ACCIDENT REPORT

Report on the investigation of

the grounding and evacuation of the

domestic passenger vessel

Surprise

at Western Rocks, Isles of Scilly

on 15 May 2016

MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

SERIOUS MARINE CASUALTY REPORT NO 14/2017 JUNE 2017

Extract from

The United Kingdom Merchant Shipping

(Accident Reporting and Investigation)

Regulations 2012 – Regulation 5:

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

NOTE

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

Front cover photograph courtesy of Peter Hicks

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For all enquiries:
Marine Accident Investigation Branch
Spring Place
105 Commercial Road
Southampton
United Kingdom
SO15 1GH

Email: maib@dft.gsi.gov.uk
Telephone: +44 (0) 23 8039 5500
Fax: +44 (0) 23 8023 2459

Press enquiries during office hours: 01932 440015
Press enquiries out of hours: 020 7944 4292

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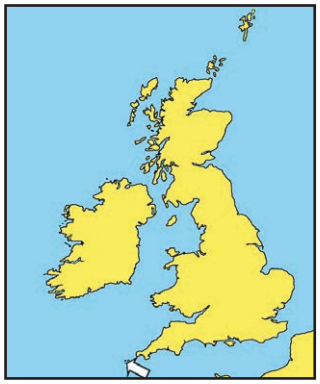
GLOSSARY OF ABBREVIATIONS AND ACRONYMS

BML	-	Boatmasters' Licence
CHA	-	Competent Harbour Authority
DP	-	Designated Person
DSC	-	Digital Selective Calling
DSM Code	-	Merchant Shipping (Domestic Passenger Ships) (Safety Management Code) Regulations, 2001, as amended
IMO	-	International Maritime Organization
LKE	-	Local Knowledge Endorsement
LOA	-	Length Overall
LSA	-	Life Saving Appliances
kW	-	Kilowatt
m	-	Metre
MCA	-	Maritime and Coastguard Agency
MGN	-	Marine Guidance Note
MSN	-	Merchant Shipping Notice
nm	-	Nautical Mile
PMSC	-	Port Marine Safety Code
RNLI	-	Royal National Lifeboat Institution
SHA	-	Statutory Harbour Authority
SMBA	-	St Mary's Boatmen's Association
SMHA	-	St Mary's Harbour Authority
SMS	-	Safety Management System
SOLAS	-	International Convention for the Safety of Life at Sea, 1974, as amended
UK	-	United Kingdom
UKC	-	Under Keel Clearance

UTC	-	Universal Co-ordinated Time
VHF	-	Very High Frequency

TIMES: all times used in this report are UTC+1 unless otherwise stated

SYNOPSIS



At 1135 on 15 May 2016, the passenger vessel *Surprise* grounded at Western Rocks, Isles of Scilly during a wildlife sightseeing trip. All 48 passengers were evacuated to other boats then taken ashore by the St Mary's lifeboat. *Surprise* was damaged below the waterline, but the water ingress was contained by its own bilge pumps and it returned to harbour under its own power.

The investigation concluded that *Surprise* grounded because the skipper was unaware of an isolated, shallow rock when deliberately manoeuvring very close to exposed rocks so the passengers could observe basking seals. Insufficient passage planning had taken place prior to the trip and the skipper had not assessed where safe and unsafe areas existed.

Persistent operations in hazardous, shallow waters also meant that the safe conduct of navigation on board *Surprise* was heavily reliant on the skipper's local knowledge. However, given the complexity of the hazards, it would not have been possible for the skipper to have known the exact location of every isolated rock at all states of tide.

Although the emergency response on board *Surprise* was swift and effective, the vessel's onboard procedures did not provide guidance on the conduct of navigation or emergency reactions for grounding.

Additionally, the absence of a documented risk assessment for *Surprise*'s operations had been identified by the Maritime and Coastguard Agency during an inspection of the vessel prior to the accident.

This report makes a safety recommendation to the Council of the Isles of Scilly to review its procedures for the issuing of local authority boatman's licences. A recommendation is also made to the St Mary's Boatmen's Association intended to improve its guidance to members on passage planning and conduct of navigation.

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *SURPRISE* AND THE ACCIDENT

SHIP PARTICULARS	
Vessel's name	*Surprise*
Flag	United Kingdom
Classification society	Not applicable
IMO number/fishing numbers	Not applicable
Type	Class VI domestic passenger vessel
Construction	Wooden: double diagonal construction
Year of build	1949
Length overall	14.29m
Gross tonnage	Not applicable
Minimum safe manning	2
VOYAGE PARTICULARS	
Port of departure	St Mary's, Isles of Scilly
Port of arrival	St Mary's, Isles of Scilly
Type of voyage	Wildlife sightseeing trip
Passengers on board	48
Crew manning	2
MARINE CASUALTY INFORMATION	
Date and time	15 May 2016, 1135
Type of marine casualty or incident	Serious Marine Casualty
Location of incident	49°51.935'N - 006°23.893'W
Place on board	Hull
Injuries/fatalities	None
Damage/environmental impact	Hull damage resulting in water ingress
Voyage segment	Mid-water
External & internal environment	Wind: light airs Sea State: 0 (glassy calm) Weather: cloudy Visibility: good Height of tide: 4.0m
Persons on board	50

Image courtesy of Peter Hicks

Surprise

1.2 BACKGROUND

Surprise was a UK registered Class VI[1] domestic passenger vessel. It was certified to carry up to 72 passengers and operated seasonally[2] from St Mary's Harbour in the Isles of Scilly, primarily providing wildlife sightseeing trips for tourists. *Surprise*'s skipper/owner was a member of the St Mary's Boatmen's Association (SMBA), which was a collective of 10 local boat owners who worked together to provide a variety of ferry and sightseeing services.

The Isles of Scilly is an archipelago of over 200 islands and rocks south-west of Land's End, Cornwall. It is an area with widespread and significant navigational hazards including shallow banks, rocky areas, strong tidal streams and narrow passages between islands. Western Rocks is an area of numerous, uninhabited rocks in the south-west of the archipelago **(Figure 1)**. Tourism is a key industry with over 100,000 visitors a year, many of whom embark in local passenger boats.

[1] A Class VI passenger vessel is defined as: a vessel engaged only on voyages with not more than 250 passengers on board, in favourable weather and during restricted periods, in the course of which the ships are at no time more than 15 miles from their point of departure, nor more than 3 miles from land.

[2] *Surprise* was operated between April and October each year.

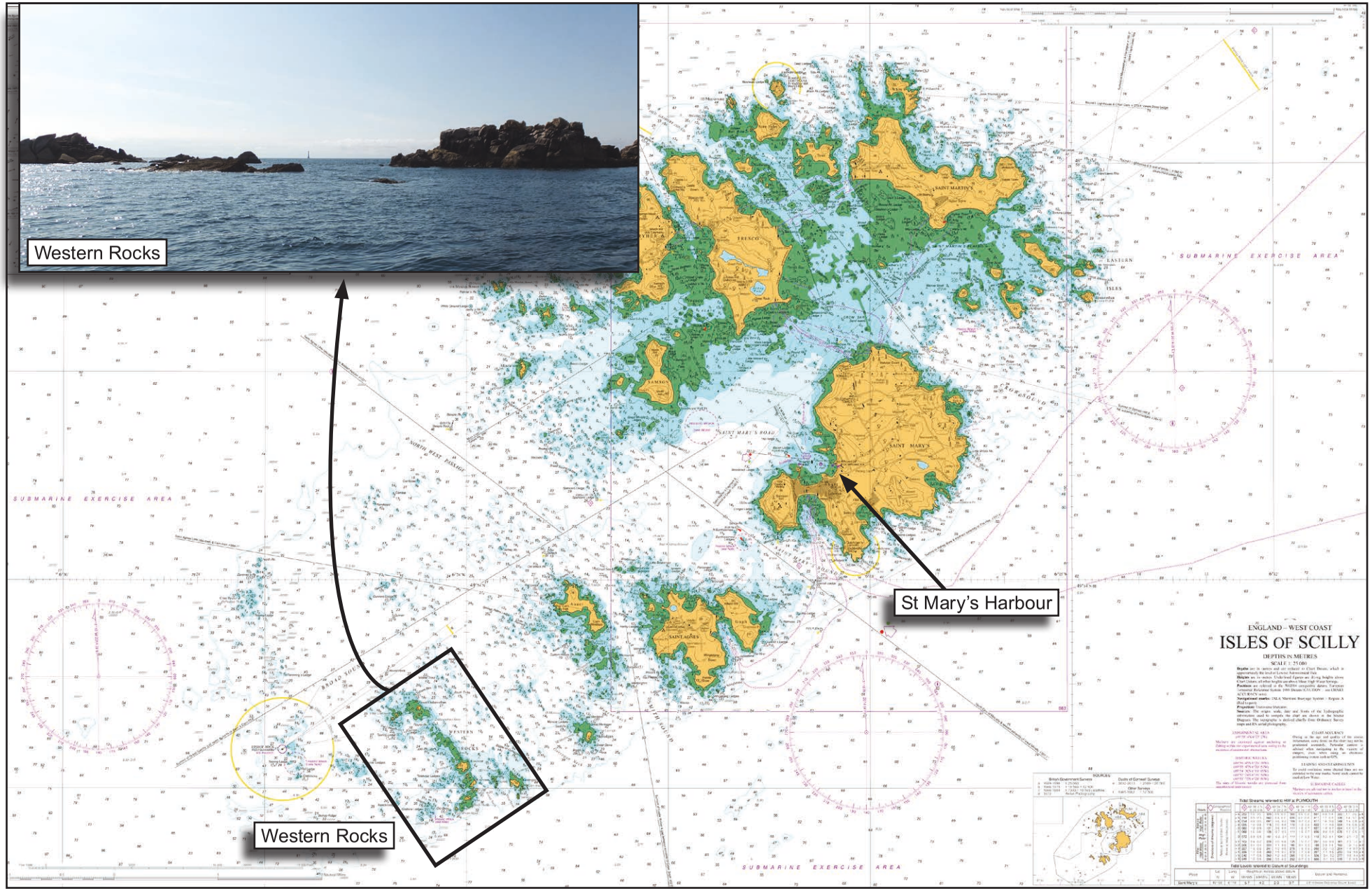


Figure 1: The Isles of Scilly region with inset picture of Western Rocks

1.3 NARRATIVE

At 0830 on 15 May 2016, *Surprise*'s skipper attended the SMBA's daily planning meeting, where he was allocated a sightseeing trip to Western Rocks and Bishop Rock Lighthouse. Following the meeting, the skipper and his crewman moved *Surprise* from its mooring in St Mary's Harbour to the quay, where 48 passengers embarked.

