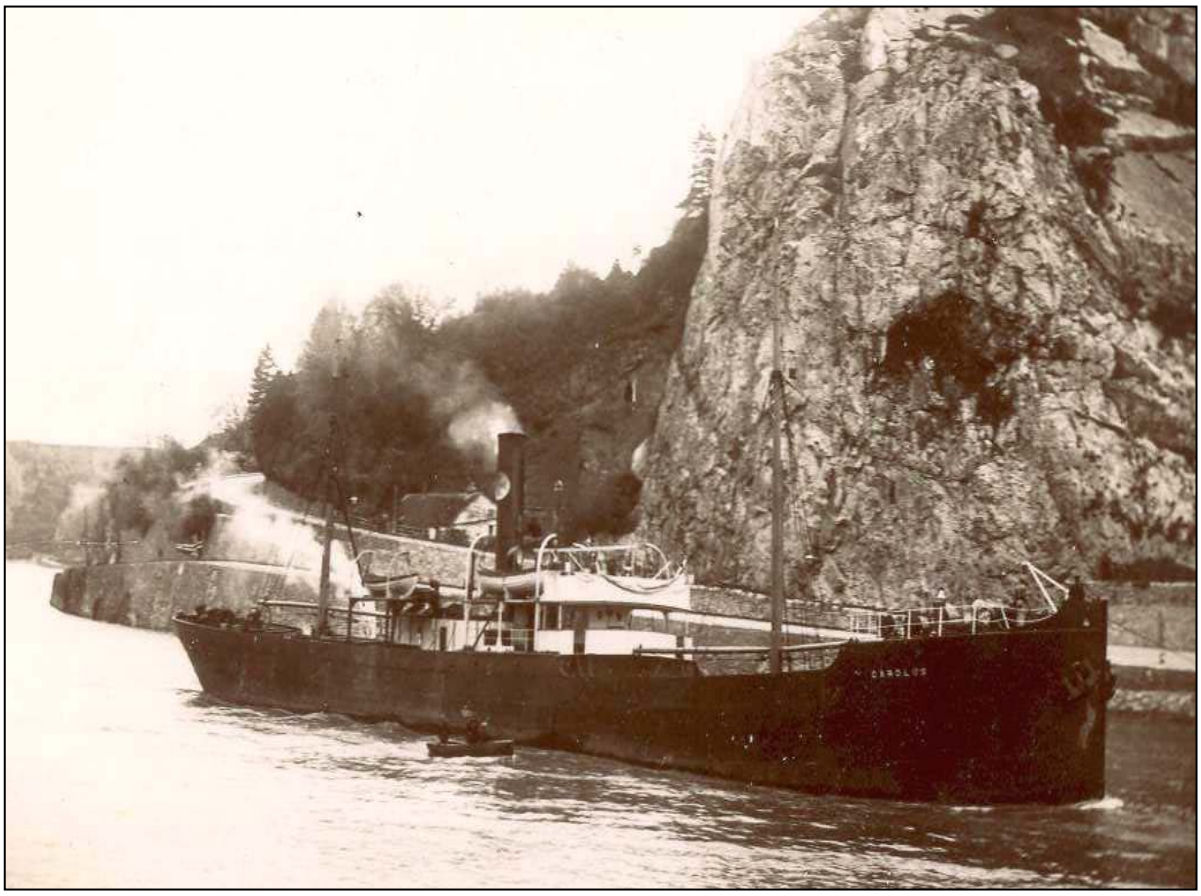
IDENTIFYING SHIPWRECKS OF HISTORIC IMPORTANCE LYING WITHIN DEPOSITS OF MARINE AGGREGATE

STAGE 1 - PROJECT REPORT

March 2007



Prepared by
David Parham & Paola Palma

Centre for Marine and Coastal Archaeology
School of Conservation Science
Bournemouth University

For submission to
English Heritage

IDENTIFYING SHIPWRECKS OF HISTORIC IMPORTANCE LYING WITHIN DEPOSITS OF MARINE AGGREGATE

STAGE 1 - PROJECT REPORT

Contents

Summary

This project aims to provide a foundation of knowledge on which significance of individual shipwrecks within the territorial waters of England can be made using those records held within the National Monument Record as a base.

