

SOLENT ARCHAEOLOGICAL DIVERS SUB AQUA CLUB

SOLENT WRECK PROJECT REPORT 2012



Project Funded by

British Sub-Aqua Jubilee Trust

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Summary

The project run by the Solent Archaeological Divers Sub Aqua Club (SADSAC) in 2011 had two main aims. The first was to create an archaeological record of four wrecks in the area of the Western Solent for which there were few records. The depths ranged from 20 metres to 39 metres and so would appeal to a range of divers, from Ocean Divers to Dive Leaders and above and their equivalent qualifications from other agencies. The second aim was to produce a series of drawing and images that would help the recreational diver know which parts of the vessel they were looking at and what functions those parts performed. This would help their navigation around wrecks, and enhance their enjoyment and understanding of the wreck on which they were diving.

The core diving team was made up by SADSAC members and volunteer divers who were invited to take part. Eight recreational divers who had volunteered for the experience in 2010 then joined SADSAC in 2011 and are continuing their involvement with maritime archaeology. The project has shown that divers enjoy diving with a purpose, and are happy to develop skills and competences so that they can make a contribution to the knowledge and understanding of marine historic assets within the Solent and the Isle of Wight region. A useful by-product of the work was the illustration of how important it is for wreck non-specialists to have some form of plan that they can take with them when they dive. Recognition of wreck structures and general navigation was noticeably easier for most divers if they carried a plan.

Seven days of diving were undertaken on five sites, involving 74 person diving days. The original intention had been to complete the dives within the 2011 season. The weather meant that only dives on the SS *Serrana* and HMS *Warwick Deeping* were completed during 2011. Permission to extend the research dives into the 2012 season was sought and given from BSAJT.

The sites consisted of SS *Faith*, SS *Serrana*, HMS *Warwick Deeping*, SS *Spyros* and SS *Venezuela*.

The *Faith*, dating to the middle of the 19th century, has a very early two cylinder steam engine and significant artefact and structural remains. The true position is known, but because she has not previously been written about with an accurate position the wreck is rarely dived. She is potentially worthy of designation under the Protection of Wrecks Act (1973). SADSAC have decided to include her features but not her exact position until issues surrounding legal protection have been resolved because this report will be in the public domain. Members of the BSAJT will be given the accurate information separately if they wish to have it.

The SS *Serrana* had been selected because the dive on the previous year had left some areas unrecorded. The Hampshire and Wight Trust for Maritime Archaeology (HWTMA) had surveyed the *Serrana* as part of the Atlas of the Two Seas project. As a shallow site of only 20 metres this was an ideal site for Ocean Divers and newly qualified divers of other agencies. Sadly the visibility was appalling, and although she remains an interesting early wreck dive for new divers in good visibility, little was added to the plans. However Martin Davies of Amberley Photographics was able to take some images of the features for this report.

HMS *Warwick Deeping* is at the other end of the experienced diver spectrum. As a World War II casualty she is remarkably intact. She is not often dived as she is too deep at 37 metres for most recreational divers, but not deep enough to tempt the trimix technical divers. However she is an interesting wreck with all of the main diagnostic features of a WW II vessel engaged in coastal defence, and will be an ideal progressive dive for those who decide they do want to dive deeper. It was also useful for our team to develop survey techniques that function well at such depths.

The SS *Spyros* was selected because there had been some debate about whether she was the *Spyros* or the *Clyde*. Survey work done by the SADSAC team and volunteers supported work done by the HWTMA that took basic dimensions which proved conclusively that she could not be the *Clyde*, so was either the *Spyros*, or an unknown wreck with a similar engine. SADSAC wanted to record the expansion chamber on top of the boiler and as a vessel with a double expansion engine (two expansion cylinders) we wanted to produce a measured drawing of the engine top and associated features. The engine is upright and is in association with the boiler. She has other structure and is an ideal wreck for encouraging recreational divers to build a greater understanding of what they are diving on.

SS *Venezuela* is a popular dive with divers who are happy in the 25-30m range. She has a pair of triple expansion engines sat upright just behind their respective boilers. This is an ideal vessel for helping divers to understand the engine/boiler relationships for navigating on a wreck. Her similarity to an extant vessel (the SS *Shieldhall*) meant that she could be a prime example for non-archaeological divers to understand the swim-over survey and structural recognition if they visited the *Shieldhall* before diving on the *Venezuela*. Previous work by HWTMA gave a useful foundation for a targeted survey. One engine had been recorded by them in 2011, and we wanted to confirm the presence or absence of the second engine. At 27m it is possible for reasonably experienced divers to learn to apply survey techniques to her engines and boilers and for recreational divers to identify structural remains. She is worth a more comprehensive survey and publication of a plan that can be used by divers visiting the site to make the dive more interesting and enjoyable.

Acknowledgements

The Solent Archaeological Divers Sub Aqua Club gratefully acknowledges the funding received from the British Sub Aqua Jubilee Trust that made this project possible. We would also like to thank the Hampshire and Wight Trust for Maritime Archaeology (HWTMA) for sharing their findings and expertise during the period of this project.

SADSAC would also like to thank Dave Wendes, the skipper of Wight Spirit, for giving freely of his knowledge and expertise during the project. He has been involved in researching and diving wrecks in the area for many years. Throughout the project he has shared his own research very generously.

We would also like to thank all the volunteers who gave us their valuable time. We would particularly like to thank Philip Alcock, Matt Cass, Martin Davies, Barry Jarvis and Dave Robbins for providing us with their images so that we could record the structures that we saw, or in some cases, failed to see, because of poor visibility.

Special mention must go to the crew of the SS *Shieldhall*, who allowed me to go all over the ship while she was in refit, and were endlessly patient with my queries. They have also kindly given permission for SADSAC to photograph whatever was needed for publication as long as the ship was credited.

SADSAC would also like to thank Cdr. M. Marks OBE (RN retd) for access to the workings of the steam pinnace 199 while she was in refit to provide images for the second part of this project.

SADSAC would also like to thank John Liddiard for his kind permission to use his images from his Wreck Tours columns in the electronic report. His work provided much of the inspiration and some images used for this project. Final acknowledgement must go to David Leigh Stone of the Underwater Society of British Columbia. His book '*The Wreck Diver's Guide to Sailing Artefacts of the 19th Century*', was seized on avidly by maritime archaeologists working on the Thorness Bay wreck in 2010 and made us realise how useful something similar could be if the focus was metal wrecks and their features and the appeal that it would have to an audience of divers new to wreck diving, or divers new to metal ship structure.

Copyright Statement

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1. Project Background

1.1 INTRODUCTION

The Solent Archaeological Divers Sub Aqua Club (SADSAC) is a British Sub Aqua Club Special Branch whose members enjoy diving on and recording archaeological material. Some members are professional archaeologists. Other members are those who took part in the 2010 project and enjoyed it sufficiently to want to continue, so joined SADSAC. Some had done Nautical Archaeology Society (NAS) courses, others had not. The two Solent Wreck projects done by SADSAC over three years demonstrated that a group made up of professionals and competent volunteers can achieve worthwhile results with wreck recording.

The project was designed to allow an archaeological survey to be carried out on wrecks in the Solent and surrounding area that had substantial structure but for which there was little information in the public domain. As the project evolved it became apparent that there were existing but scattered information sources about most of the wrecks SADSAC were investigating.

After SADSAC had selected the vessels for survey it became evident that there was a progression in steam engine design in the wrecks we had decided to record. This progression might allow divers to understand the difference between a triple expansion engine and other forms that they might be likely to see during their diving career, as well as helping those interested in wreck research to identify vessels by the propulsion system.

The second strand of the project, to create a guide to the features of a wreck at a very basic level, was relevant to divers with many different backgrounds. Divers new to wreck diving could begin to understand what they were seeing, and how to know whether they were going from bow to stern or *vice versa* and wooden wreck specialists could be given extra support in understanding the use of steam power and metal hulls. It was thought that divers would benefit from having the resources brought together so that identifying features on a metal wreck could be made easier and made more interesting with the use of photographs, plan drawings and explanations about structure and artefacts.

As a result of this project SADSAC hope to have added to the knowledge and understanding of some of the wrecks in the Solent and waters adjacent to the Isle of Wight.

1.2 AIMS AND OBJECTIVES

Project aim

To continue the archaeological surveys of wreck sites from 2010 that had been identified as in need of further work. We also wished to investigate some vessels that needed to be positively identified, and to begin work on vessels with previously unrecorded structures and features. SADSAC will also be working towards producing a guide for recreational divers showing how the structures and artefacts on a wreck looked before the vessel sank, and what they may look like after years underwater.

Project Objectives

Objective 1: undertake diver recording of the wrecks to develop surveys of the seabed archive-the proposed surveys should confirm the extent, density and preservation of the individual vessels. Information gathered will allow for the planning of future work and can be fed into historic asset management datasets and programmes.

Objective 2: to maintain and develop survey and post-survey skills of project members-this will give less experienced archaeological divers the opportunity to develop their skills by working with more experienced archaeologists. It will also develop their ability to recognise metal wreck structure and artefacts and to navigate around the wrecks in waters that can often be quite dark with five metres visibility being considered good.

Objective 3: To contribute to the knowledge of the archaeological sites through production of a field report and a guide to interpreting metal ship remains underwater-the survey will create an archive, which can then inform future work. The production of the guide to structure and features will be useful for professional archaeologists, avocational archaeologists, volunteers without archaeological training and also for recreational divers who only want to visit the wreck and enjoy the experience.

2. Methodology

2.1 DIVING METHODOLOGY

All divers were required to produce proof of their diving qualifications, medical fitness to dive and evidence of third party insurance. Before diving started a project plan was developed which included detailed information on:

- Diving team composition
- Boat details, including safety equipment
- Dive times to coincide with slackest possible water
- Pre-dive planning using BSAC 88 tables to back up computer calculations
- Risk assessment including a daily risk assessment
- Daily operations plan.

SADSAC members who were also members of the HWTMA were able to use the HWTMA cylinders, wings and regulators, which were all certified as in test. Other divers used their own equipment and were considered responsible for ensuring the equipment was serviced in accordance with manufacturer's instructions.

2.2 SURVEY METHODOLOGY

Survey methods used in this survey included swim-over surveys to get a general impression of the wreck, measured surveys using tapes and boards, and site recording using photography. Photography was particularly useful in dark conditions.

Before each dive a survey strategy was briefed detailing the objectives for each diving pair and each site. Where known the information on the vessel's history for the briefings was provided by Dave Wendes' *'South Coast Shipwrecks off Dorset and Wight 1870-1979'*. This was supported by further electronic

research in national archives, web sites such as Wrecksite EU, and in books dealing with the development of the steam ship from 1830 to 1970. Throughout this report the history of the vessel has been taken from Wendes (2005). Other sources were used to expand the details of the vessels, most particularly Wreck Site at www.wrecksite.eu

Following the dive, log sheets were completed and archived. From the log sheets it was possible to develop plans for future work. Recording sheets were based on the Museum of London Archaeological Survey sheets (MoLAS) as amended by the project team. The sheets used were:

- Archaeological Record sheet
- Photographic record sheet
- Drawing Index
- Video Index

Other sheets available but not used were:

- Context sheet and log
- Finds index and record sheets
- Timber index and record sheet

Further work could mean that context sheets would be relevant. As this project was a non-disturbance survey project a finds index was not appropriate, but was available if something extraordinary was found that was vulnerable to loss. The timber index and record sheet could have been used in one or two instances where wooden deck timbers appeared underneath shingle and may become relevant in future survey work.

2.3 SKILLS DEVELOPED

During the 2011-12 project there were only three participants who had not experienced a range of archaeological survey techniques. One of those had a talent for drawing and went on to do his Nautical Archaeology Society (NAS) Part One course. All were happy to use slates and permatrace to record what they saw. Most of the work done was by measured sketch with annotated photographs identifying structures and features in dives that were generally low visibility or quite dark. 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 collaborative process was really useful in helping people to understand what they had been recording and resulted in increased understanding of what had been observed and recorded for all of the project team.

