TWO TUGS

Report of the investigation of WW2 wrecks reported to be HMRT SESAME and USS PARTRIDGE, Baie de Seine, Normandy, France

Southsea Sub-Aqua Club | BSAC Branch 0009
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Front cover images HMRT SESAME © IWM and USS PARTRIDGE PD-US Expired

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Summary

Southsea Sub-Aqua Club's 2019 expedition project 'Two Tugs' continues our desire to learn more about the WW2 Allied invasion of Normandy and the stories of the numerous individual ships, vessels and craft that took part in this momentous and historic endeavour. Our focus has been on smaller ships and craft rather than the more significant ships and whose role was less obvious, but just as vital, to the overall success of Operation NEPTUNE.

The role of tug boats in maritime operations is seldom told yet they were often the saviours of stricken ships and their crews. The tugs were also essential to the successful exercise to construct two artificial harbours which were vital to ensure that the Allied forces were able to be supplied with men, equipment and supplies to strengthen and reinforce their foot hold in Normandy.

Our investigation has revealed some surprising and unexpected results which we are pleased to share through this report. As a result of our surveys and subsequent research we believe that these wrecks are not HMRT SESAME nor USS PARTRIDGE. Indeed our conclusions are that the wreck reported to be HMRT SESAME is the British tug 'DUNDAS' and the wreck reported to be USS PARTRIDGE is, to our surprise, the British Destroyer HMS ISIS. This report sets out the evidence from survey and research which supports this conclusion. In addition, this reports identifies other surprising artefacts which we discovered at the wreck sites and a findings of a marine life survey which enhance the overall project report.

In addition to the investigation and recording these wrecks our Two Tugs project aimed to raise awareness of Operation NEPTUNE and its place in modern history. We also wish to illustrate the role recreational divers can play in documenting the historic environment that otherwise remains unseen and potentially forgotten.

Acknowledgements

Our sincere gratitude goes to the many people and organizations who have assisted and supported us in this challenge especially;

- The French Cultural Ministry, Département des Recherches Archéologiques Subaquatiques et Sous-Marines (DRASSM)[1]. In particular, we wish to thank Cécile Sauvage;
- The British Sub-Aqua Jubilee Trust for their financial support to this project;
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- Chris Howlett – Subject matter expert on the Normandy Campaign and formerly of UKHO, for his advice, support and contribution to this report;
- Danny Lovell – Subject matter expert for his research and contribution to this report;
- Robert S. Neyland, Ph.D. Branch Head, Underwater Archaeology Branch, Naval History and Heritage Command, US Navy, Washington DC for information regarding the US Navy survey of wrecks in the Baie de Seine.
- Mike Constandy of Westmoreland Research LLC for his speed in obtaining copies of ship's plans from the US National Archive.

[1] The French organization responsible for the management of all subaquatic and submarine archaeological activities. DRASSM is qualified to deal with all matters of archaeological research that involve diving, is charged formally to control submarine archaeological research and discoveries, and to implement the legislation on maritime cultural goods.

- Miss Audrey Patraux for her assistance with translation of this report into French.
- Mr Richard Rowley for assistance with location/position images.

Copyright Statement

[2] Alison Mayor, Martin Davies, Tom Templeton, Doug Carter, Robert Watkins, Jenny Watkins, Jim Fuller, Pete Dolphin, Alison Bessell and Mark Hardy.

TWO TUGS

1. Introduction

In June 1944, following two years of meticulous planning the city of Portsmouth and other harbour towns along the south coast of England prepared for Operation NEPTUNE[3], the Naval assault phase of Operation OVERLORD, and the largest ever maritime invasion. The Allied fleet of nearly 7,000 ships, vessels and craft with their precious cargo of hundreds of thousands of troops and equipment finally set sail on 5th June 1944 to cross the Channel to Normandy. In the early hours of D-Day on the 6th June 1944, the first soldiers landed on the French beaches code named UTAH, OMAHA, GOLD, JUNO, and SWORD. So began one of the most daring and ambitious campaigns of WW2 which ultimately led to the liberation of France and the end of WW2 in Europe.

Many vessels were lost or damaged during Operation NEPTUNE as German defences fought to repel Allied forces. Seventy-five years later the wrecks of the Baie de Seine remain the last resting place for many who made the ultimate sacrifice for our freedom.

Of the vessels that took part in the Normandy Campaign many were lost as a result of enemy action, weather, or mines. Thousands of men made the ultimate sacrifice and for many their last resting place is unknown.

This project centred on two vessels lost within just a few hours of each other on 11th June 1944, namely a British Rescue Tug 'SESAME' and the American former minesweeper USS 'PARTRIDGE'. Our aim was to survey and record the wrecks and confirm their identity through archive document research.

However, following our survey and historic research we were surprised to discover that the wrecks are unlikely to be the SESAME and PARTRIDGE; as evidenced and explained in the detail of this report. There were also a number of unexpected discoveries that emerged as a result of our diving and research.

1.1 Background

Since 1954 members of Southsea Sub-Aqua Club (SSAC)[4] have enjoyed exploring our underwater world and the history that lays hidden in the depths. Over time our members have contributed much to the recreational diving world and the wider community through their determination, skills and hard work. From the invention of Octopush (underwater hockey) to the discovery of the historic Tudor flagship 'Mary Rose'[5] SSAC Branch[6] have been one of the most active and productive branches of the British Sub-Aqua Club. For the last ten years the club have been actively recording

[3] The codename for the naval assault phase of Operation OVERLORD.
[4] Established in April 1954 as Branch 0009 of the British Sub Aqua Club (https://www.bsac.com/home/)
[5] Led by Alexander McKee, it was members of SSAC that found and identified the wreck of Henry VIII warship Mary Rose.
[6] www.southseasubaqua.org.uk

wrecks along the south coast of England and in particular the wrecks associated with the largest ever maritime invasion; the WW2 wrecks of D-Day and Operation NEPTUNE[7].

It was a natural progression to extend this work to learn more about the Normandy campaign, through the investigation and recording of unidentified wrecks of the Baie de Seine believed to be lost during this historic endeavour. In 2017 our Project Cardonnet investigated and recorded several of the WW2 Operation NEPTUNE wrecks on the Banc du Cardonnet, located in the Baie de Seine, Normandy. In order to achieve this the dive team were required to obtain formal permission from the French authorities and also to achieve French commercial diver equivalence certification[8]. The success of Project Cardonnet in recording these wrecks has enabled the dive team to return to Normandy and, having obtained approval, to conduct two successful projects during 2018; 'No Roses' and 'Finding Cato' investigated the wreck of a possible British Landing Craft and three British minesweepers.

The inspiration for this project followed a survey expedition aboard the DRASSM survey vessel 'Andre Malraux' at the kind invitation of Cecile Sauvage. During this expedition Martin Davies and Alison Mayor dived the wreck believed to be HMRT SESAME. We became curious about the wreck as certain features did not align with early research. This research also highlighted the fate of the USS PARTRIDGE, which was carrying out similar duties to SESAME and sank as a result of enemy action within hours of her loss. Our objective was to investigate the two wrecks and the circumstances that led to the loss of these relatively unknown vessels.

The project team members are extremely aware of the ultimate sacrifice made by many in the Normandy campaign and throughout WW2. We are always respectful of the fact that many of these wrecks are the last resting place of brave soldiers and sailors from the Allied forces. Based in the historic naval city of Portsmouth, from where many thousands of men set sail for Normandy, we are always sensitive to the fact that we are visiting a special place, one that few people are able to visit. We take the greatest care not to disturb or interfere with any wreck or remove artefacts. Indeed many of the project team have either served in or with the British Armed Forces and/or have family members who have served.

1.2 The Wreck Sites and Survey

Using the skills and knowledge we have developed from our 2017 and 2018 expeditions and with the approval of DRASSM, we planned to record the wrecks of PARTRIDGE and SESAME located in the centre and to the west of the Baie de Seine on the approaches to OMAHA beach. Various survey techniques were used;

- Physical measurements
- Photography;
- Photogrammetry;
- Videography; and
- Side-scan Sonar.

Where practicable, 3D photogrammetry models of significant wreck features were created to aid identification and improve the wider knowledge, understanding of the wreck sites. To create a holistic record of the wrecks a marine life survey was also undertaken.

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[7] Operation NEPTUNE was the maritime phase of Operation OVERLORD - The invasion of Normandy by sea and the liberation of France.

[8] Institut National de Plongée Professionnelle (INPP - 'Classe 1B')

Using side scan and multibeam sonar data gathered by DRASSM[9] and working closely with subject matter experts Chris Howlett and historical researchers Stephen Fisher and Danny Lovell, our Two Tugs project centred on the sites using DRASSM wreck reference numbers as follows;

'EA 4630' - supposed HMRT SESAME; and

'EA 3234' - supposed PARTRIDGE (AM16).

1.3 Expedition Unknown… the Television Programme

Our Two Tugs project came to the attention of Circle the Globe media production company whose 'Expedition Unknown' series is broadcast on the Discovery Channel. Following our survey week we were delighted to return to Normandy to dive with the host of the programme Josh Gates, and tell him about some of the wrecks we have been investigating. The resultant television programme is due to broadcast in spring of 2020 and will be a significant help in delivering our aim to raise awareness of Operation NEPTUNE and the history of some of the wrecks in the Baie de Seine to a global audience.

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[9] DRASSM multibeam surveys ref 4630 (2018) and 3234 (2019)

2. Project Aims and Objectives

2.1 Project Aim

The primary aim of our project was to record the wrecks and, through reference to the documentary historical record, confirm the identity of the wrecks. In addition, we aim to share our findings with others to raise awareness of the heroic sacrifice made by Allied forces in seeking to liberate France.

2.2 Project Objectives

Our principal objective was to investigate and record wrecks, allegedly those of HMRT SESAME and USS PARTRIDGE, to confirm their identity as follows:

Objective 1: to contribute to the knowledge of the archaeological sites through production of a field report and photogrammetry models to assist in the interpretation of the wrecks. The resultant documentation may be used to confirm the extent and preservation of the vessel which can become a baseline for future condition surveys. The data will be submitted to DRASSM and may be of use to professional archaeologists, avocational archaeologists, and also for recreational divers who only want to visit the wreck and enjoy the experience.

Objective 2: to confirm, or otherwise, the identity of the wrecks to enable the story of the role of tugs and those who served on them to be remembered today and in the future.

To achieve these objectives we recorded key identifying features of the wrecks and cross referenced this with historical photographs and documentary records where available.

2.3 Permission to Survey

In order to undertake a survey and document the wrecks permission must first be sought from the French authorities, namely DRASSM and the Prefecture Maritime. An application, with supporting project plan was submitted and permission was granted on by the Ministry of Culture on 9th July 2019[10] and Prefecture Maritime on 8th July 2019[11] (see Appendix 2).

[10] Ministère de la Culture OA 3809 dated 9th July 2019.
[11] Préfecture Maritime de la Manche et de la mer du nord No 0-16340-2019/PREMAR MANCHE/AEM/NP dated 8th July 2019.

3. Operation NEPTUNE and the Role of Tugs.

3.1 Operation NEPTUNE

On D-Day, 6th June 1944, Allied forces launched a combined naval, air and land assault on Nazi-occupied France[12]. Codenamed Operation 'OVERLORD', the Allied landings on the Normandy beaches marked the start of a long and costly campaign to liberate north-west Europe from German occupation. Early on 6th June 1944, Allied airborne forces parachuted into drop zones across northern France. Ground troops then landed across five assault beaches; UTAH, OMAHA, GOLD, JUNO and SWORD. By the end of the day, the Allies had established a foothold along the coast and could begin their advance into France.

The invasion was conducted in two main phases - an airborne assault and amphibious landings. Shortly after midnight on 6th June 1944, over 18,000 Allied paratroopers and glider borne troops were dropped into the invasion area to provide tactical support for infantry divisions on the beaches. Allied air forces flew over 14,000 sorties in support of the landings and, having secured air supremacy prior to the invasion, many of these flights were unchallenged by the Luftwaffe.

Figure 1 Aerial photo of ships and tugs of the Royal Navy massing off the Isle of Wight before setting off for the Normandy beaches. (© IWM (A 23720A))

[12] Source Imperial War Museum web site. https://www.iwm.org.uk/

The maritime phase of Operation OVERLORD was codenamed Operation 'NEPTUNE'. In overall command was British Admiral Sir Bertram Ramsay, who had served as Flag Officer at Dover during the Dunkirk evacuation four years earlier. He had also been responsible for the naval planning of the invasion of North Africa in 1942, and one of the two fleets carrying troops for the invasion of Sicily the following year. On 1st June, from his headquarters at Fort Southwick on the outskirts of Portsmouth, Admiral Ramsey took command of the immense armada of ships collected together for Operation NEPTUNE.

The invasion fleet, which was drawn from eight different navies, comprised 6,939 vessels: 1,213 warships, 4,126 landing craft of various types, 736 ancillary craft, and 864 merchant vessels[13]. The majority of the fleet was supplied by the UK, which provided 892 warships and 3,261 landing craft. In total there were 195,700 naval personnel involved; of these 112,824 were from the Royal Navy with another 25,000 from the Merchant Navy, 52,889 were American, and 4,998 sailors from other allied countries.

Figure 2 A large group of LCTs (Landing Craft Tank) moored along the quayside at Southampton, 1944. (© IWM (A 23731))

Two important co-ordinating bodies were created. The Build-Up Control Organisation (BUCO) was formed on 20 April 1944 at Combined Operations Headquarters (although it was not part of it). It was charged with responsibility for regulating the build-up of vehicles and personnel by allocating priorities for the available shipping. Once the final plans for the landing were drawn up, all further alterations had to be implemented by BUCO. Movement Control (MOVCO) was responsible for the movement of

[13] www.ddaymuseum.co.uk/d-day/d-day-and-the-battle-of-normandy-your-questions-answered

units to the coastal areas and ports from which they would embark. Like BUCO, it had separate staffs for the American and British zones which operated independently. There was also the Turnaround Control Organisation (TURCO), which controlled the turnaround of shipping at the ports of loading; the Combined Operations Repair Organisation (COREP), which handled repairs to damaged ships and landing craft; and the Combined Tugboat Organisation (COTUG), which managed a fleet of tugboats.

The invasion fleet was split into the Western Naval Task Force (under Admiral Alan G Kirk) supporting the US sectors and the Eastern Naval Task Force (under Admiral Sir Philip Vian) in the British and Canadian sectors. Available to the fleet were five battleships, 20 cruisers, 65 destroyers, and two monitors. German ships in the area on D-Day included three torpedo boats, 29 fast attack craft, 36 R boats, and 36 minesweepers and patrol boats. The Germans also had several U-boats available, and all the approaches had been heavily mined.

Figure 3 Admiral Bertram Ramsay, Allied Chief, Expeditionary Force, with Commodore H W Faulknor, DSO, RN, watching from the bridge of an MTB as the Invasion Fleet sets out from its base. (© IWM (A 23841))

Beginning at dawn on 6th June 1944, two naval task forces landed over 132,000 ground troops on the beaches of Normandy as part of Operation NEPTUNE, the seaborne invasion of northern France. The target 80 Km (50-mile) stretch of the Normandy coast was divided into five sectors: UTAH, OMAHA, GOLD, JUNO, and SWORD. The Western Task Force was responsible for the American beaches at UTAH and OMAHA, and the Eastern Task Force was assigned to the British at GOLD, JUNO and SWORD. Within these task forces were five Naval Assault Forces - one for each of the five beaches. The Allied navies bombarded German coastal defences both before and during the landings and continued to provide artillery support after D-Day as troops moved further inland.

Naval forces and merchant ships also helped transport men and supplies during the crucial post-invasion build-up. Daily convoys, controlled and guarded by the Royal Navy, brought reinforcements and supplies from England and took casualties and German POWs from France. Operation NEPTUNE was completed on 30 June 1944 ('D'+24), when responsibility for the reception and defence of shipping was transferred to the Flag Officer, British Assault Area and the Eastern Naval Task Force was formally disbanded. By this date, 570 Liberty Ships, 180 troop transports, 788 coasters and 905 LSTs, as well as 1,814 LCTs and LCI(L)s, had delivered their cargoes to the far shore, landing 861,838 men, 157,633 vehicles and 501,834 tons of stores.

By the time the Battle of Normandy ended in August 1944, these numbers had increased to over 2 million men, 400,000 vehicles and 3 million tons of stores and supplies. The build-up convoys continued and a strong seaward defence was still necessary, to protect the anchorages and convoys against the surface ships and U-Boats based on the Biscay coast, as well as the "Small Battle Units" deployed from the beaches to the east of the River Orne, until the former were all sunk or neutralised (in late August) and Le Havre was captured on 12 September 1944.[14]

3.2 Auxiliary Vessels and Tugs

A wide variety of smaller vessels from Allied naval forces were allocated for duty in support of Operation NEPTUNE. These vessels comprised specialist craft and more traditional vessels that were adapted for use in supporting Operation NEPTUNE. Over seven hundred vessels fell into this category, as follows;

Tugs and Rescue tugs	216	'Mulberry' control	9
Survey ships	4	'Pluto' force	33
Mooring and Buoy vessels	36	AA craft	9
Telephone cable ships	6	Smoke-screen trawlers	62
Salvage and wreck dispersal	42	"Miscellaneous" vessels	295
Depot and repair ships	15	Total	727

Table 1 Auxiliary Vessels involved in Operation NEPTUNE.

3.3 Naval Losses during the Normandy Campaign

On D-Day, three destroyers (Norwegian, British and American), one US minesweeper, one RN MTB and one US patrol craft were sunk or damaged beyond repair by all causes. One British merchant ship was lost.

Subsequent losses associated with support for the invasion forces, to 12th September 1944, totalled 50 major and 10 minor war vessels sunk or damaged beyond repair and 26 merchant vessels lost outright.[15]. However the number of smaller Auxiliary craft lost could not be established during our research. According to the Royal Naval Historical Branch publication 'Operation NEPTUNE - The Normandy Invasion D-Day 6th June 1944[15]; "Coaster ASHANTI and 4 tugs sunk by E-boats in mid-Channel on 11th June 1944". Both HMRT SESAME and USS PARTRIDGE were reported as sunk on 11th June 1944 and are assumed to be two of the four tugs mentioned.

PARTRIDGE and SESAME were lost on 11th June 1944 and both had been tasked with towing Mulberry Harbour units and fell victim to German torpedoes launched from E-Boats. Many lives were lost.

14 https://www.royalnavy.mod.uk/-/media/royal-navy-responsive/documents/events/d-day-70/13_472-nhb-operation-neptune-d_day-book.pdf

15 https://www.royalnavy.mod.uk/-/media/royal-navy-responsive/documents/events/d-day-70/13_472-nhb-operation-neptune-d_day-book.pdf

4. Project and Survey Methodology

4.1 Position of the Wrecks

The wrecks are positioned 16km (8.6 Nautical miles) to the North West (EA4630) and 20Km (10.7 Nautical miles) to the North (EA3234) of Port-en-Bessin. Our boat (Southsea Explorer) journeyed out to the sites for each dive, with a transit time of between 30 - 40 minutes. The transit time was dependent on the sea state and weather conditions on the day. Below is a table indicating the known charted positions and their distance and bearings from Port-en-Bessin to the sites that we will be using. The positions are as follows:-

Site Name	Latitude	Longitude	Distance/Bearing	Reciprocal
EA4630 (SESAME)	49°27.506N	00°54.827W	16Km - 316°NW	16Km – 134° SE
EA3234 (PARTRIDGE)	49°31.426N	00°43.890W	20Km - 005°N	20Km - 185°S

Table 2 Positional data of wreck sites. (Source DRASSM)

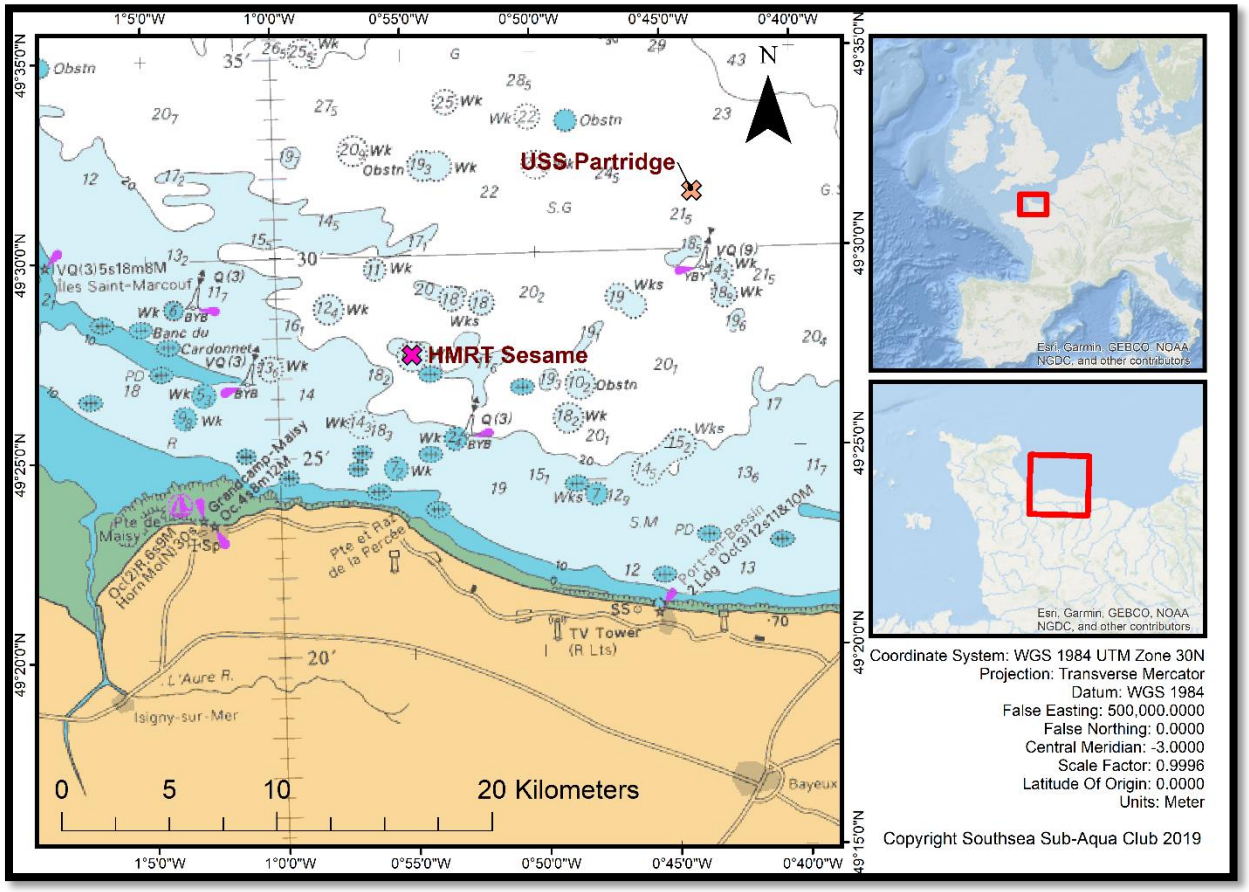

Figure 4 section of chart showing position of Target 1 PARTRIDGE and Target 2 SESAME. (© Richard Rowley)

4.2 Expedition Plan and Logistics

We travelled from Portsmouth to Ouistreham via ferry on the morning of 20th July 2019, and arrived that afternoon at Port-en-Bessin.

Figure 5 Southsea Explorer - SSAC's well equipped dive boat. (© Martin Davies)

Our boat 'Southsea Explorer' is equipped for diving and has been purposely designed for diving operations. Fitted with two navigation systems, five sonar systems and two DSC VHF radios, Southsea Explorer has capacity for a maximum of 10 persons, (8 divers and 2 crew). The boat is equipped with first aid and emergency oxygen and also has a ladder to aid recovery of divers from the water. With a powerful 175Hp engine and 120L of fuel it has a maximum operating range of 60 miles (100Km).

Boat operations were conducted from the harbour at Port-en-Bessin. This harbour is tidal and has access to the sea to by a lock gate system which operate 2 hours either side of High Water. Our experience has shown that we can access the water 3 hours either side of high water if we use the slipway next to the fish market. These times were taken into account when planning the diving operations. The dive team ensured that the programme for the day allows sufficient time to arrive at Port-en-Bessin and access the outer harbour through the lock system or by launching directly from the slipway. The daily programme was adjusted to allow for the distance to dive site and slack water for diving operations. For much of the survey week we planned to dive once a day due to the restriction of low water at the port. However towards the end of the week there were opportunities to dive twice.

Figure 6 the outer harbour at Port-en-Bessin. (© Martin Davies)

Port-en-Bessin has all we need in terms of shops, fuel, goods and services and will also provide an excellent base to explore the area where there are many points of interest particularly those connected with D-Day and the Battle of Normandy.

We stayed in a gîte near the coast to the east of Port-en-Bessin and not far from the landing beaches of OMAHA and GOLD.

Figure 7 our accommodation near Commes and Port-en-Bessin. (© Martin Davies)

4.3 Diving and Survey Methodology

We were aware that in order to record and document the wreck we would require permission from the Département des Recherches Archéologiques Subaquatiques et Sous-Marines (DRASSM) and the Prefecture Maritime. An application with associated project plan, risk assessment and emergency plan was submitted to DRASSM in November 2018 and subsequently approved on 28 March 2019. A copy of the DRASSM and Prefecture permission documentation can be found at Appendix 1.

All divers taking part in the survey activity met the required certification level of INPP Level 1B. The diving was conducted in accordance with BSAC Safe Diving Practices and French diving regulations and MT12. All divers held current 'Fit to Dive' medical certification.

4.4 Project and Diving Management

The nominated Project Leader was Martin Davies and the appointed Dive Operations Manager was Tom Templeton. The table below details the dive/survey team members, their qualification and roles in the project.

Name	Qualifications	Role
Martin DAVIES	INPP Level 1B* BSAC Advanced Diver CMAS 3* diver BS EN 14153-3 ISO 24801-3	Project Leader Diving Officer for SSAC Photographer/Photogrammetry Coxswain
Doug CARTER	INPP Level 1B* BSAC Advanced Diver	Survey Diver

	CMAS 3* diver BS EN 14153-3 ISO 24801-3	
Jim FULLER	INPP Level 1B* BSAC Advanced Diver BSAC Open Water Instructor CMAS 3* diver CMAS 2* Instructor BS EN 14153-3 ISO 24801-3	Survey Diver Coxswain
Alison MAYOR	INPP Level 1B* BSAC Advanced Diver CMAS 3* diver BS EN 14153-3 ISO 24801-3	Survey Diver Photographer
Tom TEMPLETON	INPP Level 1B* BSAC Advanced Diver BSAC Open Water Instructor CMAS 3* diver CMAS 2* Instructor BS EN 14153-3 ISO 24801-3	Dive Operations Manager Survey Diver Photographer/Video Coxswain
Alison BESSELL	INPP Level 1B* BSAC Advanced Diver BSAC Open Water Instructor CMAS 3* diver CMAS 2* Instructor BS EN 14153-3 ISO 24801-3	Survey Diver Photographer Marine Biologist
Jenny WATKINS	INPP Level 1B* BSAC Advanced Diver BSAC Open Water Instructor CMAS 3* diver CMAS 2* Instructor BS EN 14153-3 ISO 24801-3	Survey Diver Photographer
Robert WATKINS	INPP Level 1B* BSAC Advanced Diver BSAC Open Water Instructor CMAS 3* diver CMAS 2* Instructor BS EN 14153-3 ISO 24801-3	Survey Diver Photographer Coxswain

Table 3 Project diving team and roles.

In addition to the dive team, valuable support was provided by former SSAC member Alain Demairé who as a CMAS and French Federation 3* instructor was able to provide advice on French diving regulations. Hydrographic expertise was provided by Chris Howlett, who also was able to provide historical expertise along with Stephen Fisher, an archaeologist and historical researcher specialising in the Normandy campaign. Assistance with research has also been received from Danny Lovell (WW2Talk).

A comprehensive dive plan, risk assessment and incident plan were produced as part of the approved project plan submitted to DRASSM for consideration. All members had third party liability insurance (BSAC) plus travel and medical cover.

Following approval by DRASSM and the Maritime Prefecture a Notice to Mariners was issued to inform sailors and vessels that the survey was taking place. Two INPP certified divers were required to remain on the boat during diving operations to provide surface / rescue cover during diving operations.

Before the project began and prior to each dive a comprehensive briefing was given to all taking part. Relevant information was provided including;

- Diving team composition;
- Boat details, including safety equipment;
- Dive times to coincide with slackest possible water;
- Pre-dive planning using French diving tables (MT12) to back up computer calculations;
- Risk assessment including a daily risk assessment; and
- Daily operations plan and weather.

All boat and diving equipment used were certified as in test/service. Emergency Oxygen and first aid equipment, boat radios and navigation equipment were checked each day.

Figure 8. Our boat, Southsea Explorer undergoing, pre-launch checks at Port-en-Bessin. (© Alison Mayor).

We chose to conduct our operations from Port-en-Bessin where there is a large and well maintained slip way to launch boats. Access to the open water was possible up to 3 hours before and after High Water. We launched and recovered the boat daily.

Figure 9. Port-en-Bessin boat launch (© Alison Mayor).

The survey was planned to coincide with a good neap tide to maximise slack water period and thereby dive times.

5. Dive Management and Programme

We planned a series of 6-7 dives to conduct the investigation during the period 21st July to the 27th July 2019. The dates selected were on good neap tides and this allowed longer dive times. The longer period of slack water provided the maximum opportunity to record data and also adds to the safety of diving operations.

Diving was conducted to ensure surface safety cover of 2 INPP divers was maintained at all times.

5.1 Port en Bessin Tide and Slack Water Times

The SHOM chart for the area is number 7421 (De la Pointe de La Percée à Ouistreham). Tidal predictions were calculated with UKHO 'Total Tide' software and checked against locally published tidal information. High and Low water calculations based on 1582 LE HAVRE. The tidal predictions for area SN159W for the days of the project were as follows; (note: All times are expressed as local time (UTC +2)). All diving was be subject to weather and sea conditions at the time.

21 July to 27 July 2019

Sunday 21/7/2019							**Duration**	
Low	08:32	1.8 m	Slack from	09:40	to	10:20	40	minutes
High	13:43	6.8 m	Slack from	15:40	to	16:30	50	minutes
Monday 22/7/2019								
Low	09:06	1.8 m	Slack from	09:30	to	10:10	40	minutes
High	14:15	6.4 m	Slack from	15:30	to	16:20	50	minutes
Tuesday 23/7/2019								
Low	09:38	2.0 m	Slack from	10:10	to	10:50	40	minutes
High	14:48	6.5 m	Slack from	16:00	to	17:00	60	minutes
Wednesday 24/7/2019								
Low	10:10	2.2 m	Slack from	10:50	to	11:40	50	minutes
High	15:25	6.1 m	Slack from	16:40	to	17:50	70	minutes
Thursday 25/7/2019								
Low	10:48	2.4 m	Slack from	11:40	to	12:30	50	minutes
High	16:14	6.0 m	Slack from	17:40	to	18:40	60	minutes
Friday 26/07/2019								
Low	11:40	2.6 m	Slack from	12:40	to	13:50	70	minutes
High	17:25	5.8 m	Slack from	18:40	to	19:50	70	minutes

	Unable to launch/recover due to low water
	Possible to launch and/or dive
	Possible but too late in the day
	Planned dive

Table 4 Tidal data and projected slack water times – **local French time**

The green highlighted times in Table 4 above represented those tides which were likely to be suitable for diving the sites near Port-en-Bessin. Actual slack water was usually 10-15 minutes before the projected time.

The longer slack water periods of up to 70 minutes from mid-week onwards, provided an excellent opportunity to gather data, photographs and video, along with measurements and site plans if possible. The maximum dive time was no more than 60 minutes. Nitrox gas was used to reduce the risk of decompression illness and extend dive time.

For diving operations we embarked at Port en Bessin 60-70 minutes before the dive time and planned to be at the dive site at least 30 minutes before dive time. For convenience we left a buoy on each wreck site for the duration of the survey on that particular wreck. The buoy was removed at the end of the survey.

5.2 Dives Conducted

The weather and sea conditions were very favourable for the survey and diving was achieved over 6 days. The first wreck to be surveyed was EA4630 (supposed SESAME) followed by EA3234 (supposed PARTRIDGE). The following dives were recorded;

Date	Wreck Site	Number of Divers	Total Dive Time (minutes)	Maximum Depth (metres)
21 July 2019	EA4630 (SESAME)	8	376	27m
22 July 2019	EA4630 (SESAME)	8	322	27m
23 July 2019	EA4630 (SESAME)	8	300	27m
24 July 2019	EA3234 (PARTRIDGE)	7	334	30m
25 July 2019	EA3234 (PARTRIDGE)	8	310	30m
26 July 2019	EA3234 (PARTRIDGE)	7	239	30m
	Total	**46**	**1,881**	

Table 5 Summary of dives completed.

The programme of dives allowed for the shallower wreck (EA4630 SESAME) to be dived at the beginning of the week on high water and the deeper dive (EA3234) to be dived on low water towards the second half of the week.

5.3 Search Techniques

Initial location of the dive sites was made by using the position data from the 2013 survey. We used our boat echo sounder to locate the wreck. Southsea Explorer has side scan sonar and “down-vision” equipment. Once located, a shot line was deployed to mark the wreck site and to enable divers to descend to the wreck.

5.4 Survey Methodology

Survey methods used during the survey included;

- Swim-over surveys to get a general impression of the wreck and determine any key features to aid identification.
- Basic measurements, (distances and objects);
- Photography and video.

The main reason for using photography was to produce 3D models of artefacts and wreck features using photogrammetry[16]. The dive team successfully recorded the wrecks in detail using 3D images created by photogrammetric techniques as well as by video and by taking basic measurements.

Images were processed using AGISOFT PhotoScan to produce 3D visualizations that can be viewed using ADOBE pdf reader (via Google Chrome). In due course the images and supporting documentation will be made fully accessible to the World Wide Web[17] and will allow use of Virtual Reality (VR) to visit the wrecks in a fully interactive way.

