joystick was found in the 'off' position, the engine control lever was in the full ahead position and the autopilot was found engaged on a heading of 002º. The main hydraulic drive system was found engaged.

The RNLI team were unable to inspect below decks because the vessel was flooded. However, later that day, divers employed by Neil Smith's family were able to search most of the compartments below deck, but his body was not found.

Photograph courtesy of Marine Scotland Compliance

Figure 23

Breadwinner located on Grif Skerry

3.3.2 Continued search and casualty location

On the afternoon of 21 January, a number of *Breadwinner*'s creel leaders were retrieved from the sea in an attempt to determine whether Neil Smith had become entangled in the gear and dragged overboard. However, his body was not found. Following this, his nephew, who occasionally helped out on *Breadwinner*, boarded the stricken craft for further inspection. On board, he found two leader marker buoys attached to a broken tail of rope trapped between the winch and the wheelhouse **(Figure 24)**. This led him to believe that another, incomplete leader of creels had yet to be found, prompting a further sea search by local fishing vessels.

Photograph courtesy of Rodney Smith

Figure 24

Trapped marker buoys on *Breadwinner*

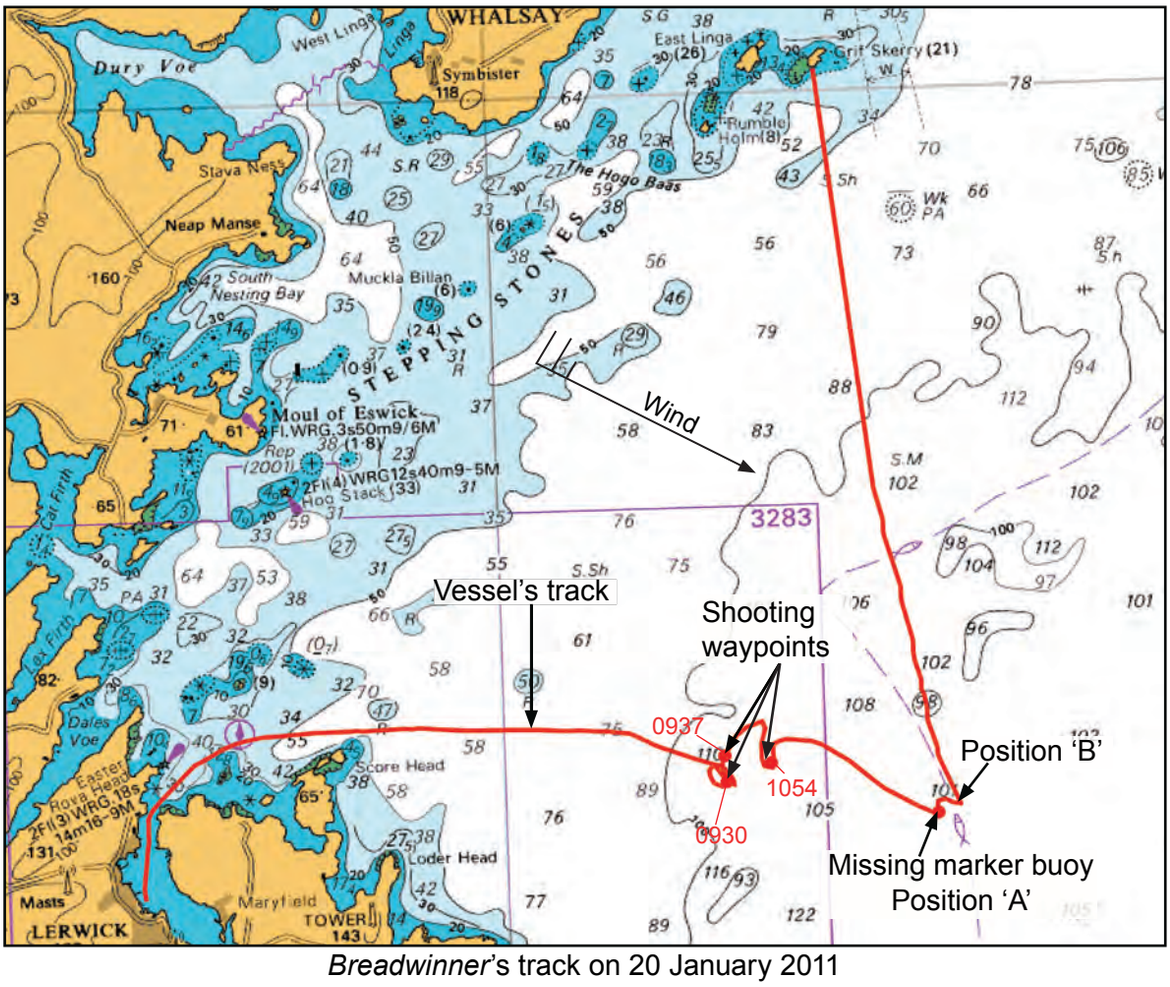
Fishing vessels continued searching the area of the previously located leaders, but found no primary marker buoys belonging to the missing leader. This led the searchers to believe that the missing marker buoys might have become accidently caught in the propeller of a passing vessel, and thus detached from the leader rope. This would have left the creels adrift on the seabed, with no surface marker to indicate their position.

On Saturday 22 January a concentrated air, sea and shoreline search continued for Neil Smith. After hours of fruitless searching the official CG co-ordinated search was terminated at 1630 due to failing light. The next morning, family and friends continued searching even though the official search had been stopped.

On Tuesday 25 January fishing vessels commenced dragging the seabed with creepers[16] in an attempt to find the missing leader of creels. Thereafter, local fishing vessels continued a daily sea search for the missing creels in the hope that Mr Smith's body would be found attached.

The same day, the C Max track plotter was removed from the wreck of *Breadwinner* in the hope of obtaining a record of the vessel's last movements, and possibly locating the missing creels. Her global positioning system (GPS) receiver was not removed at this time. Waypoints retrieved from the track plotter showed the shooting positions of the first and last creels of a leader at 0930 and 0937 respectively, and a first creel waypoint again at 1054 **(Figure 25)**. However, the plotter had not been set to record the vessel's track beyond the waypoints.

Figure 25



Breadwinner's track on 20 January 2011

On Thursday 27 January the GPS was removed from *Breadwinner* and analysis of this revealed the vessel's final movements **(Figure 25)**. Following the accident, it appeared that *Breadwinner* fell down before the wind and dragged the leader slowly behind her for approximately 2.5 miles, to position 'A'. At this point it is believed the

[16] Creepers: 'Creeping' is the term used for dragging a heavy spiked implement (creeper) across the seabed behind a boat making way at dead slow speed, to retrieve items such as nets or creels lost on the seabed. When the creeper snags something relatively heavy or fastened to the seabed, the boat stops and the creeper is retrieved in the hope that the missing item is attached.

leader snagged on the seabed, enabling *Breadwinner* to pivot on the leader rope and bring her head back to a northerly heading. It is thought that the creels then broke out of the seabed briefly, and *Breadwinner* again fell down before the wind before the creels once again snagged. The buoy rope parted at position 'B' having been weakened by chaffing on the vessel's transom top rail and, free of the restraint, *Breadwinner* resumed her original shooting course and speed of just over 3kts towards Grif Skerry.

Early on the afternoon of 28 January the fishing vessel *Quiet Waters* LK 209*,* with members of Neil Smith's family on board, located the missing primary marker buoys some 2.25 miles east-south-east of where they had initially been expected to be found. Mr Smith's body was found entangled in the back rope between creel numbers 53 and 54.

A post mortem examination established that the cause of death was drowning.

3.4 NEIL SMITH

Neil Smith was skipper and owner of *Breadwinner*. He was aged 54 and other than a few years spent working at Sumburgh Airport, had spent most of his working life as a fisherman. He was physically fit and known to be in good health.

Mr Smith was highly respected in the Shetland community and was known for his innovative thinking and ability to turn his hand to many different activities. He had owned a number of fishing boats before purchasing *Breadwinner* in October 2006.

Neil Smith held Seafish certification in Safety Awareness, Accident Prevention and Risk Assessment, STCW certification in Personal Survival Techniques and a marine radio Short Range Certificate issued by the Royal Yachting Association. The MAIB was unable to obtain any record of Mr Smith having attended the mandatory training courses in first-aid or fire-fighting. However, the CG confirmed that certificates for these courses were sighted during its inspection (see section 3.7).

3.5 VESSEL DESCRIPTION

Breadwinner was built by J N Lowther of Whitby in 1992. She was a heavily built, carvel planked, wooden boat with a forward wheelhouse and roomy aft working deck. Although originally built as a creel fishing boat, over time and through various owners she had been adapted for multi-purpose fishing, including trawling and scallop dredging. During Neil Smith's ownership she had only been used for scallop dredging and creel fishing.

Abaft of the wheelhouse sat an athwartships Spencer Carter 1.5 tonne trawl winch, which was well greased and had good condition trawl warps on the main barrels. A net drum sat on top of the aft trawl gantry, but this had never been used by Mr Smith. A hydraulically operated 'V' wheel creel hauler was fixed on the forward starboard shoulder of the boat, to assist hauling through a davit-mounted snatch block **(Figure 26)**. A new Cummins 220hp main engine had been installed personally by Mr Smith in October 2010.

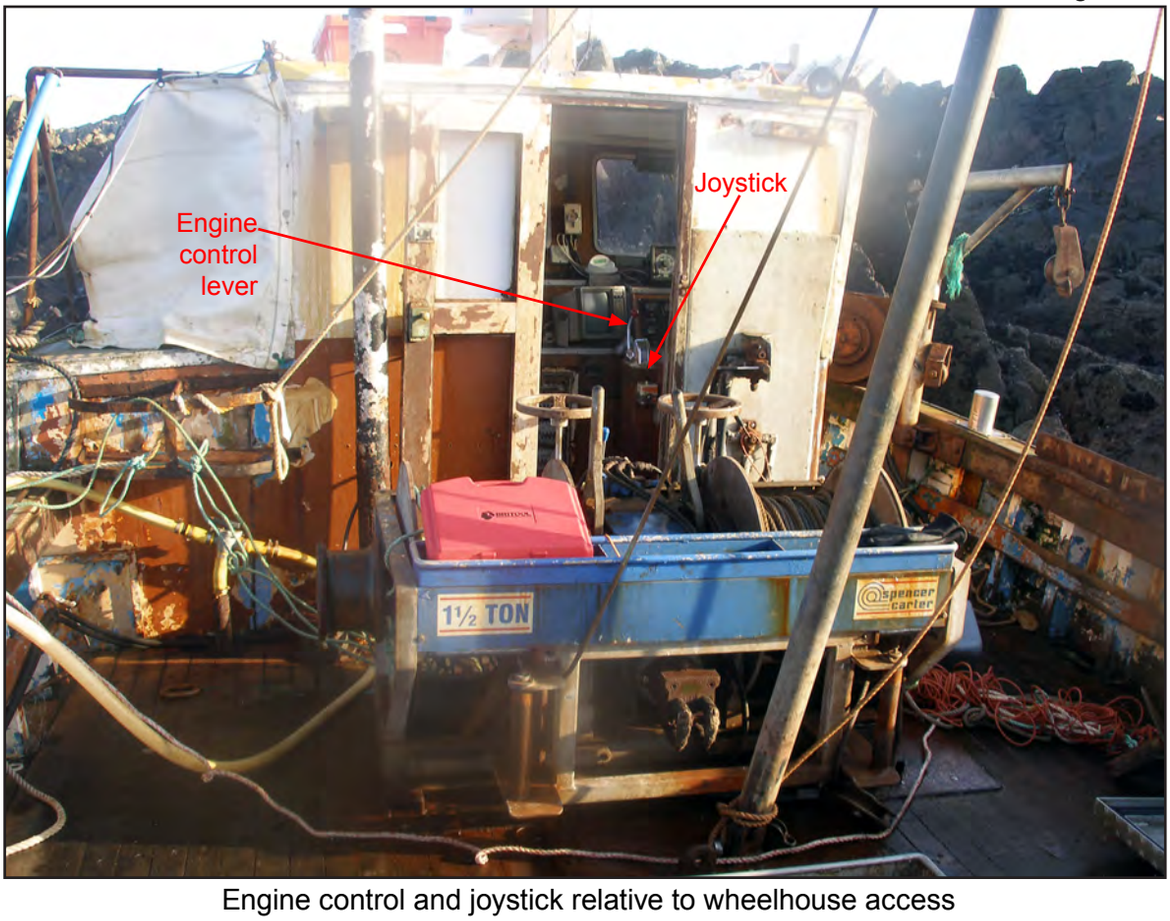
Figure 26

Hauling arrangement on *Breadwinner*

Neil Smith modified *Breadwinner* for one-man operation of creels by installing a full width plywood shooting ramp forward of the transom bulwark. To give protection to the ramp and deck, the entire area was covered in heavy duty laminated rubber matting. Of note was the installation of a dividing pound board fastened to, and abaft of, the winch on the starboard side **(Figure 22)**. This board kept creels stacked on deck separated from the back rope.

Breadwinner's wheelhouse was comprehensively fitted out with a selection of marine electronics including: radar, echo sounder, VHF radios, C Max track plotter, Navitron autopilot and Furuno GPS. Access to the wheelhouse from deck was through a central door on the aft bulkhead, which gave ready access to the steering joystick and engine control lever without having to leave the deck **(Figure 27)**. All the instruments were placed within easy reach of both the wheelhouse door and the skipper's seat, which was positioned in the aft starboard corner of the wheelhouse. The only readily available knife found on *Breadwinner* during the investigation was located in this area. Access to the engine room and fo'c'sle cabin was through a hatchway on the port side of the wheelhouse deck.