This document explains how the National Monument Record was complied and the limitations inherent both within the sources used to compile this record and the shipwreck resource itself. It shows that whilst shipping loss and hydrographic survey records from which the record was complied go part of the way to establishing the significance of individual sites, they cannot do so alone as they concentrate mainly on the loss with limited data on other aspects of a ship's life and purpose.

This document explains what cost effective sources can be used to enhance this knowledge base to provide the data required to make judgments of this nature. It explains how Stage 1, the initial data capture stage of the project, was undertaken, the problems it encountered and how the data collected has been stored.

The project is relevant to the management of archaeology underwater in the United Kingdom and the marine aggregate industry. It provides the data for, and in later stages will make judgments on, the significance of individual shipwreck sites. This will allow heritage managers and the marine aggregate industry to make informed decisions about the management of the shipwreck resource within deposits of marine aggregate.

.

1. BACKGROUND

1.1 Introduction

1.1.1 Following discussions that were ongoing with English Heritage staff since May 2002 Bournemouth University was commissioned in February 2006 to undertake a project entitled *Identifying Shipwrecks of Historic Importance lying within Deposits of Marine Aggregate* funded by the Aggregate Levy Sustainability Fund (ALSF). The final deliverable of this project is an enhanced maritime data set to be supplied to the National Monuments Record (NMR). For the first time this enhanced maritime dataset will contribute towards facilitating judgments about the significance of individual shipwreck sites and enabling informed decisions on how best they should be managed.

1.1.2 The UK's Marine Historic Environment (MHE) contains a range of features, sites and material which includes submerged prehistoric land surfaces, palaeo-enviromental remains, the remains of ships of all periods, including some of the oldest known shipwreck sites in the world, aircraft crash sites as well as a range of more unusual features such as experimental swimming tanks, floating docks and tin processing plants (Roberts & Trow, 2002).

1.1.3 As a result of the United Kingdom's long maritime history and its position on the maritime approaches to Northwest Europe the density of shipwreck remains within MHE is amongst the highest, if not the highest in the world. The National Monument Record for England contains over 40,000 marine sites compared, for example, to that of South Africa which has 2,500, Australia which has 6,000 or Canada's 9,000**.** (Roberts & Trow, 2002). However the historic lack of a national strategy for the research and management of this MHE makes it the least understood of the UK's historic environment. Further information about Maritime Archaeology and English Heritage's management of it can be found in Roberts & Trow, 2002.

1.1.4 As can be seen from the above, by far the greatest component of the MHE is its shipwreck component. Shipwrecks are commonly considered as part of the Environmental Impact Assessments (EIAs) that accompany applications to dredge marine aggregates. A wide variety of existing datasets, secondary sources and geophysical surveys can be used to estimate their likely presence, extent, character and period. However, these sources in isolation cannot establish the relative or absolute importance of known or potential wrecks because the 'importance' of a wreck arises from a context that is wider than the aggregates area under consideration. This project builds on the framework developed within the Importance of Shipwrecks project (see Wessex Archaeology, 2006). Identifying Shipwrecks of Historic Importance seeks to test Wessex Archaeology framework by applying it to located wrecks within the National Monuments Record (NMR) and to identify the presence of 'important' shipwrecks within aggregate extraction areas. This project uses available historical sources to enhance our understanding of the marine

historic environment by identifying archaeologically important sites amongst the wealth of wreck sites that exist within English Territorial waters. This project establishes the character of the shipwreck component of England's marine historic environment. This enhanced understanding of the shipwreck resource will allow regulators, advisors and industry to make informed decision about how to best manage and mitigate for any impact on sites that lie within aggregate extraction areas.

1.1.5 So little is known about the shipwreck resource that every site must be considered significant as we are not currently in a position to judge the importance or redundancy of individual sites. Non-significance or redundancy of individual sites cannot be established until a reliable body of data for use in the evaluation of the significance process exists (Schelberg, 1996). Therefore, this project contributes to establishing a reliable body of data by using maritime historical sources to enhance the maritime component of the National Monument Record (NMR) (the 'Record'). This enhancement can be used to characterise the sites within the 'Record' and within aggregate extraction areas to provide a sound foundation of knowledge on which most archaeologically significant sites can be identified and the redundancy of others proposed.