Photogrammetry relies on a disciplined approached to the survey process and is particularly challenging when underwater visibility and light penetration is poor. A degree of overlap and recognizable points assists the photogrammetry software to process multiple points (pixels) in a geometric space. In the underwater environment marine growth, movement and current provide additional challenges to obtaining a series of images that are capable of generating a 2D or 3D image.

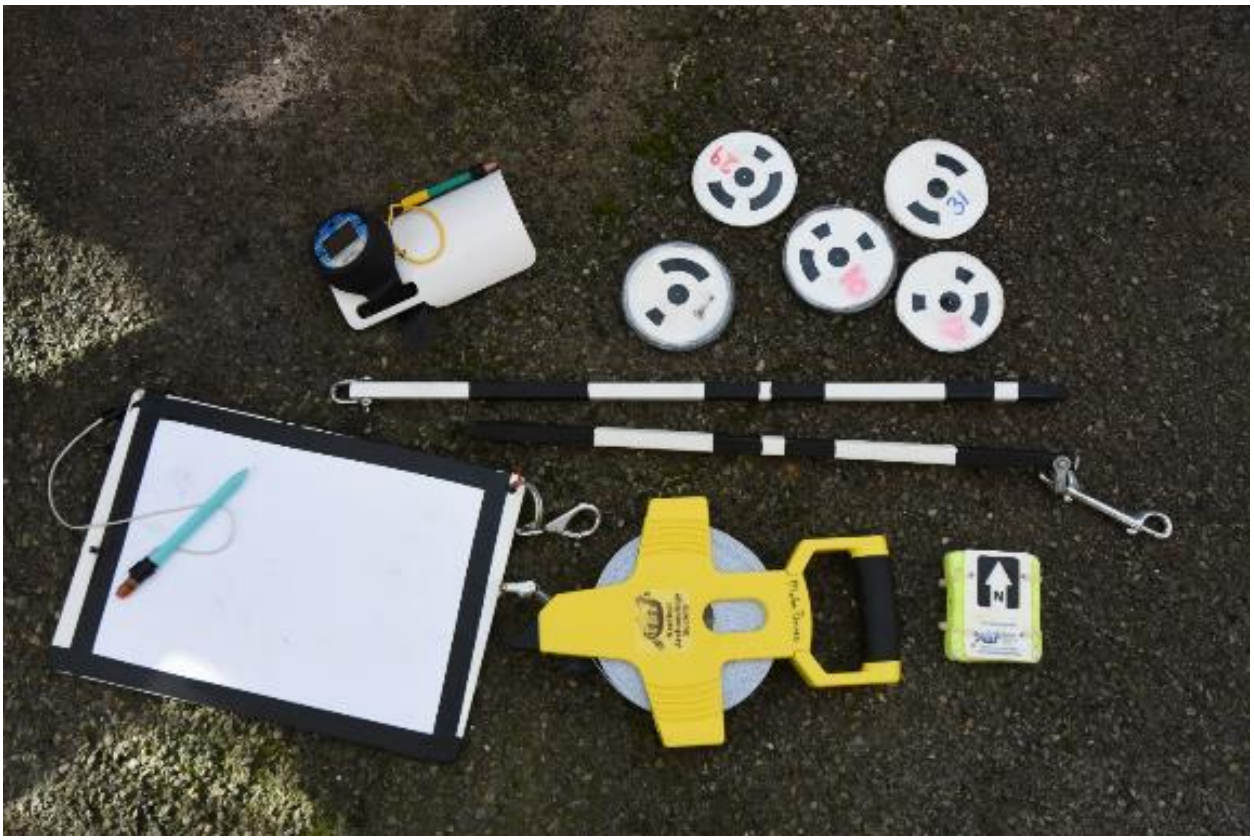

Figure 10. Typical survey equipment used for the project. (© Martin Davies)

Additional survey equipment such as scale bars and circular 'targets' were used to assist the software to identify control points and assist in the creation of the image. Each target has a unique identification symbol irrespective of orientation.

[16] Photogrammetry has been defined by the American Society for Photogrammetry and Remote Sensing (ASPRS) as the art, science, and technology of obtaining reliable information about physical objects and the environment through processes of recording, measuring and interpreting photographic images and patterns of recorded radiant electromagnetic energy and other phenomena.

[17] To be hosted on Sketchfab.com.

Figure 11. Use of photogrammetry targets (© Martin Davies)

Before each dive survey tasks were briefed detailing the objectives for each diving pair. Where known the relevant information on the vessel's history and possible orientation/features were included. Where available, ship construction plans and photographs were used to gain an appreciation and understanding of the construction and lay out of both HMRT SESAME and USS PARTRIDGE to aid divers in the identification of key features and the general orientation of the wreck.

Following each dive, log sheets were completed and archived. From the log sheets it was possible to develop plans for future work.

As this project was a non-disturbance survey project a 'finds index' was not required.

5.5 Skills Developed

Most of the work completed was by video and photography. However, the low visibility and poor light penetration sometimes proved challenging and affected some of the photogrammetry models.

At the end of the diving day a debriefing session and log completing session allowed discussion of results and made sure that the record of the day's diving could be used to contribute to the outcomes of the project.

The feedback sessions were very useful in helping people to understand what they had been recording and resulted in increased understanding of what had been observed and recorded. Where possible, images were viewed to help identify key features of the wreck.

5.6 Research and Documentation/Drawings

In order to assist in the identification of the wreck it was important for us to obtain details of the construction of each type of vessel.

HMRT SESAME

Ship's plans for HMRT SESAME could not be located. However, construction drawings for a sister Assurance Class tug, HMRT Antic, were available to view by request at the National Maritime Museum, Royal Arsenal, in London.

Copyright restrictions do not allow for a reproduction to be published in this report. However, viewing the plans did provide some valuable information about the design and construction of the Assurance Class of tug.

USS PARTRIDGE

Copies of the construction drawings for USS PARTRIDGE were sourced via Mike Constandy, a professional researcher[18]. Mike kindly visited the US National Archive to photograph the drawings and associated modifications to the Lapwing Class minesweeper in order to convert USS PARTRIDGE into a rescue tug.

Other relevant historical information was also provided by Chris Howlett and Danny Lovell. Chris was able to supply details of the anchoring sectors and Danny details of the WW2 Operation NEPTUNE After Action reports and various photographs.

Figure 12 Martin Davies examines the original ship construction plan for HMRT ANTIC. (© Alison Mayor)

5.7 Other Tasks

In addition to recording observations and images from the dive it was also important to prepare for the next day of diving. Diving equipment and photographic / survey equipment was prepared for the following day.

There were opportunities to visit museums and other places of interest in order to conduct research but also to better understand the context and challenges that were present during the historic events of 1944.

One of the local museums, the Musée d'epave sous marine at Port en Bessin contained a number of exhibits that were relevant to our investigations. The museum was established by a former salvage company owner who was contracted by the French Government to remove dangerous wreckage from the Normandy beaches and inshore waters in the post war years.

A number of artefacts were described as being from HMRT SESAME and USS PARTRIDGE in addition to other wrecks. Many of the exhibits appeared to be deteriorating and in poor condition.

[18] Westmoreland Research LLC.

6. Survey of EA4630 - Supposed HMRT SESAME

6.1 Wreck Data

The wreck is located 16Km (8.6Nm) to the North-West of Port-en-Bessin at Latitude: 49°27.506N: Longitude: 00°54.827W (WGS84). The wreck is orientated in an East to West direction.

The wreck stands upright on an even keel in a general charted depth of 20m[19]. The highest point of the wreck, the towing stanchion, stands approximately 4.5m above the sea bed.

First recorded by the UKHO in 1956, the wreck was identified as a steam powered tug, most likely to be British, and likely to be HMRT SESAME. Martin Davies and Alison Mayor were extremely fortunate to have dived the site previously in 2018 as part of the DRASSM survey to support the French application for UNESCO World Heritage Site designation.

Being virtually intact it was a very pleasurable dive with a healthy population of marine life. However, our interest was aroused by several potential inconsistencies with the record of HMRT SESAME's loss and also the dimensions/features of the wreck. This interest led, in part, to our Two Tugs project.

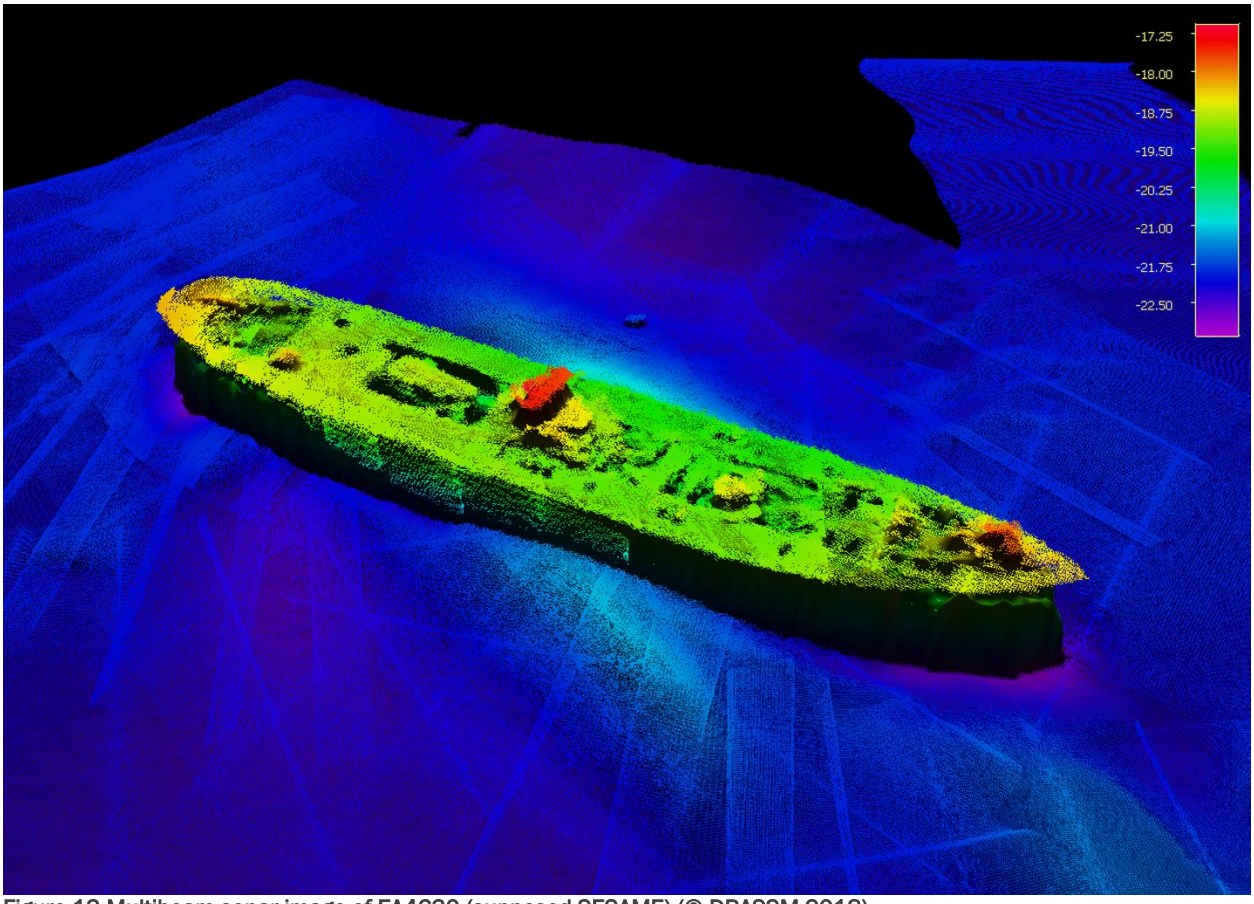

Figure 13 Multibeam sonar image of EA4630 (supposed SESAME) (© DRASSM 2018).

[19] At lowest Astronomical Tide.

Sonar images were also taken using our on-board Raymarine sonars.

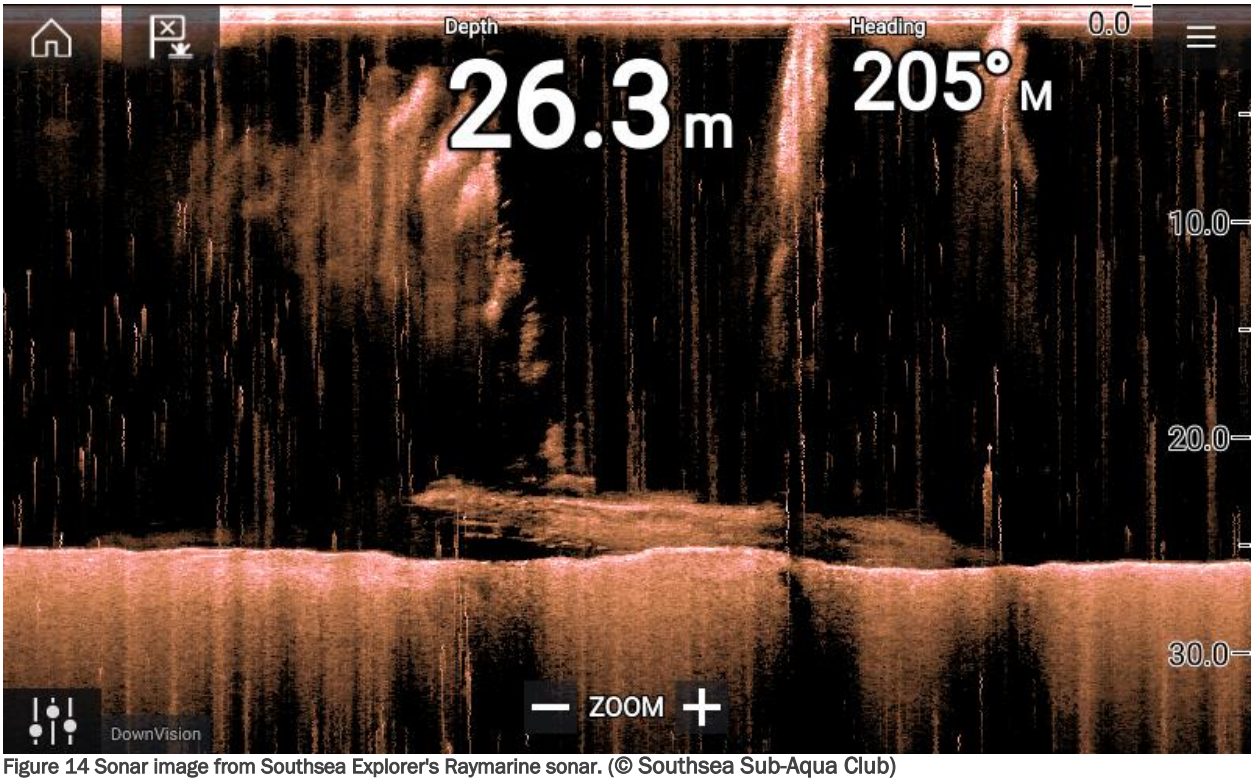

Figure 14 Sonar image from Southsea Explorer's Raymarine sonar. (© Southsea Sub-Aqua Club)

6.2 Survey Findings and Observations EA4630

Our survey examined four key areas of the wreck in order to confirm, or not; the wreck as HMRT SESAME.

1) The dimensions; principally the length and beam of the wreck;
2) The towing arrangements;
3) The engine and propulsion system, and;
4) Any evidence of torpedo damage.

These artefacts are shown as illustrated on the multi-beam image below.

The information gathered during the survey was then compared to historic data for HMRT SESAME and other British Assurance Class tugs. We also conducted research into the loss of HMRT SESAME in order to understand the likely position of her sinking. The comparisons between the data for HMRT SESAME (Assurance Class tug) and our wreck observations are detailed in paragraphs 6.3 to 6.6 below.

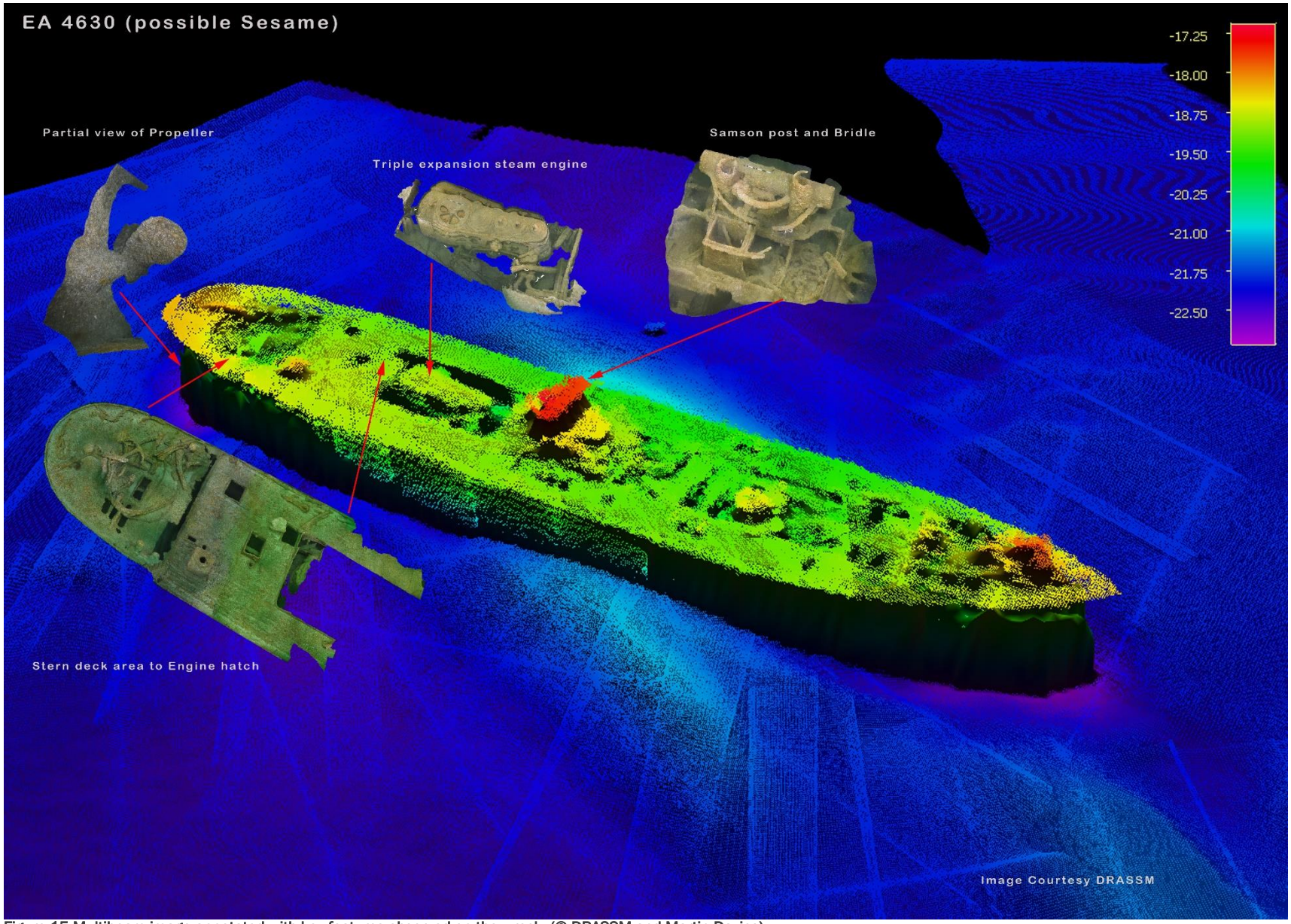

Figure 15 Multibeam image annotated with key features observed on the wreck. (© DRASSM and Martin Davies)

6.3 Wreck Dimensions and Hull

A direct measurement from bow to stern was not practicable due to the towing stanchion and forward winch assembly, which obstructed the ability to measure accurately. In order to overcome this two divers measured from bow to stern on the outer edge of the deck or gunwale. The length measurement was **41m** (134 feet 6 inches). In addition, the beam of the wreck, close to the towing stanchion and estimated to be the widest part of the wreck was measured. The beam measurement was **7.5m** (24 feet 7 inches).

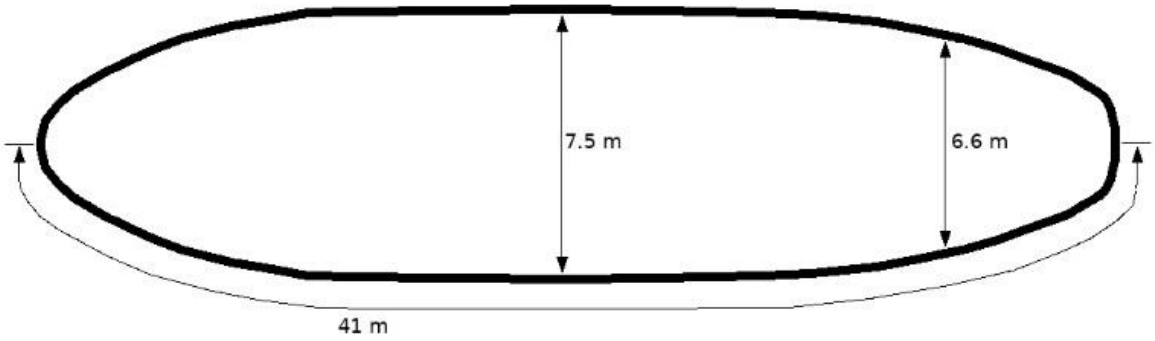

Figure 16 EA4630 Wreck hull measurements (© Jim Fuller)

Further measurements and observations were recorded from the engine bay to the stern. It was noted that the wreck had a break in the structure, which was approximately 6m from the stern extending across the width of the deck (6.3m) and partially down the starboard side of the ship.

The width of the wreck across the deck behind the engine bay was **6.6m** (21 feet 8 inches) indicating a tapering stern.

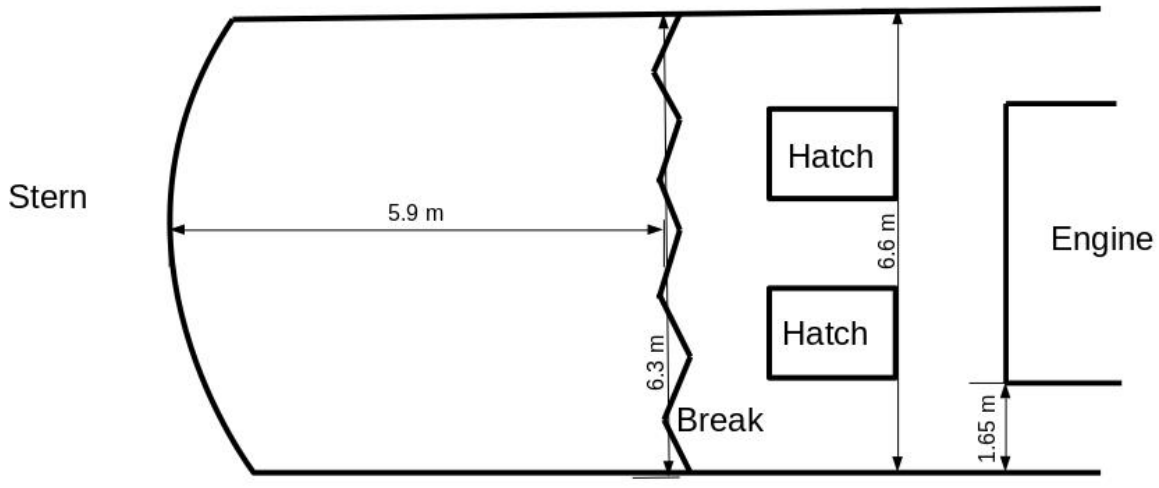

Figure 17 EA4630 Survey data from the stern area. (© Jim Fuller)

A photogrammetry model was also produced of the section between the engine and stern area of the wreck. This model clearly shows the break in the wreck structure and collapse of the deck.

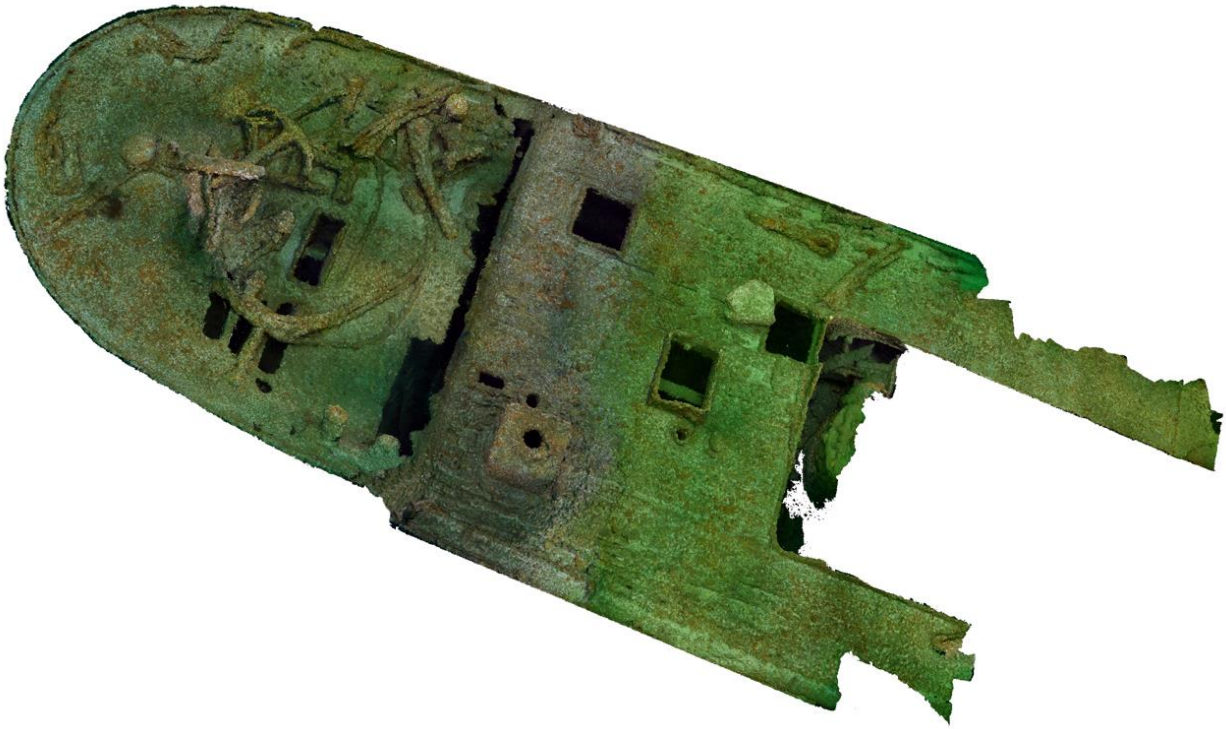

Figure 18 EA4630 Image created from photogrammetry model – a plan view of the deck from the engine bay to the stern. Note steering quadrant and anchor. (© Martin Davies)

Figure 19 EA4630 Image created from photogrammetry model - stern from the port side showing the collapse of the deck area. (© Martin Davies)

Figure 20 EA4360 Image created from photogrammetry model -Stern from the starboard side showing the collapse of the deck area. (© Martin Davies)

The top of the rudder post and steering quadrant were observed together with an anchor and rope. The damage to the starboard side at the top of the hull was significant, but we could not determine whether this had occurred at the time of the sinking or afterwards. However, given the intact condition of the wreck elsewhere, and this being the only evidence of a breach in the hull's integrity, it may be that the damage was a contributory factor to the sinking.

Built 1943 by Cochrane and Sons Ltd., Selby, Yorkshire, HMRT SESAME[20] was the last of the Assurance Class tugs to be built for the Royal Navy, entering service in early 1944.

HMRT SESAME was 156 feet 7inches long (**47.7m**) with a beam of 34 feet 9 inches (**10.6m**). [21]

The ship construction drawing for another Assurance Class tug, HMRT Antic, indicated a dual level or 'stepped' hull with a rise in the hull in the middle of the ship. A photograph of HMRT SESAME below clearly shows this elevation of the forward half of the vessels hull and deck. We did not observe this rise in the hull on the wreck.

[20] Yard Number 1275
[21] http://thamestugs.co.uk/

Figure 21 Photograph of HMRT SESAME January 1944. Note the stepped hull shape. (© IWM (FL 18913))

Observation 1 - The wreck is too small, both in length and width, to be that of HMRT SESAME.

Observation 2 – The hull of the wreck does not rise in a distinctive 'step'.

6.4 Towing Arrangement

One of the most impressive features of the wreck is the towing stanchion situated amidships. This robust structure would have been used to secure the tow rope to the vessel. The stanchion is the highest part of the wreck and is normally shrouded with a large shoal of fish.

The towing stanchion is a key feature of the wreck and confirms the vessel's purpose and design as a tug.

Measurements of the stanchion were taken, which aligned with the data from the previous DRASSM survey data. Part of the rope guide has broken, but otherwise the stanchion remains intact.

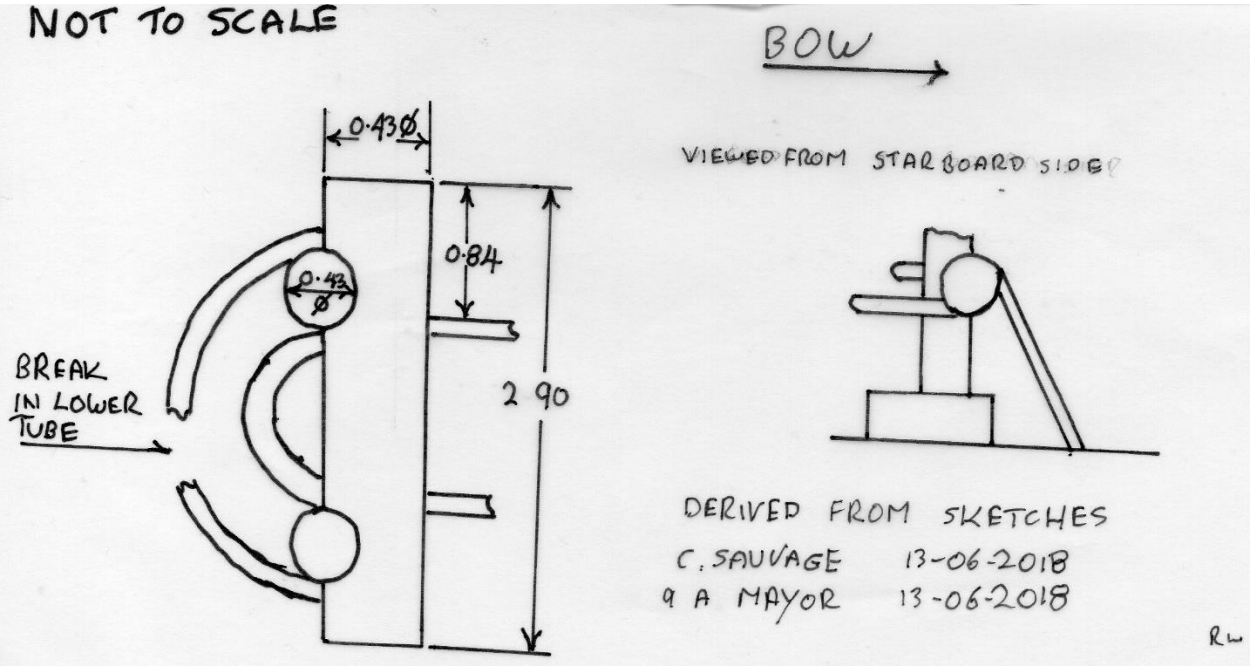

Figure 22 EA4360 Drawing of the towing stanchion with measurements taken by DRASSM survey 2018. (© Rob Watkins)

A photogrammetry of the stanchion was created and detailed sketch produced.

Figure 23 EA4360 Image from photogrammetry model. Towing stanchion from port looking forward. (© Martin Davies)

Figure 24 EA4360 Image from photogrammetry model. View looking down at the towing stanchion. (© Martin Davies).

Having viewed the original construction drawing for Assurance Class tug HMRT ANTIC it was noted that this class of tug was fitted with a 'Monarch Patent tow hook' and the towing stanchion assembly was very different from that observed on the wreck. In addition the Assurance class tugs were fitted with a large capstan winch near the stern. No such winch was observed on the wreck.

Figure 25 Model of HMRT PROSPEROUS, and Assurance Class tug showing tow hook assembly (and stepped hull). (© IWM (MOD 575))

A tow hook was observed at the wreck museum at port-en-Bessin. The exhibit was not labelled and therefore the provenance of the tow hook cannot be established. However, it is likely to be from either HMRT SESAME or USS PARTRIDGE as both tugs had similar tow hook arrangements.

Figure 26 The tow hook exhibited at the wreck museum in Port-en-Bessin. (© Alison Mayor)

Observation 3 – The towing stanchion assembly on the wreck is not of a design that was present on Assurance Class tugs (such as HMRT SESAME).

6.5 Engine and Propulsion System

The propulsion system indicated that the vessel was a steam powered tug. Part of the boiler was observed, but was mostly covered by deck and the towing stanchion. There was no evidence of coal so the assumption is that the fuel used to heat the boiler was oil/diesel.

The engine was clearly visible and is a three cylinder engine. The engine was carefully measured, including the diameter of the cylinders.

Cecile Sauvage (DRASSM) had measured the engine in 2018. The overall length of the engine was 4.12m: cylinders were measured across the top of each head and are as follows (smallest to largest)[22];

0.36m **: 0.46m :** 0.43m **: 0.65m :1.04m**

We took the opportunity to measure the engine again, including the engine compartment. The cylinder heads (Smallest to largest) were measured as;

0.49m **: 0.57m :** 0.50m **: 0.67m : 1.04m**

It is believed that the measurements 1 and 3 are of the steam expansion chambers. Measurement for 2, 4 and 5 represent the piston cylinder heads. Whilst the measurements of the largest cylinders are very similar, it is noted that there are some differences in the smaller measurements.