At about 1015, the skipper unberthed *Surprise* and reported the passenger numbers to the SMBA ticket office. Once clear of the berth, the skipper made a safety announcement to the passengers on the vessel's public-address system then manoeuvred *Surprise* out of the harbour. To provide close-up views of seals and birds, *Surprise* passed close to several islands during the passage to Western Rocks **(Figure 2)**.

At about 1130, *Surprise* was manoeuvred at slow speed into the small bay between two large rocks, known as Dry Splat and Daisy **(Figure 3)**. Once in the bay, the skipper stopped the vessel for a few minutes to allow the passengers time to enjoy the views and photograph the seals that were basking on the rocks nearby. At about 1135, the skipper applied ahead power and started to manoeuvre *Surprise* out of the bay. As the vessel's speed increased it struck a submerged rock. A loud scraping noise was heard as *Surprise* shuddered to a halt and lodged on the isolated rock **(Figure 3)**. The rock penetrated *Surprise*'s hull below the waterline and the vessel started to take on water.

Realising that *Surprise* was aground and taking on water, the skipper disengaged the vessel's propellers and manually started its electric bilge pumps. The skipper made a "Mayday" distress call on very high frequency (VHF) radio, channel 16, and instructed the crewman to help the passengers don their lifejackets. He then sought volunteers to manually operate the mechanical bilge pumps and ordered the crewman to release and inflate the liferaft.

The skipper's "Mayday" was heard by Falmouth Coastguard and numerous local vessels that were operating nearby. The coastguard tasked a search and rescue helicopter and requested the launch of the St Mary's Royal National Lifeboat Institution (RNLI) lifeboat. Three small local boats - *Pioneer*, *St Agnes* and *Orca* - all proceeded immediately to assist *Surprise* and the Isles of Scilly ambulance boat arrived soon after. By about 1150, all the passengers had been transferred from *Surprise* to the assisting boats **(Figures 4, 5,** and **6)**. After the passengers had been evacuated, *Surprise* floated off the rock unaided **(Figure 7)**.

At 1155, the lifeboat arrived on scene and *Surprise* came alongside it to embark a member of its crew and a portable salvage pump. Content that the situation was stable, *Surprise*'s skipper started heading back to St Mary's in company with several other local boats **(Figure 8)**. Each of the local boats with *Surprise*'s passengers on board then took it in turn to transfer them to the lifeboat. By about 1210, all the passengers were safely on board the lifeboat.

The lifeboat arrived in St Mary's at 1235 and disembarked the passengers **(Figure 9)**. A doctor, a nurse and the Isles' police officer were waiting on the quay to help assess the condition of the passengers; none of them required medical assistance

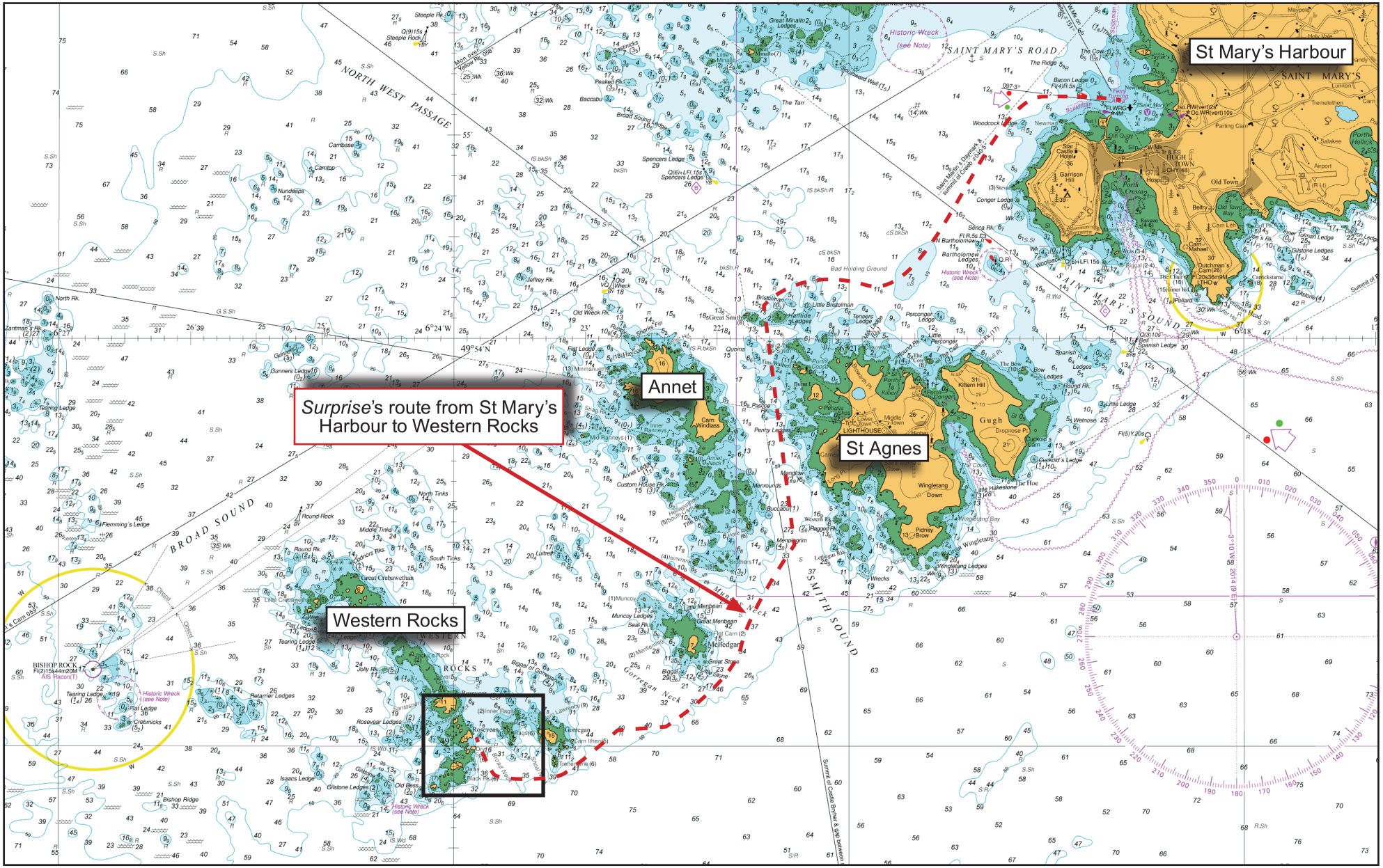


Figure 2: Overview of *Surprise*'s route from St Mary's Harbour to the grounding location

Figure 3: Approximate route of *Surprise* immediately prior to grounding and the accident location