2.4 POST SURVEY TASKS

Post survey tasks were undertaken by a combination of the members of the team to ensure that the work is completed to acceptable standards. All post survey work was undertaken in line with the best practice as defined in '*Archaeological Archives*' (Brown 2007).

The major post survey tasks were the ordering and checking of log sheets, the completion of photographic logs and video logs for any images taken during the project and where possible the measured sketch plans will be drawn up to include in the project report.

3. Project Results – Wreck Survey

3.1 SUMMARY

Seven days of diving were undertaken on five different wrecks. The shallowest was the *SS Serrana*, at 18 metres (18m) and the deepest, *Warwick Deeping* at 37m. The *Spyros* and the *Venezuela* were approximately 29-30m and the *Faith* was 36m at the seabed.

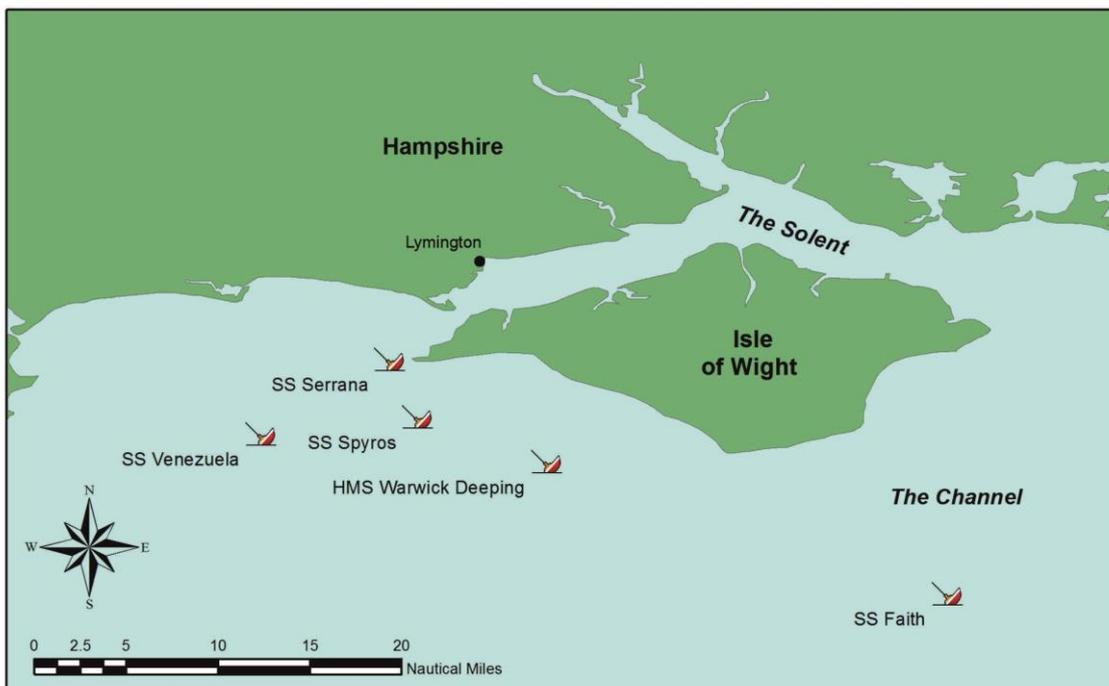


Figure 1. Locations of the five vessels surveyed in the 2011-12 project.

Most sites were only dived once during the project. The exceptions to this were the *Spyros*, dived twice by the team and once by an individual member and the *Venezuela*. The *Venezuela* was dived a second time with one SADSAC diver as part of another group to clarify the existence or otherwise of the second engine and to establish the position of jumbled structure identified on the first very low visibility dive.

The *Faith* was possibly the most exciting vessel dived by the team. *Faith* has only been dived once by SADSAC and there is scope for a full archaeological survey to be done on this vessel built as a steam ship, but carrying masts and sails for security.

The core team of four divers from SADSAC from the 2010 project had expanded to a core team of eleven SADSAC divers, with the others being invited because they had expressed an interest in this form of diving (see Appendix 1 for the full list of divers over the period of the project). This allowed knowledge and experience to be shared. It also reinforced what seemed an evident truth: the more the wreck had existing plans copied on to permatrace, the more the divers got to their correct area and the more productive the work. This was especially true of those new to wreck diving, whose knowledge of ship terminology and structure made the relevance of the second part of the project evident.

3.2 SS SERRANA

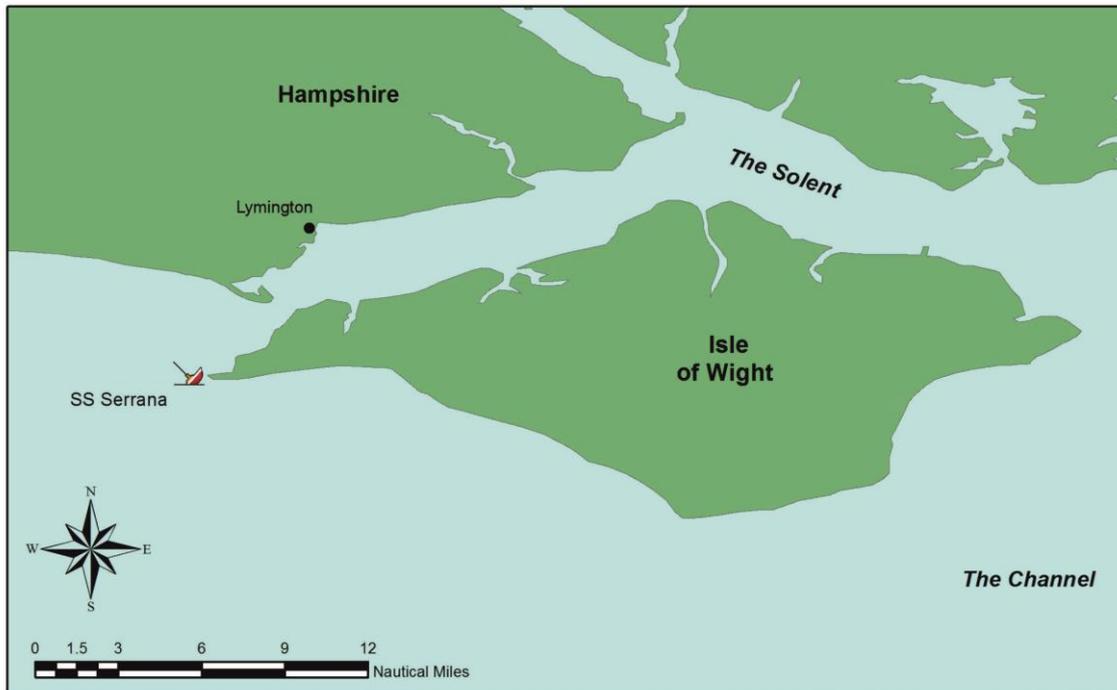


Figure 2. Position of SS Serrana. Location data has been provided by Dave Wendes.

In 2009 the site was part of the diving schedule for the New Forest Coastal Zone Assessment (<http://newforestpa.gov/lookingafter/la-landscape/archaeology/coastal.htm>) a joint project funded by the New Forest National Park Authority funded by English Heritage. In 2010 SADSAC had identified the *SS Serrana* as needing further work (SADSAC 2010:44).

The SADSAC survey of the stern section of *SS Serrana* took place on May 15th 2011. The depth of 18 metres meant that the *Serrana* is an accessible wreck for a range of divers qualified through all of the recognised recreational diving agencies. It would allow new divers with a particular interest in wreck diving and archaeology to put their training to use in diving with a purpose.

3.2.1 SITE DESCRIPTION

The remains of the stern section of the *SS Serrana* are at 50° 39.87' north, 001°35.82' west (Wendes 2006:144). The stern section had broken away from the bow section and settled in deeper water. The bottom is shingle with some sand, and has a silty layer on top of the shingle.

3.2.2 VESSEL HISTORY

SS Serrana was built by John Redhead of South Shields and completed in 1905 as a single screw steam ship of 3677 tons gross, with one deck and schooner rigged. *Serrana* was 108m in length and 14.5 in breadth with a hold depth of 4.66m, had triple expansion engines and two scotch boilers developing 350 nominal horsepower. The vessel was owned by Scrutton and Sons and was on course from London

to Barbados, Albert George Maskell Master, with 300 tons of general cargo, 500 tons of coal and 112 bags of mail. At the time of loss she was armed with one 4" stern gun and two howitzers. *Serrana* was torpedoed on 22nd January 1918 by *UB-35* and sank on 23rd January (Wendes 2006:144). Forty-three members of the crew were rescued, one dying later in hospital. Two passengers drowned and three stokers in the stoke hold were killed by the explosion.

It was during rescue operations by the tugs *Grappler* and *Walvish* that the *Serrana* grounded on the bridge reef and broke in two. The stern section is some 400m north west of the Needles.

3.2.3 SURVEY RESULTS

During the 2010 SADSAC survey Dave Wendes had taken a side scan image that showed the boilers, engines, rudder and propellers were extant. SADSAC had also done a swim over to produce a sketch of the larger features of the site (SADSAC 2010:40-42). The survey tasks for the 2011 dive were to measure the boilers, locate and photograph the gun and to locate the second triple expansion engine, or the remains of the engine to take the diameters of the high pressure, medium pressure and low pressure piston covers. One pair measured the propellers.

The SADSAC team dived on SS *Serrana* on May 12th 2011. The visibility was extremely poor. Of the five pairs that dived one pair took photographs of the gun, stern post, propeller and boiler. The other divers found it almost impossible to orientate themselves and surfaced. The photographs that were taken by Martin Davies show clearly that the 4" stern gun is still on the wreck and is largely intact (fig.3). The image taken of the gun by Martin Davies is included for completeness. However the quality of the image does not allow for a large reproduction. It is a true reflection of the poor visibility on site.

He was also successful in getting images from the rudder fixings (gudgeon) on the stern (figs 4 and 5). Evidence from video taken by Dave Robbins shows that the four-bladed steel propeller (fig.6 is still attached to the shaft, and that the propeller tunnel is still in evidence for some metres as an intact tunnel, not a series of reinforcing hoops as had had been thought.

From various measurements it was possible to state that one propeller blade measured 2200mm and the width of the boss behind the propeller had an external diameter of 370mm. The length of the fittings from the stern end to the forward edge of the propeller was 1200mm. A mast lying on the seabed on the port side just forward of the howitzer (the upright gun) was measured at 4000mm long with a diameter of 250mm. China plates were observed in close proximity with the mast (Alison Mayor pers.comm. 2011).



Figure 3. Stern gun on SS Serrana.



Figure 4. Rudder post SS Serrana 2011.



Figure 5. Stern gudgeon on rudder post SS Serrana



Figure 6. Propeller on Serrana ©Michael Pitts 2011

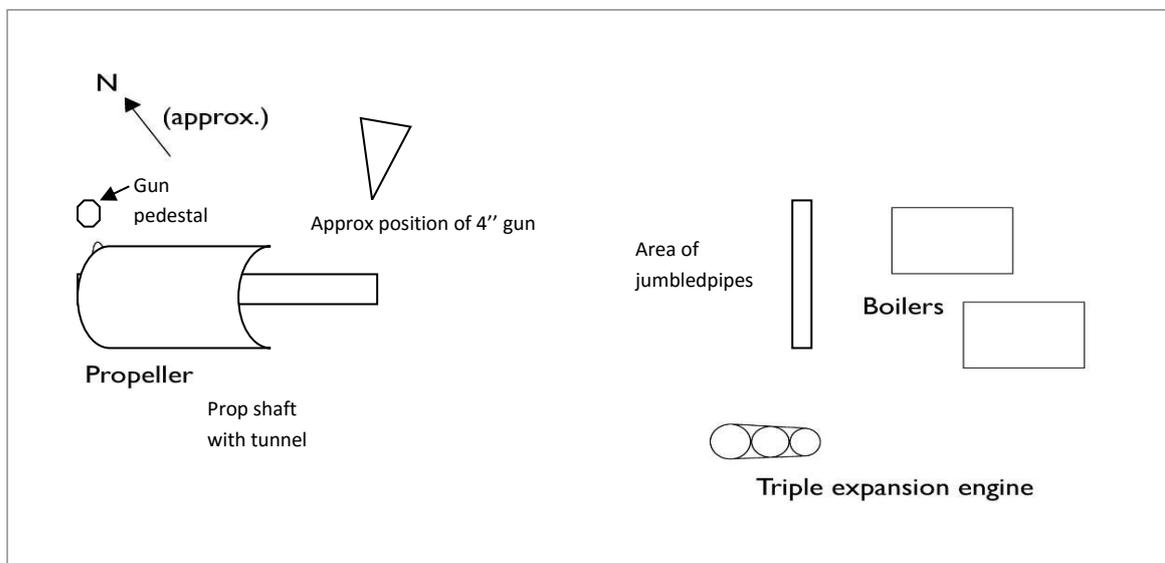


Figure 7. Updated swim over survey plan of SS Serrana.