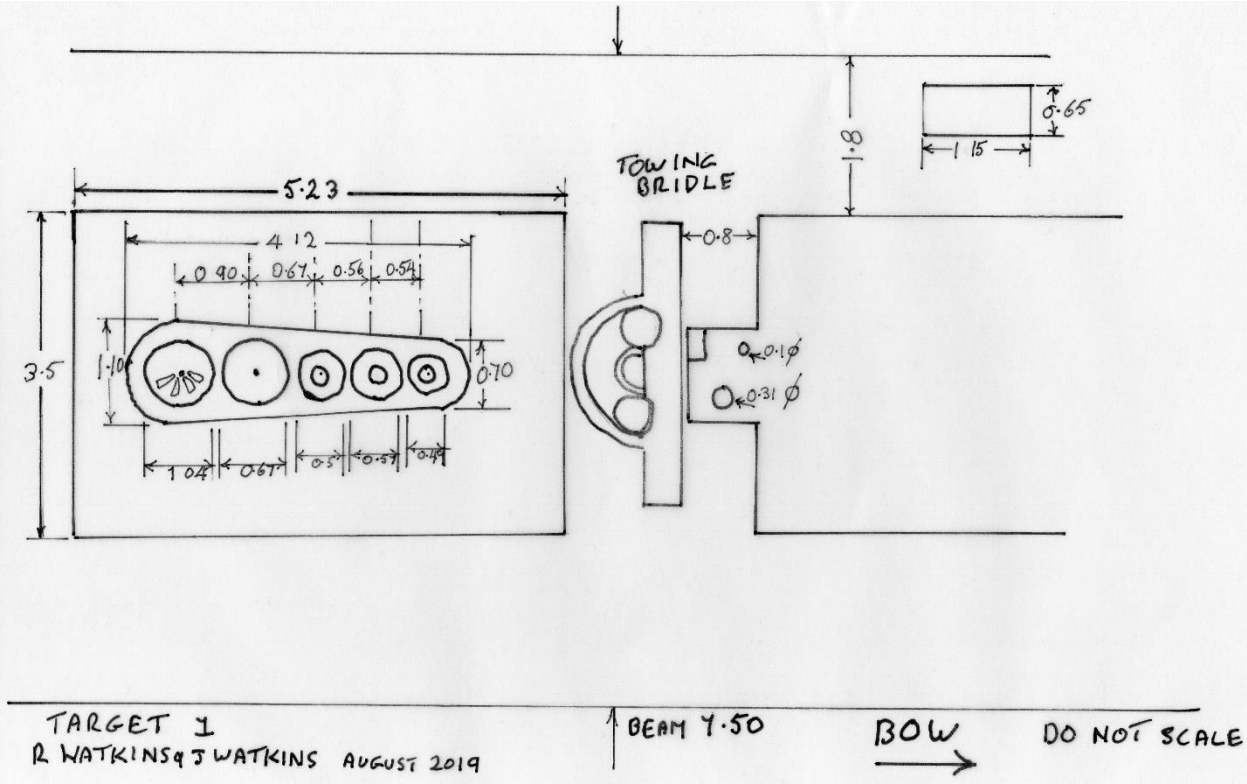

Figure 27 Measurements of engine and other wreck features (© Rob Watkins)

[22] Cecile Sauvage survey report EA4360 dated 13 June 2018.

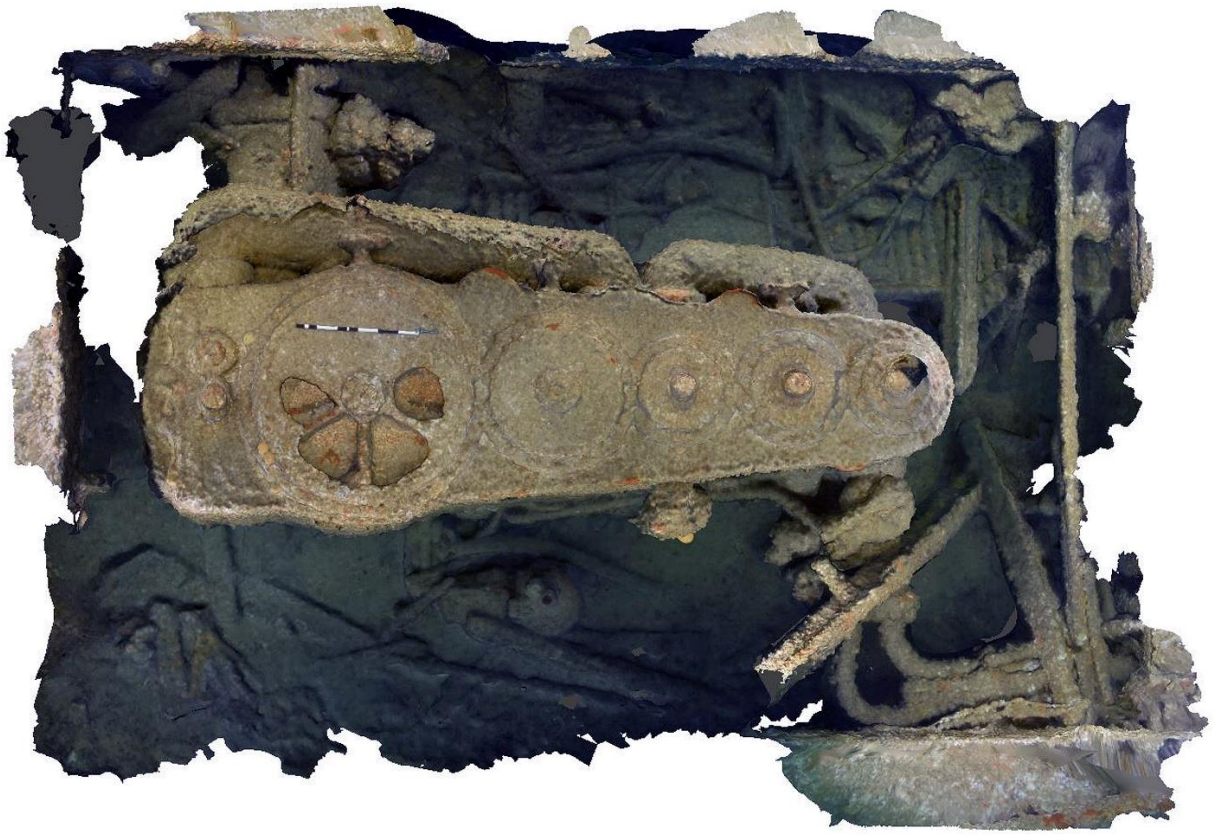

Figure 28 EA4360 Image of engine created from a photogrammetry model. (© Martin Davies)

Assurance class tugs such as HMRT SESAME built by Cochrane and Sons, Selby had a 1350ihp 3 cylinder triple expansion steam engine made by C D Holmes and Co., Hull. The cylinder sizes are recorded as 17" x 28" x 46" with 33" stoke (**0.43m x 0.71m x 1.17m with 0.83m stroke**).

The oil fired boiler was also manufactured by Holmes and was 16 feet in diameter and was supplied by a, 11 feet 6 inch oil bunker (240 tons). Oil consumption averaged 0.8 tons per hour. Assurance class tugs had a single screw propeller and the maximum speed was given as 13 knots. This generated a bollard pull of 13.5 tons[23].

Observation 4 - The engine cylinder sizes do not match those of an Assurance Class tug engine as they are smaller than the CD Holmes 1350ihp engine.

Propulsion System - Propeller

The iron propeller is in situ on the wreck, however one or more of the propeller blades is missing. The propeller was measured during the survey.

Two sets of measurements were taken and used to calculate whether the propeller originally had three or four blades. The lengths of the blades were measured as 1.36m and 1.41m. The distance between the tips of the blades was measured as 1.80m and 1.85m. This variation was due to the curve of the blades, the proximity of the rudder and the considerable marine growth on the propeller.

[23] http://thamestugs.co.uk/

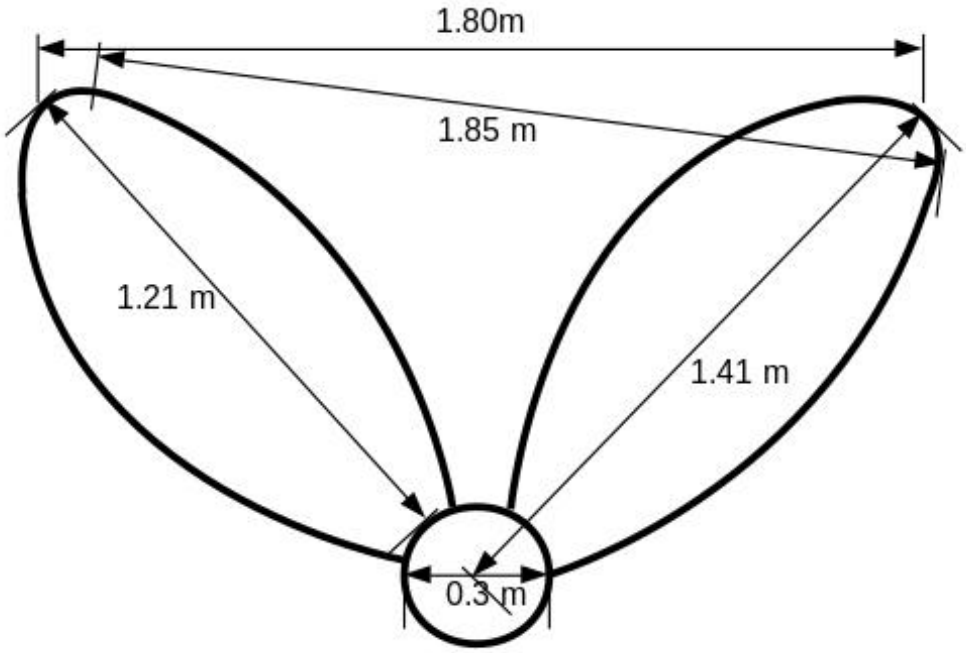

Figure 29 EA4360 propeller measurements. (© Jim Fuller)

Using trigonometry, the angle between the blades at the shaft was calculated to be (for each of the four variations of measurements:

Blade length	Distance between tips	Angle between blades
1.41m	1.80m	79 degrees
1.36m	1.80m	82 degrees
1.41m	1.85m	82 degrees
1.36m	1.85m	86 degrees

Table 6 EA4360 Measurements and calculation of propeller (Jim Fuller)

These results indicate that the propeller had four blades as the angle between the blades is 90 degrees.

It should be noted that it was not possible to measure between the tips of the blades exactly. A variation of less than 60mm between the tips would have yielded a more exact result of 90 degrees. If the propeller had been three bladed the distance between the tips would have been approximately 2.39m, i.e. more than 0.5m greater than the observed measurements. Thus the conclusion is that the propeller would have originally had four blades.

Due to lighting conditions only a partial photogrammetry of the propeller was achieved but is included for completeness.

Figure 30 EA4360 Image from a partial photogrammetry model of the propeller. (© Martin Davies)

Observation 5 - The vessel had a four bladed iron propeller.

6.6 Hull Condition and Evidence of Torpedo Damage

HMRT SESAME was reported to have sunk after being struck amidships on the starboard side by a torpedo from a German E Boat[24]. It was reported that the tug sank in less than a minute. The damage from the torpedo would have been significant, but the wreck structure is intact and there is no sign of

[24] ADM 199/1637

torpedo penetration, or explosion. There is a build-up of sand on the starboard side, which may obscure a breach in the hull. However, there is no evidence of an explosion. The damage from a torpedo explosion to a relatively small vessel would have been significant and we were surprised not to have seen any sign of an explosion.

The structure of the wreck from amidships to bow also appeared to be intact with no visible breaches of the hull above the sand. At the bow the main anchor winch was in place though shrouded with fishing net. The deck area had collapsed into the wreck in some places.

Observation 6 – No evidence was found of torpedo damage / explosion.

6.7 Survey Summary and Conclusion

Having surveyed the wreck and identified the six primary observations above we have concluded that the wreck is a tug, but unlikely to be that of HMRT SESAME.

We have conducted further research and believe we have identified another British tug, which we believe is a closer match to the wreck, namely the tug 'DUNDAS'.

6.8 EA4630 Wreck Identity - Tug 'DUNDAS' (formerly known as ATLANTIC)

The British tug 'DUNDAS' was built in 1919 by the Dutch company De Groot & Van Vilet, in Slikkerveer.

Originally named 'Atlantic' she was delivered to NV Mij Atlantic, Dordrecht.

In 1925 Atlantic was sold to Grangemouth & Forth Towing Co Ltd., Grangemouth, Scotland and renamed 'DUNDAS'.

On 21st October 1942 DUNDAS was requisitioned by the Royal Navy for coastal towing and based in Rosyth, Scotland.

On 7th June 1944 DUNDAS left the waters of the Solent, on the South coast of England towing 2 Mulberry pontoons (Convoy ETC22W).

On 23rd June 1944 DUNDAS was reported as damaged and beached following a collision with a US vessel off Normandy beachhead.

In July 1944 DUNDAS was salved from the beach but subsequently sank under tow.

We contacted the Dutch Tug museum 'Nationaal Sleepvaart Museum'[25] in the Netherlands who provided more information and kindly allowed us to use the photographs below.

Unfortunately construction drawings for the vessel were not available.

[25] https://www.nationaalsleepvaartmuseum.nl/en/

Figure 31 Tug 'Atlantic', Image courtesy of Nationaal Sleepvaart Museum.

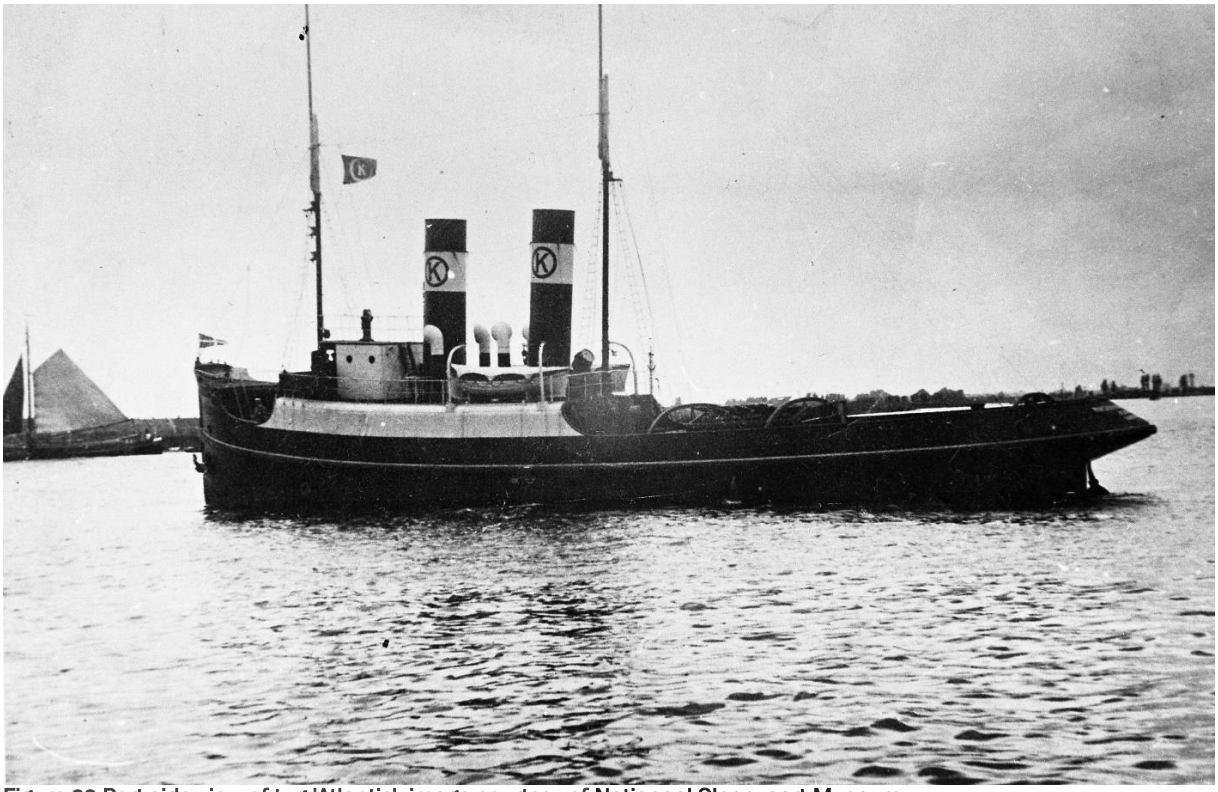
Figure 32 Port side view of tug 'Atlantic', image courtesy of Nationaal Sleepvaart Museum.

The details received from the museum were as follows;

“Gegevens van de Atlantic / DUNDAS.

Registered: LR25-26:13764 /LR43-44:06904 / (GBR) ON 130129.

264 GRT,0 NRT, **Length 36.32m, Beam 7.46m**, Draught 4.00m, (119’2' x 23.1' x 12.3') Dp3,73m.

Steel hull, 1 fpp, T3cyl by "H. Versteeg" at Hardinxveld, 79nhp-750ihp @130rpm, speed 11kn.

Tug ATLANTIC

1919: Built by "De Groot & Van Vliet" at Slikkerveer (NLD) (YN 73)

1919: delivered to "NV Mij Atlantic", mng "Baggermij L. Kalis & Co NV" at Dordrecht (NLD)

(NLD flag, regd Dordrecht)

1925: To "Grangemouth & Forth Towing Co Ltd" at Grangemouth (GBR), renamed **DUNDAS**

(GBR flag, regd Grangemouth, ON 130129, 254 GRT, 1 NRT)

1942 -21/10: requisitioned by the UK Royal Navy for coastal towing, based Rosyth (GBR)

1944 -06/06: served at Normandy landing

1944 -23/07: sunk and lost after collision with US vessel off OMAHA Beach, Normandy (FRA)”

This information confirmed that DUNDAS was 119 feet 2 inches long (**36.32m)** with a beam of 23 feet 1 inch (**7.46m)**. DUNDAS’ displacement was 264 tons and was powered by a three cylinder triple expansion engine (15” x 24” x 40.5” with 24” stroke) (**0.38m x 0.61m x 1.03m** with 0.61m stroke) manufactured by H Versteeg, Hardinxveld. ON130129.

Observation 7 - It is noted that the measurements for cylinders 1, 2 and 3 align with those recorded for Atlantic / DUNDAS. (As taken by Cecile Sauvage 0.46m : 0.65m :1.04m)

Observation 8 - The length and beam of DUNDAS are consistent with the hull dimensions taken during the survey. Outer hull external measurement 41m (allowing for hull shape) and the beam at 7.5m.

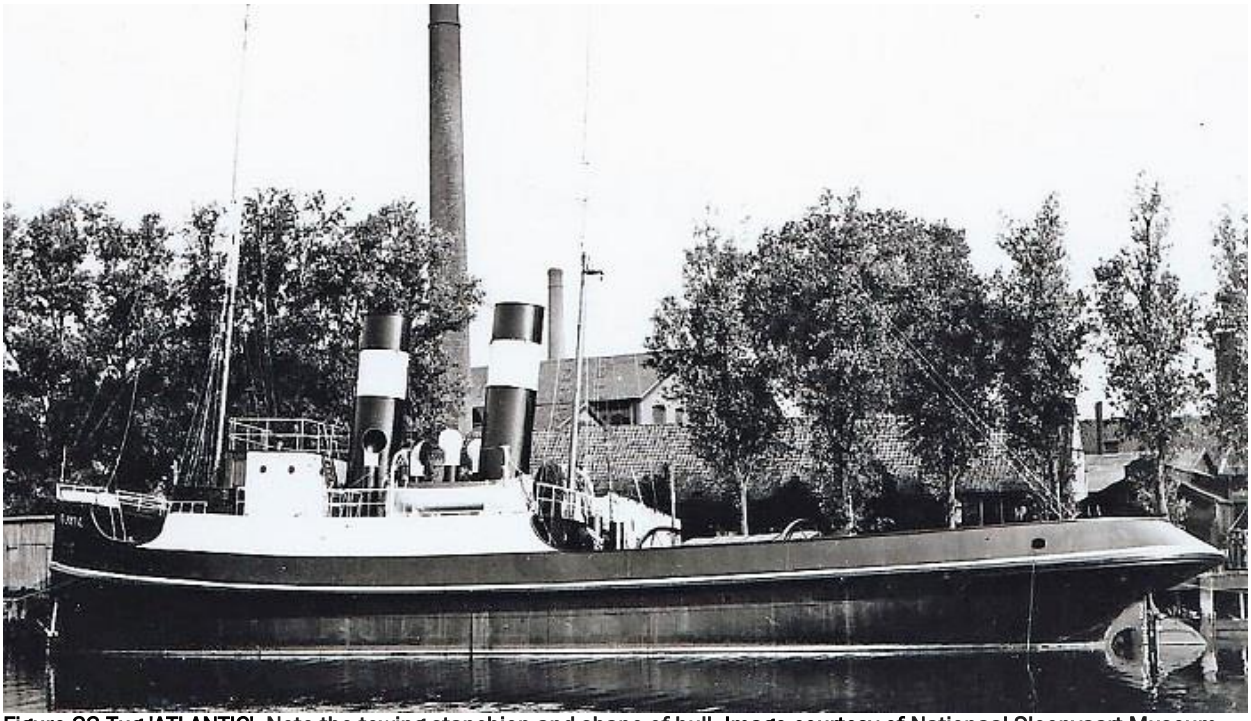

Figure 33 Tug 'ATLANTIC', Note the towing stanchion and shape of hull. Image courtesy of Nationaal Sleepvaart Museum.

Observation 9 - The towing stanchion is a similar design and position in the vessel (see image below).

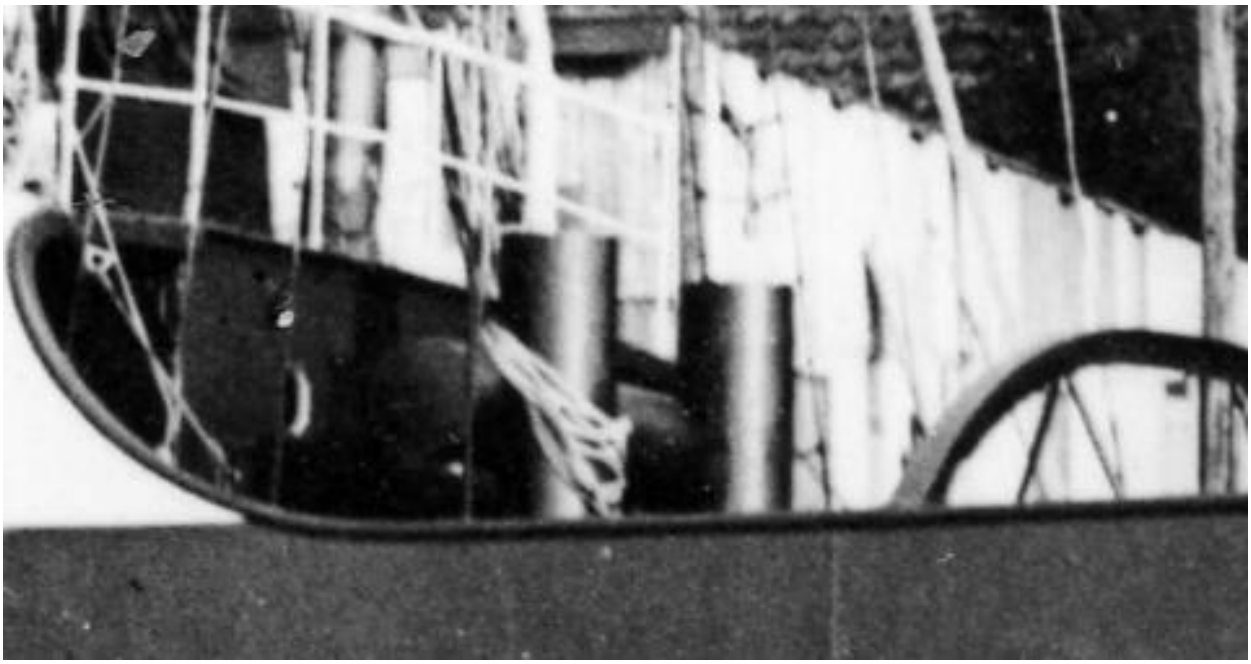

Figure 34 Close-up of the towing stanchion of tug 'Atlantic', Image courtesy of Nationaal Sleepvaart Museum.

We also found documents in the US National Archive which gave further details about the collision with a US Navy ship and her loss whilst under tow.

Further details of the loss of DUNDAS are covered in Section 9.

6.9 EA4630 - Summary of Observations

Number	Observation
1	The wreck is too small, both in length and width, to be that of HMRT SESAME.
2	The hull of the wreck does not rise in a distinctive 'step'.
3	The towing stanchion assembly on the wreck is not of a design that was present on Assurance Class tugs (such as HMRT SESAME).
4	The engine cylinder sizes do not match those of an Assurance Class tug engine as they are smaller than the CD Holmes 1350ihp engine.
5	The vessel had a four bladed iron propeller.
6	No evidence was found of torpedo damage / explosion.
7	It is noted that the measurements for cylinders 1, 2 and 3 align with those recorded for Atlantic / DUNDAS. (As taken by Cecile Sauvage 0.46m : 0.65m :1.04m).
8	The length and beam of DUNDAS are consistent with the hull dimensions taken during the survey. Outer hull external measurement 41m (allowing for hull shape) and the beam at 7.5m.
9	The towing stanchion is a similar design and position in the vessel to that of Atlantic/DUNDAS.

Table 7 Summary of observations EA4630

7. Survey of EA3234 – Supposed USS PARTRIDGE

7.1 Wreck Data

The wreck is located 20Km to the North-West of Port-en-Bessin at Latitude: 49°31.426N Longitude 00°43.890W (WGS84). The wreck is orientated in an East North East to West South West direction with the bow at the East. The wreck has been associated with the USS PARTRIDGE though we could not establish how the identity had been established. The general seabed comprised of clean, course sand and shell. There was evidence of lost fishing equipment on the site.

The wreck site is extremely degraded and dispersed over an area of approximately 150m long and in a general charted depth of 25m[26]. The highest point of the wreck, the boilers, stands approximately 3m above the surrounding sea bed. The ship is resting on its starboard side.

UK Hydrographic records note the wreck was first recorded in 1955[27]. In 1976 the wreck was described as a 'small twin screw vessel' and that a small paravane had been recovered.

In 1988 the record indicates that the wreck 'is a large cargo vessel' and in 2007 the French records note the wreck of 'a US merchantman.

Between 2000 and 2002 the US Navy Historical Centre - Underwater Archaeology Branch conducted a survey of the US Navy vessels lost during the Normandy campaign[28]. Our thanks to Dr Bob Neyland for providing details of the survey report for the site.[29] The US Navy team used sonar and an ROV to survey the wreck and the data recorded that the wreck site covered an area of approximately 7,500m^2 with a maximum height of 2.8m. Magnetic survey data indicated that a large proportion of the wreck remained buried.

The US Navy report also noted that diagnostic features within the wreckage were difficult to identify due to the degree of damage caused by the detonation of a torpedo and post-war salvage activities. However, the ROV camera did record the barrel of a gun which was believed to be one of the 3 inch / 50 Calibre Dual Purpose guns fitted to the USS PARTRIDGE.

"The gun lay on its starboard side, covered in marine growth. Though the barrel lay exposed, marine growth concealed nearly everything but a portion of the elevating arc and pointer's hand wheel."

In 2019 DRASSM surveyed the wreck site using multibeam sonar and kindly shared the survey images below.

[26] At Lowest Astronomical Tide.

[27] UKHO wreck number 24406 sourced from www.wrecksite.eu

[28] https://www.history.navy.mil/research/underwater-archaeology/sites-and-projects/ship-wrecksites/remote-sensing-of-d-day-sites.html

[29] Chapter 12 OMAHA Beach, pages 128 to 131.

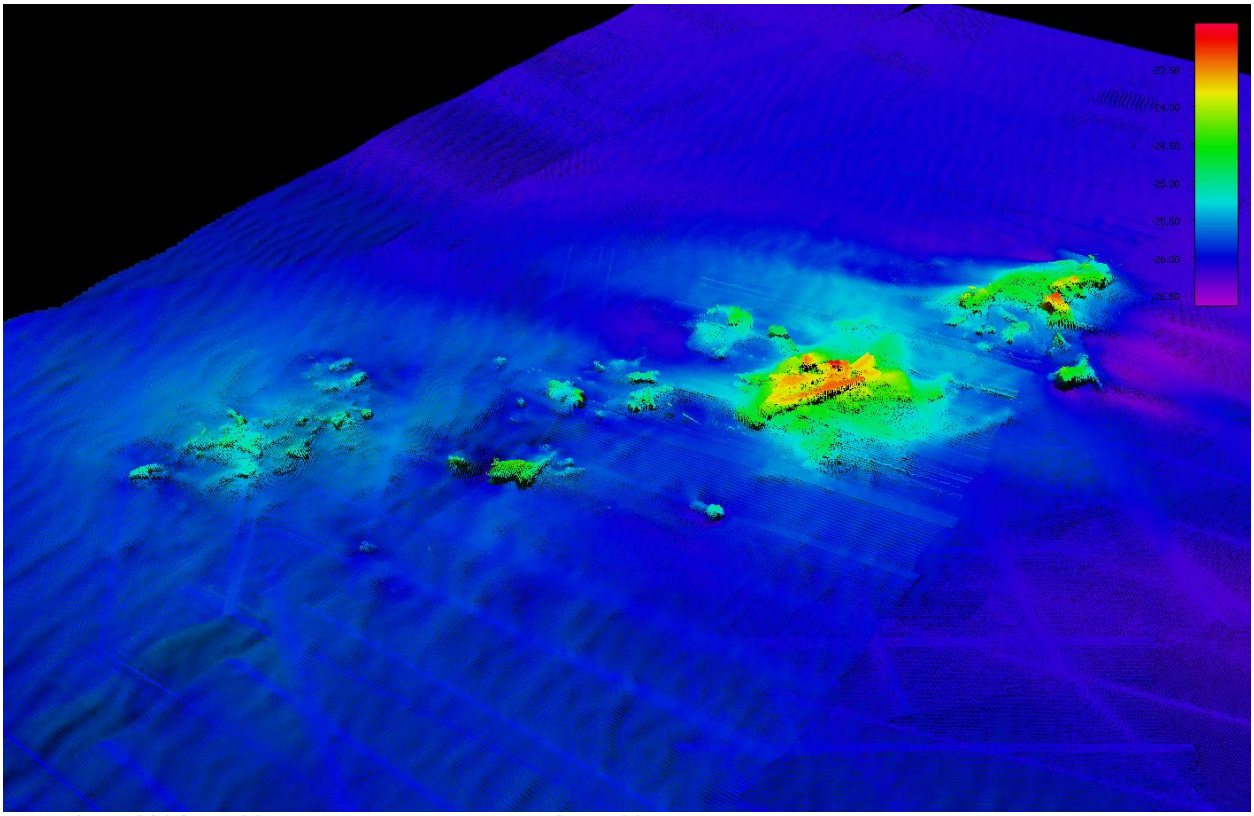

Figure 35 EA3234 DRASSM Multibeam sonar image. (© DRASSM).

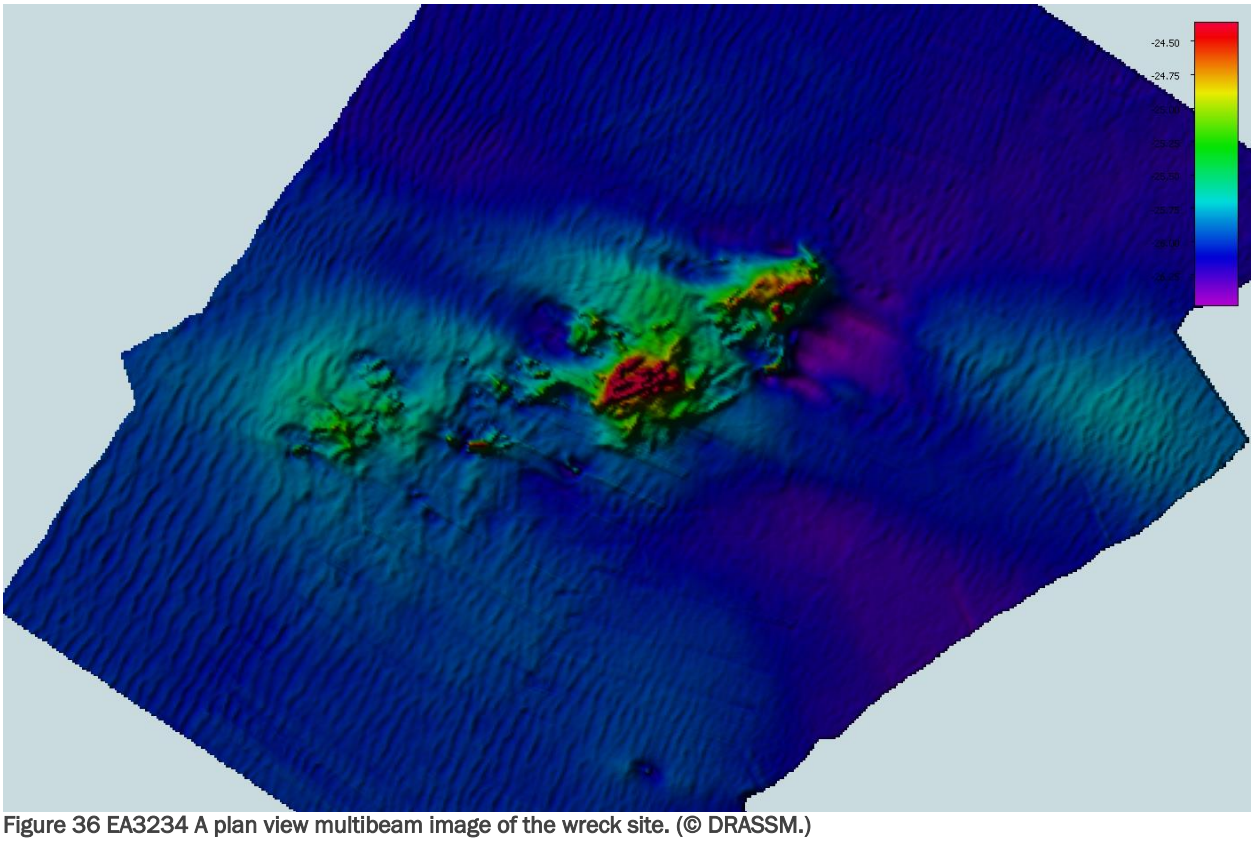

Figure 36 EA3234 A plan view multibeam image of the wreck site. (© DRASSM.)