Image courtesy of Mike Harcum

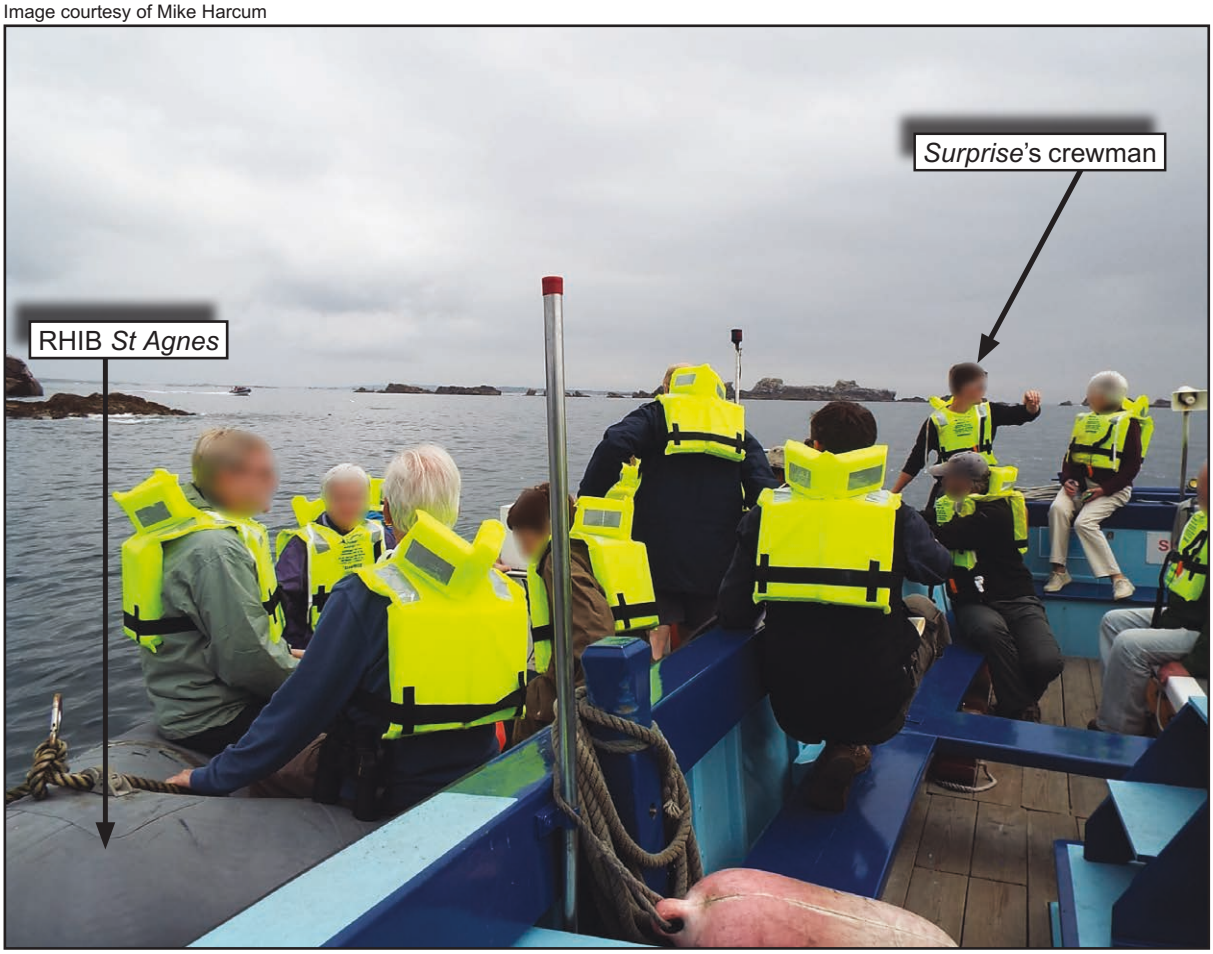


Figure 4: Passengers transferring from *Surprise* to *St Agnes*

Image courtesy of Mike Harcum

Figure 5: Passengers from *Surprise* on board *Pioneer*

Image courtesy of Peter Hicks

Figure 6: Passengers from *Surprise* on board the ambulance boat

Image courtesy of Mike Harcum

Figure 7: *Surprise* in the accident location after all the passengers had been evacuated

Image courtesy of Mike Harcum

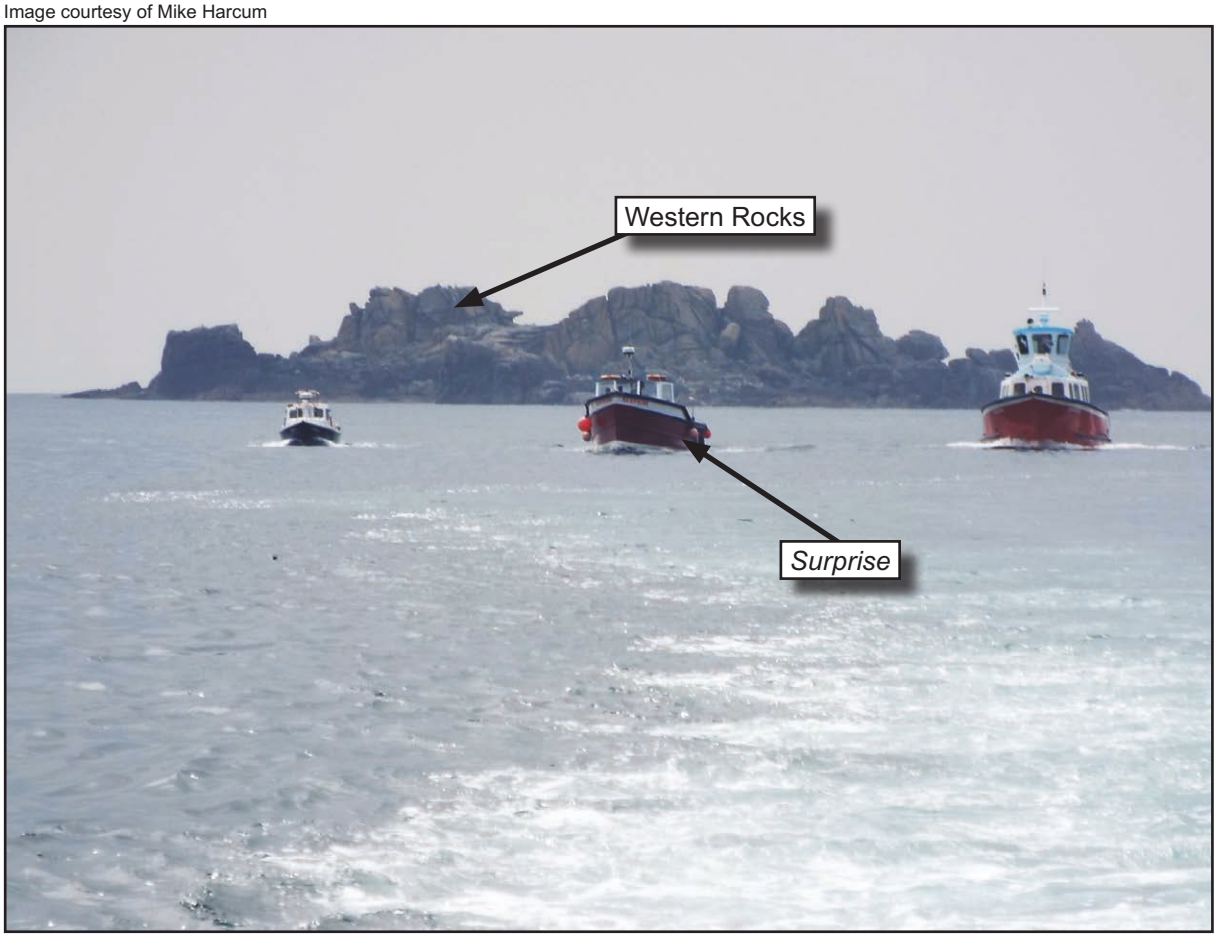


Figure 8: *Surprise* heading back to St Mary's Harbour in company with other local boats

Image courtesy of the Maritime and Coastguard Agency

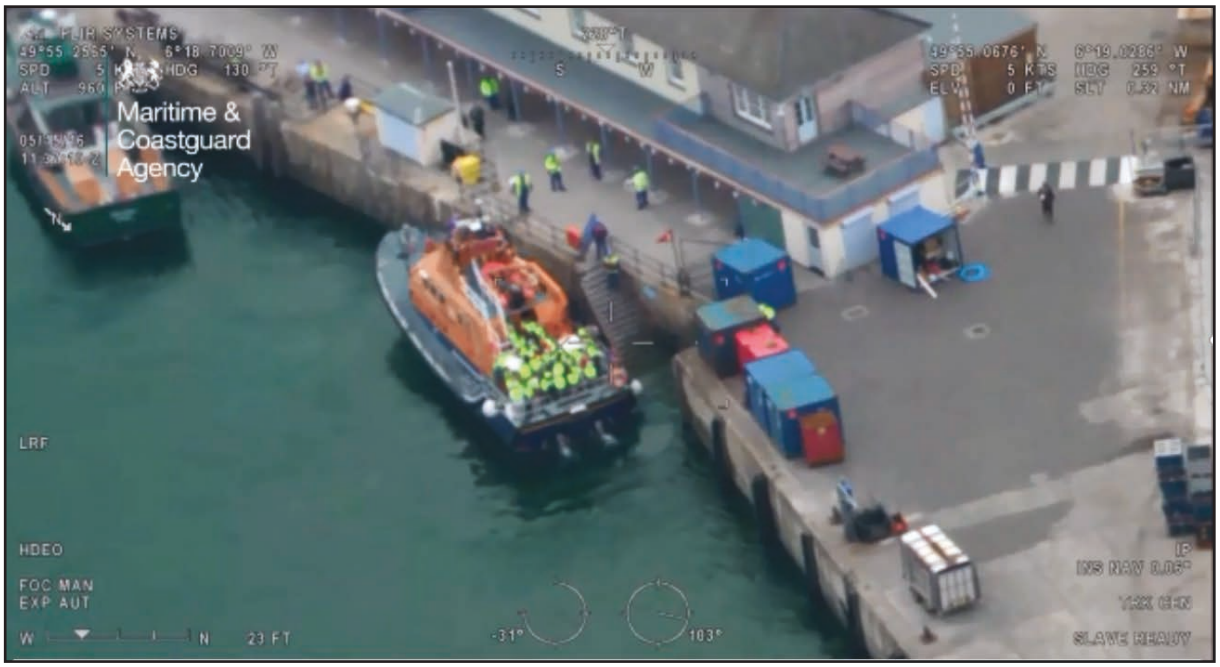


Figure 9: *Surprise*'s passengers disembarking from the lifeboat at St Mary's Harbour

and they were allowed to return to their accommodation. *Surprise* arrived in St Mary's about 25 minutes later and proceeded to a boatyard, where it was lifted out of the water for inspection and subsequent repair **(Figure 10)**.

Surprise had a 1.5m long scrape mark along the starboard side of its hull and a single area of significant damage where the hull had been penetrated; the damage was also visible internally **(Figures 11** and **12)**.

1.4 ENVIRONMENTAL CONDITIONS

In the location of the grounding, the sea was glassy calm and there was very little wind. The sky was cloudy but it was dry and the visibility was good. The accident occurred about an hour and 40 minutes before high water and the height of tide was 4.0m.

1.5 *SURPRISE*

Surprise was a former Admiralty passenger boat built in Chichester in 1949. It had been operated as a passenger ferry and sightseeing boat in the Isles of Scilly for over 30 years. *Surprise* was 14.29m in length, had a draught of 0.74m and an open deck layout with a forward covered wheelhouse; the hull was a mahogany double-diagonal overlapping construction.

Surprise was fitted with two propulsion engines, two reversible gearboxes and two propellers. The main centreline propeller was driven via its gearbox by a 96 kilowatt (kW) Perkins Sabre engine. The starboard, auxiliary wing propeller was driven via its gearbox by a 44kW Beta Marine engine.