Figure 27



Engine control and joystick relative to wheelhouse access

3.6 FISHING PROCESS

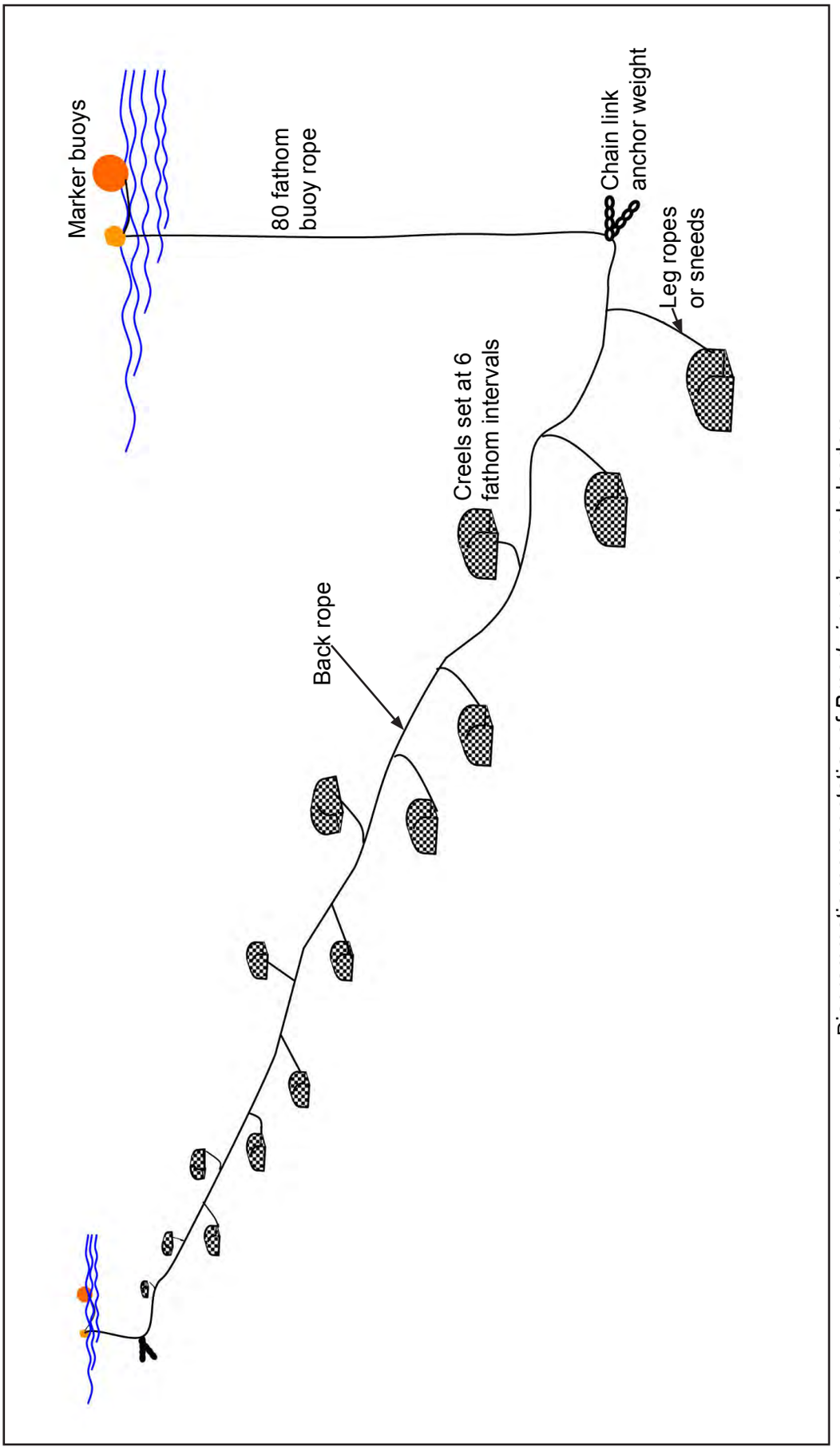
For several months before the fatal accident, *Breadwinner* had fished with creels for prawns[17], brown crab and lobster. On the day of the accident Mr Smith was fishing for prawns, although he did have a leader of crab creels shot closer inshore. *Breadwinner* had five leaders of prawn creels shot in an area of broken ground about 4 miles east of Score Head. Mr Smith preferred to haul his creels every second day, however weather conditions in the month of January often dictated when fishing would take place. The last time *Breadwinner*'s creels had been hauled was 2 days before the accident, and it is believed that only two of the five leaders were hauled at that time.

Each leader was made up of 70 creels. They were set at 11m (6fm) apart along a 12mm polypropylene back rope that had a chain weight attached at each end. The back rope's location was marked by buoys at both ends, which were connected to the back rope by 10mm buoy ropes. The approximate total length of the line deployed was 0.5 mile **(Figure 28)**. Prawn creels are quite light weight compared to crab or lobster creels, weighing approximately 3.5kg each. This prevents them sinking into the muddy seabed, the habitat of prawns.

Neil Smith preferred to fish single-handed. He did, however, occasionally ask his nephew to assist him, especially if the creels had shot foul[18] and he knew that they might be difficult to retrieve.

[17] Prawns: a colloquial term for nephrops norvegicus; also known as Norway lobster, Dublin Bay prawn or langoustine.
[18] Foul: used in this context to mean tangled together in a group.

Figure 28



Diagrammatic representation of *Breadwinner*'s creels leaders

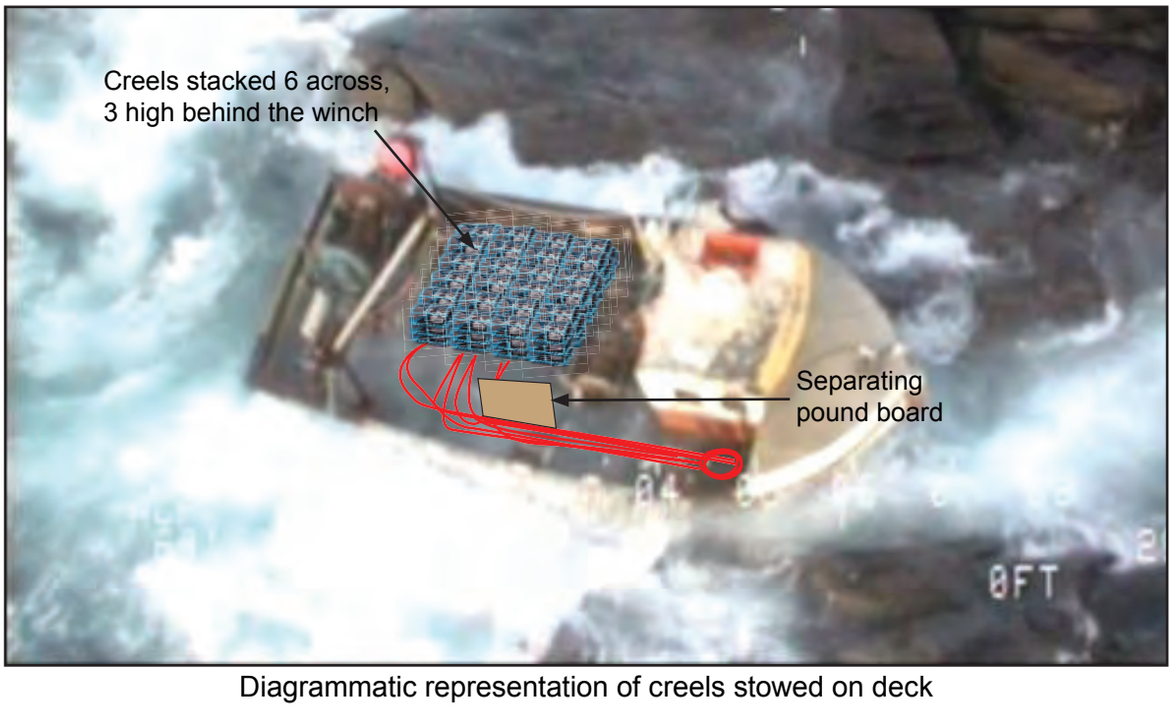
3.6.1 Shooting

Breadwinner's system of shooting was known as a self-shooting arrangement. Prior to shooting, a leader of 70 creels was stacked in rows of three high and six athwartships behind the trawl winch for four rows towards the stern **(Figure 29)**. To shoot a leader of creels, the skipper would set a boat speed of about 3kts and engage the autopilot on a suitable heading. He would then leave the wheelhouse to deploy the first marker buoy, buoy rope and chain weight. The tension on the back rope created by the chain weight would then pull the creels over the stern in succession as the boat steamed ahead. The skipper would normally remain in the wheelhouse during shooting, but would go on to the deck to cast away the second set of marker buoys, which were usually stowed between the winch and the wheelhouse, within easy reach of the wheelhouse door.

Neil Smith was known to shoot his creels from the safety of the wheelhouse; shore observers with binoculars confirmed they had watched him shoot lobster leaders in this fashion. He had also been known to make statements to friends and colleagues to the effect of *"if the creels go foul during shooting, let them go and sort out the mess later"*.

Neil Smith always marked the position of a leader using waypoints on his track plotter. This enabled him to find his creels should the marker buoys have disappeared for any reason and to provide positional information to trawler skippers in the area so they could avoid snagging his gear. On the day of the accident, he had marked both ends of his first leader at 0930 and 0937 **(Figure 25)** and the first end of the second leader at 1054, which subsequently pulled him overboard a few minutes later.

Figure 29



Diagrammatic representation of creels stowed on deck

3.6.2 Hauling

When hauling, Neil Smith would manoeuvre *Breadwinner* to pick up the leader marker buoys from the surface, and then feed the buoy rope through the open snatch block on the davit arm and over the 'V' wheel of the hauler **(Figure 26)**. The marker buoys were then stowed between the wheelhouse and the winch, and would become the last item of gear to be cast overboard during the shooting process. The buoy rope would be hauled, and the first chain weight recovered and stowed clear of the rope. This buoy rope adjoined the back rope to which creels were attached by short sneeds[19]; the back rope would continue to be hauled through the snatch block by the hauler and coiled freely on the deck directly below the hauler. As each creel came up to the snatch block, Mr Smith would lift the creel and simultaneously throw the sneed out of the snatch block, allowing the back rope to continue unhindered around the hauler.

Each creel would then be carried to a sorting table on top of the winch **(Figure 22)** and emptied of catch and debris. The live prawns were stowed individually in a tank of aerated water to the port side of the winch. After clearing and re-baiting, creels would be placed in their 'stowed-for-shooting' position behind the winch in a three high row of six creels athwartships.

The process of clearing, baiting and stacking creels would be repeated every 6fm until the entire leader was hauled and stowed. As each creel was stacked sequentially, Mr Smith would ensure that the bights of back rope, to and from the hauler, were leading clear from the creels and stowed towards the starboard bulwark. The second chain weight would finally be retrieved below the snatch block; at this point the buoy rope was untied from the chain weight and back rope. The buoy rope's tail was then taken aft, passed out around the starboard gallows, carried forward inboard and re-tied to the chain weight. The buoy rope was seldom taken onboard, but instead shooting would commence from this position, removing the potential danger of an additional 80fm of buoy rope on the deck.

During the hauling process *Breadwinner* would haul up to wind and/or tide and, if need be, the skipper would occasionally give a burst of power ahead or astern, altering the helm accordingly to keep the back rope on a proper lead.

3.7 SAFETY INSPECTIONS AND SAFETY EQUIPMENT

Breadwinner displayed an in date MCA safety certificate decal in her wheelhouse. Her most recent small vessel inspection, as required by the *Fishing Vessels (Code of Practice for the Safety of Small Fishing Vessels) Regulations 2001* (S.I. 2001 No. 9), also known as the Small Vessel Code, was carried out on 10 April 2007 by the CG on behalf of the MCA. The only deficiencies identified at that time were the absence of lights and whistles on her lifejackets, and these were quickly rectified.

In addition to the mandatory safety equipment required for a vessel of her length, *Breadwinner* also carried a 4-man liferaft and an Emergency Position Indicating Radio Beacon (EPIRB).

[19] Sneed is the local terminology for the rope that connects the creel to the back rope. In other parts of the UK it is known as a leg rope.

The Small Vessel Code inspection regime required the inspecting officer to establish if a risk assessment had been carried out for safe working operations. It is understood that although this had been done, it was not a written document. There was no requirement for risk assessments to be written, although the MCA recommended that skippers did write them down.

Owners and skippers of small fishing vessels were required to certify annually that their vessel still complied with the Small Vessel Code, by declaring that the safety equipment had been properly maintained and serviced in accordance with the manufacturers' recommendations and that an appropriate, up to date health and safety risk assessment had been completed. There were no self-certification certificates available that related to *Breadwinner* since the inspection conducted by MCA staff in 2007.

SECTION 4 - ANALYSIS

4.1 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.

4.2 THE ACCIDENT

Neil Smith died from salt water drowning as a consequence of becoming entangled in his fishing gear and then being dragged overboard during the creel shooting operation.

He did not stay in a place of safety - the wheelhouse - during the shooting operation despite his many years of experience and being fully aware of the dangers of being on deck while shooting creels.

The weather and sea state at the time of the accident were very close to the operating limit for small vessels such as *Breadwinner*. *Breadwinner* was shooting with wind and seas just forward of the port beam, and she would have been pitching and rolling quite heavily.

Breadwinner's engine control was found at the full ahead position. However, it is considered that the control lever, which would have been initially set at a 45º angle for approximately 3kts speed, was pushed to the full ahead position by floating debris while *Breadwinner* was awash on the rocks. It is possible that the autopilot heading control knob had also been subjected to deflection by the same debris.

Neil Smith entered a waypoint on his track plotter when shooting the first creel of the final leader at 1054 **(Figure 25)**. For reasons unknown, he either remained on deck during shooting (considered unlikely in the weather and sea state), or left the safety of his wheelhouse at some stage during shooting. As the last stack of creels shot out, he became entangled in the gear between creels 53 and 54 and was dragged overboard, with no one to assist him or raise an alarm.

It is possible that the last three-high stacked creels fouled, or that the whole stack fell over on deck due to the heavy pitching and rolling, and that Neil Smith went into the area to clear them. This is thought unlikely as he had been known to let creels shoot foul even in good weather rather than attempt to clear them. Therefore the likelihood of him attempting such a thing in poor weather is considered highly remote.

It is also possible the last stack of creels fell over and jammed or fouled, behind a bulwark stanchion for instance, and stopped shooting. With the boat going ahead, tension would have transferred to the back rope. Neil Smith might have left the wheelhouse to 'assess the problem' before deciding what action to take. This could have involved turning *Breadwinner* to alter the lead of the back rope, applying full power to clear the obstruction, or coming astern to ease the tension in the back rope. Perhaps at the critical moment, when he was on deck, the jam freed violently, snaring Mr Smith, sweeping him over the stern in a tangle of creels and rope. The accumulated tension in a back rope freeing in such circumstances would be catapult-like in its violence.