A sonar image using the sonar on our boat Southsea Explorer illustrates the maximum depth and wreck height above the sea bed.

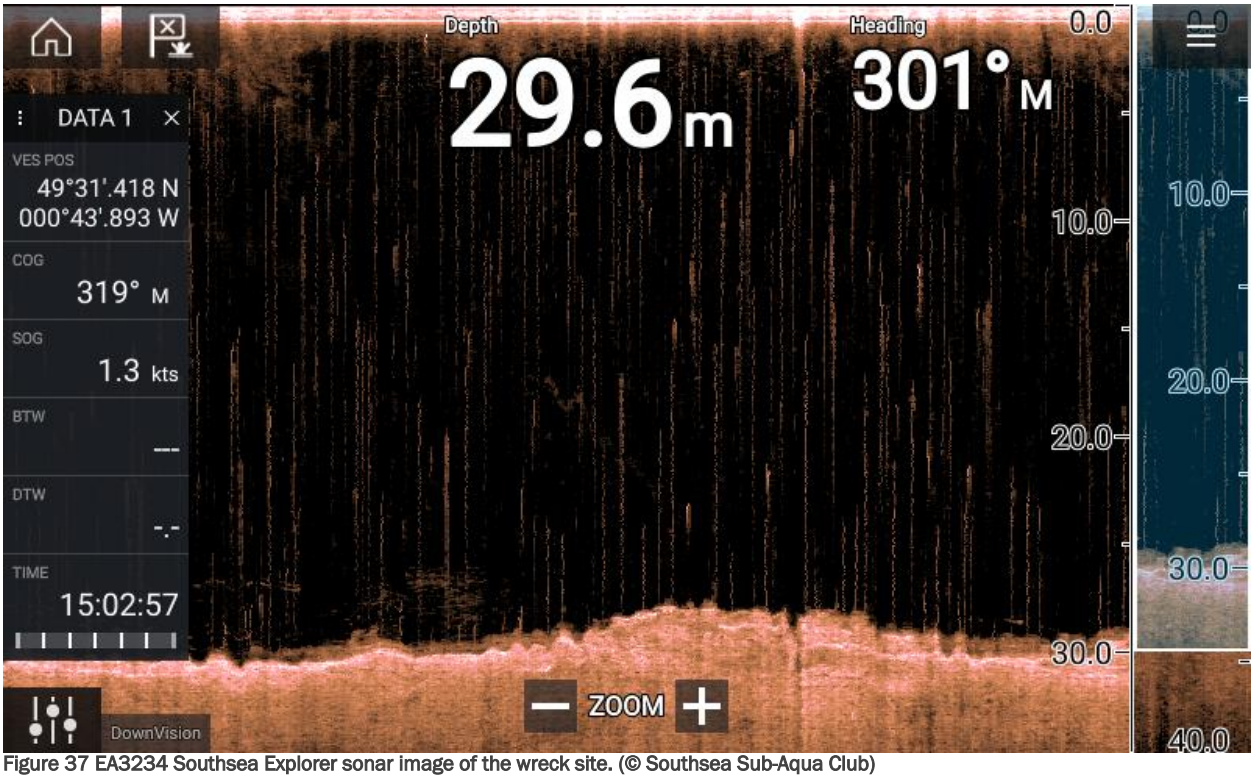

Figure 37 EA3234 Southsea Explorer sonar image of the wreck site. (© Southsea Sub-Aqua Club)

7.2 Survey Findings and Observations EA3234

Due to the poor condition of the wreck, believed to be as a result of commercial salvage activity our approach to the survey was to record recognisable features of the wreck. Our survey examined five key areas in order to confirm, or not; the wreck as that of the USS PARTRIDGE. The key features examined were;

1) The bow area;
2) The anchor;
3) The guns;
4) The boilers and power system, and
5) Various notable artefacts.

The information gathered during the survey was then compared to historic data for USS PARTRIDGE and other US Lapwing Class minesweepers.

A copy of the original USS PARTRIDGE construction drawings were sourced from the US National Archives and Records Agency (NARA) with the assistance of Mike Constandy. These drawings, along with others showing the modifications made to PARTRIDGE's sister ships (TERN and KINGFISHER) to convert them for towing duties were very informative allowing the comparison of the wreck features to the official ship design.

We also conducted research into the loss of USS PARTRIDGE in order to understand the likely position of her sinking.

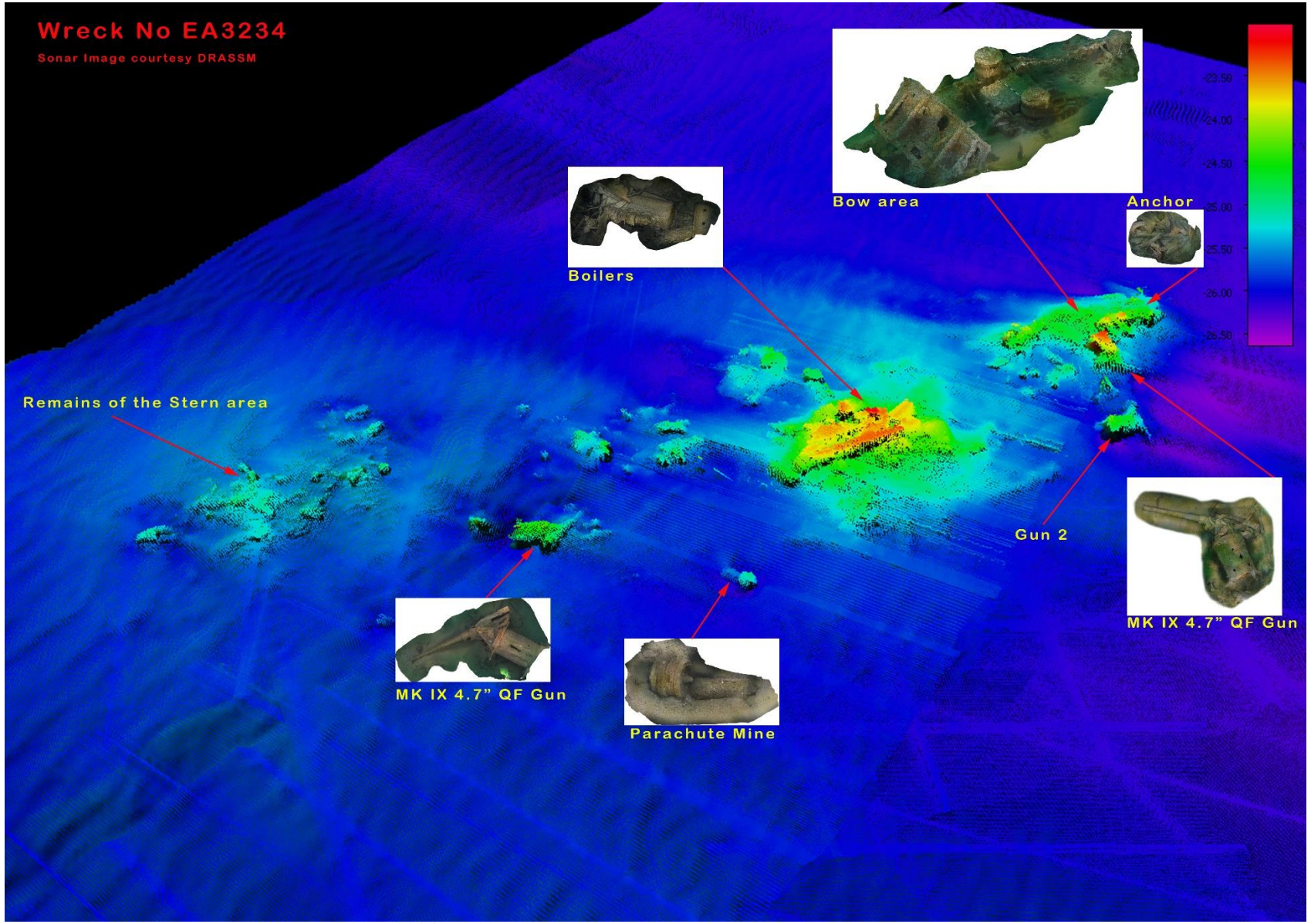

Figure 38 EA3234 DRASSM multibeam image showing location of key features. (© DRASSM)

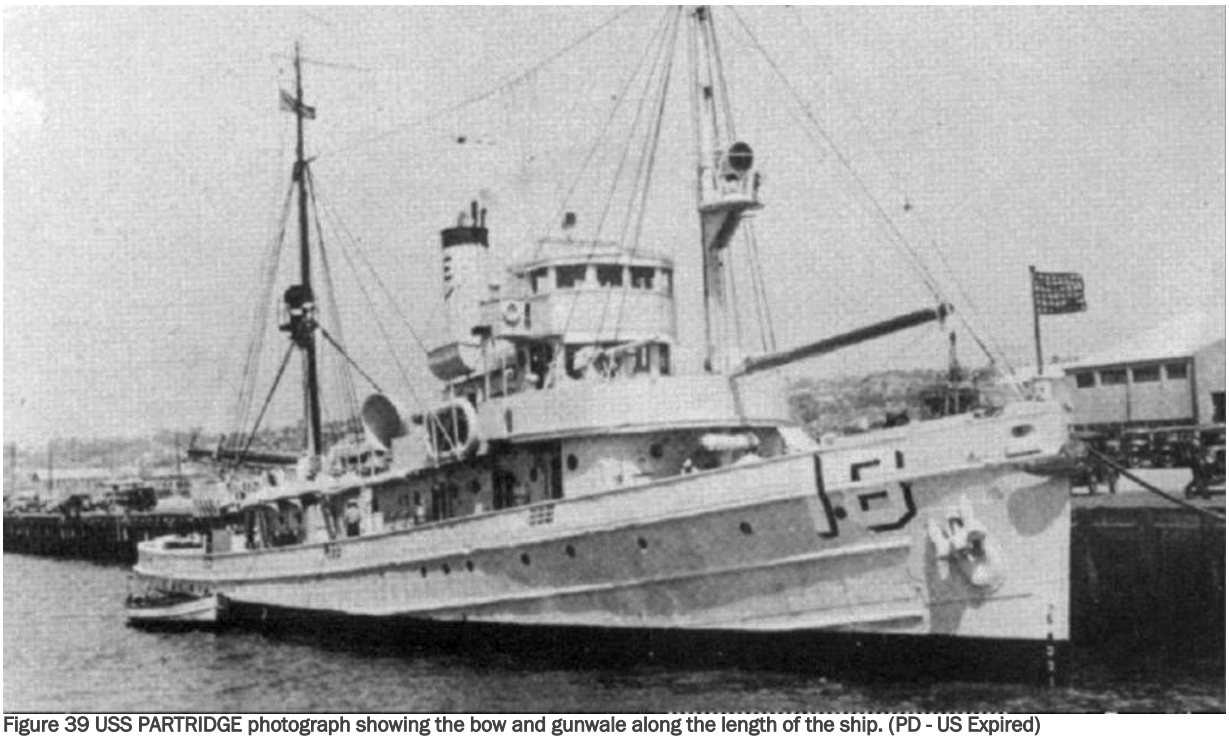

Figure 39 USS PARTRIDGE photograph showing the bow and gunwale along the length of the ship. (PD - US Expired)

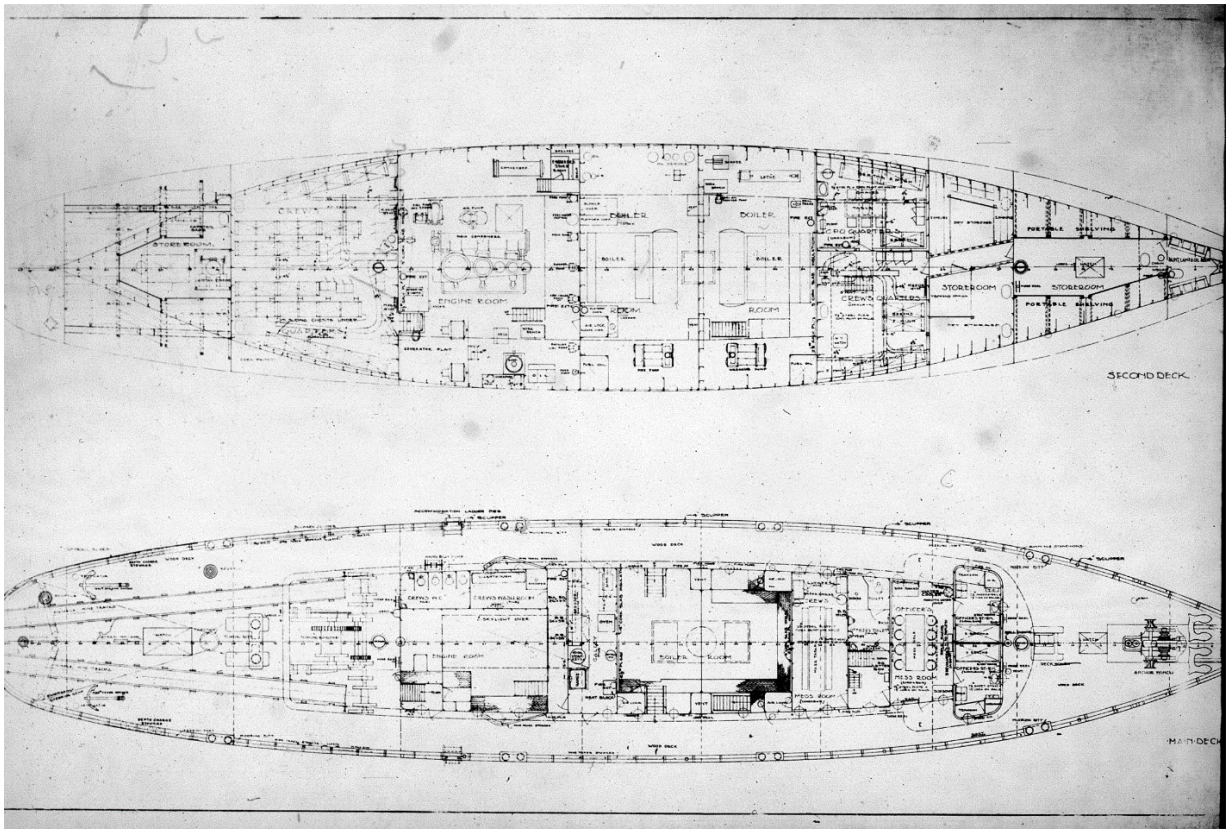

Figure 40 USS PARTRIDGE construction drawings for main deck and second deck. (PD-US Expired - courtesy Mike Constandy)

The comparisons between the data for USS PARTRIDGE and our wreck observations are detailed below.

7.3 The Bow Area

The bow is the most complete section of the ship and rests on its starboard side. On the deck behind the bow we observed a windlass anchor winch with vertical capstans. The chain to the port anchor was visible and extended down the hawser to the anchor.

The bow deck also featured a break-water, designed to protect the ship in heavy seas. There was no visible gunwale around the edge of the deck.

Figure 41 EA3234 Photogrammetry image of the bow deck area note the vertical windlass capstans, port anchor chain and break-water. (© Martin Davies)

The near vertical stem post of the slightly raked bow was visible for several metres until it disappeared beneath the sand.

USS PARTRIDGE and other Lapwing class minesweepers had a gunwale that ran the length of the ship and a horizontal windlass anchor winch. The presence of a gunwale negates the need for a breakwater and therefore breakwaters were not fitted on Lapwing class vessels such as the USS PARTRIDGE.

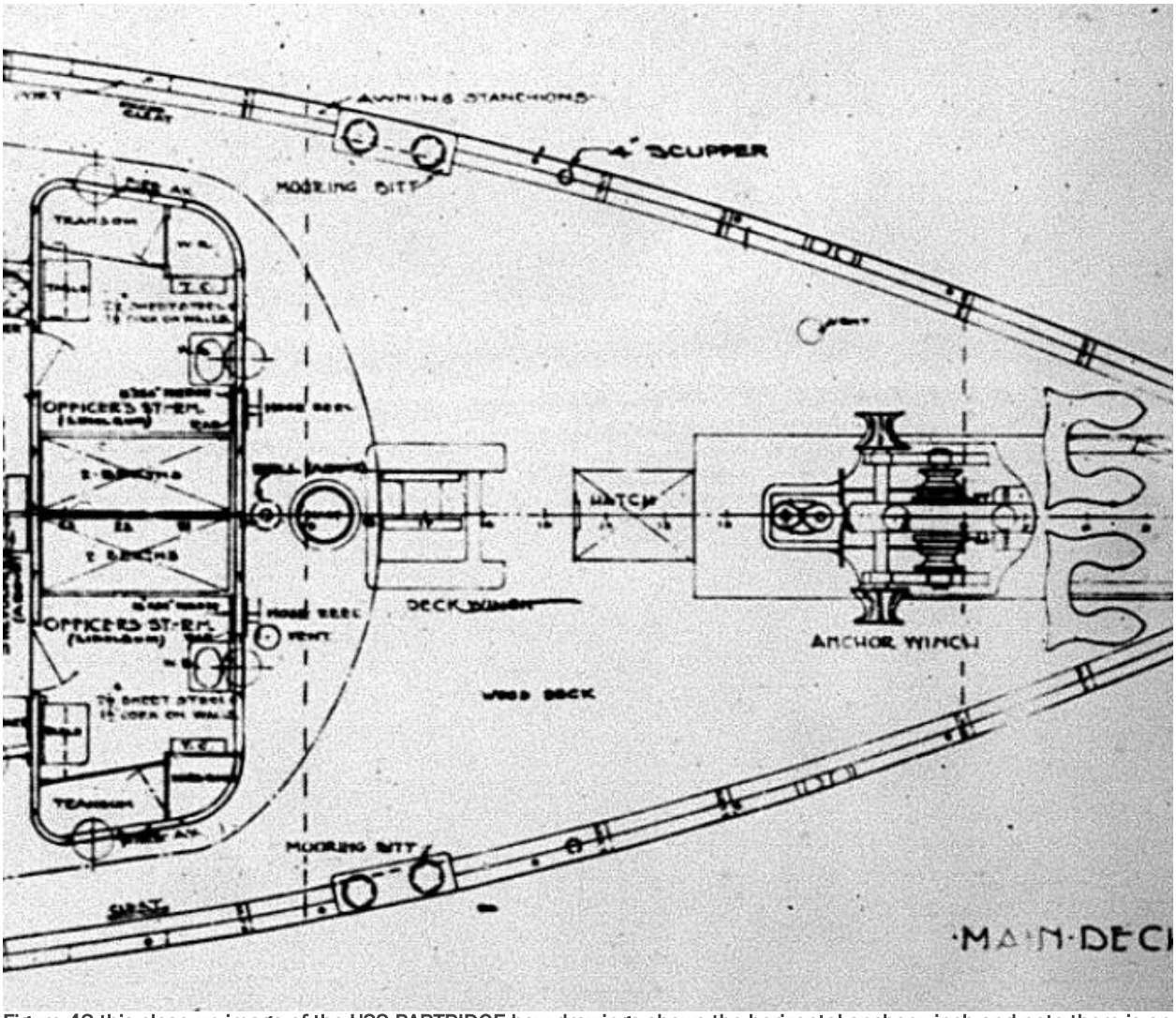

Figure 42 this close up image of the USS PARTRIDGE bow drawings shows the horizontal anchor winch and note there is an absence of a breakwater. (PD-US expired. Courtesy Mike Constandy)

Observation 1 – The anchor winch (windlass) of USS PARTRIDGE is of a horizontal design. The wreck anchor winch is of a vertical design.

Observation 2 – The bow area features a breakwater. However, this is not present on the drawings for USS PARTRIDGE.

Observation 3 – There is no gunwale present on the wreck. However, a breakwater shield was found to be present behind the anchor winch.

7.4 The Anchor

The port anchor was located in the hawser and the chain could be followed back to the winch on the deck. The anchor is a stockless anchor used by many warships of the time.

Figure 43 EA3234 the stockless anchor on the port side with the top of the shank entering the hawser (left) and the crown (base) of the anchor to the right (© Martin Davies)

The two flukes of the anchor measured approximately 1.1m and the base 1.0m. Basic calculations indicated the weight to be in the region of 4,000 lbs (1,800 kg).

Observation 4 the stockless anchor was consistent with those used by small to medium sized 20th Century warships.

7.5 The Guns

A total of three breach loading guns were found on the site; two guns behind the bow and one after the boiler section to the west.

Each single gun was intact on their mountings and rested on its side. The bore of the gun at the muzzle measured **120mm** (4.7 inches) and the gun barrel length was **5.6m**.

Figure 44 EA3234 Image taken from photogrammetry model of Gun 1. (© Martin Davies)

Figure 45 EA3234 Plan view of Gun 3 (© Martin Davies)

Figure 46 EA3234 Photogrammetry image of Gun 3 and breech mechanism. (© Martin Davies)

The guns are believed to be Royal Navy Quick Firing (QF) 4.7-inch Mk IX [30] or Mk XII which armed the majority of Royal Navy and Commonwealth destroyers in World War II[31]. The discovery of these three guns was material to our research of the identity of the wreck. These guns are much larger than the two 3 inch guns installed on USS PARTRIDGE and other Lapwing Class ships. This observation alone leads us to conclude that the wreck is not the USS PARTRIDGE.

Observation 5 – The presence of three QF 4.7 inch Mk IX or Mk XII guns means that the wreck is unlikely to be that of a US Navy vessel and is most likely to be either British or Commonwealth Destroyer from WWII.

The QF Mark XII Naval gun was developed and manufactured by Vickers-Armstrong after the First World War.

One of the biggest changes between this and earlier naval models was the move from BL (Breach load) systems, which has a slower reload process compared to the new QF Cartridge system. It used a brass case with cordite/primer and a new horizontal sliding-block breech mechanism. This made loading, firing and repeating quicker, which made many handlers achieve a rate of fire of twelve rounds per minute. There is a report on the gunnery trials in 1930's that HMS BASILISK handlers fired five rounds in 17 seconds, which is amazing compared to the older BL set up only running two rounds in this time frame. The basic data for the British QF 4.7 inch gun (Mk IX and Mk XII) is as follows;

QF 4.7 inch Mark IX & Mark XII	
In service	1928–1970?
Used by	Royal Navy Royal Canadian Navy Royal Australian Navy Royal Hellenic Navy Royal Netherlands Navy Polish Navy Royal Norwegian Navy Turkish Navy Dominican Navy Argentine Navy Brazilian Navy
Wars	World War II Korean War
Production history	
No. built	742 (Mk IX); 372 (Mk XII)
Specifications	
Mass	2.963–2.984 long tons (3,011–3,032 kg) (Mk IX) 3.238–3.245 long tons (3,290–3,297 kg) (Mk XII)
Length	220.62 in (5.60 m) (Mk IX) 224.08 in (5.69 m) (Mk XII)
Barrel length	Bore: 212.58 in (5.40 m) L/45 (cal)

[30] https://en.wikipedia.org/wiki/QF_4.7-inch_Mk_IX_%26_XII_naval_gun

[31] Campbell, *Naval Weapons of World War Two*, p48

Shell	Separate loading cased charge
Shell weight	50 pounds (22.7 kg) SAP or HE
Calibre	4.724 inches (120 mm)
Breech	Semi-automatic horizontal sliding-block
Recoil	Hydro-pneumatic
Elevation	Varied by mounting
Rate of fire	about 12 rounds per minute
Muzzle velocity	2,650 ft/s (810 m/s)
Maximum firing range	16,970 yards (15,520 m) at 40°

Table 8 Specification of Royal Navy QF 4.7 inch gun (source Wikipedia)

The QF 4.7 inch Mark XII fired a 45-calibre 50 lb. (23 kg) shell, The maximum range at 40 degrees elevation was 16,970 yards (15,520 m) fired muzzle velocity of 2,650 fps (808 m/s). The 40-degree elevation was justified on the grounds that destroyers would be screening the battle-fleet during aerial attack, and 40 degrees elevation was adequate to engage aircraft that were concentrating their attack on other ships. To get this firing distance with accuracy the Mark XII had a barrel length of 5.40 meters with a Hydro-pneumatic recoil system. The gun's weight came in at around 3300 KG.

The Mark XII was fitted to A-class destroyers of 1930's and on most subsequent destroyer classes up to and including the R class of 1942.

A QF 4.7" gun is part of a naval gun collection at 'Explosion' museum[32], Gosport, Hampshire. The museum is part of the National Museum of the Royal Navy. This gun was fitted to later destroyers and has protective shielding for the gunners.

[32] https://www.nmrn.org.uk/our-museums/explosion-museum-naval-firepower.

Figure 47 the 4.7" Mk IXB gun on display at Explosion museum. (© Rob Watkins)

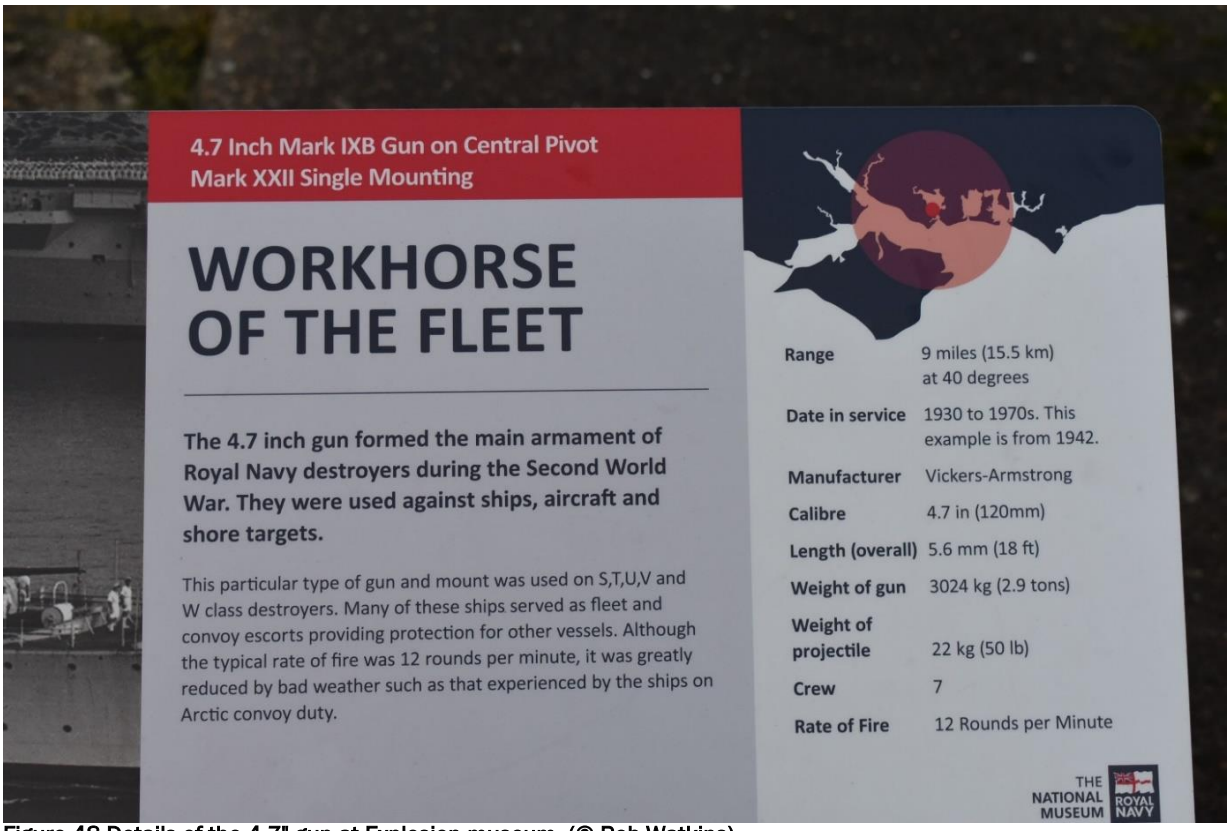

Figure 48 Details of the 4.7" gun at Explosion museum. (© Rob Watkins)

7.6 The Boilers and Power System

The highest part of the wreck is where the remains of the ship's steam boilers are located. We observed two cylinders surrounded by many lengths of broken pipes. The larger of the two cylinders had pipes extending vertically and the other, smaller cylinder, on its side, had pipes that extended horizontally. The boiler assemblage was very broken possibly as a result of salvage activity.

Rather than a single large traditional marine steam boiler used by larger ships, the propulsion system of Lapwing Class minesweepers (such as USS PARTRIDGE) comprised two Babcock and Wilcox header boilers, and one 1,400shp Harlan and Hollingsworth 200psi saturated steam vertical triple expansion reciprocating steam engine, driving one shaft/propeller.

There was no evidence of the reciprocating engine that powered Lapwing Class minesweepers.

The area is bounded on one side by a length of port side deck or bulwark[33], complete with bollards. In this area we also observed the remains of a fishing trawler's gear and net.

To the North West (280 degrees) of the boilers were two isolated areas of wreckage the most significant of which may be part of a turbine assembly. Close to the turbine was the skeletal remains of a cetacean.

To the West (220 degrees) we found a circular object (described in the image below as a winch) which we believe may also be part of a turbine assembly.

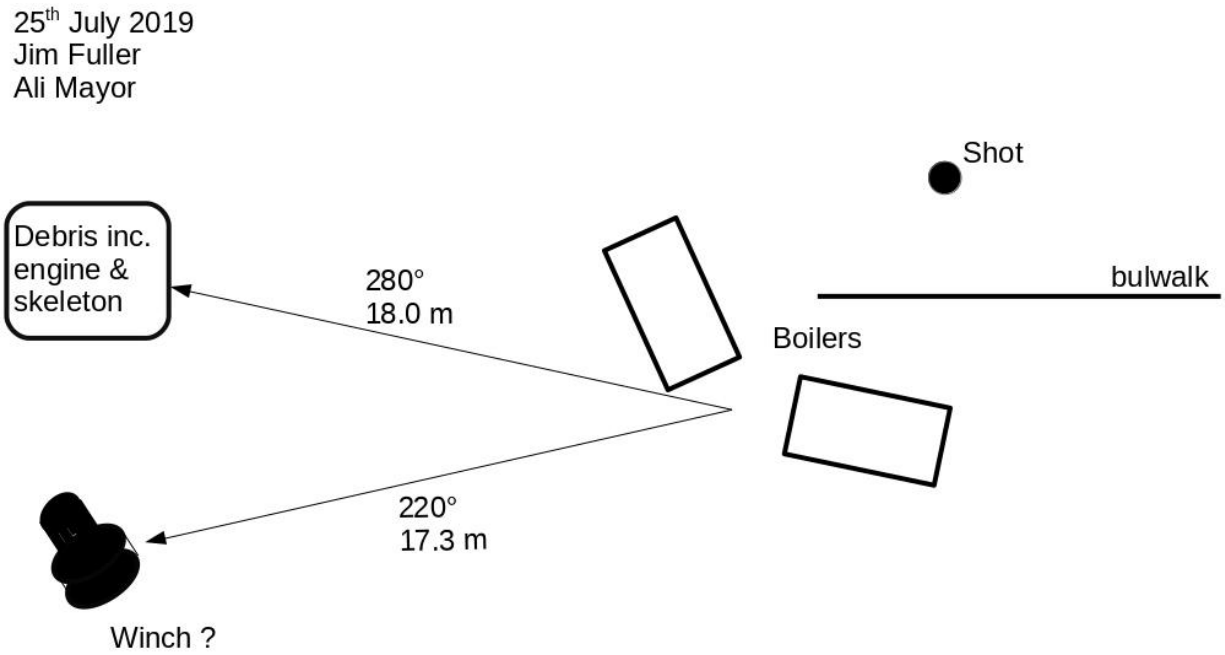

Figure 49 EA3234 Diagram illustrating position of boiler cylinders and port bulwark. (© Jim Fuller)

[33] An extension of a ship's sides above the level of the deck.