1.1.6 English Heritage's maritime responsibilities lie within the English Territorial Waters (Roberts & Trow, 2002). The geographical areas to be considered match that of English Heritage's area of primary responsibility as well as those waters adjacent to the coast of England from the mean high water mark to either the limit of the United Kingdom Continental Shelf[1] or the median line that demarcates English waters from those of another nation. For the purposes of this project Scotland, Wales, Northern Ireland, the Isle of Man and the Bailiwicks of Jersey & Guernsey fall within the definition of another nation.

1.1.7 Using such a wide area allows the entire English shipwreck resource to be considered, (defined as those sites whose character can be established as detailed in 2.2.3). This will allow a true assessment to be made of each individual shipwreck in a national context and thus remove any regional uncertainty of the importance of individual shipwrecks. The international and movable nature of shipping is such that significance can only be established at a national level and comparable shipwrecks are often spatially widely removed from each other. As an example the significance of the early Royal Navy Submarine A3 (HOB UID 904626) located in Dorset can not be established against other wrecks within its immediate locality as no similar sites exist. However its contemporaries are widely dispersed: the A1 (HOB UID 911782, also a Designated Wrecksite) in Hampshire, the A7 (HOB UID 919768 a Controlled Site under the Protection of Military Remains Act) Cornwall, B2 (HOB UID 901840) in Kent), Holland 5 (HOB UID 1397999 also a

[1] As defined in the Continental Shelf Act 1964 and subsequent orders made under section 1(7) of this act

Designated Wrecksite) in Sussex and the Holland 1 (in the Submarine Museum, Gosport, Hampshire).

1.2 Relevance

1.2.1 The project is relevant to the marine aggregate industry as shipwrecks form by far the single greatest tangible component of the MHE found within aggregate extraction areas. Whilst it is possible through desk based research and geophysical survey to locate shipwreck remains and often identify the wreck(s) in question it was not possible, prior to the inception of this project, to judge the significance of each individual shipwreck due to a lack of data on which these judgements could be made. This is explained in detail in section 2 below.

1.2.2 The traditional mitigation approach to the presence of a shipwreck site within an aggregate extraction area has been to protect the site by the creation of an exclusion zone within which no extraction can take place. This has an economic impact on the extraction industry in terms of a reduced aggregate yield from the licensed area and additional ship time costs due to course alterations around the excluded area.

1.2.3 This document details the current state of the Record, identifies and explains the gaps in knowledge within the Record that are required to be filled in order to provide a sound foundation of knowledge on which the significance of individual shipwrecks can be judged within the national record.

1.2.4 This will allow those wrecks that are deemed to be of importance to be managed in relation to their value to the nation and therefore allow those that are deemed to have less importance to be managed in accordance with their perceived value.

1.2.5 In addition to its importance to the marine aggregates industry this project also has added value. It provides comprehensive and understandable information that will be required to address those interests in marine historic assets via the proposed *Register of Historic Sites and Buildings* (DCMS 2007).

1.2.6 The Record as it stood prior to the inception of this project consisted only of data primarily detailing the loss of the ship involved but did not commonly include details of the ships build, use, loss, survival or investigation, the factors on which the broad history and significance of a ship can be established. An example of this is shown in the table below using the cargo ship SS *Volnay* (HOB UID 919180).

NMR Record
The cargo ship SS *Volnay* (HOB UID 919180) The NMR recorded the wreck remains of a Scottish Cargo Vessel with auxiliary information such as she was made from steel and was en-route from Halifax & Montréal in Canada with a cargo of government Stores including ammunition to Plymouth when lost on 14th December 1917.