Figure 10: *Surprise* out of the water after the accident

Figure 11: Hull damage to *Surprise*'s starboard side with detail inset

Figure 12: Internal hull damage and electric bilge pump

The wheelhouse was equipped with two Garmin chart plotters, a magnetic compass and two VHF radios, one of which had a digital selective calling (DSC) function **(Figure 13)**. The main chart plotter was a Garmin GPSMap 3010C unit that included a navigation alarm function to indicate when the vessel was off course by a pre-set distance. The main plotter's electronic chart data information had not been updated since 2006. *Surprise* was not fitted with an echo sounder.

Surprise had three electric bilge pumps that could be started manually from the wheelhouse or automatically through the activation of remote float switches; the vessel also had two manually operated mechanical bilge pumps. Although the hull was penetrated below the waterline, the electric bilge pumps coped with the rate of water ingress and prevented the floodwater rising above the vessel's deck boards.

Surprise's lifesaving appliances (LSA) comprised a 37-person liferaft, three 15-person buoyant apparatus, four lifebuoys and 74 lifejackets.

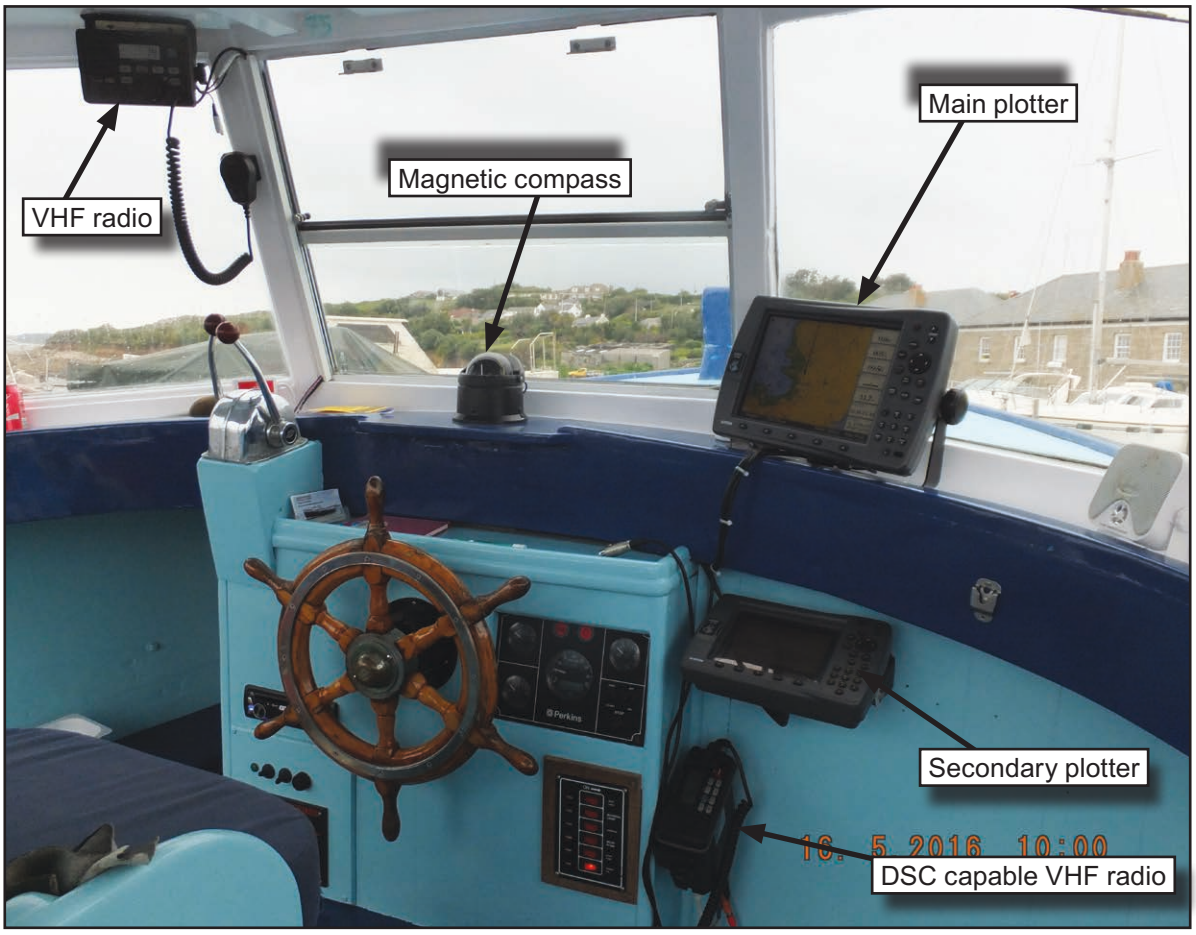


Figure 13: *Surprise*'s wheelhouse showing the navigation equipment

1.6 CREW

The skipper was a 28-year-old career boatman who had been working as a crewman and skipper in the Isles of Scilly since the age of 16. He purchased *Surprise* in 2011 and was its full-time skipper. He held a Maritime and Coastguard Agency (MCA) Tier 2 Level 2 Boatmasters' Licence (BML) and a category AA Boatman's Licence issued by the Council of the Isles of Scilly (the Council). He also

held a commercially endorsed Royal Yachting Association Yachtmaster Offshore Certificate of Competency and a Ship Radio Licence, and had attended sea survival and fire-fighting training courses.

The crewman was 20 years old and lived locally. Since leaving school he had crewed on passenger vessels in the Isles of Scilly each summer. He held a Category EE Council of the Isles of Scilly Boatman's Licence that allowed him to work as a boat-hand/crewman.

1.7 ST MARY'S BOATMEN'S ASSOCIATION

The SMBA advertised six standard passenger ferry routes and six 'circular' wildlife trips for tourists. Not all of the advertised trips were available every day and additional special trips were provided during peak periods. The SMBA members worked together to co-ordinate their services in line with customer demand and boat availability. All 10 of the boats in the SMBA were certified by the MCA as Class VI domestic passenger vessels.

During the operating season, the SMBA members would meet each day at 0830 to review the weather conditions, boat availability and anticipated customer demand. At the meeting, they agreed what ferry services and sightseeing trips to offer that day and which boats to use. This information was advertised to potential passengers on several notice boards located around the harbour **(Figure 14)**. At the time of the accident, *Surprise* was undertaking the *Bishop Rock Lighthouse, Western Rocks and Annet* circular trip.

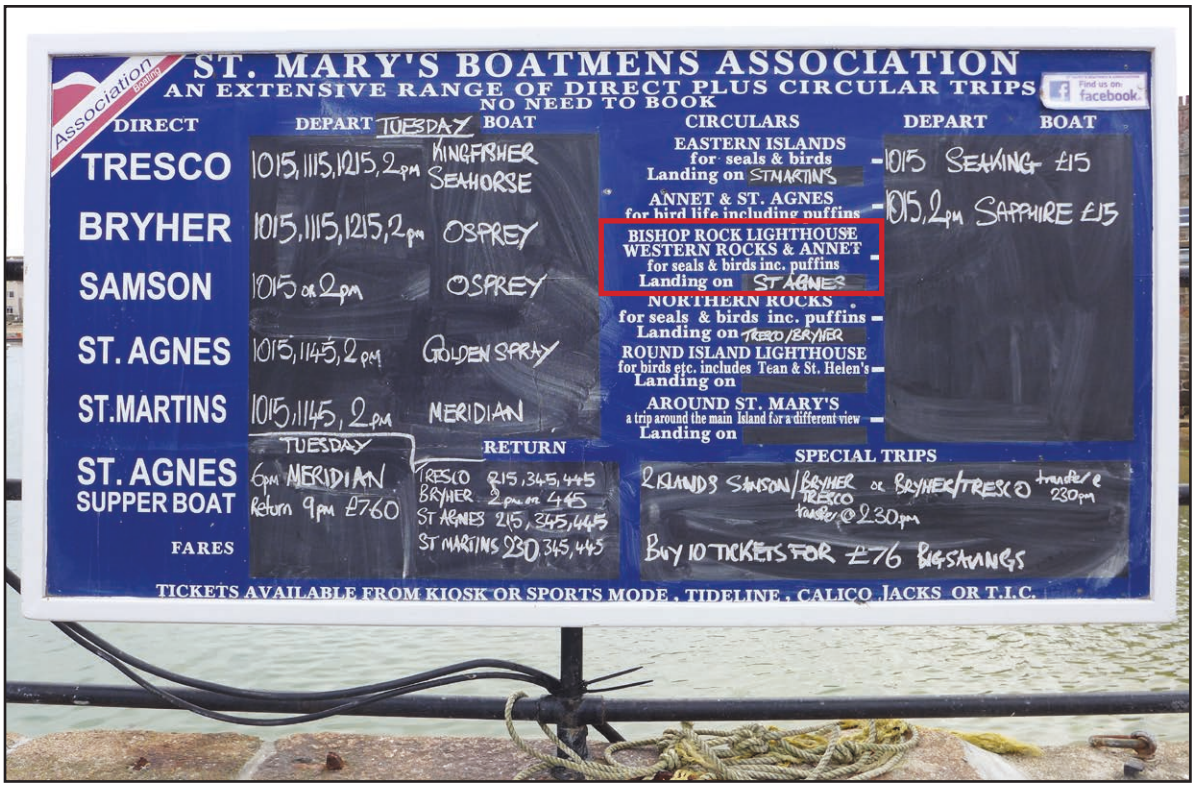


Figure 14: St Mary's Boatmen's Association noticeboard

1.8 THE MANAGEMENT OF SAFETY

1.8.1 The Domestic Passenger Ship Safety Management Code

Class VI passenger vessels were subject to the Merchant Shipping (Domestic Passenger Ships) (Safety Management Code) Regulations, 2001, as amended (DSM Code). These regulations required passenger vessel operators to develop and implement a safety management system (SMS) for the safe operation of vessels.

Guidance regarding the implementation of the DSM Code was provided by the MCA in its Merchant Shipping Notice (MSN) 1869(M), *Safety Management Code for Domestic Passenger Ships*. The regulations required vessel operators to produce a health, safety and environmental protection policy and develop and implement procedures for:

- the safe operation of vessels in compliance with relevant rules
- communicating between personnel, ashore and afloat
- reporting accidents
- responding to emergency situations.