3.2.4 CONCLUSIONS

The *SS Serrana* has substantial though fragmented structure on the stern section. The 4" stern gun is still on the vessel and the mounting for the other gun is still present close to the stern. She has a large, single screw propeller (Fig 6), with an extant drive shaft covered with a very noticeable propeller tunnel (Fig 7). There are also the remains of the bearings that directed the thrust to the spinning propeller. Continuing forward there are two large single ended boilers, suggesting that the remains of another triple expansion engine may be somewhere in the debris just in front of the boiler. The alignment of boilers and engine suggests that one boiler has fallen out of position. There is one engine in the correct position, the engine has fallen on its side and has lost coherence. Nothing has been seen of the condenser.

This is an interesting wreck in good visibility. It would be beneficial to draw a plan of the existing features of the site for the use of dive clubs and boat charterers so that divers new to wreck diving could follow her structure during the dive.

Further work establishing the possible existence of a second engine would be a useful task to set local dive clubs if they wanted to add to what is already known.

The archaeological record could be enhanced by a fully measured plan of the remaining structure. If a measured plan was produced it could be used for training in archaeological recording methods in conditions of poor visibility.

3.3 HMS WARWICK DEEPING

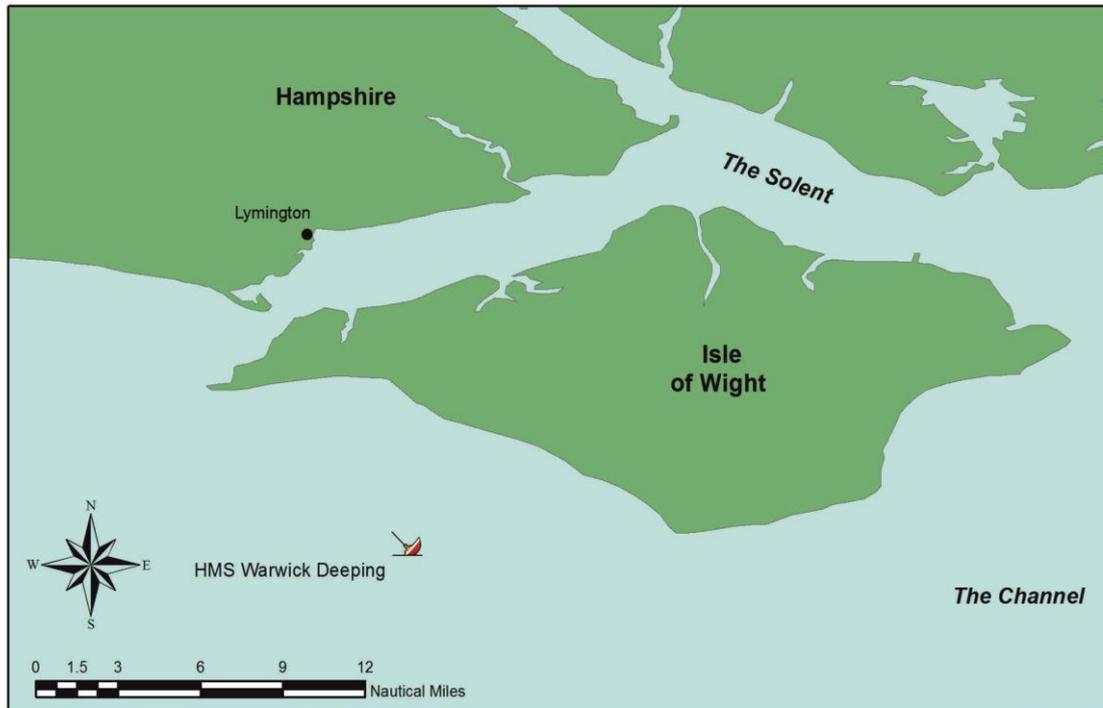


Figure 8. Position of HMS Warwick Deeping: location data provided by Dave Wendes.

HMS *Warwick Deeping* was selected for inclusion in this project because it is an excellent example of a steam trawler adapted for use in WW11 as an anti-submarine vessel. The structure is remarkably intact, producing a comprehensive view of the main features of her class. Historically the converted steam trawlers were an important aspect of the defence of the coastline during WW2 and were tasked to give warning of enemy submarine activities. Unlike many wrecks where the machinery is the main focus of attention because the larger metal structures are all that exist, this site still looks like an armed anti-submarine trawler with decks, deck furniture and armaments very visible.

Diving on the site is limited, partly by depth and decompression requirements, but also by a fairly short period of slack water (40 minutes on neap tides).

3.3.1. SITE DESCRIPTION

The site is located at 50° 34.25' north, 001°27.82' west to the south of the Isle of Wight (Fig 8). The location has been provided by Dave Wendes, who confirmed the position by using a combination of DGPS and sonar equipment. The identity of the site, in this position, was confirmed by divers.

The site is at a general depth of 36m and the wreck stands some 5m proud of the seabed and lies on an orientation of 150°/330°. The site consists of an upright hull and almost fully-decked upper elements. A swim-over survey of the deck shows a remarkable degree of preservation with structural elements, fixtures and some fittings still *in situ*.

3.3.2 VESSEL HISTORY



Figure 9. Warwick Deeping from Wendes 2005:241© credited Alec Gill and Jim Fuller.

The steam trawler was completed in December 1932 at the yard of Cochrane and Sons Ltd, Selby. The machinery was built by CD Holmes Company Ltd of Hull. The vessel was 445 tons gross with a three cylinder triple expansion engine and a single ended boiler producing 111 nominal horsepower, with a steel screw and a cruiser stern. The measurements at the yard were: length was 47.5m breadth 7.96m and depth of hold 4.66m.

The ship was originally owned by the Newington Steam Trawling Company Ltd. then purchased by the Admiralty in August 1939 and converted for use as an anti-submarine vessel. The armament consisted of one 4" fo'c'sle gun and one 0.5" twin barrelled machine gun fitted on the wheelhouse roof (Wendes 2005:242).

She was on anti-submarine patrol when she was sunk on 12th October 1940 by the German torpedo boats *Falke*, *Wolf*, *Greif*, *Kondor* and *Seeadler*. *Warwick Deeping* was struck by two shells, one on the bow gun, the second below the waterline. She became hard to handle and eventually the crew of *Warwick Deeping* took to the boats. All survived. A subsequent Board of Enquiry concluded that the crew of this trawler, and her companion *Listrac* had not been properly trained in gunnery because it had not been anticipated that these trawlers would be expected to fight German torpedo boats. They were meant to have a warning role (Wendes 2005:242).

3.3.3. SURVEY RESULTS

SADSAC dived on *Warwick Deeping* on October 15th 2011. The shot was just aft of the deckhouse. Visibility was in excess of eight metres and the sea was flat. The structure is reasonably well preserved in the upper levels, which makes it an unusual vessel to dive. She still carries her 4" main gun, and there are depth charges on the deck and just off the wreck on the seabed. The deckhouse only remains as a framework, as the infilling structure is lost. On each side of the deckhouse, but slightly forward, are two *in situ* depth charge launchers. Forward of the depth charge launchers is a deck space that is beginning to be very open. The ventilation shafts have gone, and what appear to be square deck lights are falling into the hold below. The holds are open and empty.

There are depth charges lying on the deck by the gunwhale, so some caution is probably good (fig.10). On either side the mooring bollards are still in the correct position. Forward of this are there was a covered foredeck, allowing the anchor to be raised and lowered in shelter. This is now very open, and the chain is visible. The bow is intact, and stands up at least four metres.

From the deckhouse going aft the wreck is quite open. Just forward of the stern are pairs of bollards. The stern area still has some evidence of decking, in poor condition, and some of the steering mechanism is visible. The stern is a round or fantail stern. The propeller and rudder are still attached and visible, in a scour pit at 38m.

The hull appears almost intact, although she is beginning to break up between the deck and top of the sheer.



Figure 10. Depth charge launcher and upturned gun pedestal on HMS Warwick Deeping. Photographs by kind permission of John Liddiard

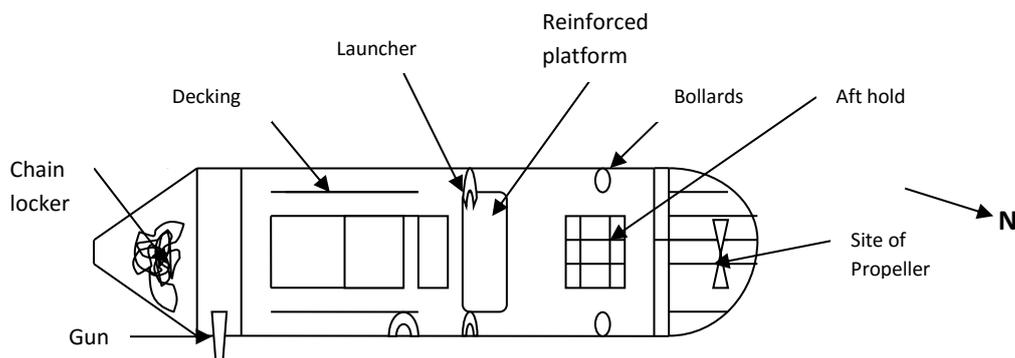


Figure 11. Diagrammatic representation of the swim over survey on HMS Warwick Deeping.



Figure 12. Gun on Warwick Deeping Photograph ©John Liddiard 2002

3.3.4 CONCLUSIONS

The time we spent surveying on this vessel was limited by the depth and decompression considerations. The survey confirmed that an unusual number of substantial structures were still visible.

In spite of her circumstances of loss her hull is remarkably intact. The coherence of her structure and the nature of her artefacts result in an assemblage that is as close to the popular concept of time capsule of a WW11 anti-submarine patrol vessel as it is likely to be possible to achieve. Future opportunities to do a fuller survey should be taken before the vessel degrades any further. A video survey available in the public domain should be the minimum considered for an archive recording of *Warwick Deeping*. There is also scope for stills photographs to be taken of some of the important features on this wreck.

With a clear deck plan any subsequent diving on her can be targeted at recording various structures. A measured survey of the vessel, with supporting stills photographs with scales could be a really good way to record the vessel, and make it a more interesting dive for recreational divers. Accurate recording of the *in situ* depth charge launchers and any evidence of her change of use from steam trawler to anti-submarine vessel would also be useful additions to the archive.