Figure 50 EA3234 Photogrammetry image of boiler debris - larger cylinder (steam drum) and smaller cylinder (water drum). (© Martin Davies)

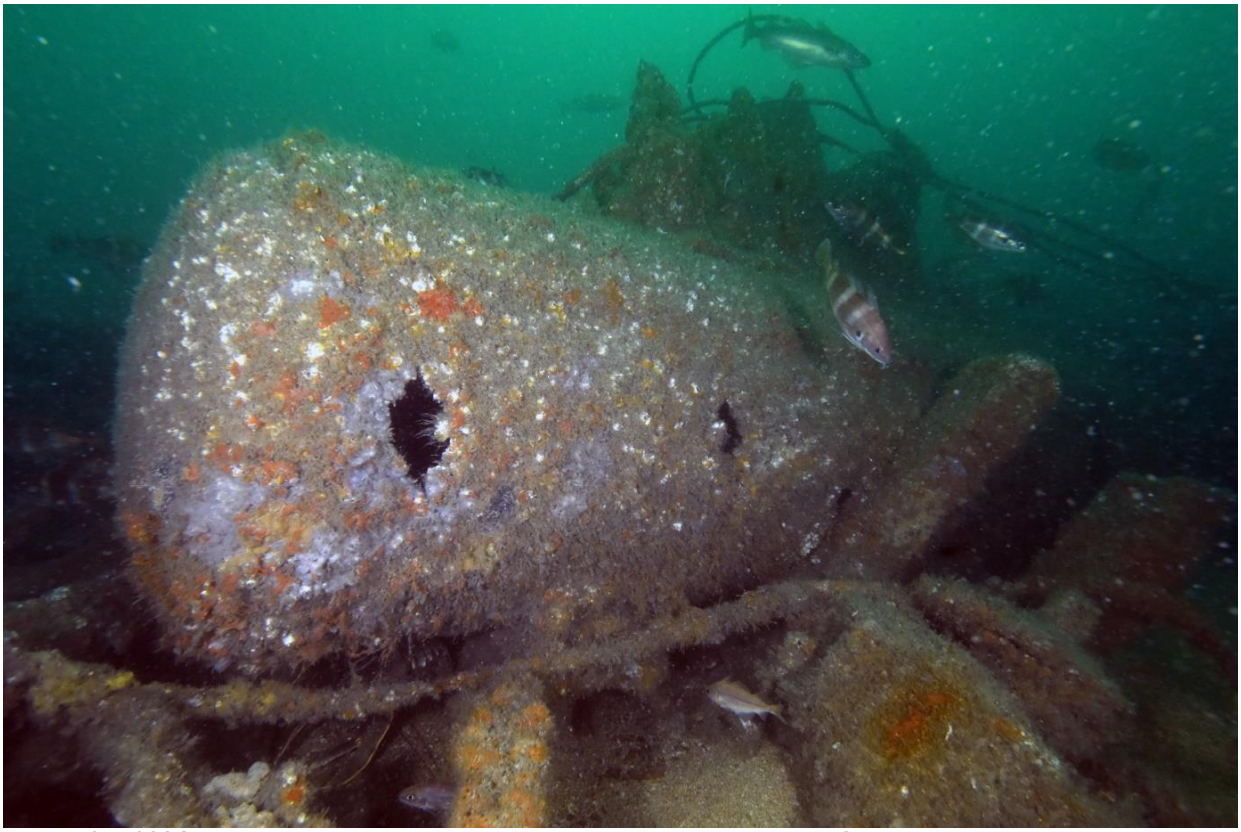

Figure 51 EA3234 the larger boiler steam cylinder with pipes extending vertically. (© Martin Davies)

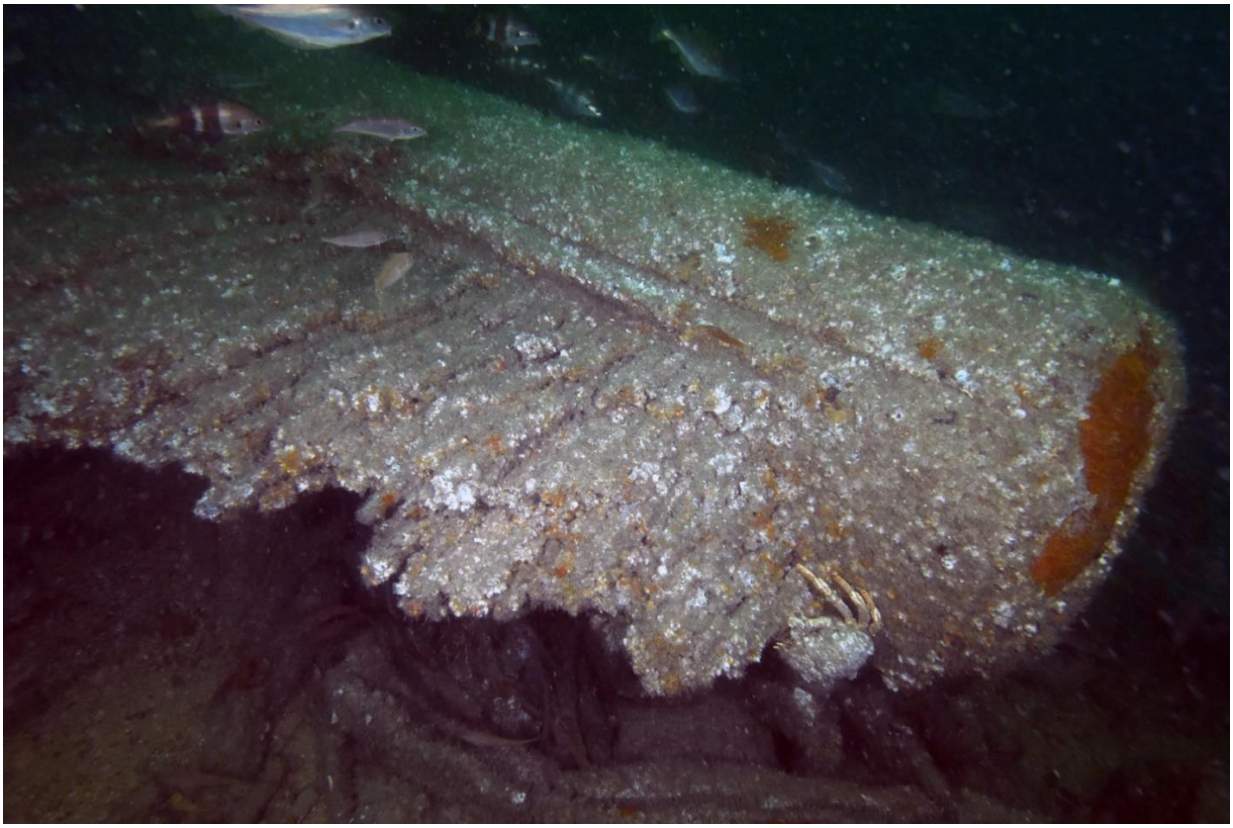

Figure 52 EA3234 the smaller boiler cylinder (water) with horizontal pipes. (© Martin Davies)

Figure 53 EA3234 a large amount of broken boiler pipes. (© Martin Davies)

Our research of USS PARTRIDGE / Lapwing class minesweepers confirmed that the ship were powered by two Babcock and Wilcox header boilers. A close up of the ship plans for USS TERN (a Lapwing Class minesweeper) illustrates the boiler and engine arrangement that would have been fitted in USS PARTRIDGE.

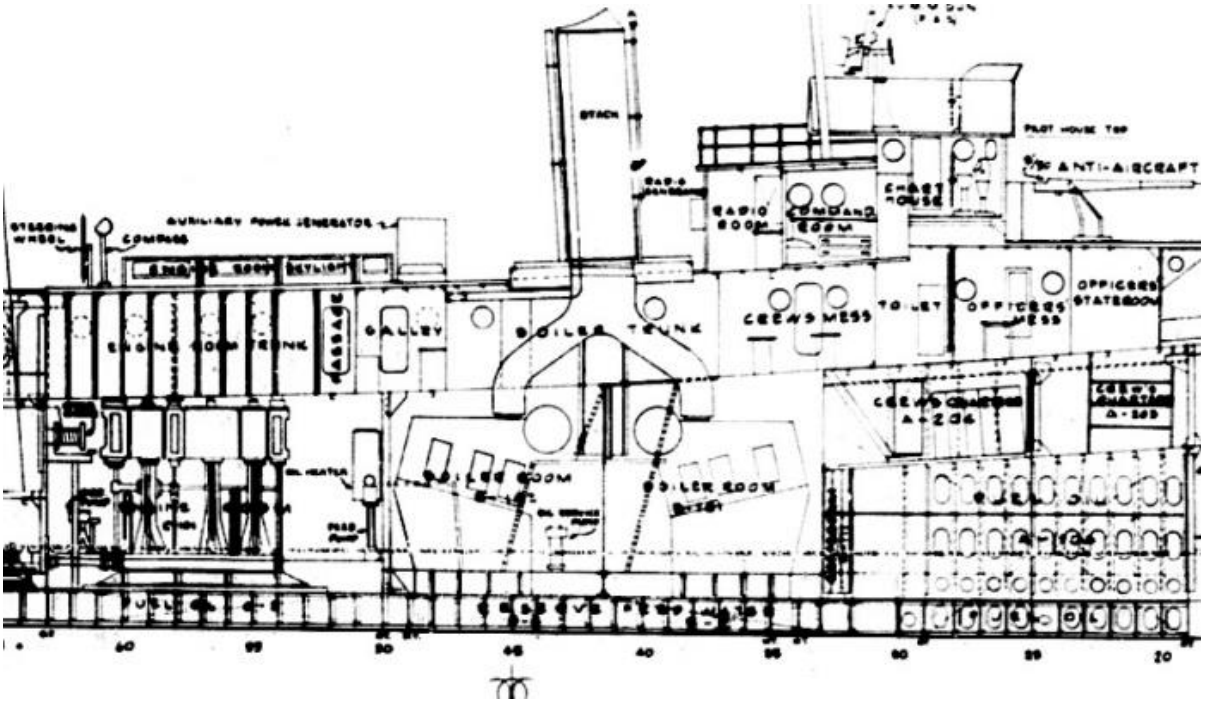

Figure 54 Extract from ship construction plans for USS PARTRIDGE. (PD-US-expired. Courtesy Mike Constandy)

Designed by the American firm of Babcock & Wilcox, this type has a single drum, with feed water drawn from the bottom of the drum into a header that supplies inclined water-tubes. The water tubes supply steam back into the top of the drum. Furnaces are located below the tubes and drum.

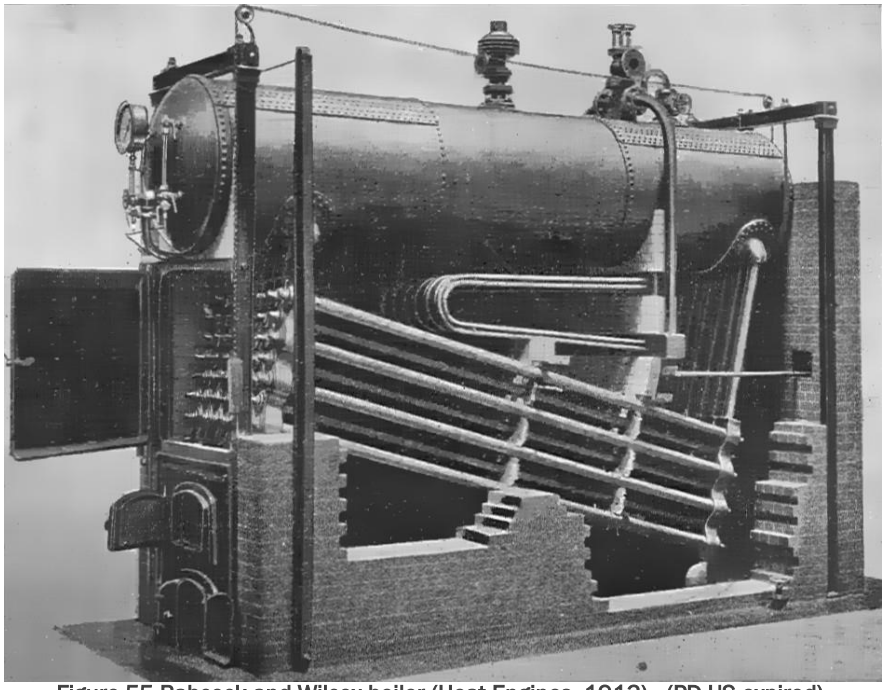

Figure 55 Babcock and Wilcox boiler (Heat Engines, 1913). (PD-US-expired).

We also noted the presence of what appeared to be a part of a turbine assembly to the North of the boilers.

Figure 56 EA3234 Photogrammetry of a section of the probable turbine system. (© Martin Davies)

Observation 6: The boiler assemblies (cylinders and pipes) do not align with those of a Babcock and Wilcox boiler. The water/steam tubes entered the cylinder directly. One cylinder was much larger than the other.

Observation 7: We did not find evidence of a triple expansion engine. However it is noted that the site has been subject to commercial salvage and this may explain why an engine was not found.

Observation 8: We recorded what appears to be part of a turbine assembly. USS PARTRIDGE was not fitted with a turbine system.

7.8 Other Notable Artefacts

There were a number of other interesting artefacts on the wreck site that we recorded on the site. These may, or may not, aid the identification of the wreck but were recorded in order that they could be researched after the survey had completed.

Port Bulwark

As mentioned previously a length of the port side of the ship was observed neared the boilers. It was noted that the bollards were set directly on to the deck. A fairlead was also seen.

There was no gunwale.

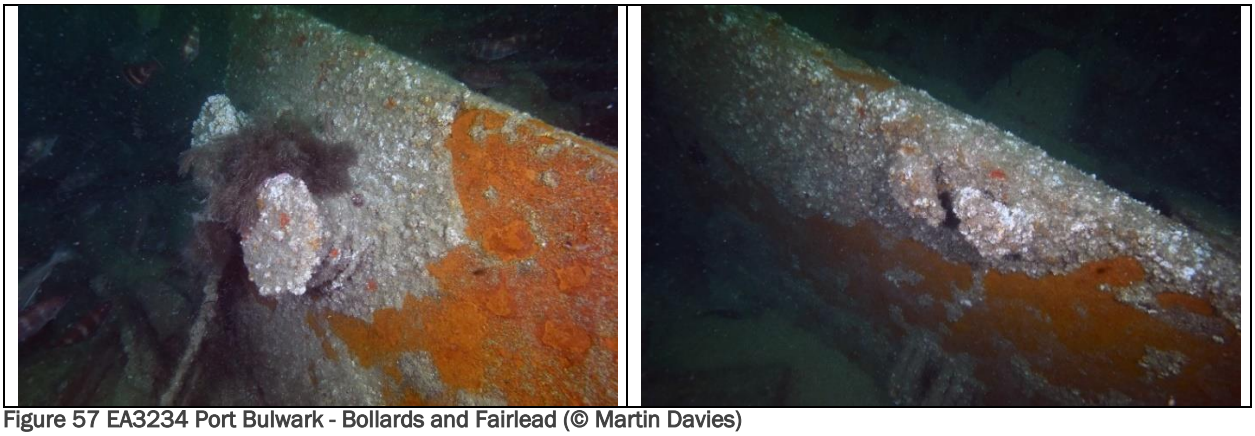

Figure 57 EA3234 Port Bulwark - Bollards and Fairlead (© Martin Davies)

Observation 9 The bulwark of Royal Navy Destroyers had no gunwale and deck fittings such as bollards and fairlead were fixed directly to the deck.

Possible Gun Mounts

Two potential gun mounts were observed. The larger object (left) may be upside down and appeared to have rings of cogs around the outer edge.

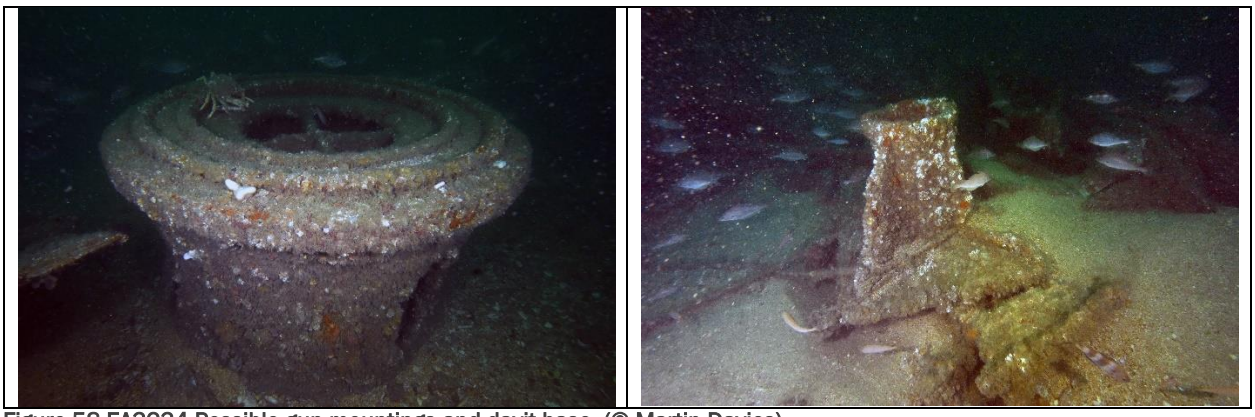

Figure 58 EA3234 Possible gun mountings and davit base. (© Martin Davies)

Trawler Fishing Equipment

There was a substantial amount of trawler equipment present on the wreck, especially around the north west of the boiler area and gun 2.

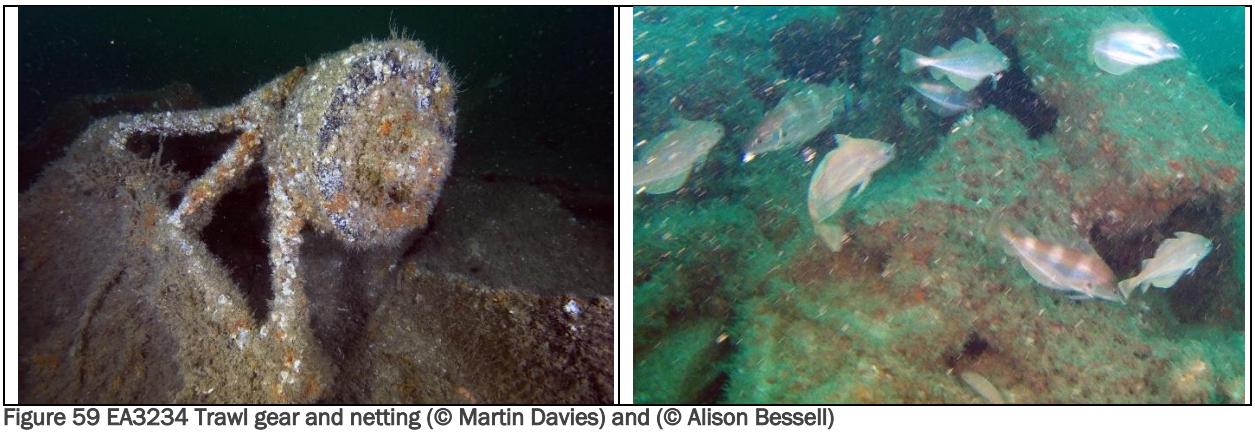

Figure 59 EA3234 Trawl gear and netting (© Martin Davies) and (© Alison Bessell)

German Parachute Mine (LMB)

Towards the south west of the boilers we located two objects that were close together and our initial thought was that the two items were part of the same object. We considered it may be part of a turbine assembly.

Figure 60 EA3234 Mine like object (German Parachute Mine) and possible turbine assembly. (© Martin Davies)

Further investigation, some weeks later, and having visited the wreck museum at Port-en-Bessin, we realised that one of the objects may be a mine like object. The museum has a display of an inert German mine which closely resembled the artefact on the right hand side of the above image.

Parachute mines (Luft Minen) LMB were developed to carry a larger charge than the earlier LMA by lengthening the case. They weighed 2,116 lbs. (960 kg) with a 1,554 lbs. (705 kg) 'Hexanite' explosive

charge. LMBs had a detonator which contained diaphragm and a water soluble plug that activated them as magnetic mines in 8 feet of water. They also contained a clockwork fuse mechanism if they fell on land.[34]

The specification/features of the LMB mines were:

- 26” diameter aluminium cylinder, 5'8.5” long (9' 9.5” including the parachute case)
- Parachute lug 4” Diameter at 270 degrees from top of the mine
- Hydrostatic Clock 6” Diameter at 180 degrees 18.5” from the front of the mine
- Detonator cover plate 4.5” diameter 90deg 15.5” from the front of the mine
- Bomb fuse 3” dia 270deg 20.5” from the front of the mine
- Filling hole covers 3 off 6” dia 135 & 225 deg 19” from front and one in front.[35]

They were nicknamed 'oyster mines' as they lay on the seabed.

Figure 61 A German mine (LMB) at the shipwreck museum (© Alison Mayor)

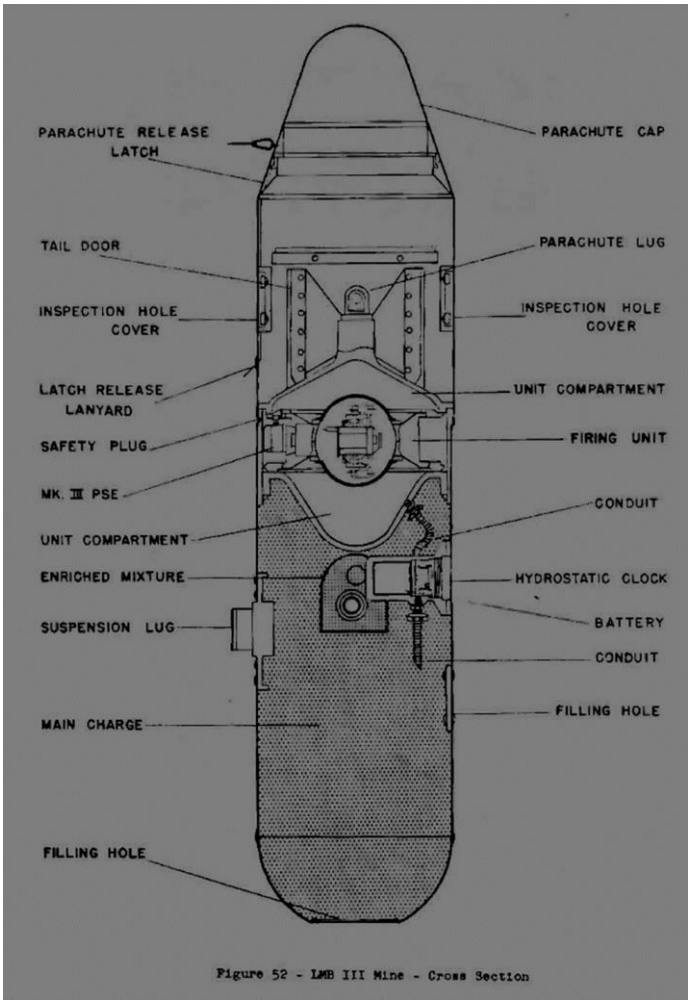

Figure 62 A cross section of an LMB mine. (PD-US-expired)

We alerted the presence of the mine like object to Semaphore Port-en-Bessin who notified the appropriate authorities.

[34] www.iwm.org.uk/collections/item/object/30020471
[35] OP 1673A US Navy Department document Chapter 5

7.9 Survey Conclusions

In stark comparison to the other survey site (EA 4630) it was very evident that the wreck site had been dispersed and extensively salvaged. In the limited time available we were unable to visit the far western area of the site. It was not possible to measure the full dimensions of the wreck site.

Despite these limitations, our survey of wreck EA3234 had revealed some very surprising results. It was clear from the presence of three guns that this could not be the wreck of USS PARTRIDGE. The guns were too large for a Lapwing class vessel and the bow and its features (winch, breakwater, deck and anchor etc) did not match the drawings for the Lapwing class of ship. In addition, the boilers and propulsion system was not that of the boiler and triple expansion engine that powered USS PARTRIDGE.

We began researching vessels that have been lost in the area that had corresponding features to those that were recorded or observed, beginning with the QF4.7 inch guns.

QF 4.7 inch guns were principally fitted to British Royal Navy Destroyers and two of these ships were sunk during the Normandy campaign;

- HMS SWIFT (G46) an S-class destroyer of the Royal Navy, commissioned in December 1943 and sunk after striking a mine and breaking in two off SWORD beachhead on 24th June 1944. (53 casualties); and
- HMS ISIS (D87/I87) an I-class destroyer of the British Royal Navy, commissioned into service in June 1937. ISIS struck a mine and sank on 20th July 1944 off the western sector of the Normandy landing beaches. (155 casualties).

Figure 63 HMS SWIFT Royal Navy Destroyer (© IWM (FL 7061))

Both destroyers were fitted with four QF4.7 inch guns when built, but there is an indication that HMS ISIS was later modified to remove one of her guns.

HMS SWIFT - This S Class War Emergency Programme destroyer[36] had a main gun armament of four 4.7 inch (120 mm) QF Mk. IX guns on single mountings, capable of elevating to an angle of 55 degrees rather than the 40 degree of previous War Emergency destroyers, giving improved anti-aircraft capability.[37]

HMS ISIS – This I Class destroyer was originally fitted with four 4.7 inch (120 mm) QF Mk. IX guns on single mountings. However, indications are that for HMS ISIS, INTREPID, ILEX and IMPULSIVE, the 'B' gun was removed and replaced by two QF 6-pounder 10 cwt (2.25 inch/57 mm L/47) guns on a twin mounting Mark I* to combat E-boats and a Hedgehog forward throwing mortar to prosecute submarines[38].

Although it is possible that one of the wreck's guns has been recovered during salvage operations the reported position of the loss of SWIFT being off SWORD beach, and other documentary records as detailed in Section 8 lead us to believe the wreck (EA3234) is likely to be that of the British Destroyer HMS ISIS (D87).

Noting that the sinking of HMS ISIS resulted in the loss of over 150 servicemen we believe the identification of this wreck would be of significant importance if the wreck is indeed the final resting place for those lost in the tragedy.

Our hypothesis that the wreck is likely to be that of a British Royal Navy destroyer (most likely HMS ISIS) rather than a US ocean going rescue tug (USS PARTRIDGE) is supported by the following research and comparison to the survey data as detailed below.

7.10 HMS ISIS (D87)

Between 1930 and 1937 the Royal Navy commissioned one destroyer flotilla each year, a total of sixty-eight ships, of the A to I classes. The convention was to assign a letter to each class, ships' names starting with that letter, except for the leader.

HMS AMAZON and HMS AMBUSCADE were launched in 1926 and they were the prototypes for the following nine classes (A to I) launched between 1929 and 1941.[39]

Intrepid - I Class Destroyer Design and Specification

The Intrepid (I-Class) destroyers were a group of nine destroyers, including a flotilla leader, built for the Royal Navy during the 1930s. The I Class ships were a repeat of the preceding G and H class, except that they had ten torpedo tubes (two banks of five) instead of eight. They incorporated the new bridge and wheelhouse layout. All ships were fitted for minesweeping and with depth charges and ASDIC for anti-submarine (A/S) work and were capable of conversion to minelayers.

HMS ISIS laid down at Yarrow and Company shipyard in Scotstoun, Glasgow in March 1936 and commissioned into the Royal Navy on 2nd June 1937. ISIS displaced 1350 tonnes, had an overall length of 323 feet (98.5 m) and was 33 feet (10.1 m) in the beam.

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[36] Source https://en.wikipedia.org/wiki/War_Emergency_Programme_destroyers
[37] Source https://en.wikipedia.org/wiki/HMS_SWIFT_(G46)
[38] Source https://en.wikipedia.org/wiki/I-class_destroyer .
[39] Source https://en.wikipedia.org/wiki/British_World_War_II_destroyers#Evolution

Figure 64 HMS ISIS, I Class Destroyer with HMS DUNCAN (D Class Destroyer) in the background. (© IWM (A 7297))

Bow Area and Anchor

Comparisons were made to the detailed ship's plans for HMS GLOWWORM[40] as published in the book 'British Warships of the Second World War – detailed in the original builders' plans'[41][42]. Many of the bow features recorded on the wreck corresponded with that of the HMS GLOWWORM plans.

The bow area of the wreck closely aligns with that seen in the photograph of HMS FOXHOUND[43], an F Class destroyer. The windlass winch, with vertical drums and motor housing and position of the anchor chain is similar to that observed on the site (see Figure 41).

The GLOWWORM design drawings also specifies two stockless bow anchors (one port and one starboard) with a weight of '1 ton 16 hundredweight' or 4032 pounds (1829Kg). This specification aligns with the calculated weight of the anchor observed at the site.

Observation 10. The remaining elements of the ship's bow observed at the wreck site closely resemble those of a Royal Navy I Class Destroyer such as HMS ISIS.

[40] Source https://en.wikipedia.org/wiki/HMS_Glowworm_(H92)
[41] Book by John Roberts pages 104-109. ISBN 978-1-4738-9068-8
[42] National Maritime Museum J9679.
[43] Source https://en.wikipedia.org/wiki/HMS_Foxhound_(H69)

Figure 65 the forward 4.7-inch guns of HMS FOXHOUND, off Freetown, Sierra Leone, August 1943. (© IWM (A18772))

Boilers and Power System

ISIS was powered by twin propellers each driven by two Parsons steam turbines using steam generated by three Admiralty three-drum boilers designed to give a maximum design speed of 35.5 knots.

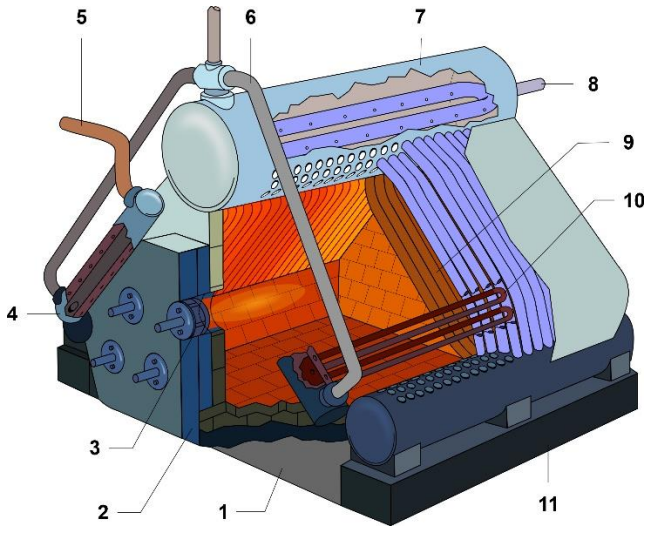
Admiralty Three Drum Boilers

The *Admiralty three-drum boiler*, developed for the Royal Navy between the First and Second World Wars. The first boilers were installed in three of the A Class destroyers of 1927. These boilers established new Royal Navy standard operating conditions for boilers of 300 psi (2.0 MPa) / 600 °F (316 °C).

A unique feature of this boiler was in the tube banks. Rather than straight tubes, each tube was mostly straight, but slightly cranked towards their ends. These were installed in two groups within the bank, so that they formed a gap between them within the bank. Superheaters were placed *inside* this gap and hung by hooks from the steam drum. The advantage of placing the superheaters here was that they increased the temperature differential between the inner and outer tubes of the bank, thus encouraging circulation. In the developed form, the boiler had four rows of tubes on the furnace-side of the superheater and thirteen for the outer-side.[44]

The boiler tubes observed on the wreck featured a bend towards the end.

[44] Source https://en.wikipedia.org/wiki/Three-drum_boiler



1. Bilge
2. Combustion air
3. Fuel atomiser
4. Superheater header
5. Superheated steam to engine room
6. Saturated steam take-off
7. Steam drum
8. Feed water inlet
9. Steam bubbles forming
10. Steam being superheated
11. Boiler seating.

The water comes (8), and goes into pipes (9). Warmed by the combustion of the fuel (came in 3), steam bubbles forming in these pipes, and arrives in the drum (7). The steam goes (through 6) in smaller pipes (10) and is superheated. Finally, superheated steam goes to engine room (5).

Figure 66 HMS BELFAST, diagram of the boiler. [45] Shakki [CC BY-SA 4.0 (https://creativecommons.org/licenses/by-sa/4.0)]

Observation 11. The remaining elements of the boiler observed at the wreck site closely resemble those of an Admiralty Three Drum Boiler installed in Royal Navy Destroyers such as HMS ISIS.

Turbine

HMS ISIS was fitted with two marine turbines manufactured by Parsons Marine Steam Turbine Company Limited[46]. The company was founded by Charles Algernon Parsons in 1897 and specialised in building the steam turbine engines that he had invented for naval use.

Details of these turbines has been difficult to locate however a photograph of the Parsons turbine for Royal Navy Destroyer HMS ARCHERON [47] appears to show (on the left hand side of the photograph) part of the turbine assembly found on the wreck site (see Figure 56).

Observation 12 The remaining elements of the steam turbine observed at the wreck site closely resemble those of a Parsons steam turbine installed in Royal Navy Destroyers such as HMS ISIS.

Other Artefacts

It was noted that several artefacts from HMS ISIS were on display at the wreck museum in Port-en-Bessin confirming that the wreck had been salvaged. In 1970 the French state approached M Jaques Lemonchois to clear dangerous wrecks off the Normandy sea bed. He was given salvage rights for half of the seabed off the Normandy coast with the other half owned by M Jean Demota. M Lemonchois later became the curator of the wreck museum which opened in 1991.

Artefacts in the museum included the ship's bell, a smaller gun (possible 6pdr or 3") and parts of the propulsion system. Smaller, more personal items were also displayed with some of the munitions recovered.

[45] Shakki [CC BY-SA 4.0 (https://creativecommons.org/licenses/by-sa/4.0)]

[46] https://en.wikipedia.org/wiki/Parsons_Marine_Steam_Turbine_Company

[47] https://www.gracesguide.co.uk/File:Im1931v151-p700.jpg

Figure 67 Artefacts on display at the wreck museum, Port-en-Bessin. Left - Gun, Centre – Bell, Right Propeller support and Rudder bar. (© Alison Mayor)

7.11 EA3234 Wreck Identity - HMS ISIS (D87)

Having conducted research into the artefacts observed at the site our conclusion is that the wreck EA3234 is highly likely to be that of a British Royal Navy Destroyer and probably that of HMS ISIS.

Further details about the loss of HMS ISIS and SWIFT, which further support the case for the wreck being that of HMS ISIS, are included in Section 9.

7.12 EA3234 Summary of Observations

Number	Observation
1	The anchor winch (windlass) of USS PARTRIDGE is of a horizontal design. The wreck winch anchor is of a vertical design.
2	The bow area features a breakwater. However, this is not present on the drawings for USS PARTRIDGE.
3	There is no gunwale present on the wreck. However, a breakwater shield was found to be present behind the anchor winch.
4	The stockless anchor was consistent with those used by small to medium sized 20th Century warships.
5	The presence of three QF 4.7 inch Mk IX or Mk XII guns means that the wreck is unlikely to be that of a US Navy vessel and is most likely to be either British or Commonwealth Destroyer from WWII.
6	The boiler assemblies (cylinders and pipes) do not align with those of a Babcock and Wilcox boiler. The water/steam tubes entered the cylinder directly. One cylinder was much larger than the other.
7	We did not find evidence of a triple expansion engine. However, it is noted that the site has been subject to commercial salvage and this may explain why an engine was not found.
8	We recorded what appears to be part of a turbine assembly. USS PARTRIDGE was not fitted with a turbine system.
9	The bulwark of Royal Navy Destroyers had no gunwale and deck fittings such as bollards and fairlead were fixed directly to the deck.
10	The remaining elements of the ship's bow observed at the wreck site closely resemble those of a Royal Navy I Class Destroyer such as HMS ISIS.
11	The remaining elements of the boiler observed at the wreck site closely resemble those of an Admiralty Three Drum Boiler installed in Royal Navy Destroyers such as HMS ISIS.
12	The remaining elements of the steam turbine observed at the wreck site closely resemble those of a Parsons steam turbine installed in Royal Navy Destroyers such as HMS ISIS.