MSN 1869(M) stated that the procedures required to ensure the safe operation of the vessel should include navigation and ship handling. The MSN also stated that procedures for responding to emergency situations, such as grounding, flooding and ship abandonment should be clearly stated. The DSM Code required crew members to carry out, and keep a record of, emergency exercises, and encouraged the involvement of shore personnel.

1.8.2 The St Mary's Boatmen's Association safety management system and *Surprise*'s onboard procedures

In order to comply with the requirements of the DSM Code, the SMBA had developed a generic SMS for use by its members. The SMBA SMS comprised 18 sections that were set out in two parts **(Annex A)**: Part 1 contained the members' safety policy and operating procedures; Part 2 contained various record sheets and checklists. A copy of the SMBA SMS was held on board *Surprise* and it had been approved for use by the MCA in April 2012.

Onboard procedures and vessel maintenance requirements were set out in Section 7 of the SMBA SMS and included embarkation and disembarkation of passengers, passenger counting, safety announcements and managing deficiencies. Section 8 stated that personnel should be familiar with the emergency procedures set out in the SMBA Emergency Training and Maintenance Manual; this manual included procedures for dealing with flooding. Sheets for recording crew emergency preparedness exercises were included in Section 16 of the SMS. There was no record of crew training in Section 16 of *Surprise*'s SMS.

The SMBA SMS provided safety policy and guidance for skippers but stated that the Association was not responsible for the safe operation of individual boats. Therefore, as a supplement to the SMBA SMS, the skipper of *Surprise* had developed a set of vessel specific safety procedures **(Annex B)** for:

- engine start up and operation
- operation and use of safety equipment
- emergency situations
- passenger counting
- emergency VHF radio communications.

Surprise's onboard procedures for emergency situations included main engine fire, man overboard and steering failure; there were no emergency procedures for grounding or flooding.

The SMBA's guidance and the skipper's onboard procedures taken together formed *Surprise*'s SMS. Neither contained risk assessments for navigational safety or guidance on passage planning and the conduct of navigation.

1.9 THE CONDUCT OF NAVIGATION ON BOARD *SURPRISE*

1.9.1 Passage planning

The International Maritime Organization's (IMO) Convention for the Safety of Life at Sea[3] (SOLAS) required a ship's master or skipper to ensure that intended voyages are planned using the appropriate nautical charts and nautical publications for the area concerned, taking into account the guidelines and recommendations contained in IMO Resolution A.893(21) - *Guidelines for Voyage Planning*. The IMO guidelines explain that:

> *The development of a plan for voyage or passage, as well as the close and continuous monitoring of the vessel's progress and position during the execution of such a plan, are of essential importance for safety of life at sea, safety and efficiency of navigation and protection of the marine environment.*

The IMO resolution discussed the four key components necessary to ensure the effective planning and achievement of a safe passage. The initial voyage planning **appraisal** stage involves the gathering of all information relevant to the intended voyage. The next stage requires the detailed **planning** of the whole voyage from berth-to-berth. The third and fourth stages are the effective **execution** of the plan and **monitoring** the progress of the vessel during the implementation of the plan.

MCA guidance on the implementation of the IMO regulation stated that voyage plans *'may be sensibly less for small vessels*' and did not have to be written down, but required that particular attention was paid to ensuring familiarity with weather, tides, vessel limitations and any navigational dangers that may be encountered.

[3] *Surprise* was required to comply with the Merchant Shipping (Safety of Navigation) Regulations, 2002, as amended, which ensured compliance of UK vessels to SOLAS Chapter V (Safety of Navigation), where applicable.

The general route for wildlife trips was decided on the day and, once underway, adjusted to exploit the best sightseeing opportunities. There was no calculation of a limiting danger line[4] and navigation in good visibility was primarily conducted using visual references.

1.9.2 Use of navigation charts and chart plotters

The location of the grounding was in an intertidal zone. Intertidal zones are coloured green on Admiralty charts and electronic plotters and contain areas and isolated hazards that will be dry at low tide and submerged at high tide. Drying heights[5] for these areas and hazards are typically marked on charts. There were no drying heights shown in the vicinity of the grounding on either the Admiralty chart or *Surprise*'s plotter **(Figure 15)**. The information on the Admiralty chart was based on data collected during surveys conducted between 1966 and 1975. The quality of surveys would not have provided full seafloor coverage or identified all isolated dangers[6].

Figure 15: Reconstruction of *Surprise*'s chart plotter display at the time of the grounding

Although primarily navigating using his local knowledge and visual references, the skipper gained additional situational awareness from his electronic chart plotters. The skipper had saved routes on his plotter for some of his regular passages, such as the route east of Tresco **(Figure 16)**, but he did not routinely enter pre-planned tracks or waypoints for his circular sightseeing trips.

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[4] Limiting danger line calculated as: vessel draught + minimum under keel clearance (UKC) – height of tide. This calculation results in determining the charted depth that a vessel is safe to operate in for a known height of tide.

[5] Drying heights appear as an underlined number on the chart in intertidal zones and represent the height of the feature above chart datum.

[6] See Mariners Handbook (NP100), Chapter 1 (Surveying)

Figure 16: Historical track around Tresco stored in *Surprise*'s chart plotter

1.10 VESSEL CERTIFICATION AND SAFETY MANAGEMENT AUDITS

Surprise was required to hold a UK Passenger Certificate and a Domestic Ship Safety Management Certificate, and was subject to annual certification inspections. Due to the vessel's age, it was required to be inspected annually both out of the water and afloat. The inspections were carried out by surveyors from the MCA's Marine Office in Falmouth.

Prior to the accident, *Surprise* was last inspected out of the water on 5 January 2016 and afloat on 21 March 2016. MCA reports from these inspections identified a total of 14 deficiencies, 10 of which were required to be rectified before *Surprise* could proceed to sea. The deficiencies included an absence of required charts, risk assessments not being documented and the need to conduct crew training before sailing.

The MCA had issued a full-term UK Passenger Certificate **(Annex C)** for *Surprise* that was valid until 19 March 2017. As a result of the deficiencies identified during its last inspection, the MCA only issued a temporary Domestic Ship Safety Management Certificate **(Annex D)** for the vessel that was valid until 30 June 2016[7]. This interim certificate stated that the vessel's SMS complied with the DSM Code.

[7] The MCA surveyor planned to return to the Isles of Scilly within the 3-month period and repeat the inspection of *Surprise* to ensure that the deficiencies had been rectified. This did not happen as the vessel grounded in the interim period between the temporary certificate issue and planned re-inspection.

Surprise's UK Passenger Certificate stipulated conditions for two operational modes: Mode 1 and Mode 2. In Mode 1 the vessel was allowed to carry up to a maximum of 72 passengers[8] but its operations were limited to:

> *safe and navigable channels and not more than 1 mile from safe landings, including Rosevear but excluding Bishop Rock.*

In Mode 2 the vessel's passenger numbers were limited to 35, but it was permitted to operate up to 3nm from safe landings, *including Bishop Rock*.

1.11 THE DUCHY OF CORNWALL AND ST MARY'S HARBOUR

The Duchy of Cornwall (The Duchy) was a privately-owned estate that provided income for the personal, public and charitable activities of the Duke of Cornwall. The Duchy owned and managed most of the land in the Isles of Scilly, St Mary's Harbour and about a third of the residential buildings.

Under the Order of Creation of the St Mary's Harbour Authority (SMHA), 1890, the Duke of Cornwall was the Statutory Harbour Authority (SHA) for St Mary's Harbour. The Duchy of Cornwall's Land Steward (Western District and Isles of Scilly) was the Duty Holder under the provisions of the Port Marine Safety Code (PMSC), accountable for ensuring compliance with the PMSC through safe marine operations in the harbour and its approaches. The Duty Holder was a chartered surveyor with no commercial maritime experience. Day to day responsibility for safe management of the harbour area was delegated to the St Mary's Harbour Authority harbourmaster who was a professional mariner.

SMHA was also the Competent Harbour Authority (CHA) for the provision of pilotage in the Isles of Scilly under the terms of the Pilotage Act, 1987. Details for the provision of pilotage by SMHA was contained in the *Isles of Scilly Pilotage Service Operating Procedures,* which was supplemented by a guide titled *Pilotage Information for Ships' Masters and Agents*.

Pilotage was available for vessels of any size upon request but was compulsory for all vessels over 30m length overall (LOA), with some exceptions[9]. The pilotage area comprised all waters within 5nm of the southern point of the island of Samson **(Figure 17)**.

The Duchy's *Navigational Safety Policy* **(Annex E)** stated that:

> *The SMHA in its role as SHA/CHA has a responsibility to facilitate the safety of navigation within St Mary's Harbour and the Isles of Scilly Pilotage District.*

It further stated that SMHA was committed to:

- *Consult widely with port and other relevant stakeholders in respect of navigational safety issues.*

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[8] The vessel carried LSA for 74 people [Section 1.5]. Under this condition an evacuation of the vessel at sea would result in passengers entering the water.