3.4 SS SPYROS

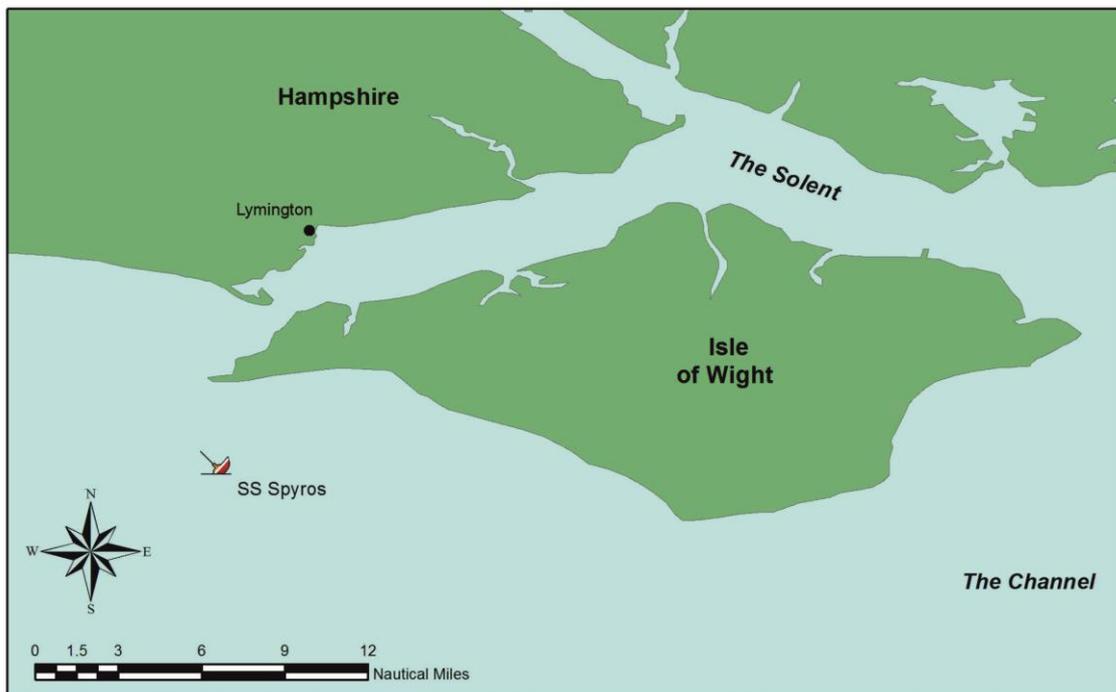


Figure 13. Position of SS Spyros: location data provided by Dave Wendes.

The *SS Spyros* was suggested as a target for this project by Dave Wendes because she is remarkably intact, and has an interesting engine configuration. Some years ago there had been debate about her identity because the *Clyde*, with a similar engine construction, had also been lost in the area. The HWTMA had measured the length of the vessel and confirmed the identity as the *Spyros* (Dave Wendes pers.comm. June 2012). SADSAC wanted to confirm the measurements and record her current condition.

3.4.1 SITE DESCRIPTION

The *Spyros* is at 50° 36.71' north, 001° 34.8' west. The remains lie in a maximum depth of 31m of water at an angle of 070°/250°. The vessel is upright and remarkably intact, with some hull structure standing at 3.80m above the seabed on the starboard side and the boilers at four metres on a shingle seabed (Wendes 2006: 198). A swim-over survey will show new wreck divers the boiler, a 2 cylinder-compound engine, hold coamings in place, winches and anchors, as well the single blade remains of a four-bladed propeller.

3.4.2 VESSEL HISTORY

The *Spyros* was built in 1880 by Rostocker Act.Ges. Rostock. She was a single decked iron screw steamer. Her machinery was built by the same company. She was 387 tons gross and 46.7m by 7.96m width a hold depth of 4.30m. She had a two cylinder compound engine with 51 nominal horsepower. In 1914 she was named *Jyden*, registered in Denmark. By 1917 she was the *Nacka* in Stockholm. In 1918 she was renamed *Citos*, registered in Malmo. In 1920/21 she was named *Spyros* and owned by P.G.Lemos and G.F. Andreadis.

On 20th December 1920 she was bound from Newcastle to St Ives carrying coal. She foundered eleven miles south of St Catherine's Point. When she foundered the eleven crew took to the boats and rowed some 35 miles to safety, Wendes (2006:198)

3.4.3 SURVEY RESULTS

SS *Spyros* was dived on three occasions. The first dive on June 2nd focussed buddy pairs on specific targets. To help with orientation each pair had a permatrace sheet with John Liddiard and Max Ellis's plan of SS *Spyros* from Wreck Tour 87 [online 01/06/2012]. The purpose was an informal assessment of the value of well-produced site plans in helping divers to navigate on a wreck.

Two sets of photographers recorded the expansion drum on the boiler, and the two cylinders of the compound engine. One pair of divers recorded the dimensions of the steam dryer and the part of the boiler showing above the shingle. Another pair of divers recorded the dimensions of the aft hold. The other divers were tasked to do a visual survey of the bow and stern areas.

The results from the informal use of a pre-prepared plan were very positive. All divers found their stations, and all divers felt that having a plan on their boards was a positive advantage in visibility of five or six metres.

The second dive, on July 15th 2012, concentrated on taking measurements that could confirm her as the *Spyros* or the *Clyde*. Other tasks included locating the spare propeller, drawing the compound engine cylinder covers to scale, creating a scale drawing of the drier on the boiler and taking measurements of the width of the vessel and length of the vessel. More detailed measurements were taken of the bow, and the height of the vessel above the shingle seabed was recorded.

One pair did a complete swim-over survey noting the current condition of the vessel. They found the after hold coaming had distorted, and slipped towards the hold. Other hold coamings were virtually intact. Two winches were found, the one by the forward cargo hold had collapsed inwards. Mooring bollards are still in position at bow and stern.

The general height of the hull above the seabed was between 3.80m on the starboard bow, and 1.45m where the hull had started to deteriorate by the forward bulkhead on the port bow, just aft of the forward hold. The frames in the bow were approximately 50cm apart, suggesting a robust construction for an early metal ship. The width of the vessel at the forward bulkhead was 7.3m. These measurements tend to confirm her identity as the *Spyros*. There is evidence that part of her cargo of coal is still in the hold, although it would be interesting to establish if this was cargo or fuel.

The boiler is partially buried, with less than half its circumference exposed. The boiler measured 4.4m in length, with the steam drier drum 1m in from the aft end of the boiler (figs.14 and 15). The maximum width of the steam drum was approximately 70cm.



Figure 14. Side view of steam drier on boiler © Barry Jarvis 2012

The engine was a twin cylinder compound engine. The overall length of the engine block was 225cm, the high pressure cylinder measured 44cm across the top and the low pressure cylinder was 81cm in diameter.



Figure 15. Twin expansion compound engine on SS Spyros © Barry Jarvis 2012.

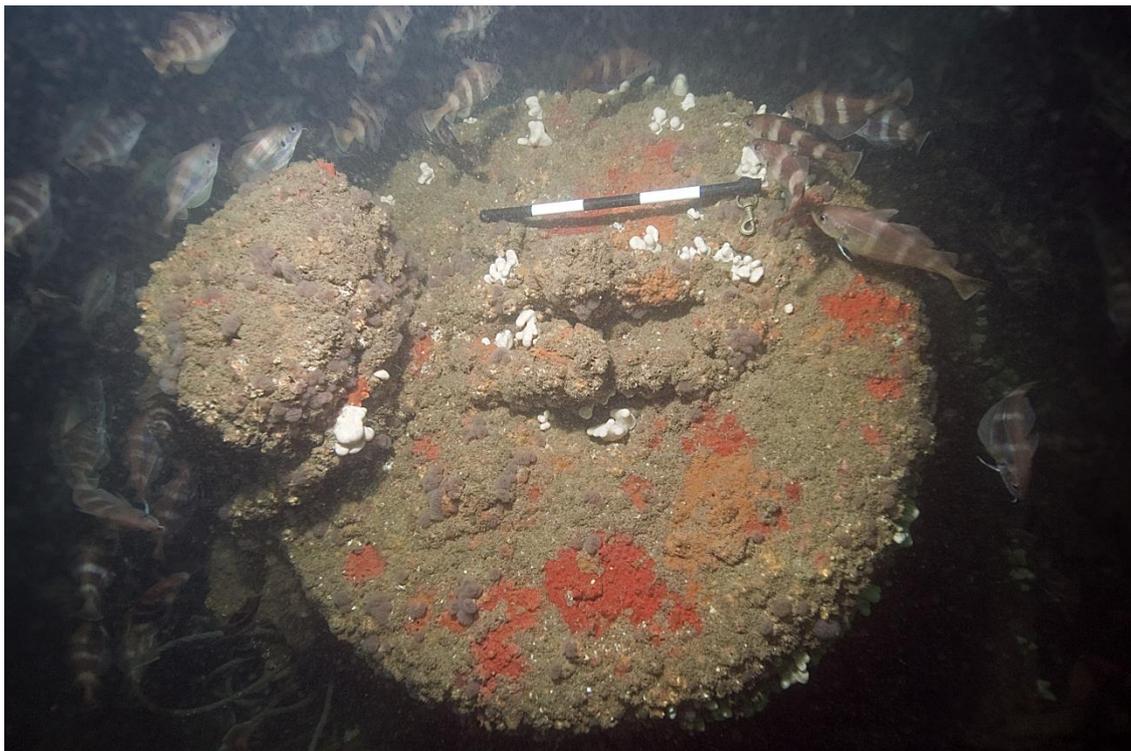


Figure 16. Detail of high pressure cylinder © Barry Jarvis 2012.

The bladed propeller and the steering arm on the stern are still visible (fig.17). The propeller is broken.

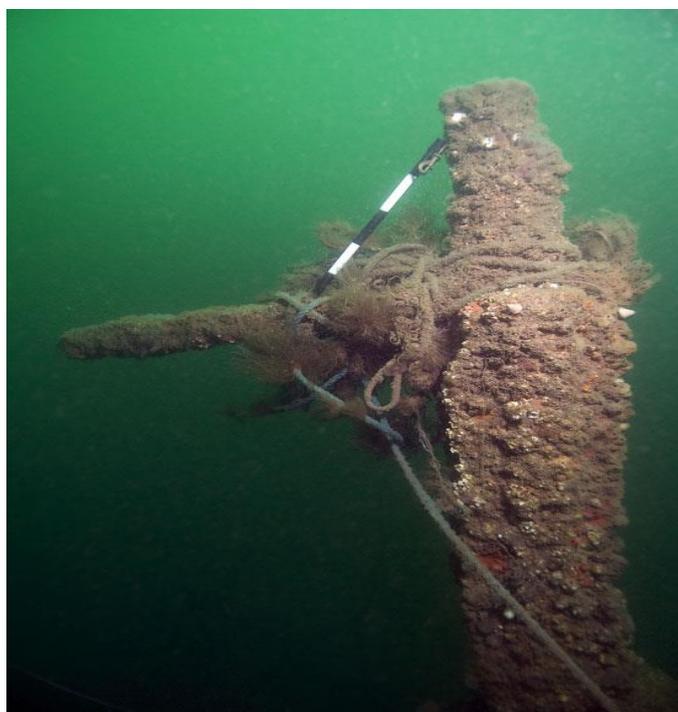


Figure 17. Remains of rudder and rudder post© Barry Jarvis 2012.

It had not been possible to measure the overall length of the vessel on this dive. As the dimensions were a critical part of establishing her identity as either the *Spyros* or the *Clyde* a final dive was undertaken on July 23rd by two SADSAC members diving with another group. On this occasion a full-length

measurement was taken. The measurement of 49m 30cm is longer than her given length, but it was not possible to keep the tape level over the length of the vessel. As the overall length of the *Clyde* was 40.1m this wreck could not be the *Clyde*.

3.4.3 CONCLUSIONS

The work done on this vessel demonstrated that diving with a clear plan of the wreck made the work more productive. Good quality photographs could show details of structure that would allow time-consuming measured drawings to be selected more purposefully. Finally diving on a site that habitually has low visibility or is quite dark with the same team more than once makes the diving easier and the results more detailed.

This is an ideal wreck for showing divers how to navigate a wreck and identify main structures and features. The engine is early and a good example of a two cylinder compound engine from the later part of the 19th century.