It is more conceivable that Neil Smith lost his footing in difficult sea conditions and became entangled in a bight of back rope between the hauler and the creels, which then dragged him overboard. Mr Smith did not usually carry a knife, although one was normally available in the starboard side of a tray at the aft side of the trawl winch. However, this knife might not have been within reach when Mr Smith became entangled. Even with a knife available, Mr Smith would have had very little time in which to cut himself free before being dragged overboard. In any event, it is believed that he had no knife readily available to cut himself free.

4.3 FATIGUE

The accident occurred a little less than 4½ hours after *Breadwinner* left harbour. Neil Smith was well rested and had not fished the previous day. His operation was 'day fishing', and frequently at that time of year days were lost due to bad weather, giving extra rest periods between fishing trips.

Mr Smith fished on 5 days between 8 January and 20 January and averaged 7½ hours at sea on these days. Fishing days normally culminated in storing the day's catch into 'keeps' once back in port, adding a further hour to the skipper's working day. It is believed that even on successive days fishing, there were adequate rest periods, so fatigue is not considered a contributory factor in this accident.

4.4 OPERATIONAL SAFETY GUIDES AND ADVISORY NOTES

It is unknown whether Neil Smith had ever accessed either MCA or Seafish guidance literature **(Annex A)**. The available literature gave useful advice, however there were areas within it that could have been improved.

4.4.1 The MCA's Fishermen's Safety Guide

The MCA's *Fishermen's Safety Guide* contains a section dedicated to potting and creeling, which makes reference to the value of barriers separating crew from gear and ready access to knives.

It also makes specific reference to shooting directly off the deck (self-shooting) by means of a gate or ramp, as was the case on *Breadwinner*. However, the document does not emphasise the need for crew to be off the deck during shooting when utilising such a system, nor does it offer guidance on safety for single-handed operations, both of which would have been useful additions.

4.4.2 Seafish's Small Vessel Safety Guidance Booklet

Seafish's *Small Vessel Safety Guidance* booklet reiterates much of the information found in the MCA's *Fishermen's Safety Guide*. It, too, would have benefited from the inclusion of guidance on single-handed operations and the need to be clear of the deck during the self-shooting operation.

4.4.3 Seafish's Potting Safety Assessment of 1999 and Potting Safety Industry Advisory Note of 2010

The *Potting Safety Assessment,* 1999 and the *Potting Safety Industry Advisory Note,* 2010 both highlight the safety benefits of using barriers or dividing boards to segregate crew from gear. Since publication of the 1999 document, self-shooting systems had become more prevalent, and the *Advisory Note* of 2010 **(Annex A)** (updated in 2011) highlighted their benefits.

The *Advisory Note* also made reference to a single-handed, self-shooting operation where the skipper is *"…not required to step back onto the deck, and into the shooting area, for the remainder of the shooting operation"*.

However, it went on to suggest that in situations where two crewmen are on board, the *"deck hand can stand safely behind the open transom door during shooting operations".* Simply being in that area could encourage a crewman to try to rectify fouled creels. Therefore it would have been useful if the *Advisory Note* had strongly emphasised the need for all crew to be off the deck during self-shooting operations.

SIMILAR ACCIDENTS, DISCUSSION AND SAFETY ISSUES

Photograph courtesy of Ian Leask and www.shipnostalgia.com

SECTION 5 - SIMILAR ACCIDENTS

There have been 13 recorded fatalities on UK creel fishing vessels since the beginning of 2007, 9 of which were a result of either falling or being dragged overboard with the gear. Of these 9 fatalities, 7 were single-handed fishing operations, with no one to witness the accident or provide assistance.

During the same period there were 10 single-handed fatalities on various other types of UK fishing vessels, most of which were man overboard (MOB) accidents where the casualties were not wearing any type of PFD, lifeline, PLB or remote engine shut-off. Generally, the boats were either found unmanned at sea, or on the shore as a result of them continuing to make way through the sea unmanned.

SECTION 6 - DISCUSSION

6.1 WORKING PRACTICES

While there were differences in the circumstances that led to each of these fatal accidents, both occurred as a direct result of the working practices that were being used.

Discovery and *Breadwinner* were both being operated by lone skippers and there was no support or backup when the fishing operations started to go wrong. Without additional safety precautions, there was little to prevent either man being carried overboard, and nothing that could be done to recover them or raise the alarm. To prevent this deadly situation, lone fishermen should consider the way they operate, at three levels:

- Firstly, the working arrangements should be such that there are physical and/or procedural barriers to prevent lone skippers becoming entangled in fishing gear.

- Secondly, lone skippers must be able to identify how the risk increases when fishing operations start to go wrong. Safe working practices are needed when dealing with common problems, such as creels that become tangled together during shooting operations. If all else fails, a lone skipper must think of a way of stabilising the situation and reducing the risk while help is sought.

- Finally, if the worst should happen, a lone skipper must be able to prevent further injury and summon help. Automatic machinery shut-down devices and personal protective equipment should help reduce the risk of injury in accidents on board the vessel. A lifeline and a sharp knife could prevent a lone skipper being carried overboard. However, if the lone skipper does end up in the sea, additional buoyancy and a means of summoning help are essential for survival.

These issues are likely to be far less clear cut for a skipper assessing his or her own boat. Although some written guidance is available, it is unlikely to be as effective as an impartial view from a third party. This is particularly relevant to the process of risk assessments. Despite being a mandatory requirement, risk assessments do not need to be written down for smaller fishing vessels, and their conclusions are never challenged. The consequence of this is that operational safety is left to the operator, who may not necessarily appreciate that a risk exists, or may not know how an identified risk can best be mitigated.

From 2005 to 2007, third party assistance with hazard identification and control was available in Scotland from the MCA's FVSO, and subsequently until March 2008 from Seafish staff. This service ceased due to financial constraints, but the evidence from these accidents shows there is a particular need to provide single-handed fishermen with credible, effective advice on safe working practices.

6.2 FV *DISCOVERY*

In the case of *Discovery*, the skipper was faced with completing all the tasks that were generally carried out by two people. Neither the owner nor skipper had carried out any form of risk assessment for their fishing operation. Furthermore, they had not considered the additional risks of operating single-handedly. The available guidance and risk assessment pro-forma had not been used.

Once overboard, the skipper would quickly have become separated from *Discovery*, due to wind and/or tide. A lifeline, or fall preventer harness attached to a strong point might have prevented Bruce Pearson from entering the water, and either could have been fitted along the centre line above his head, immediately below the stowed landing derrick. However, such a preventer would need to be carefully considered so that it did not introduce a new snagging hazard.

Had the skipper been wearing a PLB, the alarm would have been raised and the rescue effort would have started much earlier. Finally, had he worn a PFD, his survival time would have increased and the rescue operation would have stood a much better chance of success.

6.3 FV *BREADWINNER*

There are three areas of Neil Smith's operation where safety might have been improved had he re-evaluated his working practices.

6.3.1 Separation of crew from gear

The *Potting Safety Assessment 1999* and the *Industry Advisory Note on Potting Safety* both highlight that fitting barriers or dividing boards can be used to separate crew from the back rope. During shooting, it was Mr Smith's choice to return to the wheelhouse as soon as he had deployed the first marker buoy and chain weights of a leader, so he was safely clear of the deck once the creels started to shoot. On this occasion, however, he was on deck as the last creels were deploying. Although there was a small pound board on the starboard side of *Breadwinner*'s deck **(Figure 22)** to prevent the creels from fouling the back rope, it did not prevent him from becoming entangled in it. It cannot be known what prompted Mr Smith not to stay in the wheelhouse throughout the shooting operation, but once on deck the mechanisms on *Breadwinner* to separate the man from the back rope were ineffective. A better review of the deck layout might well have established that additional pound boards, dividers or other means could have been used to ensure that crew could carry out essential tasks without ever needing to come into contact with the back rope while it was running out.

6.3.2 Stacking of creels

Breadwinner's creels were stacked in rows three high. The higher a stack, the more prone it is to toppling over, inducing the operator to try and clear the tangle of creels (or 'foul') before they are shot over the stern.

Had the number of creels per leader been reduced so that the creels only needed to be stacked two high, the possibility of them toppling over and becoming tangled would have been greatly reduced. Albeit this would have needed more leaders to be shot and hauled for the same number of creels, thereby extending the working day.

6.3.3 Survival and accident mitigation considerations

Once snared by the back rope, Mr Smith's best chance of survival would have been to cut the rope pulling him overboard. This would have required him to have had a readily available knife on his person, or knives placed in strategic positions on board.

Had he been able to free himself from the rope after going overboard, his survival time would have been limited since he was not wearing a PFD to keep his head above water, or a PLB capable of alerting rescue authorities and enabling them to find him.

Breadwinner was making way at over 3kts, so it would have been almost impossible for anyone in the water to catch up with the vessel and get back on board. There are remote engine cut-out devices on the market which have the ability to stop engines, either manually or when the control unit is taken beyond a predetermined distance. Fitting and using such a device would improve the safety of all single-handed vessels, not only fishing boats.

6.4 EVALUATION OF WORKING PRACTICES

6.4.1 Risk assessment

All fishing vessel owners were required to ensure that the risks to the health and safety of workers on board their vessels were assessed. This requirement applied equally when the owner and worker were the same individual. MGN 20 (M+F) contained guidance on the regulations and the principles of risk assessment.

MSN 1813, the *Code of Practice for the Safety of Small Fishing Vessels*, specified the requirements for vessels of less than 15m length, and provided guidance as to how these might be met. Of particular note, it stated that risk assessments must be reviewed to ensure that they were appropriate to the fishing method in use. However, there was no requirement for the risk assessments to be recorded.

Risk assessment need not be a complicated process, but the very act of recording a risk assessment helps ensure that the risks themselves are quantified, that appropriate mitigating measures are identified, and the resultant risk after the application of mitigating measures is deemed acceptable. A recorded risk assessment can also be reviewed at a later date and checks made that any hazard control measures identified remain appropriate and in place. Finally, a written risk assessment provides a third party with a foundation on which to base a review or discussion of safe working practices. Therefore, while the requirement to conduct a risk assessment is potentially useful, without a structure and record of the process its value in improving the safety of working practices on small fishing vessels is questionable.

6.4.2 Small Vessel Code inspection

During *Breadwinner*'s Small Vessel Code inspection of 10 April 2007, Neil Smith indicated that he had carried out a risk assessment. Since there was no requirement for this to be recorded, he was not asked to demonstrate evidence of it.

During inspections, surveyors and inspectors were required to enquire about the completion of risk assessments. However, they were not expected to inspect them as any such inspection could be interpreted as a tacit approval of their contents. Furthermore, surveyors were not expected to evaluate operating practices during inspections.

Notwithstanding the absence of a requirement to review working practices, as creel boats seldom have their fishing gear on board in harbour, an evaluation of a vessel's working methods would have been difficult to achieve. Therefore, fishing vessel inspections conducted under the Small Vessel Code were of no value in improving the safety of working practices.

6.4.3 Annual self-certification

Annual self-certification certificates have been required since 2007. They are not required to be submitted to the MCA, but should be available for inspection by an MCA surveyor when requested, or during an inspection. As *Discovery*'s Small Vessel Code inspection had taken place less than 1 year before the accident, the skipper had not yet been required to carry out the subsequent annual self-certification.

However, there were no self-certification certificates relating to *Breadwinner* available for any period since the last inspection in 2007. This situation is not uncommon and there are few examples where fishermen have completed the annual self-certification process in the way intended by the Code.

Although the self-certification form requires skippers to affirm that they have conducted a risk assessment and that it remains valid, there is no way of verifying the statement as there is no need for a written risk assessment in the first instance. Therefore, the annual self-certification process was of no value in improving the safety of working practices on *Breadwinner*.

6.4.4 External evaluation

A previously successful external evaluation of working practices, carried out by an MCA FVSO on over 15m fishing vessels, was terminated in 2007, before it could be extended to the small vessel fleet.

This removed the advantage of an independent observer possibly identifying issues overlooked by operators, and the very real benefit of working practices being discussed between peers.

External evaluation of the working practices employed on both vessels might have identified the shortcomings of their working methods and established that more could be done to reduce or control the hazards.

6.5 FUTURE DEVELOPMENTS

ILO 188, which the UK has been recommended to ratify before 2013, applies to all fishermen and requires owners and skippers both to carry out effective risk assessments and to ensure their vessels are suitably manned. In addressing its ratification, the MCA has the opportunity to review and improve the regulations and codes so as to address the wider safety deficiencies in the fishing industry, and in particular address the additional problems of single-handed fishing operations.