[9] Warships, Trinity House vessels engaged on navigation mark maintenance and trawlers less than 47.5m LOA were exempt from compulsory pilotage

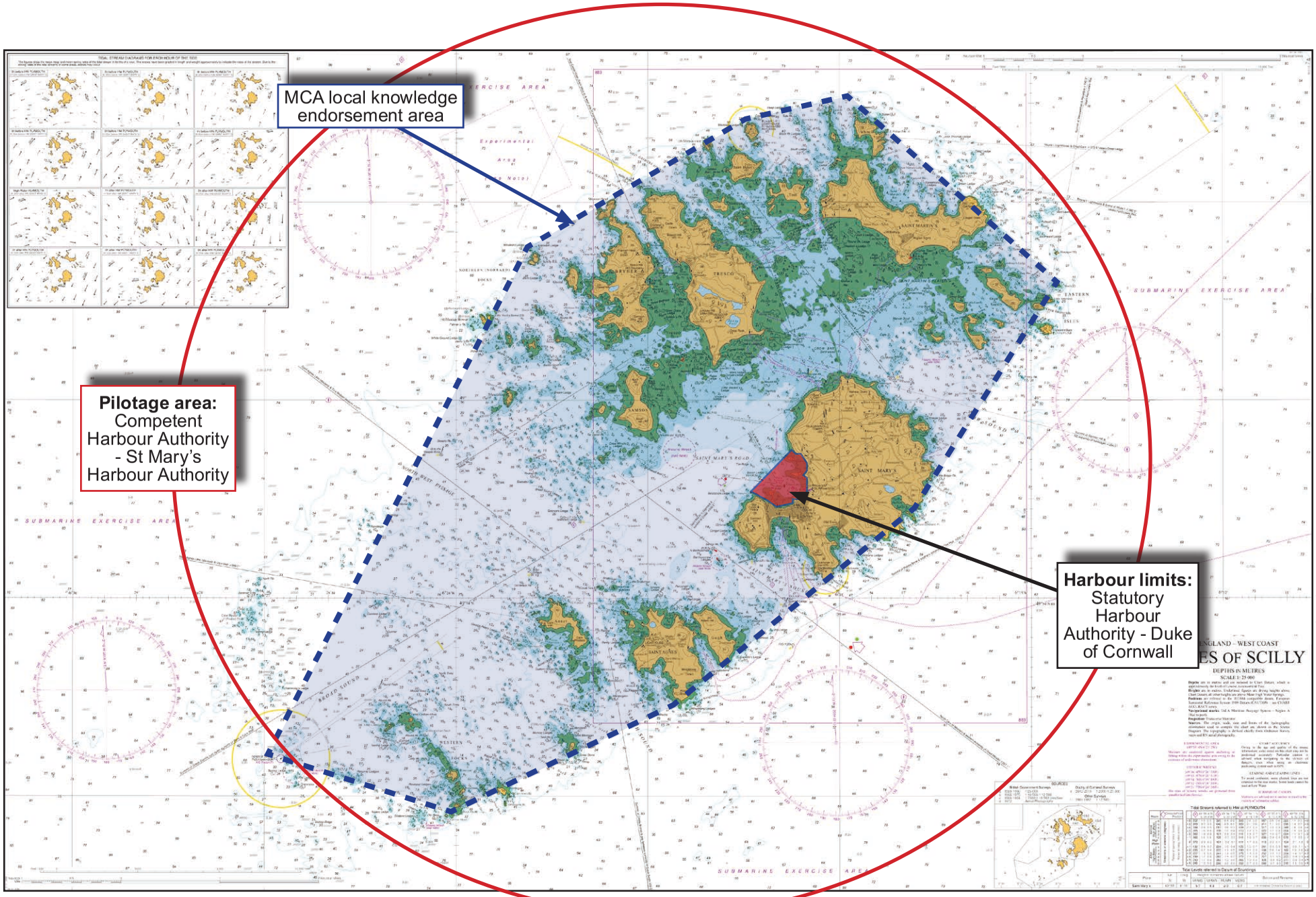

Figure 17: The Isles of Scilly chart showing the pilotage area, harbour limits and MCA local knowledge endorsement area

- *Ensure the best channels for navigation are determined, marked and monitored.*

- *Ensure that appropriate competency standards are adhered to for passenger, freight and other commercial operations.*

- *Provide effective plans, management and co-ordination in response to emergency situations within the area of jurisdiction.*

The St Mary's Harbour Users Group included local boat and ferry operators and was chaired by the harbourmaster. The group met regularly to discuss safety and other matters relating to the operation of the harbour. The Council of the Isles of Scilly was invited to the Harbour Users' Group meetings, but did not routinely attend.

1.12 THE MARITIME AND COASTGUARD AGENCY BOATMASTERS' LICENCE

1.12.1 Overview

The competency requirements for masters/skippers of Class VI passenger vessels were set out in the *Merchant Shipping (Boatmasters' Qualifications, Crew and Hours of Work) Regulations, 2015*. Guidance on the structure and requirements of the BML system and the regulations was provided by the MCA in its MSN 1853(M)[10].

The BML structure was based on a two-tiered system: Tier 1 and Tier 2. The Tier 1 BML was a national licence and was transferable between different areas subject to local knowledge requirements. The Tier 2 BML was a local, operation-specific, qualification that restricted the holder to the waters and operation specified on the licence. The Tier 1 and Tier 2 BMLs had two Levels: Level 1 and Level 2. Tier 2 Level 2 BMLs, as held by the skipper of *Surprise*, allowed the holder to operate in specified areas of category A to D[11] waters and a limited coastal area[12].

1.12.2 Generic competencies for Tier 2 boatmasters

Given that a Tier 2 BML was issued for specific waters and operations, MSN 1853(M) stated that:

> *Para 12.5. Candidates for Tier 2 licences will be examined on the sections of the generic Tier 1 and specialist operations endorsements syllabi that are relevant to their proposed area and type of operation.*
>
> *Para 12.7. Normally the MCA will conduct an on-board practical and oral assessment for Tier 2 BML candidates.*

Annexes 9 to 11 of MSN 1853(M) contained the syllabi for generic Tier 1 skills and specialist operations areas, including passenger vessel operations. The generic syllabus included a requirement for skills in navigation, boat handling, mooring and unmooring, maintenance, health and safety as well as dealing with emergencies.

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[10] MSN 1853(M) - *The Merchant Shipping (Boatmasters' Qualifications, Crew and Hours of Work) Regulations 2015, Structure and Requirements.*

[11] As defined in MSN 1827(M) *Categorisation of Waters*.

[12] Limited coastal area means an area of no more than 5 miles from land and no more than 15 miles from a point of departure or arrival (excluding waters of category A, B, C or D).

The generic syllabus for specialist passenger operations required candidates to demonstrate knowledge of operational procedures for the safe carriage of passengers.

1.12.3 Local knowledge

Given the significance of the navigational hazards in the Isles of Scilly, holders of a Tier 1 BML were required to undertake a local knowledge endorsement (LKE) examination. The Isles of Scilly was one of only 13 areas within the UK where the hazards required this additional level of training above the generic syllabus. **Figure 17** shows the applicable area for an LKE in the Isles of Scilly. For holders of a Tier 2 BML, the licence was limited to specific waters and operations and MSN 1853(M) stated that:

> *Para 5.5. Candidates for a Tier 2 BML will not require separate local knowledge or specialist operations endorsement as they will be examined for specific waters and operations for their T2 BML.*

Surprise's skipper had a Tier 2 Level 2 BML that had been issued by the MCA. The MCA did not have a dedicated examiner in the Isles of Scilly and did not assess his knowledge of the local waters; instead, it placed a condition on his licence that required him to comply with the restrictions described in his Council of the Isles of Scilly boatman's licence. In order to qualify for an Isles of Scilly boatman's licence, skippers were required to pass a local knowledge practical examination.

1.13 THE COUNCIL OF THE ISLES OF SCILLY LOCAL AUTHORITY BOATMAN'S LICENCE

1.13.1 Overview

The Council of the Isles of Scilly was an MCA approved competent authority[13] for small commercial vessels[14] **(Annex F)**. The Council required the skippers and crew of all domestic passenger vessels and small commercial vessels operating in the Isles of Scilly to hold its local boatman's licence. For small commercial vessels, the local boatman's licence alone was a sufficient qualification for a skipper. For skippers of passenger vessels in the Isles of Scilly, their MCA BML was endorsed with a requirement to comply with the restrictions described in their '*Isles of Scilly Boatman's Licence – Passenger Vessel Operations'.*

1.13.2 The licensing system

The Isles of Scilly boatman's licensing system was administered by the Council's Licensing Department and was supervised by the Council's boating sub-committee. The terms of references for the boating sub-committee included a requirement to:

> *Deal with the issues relating to the registration and licencing of Boats and Boatmen in the locality of the Isles of Scilly.*

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[13] Competent Authority means either the Maritime and Coastguard Agency or an organisation that issues Certificates of Competence which has applied for and been granted recognition by the Maritime and Coastguard Agency as having the appropriate technical and administrative expertise.

[14] Vessels under 24m in length and carrying no more than 12 passengers. See Table 1 to Annex 3 of Marine Guidance Notice (MGN) 280 (M), *Small Vessels in Commercial Use for Sport or Pleasure, Workboats and Pilot Boats – Alternative Construction Standards*.

There were no local legislation or byelaws for the licensing requirement and none of the boating sub-committee members had any professional maritime experience.

The Council boatman's licensing system had six qualification levels, graded EE to AA and MC[15] **(Annex G)**. The EE level was for crew members; the other five levels were for skippers, and placed geographical limits on the holder. The highest qualification level, AA, was unrestricted and permitted the holder to operate a vessel anywhere within the area of the Isles of Scilly[16].

Although the Council was designated as the competent authority, it did not investigate the accident and took no action to prevent recurrence.

1.13.3 Isles of Scilly boatman's licence examination process

Candidates wishing to be considered for an Isles of Scilly boatman's licence were required to submit a request to the Council's Licensing Officer, who would then arrange a date for an assessment to be conducted by a Council appointed examiner.

The Council's primary examiner was a 77 year old former Isles of Scilly pilot who had served for many years as the chief officer on board the St Mary's to Penzance ferry. The examiner was not employed by the Council but worked on a consultative basis conducting practical local knowledge examinations at sea. The Council did not have a syllabus for its local knowledge tests or written guidance for its appointed examiner.

The practical tests probed candidates' knowledge levels based on the grade of licence that had been applied for. Candidates would be tested at sea on their knowledge applicable to the licence being granted; there were no written or oral examinations and no written guidance. The tests were usually witnessed by a member of the Council.