3.5 SS VENEZUELA

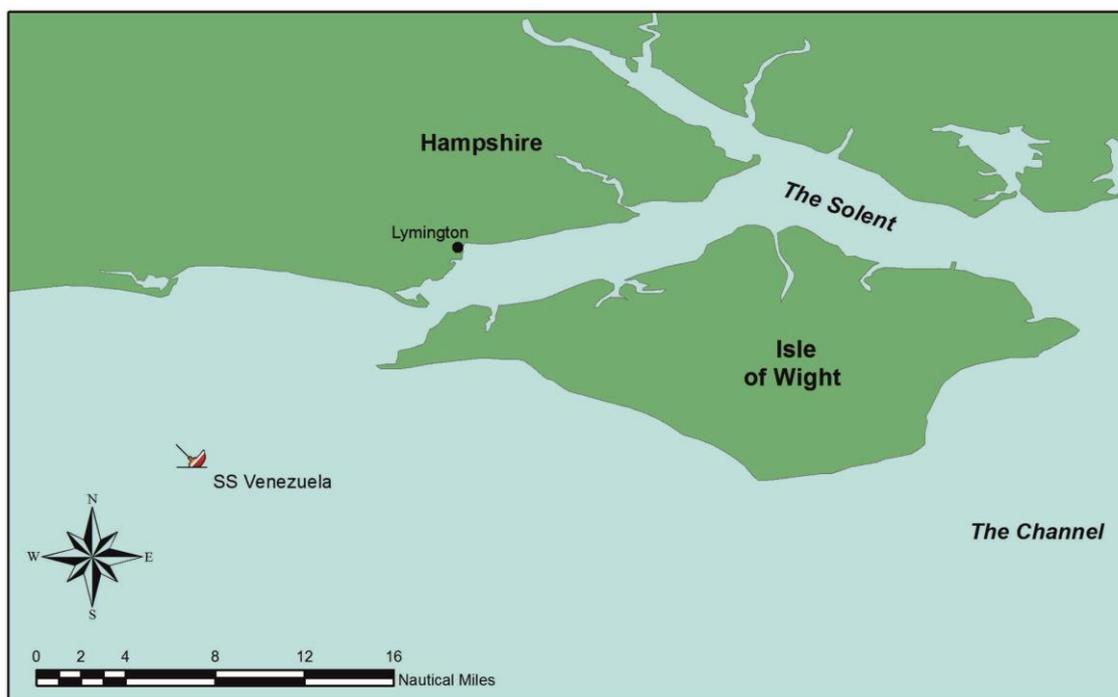


Figure 18. Position of SS Venezuela: location data provided by Dave Wendes.

The *Venezuela* is a popular dive site for local groups. She is a substantial vessel still and has two upright triple expansion engines still in their correct relationship with the scotch boilers. *SS Venezuela* had not been one of our project targets as SADSAC had hoped to complete the work on *Serrana*. However on 12th May 2012 the visibility close inshore was appalling and the decision made on that morning was to go out to the *Venezuela*, confirm the existing structure, measure the boilers, locate the second triple expansion engine, and see how far the seabed had encroached on the stern section following work done by HWTMA in May and July 2011.

3.5.1 SITE DESCRIPTION

The remains of *SS Venezuela* are located at 50° 37.78' north, 001°43.39' west some six miles to the south west of the Needles lighthouse, Isle of Wight. At high water the wreck is 27m deep, and is upright on the bottom with an approximate height of 6m (the large machinery), orientation 160°/340°. The full extent of the site still needs some investigation. Her recorded length is difficult to confirm because part of the vessel is buried in shingle that seems mobile.

The HWTMA survey shows the stern clearly, but the bow is identified only by chain and bollards. The wreck has substantial structure still remaining. Her hull remains are clearly visible and provide a framework for her boilers, twin triple expansion engines, deck furniture such as bollards, and evidence for her derricks and masts. There appears to be little wreckage outside her hull, apart from some plates and masts.

3.5.2 VESSEL HISTORY

The *Venezuela* was completed in 1907 by Bow, McLachlan and Sons of Paisley who also built the machinery. She was 730 tons gross and was 64.4m long by 10.4m wide with a depth of hold of 3.29m. Originally classed as a river boat (Dave Wendes pers. comm. August 2012) she is described as a steel twin screw, river steamer, one deck, fitted with electric light. (The implication of 'fitted with electric light' is that such new technology was fitted on what became a sea going vessel was worthy of note.) She had twin triple expansion engines powered by two single ended boilers with 84 nominal horsepower.

In 1910 she was owned by cia Argentina de Nav (Nicholas Michanovich) Ltda and registered in Buenos Aries. In 1917 she was owned by Dodero Huos, and in December 1917 she was owned by SA De Navigation Havriasc, Le Havre.

On 14th March 1918 she was en route from Swansea to Rouen via Falmouth with a cargo of coal when she was torpedoed by *UB-59* commanded by Erwin Wassner. According to Wassner she sank very quickly and there were no survivors.

3.5.3 SURVEY RESULTS

The HWTMA generously made their 2011 results available to SADSAC, and the results of our survey will be made available to them (figs.19 and 20).

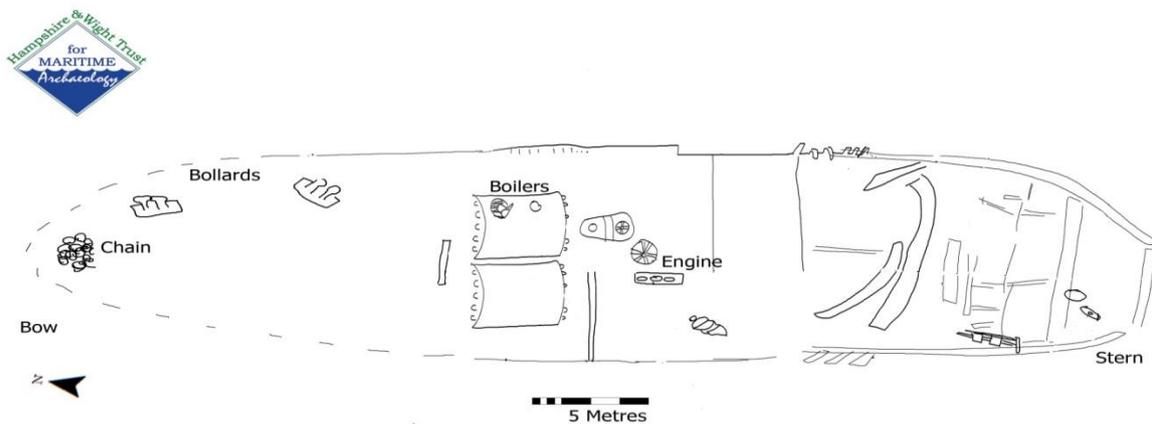


Figure 19. HWTMA survey results 2011 ©HWTMA 2011

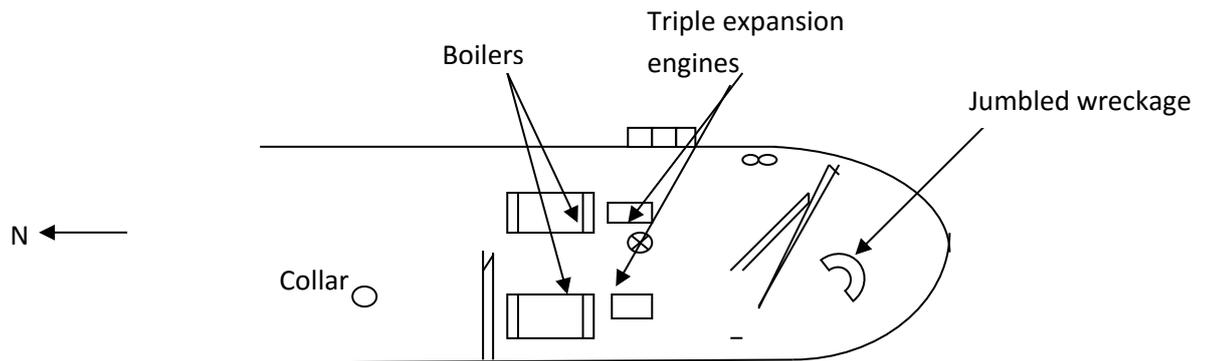


Figure 20. Results of SADSAC survey 2012

On July 24th the site was dived again by a member of the SADSAC team as part of another diving group. On this occasion visibility was excellent and it was possible to see the second engine, and to identify those structures noted by the May 15th team. A sketch plan was produced showing the existence of the second triple expansion engine and possible remains of an after steering position, or possible part of a steering arc at the stern, as well as bollards on her stern which had collapsed inwards (fig.20). Remnants of a possible bulkhead between the boiler room and the forward part of the vessel were also found. Immediately forward of that bulkhead was a hoop, similar to a mast hoop, lying on the surface (Stone 1993:64). This may have been part of a derrick or mast securing system. No attempt was made to locate the forward bollards or anchor chain found by the HWTMA earlier in the year.

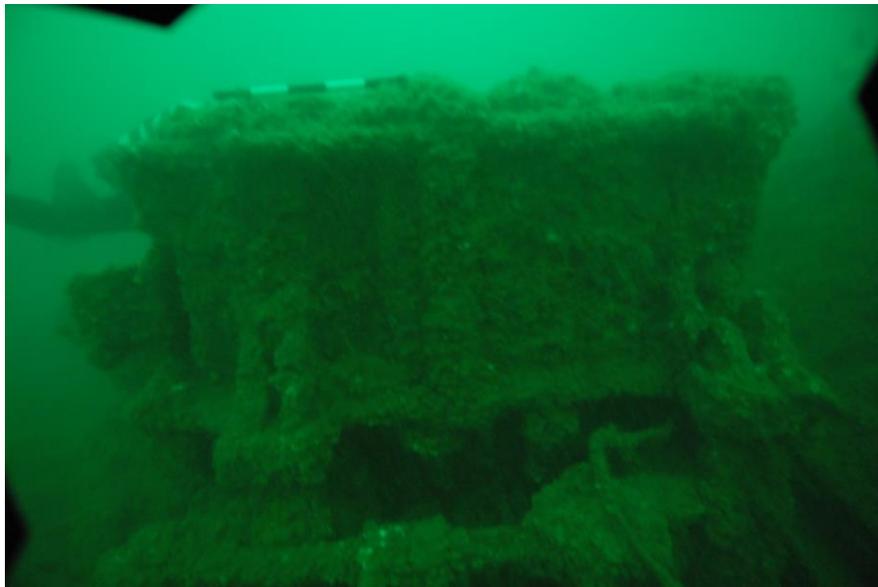


Figure 21. Triple expansion engine photo ©HWTMA 2011



Figure 22. Boiler from Venezuela HWTMA



Figure 23. Hull remains 2011 observed again 2012 by SADSAC ©HWTMA

3.5.4 CONCLUSIONS

The results of the initial survey done in May 2012 were disappointing for two reasons. The visibility, though better on this site than it would have been on the *Serrana*, was still poor. Because we had not planned to dive this wreck we had not brought any site plans for divers to take down with them and for those who had not dived the vessel before it compounded the effects of poor visibility. For some this was an unproductive dive but it did demonstrate the benefit of having site plans on boards to take down so that divers going on the wreck to survey can navigate more confidently to the area that needed recording.

We were fortunate that there was an opportunity for one SADSAC member to dive it again on July 24th. The visibility was in excess of eight metres. On this occasion it was possible to see both engines and

both boilers (figs.21 and 22) very clearly. Going towards the stern it was possible to see the area of jumbled frames and possible mast structures. Some plates had fallen outwards. The shingle seabed seems quite mobile. There is evidence of substantial structure below the seabed, and the area of the bow is almost completely covered with shingle. It was difficult to establish what structure remains in the bow area, and it could be useful to dive again to see what is happening with the shingle.

The wreck is dived frequently by recreational divers. She is in fairly good condition and has large machinery still in position as they would have been on a working ship. Her two triple expansion engines are upright and in the correct relationship relation to her boilers. Because she is relatively shallow this would be a good wreck to teach survey techniques on. The vessel itself, dating from the early part of the 20th century is worth closer recording and further research. It would be useful to make site plans available because she is such an easy wreck to dive, and there is so much left to see.