SECTION 7 - SAFETY ISSUES

7.1 SAFE SYSTEMS OF WORK

1. It is probable that the angle between *Discovery* and the lead of the back rope changed, so that the line led aft on the potting roller. This movement would have created an angle at the 'V' in the wheel of the hauler sufficient for the tensioned back rope to ride out of it. [2.6 ***Discovery***]

2. Some creeling vessels fitted with potting rollers have an additional vertical guide close to the hauler to maintain the angle of the back rope onto the hauler. This guide reduces the risk of the back rope riding out of the hauler. [2.6 ***Discovery***]

3. Further research is required to determine whether additional vertical guides are the best method of preventing back ropes from riding out of haulers, when used in conjunction with potting rollers, or if other modifications would be effective. Once complete, the improvements to the potting roller design for new boats, and the modifications that can be made to existing systems, should be disseminated to the industry. [2.6 ***Discovery***]

4. The weather and sea state at the time of the accident were very close to the operating limit for small vessels such as *Breadwinner*. [4.2 ***Breadwinner***]

5. The casualty did not remain in a place of safety during the self-shooting operation. [4.2 ***Breadwinner***]

6. There was no means of ensuring the separation of crew from gear on the deck. [6.3.1 ***Breadwinner***]

7. The creels were stacked in rows three high; this increased the likelihood of the creels toppling and fouling each other during shooting. [6.3.2 ***Breadwinner***]

8. It is believed that the casualty had no knife readily available with which to cut himself free. [4.2 and 6.3.3 ***Breadwinner***]

7.2 SINGLE-HANDED WORKING AND RISK ASSESSMENT

1. Evidence from both accidents shows there is a need to provide single-handed fishermen with credible, effective advice on safe working practices. [6.1 ***Discovery***, ***Breadwinner***]

2. *Discovery*'s skipper faced additional hazards when working single-handedly as the number of the tasks to be carried out increased. The complexity of the work he was required to carry out also increased due to the boat-handling skill required to haul *Discovery* across a spring tidal flow with an opposing wind. [6.2 ***Discovery***]

3. Further guidance from industry bodies on the specific hazards of creeling and, specifically, creeling single-handedly, should highlight the additional precautions fishermen should consider when working alone. [6.2 ***Discovery***]

4. The ever present risk of falling overboard leaves the fisherman working single-handedly vulnerable to being separated from his boat with no one else to help him, or to raise the alarm. [6.1 ***Discovery***, ***Breadwinner***]

5. Safety might have been improved had the casualty re-evaluated his working practices. [6.3 ***Breadwinner***]

6. None of the available operational safety guidance or advisory notes specified the need for crew to be off the deck during self-shooting operations. [4.4.1, 4.4.2, 4.4.3 ***Breadwinner***]

7. None of the available operational safety guidance or advisory notes offered guidance for single-handed operations. [4.4.1, 4.4.2 ***Breadwinner***]

8. There was no requirement for owners or operators of small fishing vessels to record their risk assessments. This made it difficult to review them at a later date and be satisfied that the hazard control measures identified were still appropriate and in place. [6.4.1 ***Discovery***, ***Breadwinner***]

9. Small Vessel Code inspectors were not expected to evaluate operating practices during inspections. [6.4.2 ***Discovery***, ***Breadwinner***]

10. External evaluation of the casualties' shooting and hauling procedures might have established that possible controls to reduce hazards were missing. [6.4.4 ***Discovery***, ***Breadwinner***]

7.3 USE OF PERSONAL PROTECTIVE EQUIPMENT AND LOCATORS

1. A lifeline or fall preventer could have prevented *Discovery*'s skipper from being knocked overboard at the hauling position. [6.2 ***Discovery***]

2. The search and rescue operation was started around 6 hours after *Discovery*'s skipper was lost overboard. Despite the best efforts of all those involved, they were very unlikely to find the skipper alive. [2.7 ***Discovery***]

3. *Breadwinner* was operated by a lone fisherman without a remote engine cut-out device. [6.3.3 ***Breadwinner***]

4. Wearing a PFD would have increased both skippers' survival time in the water. [6.2 ***Discovery***, 6.3.3 ***Breadwinner***]

5. Had the skippers carried PLBs, the alarm would have been raised and the rescue effort would have started much earlier, thus increasing the chances of survival. [6.2 ***Discovery***, 6.3.3 ***Breadwinner***]

7.4 FUTURE DEVELOPMENTS

1. The ILO 188 convention has the potential to have a major impact on the fishing industry, and may provide a catalyst for the development of safer working practices on fishing vessels and particularly small fishing vessels. [6.5 ***Discovery***, ***Breadwinner***]

ACTIONS TAKEN AND RECOMMENDATIONS

Photograph courtesy of Ian Leask and www.shipnostalgia.com

SECTION 8 - ACTIONS TAKEN

8.1 SEA FISH INDUSTRY AUTHORITY

The Sea Fish Industry Authority intends to commission a study on potting roller and 'V' wheel haulers to investigate possible improvements to roller and hauler design.

8.2 MARITIME AND COASTGUARD AGENCY

The Maritime and Coastguard Agency has:

- Committed to creating legislation that would make the wearing of PFDs on commercial fishing vessels compulsory.

- Re-issued on its website the poster highlighting the dangers associated with single-handed fishing operations.

8.3 SCOTTISH FISHERMEN'S FEDERATION

The Scottish Fishermen's Federation's Marine Safety Committee has started production of a 'Safe Potting' video to be accessible on its website by all fishermen.

SECTION 9 - RECOMMENDATIONS

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

2011/138 Extend the current guidance published in the *Fishermen's Safety Guide* to cover the additional safety considerations needed for single-handed operations. This should, as a minimum, include:

- The additional workload that single-handed operation imposes on the individual.
- Advice on how to mitigate the additional hazards of operating fishing equipment single-handedly, including: guarding of dangerous machinery; positioning of operating controls; the need for working areas to be safely separated from hazards such as revolving drums and back ropes; and the provision of emergency stops.
- Additional measures that can be taken to deal with emergency situations, such as: use of automated MOB alarm systems including remote engine shut-off where appropriate; positioning of emergency equipment so that it is easily accessible; the wearing of appropriate personal protective equipment such as personal flotation devices and/or safety harnesses, and the carrying of rescue knives or similar cutting tools.

2011/139 Through its chairmanship of FISG, work with the wider fishing sector to ensure that means are established to engage with and educate fishermen in the methods of recognising and mitigating the occupational hazards of professional fishing.

Marine Accident Investigation Branch
November 2011

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

Annex A

Seafish Advisory Note April 2010 - Potting Safety

SEAFISH
the authority on seafood

Industry Advisory Note

April 2010

Potting Safety

The Marine Accident Investigation Branch (MAIB) report *Analysis of UK Fishing Vessel Safety 1992 to 2006*[1] found that a higher than average man overboard fatality rate was attributed to parts of the potting sector. The report recommended Seafish research potting methods and procedures.

This advisory note summarises the available information on potting related incidents and provides guidance on safe practices.

Fatalities in the Potting Sector

MAIB has been recording accident data since 1991. During the period 1st Jan 1991 – 31st Dec 2009, the deaths of 54 fishermen from the potting sector were recorded. This represents an average of 2.8 fatalities a year during this 19 year period.

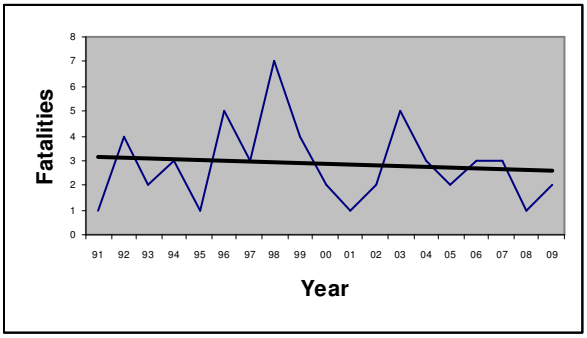


Figure 1: UK Potting Fatalities 1991 - 2009

The figure above shows that the fatality rate has remained consistent with no significant improvements being achieved. Further improvements in safety practices are needed to reduce the loss of live within the sector.

It is estimated that the number of UK full- and part–time fishermen engaged in potting is 4,600[2]. This equates to an average fatality rate of one per 1,618 fishermen each year.

Clearly too many lives are being lost and this warrants a closer re-examination at available data to try and ascertain why accidents are occurring in the sector and what actions may be employed to reduce the accident rate.

It can be seen from the table below that nearly half (46%) of deaths in this sector are due to fishermen going overboard. This is much higher than for the catching sector overall for which a third of all fatalities between 1992 and 2006 resulted from fishermen going overboard[1].

Table 1: Summary of Fatalities on Potting Vessels reported to MAIB References:

Incident Type	Fatalities Rate 1991 -2009	% of Fatalities 1991 -2009
Person Overboard	25	46.3
Flooding/Foundering	12	22.2
Capsize/Listing	10	18.5
Missing Vessel	4	7.4
Accident to Person	1	1.9
Collision	1	1.9
Grounding	1	1.9
Total	***54***	**100**

1. http://www.maib.gov.uk/cms_resources.cfm?file=/FishingVesselSafetyStudy.pdf
2. Calculated from 2,599 vessels actively engaged in potting in 2008 using average crew numbers recorded in England and Wales for each category.

Size Category	Av. Crew	Vessels	Totals
10m & under	1.6	2,285	3656
10 – 15m	2.5	264	660
Over 15m	5.7	50	285

Pot fishing hazards

The main potting hazards that may result in a fatality or serious injury include:

- **Snagged in rope when shooting**

A loop or bite of rope caught around a limb during shooting will result in serious injury or death. The limb is likely to be severed or the person will be dragged overboard and, even if wearing a lifejacket, likely to be pulled down by the weight of pots attached to the rope. Accidents have also occurred due to a loop of rope snagging a pot and carrying it overboard, striking a crewman on its passage.

- **Pots out of sequence**

Stacking pots in a rigid sequence is essential where pots remain attached to the back rope and all involved in the shooting operation need to be totally certain of the sequence. Problems can occur if a pot is stacked out of sequence to enable it to be repaired prior to shooting, or if the vessel motion causes stacked pots to fall. Should an incorrect pot be selected, the correct pot will be pulled from the stack as the back rope tightens and 'fly' across the deck, quite likely striking the man holding the incorrect pot at the rail.

- **Trips and falls**

The most common accident in any workplace, but on a fishing vessel it can be fatal if the person falls overboard and in potting, a simple trip and fall could be disastrous during the shooting operation.

- **Vessel overloading**

The overloading of a fishing vessel with pots, either by having too many on a string or when moving strings to new fishing grounds, can put the vessel at risk of capsize and foundering, and her crew at risk of drowning.

- **Struck by pot or anchor at the davit block**

Failure to stop the hauler can result in a pot, or perhaps an anchor, hitting the davit block and possibly swinging over the top to strike the crewman.

- **Fatigue**

Not a potting specific hazard but fatigue is a common hazard in the catching sector. Working in a physically demanding job for long hours ultimately leads to fatigue, and this increases the risk of an incident occurring. Anecdotal evidence from industry suggestions many more pots are being worked than 10-15 years ago and in many cases have doubled. This will undoubtedly increase levels of fatigue within the sector.

- **Crew competence**

Owing to reduced or static levels of income in the sector it may be more difficult to attract and retain experienced and competent crew. Inexperienced crew are more likely to be involved in an accident.

- **Operating single-handed**

Problems with recruitment and low returns force more fishermen into working single-handed. This practice may increase the risk of accidents and certainly reduces the chances of rescue should an accident occur.

These hazards do occur and injuries and deaths can be the result.

Hazard reduction methods

Some suggestions for reducing the risk of hazards and accidents occurring are detailed below:

1. Detachable Pots - Toggle System

This system, originally devised by Trevor Bartlett (Devon) for use on his 18m potter *Euroclydon* and now in use on most of the larger potting vessels, is a major advance in pot fishing safety. The key to the system is a toggle clip which connects into a loop to join together the two-piece leg rope at a point quite close to the pot.

By slipping the toggle clip out of the loop, the pot can be detached from the back rope, enabling it to be stored anywhere and without worrying about sequence. On hauling, the pots are lifted on board as normal, but once on board, the toggle is disconnected and the loop, which it fits into, is slipped over a vertical steel pole.

Figure 1: Detaching the pot from the main ground rope onboard 16m Dartmouth based vessel *Excel*

The size of the eye splice is critical to this shooting system. If the opening of the eye splice is too loose the pots may become unattached when hauling or shooting and be lost. If it is too tight it will be a struggle to unattach when hauling and attach the strop to the toggle when shooting.

Figure 2: Placing the eye splice on the pole ready for shooting.

Putting each eye splice on the pole ensures each of the strops is kept in the correct sequence for shooting back.

The pot, now separate from the back rope is emptied, baited and stacked. The back rope, as normal, is allowed to pile up on deck and the loop, of each disconnected leg rope, is dropped over the pole in sequence. Thus at the end of the haul, the back rope is in a pile on the deck with each leg rope leading to the pole. The pots are stacked securely out of harms way, wherever is convenient, as there is no need to keep them in sequence.

During the shooting operation, the pot is stood on a shooting table and the first leg rope loop removed from the pole. The toggle is slipped into the loop, thus connecting the pot which is pulled into the sea when the back rope tightens. The next pot is placed in position and connected to the next leg rope from the pole. Shooting proceeds with one

man connecting the toggles and one or two men bringing the pots to the shooting table.

Figures 3: Attaching the pots to the ground rope whilst shooting.

Aside from the ability to stack the pots out of sequence, the system gives more compact storage of the back rope with all the leg ropes leading to the pole. Because the leg ropes are constrained to a narrow area it is easy to build a division to separate the rope from the deck area where the crew handle the pots. In addition, should a problem occur with the shoot, the leg ropes can simply be slipped off the pole as required to enable back rope to be paid away.

It is appreciated that deck space and crew numbers are limiting factors for many small boat operators to adopt this method. However, vessel operators are urged to consider the adoption of this system as the hazard of pots being dragged wildly across the deck is totally removed. If the limiting factor is deck space consider working shorter strings. See Figure 4.

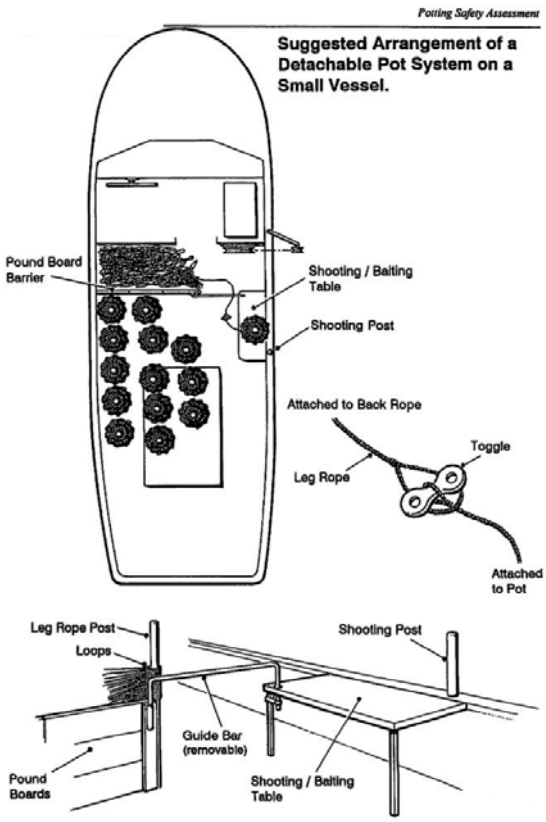


Figure 4: Suggested arrangement or a detachable pot system on a small vessel.