For crewmen applying for an EE level licence, there was a booklet titled *Crews' Licence* **(Annex H)** that provided guidance on the level of knowledge required, including: first-aid, safety equipment, knots, rowing, passenger handling and safety at sea. For skippers applying for licences graded MC or DD to AA **(Annex G)**, the examination was primarily a test of local knowledge of the navigational hazards in the area covered by the licence. For the Council's AA licence, as had been granted to the skipper of *Surprise*, local knowledge of the entire archipelago was tested.

1.14 PREVIOUS OR SIMILAR ACCIDENTS

1.14.1 Grounding of *Wizard*

At about 0530 on 19 November 2007, the ridged-hulled inflatable boat *Wizard* ran aground between St Mary's Harbour and the nearby island of St Agnes. The boat was operated by St Mary's Jet Boat Services and was transferring a team of civil engineers between the islands. The accident occurred during the hours of darkness and three of the seven people on board were injured. *Wizard*'s skipper held an MCA Tier 1, Level 2 BML endorsed with an Isles of Scilly boatman's licence. A preliminary

[15] MC was a 'Main Channel' licence, see **Annex G**

[16] The area of the Islands was defined as the archipelago of the Isles of Scilly and not more than 3 miles to seaward of the line joining Bishop Rock Lighthouse, Round Island, White Island, Hanjague and around the south-east of St Mary's.

examination of the accident was undertaken by MAIB and resulted in a letter from the Chief Inspector of Marine Accidents to the Council of the Isles of Scilly recommending that:

> *A risk assessment is carried out on the Council of the Isles of Scilly's boatman's licence assessment procedures including operations in darkness.*

The Council of the Isles of Scilly was unable to provide evidence that action was taken to address this recommendation.

1.14.2 Collision involving a St Mary's passenger vessel

At about 1020 on 28 August 2014, a high-speed jet boat with 12 passengers on board was on passage between St Mary's and the island of Tresco when it collided with another local boat. The jet boat was proceeding at about 18 knots and the skipper was not keeping a lookout; he had become distracted because he was doing tidal calculations using an app on his mobile phone.

The skipper of the jet boat held a Council boatman's licence. The circumstances of this accident were reviewed by the Council's boating sub-committee at a meeting held on 11 September 2014, where a decision was taken that the jet boat skipper's Council boatman's licence should be suspended.

SECTION 2 - ANALYSIS

2.1 AIM

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

2.2 THE GROUNDING

Surprise was holed below the waterline and started to flood when it grounded on one of several subsurface rocks while being manoeuvred in a small bay in the intertidal zone. The skipper had entered the bay to give his passengers a close-up view of basking seals. He had undertaken similar trips many times before, was familiar with the area and was aware that it contained rocky hazards.

The skipper did not follow a pre-prepared passage plan and was wholly reliant on his local knowledge, vigilance and ability to see shallow rocks to avoid grounding when within the intertidal zones of Western Rocks. This method of navigation required good visibility through the water and some swell to create a wash of water around rocks that were just under the surface **(Figure 18)**. The glassy calm conditions at the time of the grounding meant that the normal levels of wash around rocks was not present. This made navigation in the intertidal zone even more difficult and contributed to the grounding.

Figure 18: Example of rock wash around an isolated rock hazard

2.3 SAFE NAVIGATION IN THE ISLES OF SCILLY

2.3.1 Passage planning

The SMBA provided a limited and defined set of ferry routes and sightseeing trips **(Figure 14)**. However, it had not developed any passage planning guidance and, despite the skipper checking the heights of tide and predicted weather conditions for the trip, detailed passage planning was not undertaken on board *Surprise* prior to its grounding.

The SMBA's process of allocating vessels to trips on the day of departure left little time for the skippers to prepare or review their navigation plans. Furthermore, as the purpose of the sightseeing trips was to provide close-up views of wildlife, the skippers usually varied their routes from day-to-day depending on environmental conditions and the location of seals and birds. Once underway, monitoring the vessel's passage and continually identifying its proximity to danger was necessary to prevent grounding.

Boating in the Isles of Scilly was particularly challenging due to the shallow banks, significant tidal streams and the extensive presence of rocky hazards. The key to effectively managing such risks is through the preparation and execution of safe passage plans, rather than almost total reliance on local knowledge and vigilance. Had an outline plan, with navigational limits set for areas of particular danger been developed for each of the trips and then completed as required by the relevant skippers on the day, this accident might have been avoided. Further guidance on passage planning and conduct of navigation could be provided by the SMBA without undermining individual skippers' responsibility for the safety of their own vessels.

2.3.2 Operating in intertidal zones

The location of the grounding was marked as an intertidal zone on the Admiralty chart and *Surprise*'s plotter, but it did not have any charted drying heights. To operate safely in an intertidal zone, the height of tide needs to be known and appropriate limiting danger lines need to be calculated. The calculation of a limiting danger line is no more than the application of a basic navigational principle. In the case of *Surprise*, a working draught of 1.0m and minimum UKC of, perhaps, 0.5m could have been combined with the height of tide to assess the safe and unsafe areas for each trip **(Figure 19)**.

Had such conventional navigation techniques been applied, it would have been apparent that the vicinity of the grounding, in an intertidal zone without a drying height, would have been unsafe to proceed into without detailed knowledge of every hazard at all states of tide. Although the skipper had undertaken similar trips before, the multitude of hazards in the area meant that he could not have been expected to know the location and height of every submerged rock. Thus, entering the intertidal zone where the seals were basking was unsafe and the passengers' sightseeing experience should have been provided by staying in deeper water.

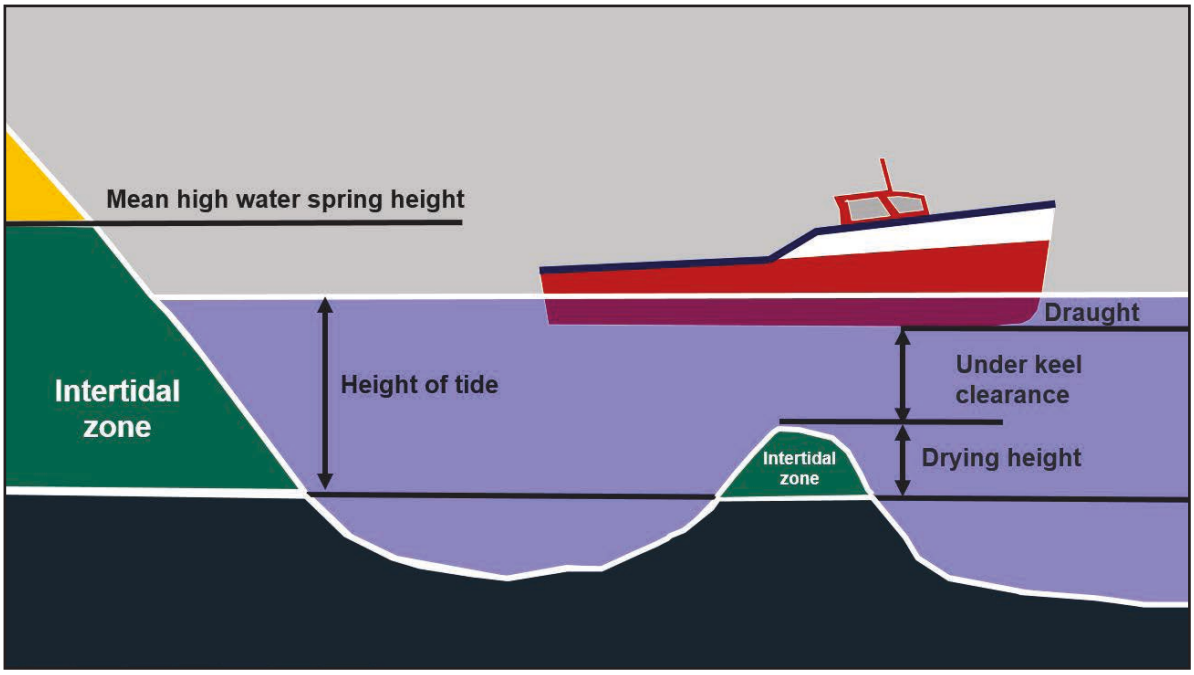

Figure 19: Illustration of a vessel navigating safely in an intertidal area where drying heights are shown and there is sufficient height of tide

2.4 USE OF ELECTRONIC NAVIGATION AIDS

Surprise was equipped with two electronic chart plotters, but the skipper was navigating primarily by visual means and the vessel did not have an echo sounder.

Surprise's main plotter was a Garmin 3010C unit that had a navigational alarm function capable of alerting the skipper if the vessel strayed off a planned track by a pre-set distance. This feature could have been utilised to aid the skipper's situational awareness; however, there were no pre-planned tracks or waypoints plotted and this function was not in use. The electronic charts installed in the plotter were also out of date, having not been refreshed since 2006. Electronic charts need to be kept up to date to ensure they are safe for navigation.

It is unlikely that the presence of an echo sounder would have prevented the grounding. For an echo sounder to be an effective navigational safety barrier, two conditions need to exist: the expectation of danger, and seabed contours that would alert the crew to danger ahead in sufficient time to take avoiding action. In this case, the skipper was aware that the vessel was in shallow water but the nature of the isolated rock hazards meant that an echo sounder would be unlikely to warn of the danger in sufficient time to react.

However, had *Surprise* been fitted with an echo sounder, during normal operations, the skipper would have been able to observe the actual clearance under the keel and, therefore, build up an awareness of the local depths and hazards on frequently used routes. This would have been a helpful additional layer of local knowledge to aid safe navigation.

Surprise's skipper did not fully utilise the functionality of his chart plotter. Had he done so, and invested in an echo sounder, he would have enhanced his level of situational awareness and significantly reduced the risk of grounding.