3.6 SS FAITH

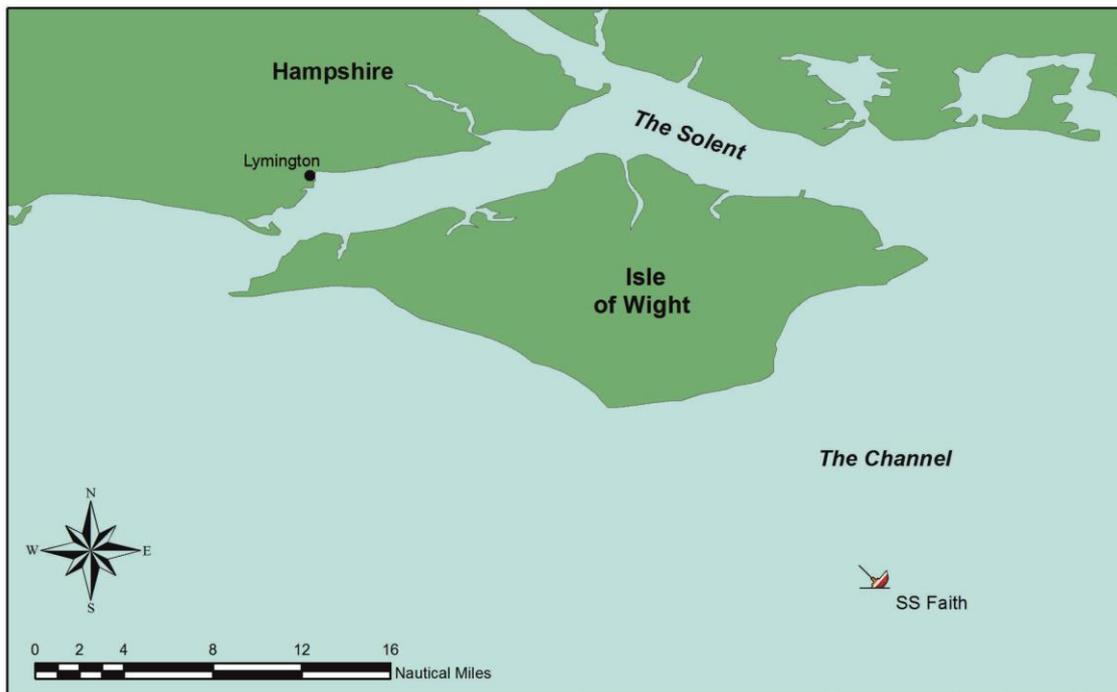


Figure 24. The very general position of SS Faith: location data provided by Dave Wendes.

The site of SS *Faith* was the final dive of the SADSAC BSAJT project 2011-12. The site was selected because she was mentioned in English Heritage's guide to ship developments of the Victorian period that Mark Dunkley generously allowed SADSAC to view.

Constructed in Birkenhead in 1852, the iron hulled *Faith* was propelled by steam and sail, and had served as a Crimean war troopship before foundering off the Isle of Wight three years later en route to Istanbul to be delivered to new Turkish owners. Only two other iron steamers from this period are known: the wrecks *Nile* and *Zebra* (Dunkley 2012 in press).

Further research indicated that both the *Nile* and *Zebra* had driven ashore on the rocks in Cornish waters, so were less likely to be in reasonable condition. The *Faith*, in 36m, was likely to have a better state of preservation.

3.6.1 SITE DESCRIPTION

The remains of the *Faith* lie in 36m. The exact location is known to Dave Wendes and the SADSAC project team but because of the importance of the vessel, and the nature of some of the structure, only an approximate position is given as some 12 miles south east of St Catherine's Point, Isle of Wight. The position and depth of the wreck was provided by Dave Wendes and confirmed by the SADSAC diving team on 18th August 2012.

The site is quite dark, and silty, with a shingle bottom underlying the silt. The bottom appears flat with no boulders. The propeller, propeller shaft, engine bearings, engine and boiler are extant as are some items of cargo, still boxed. Early materials for lubricating the engine are still visible, including oil boxes.

3.6.2 VESSEL HISTORY

Faith was an iron vessel built in 1852, yard number 89, by John Laird and Sons at Birkenhead. John Laird's company was primarily known for building substantial vessels, but sometimes built smaller cargo steamers such as *Faith*, *Nile* and *Zebra*. The company had a reputation for innovation in the construction of steam ships [www.wrecksite.eu accessed 24/08/2012]. *Faith* was initially owned by the Elder Dempster Line and served as a troopship in the Crimean War. She also went to sea under the ownership of the African Steamship Company (ASSC). In 1855 she was sold to the Turkish government, and foundered on her outward voyage to Turkey off the Isle of Wight.

She was 894 tons in weight, length 62.5m breadth 9.1m and depth of holds 4.6m. She could develop 110h.p. with a top speed of nine knots [www.wrecksite.eu accessed 24/08/2012]. Her engine was built by Fawcett Preston of Birkenhead (Dave Wendes pers.comm. August 2012). The boilers would probably have used surface condensers, and as yet it has not been confirmed whether her engine is a simple single expansion engine or a compound engine. Her boiler was a rectangular fire tube boiler, known as a 'box boiler' (fig.25) http://www.cityofart.net/bship/boiler_rect.html [accessed online 31 08 2012].

From observation of the remains of the boiler it seems evident that more investigation is needed about the level of scaling to be expected with either sea water cooling or freshwater cooling (Griffiths 1997:60-62). There is also the question of whether she is a 'wet bottom' or 'dry bottom' boiler.

A wet-bottom rectangular boiler is made with the "furnace wholly inside and independent of the shell, the furnaces being surrounded by water on all sides...In the dry bottom boiler the furnace terminates in the boiler shell at the bottom. ...this causes trouble by being filled up with sediment" http://www.cityofart.net/bship/boiler_rect.html [accessed online 31 08 2012].

3.6.3 SURVEY RESULTS

This vessel was dived on August 18th 2012 after another period of wet weather. The visibility was less than four metres, and it was dark. The shot was right by the propeller shaft, which enabled straightforward navigation in otherwise poor conditions.

At the rounded stern are the remains of a two-bladed iron propeller, with the boss still evident (fig. 27). This leads to a fairly intact and still straight shaft. Close to the propeller on the port side is a wheel, function unknown (fig. 28). Similar wheels on other vessels are used in controlling derricks or cargo loading systems. There is a considerable amount of structure here, but it is confused. The iron frame sections appear triangular, suggesting that the frames come from lower down in the vessel, near the keel. From here, swimming towards the bow, are two or three large thrust bearings. Just forward of the thrust bearings, and just aft of the engine, is an oil box, still with the lid on (fig. 26). About a metre to the port side of the box is another, larger box, function unknown. Some few metres towards the bow is part of the engine, possibly the piston for one of the cylinders and immediately behind that are the remains of the box boiler (fig.30).

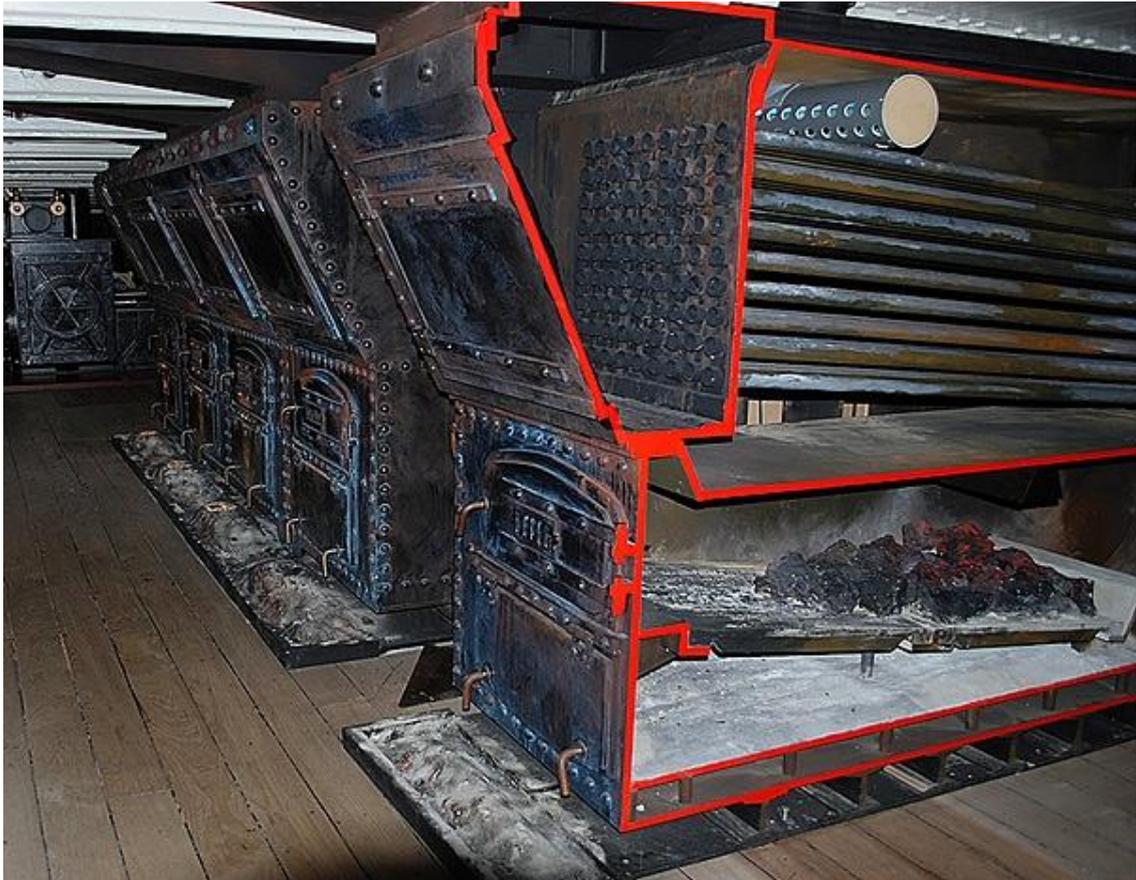


Figure 25. Rectilinear boiler. www.cityofart.net/bship/boiler_rect. accessed 31 08 2012

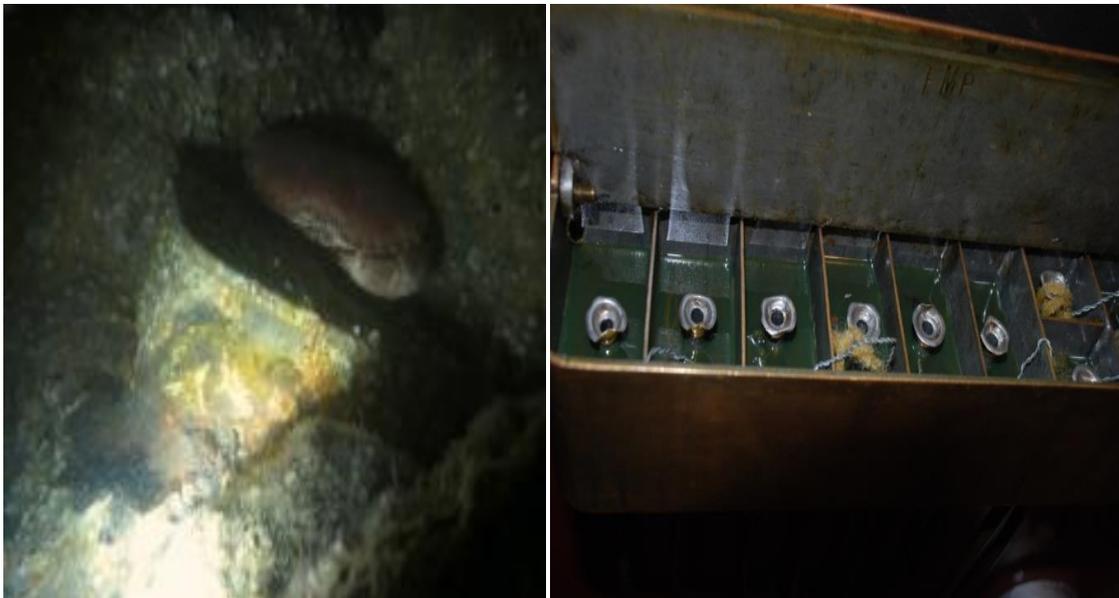


Figure 26. Lubricating boxes. ©Dave Robbins for Faith's box Lubricating box from SS Shieldhall by kind permission of SS Shieldhall.