Table 9 Summary of Observations EA3234.

8. Biological Overview of Two Tugs Project Survey Area

In addition to the archaeological survey of the wreck sites observations were made of the biology present on the wrecks and surrounding environment to provide a more holistic view of the wrecks as they can be found today.

Figure 68: Location of the wrecks surveyed during the Two Tugs Project (Google Earth)

The European Union has constructed the European Marine Observation and Data Network (EMODnet), which provides data on seabed sediments and habitats, from which the following images are extracted. Figure 69 presents the overall description of substrate types in the survey area.

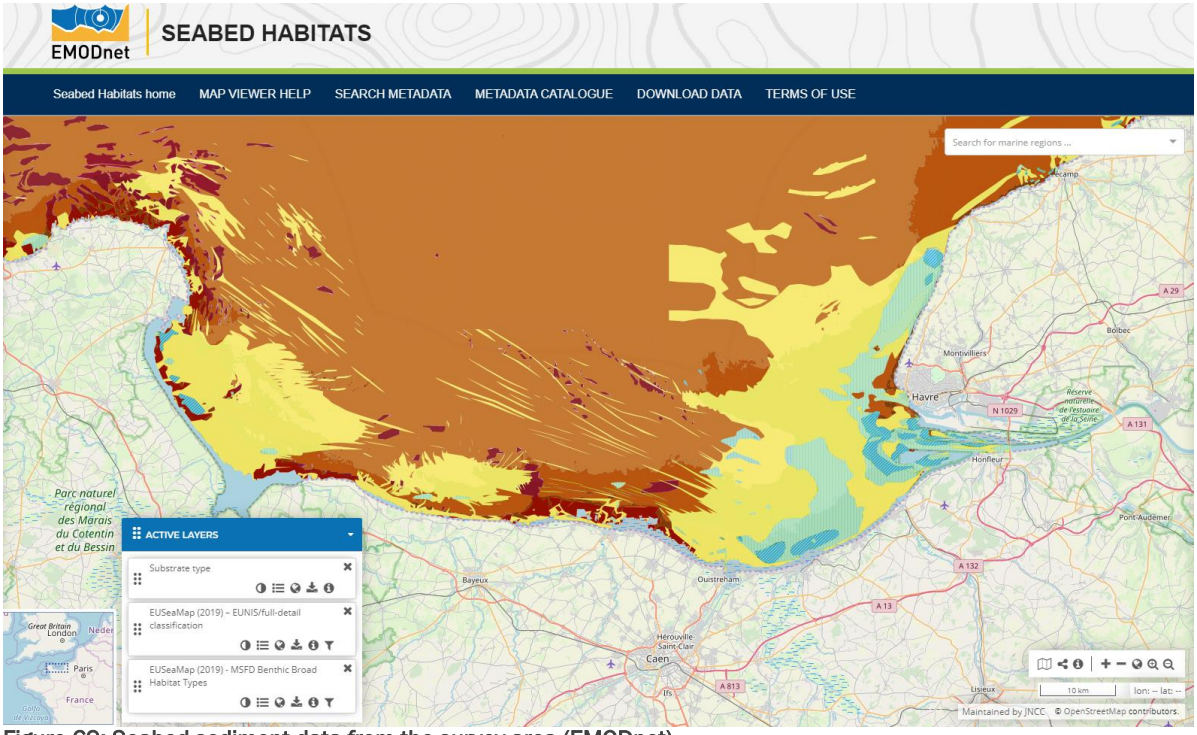


Figure 69: Seabed sediment data from the survey area (EMODnet)

The supposed wreck of the HMRT SESAME (EA4630) lies on a border between two sediment types, sand and coarse sediment. The supposed wreck of the USS PARTRIDGE (EA3234) lies further offshore to the north-east of the HMRT SESAME, in an area more clearly defined as coarse sediment. Figures 70 and 71 present the specific substrate descriptions for the areas surrounding the surveyed wrecks.

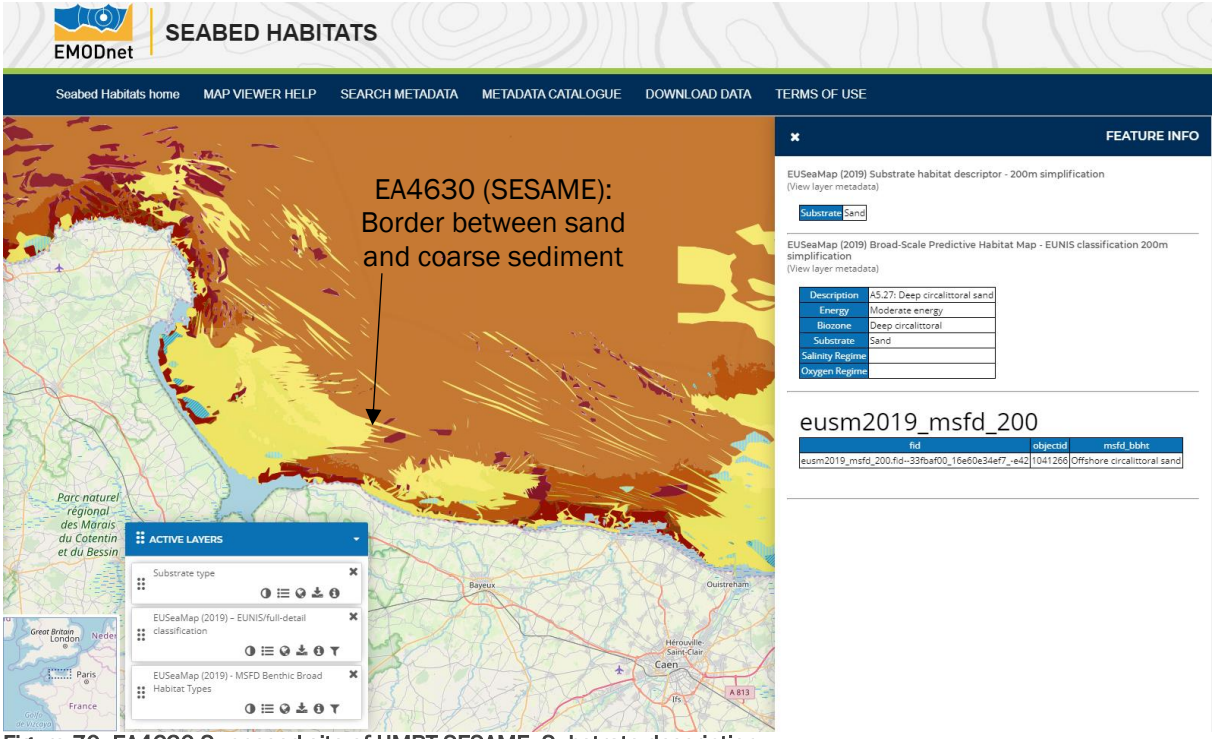


Figure 70: EA4630 Supposed site of HMRT SESAME: Substrate description

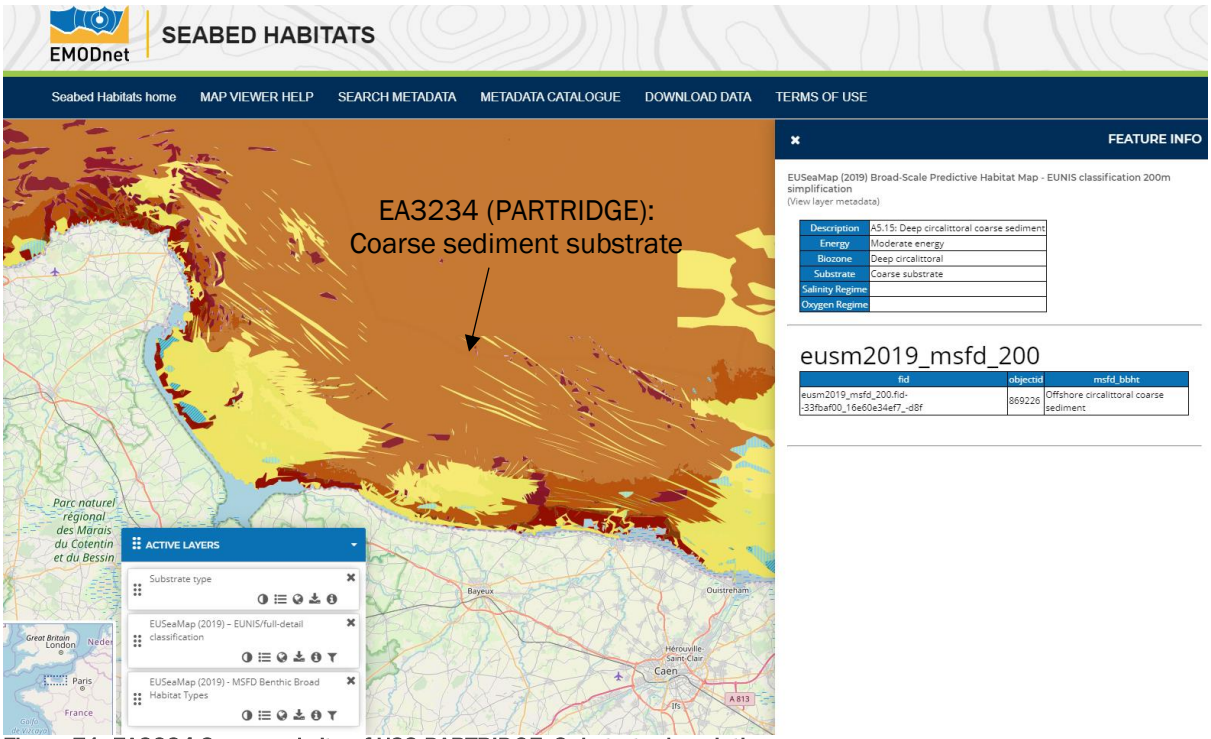
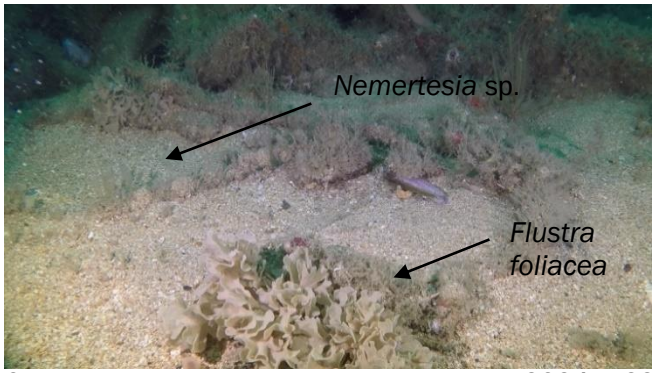


Figure 71: EA3234 Supposed site of USS PARTRIDGE: Substrate description

Figure 72 presents images of the typical sediment surrounding the wrecks investigated EA3234 (USS PARTRIDGE) and EA4630 (HMRT SESAME). Coarse gravelly sand can be seen, with extensive attachment areas for foliose fauna, some of which comprised wreck structure, additional substrate provided by larger sediment fractions such as pebbles and cobbles. In some areas the sediment more noticeably comprised large shell hash, an additional stabilising influence on the sediment, to which some foliose fauna is also able to attach. The most visible fauna in these two images comprises hydroid and bryozoan turf species, notably *Flustra foliacea*, *Nemertesia antennina, Nemertesia ramosa* and *Vesicularia spinosa*. Additional larger species included Plumulariidae, Haleciidae and *Diphasia* spp. The slightly pink covering on some of the larger shell hash is low lying coralline algae (Corallinaceae).



Coarse sediment surrounding the wreck EA3234 (USS PARTRIDGE)

Coarse sediment with large shell fragments around the wreck EA3234 (USS PARTRIDGE)

Nemertesia ramosa (small branching in this specimen indicating the species *N. ramosa)*

Vesicularia spinose

Figure 72: Coarse sediment surrounding the investigated wrecks and associated species.

On both wreck sites the overall faunal coverage was broadly similar. The low-lying fauna was dominated by barnacles, sponges, ascidians (sea squirts), short foliose turf (hydroids and bryozoans), and anemones (Figure 70 and Figure 71).

Directly across the channel from the survey area, is the coast of Portsmouth and the Isle of Wight. The clarity of the water and the lack of silt observed at both wreck sites is more reminiscent of waters further to the west of Portsmouth, but can also be seen in the deeper offshore waters of the English Channel. Most of the fauna observed would be very familiar to British divers. The orange sponge dominating the images in Figures 70 and 71 is the shredded carrot sponge (*Amphilectus fucorum*), and the white anemone is *Actinothoe sphyrodeta*.

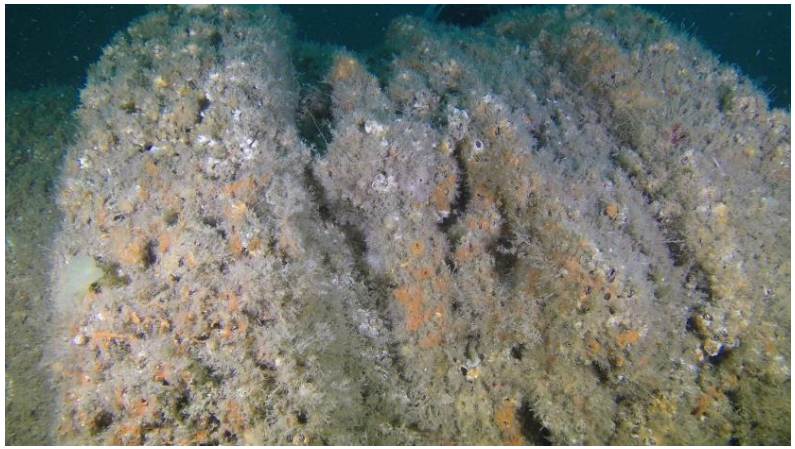
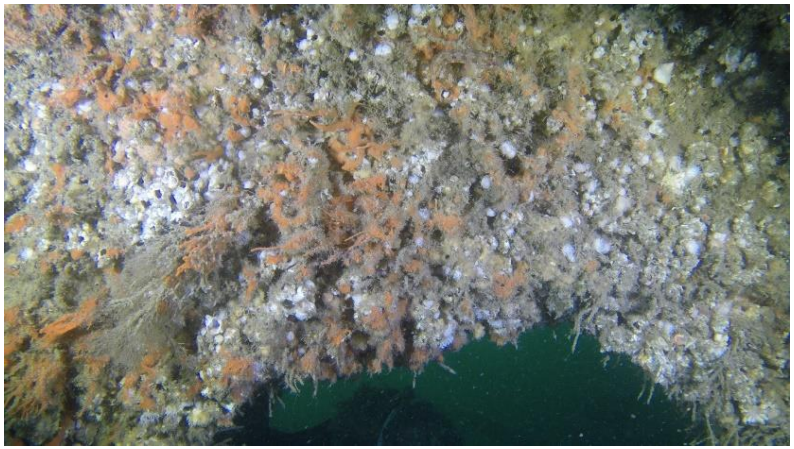


Figure 73: General faunal cover on EA3234 (USS PARTRIDGE).



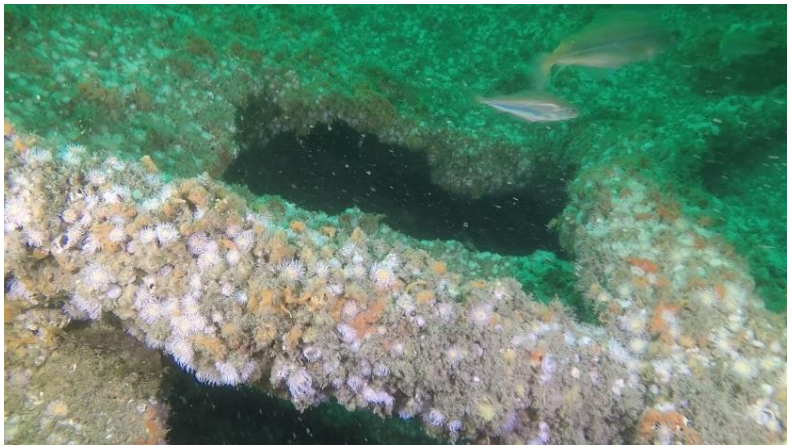
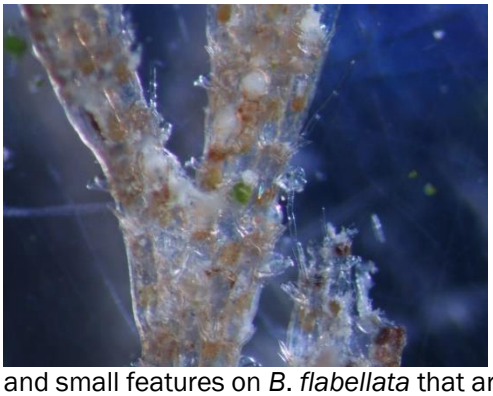


Figure 74: General faunal cover on EA4630 (HMRT SESAME).

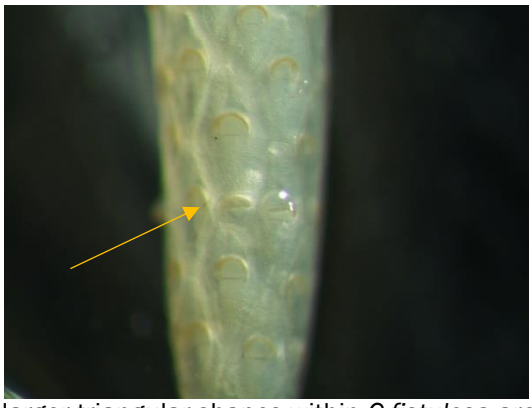
The hydroid and bryozoan turf species were varied and densely aggregated in places. Short and tall foliose species were observed and though superficially similar when viewing faunal coverage overall, closer investigation of the general turf revealed much variation. The smaller species, some only a few centimetres tall, or less, were found to include species of hydroids and bryozoans including the bryozoans *Bugulina flabellata*, *Cellaria fistulosa*, *Scrupocellaria scrupea*, and large amounts of the athecate hydroid *Eudendrium* spp. Figure 75 presents images of these smaller genus/species, and some of the features used to identify them.

Bugulina flabellata approx. 2cm tall

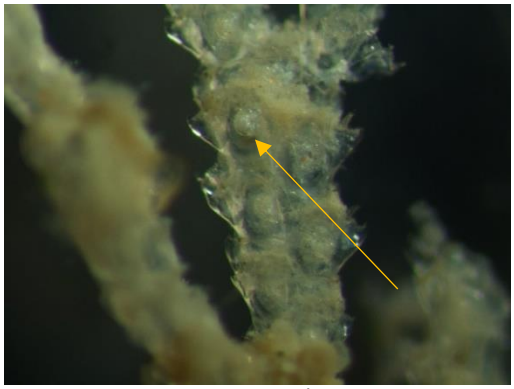


Spines and small features on *B. flabellata* that are used for identification

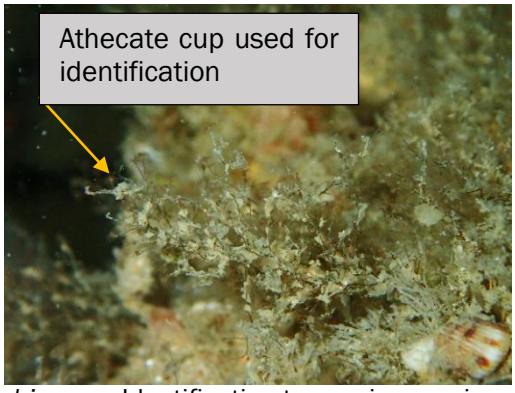
Cellaria fistulosa approx. 1cm section



The larger triangular shapes within *C.fistulosa* are the main zooids, the arrow points to one of the smaller interzooidal avicularia that are used for identification



Scrupocellaria scrupea, under 1cm long section, arrow pointing to small 'flap' that folds over the face of the small autozooids, its presence used in identification

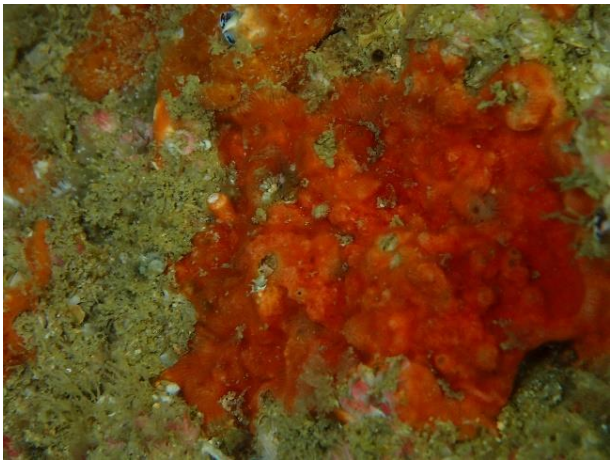


Eudendrium sp. Identification to species requires review of very small features

Figure 75: Smaller hydroid and bryozoan turf species

Across both wreck sites, bright red low-lying crusts were observed, which on analysis were found to comprise mainly two types of encrusting bryozoans, *Schizomavella hastata* and *S. teresae.* The separation of these two species is achieved by looking at very small features of each zooid under a microscope, which is not presented here.

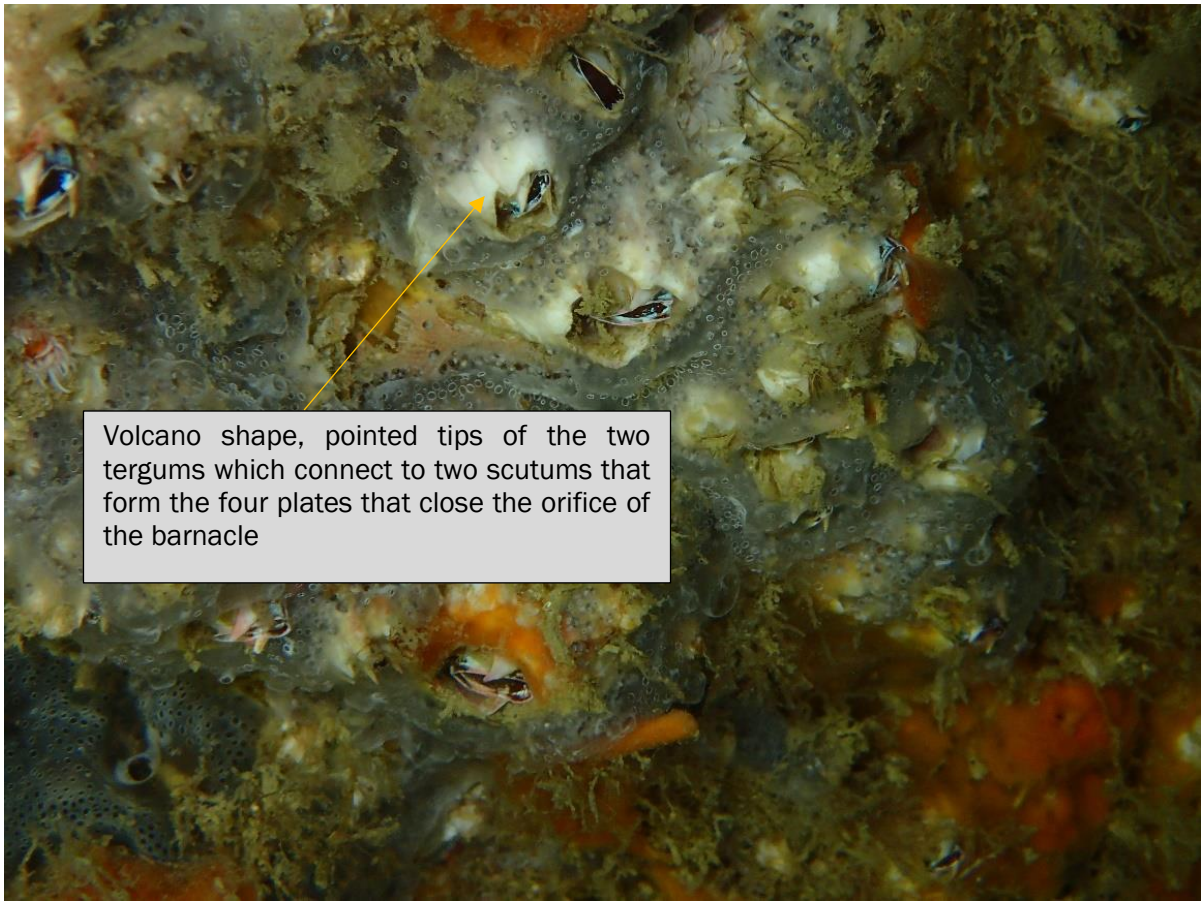
Red crust on wreckage



Schizomavella sp.

Figure 76: Bryozoan crust, *Schizomavella* sp.

The barnacle that dominates the wrecks was found to be a southern species known as *Perforatus perforatus* (previously *Balanus perforatus*). It is recorded as a noted species of artificial structures and is also known from ships hulls (Skewes, 2008). Identification of this barnacle relies amongst other things on observing its volcano shape, the colour of the tissue within its orifice, the outer plate construction, and during dissection, the shape of the flaps that open and close the barnacle, the tergum and scutum. Figure 77 shows the key features aiding its identification.




Tergum on the right and scutum on the left, two of the four plates that close the barnacle

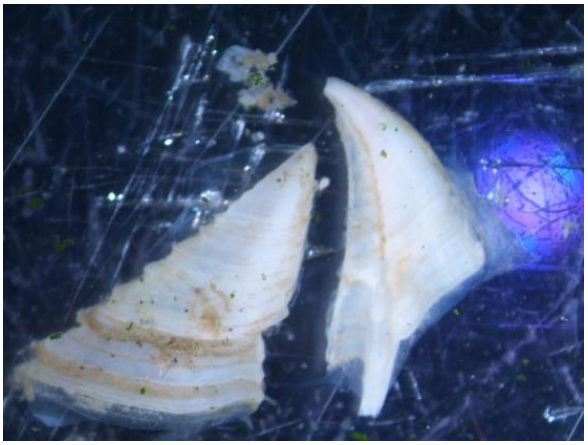

Here the tergum and scutum are separated to show some of the features that would be looked at in barnacle dissection

Figure 77: Identification of *Perforatus perforatus*

Colonial, stolonal and solitary ascidians (sea squirts) were also very common at both wreck sites. In contrast to solitary sea squirts, the colonial species comprise individual zooids which are embedded in a common test (tissue mass). The stolonal varieties are individual sea squirts, connected by a narrow stolon. The species noted in the survey area were mainly the colonial species *Diplosoma spongiforme* and *Distomus variolosus,* two colonial club headed species*, Morchellium argus* and *Aplidium punctum*, the stolonal species *Pycnoclavella aurilucens* and *Clavelina lepadiformis* (lightbulb sea squirt)*,* and the solitary species *Microcosmus claudicans*, *Polycarpa scuba*, and the often overlooked small solitary ascidian *Molgula complanata*. Figures 78, 79 and 80 present images of the commonly observed ascidians during the survey.

The colonial sea squirt *Diplosoma spongiforme* creeping over barnacles. The semi-transparent test is not immediate evident to the eye but occurred regularly across the survey area

Distomus variolosus: This small red sea squirt forms colonies, the individuals of which are partly fused and which are retained in a common test

Figure 78: Examples of colonial ascidians

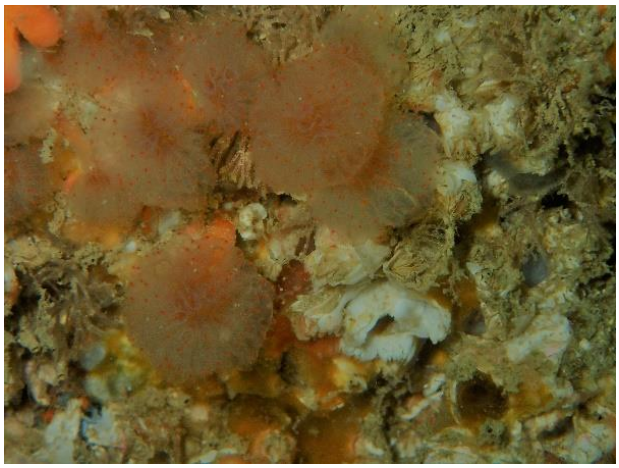
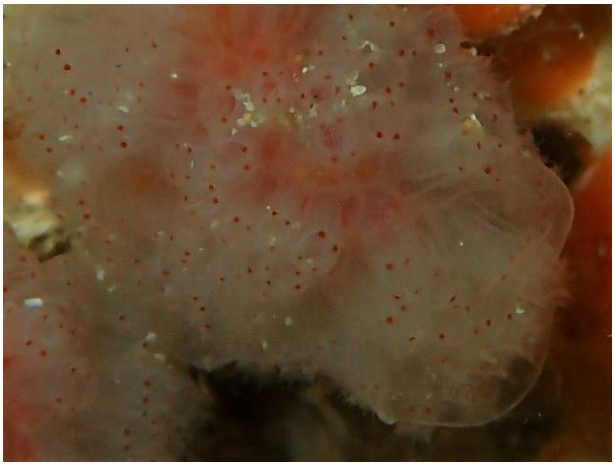
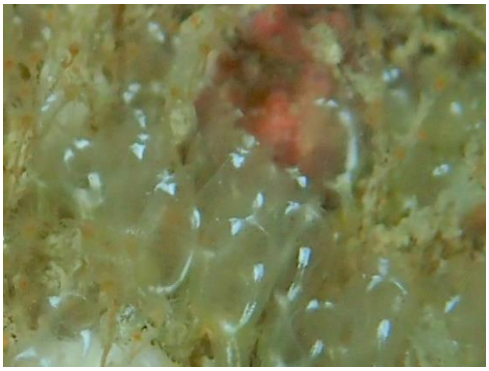
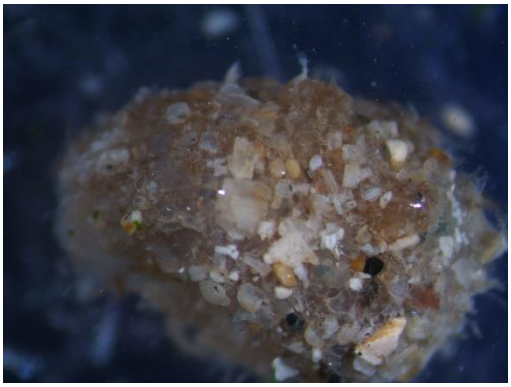
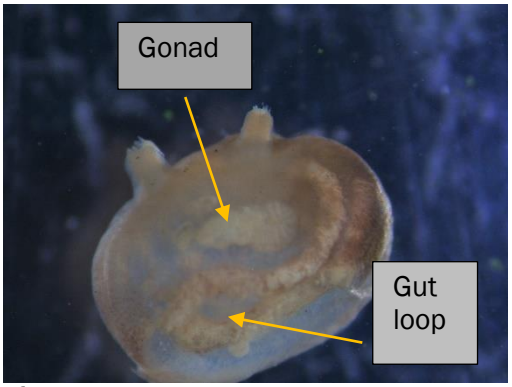
 *Aplidium punctum*	 Close up of *A. punctum* showing the single red spot found on the top of each zooid, a feature used in species identification
 *Morchellium argus*	 Close up of *M. argus* showing the four red dots found on the top of each zooid, in a box shape, which contrasts with *A. punctum*

Figure 79: Club head ascidian species, *Aplidium punctum* and *Morchellium argus.*

<table>
<tr><td>  </td><td>Left: Light bulb sea squirt, Clavelina lepadiformis

Below left and right: Very small creeping sea squirt in the low-lying faunal turf, Pycnoclavella aurilucens. Image on the right shows a close up of the individual zooids, and the diagnostic white pigment on the top of each zooid, arranged in three dots.</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td> 
Microcosmus claudicans, identified by the bright red and orange stripes within the siphons</td><td> 
Polycarpa scuba often identifiable by its paler flared siphons</td></tr>
<tr><td> 
The small ascidian Molgula complanata is covered by sand grains and often found adhering to larger fauna such as hydroids</td><td> 

To identify Molgula complanata, the sand grain covered test is removed. The open gut loop, and the posteriorly directed gonad are used in its idenitfication</td></tr>
</table>

Figure 80: Stolonal and solitary ascidians observed

Sponges were very prevalent at both wreck sites. The most common sponge seen was the shredded carrot sponge, *Amphilectus fucorum* but other sponges were also very common. Some sponges are very distinctive and do not require dissection for identification purposes, such as *Hemimycale columella*, regularly seen across the survey area. Another sponge that was commonly observed, mainly at the proposed wreck site of the HMRT SESAME, was the tennis ball sized globular sponge, *Tethya* (=*citrina*), where it occurred in clusters within the wreckage. Another more easily identifiable sponge is the chocolate brown sponge, *Raspailia ramosa*, which forms clusters of finger like growths, covered in varying degrees of silt or small particles. However many sponges form low lying crusts or thin cushions, and require dissection.

Hemimycale columella with its distinctive crater covered surface

The yellow globular sponge *Tethya* (=*citrina*) occurring in small clusters on the wreck investigated EA4630

Chocolate brown fingers of *Raspailia ramosa*

Large cushion shapes of the family Suberitidae

Large cushion form sponge seen commonly in the south-west of Britain, *Cliona celata*

Crumbly sponge, *Dysidea fragilis,* a sponge that does not have any spicules but incorporates particles such as sand grains into its tissue

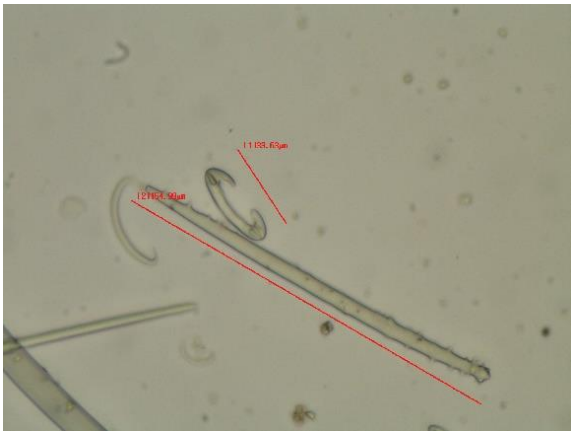
Figure 81: Sponges observed within the survey area.