2.5 EMERGENCY RESPONSE

When *Surprise* grounded, the skipper's immediate actions were to raise the alarm, ensure passengers donned lifejackets, start the bilge pumps and launch the liferaft. He also took a conscious decision not to attempt to propel *Surprise* off the rock. As a result of these actions, all the passengers were evacuated safely from *Surprise* to assisting vessels within about 15 minutes.

The skipper's actions in response to the emergency situation were swift and appropriate; in particular, his decision to remain aground was a sensible one, especially as other vessels were close by and able to rapidly evacuate the passengers without *Surprise* having to move. In similar circumstances, the temptation to re-float the vessel and attempt to return to harbour unaided can be very strong. However, such action can lead to further damage and result in uncontrolled flooding with the subsequent risk of loss of the vessel and potential loss of life.

The skipper and his crewman should be commended for their appropriate actions to ensure the safety of the passengers. However, despite this very effective emergency response, *Surprise* did not have documented procedures for grounding nor were regular drills carried out. Procedures covering the actions to be taken for all foreseeable emergencies should be documented and conducting drills will build crew confidence in their ability to cope with emergency situations.

2.6 SAFETY MANAGEMENT

2.6.1 Safety management system

The DSM Code required an SMS for the safe operation of vessels and procedures for dealing with emergencies; however, *Surprise*'s SMS, made up of the SMBA's SMS and the onboard procedures, did not provide sufficient guidance.

Preparing a risk assessment is a methodical process that identifies hazards, the associated consequences and the mitigating actions necessary, including procedures for operations and emergencies. The SMBA's SMS had been approved by the MCA but did not contain any guidance for skippers on the conduct of passage planning or safe navigation.

Accurately calculating and maintaining a minimum UKC would be challenging given the navigational hazards and absence of drying heights in some intertidal areas. Nevertheless, since the accident, the SMBA has addressed this issue through the production of updated procedures **(Annex I)** that call for *reasonable and safe under keel clearance* when conducting wildlife sightseeing trips. It also states that passengers are *likely to be just as content with a view of a seal at five metres distant instead of two.* These updated procedures introduce the concept of maintaining a minimum UKC but would benefit from more detail on how and where UKC should be calculated when planning wildlife trips.

2.6.2 Effectiveness of audits

During inspections of *Surprise*, the MCA identified numerous safety deficiencies that required rectification prior to sailing. Indeed, based on the safety shortcomings, the MCA took a decision to only issue a short-term Safety Management Certificate for the vessel and then re-inspect it in the near term.

Although the skipper had rectified most of the safety deficiencies, there was no documented risk assessment and crew training had been limited to briefings; no drills or exercises had been recorded. This should not distract from the fact that the emergency response on board *Surprise* was efficient and effective. However, it would have been more appropriate for the skipper to have invested time in developing a documented risk assessment, particularly for navigation, and carrying out drills and exercises with the crewman, rather than just conducting verbal briefings.

2.6.3 Operational modes for passenger vessel safety

The MCA's UK Passenger Certificate for *Surprise* **(Annex C)** imposed two operational modes that were intended to control passenger numbers based on the provision of lifesaving apparatus and distance from safety.

On the morning of the accident, when the skipper of *Surprise* agreed to provide a trip to Bishop Rock, the Mode 2 restriction of a maximum of 35 passengers should have been applied. However, this limitation was not taken into account and more than the maximum number of passengers permitted in Mode 2 were embarked for a sightseeing trip advertised to include Bishop Rock.

For the UK passenger certificate Mode 1 and 2 system to be effective, the SBMA skippers should take it into account when deciding which trips to offer and how many tickets to sell given the intended voyage.

2.7 LOCAL ARRANGEMENTS FOR LICENSING AND ENDORSEMENT

The Council was licensing commercial vessel operations in the archipelago by issuing Isles of Scilly boatman's licences. This licence alone was sufficient to operate a small commercial vessel; it was also used to endorse the MCA BMLs for passenger vessel skippers.

The Council's boating sub-committee, which was responsible for dealing with issues relating to the licensing system, did not have underpinning legislation, maritime experience or a suitably qualified advisor to maintain an effective overview of the system. The MCA had also not reviewed the Council's status as a competent authority to issue licences since the original endorsement in 2000 **(Annex F)**.

Shortcomings in the effectiveness of the Council's licensing procedures had previously been identified by MAIB in 2007 [Section 1.14.1]; however, there was no evidence that the recommended risk assessment took place.

Due to the archipelago's navigational hazards, a high degree of local knowledge was required for the safe operation of passenger vessels, particularly the boats such as *Surprise* that were delivering wildlife sightseeing.

Assuring standards of local knowledge for BML holders was delivered through an LKE for holders of a Tier 1 licence and examination of local waters as part of the core examination for Level 2 BML holders. Given that the MCA did not have a dedicated examiner in the Isles of Scilly, it had come to rely on the Council's examination process for a local authority licence, which was primarily a test of local knowledge.

For a local licensing system to be effective, a process needs to be in place that assures standards of training and examination. There was no documented syllabus or written training guide for skippers taking the Council's local examination, and the examiner had not been approved by the MCA. If an examination syllabus and guide to local navigation had been developed, it could have formed the basis for training in preparation for written, oral or practical examinations and would also have provided continuity when examiners changed.

An effective licensing system also needs to be responsive to the lessons identified after accidents, which was not the case post the grounding of *Wizard* in 2007; additionally, the Council did not take any action in response to this accident.

The Council of the Isles of Scilly did not have the marine expertise or knowledge to act as a competent authority for the issuing of local boatmen's licences, and there was no documented syllabus, assurance of training standards or effective response to accidents. This issue needs to be addressed by the Council in co-operation with the MCA and SMHA.

SECTION 3 - CONCLUSIONS

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

1. *Surprise* grounded on an isolated rock while being manoeuvred in a hazardous area during a wildlife sightseeing trip. [2.2]

2. The grounding occurred on an intertidal area of the chart where the skipper was wholly reliant on local knowledge to maintain navigational safety. Had conventional navigation techniques been applied when planning the trip, it would have been apparent that entering the bay was unsafe. [2.3.1, 2.3.2]

3. The skipper relied upon an amount of wash around shallow rocks to aid him avoiding these hazards. The glassy calm conditions at the time of the accident meant that this indicator was not present. [2.2]

4. Had the SMBA skippers developed generic passage plans and set limits for UKC and proximity to hazards such as shallow rocks, this accident might have been avoided. [2.3.1]

5. More effective use of electronic navigation aids, including an echo sounder, could have improved the safety of navigation on board *Surprise*. [2.4]

6. Although *Surprise*'s onboard procedures did not include the risk of grounding, the emergency response of the crew was swift and appropriate, ensuring all the passengers were evacuated safely back to shore. [2.5]

3.2 SAFETY ISSUES NOT DIRECTLY CONTRIBUTING TO THE ACCIDENT THAT HAVE BEEN ADDRESSED OR RESULTED IN RECOMMENDATIONS

1. The absence of a documented risk assessment on board *Surprise* had been identified as a safety management shortcoming during an MCA inspection; however, this issue had not been addressed by the skipper prior to the accident. [2.6.2]

2. The MCA operational limitation, expressed as Mode 1 or 2, which determined the maximum number of passengers to be embarked based on the intended route, was not considered by the skipper prior to the trip. [2.6.3]

3. The Council of the Isles of Scilly did not have the marine expertise or knowledge to act as a competent authority for the issuing of local boatmen's licences, and there was no documented syllabus, assurance of training standards or effective response to accidents. [2.7]

SECTION 4 - ACTIONS TAKEN

The **Maritime and Coastguard Agency** has:

- Investigated the accident and produced a report, which concluded that:
  - *This trip was no different to many previous trips undertaken by Surprise.*
  - *The conditions were described as 'perfect' and there was little movement of water that might have given a visible indication of rocks.*
  - *The absence of an echo sounder denied the skipper an indication of underwater hazards.*
  - *There was no risk assessment identifying the hazard and the route was chosen based on the likelihood of seeing wildlife; safe passage was reliant on the skipper's local knowledge.*
  - *The skipper did not hesitate to obtain assistance and appropriate emergency procedures were carried out.*
  - *There was confusion regarding the Isles of Scilly Council's responsibility and authority in respect of Boatmen's licences.*

- The MCA investigation recommended that:
  - *A detailed risk assessment should be carried out by the SMBA to identify hazards and ensure appropriate mitigation.*
  - *Echo sounders should be fitted to all boats.*
  - *The safety management system should be reviewed and amended.*
  - *The Isles of Scilly Council should review procedures for responding to issues involving Boatmen's licences.*

The **St Mary's Boatmen's Association** has:

- Revised its procedures for wildlife sightseeing trips taking into account lessons from the accident. The new procedures **(Annex I)** stated that:
  - *The intended route should allow for reasonable and safe under keel clearance.*
  - *When deviating out of recognised safe channels to engage in wildlife watching, a constant evolving dynamic risk assessment should be taking place involving the boatmaster's own experience and local knowledge coupled with observance and monitoring of visible hazards, tidal streams and leeway due to wind.*
  - *Safe distance should be a major consideration when approaching wildlife and a rather wider margin of safety should now be adopted than has hitherto been the case. For example, passengers are likely to be just as content with a view of a seal at five metres distant instead of two.*
  - *For the close approach to wildlife, visual observation is the primary means of maintaining a safe position relative to any hazards present combined with the local knowledge of the area acquired by the boatmaster.*

SECTION 5 - RECOMMENDATIONS

The **Council of the Isles of Scilly**, in co-operation with the **Maritime and Coastguard Agency** and the **St Mary's Harbour Authority**, is recommended to:

2017/127 Review its procedures for the examination and issue of Local Authority Boatman's licences. The review should consider the applicability of the licensing scheme and assurance of examination standards.

The **St Mary's Boatmen's Association** is recommended to:

2017/128 Update its safety management system to incorporate guidance on passage planning and the conduct of navigation. (Such guidance should not affect the responsibility of individual skippers for the safe operation of their own vessels.)

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

Marine Accident Report

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