Figure 27. Two bladed propeller. Photo. ©Dave Robbins



Figure 28. Wheel, possibly used to regulate a valve on steam driven machinery ©Dave Robbins 2012



Figure 29. Pintle on SS Faith ©Dave Robbins 2012

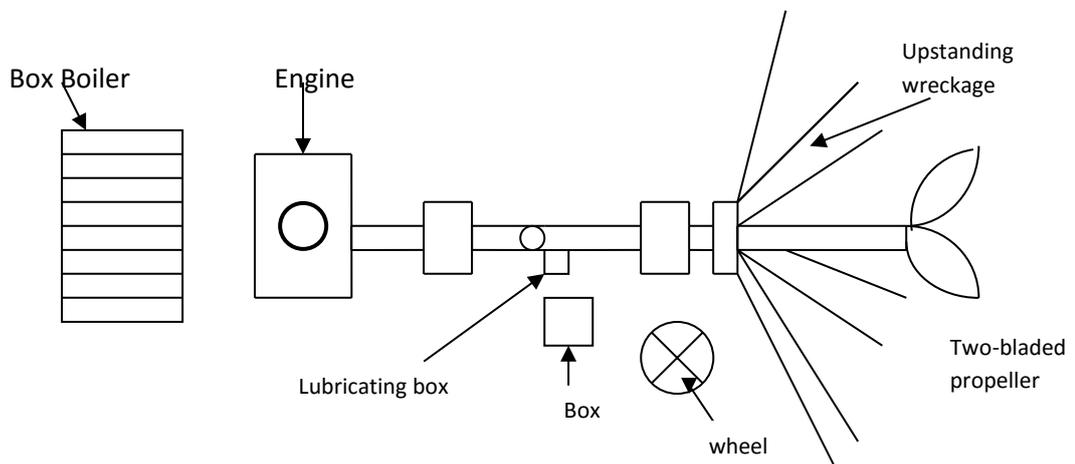


Figure 30. Sketch plan of observed structure of SS Faith. Not to scale.

3.6.4 CONCLUSIONS

Faith is an unusual and important vessel because she was built and working at a time when ship and boat building were in transition from wooden hulls propelled by sails, to steam vessels, with a different, non-heeling hull shape. This new shape was propelled by steam and screw propellers. Steam propulsion was not always considered reliable at that time so she was given the safeguard of masts and sails. The implications of an early screw propeller and the choice of an effective stern gland was a topic of debate in the 1850s as the benefits of *Lignum vitae* over any other form of bearing was becoming recognised (Griffiths 1997:33).

Because the plans are currently proving elusive, artwork showing this form of vessel is particularly useful. A picture in the museum at Suomenli, a fortress just offshore in Helsinki harbour, shows several small vessels with a single funnel and two masts engaged in bombarding the fortifications. The picture was painted in 1855, the year that *Faith* sank *en route* to Turkey. Further investigation into artwork showing steam vessels of this period could be useful.

The compound engine was seen as the way forward, but single engines were still being used, and the implications for the management of the boiler with fresh water or sea water cooling were related to the management of higher pressures in the cylinders and the development of the compound engine and boiler design (Griffiths 1997:45-47). Because of her importance SADSAC are completing the initial process for consideration for designation under the Protection of Wrecks Act 1973. The hope is that designation will follow, and divers with an interest in the development of marine engineering will be able to dive the wreck on a visitors' licence.

4. Summary and assessment of the wreck survey

The aim of the 2011-12 project was to:

- undertake archaeological surveys of wreck sites from 2010 that had been identified as in need of further work and to investigate previously unrecorded vessels;
- maintain and develop recording skills of the SADSAC group and the volunteers that supported the work;
- produce material that could be used by recreational divers to help them understand the structure they were diving on;
- publicise the work of the British Sub Aqua Jubilee Trust.

During the course of the project five sites were surveyed and subject to recording, with the production of site plans, sketches, or photographic recording. The vessels were:

- *SS Faith* built c.1850
- *SS Spyros* built 1880
- *SS Serrana* built 1905
- *SS Venezuela* built 1907
- *HMS Warwick Deeping* built 1932

The *SS Faith* had not been recorded previously. The schematic diagram with photographs is the first recording work to be done on her. It was dark and silty on the dive, but the material gathered is enough to form the basis of an application for protection under the 1973 Protection of Wrecks Act. SADSAC members are in the process of searching museum archives for information about her builders and engine manufacturers. The dive on *Faith* proved how useful good quality photographs are in interpreting structure in low visibility conditions. Further research and recording are an imperative.

The *SS Spyros* was selected because John Liddiard had made her the focus of one his Wreck Tours (87) in 2006. She has a two cylinder compound engine with a steam drier on the boiler. We were able to experiment informally with seeing how the use of the plan of the ship would help volunteer divers and archaeologists get more productive work done. We could also use the plan to see how the wreck had changed in the ten years since the articles had been completed. The vessel seemed remarkably unchanged, and the *Spyros* would seem to be a good choice for teaching wreck navigation and recording techniques in limited visibility.

The *Serrana* had been recorded in the SADSAC 2010 project and identified as worth further work. Sadly the visibility was so poor that little productive work could be done. However some material was identified by those swimming over the wreck, and the short video clips from Dave Robbins and Philip Alcock confirmed that the propeller tunnel did still exist, as did one gun mount, and another gun. These structures could form part of the survey programme at another time.

SS Venezuela had been surveyed previously by HWTMA, who had visited her on one occasion. SADSAC were able to do two visits, during which the existence of the second triple expansion engine was confirmed, as were remnants of mast furniture, and some confused wreckage near the stern that would benefit from further examination.

HMS *Warwick Deeping* had been recorded by HWTMA and by John Liddiard in Wreck Tour 56, 2003. She is representative of a specific response to a military threat and of the important role played in WW II by small vessels patrolling the coastline. The importance of the defensive role of these small vessels does not, in the author's view, seem to be reflected in modern recollections of the 1939-45 war. Designed as a steam trawler engaged in fishing, she was converted into an anti-submarine patrol vessel, and sunk by enemy action. Her remarkably intact condition gave the divers a really good opportunity to practise survey skills at 36-37m depth.

The recording skills and post-survey skills were used throughout the project and in the preparation of this report. The archive generated will be passed to HWTMA, with the hope that it will be added to their site information archive.

The final aim was to publicise the work of the BSAJT. This was less successful. SADSAC gave a presentation to an audience of about 240 at the International Wreck Conference in 2012 about applying for BSAJT funding for worthwhile projects. The audience was appreciative, and several people followed up the talk by phoning for more advice. An article written for publication in SCUBA, the magazine of the British Sub Aqua Club was prepared, but was not published because of circumstances beyond SADSAC's control.

5. Wreck Structure Identification

The decision to include a section on identifying wreck structure was made following discussions with many divers who found orientation on a wreck quite difficult. For some divers just knowing if they were going from bow to stern would have been useful. Other divers wanted to be able to understand what sort of engine they were looking at, or what sort of boiler delivered the pressure to the engines. On one BSAC Wreck Appreciation course a student confided that her branch was full of very experienced wreck divers, and so asking what something was called did not seem appropriate.

The focus of this chapter is to present some ideas about what divers who have little or no idea of ship structure could find useful to see or know. It is a first step towards creating identification slates for wreck structure, or possibly a book modelled on David Leigh Stone's *Sailing Ship Artefacts of the 19th Century* 1993. It is very basic, but some quite experienced divers don't know how to know if they are going forwards or towards the stern, and are too shy to ask.

The first diagram in this chapter shows the outline of a vessel with the major features named. From there it moves to the layout of the boilers, engines and propulsion system. When the boilers are the highest point of the wreck there is a tendency for boat skippers to put the shot in at that point. Once on the bottom by the boiler knowing which way is forward, and which way is aft is useful, especially if the plan is to return to the shot at the end of the dive.

5.1 PARTS OF A SHIP



Figure 31. External hull. Reproduced by kind permission of the SS Shieldhall management team

The wreck may have begun like the SS *Shieldhall* (fig 31). She would have had a bow, with a pair of anchors coming out of a hawse hole in the side of the hull. Above the anchors would be the anchor winches, used to handle the anchor and the heavy chain (fig.32). From there the bridge is the high structure that goes from one side to another.



Figure 32. Anchor winches showing machinery and chain. Photo© Jane Maddocks by kind permission of the SS Shieldhall management team.



Figure 33. Mooring bollards. Photo © Jane Maddocks by kind permission of the SS Shieldhall management team.

Anchor winches, chain and mooring bollards are solid, so are likely to be on the wreck. Most vessels carried spare anchors, stored towards the bow (fig 34). The picture also shows a large ventilation cover.



Figure 34. Spare anchor and top of a ventilation shaft. Photograph Jane Maddocks

If the ship was a cargo carrier the next features could be large rectangular frames outlining where the holds were. These can be several metres long and have a raised area around them, the coaming. This was used to secure the hold cover so that rough water would not swamp the ship. The cargo would need a handling system (fig 35). The large derricks would move the loads into the hold. Once the vessel has been wrecked the only sign may be large mast-like structures, or remains of the hoops used to attach the different parts to the derrick.



Figure 35. Cargo derrick in front of the bridge. Photograph by Jane Maddocks by kind permission of SS Shieldhall management team.

Behind the cargo derrick in figure 35 is the bridge. This occupies the width of the deck and is where the vessel is managed. Behind the bridge is the area of the machinery spaces below deck. The funnel (fig 36) is immediately above the machinery spaces. The large square ventilation shafts are visible beside the funnel.



Figure 36. Funnel Photograph Jane Maddocks by kind permission of SS Shieldhall management team.

Further aft is the stern. The stern deck has usually got mooring bollards on both sides. Under the stern deck and protected by it is the steering gear connecting to the rudder, and the propeller (fig.37). The steering arch helped to control the rudder movements of a heavy ship. A steel propeller may still be visible on the wreck.



Figure 37. Steering arc for rudder control. Photo Jane Maddocks by kind permission of SS Shieldhall management team.



Figure 38. Stern with rudder showing. Photograph Jane Maddocks by kind permission of SS Shieldhall management team.



Figure 39. Stern assembly showing rudder, fixings and propeller shaft. Photograph. Jane Maddocks.

5.2 SCHEMATIC DIAGRAM OF THE MAIN MACHINERY

The boiler is at the front end of the system, the propeller at the stern.

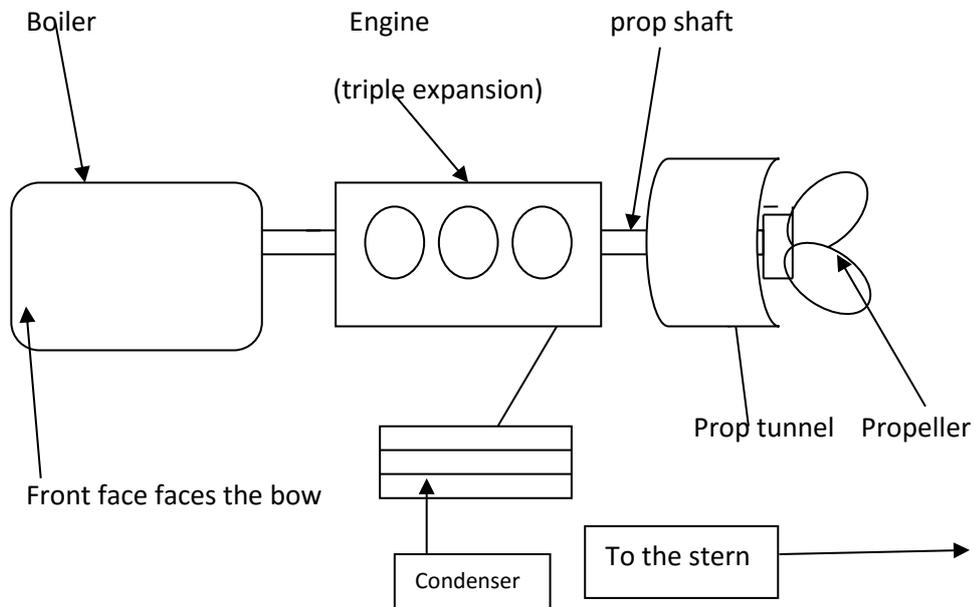


Figure 40. Schematic diagram of the boiler-engine-propeller relationship.