2. Rope Pounds or Divisions

Separating the crew from the back rope will resolve one of the most dangerous hazards; that of becoming snagged in the rope when shooting. The design of the barrier will depend on the layout of the vessel and the stacking of the pots but should endeavour to provide protection to all involved in the shooting operation. A sketch of a separation system devised by an Orkney skipper who introduced the system after the loss of one of his crewmen who became snagged in the rope is shown below in Figure 5.

This system as shown in Figure 5 uses a 600mm (2 ft) high pound board barrier to form a trough between the pound boards and the bulwark to contain all the 'tails' or leg ropes. A high wire mesh screen is set at the end of the pound boards to provide protection for the man who sets each pot in turn on the shooting table. Although the illustration shows a vessel with aft stowage of the pots, the concept can be applied to other layouts in order to keep the ropes clear of crewmembers.

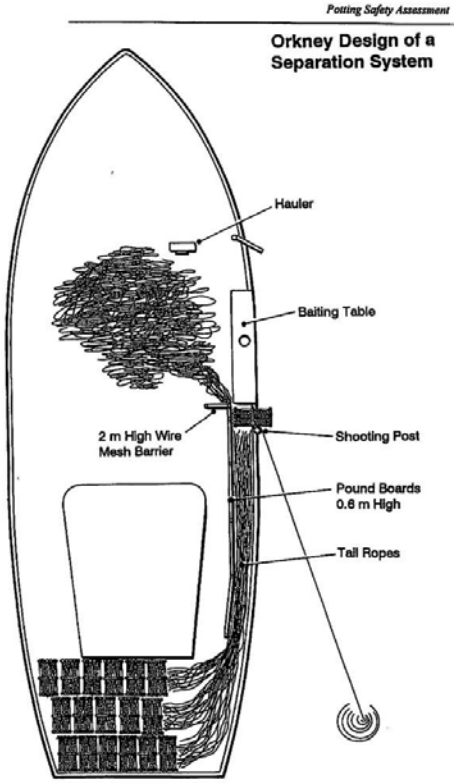


Figure 5: Orkney design of a separation system

3. Self Shooting Systems

There has been a number of varying self shooting systems developed to suit individual vessel layout and skipper preferences. The main difference between self shooting systems and the toggle system is that the pots remain attached to the back rope and as such great care needs to be taken to ensure pots are stacked in a precise pattern, and in a manner, that will not cause pots to be shot out of sequence. The main benefit of this system is reduced manual handling which in turn may reduce fatigue levels and the risk of accidents associated with fatigue.

Many self shooting systems shoot the pots through an opening cut into the transom. Figure 6 below shows pots being stacked during the hauling operation in preparation for shooting through the stern opening. This 12m vessel has a forward wheelhouse and the opening in the transom is permanent with a rail fixed across the top to help prevent crew from falling through the gap.

Figure 6: Stacking pots ready for shooting onboard the 14m Bridlington based vessel *Hollie J*

Figure 7 below shows the pots being shot away with minimal contact from the crew. A crew member can just be seen standing by to one side of the shooting area to ensure the pots are shot in sequence and without incident.

Figure 7: Self shooting through the stern opening

Similar systems to above have been developed on vessels with aft or mid-ship wheelhouses where the pots are stacked forward of the wheelhouse and shot through an opening in the transom via a 'funnel' alongside the wheelhouse. Some openings in the stern have a gate that can be closed when not shooting for additional safety.

Figure 8 shows an example of a self shooting system on a smaller vessel. When working with 2 crew the deck hand can stand in safety behind the open door during shooting operations.

Figure 8: Salcombe based 19' vessel *Amelia Grace.*

As shown in Figure 9 the door may be closed when not shooting pots for additional safety.

Figure 9: Shooting door open and closed

This system has been designed to enable single handed operation. This system was developed by owner Dean Login utilising a quick release clip (see Figure 10 below) suspended from the aft gantry that can operated from the wheelhouse.

In preparation for shooting the first end weight is suspended below the water line (well clear of the prop) over the stern from the quick release clip. Once the first buoy rope has been shot away the skipper then retreats to the safety of the wheelhouse to steer the vessel. Once the vessel is in the desired position the skipper releases the first end weight from the wheelhouse by pulling a cord attached to the quick release clip which releases the weight suspended from it.

Figure 10: End weight quick release system

The combined weight of the first end and forward motion of the boat initiates the shooting process of the pots. The last end weight shoots automatically over the stern in the same manner as the pots do. Once the last end weight has been shot away all that

remains is the end buoy line and buoy that also exits the vessel through the shooting door cut into the transom without intervention.

After shooting away the first buoy rope the skipper enters the wheelhouse and is not required to step back onto the deck, and into the shooting area, for the remainder of the shooting operation. This is a 19' vessel shooting strings of 20 pots.

Where it is not possible to shoot over the stern, systems have been developed to allow self shooting from mid-ships.

Figure 11: Self shooting ramp mid-ships onboard the Bridlington based vessel *Nordstjerne*

Figure 11 above shows a system using a ramp to allow an adaptation of self shooting from mid-ships. During shooting operations a crew member rolls or places each pot in position at the foot of the ramp to ensure it is shot away without incident. Although this method requires some human intervention the effort required is minimal.

The self shooting systems shown here have been developed specifically for each vessel layout and to the individual skippers' requirements. Therefore these are examples only and any system adopted must be designed and developed to fit vessel and skipper requirements.

3. Automatic hauler stop

The concept is to have the hauler stop automatically when a pot or anchor comes up to the davit block. Various methods could be used to achieve an automatic stop:

- **Mechanical**

A spring loaded lever arm mounted on the davit block, such that, the pot or anchor would make contact with it as it neared the block. The lever arm would activate a cut-out valve to stop the hauler. The design of a mechanical stop would have to allow the free passage of the leg rope over the open side of the davit block.

- **Optical**

An optical sensor would be utilised to detect the approaching pot or anchor. This has the advantage that there will be no possibility of the leg rope fouling but, the reliability of an optical system with all the spray from the rope would have to be proven.

- **Proximity**

The robustness and reliability of a proximity probe switch could be exploited, not to detect the actual pot or anchor, but to detect a marker attached to the back line or leg rope. Stainless steel bands crimped around the rope would act as markers to be detected by the proximity switch mounted so that the rope passed close by. The switch may well be mounted on the hauler and the distance of the marker from the pot calculated accordingly.

- **Combined**

Perhaps the most advantageous method would be to combine the control possibilities with optical or proximity detection to offer a

fail safe mechanical stop. Such a combination would enable the pot hauler to be automated (stopping automatically whenever a pot arrived level with the rail.) Indeed, if it is possible that a system could be designed to haul the pots and place each one on a table or conveyor totally automatically. Such a system would greatly improve the efficiency of potting, as it would enable the crew to concentrate totally on emptying, re-baiting and stacking pots.

Whether the development of such an auto stop system could be justified on purely safety grounds is questionable. Only a few incidents occur from persons being struck by a pot or anchor at the hauler, and some fishermen report that if they are late stopping the hauler, the pot simply jams against the davit block with the rope slipping in the hauler vee wheels.

Perhaps the biggest justification for an automated hauler stop would be on the grounds of efficiency, as it could enable attention to be concentrated on the cleaning, baiting and stacking of pots. On those vessels where the hauler operator is also cleaning pots, and has developed the timing to know exactly when to be at the hauler control, there would be little advantage, other than being able to finish clearing the pot before restarting the hauler. However, in situations where a man is solely operating the hauler it would be a major advance.

An automated hauler stop does offer a further benefit. Extending the automation further, to include lifting the pot on board onto a table, would be very desirable. Such automation, although certainly possible, would require considerable research and development to achieve a suitable and reliable system able to cope with the marine environment and vessel motion. An essential factor, with any automation, would be how cost effective the system would be to the fisherman.

4. Potting Roller

Traditionally, a davit-mounted hanging block has been used to haul pots or creels over the vessel's rail, but a wide roller mounted on the rail is now being used with good results by several vessels. The idea was pioneered by Jersey fisherman Peter Gay on board his vessel *Loup de Mer* and has become popular on several under 10m vessels in Scotland. Seafish has worked with Joe Masson to improve the roller installation on his under 10m vessel *Goodway* operating from Fraserburgh.

- **Layout**

The general layout on the vessel is shown below. Ideally, to enable the vessel to be easily controlled the roller needs to be mounted well forward on the vessel's rail and in a reasonably horizontal position.

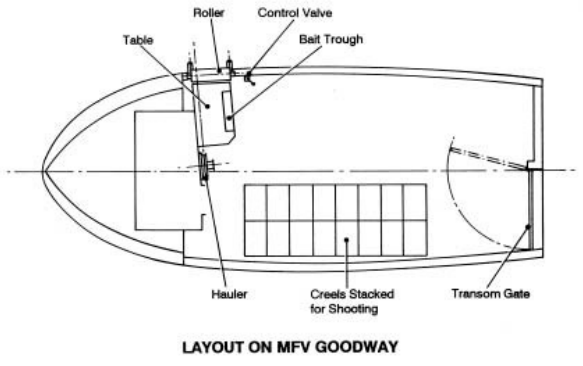


Figure 12: Roller layout on MFV Goodway

- **Roller Details**

The roller has a large diameter, necessary to smooth the passage of the pots over it and a length to accommodate the pots being used. On the *Goodway* the creels worked are 710mm x 460mm x 460mm (28 x 18 x 18inches) and the roller installed to haul these over is 273mm diameter by 850mm long. The width between the side rollers is 800mm, which gives a large clearance on the 460mm, (18inch) width of the creels.

Most pots/creels can be hauled over this size of roller, including 'inkwell' type pots, the critical factor being that there is clearance between the side rollers for the maximum dimension of the pot. Figure 13 shows the Seafish roller design with removable side rollers to avoid damage when mooring the vessel.

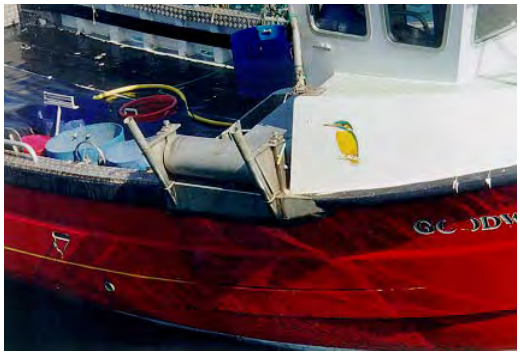


Figure 13: Seafish roller design

- **Hauler Control**

The pots/creels can be hauled over the roller at a modest speed, but it is essential that the hauler is slowed from high speed as each pot arrives at the roller. To achieve rapid smooth control a quarter turn rotary control valve is recommended. This should be mounted adjacent to the roller, readily accessible to the person standing at the roller but with the handle protected such that it cannot be accidentally caught by a rope or clothing.

Figure 14: Hauling pots with roller

- **Safety**

The roller has the advantage over the davit block in that the manual effort of lifting the pots/creels inboard has been eliminated and therefore levels of fatigue reduced. The pots/creels pass over the roller directly onto the table and only have to be lifted once for stacking ready for shooting.

5. Other considerations

- **Stability Issues**

When loading, consideration should be given to the size and capabilities of the vessel and the weather conditions. The load should then be adapted as necessary. This may mean moving pots around the vessel to even out the weight of the load, reducing the number of pots on a string, or making additional trips to move a load.

- **Fatigue**

Fatigue is often a major factor in marine incidents. Fishing vessel owners and operators are urged to review the issues of fatigue on their vessels. They are also urged to take remedial measures to prevent fatigue such as:

- ✓ Scheduling watches
- ✓ Avoiding under-manning
- ✓ Not letting other activities intrude on rest and sleep
- ✓ Ensuring adequate meals are provided
- ✓ Using a team approach where possible to prevent a single person's fatigue from impeding safety

- **Crew Competence**

Fishing Vessel (Safety Training) Regulations require fishermen to undertake basic safety training. In addition to these courses, fishermen are also recommended to undertake the following Seafish courses that comprise the Under 16.5 m Skipper's Certificate.

1. Navigation/Bridge Watchkeeping
2. Engineering/Engine Watchkeeping
3. Intermediate Stability Awareness
4. GMDSS Short Range Certificate

Skills and knowledge learned on these courses will make a big contribution towards improving and maintaining safety levels on board. Vessel operators must also ensure crew receive adequate training and induction regarding use of machinery and systems particular to the vessel. Operational systems should be regularly reviewed and risk assessments carried out involving all crew members.

- **Risk Assessments**

Regular risk assessments are an essential tool for identifying potential hazards and dangers onboard a vessel. They focus attention on what actions and measures can be taken to reduce the likelihood of an incident occurring. Involving all crew members in this process will significantly enhance the benefits.

- **Drills**

Regular drills are the best way to ensure that all crew members are prepared to deal effectively with incidents (such as man overboard) when/if they occur. All crew should participate to ensure they are competent and confident in dealing with different incident scenarios.

Life saving appliances

Epirbs and life rafts are currently not mandatory on smaller vessels. As such only eight of the ten vessels that capsized or were missing during the period 1998-2008 were carrying life rafts and none were carrying Epirbs (see Table 2). If they had been, the crew's chances of survival would have been improved. Not all of these capsizes could be attributed to potting practices, but that they resulted in loss of life is sufficient justification to include them in this report.

Small vessel operators should consider carrying these items and installing man overboard (MOB) systems as they will greatly improve the chances of survival and aid swift recovery in a capsize scenario. Additionally handheld radios and PLBs (Personal Locator Beacons) should also be considered.

Of the nineteen fatalities in the same period resulting from MOB incidents, seventeen were known not be wearing lifejackets and two are believed not to have. Had these fishermen been wearing correctly fitted lifejackets or Personal Flotation Devices PFDs) their chances of survival would have undoubtedly been improved.