Enhanced Record

The *Volnay* was a British flagged Glasgow registered steamship owned by the Volnay Steam Ship Co. Ltd and managed by Gow, Harrison & Co. Classified as *100A1 (their highest survey rating) by Lloyds. She was 385ft in length, 52ft in breadth and 26.5ft depth and 4267 tons displacement. Built in 1910 by Russell & Co in Port Glasgow from steel and equipped with electric lights and a wireless. She was powered by a 449 horse power triple expansion steam engine built by Rankin & Blackmore, equipped with a screw (propeller). She was made from steel with 2 decks, double bottomed with specialized cargo carrying equipment.

She struck a contact mine off the Manacles and was brought into Porthhallow Bay for salvage where she sank in a gale on the following day. Flotsam from her, largely foodstuffs, was washed ashore and salvaged by the local community who were subject to rationing at the time. She was then abandoned until 1919 when salvage work was conducted but the presence of ammunition on board prevented her being dismantled and these were later recovered by amateur divers after WWII. The wreck lies on a flat rocky seabed and is badly broken up with only the boilers and part of the bow rising to about 5m above the seabed, a mass of flattened ship structure and ammunition. She is a popular dive site.

Discussion

This information would suggest that the *Volany* has some local interest as a site connected to World War One folk law and a place in British Sports Diving as an early and popular dive site. She would have been a common type of ship at sea in her time and does not appear to have contained any interesting features or been specifically involved in great events. Her loss in the defense of the UK in wartime and as a typical cargo carrier on which the world's trade depended at the time makes her interesting as a 'typical' ship but her survival is poor and it is believed, but not confirmed until this project is finished, that there are other better preserved and more significant examples of this ship type.

Aggregate Levy Sustainability Fund

1.2.7 This project is relevant to the Aggregate Levy Sustainability Fund (ALSF) as it supports English Heritage's core objective to reduce the impact on the marine historic environment of aggregate extraction by meeting the following aims of ALSF Objective 2 (promoting environmentally-friendly extraction and transport):

(a) research to enhance understanding of the scale and character of the historic environment in aggregate producing areas in order to provide the baseline information necessary for effective future management by assessing the gaps in the maritime record and providing an enhanced dataset of the shipwreck resource.

(b) support for the development of management and conservation strategies for the historic environment in aggregate producing areas by identifying

which of those shipwrecks within these areas have archaeological significance and therefore allowing management and conservation strategies to target these sites as a priority.

(c) marine historic environment: baseline information and characterization of the resource; techniques of prediction and evaluation; mitigation strategies; training, awareness and information exchange by characterizing those shipwrecks within areas of aggregate extraction.

1.2.8 The project has achieved this to date by enhancing the understanding of the shipwreck record within areas of aggregate extraction and by providing a foundation on which the significance of these sites can be assessed within a national context. This meets Objective (a) above by providing an information base on which the scale and character of the shipwreck resource can be established, Objective (b) by providing an information base on which the significance of sites can start to be assessed and Objective (c) by providing baseline information about the current physical condition of individual sites within the resource which will aid the detection of other similar sites and hence mitigate against their destruction.

Taking to the Water

1.2.9 The Project will address the following priorities listed in *Taking to the Water* (Roberts & Trow, 2002):

(a) Projects designed to enhance and validate the maritime record through desk based survey (para12.5point1) by undertaking desk based survey to enhance and characterize the maritime record.

(b) National evaluation studies to characterize poorly recorded or little understood elements of the seamless maritime cultural landscape (Para 12.5 point7) by enhancing our understanding of the poorly understood shipwreck resource.

(c) Studies designed to develop methodologies that can help seabed developers meet their obligation under the Environmental Impact Regulations to identify underwater cultural heritage and mitigate damage incurred in the course of their activities (para 12.5 point 9) by enabling more informed decisions to be made about the management of maritime cultural heritage in aggregate extraction area.

2 PROJECT AIMS, OBJECTIVES AND DISSEMINATION

2.1 Project Aim

2.1.1 The aim of this project is to use widely available historical sources to enhance our understanding of the Marine Historical Environment (MHE) by identifying the archaeologically important sites amongst the mass of located shipwreck sites that exist within English Territorial waters. This will result in the creation of a list of identified archaeologically important shipwreck sites supported by the data required to underpin the *Statements of Importance* designed to provide information about the significance of specific assets and encourage appropriate maintenance and conservation in line with *Heritage Protection for the 21st Century*(DCMS 2007)

2.1.2 In addition to the above the outcome of this project will establish the true character of the shipwreck component of England's MHE. This enhanced understanding of the character of the entire resource will allow the industry to make informed decision about how to best manage, and mitigate against the destruction of sites that lie within aggregate extraction areas.