Dissection for sponge identification purposes can be done with what is known as the 'quick and dirty method', where small pieces of sponge are dissolved in bleach to break down the tissue. What remains after this is the compliment of structural elements known as spicules, of which there are many types. The combination of spicule types, their size, their orientation within the sponge structure, all contribute, among other factors, to the identification of a sponge. Within the current survey, a few sponges were indistinct enough, and occurred regularly enough to warrant further identification. Figure 82 presents an in situ image of a sponge that was subsequently dissected, and its component spicules.

Within the general turf, soft yellow sponges were seen. After dissection, the spicules were measured and photographed.

An array of spicule types found.

Larger spined spicules (acanthostyles), approximately 175 µm long.

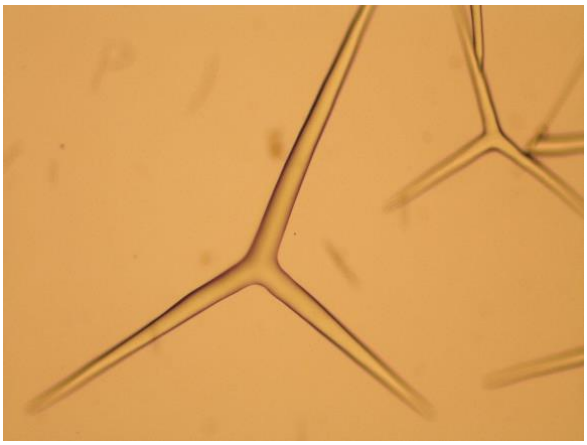


Smaller curved spicules approximately 33 µm long.

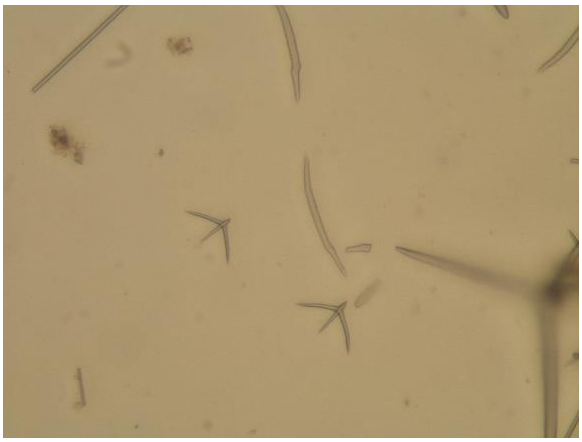
Figure 82: Myxillidae, potential *Myxilla cf. rosacea*

Spicules can be made of either silicon dioxide, as found in most of the sponges found here, or calcium carbonate, which are found in calcareous sponges. Calcareous sponges were observed within the short faunal turf, but in very small quantities. One of these was the small folded sponge *Leuconia (=johnstoni)*, which did not present itself as expected for that species, but when dissected, the sponge comprised the spicules presented in Figure 83. The calcareous sponges are undergoing a taxonomic revision and many identifications should be treated with caution.

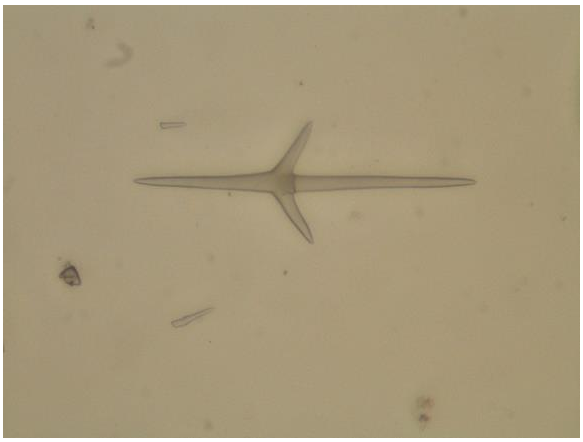
Very small and well hidden in the turf is a calcareous sponge, *Leuconia* (=*johnstoni*)



Large spicules known as triradiates



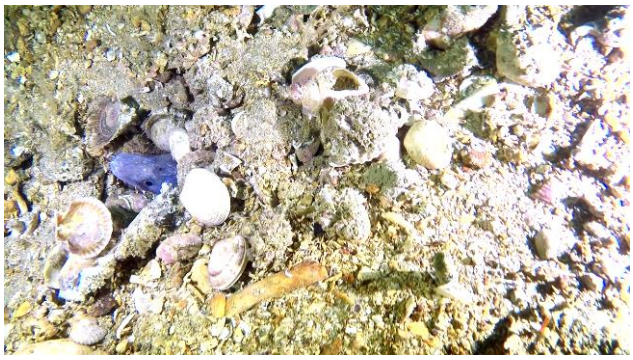
Small quadriradiates and microxea



A second type of small quadriradiate

Figure 83: Calcareous sponge *Leuconia* (=*johnstoni*)

A multitude of fish species were observed, including the commonly observed wreck species, bib/pout/poor cod, *Trisopterus luscus* and *T. minutus*. The wrecks were full of conger eels (*Conger conger*) and covered in tompot blennies (*Parablennius gattorugine*). Smaller conger eels were also seen buried the in the coarse sediment surrounding the wrecks. A variety of wrasse were observed. Well camouflaged against the wrecks, were the small scorpion fish *Taurulus bubalis*. Crabs and lobsters were also commonly seen, notably the edible crab (*Cancer pagurus*), the lobster *(Homarus gammarus*), and the large spider crab (*Maja brachydactyla/squinado*).



Small conger eel buried in the coarse mixed sediment and large shell fragments.

The scorpion fish (*Taurulus bubalis*) and to the right, a tompot blenny (*Parablennius gattorugine*)

Lobster *(Homarus gammarus*)

Spider crab (*Maja brachydactyla/squinado*)

Figure 84: Conger eel, scorpion fish, crabs and lobsters

On the supposed wreck of the USS PARTRIDGE EA3234, an unusual sight was the skeleton of a marine mammal, believed to be a small dolphin. Towards the end of the survey, recent storms had started to disperse its remains.

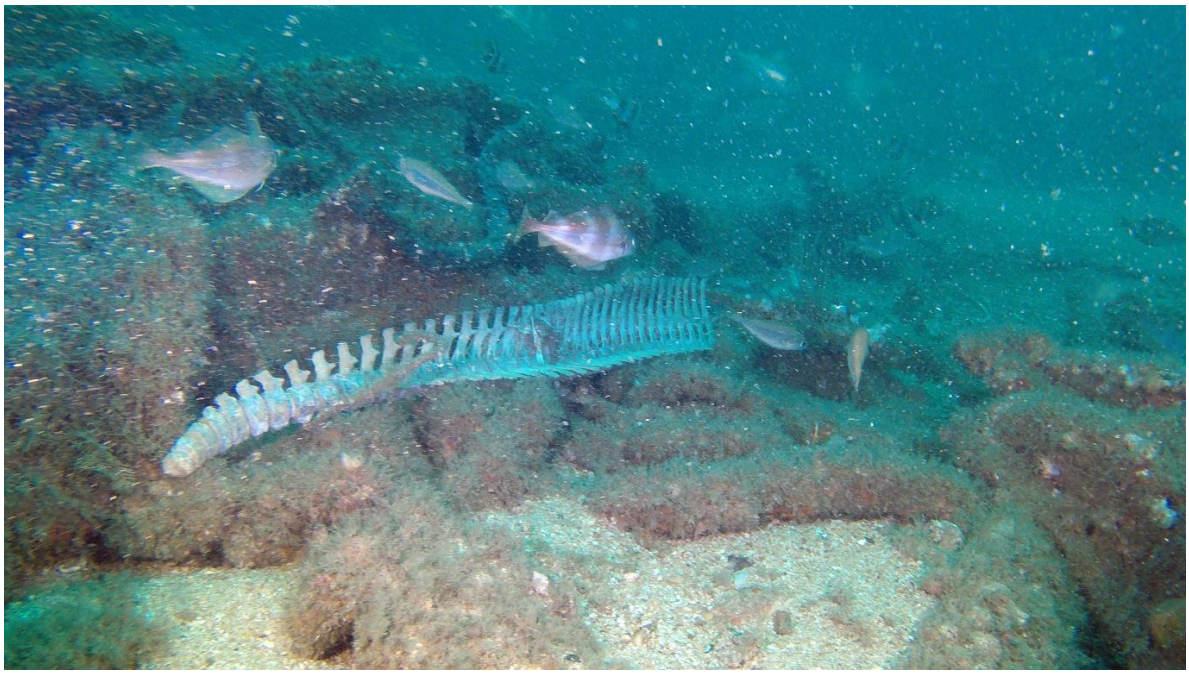


Figure 85: Skeleton of small dolphin on the 'USS PARTRIDGE'

The marine life in, on and around the two wrecks surveyed was dense and varied, and many more species were observed than it has been possible to present here.

Acknowledgment: Most of the images presented here have been provided by Alison Bessell with additional images provided by Alison Mayor and Jenny Watkins.

References;

Skewes, M. 2008. *Perforatus perforatus* An acorn barnacle. In Tyler-Walters H. and Hiscock K. (eds) *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*, [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [cited 10-11-2019]. Available from: https://www.marlin.ac.uk/species/detail/1603

9. The Loss of SESAME, DUNDAS, PARTRIDGE, SWIFT and ISIS

As part of this project we have conducted significant historical research into at least five different ships in order to either prove or disprove their association with the two wrecks. Our thanks go to those who have helped with this research and especially to those from overseas/international organisations.

The relevant information gather from our research related to the loss of each ship and observations are set out below.

9.1 HMRT SESAME (W144)

In the early hours of Sunday 11th June 1944 HMRT SESAME was sailing approximately 20 miles from the French coast and towing a Whale Unit[48]. Her position was reported to have been between 56C and 56D buoy.

SESAME had sounded the alarm and crews were standing by for an E-boat attack. It is believed that HMRT SESAME as torpedoed amidships on the starboard side and sank in less than a minute. It is likely that the remaining crew were below decks and would have been killed as a result of the explosion and sudden sinking. After being in the water for over an hour five survivors were helped aboard SESAME's Whale tow.

The NCO[49] in charge of SESAME's Whale tow had been with his men in the crew shelter. He recalled seeing a 'large flash', but that due to the large amount of gunfire and use of flares that night he paid little attention. However, a short time later, he realised the tow had stopped, he looked out of the shelter. All he saw was a puff of smoke ahead of the tow[50].

The official casualty file[51] records thirteen survivors (four officers and nine ratings) and a total of eighteen (four officers and fourteen ratings) as 'Missing Presumed Killed' (MPK).

ADAM, Alexander M, Quartermaster, RTP R/238617 T.124 T, MPK

AITKEN, Hector R, Ordinary Seaman, RTP R/269825 T.124 T, MPK

BELL, James, Ordinary Signalman, 269531 T.124 T, MPK

FAIRLESS, Thomas R, Greaser, 238936 T.124 T, MPK

HASTIE, John C, Fireman, 269903 T.124 T, MPK

HELLYAR, Kenneth R, Greaser, 234240 T.124 T, MPK

HODGSON, Eric, 2nd Radio Officer, 209657 NAP, MPK

HOWIESON, Roy, Fireman, 300614 T.124 T, MPK

LEVENS, James V F, Sub Lieutenant (E), RNR, MPK

MARE, Robert J, Assistant Steward, 300621 T.124 T, MPK

MELADY, John H, Greaser, 238875 T.124 T, MPK

---

[48] Number S.513

[49] Non-Commissioned Officer

[50] ADM 199/1637 Control Organisation (TUGS) report. Report on the loss of HM Tug SESAME.

[51] ADM 358/4355 Nominal Role of officers and ratings of HMS SESAME dated 2 Jul 1944

MORRISON, Alexander, Boatswain, 1080031 T.124 T, MPK

MUNRO, Charles W, Act/Sub Lieutenant (E), RNVR, MPK

MURRAY, Duncan, Able Seaman, 238990 T.124 T, MPK

NICHOLSON, Neil, Able Seaman, 269522 T.124 T, MPK

STRONG, John J, Cook, 81179 T.124 T, MPK

THOMSON, Isaac, Act/Sub Lieutenant (E), RNVR, MPK

WILLIAMS, Francis J, Steward, 238834 T.124 T, MPK

Another British rescue tug, HMRT STORMKING, was returning to England having successfully delivered a Mulberry Phoenix Unit to Arromanches, when the tug came upon SESAME's abandoned Whale unit. Joe Barnes, one of STORMKING's crew, recalled the event and said that 'we found the tow rope to be bar tight so we know there was a tug on the end of it'[52].

Figure 86 HMRT STORMKING (© IWM (FL 10206))

It is noted in the War Diary, Home Commands of 11th June 1944 that;

> *"Unit C (Corrupt group). 513 abandoned 284º from 58C buoy. Have taken in tow proceeding to Mulberry "B", (Storm, 111230B, to C in C, Portsmouth)"*

[52] Describing the incident in 'Towrope', 2001; 3(10):17. Source 'The Tattie Lads' Ian Dear ISBN: HB: 978-1-8448-6401-0.

It is likely that this is reference to the S513 tow lost from SESAME. However it is noted that the location is reported to be near 58C buoy. There are varying reports of the location of the loss of SESAME and her tow.

9.2 HM Tug DUNDAS

The British tug DUNDAS had been employed in the transport of Mulberry Whale units from the base at Peel Bank[53] during the initial days of Operation NEPTUNE. DUNDAS also provided much needed support to vessels in Normandy during the fierce storm of 19th to 21st June 1944 which caused significant damage to Allied ships and the Mulberry Harbours.

Figure 87 Mulberry Harbour, Arromanches: A section of a "Whale" is being towed into position. In the foreground men are sat on the shore watching the construction of the harbour. (© IWM (A 24157))

In his report of 23rd June 1944, the Master of DUNDAS reported;

> *"June 23rd, 05:45 – the American Tug A.T.R. – broke adrift from her buoy and struck DUNDAS with her stern on the starboard bow, then continued to drift ashore. I rendered assistance by taking her towing wire and tried to tow her to safety but discovered that she had holed me forehead and that I was sinking fast myself by the head. I took immediate action, cutting off the towing line and endeavoured to run my ship as far up the beach as practicable (state of tide – "low water").*
>
> *I have alas to report that on running my vessel ashore stern first, I felt her striking some object on the bottom, the impact was felt amidships.*
>
> *The vessel filled very quickly and the seas were soon breaking over the lower bridge. All hands except the Chief Engineer, R/O and myself too to the rafts, both life boats being smashed. I have to report that my Confidential and Code Books were put in a bag with weights attached*

[53] Near Wootton Creek, Isle of Wight in the Solent area.

and placed on one of the rafts in the hope of getting them ashore, but the raft turned over and they were lost.

I reported the loss to S.N.O., also to the Captain in Charge of the American Area in case the bag washed ashore."

There was no report found to indicate there were any casualties resulting from this incident.

Observation 1 Assuming that the wreck EA4360 is that of HM Tug DUNDAS, the report by her master could explain why propeller blades were missing/damaged. It may also indicate that much of the damage was at the keel and therefore not visible.

The following is an extract from the report by the master of USS BANNOCK (ATF-81)[54] who was tasked with towing DUNDAS from St. Laurent to Lee-on-Solent, England;

"Thursday, 20 July 1944

……. 0949 underway standing over to west side of transport area of OMAHA beachhead, to take HM tug DUNDAS in tow. 1047 anchored in transport area. 1112 towing hawser made fast. Made main propulsion, standing out of transport area. Making preparations to proceed en route St. Laurent, France to Lee-on-Solent, England in accordance with CTU I122.3.1 dispatched 191310B of July 1944, with DUNDAS in tow astern to 100 fathoms of 1 5/8" wire hawser. Standing out swept channel, on various courses at various speeds, 1131 anchored in northern part of transport area and hove HM DUNDAS close astern to make adjustments to rudder of DUNDAS. 1230 completed adjustments to DUNDAS's rudder. Underway and standing out into Baie de la Seine, proceeding to Lee-on-Solent, England in company with USS KIOWA. 1252 anchored in 17 fathoms of water with 30 fathoms of chain out to starboard anchor in vicinity of KANSAS light ship, Baie de la Seine, to await sailing orders from HMS CAPETOWN. Stopped main engines. 1959 sounded general quarters. 2022 secured from general quarters. Weather foggy, rainy and seas moderately calm.

Friday, 21 July 1944 0800 49° 27' 00"N 00° 54' 30"W

…Seas short and heavy with wind blowing strong gale. HM DUNDAS rolling and pitching heavily. Degaussing energised for magnetic headings. Ships present: USS KIOWA, and numerous US cargo ships. 0111 HM DUNDAS listed heavily to port, shipping main deck full of water and sank, Veered towing hawser to 100 fathoms and unshackled from main hawser. ***Position: latitude 49° 27' 00"N, 00° 54' 00"W, longitude****. Dropped red buoy, marked "Wreck" with 200 feet of light wire attached, to mark position of derelict and made necessary operational disposition reports. "*

[54] https://en.wikipedia.org/wiki/USS_Bannock

Figure 88 USS BANNOCK 26 August 1944. (PD-US expired)

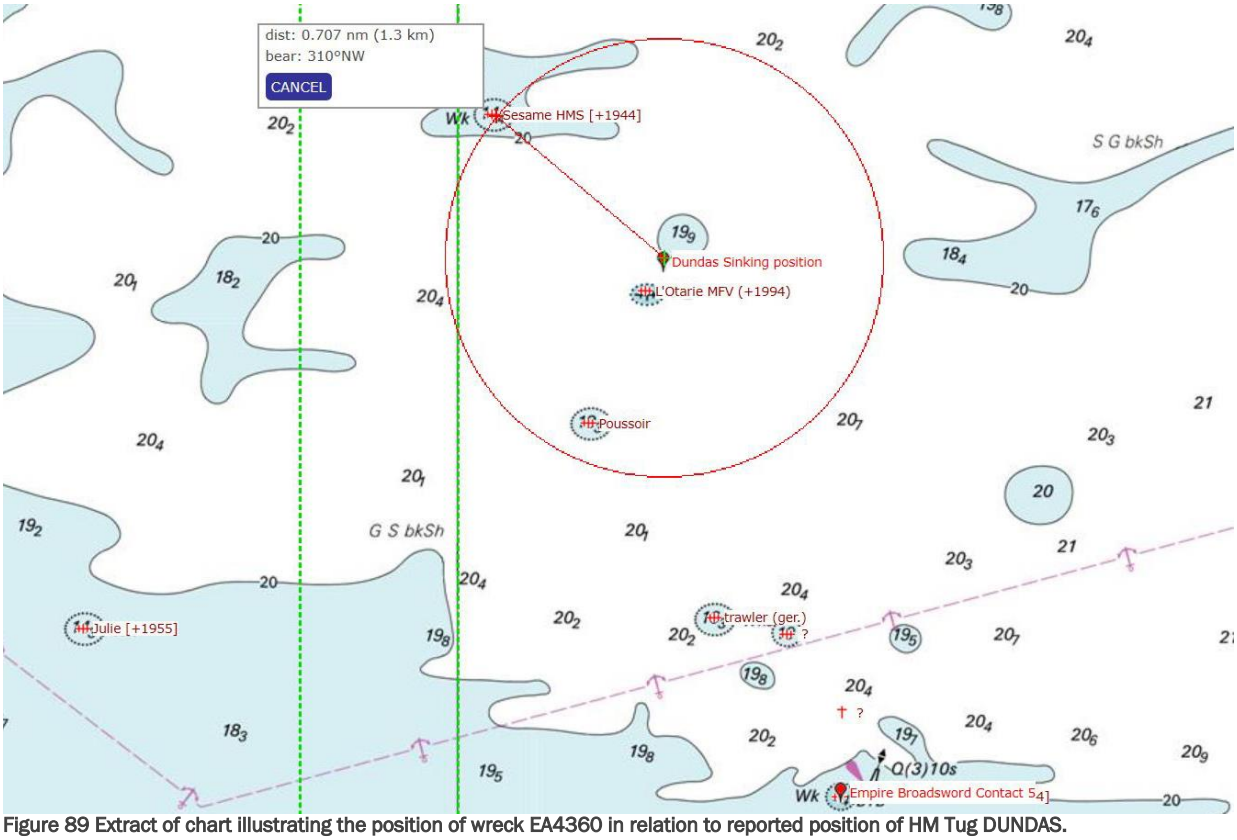


Figure 89 Extract of chart illustrating the position of wreck EA4360 in relation to reported position of HM Tug DUNDAS.

Observation 2. The position reported by USS BANNOCK of the wreck of HM Tug DUNDAS is approximately 0.7 Nm (1.3Km) from the wreck EA4360.

9.3 USS PARTRIDGE (ATO 138)

The early months of 1944 saw PARTRIDGE towing in and out of several British ports and harbours, particularly towing the components of the Mulberry Harbours from construction ports to their staging areas. This served the dual purpose of positioning the Mulberry components in place for the forthcoming Normandy landings and training the crew in towing the components across the Channel after the initial D-Day landings. For the PARTRIDGE, the initial D-Day landings found the ship standing by to perform rescue and towing duties – as she had earlier in the War in the Caribbean.

Figure 90 USS PARTRIDGE (PD -US Expired)

In the early hours of 11th June 1944, PARTRIDGE was towing three sections of Whale bridge[55] towards the Normandy beaches when she was attacked by a number of German E-Boats. She was struck by two torpedoes.

Survivors reported that one struck the area of the magazine, whilst another hit by the engine room. The magazine hit caused a catastrophic explosion which tore the ship apart. Many of the crew were killed instantly by the explosion and the ship rolled over and sank after about 20 or 30 seconds. Several of the survivors were thrown into the sea by the explosion. Most survivors made their way to the Whale-Bridge sections they had been towing, and took refuge aboard.

The explosion had been seen on the horizon by the Canadian corvette HMCS PRESCOTT, which made its way towards the flash to recover survivors. The crew from the Prescott rescued who they could and

[55] Tow number S528 comprised of the floating pontoon bridge sections of the Mulberry Harbour.

headed back to OMAHA Beach to drop them off for treatment on the beach at a makeshift hospital aboard a large LST landing craft. The Prescott buried at sea the bodies of the dead they had taken on board. Altogether, it is believed that thirty-five of PARTRIDGE's total crew of ninety were lost.

The experiences of some of those who survived the sinking of PARTRIDGE have been vividly captured in the book 'A Bird in the Deep – the true story of the USS Partridge' by James Krouse[56].

In other reports the position for the loss of both USS PARTRIDGE and HMRT SESAME are references to 56 and 58 Channel and reference to buoy 58B, 58C and 58D. An analysis of the reported positions is considered in section 9.6 below, however, these reported positions are a considerable distance from the wreck EA3234 (supposed PARTRIDGE).

The reported position of buoy 58D is Latitude 49°47' 39.987"N Longitude 0°30' 38.674"W and the wreck EA3234 is at position Latitude 49°31'.426"N Longitude 00°43'.890W".

Observation 3. The reported position in the vicinity of Buoy 58D is not consistent with the wreck position of EA3234.

[56] ISBN – 9781626130753 Chapter 14 published by ATBOSH Media Ltd.

9.4 HMS SWIFT (G46)

The Royal Navy S-class destroyer HMS SWIFT was assigned to Operation NEPTUNE as part Task Force S. HMS SWIFT was under the command of Lt. Cdr John Ronald Gower RN and took part in the operations on SWORD Beach on D-Day. She was on hand to rescue the sailors of HNoMS SVENNER, sunk by the Germans, and participated in the fire support missions of the Allied troops on D-Day by bombarding the sector of Franceville. Following the initial assault HMS SWIFT served in the eastern sector of the Baie de Seine.

Figure 91 HMS SWIFT sinking 24 June 1944. (PD Norway)

In his report to the Naval Commander Eastern Task Force on the loss of HMS SWIFT[57], Lt. Cdr Gower describes the circumstances of the tragedy as follows;

> *"Sir,*
>
> *I regret to report the loss of H.M.S. SWIFT under my command on 24th June, 1944, in approximate position 5.5 miles to the northward of Ouistreham Light House, under the following circumstances.*
>
> *2. The ship was returning from patrol which she has left at 0500, and proceeding to SWORD area prior to going alongside HMS SCOURGE for ammunition. The speed at the time was 9 knots 0503 [sic] which was the latest information received.*
>
> *3. At about 0710 a large explosion occurred presumably from a mine, apparently under No.1 Boiler Room, which immediately started swinging to port, and looked as if she might collide with an LCF which was steaming in a parallel course on my port bow. To check the*

[57] Dated 27 June 1944. ADM 358/4361

ship's weigh, I ordered the port anchor to be let go, and brought the ship up. The mid-ship portion of the ship was soon underwater to the height of the top of the funnel while the bow and stern remained above water, at an angle of about 30°, in the position she remained for some little time.

Lt Cdr Gower then describes the evacuation of the ship and rescue of survivors by several vessels in the vicinity.

The reported position was J6 which is believed to be an anchorage point to the North of Ouistreham.

Observation 4 the reported position for the loss of HMS SWIFT is too far east to be associated with wreck EA3234.

9.5 HMS ISIS (D87)

The archived official record of the loss of HMS ISIS[58] included correspondence regarding the nature of the sinking including details provided by a number of survivors.

On 20th July 1944 HMS ISIS was on anti-submarine patrol about 10 miles off the landing beaches.

At about 1802B, HMS ISIS had just completed two Asdic sweeps off the OMAHA section of the beach-head when three explosions occurred in rapid succession. The explosions occurred on the starboard side below the bridge and abreast No.1 Boiler Room. The ship took a severe list to starboard and split down the starboard side below B Gun deck. The bows of the ship turned to port. A fire broke out in the forward galley,

The ship sank bows first in 10 to 30 minutes after the explosion. Those able to abandon ship occupied five Carley floats and remained close together with two Denton rafts further away following the sinking. The survivors drifted for 6 hours before being seen by upper-deck sentries on HMS HOUND, which was anchored at A61 berth for the night as part of the night defence line for the British Assault Area. The survivors were rescued by Hound, a US Minesweeper and a US Coastguard cutter between 0209B and 0615B the next morning. Many of those rescued suffered from the effects of immersion, ingestion of Furness Fuel Oil (FFO) and hypothermia. Of the 41 men that abandoned ship only 25 survived their ordeal. HMS ISIS sank with the loss of 11 officers and 143 ratings, a further casualty later died from wounds.

The US War Diary for Friday 21st July 1944 reported that;

> *"ISIS mined on 20th July.*
>
> 1. *HOUND reports picking up one survivor, ISIS in vicinity Oboe Buoy 0209 this morning.*
> 2. *Have no information re ISIS.*
> 3. *20 survivors, ratings only, 12 cot cases.*
>
> *My 211236. ISIS sunk about 1800B/20th by torpedo or mine. Position unknown.*
>
> *ISIS last seen 2000/20. Ordered to anchor near O Buoy for the night. Have been searching for her today without success. My 211024 and 211409 refer."*

Using the detail from these accounts and researching the weather and tidal information[59] for the 20th and 21st July 1944 an analysis was made to estimate the possible movement of the survivors in relation to the wreck and 'O' buoy[60] (position Longitude 49° 28'.31N : Latitude 00° 41'.06W).

The tide was on the turn when HMS ISIS was sunk, but this increased to 1.9 knots mid-tide. Weather reports for the time confirmed a Force 4 to 5 wind[61] from the North East and this would have caused the survivors to drift to the south west at approximately 0.2 to 0.3 knots per hour. It is calculated that the forty-one men on the Carley and Denton floats would have drifted to the South and East of the wreck site EA3234. The following chart shows the estimated drift pattern for the predicted tidal conditions 10 nautical miles to the West of the wreck site in winds of 20 and 30 knots. This is consistent with the discovery of the survivors at A61 anchorage[62] 6 hours later and their subsequent recovery in the vicinity of O Buoy.

---

[58] ADM358/4375 HMS ISIS: 20 July 1944; sunk by enemy action, hit mine off the coast.

[59] Using Admiralty 'Total Tide' software program.

[60] Also known as 'Oboe' buoy.

[61] Beaufort scale.

[62] Position Longitude 49° 27'.43N : Latitude 00° 40'.6W.

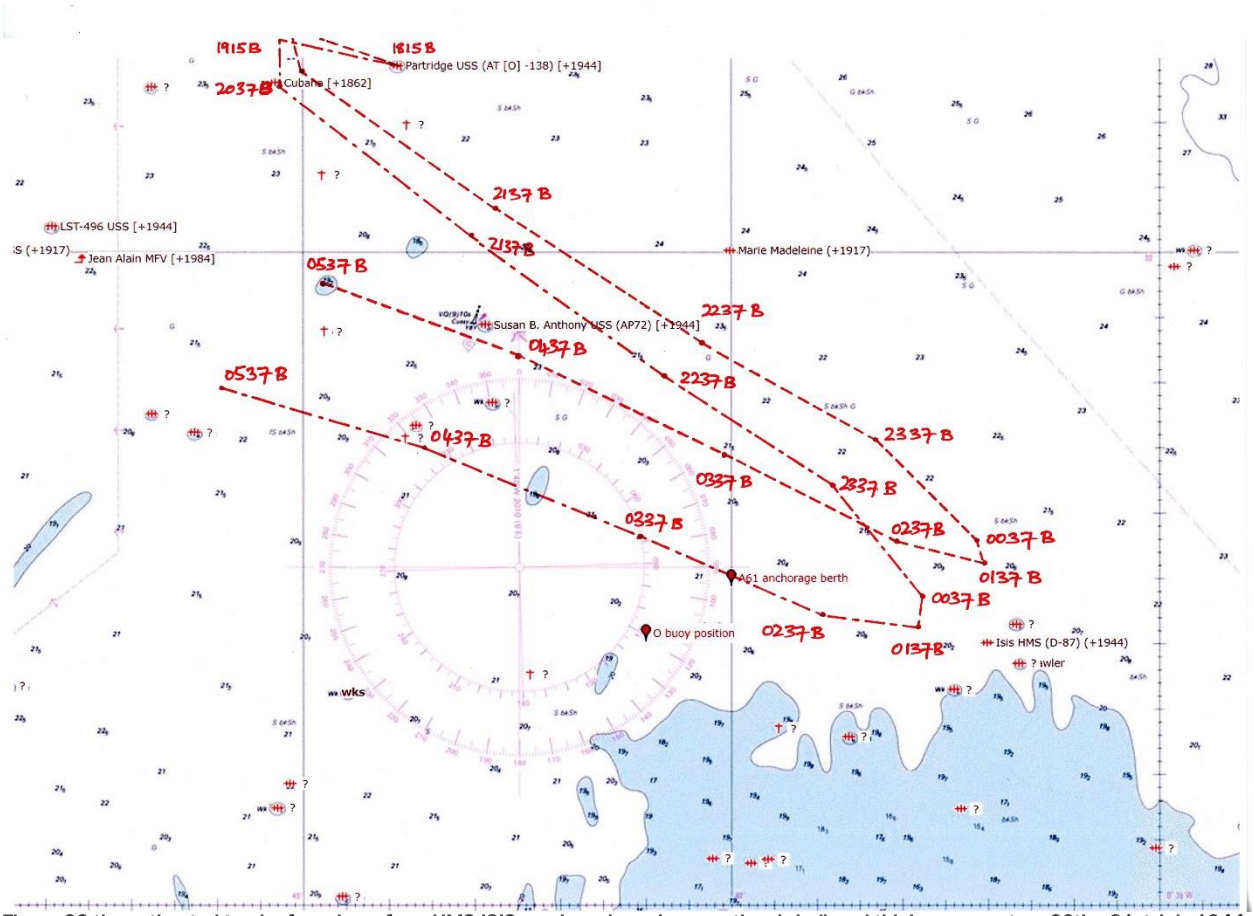


Figure 92 the estimated track of survivors from HMS ISIS survivors based on weather (wind) and tidal movement on 20th - 21st July 1944. (Tom Templeton)

Observation 5 the drifting pattern of survivors from HMS ISIS is consistent with the ship sinking at the location EA3234.

Full correspondence related to this significant loss of life was viewed[63][64] as part of the research into the loss of HMS ISIS. It is noted that in addition to the Royal Navy Officer's and crew, there were 13 crew members from New Zealand and also a civilian canteen manager from the NAAFI organisation[65].

A memorial plaque to those who lost their lives aboard HMS ISIS as a result of her sinking can be found in Portsmouth Anglican cathedral[66]. Details of those who perished can be found at Appendix 1 to this report.

HMS ISIS was 'adopted' by the town of Edmonton[67] and research also included correspondence with the local history group.[68]

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[63] ADM358/2342 HMS ISIS Officer Casualties.

[64] ADM358/4375 HMS ISIS Casualties OR (Ratings)

[65] Navy, Army and Air Force Institutes https://en.wikipedia.org/wiki/Navy,_Army_and_Air_Force_Institutes

[66] http://www.memorialsinportsmouth.co.uk/churches/cathedral/isis.htm

[67] In the London Borough of Enfield.

[68] MEMORIES OF HMS ISIS – 50 YEARS ON prepared by Tony D Jupe for the ISIS Survivors Association.

9.6 Swept Channels and Locations

In order to establish safe passage through enemy minefields Allied minesweepers cleared a series of channels for ships to navigate. Before the actual invasion minesweepers swept 10 channels numbered 1 to 10. There were two per beach, one for the fast convoys and one for the slow.

After D-Day the minesweepers widened the channels by filling in the gaps between them. Channel 56 was created by filling in the gap between channels 5 and 6. Eventually, as more 'gaps' were swept, the channels widened and eventually Channel 58 was formed when channels 5 to 8 were fully swept. Marked buoys were installed to mark the Channels with buoy ‘A’ being the furthest and ‘H’ being closest to the French coast.