Table 2: UK Potting Vessel Fatalities 1998-2008: Safety equipment employed

Incident Type	No of Incidents	Fatalities	Lifejacket worn			Liferaft		Epirb	
			Yes	No	Not known	Yes	No	Yes	No
MOB	19	19	0	17	2	n/a	n/a	n/a	n/a
Capsize/Missing	10	14	0	12	2	2	8	0	10
Grounding/Collision	2	2	0	2	0	2	0	2	0
Totals	**31**	**35**	**0**	**31**	**4**	**4**	**8**	**2**	**10**

Of these nineteen MOB incidents it is known that eight were caused by entanglement in the ropes, the causes of seven were unknown as the fishermen were operating single handed or the bodies were not recovered. The remainder were caused by bad weather. The incident involving collision was due to inadequate watchkeeping.

Lifejackets are still not worn by many fishermen on deck. It is often claimed they are a potential hazard and/or cumbersome to wear. However some fishermen do wear them and wearing a lifejacket will undoubtedly increase a fisherman's chances of survival in an MOB situation. The design of constant-wear lifejackets is always improving.

During 2005 and 2006, the RNLI and Seafish conducted evaluation research into PFDs for their suitability in a commercial fishing environment. Trials found that a number of lifejackets readily available in the marketplace were appropriate for use in potting operations.

Conclusions

The fatal accident rate for UK fishermen for the decade 1996-2005 was 115 times higher than that of the general workforce, 81 times higher than in manufacturing and 24 times higher than the construction industry which is often considered the most hazardous occupation in the UK. While the fatal accident rate for almost all other UK occupations had fallen sharply over the last 30 years, there has been no discernable reduction in the fishing industry[3].

The continued high rate of accidents resulting in fatalities within the potting sector is a cause for concern. Fishing, and indeed potting, remains a highly dangerous occupation and it is unrealistic to imagine all hazards can be eliminated. However, by considering and adopting some or all of the suggestions listed it may be possible to reduce the likelihood of accidents occurring, and by providing non-mandatory life saving appliances, increase the chance of survival when unfortunately they do occur.

Vessel operators looking to modernise their vessels to improve safety, improve working conditions and purchase non-mandatory safety equipment may be eligible for grant aid towards the cost. See over for details.

[3] MCA Research Project 578, see: www.mcga.gov.uk

Further information

- **Toggle systems, rope separation pounds and automatic hauler**

For more detailed information regarding toggle systems, rope separation pounds and automatic hauler stops see Seafish Report No. SR524: *Potting Safety Assessment*. A copy of this report can be obtained from http://www.seafish.org/resources/publications.asp. Enter 'potting' in keyword search. *Please note that fatality data included in this report was later found to be under estimated.*

- **Potting roller**

For more detailed Information see Seafish Technical Information Sheet N0: 2001/02/ms *Potting Roller*. A copy of this report can be obtained from the Seafish website http://www.seafish.org/resources/publications.asp. Enter 'potting' in keyword search.

- **Seafish courses**

Those interested in these courses should discuss course and grant availability with their local Seafish Approved Training Provider. A list of training providers can be found on the Seafish website: http://www.seafish.org/sea/training.asp?p=ef154 or call Seafish Training on 01472 252302.

- **Risk assessment**

A standard risk assessment form for potting can be found on the Marine Services section of the Seafish website http://www.seafishmarineservices.com/Safety.htm

- **Man Overboard Systems**

For information on MOB systems http://www.rnli.org.uk/what_we_do/sea_and_beach_safety/fishing_safety/mob/moredetails http://www.seamarshall.com/

- **Life jacket research**

The results of this research can be viewed on RNLI and Seafish websites: www.rnli.org.uk/fishingsafety and http://www.seafish.org/resources/publications.asp. Enter 'lifejacket' in keyword search.

- **Grant aid**

Grants toward the cost of safety improvements/equipment may be available. For the latest information contact Seafish or your Fishermen's Federation or click on the links below to the UK Fisheries Departments.

England
http://www.marinemanagement.org.uk/fisheries/grants/index.htm

Scotland
http://www.scotland.gov.uk/Topics/Fisheries/grants-subsidies

Northern Ireland
http://www.dardni.gov.uk/index/grants-and-funding/fisheries-grants.htm

Wales
http://wales.gov.uk/topics/environmentcountryside/foodandfisheries/fisheries/europeanfundforfisheries/?lang=en

For further information contact:
Jon Lansley Tel: 07876 035744
j_lansley@seafish.co.uk

Origin Way, Europarc, Grimsby DN37 9TZ

t: 01472 252302 f: 01472 268792
e: training@seafish.co.uk w: www.seafish.org SIN: http://sin.seafood.org

Annex B

Seafish Technical Information Sheet No. 2001/02/MS - Potting Roller

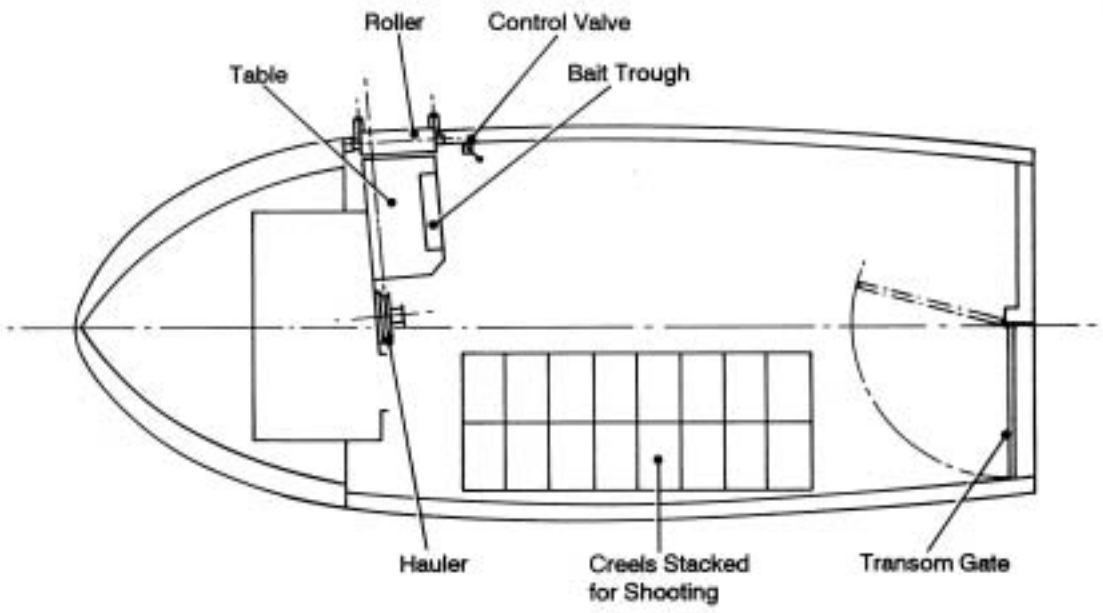
POTTING ROLLER

Technical Information Sheet No: 2001/02/MS

Traditionally, a davit mounted hanging block has been used to haul pots or creels over the vessel's rail, but a new idea, a wide roller mounted on the rail is now being used with good results by several vessels. The idea was pioneered by Jersey fisherman Peter Gay on board his vessel 'LOUP DE MER' and in recent months has become popular on several under 10m vessels in Scotland. Seafish has worked with Joe Masson to improve the roller installation on his under 10m vessel 'GOODWAY' operating from Fraserburgh.

Layout

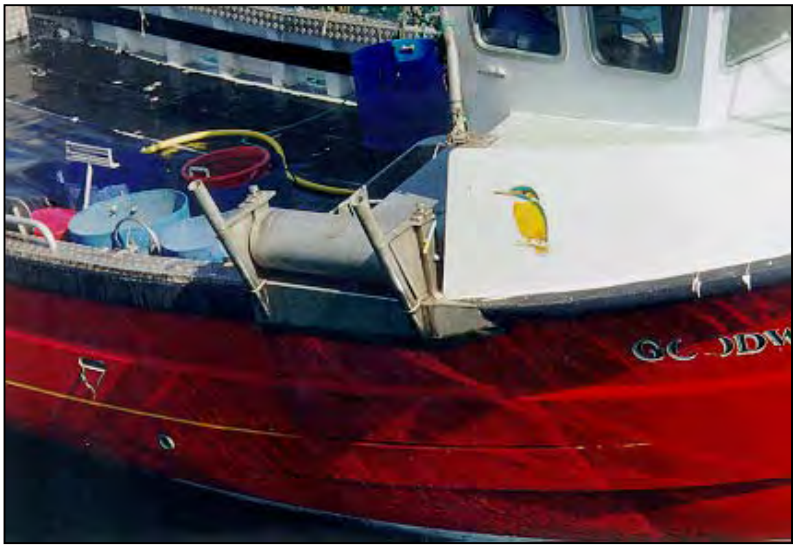
The general layout on the vessel is shown below. Ideally, to enable the vessel to be easily controlled the roller needs to be mounted well forward on the vessel's rail and in a reasonably horizontal position. Hence, the mounting will need to take account of the 'sheer' of the vessel. Directly behind the roller is the baiting table that needs to be set at a comfortable height for emptying and baiting the pots/creels. The hauler position must align with the forward side roller of the roller assembly and have the maximum distance reasonably possible between it and the roller. The distance between the roller and hauler is important because of the angle formed between the hauler and rope when the rope leads aft and is held against the aft side roller. If the angle is too great the rope will climb out of the hauler. The greater the distance the less the angle. For most of the time the rope will be leading forward and hence the hauler should align with this position. However, to avoid a bad angle when the rope does lead aft, a slight forward angle of the rope in the forward position will be beneficial.



LAYOUT ON MFV GOODWAY

Roller Details

The roller has a large diameter, necessary to smooth the passage of the pots over it and a length to accommodate the pots being used. On the 'GOODWAY' the creels worked are 710mm x 460mm x 460mm (28 x 18 x 18inches) and the roller installed to haul these over is 273mm diameter by 850mm long. The width between the side rollers is 800 mm, which gives a large clearance on the 460mm, (18inch) width of the creels. Most pots/creels can be hauled over this size of roller, including 'inkwell' type pots, the critical factor being that there is clearance between the side rollers for the maximum dimension of the pot.



The photograph shows the Seafish roller design with removable side rollers to avoid damage when mooring the vessel. The original roller installed on the 'GOODWAY' had fixed sidebars that eventually suffer wear. Shown in the illustration on the back page is a section through the gunwale rail with a rubbing strip, typical of many vessels. The roller's outboard face is in line with a fairing plate fitted to smooth the passage of the pots over the rubbing strip. Two uprights, using rectangular hollow section, are welded on the rail mounting to carry the main roller and the side roller brackets simply fit over the uprights at the top, with a pin entered into a hole in the rail mounting to locate them at the bottom. A clamp bracket with a hand screw prevents each side roller from lifting up. The side rollers are 63mm (2.5inch) diameter and are angled downwards at 20°. A long bolt through the spindle clamps the roller between the top and bottom flanges of the bracket. The bottom flange has a nut welded in place to receive the bolt and a 'U' section fairing plate, formed with the 20° angle to create a cone, is fabricated to the flange to ensure that the pots cannot catch on the underside of the roller. At the top of each side roller is an extension tube to retain the rope should it be 'picked up' by a pot or heavy rolling of the vessel lifts it out of the roller assembly. The extension tube is open at the top with a bottom plate drilled to take the roller spindle bolt. Drainage holes at the bottom of each tube will prevent it filling with water.

The Seafish roller assembly has sealed ball bearings with additional lip seals to ensure free running and to give a long life. Both the main roller and side roller are made using stainless steel tubes for the roller with an internal stainless steel tube to carry the bearings. On the large main roller, nylon end flanges, 38mm thick, are pressed into the outer tube and are machined to take the bearings and seals. On the side rollers the bearings can be mounted directly on the inner and outer tubes. The use of ball bearings does require accurate machining and hence a cheaper roller assembly may be possible if simple plain bearings are used.

Hauler Control

The pots/creels can be hauled over the roller at a modest speed but it is essential that the hauler is slowed from high speed as each pot arrives at the roller. To achieve rapid smooth control a quarter turn rotary control valve is recommended. This should be mounted adjacent to the roller, readily accessible to the person standing at the roller but with the handle protected such that it cannot be accidentally caught by a rope or clothing.

Hauling

The 'GOODWAY' operates with either a two or three man crew and when hauling, one man is at the roller where he has control of the hauler and control of the vessel via remote controls. The other one or two men stand at the table to empty and rebait the creels and to stack them ready for shooting. The practice is to use the hauler to pull the vessel along the string of creels. Thus, the rope is generally leading forward and will be against the forward side roller.

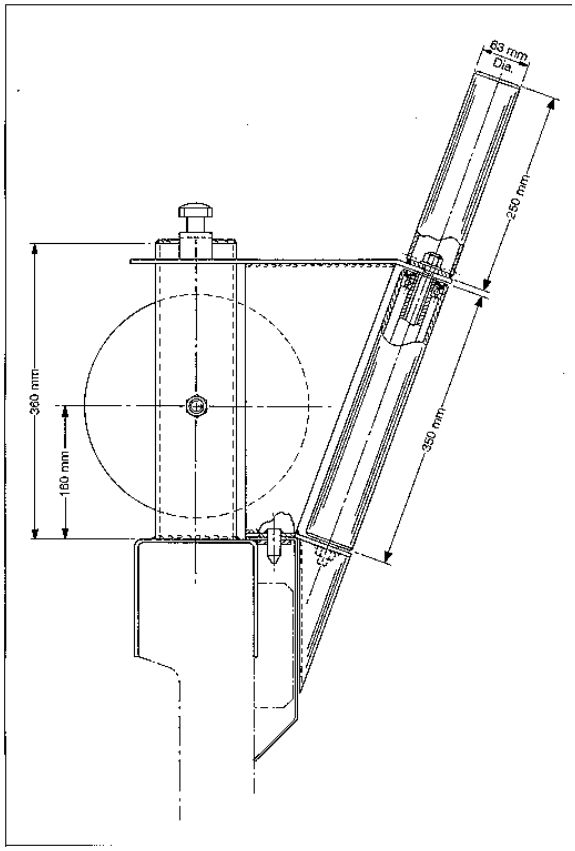
The rope between the roller and the hauler will be above the forward edge of the table leaving the table clear to receive the creels. As the leg rope for each creel reaches the roller, the hauler is slowed to allow the creel to ride up over the roller and on to the table. A crewman pulls on the leg rope to centre the creel on the table and the leg rope falls clear of the hauler. The creel is now static on the table and the hauler is speeded up again. The creel is emptied of the catch, rebaited and stacked for shooting. Occasionally, the man at the roller will have to pause hauling if a creel needs to be turned the right way up or is trapped under the rope. In general, hauling is continuous, simply slowing for each creel. Sometimes it is not always possible to keep the rope leading forward and it rests against the aft side roller. The vessel is steered to correct this but hauling continues, the creels being lifted clear of the rope that is now leading diagonally across the table.