2.1.3 By gaining an understanding of the character of the entire resource we can, for the first time, begin to identify the true potential of the resource and how it can best inform us about the past and lead to the basis of a research agenda for identified shipwreck sites. This concept will form the subject of a further project proposal once the current project has been completed.

2.2 Project Objectives

2.2.1 The project will achieve the above aim by completing the following objectives.

a) Establishing what is currently known about the located wreck sites and unchecked features or anomalies regarded as potential wreck sites held within the NMR.

b) Enhancing those records by adding the basic data available in general shipping registers.

c) Enhance the basic data held above by adding more detailed data to provide information about the vessels life.

d) Use an established desk based methodology (see Appendix 1) to attempt to identify currently unidentified, located shipwreck sites.

e) Classify each individual shipwreck site in accordance with established shipping classifications used by *Lloyds Register of Shipping* and *Jane's Fighting Ships.*

f) Establish a general accepted chronology of shipping development into which each individual shipwreck site can be fitted.

g) Use the criteria established by the Wessex Archaeology *On the Importance of Shipwrecks* project to establish the relative importance of each individual shipwreck site.

2.2.2 The intention for the chronology referred to in (f) above would be to develop a chronology and then test that against a panel of agreed experts, drawn from the marine archaeological and historical communities.

2.3 Staged Approach to this Work

2.3.1 Because of the large volume of data to be collated and classified for this work the project will be split into a number of self contained stages that will allow the project to span a number of funding cycles. Each stage will be constructed in such a way that allows a meaningful outcome for the project should funding not be available for later stages.

2.3.2 The Stages where split as follows

(a) Stage 1 has seen the completion of Objectives a) & b)
(b) Stage 2 will see the completion of Objectives c), d), e) & f)
(c) Stage 3 will see the completion of Objective g)

2.3.3 The Document only provides a Report on those objectives completed during Stage 1

2.4 Principal Means of Dissemination

2.4.1 The primary product of this project will be a project report to English Heritage and an enhanced dataset for the National Monuments Record (supplied in MS Access).

2.4.2 The project was presented at the English Heritage Marine Aggregate Levy Sustainability seminar in May 2006 and a paper about the project has been submitted for publication in the proceedings of this seminar.

2.4.3 As part of the project Bournemouth university has completed an on line record of the project using the OASIS form at http://ads.ahds.ac.uk/project/oasis.

3 THE NATIONAL MONUMENT RECORD (THE 'RECORD')

3.1 Background

3.1.1 The section aims to explain the background to the development of the Record in order to discuss the constraints of the data which it holds at a later time.

3.1.2 Historic Environment Records (HER), as is the National Monument Record, are not complete records of past human activity within the area that they cover, but a record of data about past human activity that has both survived and been discovered by relatively modern human activity.

3.1.3 The kind of human activity on the sea bed that creates the data on which HER are based is severely limited because of the technological challenges presented by the underwater environment. It is only in the second half of the 20th century that technological advances have allowed the kind of detailed survey & human access on the seabed that uncovers evidence of past human activity. Therefore marine HER have not benefited from data capture in the same way as those on land as they have had to rely very heavily upon historical and hydrographical[2] records. To understand the nature of the marine record we have to understand the background of its components and their true nature.

3.1.4 Because of the lack of data explained above the Record was compiled from non-archaeological sources between 1991 and 1996 and involved in excess of 10 person years of research and data entry (calculated from number of staff employed and length of employment). It is split into four basic components of data type: located wreck sites whose name is known ('Identified sites'), located wreck sites whose name is not sites'), unchecked features and anomalies regarded as potential wreck sites and casualties for which no archaeological evidence is currently available, see Figure 1 (Trow, 1999 & NMR data supplied to Bournemouth University in September 2005).