Buoy D was on a similar latitude to Le Havre; buoy C would have been further north.

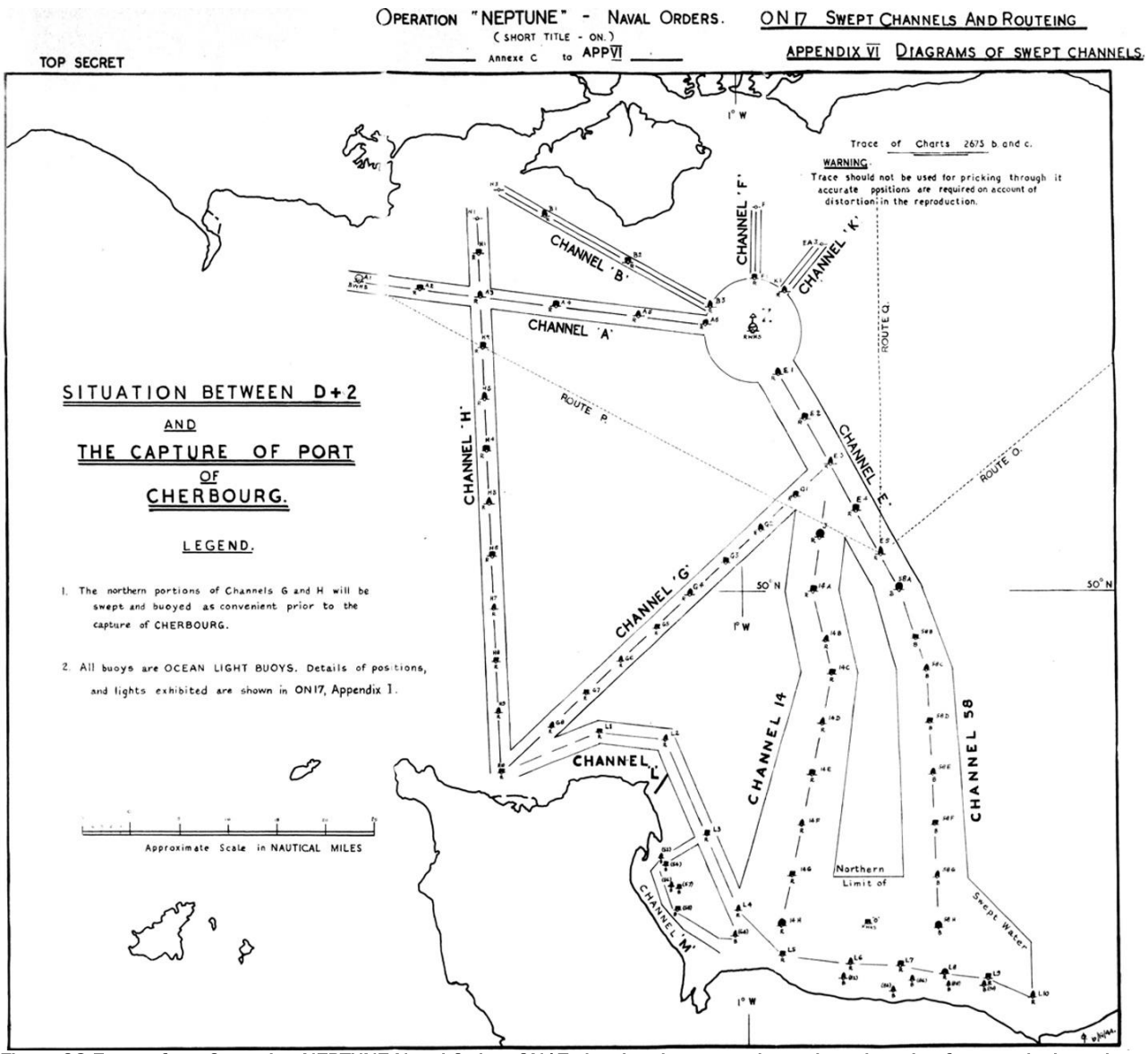

Figure 93 Extract from Operation NEPTUNE Naval Orders ON17 showing the swept channels and routing for vessels through the enemy minefields.

As mentioned previously, several historical reports indicate PARTRIDGE and SESAME were sunk near the 58D buoy. This buoy would have been significantly further north than the two wreck positions (EA4360 and EA3234).

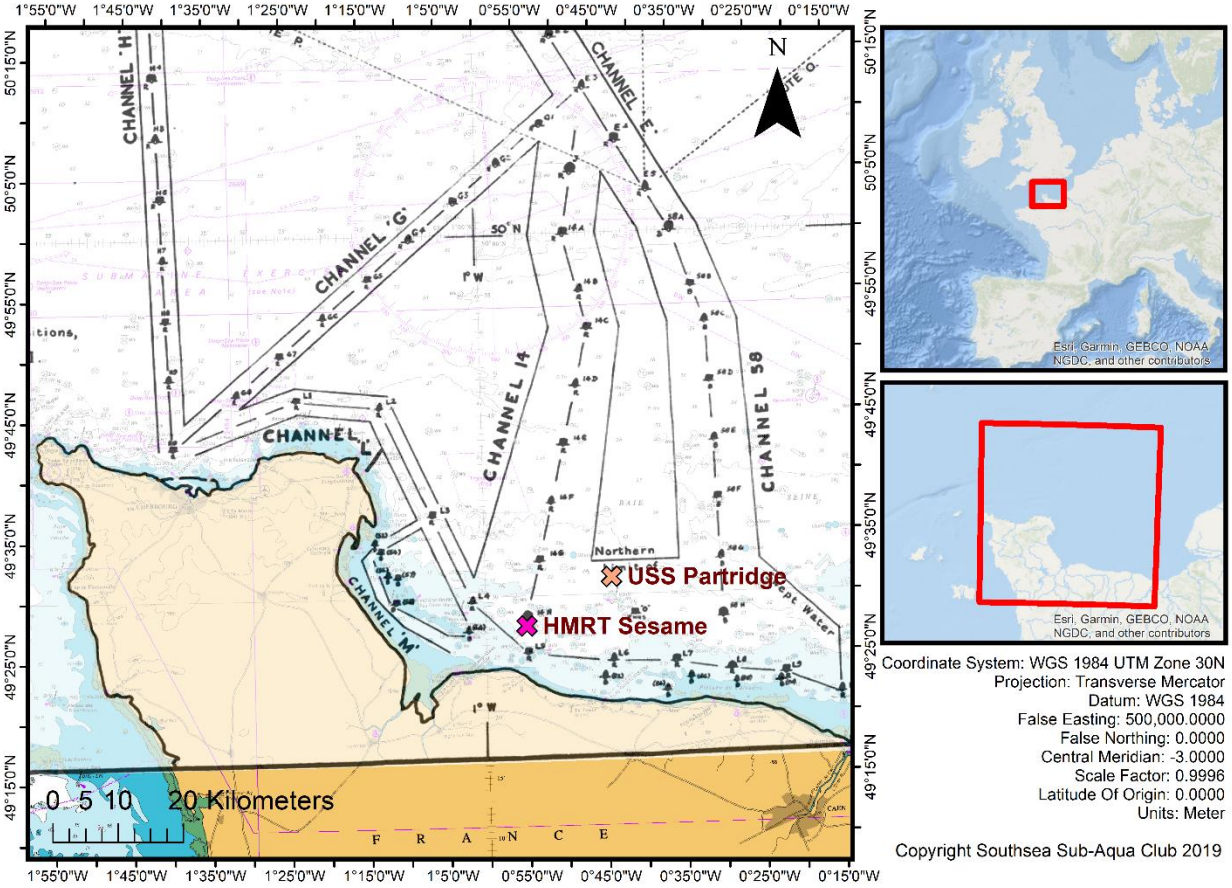

Figure 94 overlay image of swept channels and position of wrecks EA4360 (supposed SESAME) and EA3234 (supposed PARTRIDGE)

The above image illustrates the significant variation between the reported loss and the wreck sites.

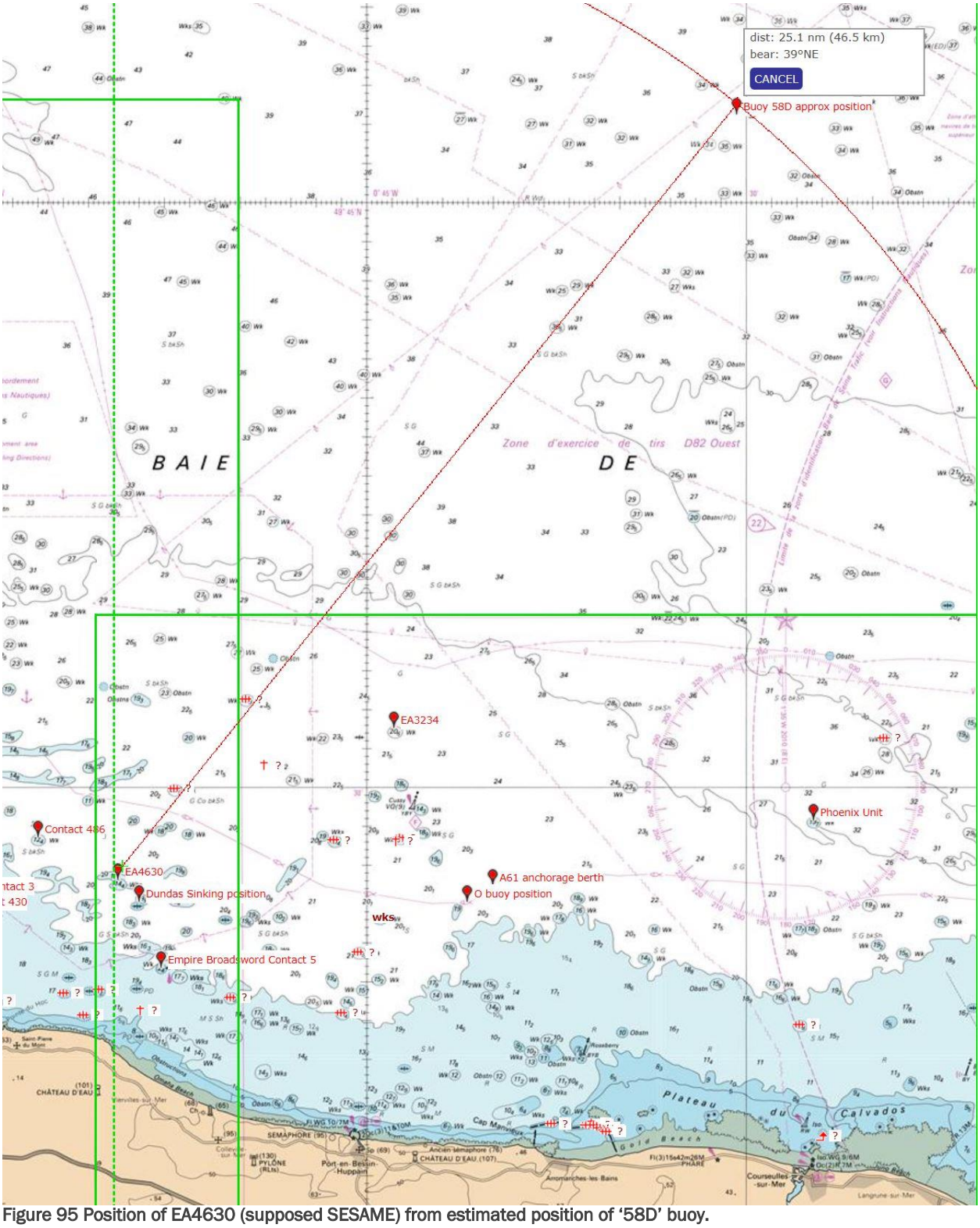

Figure 95 Position of EA4630 (supposed SESAME) from estimated position of '58D' buoy.

Site EA4360 (supposed SESAME) is 25.1Nm (46 km) distance from the estimated position of 58D buoy.

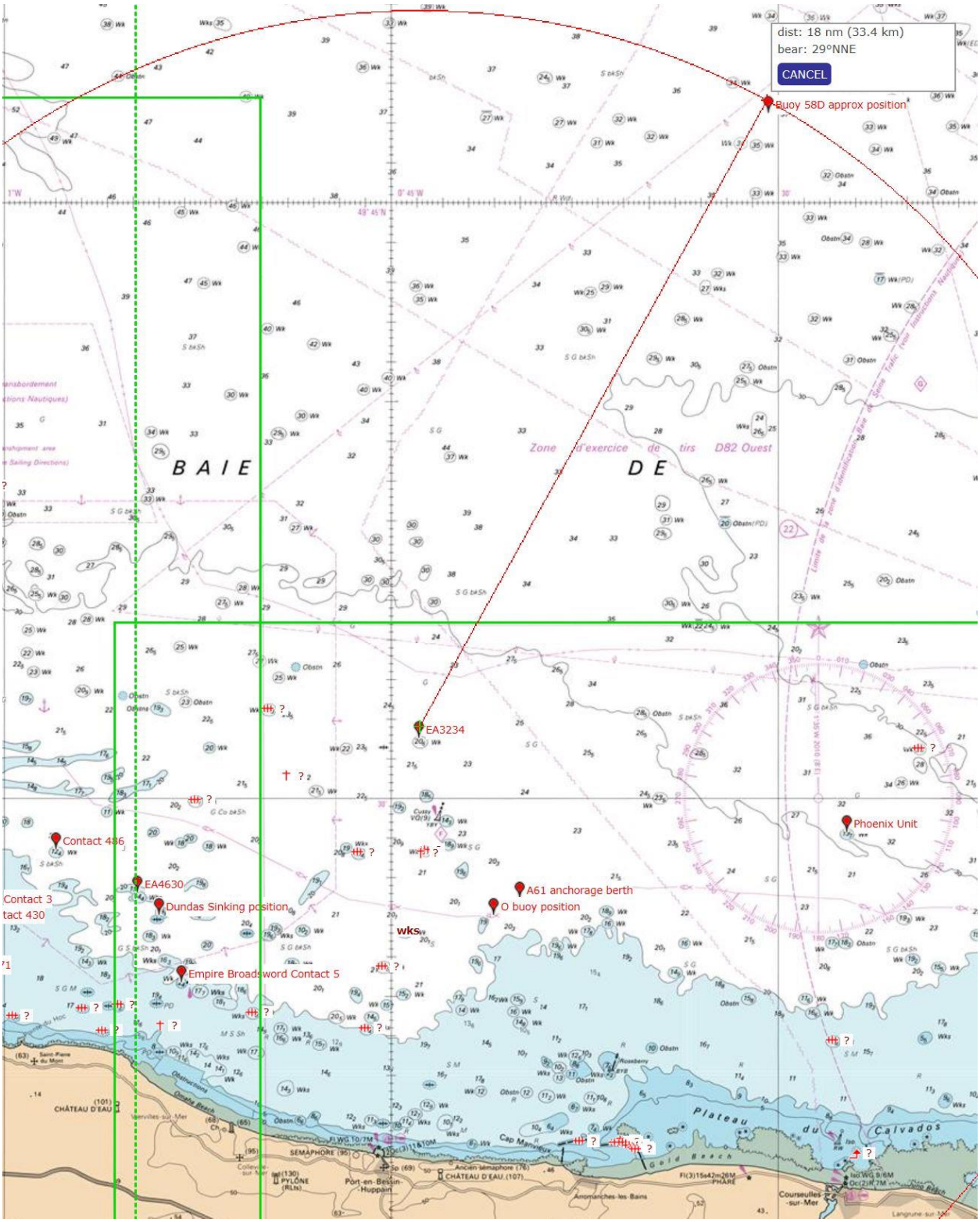

Figure 96 Extract from chart showing position of EA3234 (supposed PARTRIDGE) from the estimated position of 58D buoy.

EA3234 (supposed PARTRIDGE) is 18Nm (33.4km) distance from 58D buoy.

Observation 7 the position of the wrecks EA4360 and EA3234 are too far from the reported loss of HMRT SESAME and USS PARTRIDGE; being in the vicinity of 58D buoy.

It is also noted that all Mulberry tows from England ended at Mulberry B. Mulberry units destined for A were then taken over by small tugs and towed to Mulberry A from B. There was no reason for a Mulberry tugs (or tugs) with Whale units in to be where the wrecks (EA4360 and EA3234) have been located.

The positions of the wrecks, buoys, anchorages and the reported position of the loss of SESAME, PARTRIDGE, DUNDAS and ISIS are noted on the following extract of the SHOM chart.

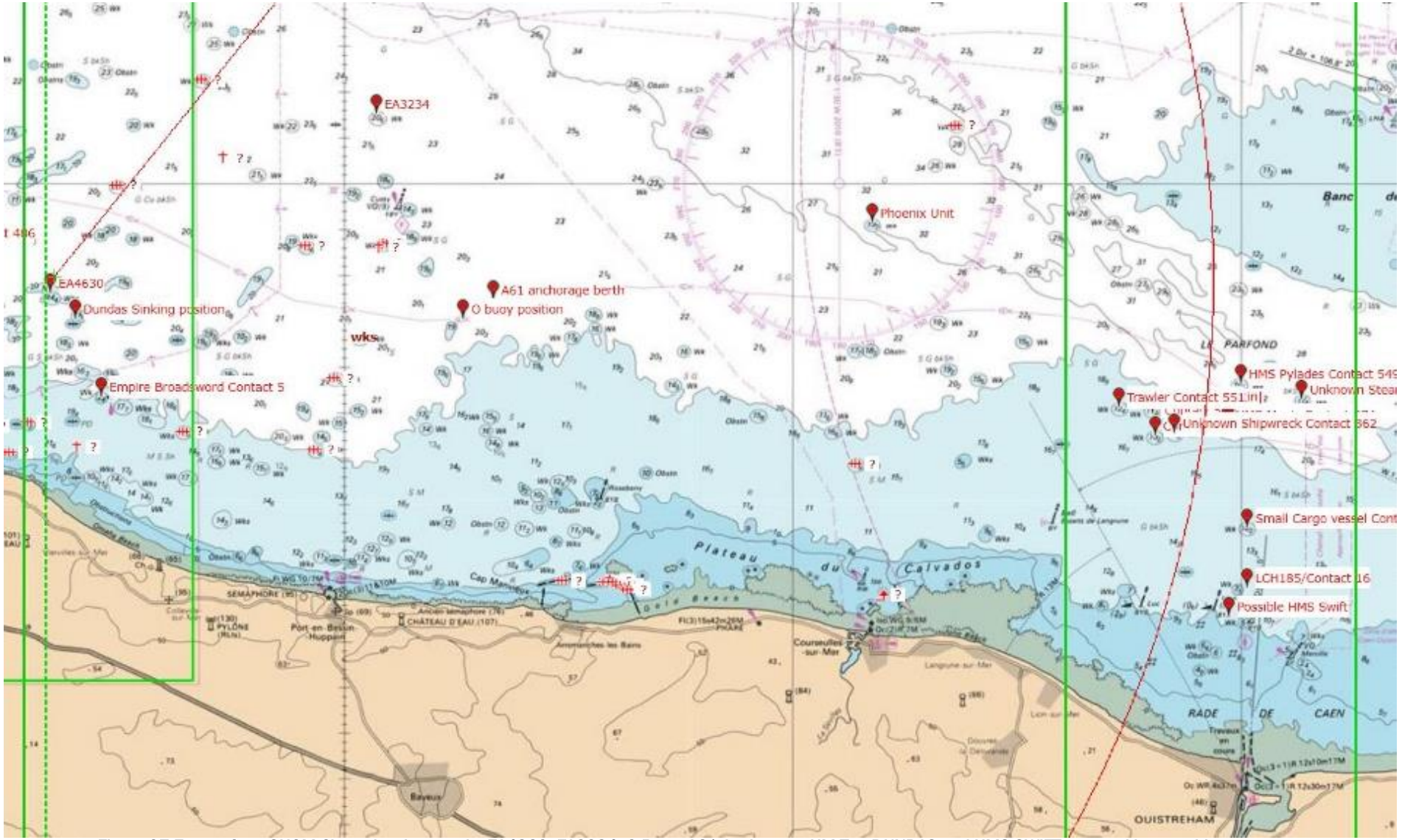

Figure 97 Extract from SHOM Chart showing wrecks EA4360, EA3234, O Buoy, A61 Anchorage, HM Tug DUNDAS and HMS SWIFT reported loss positions.

10. Two Tugs Project – Final Conclusions.

The survey project of the two wreck sites has led us to believe that the wrecks have been wrongly identified for a number of years. The physical and documentary evidence provide a compelling case for the wrecks being different vessels. To our complete surprise one of these wrecks is believed not to be a US Navy tug but is actually a Royal Navy destroyer.

Our final conclusions are that

Wreck EA4369 is not that of HMRT SESAME but is that of HM Tug DUNDAS; and

Wreck EA3234 is not that of USS PARTRIDGE but is that of Royal Navy Destroyer HMS ISIS.

The discovery of the wreck of HMS ISIS is believed to be of importance to the Royal Navy and associated veterans organisations due to the significant loss of life as a result of her loss. Southsea Sub-Aqua Club members will work with these organisations to share the results of our project in a sensitive manner to ensure the memory of those lost is respected.

The actual position of HMRT SESAME and USS PARTRIDGE remain a mystery. Given their reported position in the vicinity of Buoy 58D and without any further information about the wrecks in the area we are not able to extend the project at this stage in an attempt to locate these tugs.

Our sincere gratitude goes to all who have helped us as part of the project, including those who have assisted behind the scenes with research and translation etc.

In this 75th anniversary year of the D-Day landings we are privileged to have the opportunity to conduct this survey and thank DRASSM for the opportunity to complete this project.

Appendices

A Casualty list HMS ISIS

B Survey permission documentation.

Appendix 1 - HMS ISIS Casualty List

OFFICERS

MISSING PRESUMED KILLED

Lieutenant Commander H D DURELL Royal Navy (In command)
Temporary Lieutenant L M D APPERLEY DSC Royal Naval Voluteer Reserve
Temporary Sub-Lieutenant E R BAILEY Royal Naval Voluteer Reserve
Mr J H BURFITT Temporary Gunner (T) Royal Navy
Temporary Lieutenant (E) D G DRAKEFORD Royal Navy
Temporary Surgeon Lieutenant C J S GREEN Royal Naval Voluteer Reserve
Midshipman J G NICHOLSON Royal Navy
Temporary Sub-Lieutenant J ROGERSON Royal Naval Voluteer Reserve
Midshipman E M H RYLAND Royal Navy
Lieutenant F H SEYMOUR Royal Navy

KILLED

Temporary Sub-Lieutenant H V F WORAM Royal Naval Voluteer Reserve

RATINGS

KILLED

BALDWIN Derek E	Ordinary Seaman	P/JX 521868
CUMMING William E	Petty Officer	D/J107530
JUPE Charles S	Acting Leading Stoker (Ty)	D/KX113088
MURRAY James C	Stoker 2nd Class	D/KX525256

DIED OF WOUNDS

AVERY Roy C F	Acting Able Seaman	P/JX519073
BURTON James	Acting Able Seaman	P/JX604014
CARMICHAEL Henry	Ordinary Telegraphist	P/JX264090
CASEY John D	Able Seaman	D/JX580251
CHURCH Frederick J	Able Seaman	P/JX324365
HILLYARD Sidney J	Engine Room Artificer 4th Class	C/MX76615
HOLT Sidney	Stoker 1st Class	D/KX121719
HOWARD John	Stoker Petty Officer	D/K55442
JACKSON Ernest A	Signalman	C/JX574979
KEOWN Wilfred	Able Seaman	D/JX293968
LEWIS Cyril J	Stoker Petty Officer	D/KX77524
McCOLGAN John	Engine Room Artificer 3rd Class	D/MX54816
MUIR Alexander	Stoker 1st Class	P/KX110732
PATTEN Bert F	Able Seaman	P/JX223929
QUIGLEY Ewan J	Able Seaman	D/JX304867
SAUNDERS Geoffrey D	Acting Able Seaman	D/JX363636
STURGESS Howard G	Supply Petty Officer (Ty)	D/MX67824
SUTHERLAND Frank	Able Seaman	D/JX186529

SWADLING Thomas E	Stoker Petty Officer	D/KX76150
SYRON Thomas	Ordinary Seaman	D/JX564955
THORNE Vincent P	Ordinary Seaman	C/JX544632
WILLOUGHBY William W	Able Seaman	P/JX182557
WILSON William	Able Seaman	P/JX276417

MISSING PRESUMED KILLED

ACKERS John W	Acting Able Seaman	P/JX385643
AISBETT Thomas J	Engine Room Artificer 5th Class	P/MX635769
ALLUM Frederick C	Ordnance Mechanic 5th Class	P/MX98861
ANGUS James T	Engine Room Artificer 4th Class	D/MX74577
ASHWOOD Dennis C	Ordinary Seaman	P/JX518989
ASHWORTH George	Yeoman of Signals	P/JX138577
BAILEY Royce L	Ordinary Seaman	P/JX519294
BARKER Brian	Ordinary Seaman	P/JX501955
BARNES Donald R	Acting Able Seaman	P/JX324931
BARTRAM Leslie S	Chief Engine Room Artificer 2nd Class	P/MX52951
BETTS Alan V	Stoker 1st Class	P/KX135644
BORLAND Archibald	Able Seaman	D/JX257954
BOWLEY Frank	Able Seaman	D/JX287743
BOXALL William H	Chief Stoker	P/K64541
BROOKS Lionel A C	Leading Seaman	C/JX164607
BURTON Eric H	Acting Able Seaman	D/JX367594
BUTTON Cyril W	Ordinary Seaman	P/JX521859
CAIRNE Alexander	Able Seaman	C/JX351206
CALLISTER Edwin T	Steward	D/LX30985
CAMPBELL Henry	Stoker 2nd Class	D/KX600970
CANNON John	Able Seaman	C/JX279895
CAUSTON Harry S T	Able Seaman	D/JX238327
CHESTER John E	Able Seaman	D/JX349267
CHURCH Walter	Stoker 1st Class	D/K67294
CLAY Leslie A	Stoker 1st Class	P/KX115751
CLELAND Thomas	Able Seaman	D/JX285929
COUCH Reginald J	Petty Officer Telegraphist (Ty)	D/JX146499
COUSINS Charles J	Petty Officer	D/JX127566
COX William E	Electrical Artificer 3rd Class	C/MX60158
CROKE John P	Stoker 1st Class	C/KX152986
CUDWORTH Austin	Steward	P/LX28988
DARKER Cecil R	Acting Petty Officer (Ty)	D/J110360
DIBBENS Lerick L	Acting Petty Officer	P/JX156284
DICKINSON Frederick	Able Seaman	C/SSX33903
DIXON Douglas G	Leading Seaman (Ty)	C/JX138269
DONOHUE Henry	Petty Officer Steward (Ty)	C/LX20907
DOWNES Robert	Stoker Petty Officer	D/KX80152
ELEY Frederick	Able Seaman	C/JX353892
FIELD Henry T	Ordinary Seaman	P/JX517865
FLETCHER John	Stoker 1st Class	LT/KX99387
GALE William R	Ordinary Seaman	P/JX519263
GATENBY James A	Acting Able Seaman	P/JX250560
GILBERTSON William J	Leading Coder	P/JX310008
GOODCHILD Robert E	Ordinary Seaman	P/JX521855

GRANT Alfred	Acting Able Seaman	C/JX409108
GREEN George	Ordinary Seaman	P/JX322716
GRIFFIN Henry L	Able Seaman	P/JX383971
HALL Geoffrey G	Acting Leading Seaman (Ty)	D/JX272394
HAWKINS John E P	Stoker 1st Class	P/KX86284
HICKS Durley J	Acting Petty Officer (Ty)	D/J113137
HULMSTON Albert H	Able Seaman	D/JX141924
HUTCHIN Leslie F	Able Seaman	P/JX276943
HUTCHINSON John	Able Seaman	P/SSX14703
KELLY Dennison T	Stoker 2nd Class	P/KX178870
KING Ronald A W	Stoker 1st Class	D/KX600155
LEAR Reginald S	Acting Leading Seaman (Ty)	D/J108265
LEE Joseph	Signalman	P/JX575661
LEEL James D	Able Seaman	P/JX166374
LLOYD William E	Stoker 1st Class	D/KX117815
McKECHIN Robert	Ordinary Seaman	C/JX262314
MANNERINGS Henry	Ordinary Seaman	D/JX651867
MARMION Edward	Able Seaman	D/JX285240
MEARNS John D	Acting Stoker 1st Class	P/KX178517
MILLS Arthur W	Acting Leading Stoker (Ty)	D/KX95336
MONTGOMERY Ernest A	Acting Leading Stoker (Ty)	C/KX111607
MORRIS Eric T	Ordinary Seaman	D/JX563580
NEWTON Roslyn	Able Seaman	D/JX304607
NICHOLSON Adam	Acting Able Seaman	D/JX303493
NORTHNEY Ernest S	Able Seaman	P/SSX36127
O'DONNELL Thomas	Able Seaman	D/JX345120
PARKER Leonard A J	Ordinary Seaman	P/JX519239
PARKIN William H	Petty Officer Cook (S) Ty	D/MX56008
PEARSON Hugh G	Ordinary Seaman	P/JX519219
PETRIE James McGill	Signalman	LT/JX220684
PHILLIPS Ivor R	Telegraphist	C/JX158777
PROCTOR William	Stoker 1st Class	D/KX144428
RICE Henry	Able Seaman	D/JX303938
RICHARDS George P D	Petty Officer	D/JX126503
RINDER George S	Telegraphist	P/JX429072
RIPLEY Henry J	Stoker 1st Class	P/KX157805
ROBINSON Robert	Leading Coder	P/JX310023
ROONEY Francis J	Telegraphist	D/JX229170
SAINSBURY Sidney G	Acting Able Seaman	D/JX257112
SHERWOOD Jack	Able Seaman	C/JX355895
SMITH Harry	Acting Engine Room Artificer 4th Class	C/MX507301
SMITH John	Stoker Petty Officer	P/K64369
SMITH Thomas	Stoker 1st Class	P/KX157811
SOILITT Stanley	Acting Able Seaman	C/KX136191
STANTON John	Stoker 2nd Class	P/KX596434
STEVENS Thomas E	Ordinary Seaman	P/JX392592
STEWART George H	Ordinary Seaman	P/JX520484
TAYLOR Edward	Stoker 2nd Class	C/KX601999
TERRY Leslie R	Ordnance Artificer 4th Class	P/MX57675
THOMPSON Norman Mc	Able Seaman	D/JX368738
TURNER Ben	Sick Berth Attendant	D/MX94860

UNWIN Leonard	Able Seaman	D/JX399478
VEALE Arthur A	Acting Petty Officer (Ty)	C/JX126804
VELLENDER Reginald J	Ordinary Seaman	D/JX564067
WALKER John Wm	Stoker 2nd Class	P/KX147582
WALKER Leslie	Able Seaman	P/JX169424
WALLIS Ronald G	Able Seaman	P/JX306354
WALTERS Ronald J	Supply Assistant	D/MX604806
WARD George S	Able Seaman	D/SSX30212
WEAVING Ronald J	Acting Petty Officer	P/JX156093
WEST Ronald G	Acting Stoker Petty Officer (Ty)	C/KX95826
WHITBREAD Arthur E	Able Seaman	C/SSX26375

NEW ZEALAND RATINGS

KILLED

BRAND T E	Ordinary Seaman	NZ8612

DIED OF WOUNDS

MUNRO G C	Ordinary Seaman	NZ8626

MISSING PRESUMED KILLED

BRANDON T J	Ordinary Seaman	NZ8613
DYER R D	Ordinary Seaman	NZ8617
JOHNSTON M E	Ordinary Seaman	NZ8620
JORDAN A K	Ordinary Seaman	NZ8621
NUNN D A (Body recovered)	Ordinary Seaman	NZ8627
ROBSON Charles E	Able Seaman	NZ6445
WASLEY A I	Able Seaman	NZ1667
WILLIAMS M	Petty Officer Radio Mechanic	NZ4717

MISSING PRESUMED KILLED

GRAHAM William	Canteen Manager	C/NX608890

Appendix 2 - Permission Documentation

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RÉPUBLIQUE FRANÇAISE
MINISTÈRE DE LA CULTURE

Monsieur Martin DAVIES
7 Douglas Gardens, Havant,
HAMPSHIRE
UK PO9 5TG

Marseille, le 22 MARS 2019

Direction
générale
des Patrimoines

Département
des Recherches
Archéologiques
Subaquatiques et
Sous Marines

Affaire suivie par
Emilie AUROUSSEAU

Poste
04.91.14.28...

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13016 MARSEILLE
(France)
Tél. +33 (0)4 91 14 28 00
Fax +33 (0)4 91 14 28 14
le-drassm@culture.gouv.fr

Monsieur,

A la suite de votre demande d'autorisation pour l'opération «HMS Sesame - USS Partridge» OA n°3809, je vous informe que la commission interne d'attribution a décidé de soutenir le projet à travers une subvention de 1000€.

Votre dossier de demande de subvention est complet, l'acompte de 80% vous sera versé dans les meilleurs délais.

Dans le cas où l'opération venait à être annulée, il vous appartiendra de m'en avertir sans délai. Le cas échéant le montant de subvention versé devra être remboursé.

Le versement du solde de la subvention devra être sollicité avant le 2 décembre 2019, les éléments suivants à l'appui :

- Pour les associations, le compte rendu financier de subvention sous la forme du document cerfa 15059*01.
- Un tableau récapitulant l'ensemble des dépenses effectuées pour la réalisation de l'opération.
- La copie des pièces justificatives de l'intégralité du montant de la subvention.
- Le rapport scientifique d'opération, devant être rédigé selon les « Recommandations de rédaction du rapport scientifique d'opération ».

Tous les formulaires sont disponibles sur le lien suivant :
http://www.culture.gouv.fr/Thematiques/Archeologie/Ressources/Formulaires

Je vous prie d'agréer, Monsieur, l'expression de mes sincères salutations.

Le directeur du Département des Recherches
Archéologiques Subaquatiques et Sous-Marines

Michel L'HOUR