Hauling rates in potting vary according to the gear worked, the speed of the hauler and what the crew are comfortable with. On the 'GOODWAY', they are working strings of 45 creels at 11 fathom spacings. Hauling each string, including the dahn tow, typically takes around 17-20 minutes. The fastest they have hauled is in 15 minutes, three creels per minute, but they like to work comfortably and keep a reasonable pace for emptying and baiting.

Safety

The roller has the advantage over the davit block in that the manual effort of lifting the pots/creels inboard has been eliminated. The pots/creels pass over the roller directly onto the table and only have to be lifted once for stacking ready for shooting. However, one aspect of concern with the roller is the danger of a pot/creel flying up over the roller if the hauler control is left unattended with the hauler running at high speed. **Do not leave the hauler control unattended.**

Safety on the 'GOODWAY' is very much assured by the shooting arrangements on the vessel. As can be seen in the photograph, the vessel has a gate in the transom bulwark that is opened to allow the creels to be shot directly off the deck. A lanyard operated quick release clip is used to let go the end anchor with all the crew clear of the deck throughout the shooting operation.



Main Roller

Outer tube:	s/s 273mm OD x 6.35mm wall
Inner tube:	s/s 63mm OD x 6.35mm wall
Bearings:	60mm ID x 110mm OD x 22mm wide, light series with two seals
Seals:	Lip seal 80mm ID x 110mm OD x 10mm wide

Main Roller Uprights

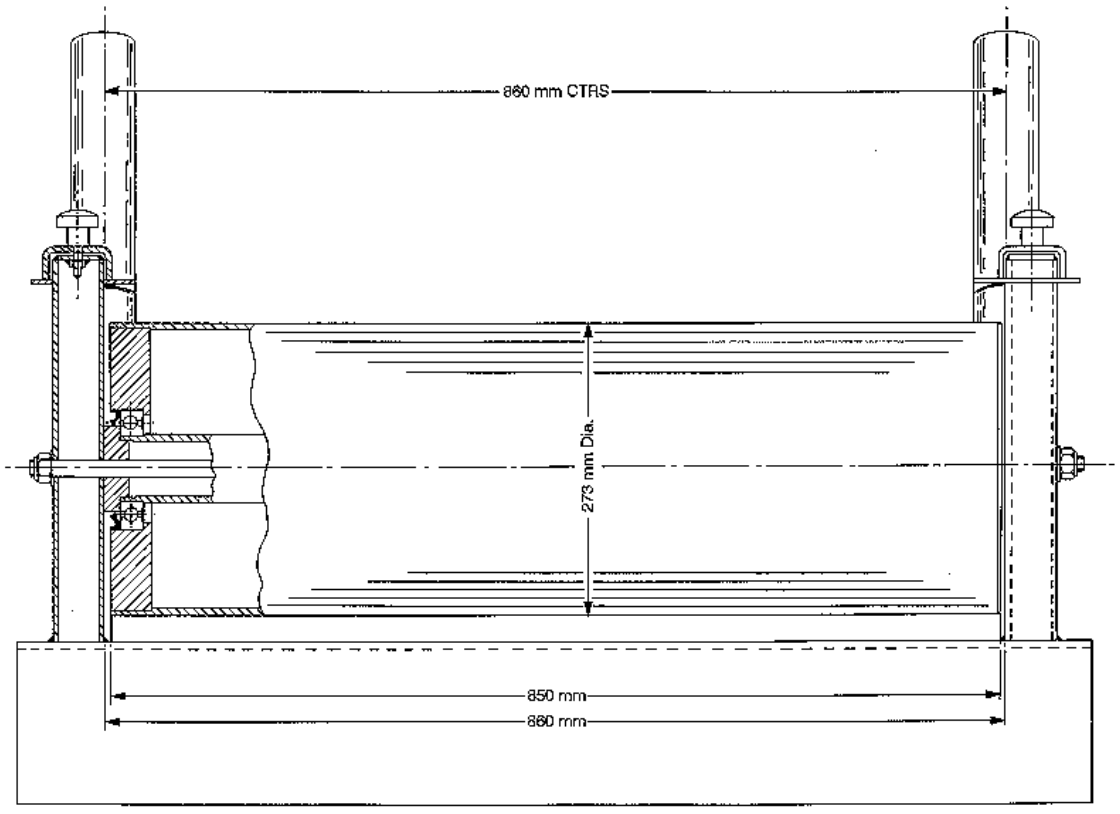
Rectangular Hollow Section 100mm x 50mm x 5mm

Side Roller

Outer tube:	s/s 63mm OD x 6.35 mm wall
Inner tube:	s/s 26.67mm OD x 3.91mm wall (pipe ¾ inch x SCH 80)
Bearings:	25mm ID x 52mm OD x 15mm wide, light series with two seals
Seals:	Lip seal 25mm ID x 52mm OD x 7mm wide

Extension Tubes

s/s tube 63mm OD x 6.35mm wall



Annex C

Seafish - Small Vessel Safety Guidance Booklet - May 2007

Small Vessel Safety Guidance Booklet

(for vessels under 15m overall length)

Issue 1 (May 2007)

Endorsed by the MCA

Introduction

This booklet contains a list of questions that the owner/operator of a vessel should consider in order to assess the safety of the fishing operation and therefore demonstrate a responsible approach. The questions are provided for guidance only and as such they may not cover every issue relating to a particular vessel. When assessing safety, all concerns and hazards that may exist on the vessel should be considered.

Performing a safety assessment

The questions are divided into sections with headings such as 'The Vessel', 'The Crew' and 'General Working', etc, with separate sections also relating to specific fishing operations. Consider the questions listed under each heading and decide if they are relevant to your vessel and fishing operation. By answering the questions honestly, and considering whether or not improvements can be made, you will be assessing the safety of the vessel and fishing operation.

This form of assessment should not be confused with a risk assessment – it is purely intended to help identify safety issues aboard a vessel. You don't have to spend money unnecessarily. If you are quite satisfied and can justify the situation on your vessel, there is no need to make any changes.

Note: A blank 'pull-out' risk assessment sheet has been provided at the centre of this booklet for use on small vessels. It includes a simple step-by-step guide to help you perform a risk assessment.

Why you should perform a safety assessment

It is important for vessel operators to consider the safety of the fishing operation and make every reasonable effort to make it as safe as possible. Reading through the booklet and considering the questions will help you to assess the safety of the fishing operation and identify any possible improvements.

The Vessel
The MCA Small Vessel Code: Have you complied with the requirements of the Code with respect to your vessel?
Safety Equipment: Have you considered having additional safety equipment not required by the Code but that would be sensible on your vessel such as a liferaft or an E.P.I.R.B. etc.?
General Condition: Is the hull in sound condition and do all hatches, doors and vents have an effective means of closure? Is the steering gear in good condition?
Freeing Ports/ Pumping Systems: If the vessel is decked, are the freeing ports clear of obstructions? Is the pumping system effective to pump water out of the hull?
Structural Changes: Have changes been made that have added or removed weight, e.g. main engine changed, shelter deck added, new winch, stern gantry or net drum added? If so, are you satisfied that the stability of the vessel is still acceptable? (Significant changes in weight, especially high up will have a big effect on stability and it should be checked by a competent person.)
Propulsion: Are the main engine, gearbox, propeller shaft, stern gland and propeller in good condition?
Sea Water Systems: Are the sea inlet valves, discharge valves, pumps and piping in good condition?
Bilge Level Alarms: Are bilge level alarms fitted in suitable spaces and in good working order?
Electrics: Are the batteries and the electrics on the vessel in good order?
Navigation: Is the navigation equipment on the vessel adequate for the area of operation and is there any back up in the event of failure?
Communication: Do you have adequate means of communication and is there a back up system? Have you any form of emergency position indicating/reporting system such as, an EPIRB or a confidential reporting/location system?

The Crew
Safety Courses: Have all persons completed the Sea Survival, 1st Aid, Fire-fighting and Safety Awareness courses that are required by regulation?
Concerns: Are there any concerns with crewmembers such as, youth, lack of experience, disability or language difficulties?

Emergency Procedures

Man-over-board: Do all persons know what they are to do if a man-overboard situation occurs? Think how such a situation would be best handled on your vessel and provide any suitable equipment and instruct all crewmembers in how they should react.

Fire: Is the fire fighting equipment on your vessel sufficient and in good order? Do all persons know what to do? Consider possible fire situations and instruct the crewmembers in how they should respond.

Abandon Ship: Do all persons know what to do? Consider what action is necessary in an abandon ship situation and ensure that all crewmembers are aware of what should be done and when.

Helicopter Rescue: Do all persons know what to do? Instruct crewmembers in the precautions necessary when receiving the line from the helicopter.

General Working

Boarding & Leaving the Vessel: Is the boarding of the vessel safe, are the harbour ladders in good order, can you make it safer?

Sea Gear: Do all the crewmembers have suitable oilskins, clothing and gloves? Safety boots with toe protectors should be considered.

Personal Buoyancy Devices (PBDs): Crewmembers are to wear suitable buoyancy devices (inflatable lifejackets etc) when working on deck. Have you provided effective items that are suitable to be worn when working?

Working on the Vessel: Is it possible to move easily around the working areas of the vessel without the dangers of tripping, slipping or falling? Are there any obstructions that need to be removed or made safer? Are all handrails in place and are they of sufficient height? Is there adequate lighting installed?

Wheelhouse

Watch-keeping: Are all watch keepers competent? Ensure that anyone left in charge of the vessel is competent to be so.

Adequate Lookout: Is an adequate lookout kept at all times? The Skipper must ensure that at all times he is aware of the movements of other vessels in the area and if working on deck there must be provision to control the vessel and to be able to see what is around.

Tiredness: Has the watch keeper always had sufficient rest? Should a 'watch alarm' system be installed on the vessel?

Accommodation/Galley
Heating & Ventilation: Is the heating and ventilation adequate considering the level of accommodation and the use of it? Dampness and fumes will cause ill health.
Cooking Facilities: Are the cooking facilities adequate and in good order?
Fire: Are smoke detectors fitted and suitable fire extinguishers available including a fire blanket near the stove?
Calor Gas: Are the necessary safety precautions in place? If used for heating or cooking, ensure that a gas detector is fitted and the cylinder is stored outside the accommodation.
Escape Route: Is the accommodation area kept clear of obstructions and is there an alternative escape route in the event of fire?

Engine room / engine space
Drives: Are all belt drives effectively guarded?
Cleanliness: Is the engine and other machinery kept in a clean condition so that oil and fuel leaks are readily visible?
Fire risk: Are exhausts in good condition and no flammable materials near hot surfaces?
Fire fighting: Have you suitable fire fighting equipment to fight an engine fire?
Batteries: Are they in good order, in a ventilated area and kept clear of items that could short across them causing a fire/explosion?

Landing Operations
Lifting equipment: Are the landing derrick, the rigging, the box hooks and winch rope/wire are in good order and suitable for the load being lifted? Note: legislation is soon to be introduced that will require lifting equipment to be tested and certified with a safe working load (SWL).
Crew Safety: Do you make sure that your crewmembers are standing clear when loads are lifted and have you considered the wearing of hard hats to protect from swinging box hooks or items falling?
Public Safety: Do you ensure that members of the public are not at risk when landing your vessel?

Maintenance Work
Protective Equipment: Have you provided suitable masks, gloves, goggles etc as may be required to carryout the maintenance tasks on the gear and the vessel?
Electrical Tools: Are you using circuit breakers or, 110 V. equipment to protect from electrical shock?

TRAWLING: Fishing Operation
Vessel Layout: Does the layout on your vessel allow the safe working of the trawl gear? Can the layout of the winch and warp runs be improved and can the crewmembers move around the working area safely without risk from slippery deck areas or trips over obstructions?
Unguarded Winch/Warp Runs: Is the winch adequately guarded, if a person fell against the moving winch would they be safe? 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?
Worn Components & Gear: Is the winch and other equipment in good order? Are the brakes, clutches, guiding on gear and controls still effective? Are the winch rollers and deck sheaves in good condition and also the hanging blocks and shackles? Worn equipment and gear may fail unexpectedly causing injury.
Location of Winch Controls: Can the winch operator clearly see that the crewmen, handling the 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.
Net Drum: If a net drum has been installed are you confident that the vessel still has good stability? Can the person at the net drum controls clearly see the crewmen handling the net to be able to immediately stop the drum if necessary?
Powerblock: If a powerblock has been installed are you confident that the vessel still has good stability? Are the powerblock and controls in good working order?
Emergency Stops: Is there any provision to stop the winch or other machinery in an emergency from a position other than the normal controls? Consider the operations and layout on your vessel and decide if an additional emergency stop in a suitable position is needed.
Trawl Doors: Is it easy to reach to chain up the door at the gantry, would a step make it easier? Would an additional hand rail at a higher point make door handling safer?
Towing Chains: Is the towing point, the towing chains/wires and the 'stopper' chains in good condition? Are the crewmembers aware of the dangers and do they stand clear?
Pair Trawling – Warp Transfer: Is the weighted end of the throwing line padded to lessen the chance of injury? Are precautions taken against the danger of the slip hook springing back when it is released?
Hooking in the Lifting Becket: Is the crewman at risk when reaching outboard? Can you make any changes that will make the operation safer?
Bag Handling: Is there an effective means of preventing the bag swinging excessively? Can the winch operator clearly see the crewmen handling the bag?
Excessive Loads in Net: Will you be aware if the net contains an excessive load and do you have provision to deal with it safely?
Ability to Jettison Gear: In an emergency, have you the means to be able to quickly free the vessel from the trawl gear?