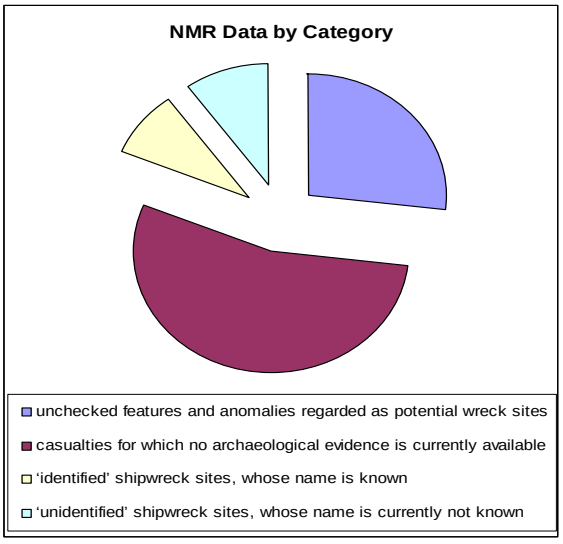


Figure 1

[2] The measurement of physical characteristics of waters and marginal land.

3.1.5 When the Record was collated in the early 1990s it relied on two principal sources. The major source of information on located wreck sites was the United Kingdom Hydrographical Office (see www.ukho.gov.uk/) (UKHO) whose purpose is not to collate archaeological data but to provide information to allow safe navigation. The other major data source, which provided documentary evidence, came from Richard and Bridget Larn of Shipwreck and Marine Ltd. (RCHME 1996) which has since been published as the *Shipwreck Index of the British Isles* (see para 4.2.9 below). Both source types are discussed below in order to have a better understanding of the marine section of the Record and its limitations.

3.1.6 Records of shipwreck are very rare until the establishment of methods for disseminating shipping intelligence, most famously *Lloyds List*, in the early to mid 18th century. Whilst shipping losses formed part of this data capture, it was the loss of the vessel that was important, not its exact position. Given the technology of the day this was often very difficult to establish and nearly all positions are vague and given in notoriously unreliable dead reckoning[3] positions such as *'13 miles south west of Beachy Head'* format. Prior to this ships cast ashore were considered of such little importance in themselves and their details were seldom if ever recorded. What did often matter were the contents of the wreck and if it had any remaining value, records of its occurrence might well survive in a dispute over the rights to its ownership such as the case of the *Hanover* (now a Designated Wrecksite HOB UID 1121918) where a dispute over the legal ownership of bullion salvaged from the wreck, *Da Costa v Firth* 1766 (4BuRR 1966), established the principal of Subrogation[4]. Whilst these disputes are common and appear often in both state and private records there is very often little information beyond that of the dispute and details such as the exact location and nature of the wreck which are rarely, if ever included. Occasionally the wrecking itself had sufficient impact in the local memory for its place of loss to be remembered as a name in the landscape. Examples of this include Spaniards Cove (1588), in Northern Ireland, *Albion* Shoal (18th century) in the Thames Estuary and *Wreckeflatte* (1236) as a field name at Fylingdales.

3.1.7 Whatever system was used in whatever period it relied on a witness to the loss, either as an observer or a survivor. It is increasingly unlikely that this would occur the further the distance from shore that the loss occurred. When dealing with shipwreck records it is important to note that many vessels were lost with no record being made of the loss. When *The Select Committee Appointed to Inquire into the Causes of Shipwreck* published their minutes in 1836 they noted that their data did not; *'embrace the whole extent of loss*…(but) *only the losses entered in Lloyds books… it is well known that many vessels and lives are lost by wreck…of which no entry is made in Lloyds book…'*(Larn 1993; vii). This project has addressed the conclusion

[3] The process of estimating current position based upon a previously determined position, and advancing that position based upon measured velocity, time, heading, as well as the effect of currents or wind.

[4] The transfer of property rights to an insurer following indemnity to the insured

3.1.8 that these recorded events can only form a small percentage of actual losses and can perhaps be regarded as the tip of the iceberg.