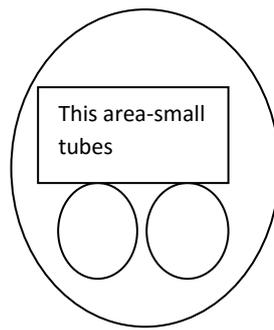


Figure 41. Schematic view of the front face of a scotch boiler.

Figures 41 and 42 show the front face of the boiler. Divers swimming along the length of the boiler away from this view will be swimming towards the stern of the vessel. The boiler will have a lot of small tubes (some boilers have more than 800 tubes). The large circles are the stoke holes, where the stokers would feed the boiler with coal (fig.42).

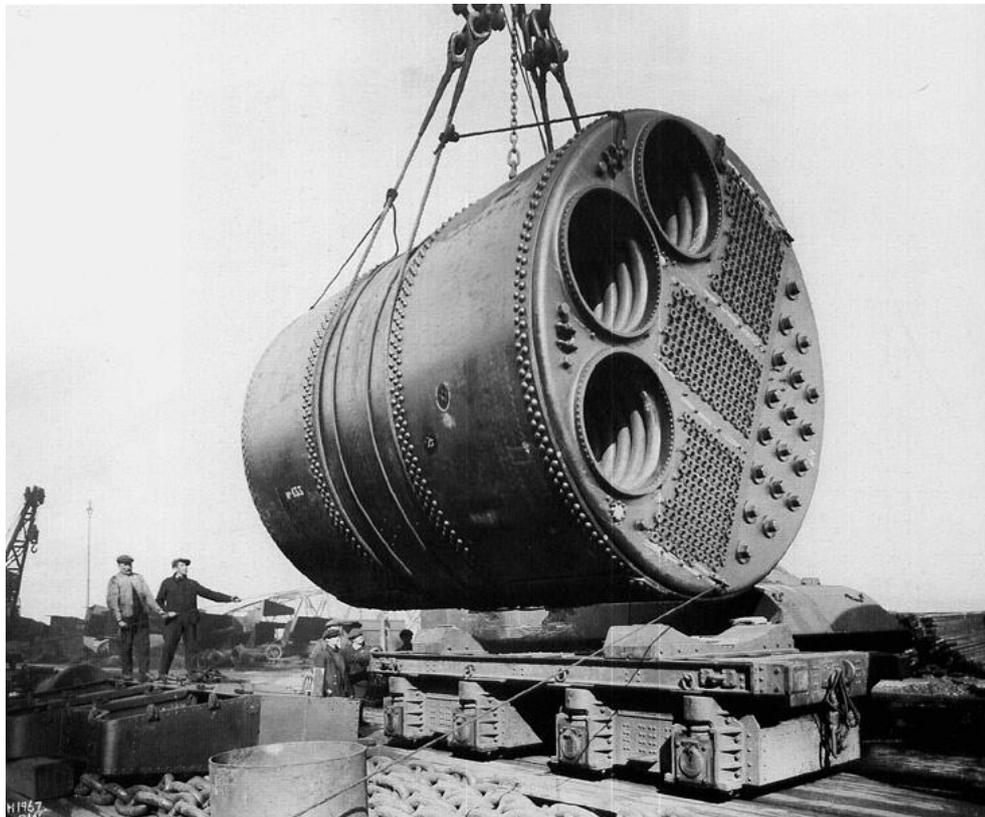


Figure 42. Large scotch boiler showing the features of the front face ©Wikipedia.org [online] 20 08 2012.

Most of the wrecks we dive the ships were powered by steam in which the boiler tubes heat the surrounding water. Steam is produced and this then goes to the engine. The steam pressure is highest in the first cylinder, so that cylinder is smaller. As the steam pressure drops the cylinders get larger in diameter to squeeze every last drop of power out of the steam. There are several different kinds of boilers. The internet site 'The Boiler Room' will give lots of information about the different types of boilers and their used.



Figure 43. Condenser from Pinnace 199 ©Steam Pinnace 199 group.

At this point, the steam goes through a condenser (fig 43), so that it becomes water again, and then goes back to the boiler and is recycled.

Engines can be harder to see. They have often fallen over, and can be a jumble of machinery. Many of the engines we see are compound engines (they have more than one cylinder) and are usually triple expansion engines. This means that the steam pressure is used three times in cylinders that get larger as the steam pressure drops. There will be three cylinder heads on top of the engine (fig.44). Sometimes, in older ships there will only be two cylinders (fig.45).



Figure 44. Top of a triple expansion engine, showing three cylinders. Reproduced by kind permission of the management team from SS Shieldhall.

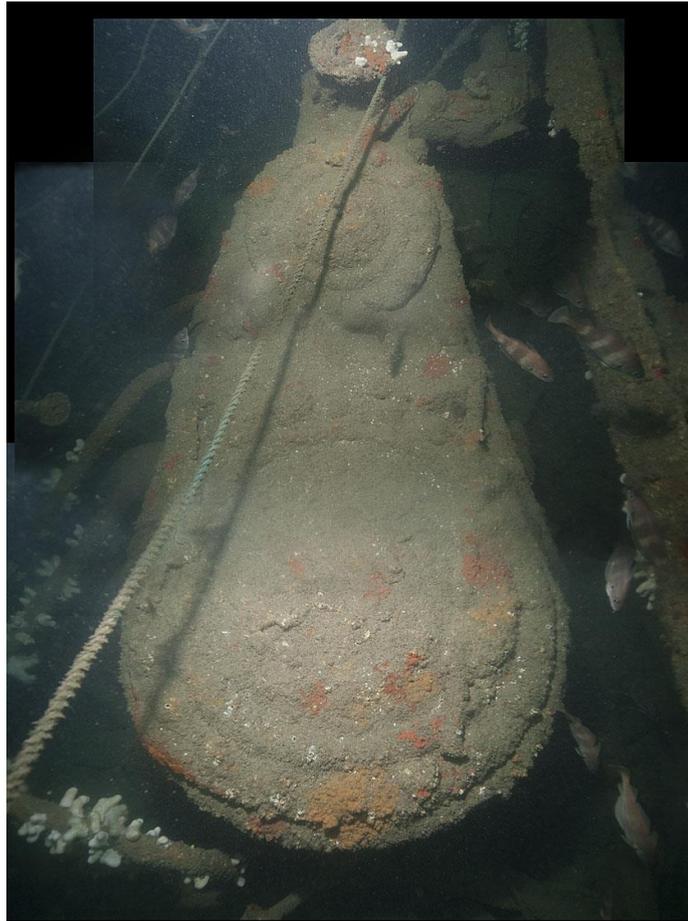


Figure 45. A compound engine underwater showing only two cylinders ©Barry Jarvis 2012.

5.3 UNDERWATER PICTURES OF SOME WRECK STRUCTURES



Figure 46. Hull remains on wreck ©HWTMA 2012

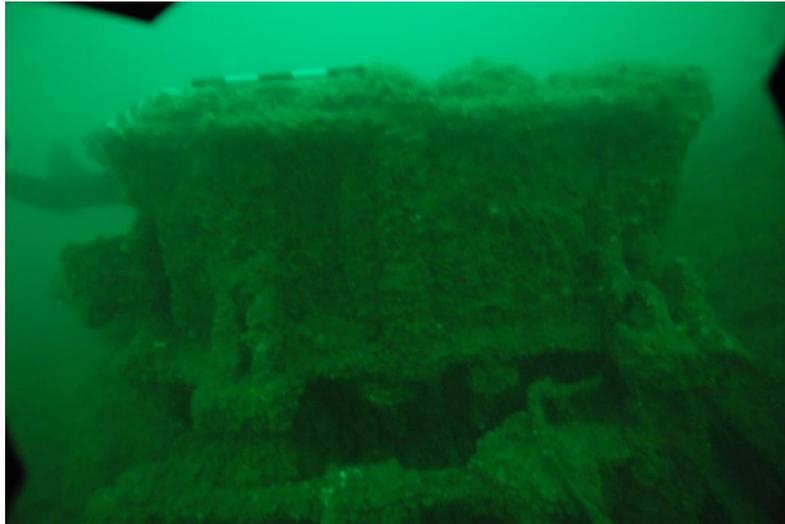


Figure 47. Upright triple expansion engine © HWTMA 2012

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Figure 48. Anchor ©Barry Jarvis 2012



Figure 49. A cargo winch © John Liddiard



Figure 50. Propeller © John Liddiard



Figure 51. Rudder post and arm ©Barry Jarvis

5.4 CONCLUSIONS

The structures chosen for this section were: the boilers, triple and double expansion engines, anchors, propeller shaft, propeller tunnel and propeller, as well as the rudder.

The diagrams and photographs in this chapter have been selected because boilers and engines are usually quite substantial in many of the wrecks dived by recreational divers. The boilers are usually visible and are a good place to decide the fore and aft direction of the dive. However there are divers who do not know which is the front face of the boiler. The engines are sometimes much harder to identify and they can be just a jumble of connecting rods. The propeller shafts and steel propellers are quite diagnostic.

The ideal conclusion to this part of the project would be the production of laminated rigid slates showing the main parts of a ship. The first side could show the plan view and a view in section. For example, the plan view could show the outline of a ship showing bow, anchor winches, mooring bollards, deck, wheelhouse or bridge, derricks, funnel, holds and stern. Underneath in section could be the anchor cable and hawse holes, the holds and their coamings, the engine spaces below the funnel, and the propeller shaft and rudder assemblies. This would also allow the boiler, engine and propeller shaft relationship to be understood.

The other side could include boilers such as the Scotch boiler and the Yarrow boiler, showing the front face to help with navigation. The card would then go on to show an underwater photograph of a twin expansion engine, a triple expansion engine and a steam turbine engine. These could be upright and also a jumbled mass of con rods, showing how wrecks degrade, but still maintain something of their original form. The difficulty is making sure that the underwater photographs are very clear, and that text on the slates is minimal in content but with a big typeface. The slates could be supported by a small

booklet using a professional artist to draw wreck material where surface photography does not really show what is essential. Perhaps the Solent and Isle of Wight is not the best environment for the photographs needed for this document and that a future project might be centred on areas of the coast with clearer water.

6. Possibilities for Future Work

In the final section of the report for the 2010 project the suggestion was made that further work could include the development of a series of photographs and drawings to help with wreck identification (SADSAC 2010:46).

During the course of this project in 2011-12 it became more evident that there was scope for a simple guide to what the features of a vessel could look like after the wrecking process. Dives carried out using pre-prepared plans generated a more comprehensive archive. Divers who were not archaeologically trained found they enjoyed a dive more when they understood what they were looking at.

There are fish life identification slates on sale in dive shops. It would be useful to investigate the possibility of producing a slate similar to fish identification, but having parts of a vessel on land and then underwater so that people could identify what they were seeing. An alternative would be to investigate high quality lamination of wreck identification material similar to that used with the visitor trail underwater guides on the *Coronation* outside Plymouth. If this was to happen a complete series of photographs would need to be taken in sufficient visibility for the structure to be seen. The surface shots would also need to be produced by a professional photographer. It will also be necessary to obtain permission for any other images to be included. Currently investigation is progressing on the production of twenty heavy-duty laminated information slates for a trial next year with volunteer divers surveying the SS *Faith*.

The best organisation of the material would be an image of the part on a ship beside that image should be one of a similar structure underwater on a wreck, and a brief explanation of the function. Good quality professional images would be needed.

More work is needed on the *Faith*. The production of a laminated set of slates should help divers working in poor visibility create a full survey quite efficiently. Once the survey has been done the hope is that the vessel will be protected under the *Protection of Wrecks Act 1973* and that the terms of the licence will allow the development of a simple diver trail so that divers can visit a very early steamship. It is accepted that the target audience may be small and visits infrequent, but the principle of responsible access is important.

Finally SADSAC would like to publicise the British Sub Aqua Jubilee Trust more widely.

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Appendix 1-Project team

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