TRAWLING: Catch Handling
Working Area: Is the catch handling area free from obstructions and can the crewmembers work safely and comfortably?
Machinery: If conveyors, elevators or gutting machines are installed, do they have adequate guards and provision for emergency stop?
Dipping Prawns: Are all crewmembers aware of the dangers when using sodium metabisulphite for dipping prawns and have you provided the necessary safety precautions?
Fishroom: Can the crewmen work in the fishroom safely without the risk of tripping over obstructions or missing gratings? Is the lighting adequate and is the ladder in good condition and securely mounted?

TRAWLING: Fouled Gear & Gear Mending
Reaching Outboard: Do you have a safety harness and suitable rigging to enable work to be carried out safely?
Tools and Safety Equipment: Do you have suitable tools in good condition to be able to carry out the necessary work and are the appropriate gloves, goggles etc available to be able to use the tools safely?

POTTING: Fishing Operation
Vessel Layout: Does the layout on your vessel allow the safe working of pots/creels? Are there any possible snag points that the rope or pots may snag on when shooting? Could you modify the vessel to enable the pots to be shot directly off the deck, via a transom gate or, a shooting ramp?
Pot Stacking: Can the pots be securely stacked in sequence ready for shooting? Have you a system of clearly marking any out of sequence pot?
Number of Pots: Is the number of pots in a 'string' limited to the number that can be easily and safely worked in the deck space available on the vessel? Are you satisfied that the number per string is safe or would safety be significantly improved by reducing the number per string?
Stability: Are you confident in the number of 'strings' you can safely carry on the vessel? Have you considered the effect on stability of carrying pots stacked high on the vessel? Consider all aspects of the loading on the vessel, the weight of pots and rope, the catch on deck, the pull of the hauler and the effects of wind and tide. Is your vessel overloaded?
Hauler: Are the sheaves in good condition and is the rope ejector knife correctly in place? Is the angle of wrap sufficient to ensure that the rope will not pull out?
Controls: Are they in good working order and easily reached by the operator? Is there any risk of the rope snagging the control? Is there an emergency stop for the hauler that can be quickly reached by other crewmembers?
Davit Block/ Roller: Is it in good condition and does it enable the pots to be hauled in board with minimum manual effort and with safety for the crew? Does it effectively retain the rope even when the vessel is rolling heavily?
Shooting: Are crewmembers at risk from becoming tangled in the rope when shooting? Is it possible to improve safety by installing a barrier to separate the rope from the area where the crew handle the pots?
Shooting Speed: Is the speed when shooting the pots safe? Would a modest reduction in speed ease the pressure on the crew and give improved safety?
Shooting Emergency: Have you considered possible emergency action should an incident happen when shooting and do all crewmembers know what to do?
Hauling: Is the crewman at the rail able to bring the pots inboard without excessive effort in reaching, bending and lifting? Would alterations to the davit block, the position of the control or adopting a rail mounted roller make the job easier?
Emptying & Baiting: Are the pots at a comfortable working height and is the crewman able to empty and bait pots without continually bending down?
Stacking: Is the deck area non-slip and free of obstructions that may cause a trip?

POTTING: Catch Handling
Working Area: Is the catch handling area free from obstructions and can the crewmembers work safely and comfortably?
Fishroom: Can the crewmen work in the fishroom safely without the risk of tripping over obstructions or missing gratings? Is the lighting adequate and is the ladder in good condition and securely mounted?
Catch Stowage: If the catch stowed on deck are you confident that it will not shift in bad weather or, block the freeing ports or, the boxes fill with water and overload the vessel?

NETTING / LINING / JIGGING: Fishing Operation
Vessel Layout: Does the layout on your vessel allow the safe working of the fishing gear? Are there any possible snag points that the nets/lines may snag on when shooting? Are the crewmembers at risk from the gear when shooting and is a shooting chute needed to make it safer?
Net/line storage: If the nets/lines are stored in bins or tubs, are these secure on the deck and will not slide in heavy seas un-balancing the vessel? Do the bins/tubs have good drainage and are they fitted with covers to prevent them filling with water from waves?
Dahn & Anchor storage: Are these stowed where crewmen can easily take them without risk of tripping and falling? Is the visibility from the wheelhouse reduced?
Stability: Are you confident in the quantity of gear that you can safely carry on the vessel? Have you considered the effect on stability of carrying gear stacked on the deck of the vessel or at a higher level? Consider all aspects of the loading on the vessel, the weight of gear and rope, the catch on deck, the pull of the hauler and the effects of wind and tide. Is your vessel overloaded?
Net Hauler: Is it in good condition and does it grip the gear effectively? Is it effectively guarded or are the crewmen at risk from a hand or arm being dragged into it? Can it easily be controlled to follow the lay of the gear?
Line Hauler: Are the sheaves in good condition and is the line ejector knife correctly in place? Is the angle of wrap sufficient to ensure that the line will not pull out?
Fairlead/hanging Block: Does it effectively retain the line when the vessel is rolling heavily and enable the man at the rail to bring fish inboard safely?
Jigging Equipment: Are the jigging reels/mackerel gurdies securely mounted at a height that allows the crewmen to operate them comfortably and safely?
Controls: Are they in good working order and easily reached by the operator? Is there any risk of the gear snagging the control? Is there an emergency stop for the hauler that can be quickly reached by other crewmembers?
Shooting: Are crewmembers at risk from becoming tangled in the gear when shooting? Is a knife to hand to cut the gear if someone becomes snagged? Have you considered possible emergency action should an incident happen when shooting and do all crewmembers know what to do?
Shooting Speed: Is the speed when shooting safe? Would a modest reduction in speed ease the pressure on the crew and give improved safety?
Hauling: Are all the crew able to do their tasks safely and comfortably? Is there a risk that the gear may pull back out? Are the crew at risk from jellyfish stings etc and is protective equipment provided?
Fish Strippers: Is there a risk of eye or facial injuries from 'flying hooks' and is protective equipment provided?

NETTING / LINING / JIGGING: Catch Handling
Working Area: Is the catch handling area free from obstructions and can the crewmembers work safely and comfortably?
Machinery: If conveyors, elevators or gutting machines are installed, do they have adequate guards and provision for emergency stop?
Fishroom: Can the crewmen work in the fishroom safely without the risk of tripping over obstructions or missing gratings? Is the lighting adequate and is the ladder in good condition and securely mounted?

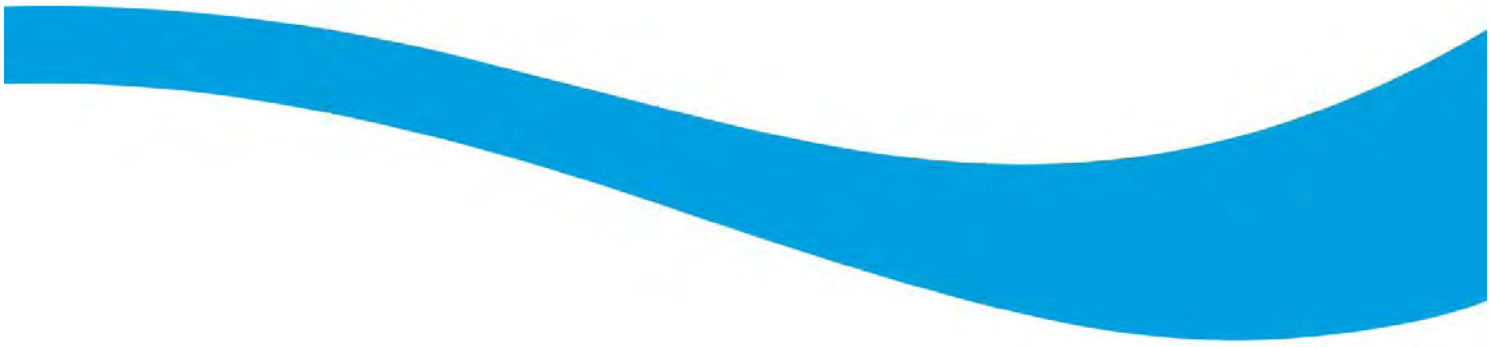
BEAM TRAWLING & DREDGING: Fishing Operation
Vessel Layout: Does the layout on your vessel allow the safe working of the fishing gear? Can the layout of the winch and warp runs be improved and can the crewmembers move around the working area safely without risk from slippery deck areas or trips over obstructions?
Unguarded Winch/Warp Runs: Is the winch adequately guarded, if a person fell against the moving winch would they be safe? 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?
Worn Components & Gear: Is the winch and other equipment in good order? Are the brakes, clutches, guiding on gear and controls still effective? Are the winch rollers and deck sheaves in good condition and also the hanging blocks and shackles? Worn equipment and gear may fail unexpectedly causing injury.
Location of Winch Controls: Can the winch operator clearly see that the crewmen, handling the gear, are stood clear before operating the winch? Can the skipper be sure of rapid response from the winch in an emergency? Ensure that a good system of communication is in place.
Emergency Stop: Is there any provision to stop the winch or other machinery in an emergency from a position other than the normal controls? Consider the operations and layout on your vessel and decide if an additional emergency stop in a suitable position is needed.
Handling Gear: Is the means of restraining the beams/dredges effective to prevent heavy gear swinging, rolling or sliding across the deck and injuring persons? Can crewmembers work on the gear safely with out the risk of crushed hands or limbs?
Stability Awareness: Do all persons involved in the operation of the vessel have awareness of the dangers of uneven loading and the need to avoid 'light ship' conditions when working the fishing gear?
Gear fouled on sea bed: Are all persons aware of the danger when attempting to free 'a fastener' of uneven loading resulting in vessel capsize? Are lifejackets worn, hatches and doors closed, Coastguard informed and every precaution taken?
Safety Release Devices: Is your vessel equipped with a means of transferring the warp from the end of the derrick to a position at the side of the vessel to reduce the overturning load if the gear is fast?
Hooking in the Lifting Becket: Is the crewman at risk when reaching outboard? Can you make any changes that will make the operation safer?
Excessive Loads: Will you be aware if the net/dredges contain excessive loads and do you have the provision to deal with it safely?
Ability to Jettison Gear: In an emergency, have you the means to be able to quickly free the vessel from the gear?

BEAM TRAWLING & DREDGING: Catch Handling
Working Area: Is the catch handling area free from obstructions and can the crewmembers work safely and comfortably?
Machinery: If conveyors, elevators or grading machines are installed, do they have adequate guards and provision for emergency stop?
Catch Stowage: Is the catch stowed on deck and if so, are you confident that the vessel's stability is sufficient? Is the catch securely stowed such that it cannot shift in heavy seas and are bags/boxes covered to prevent them filling with water from waves and endangering the vessel? Are the freeing ports kept clear?
Fishroom: Can the crewmen work in the fishroom safely without the risk of tripping over obstructions or missing gratings? Is the lighting adequate and is the ladder in good condition and securely mounted?

BEAM TRAWLING & DREDGING: Fouled Gear & Gear Mending
Reaching Outboard: Do you have a safety harness and suitable rigging to enable work to be carried out safely?
Tools and Safety Equipment: Do you have suitable tools in good condition to be able to carry out the necessary work and are the appropriate gloves, goggles etc available to be able to use the tools safely?

Notes

Notes



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Annex D

Seafish - Small Vessel Risk Assessment - May 2007

Small Vessel Risk Assessment

How to perform the risk assessment

To assess the risks on your vessel, follow the four easy steps detailed below.

Step 1 – Identify the hazards

Walk around your vessel and look at what could possibly be expected to cause harm. Ask your crew members what they think – they might notice things that aren't obvious to you. Also, check what accidents have happened in the past (refer to such information as the MAIB Fishing Vessel Incident flyers) and check the manufacturer's instructions for any equipment onboard the vessel. List the hazards overleaf (note: it may help to group hazards in respect of area, eg list all hazards found on the shelter deck under the heading 'shelter deck').

Step 2 – Decide how crewmembers might be harmed

For each hazard, identify how a crew member might be harmed; what type of injury or ill health might occur (for example, there might be the risk of a limb being crushed or severed). Consider what harm might also occur from repeated activities (for example, back injuries from lifting).

Step 3 – Evaluate the risks and consider precautions

Having identified the hazards, you have to decide what to do about them. The law requires that you do everything 'reasonably practicable' to protect people from harm. First, look at what you're already doing – think about the controls in place and how the work is performed. Then consider what additional controls can be put in place, including the use of personal protective equipment, so that harm is less likely. Initially, ask yourself if it's possible to get rid of the hazard altogether. If it's not, there might be procedures or arrangements that can be put in place to reduce the risk (this may include, for example, reducing exposure to the hazard). Also, consider less risky options.

Step 4 – Review your risk assessment and update it if necessary

Review your risk assessment at least once a year. Ask yourself if there have been any changes or if it is possible to make improvements. If the vessel is modified or new equipment is installed then review the risk assessment straight away and amend it where necessary.

SEAFISH marine services

Small Vessel Risk Assessment

Issue 1 (May 2007)

This risk assessment is intended to help identify risks that have the potential to cause harm to any crewmembers onboard the vessel. You are required to protect people as far as 'reasonably practicable'. A risk assessment is simply a careful examination of what, in the workplace, could cause harm to people, so that you can determine whether you have taken enough precautions or should do more to prevent harm.

When filling out the risk assessment form, keep it simple, don't try to overcomplicate things, and ensure that all the crew members read it once complete. If you take on any new crew members, make sure they read the risk assessment form so that they are immediately aware of the risks and the controls in place.

mca
Maritime and Coastguard Agency

Endorsed by the MCA

Small Vessel Risk Assessment	Name of vessel:	Date of assessment:

Step 1 What are the hazards?	Step 2 How might someone be harmed?	Step 3 What are you already doing?	What further action is necessary?
Spot hazards by walking around your vessel and also asking your crew what they think. Don't forget long term hazards.	Say how the hazard could cause harm.	List what is already in place to reduce the likelihood of harm or make any harm less serious.	You need to make sure that you have reduced risks 'so far as is reasonably practicable'. Consider what might reduce the risk further and list what needs to be done.

Step 4 - Review date:	Review your assessment at least once a year to ensure you are still improving or at least not sliding back. If there is a significant change in your work place, check your risk assessment and amend it where necessary.

Marine Accident Report

INVESTORS IN PEOPLE