3.1.9 Navigational Charts[5] of UK waters were not available on a large scale until the end of the18th Century when the British Admiralty undertook the task of turning the large volume of individual surveys, charts and information that it had amassed into reliable charts for the Fleet. It was not until the mid 19th century that an attempt was made to systematically chart all of the UK's waters, surveys which still form the basis for UK charts today. Individual wrecks were considered to be transient features on documents that were expected to last some time and were only charted in unusual circumstances. Examples of these include the *Albion* as a long term navigational mark in the Thames, the depiction of a 1703 Genoese wreck in Cardigan Bay (The Bronze Bell Designated Wrecksite) whose cargo of stone blocks formed a navigational hazard, or the inclusion of the *Mary Rose*, possibly as a survey datum, on an 1841 survey of Spithead (Hydrographic Department Admiralty, 1950 & Parham, 2002).

3.1.10 It was not until the coming of steel and iron vessels, whose wrecks formed more permanent navigational hazards, and more regular updating of charts in the late 19th century that wrecks were marked as permanent features. In 1913 the Admiralty (now in the form of the UKHO) took on the formal responsibility of charting known wrecks. However many wrecks, even modern ones, were not located until much later. Until the mid 20th century finding wrecks submerged in deep water was a costly, time consuming and risky business (Davies, 1981). The anti-submarine campaign of the Second World War allowed the development of sophisticated means of submarine locating equipment and its deployment throughout the seas of the world. This had a spin off for wreck location as a submerged upstanding wreck looked similar to a submarine and evidence from the *Lusitania* (1906 – 1915) 8 miles off the Old Head of Kinsale, Eire and USS *Monitor* (1862) lost 26 miles southeast of Cape Hatteras, North Carolina, shows that several wrecks were indeed attacked during the Second World War. All contacts were logged and in the years following the war the Royal Navy undertook the investigation of what had been termed 'Non Sub Contacts' in the coastal waters of the UK. Many of these proved to be upstanding iron and steel shipwrecks that form a significant part of the maritime component of the Record.

3.1.11 The methods of survey used are not designed specifically to locate archaeological material but to provide a level of information needed for safe navigation and occur in waters where it is needed, where shipping travels rather than shallow waters around navigational hazards or directly on the shore.

3.1.12 As technology has developed new wrecks have been found in waters that have previously been surveyed as the recent discovery of two World War I submarines off Orkney (*The Scotsman* 9th November 2006) during a Swath

[5] A navigational chart is a pictorial representation of the navigational landscape used by mariners to lay out courses and navigate ships. Modern charts are compiled from accurate survey but prior to the late 18th century they were more representation than survey.

Bathymetry[6] survey shows. However older and more ephemeral archaeological remains are still notoriously difficult to find, for example the discovery of Bronze Age archaeological deposits by divers working on the Salcombe Designated Wrecksite after two surveys had been undertaken with the same technology that discovered the aforementioned submarines. It is no accident that by far the majority of the older wrecks within the Record have been found by divers whose location on the seabed allows them to see the relatively ephemeral traces left by archaeological shipwrecks.

3.1.13 Large scale human access to the relatively shallow waters around the coast of the UK, the equivalent of terrestrial walks in the countryside, has only occurred since the Second World War and the development of relatively inexpensive diving technology. The sport of amateur diving in the UK began in the 1950s although it was not until the 1960s that it was carried out on any scale (Valentine, 2003). A side effect of this activity has been the identification of relatively modern shipwrecks found by other means and the occasional location of older more ephemeral shipwrecks that modern hydrographical surveying techniques cannot find. By and large these are vessels armed with cannon which are easily identified underwater and have been found in the areas of high concentrations of diving, largest around the south and west coasts of the UK.

3.1.14 The NMR maritime record was compiled from sources that can be used to identify two different types of record: that of post c1760 shipping losses, but not their exact position, and wrecks that are sufficiently intact to form hazards to safe navigation that have been located since 1945 by various forms of remote seabed survey. One could predict therefore that the majority of the located wrecks within the Record are in fact more modern wrecks that have not yet been sufficiently submerged for their structure to break up so that they are still upstanding structures rather than decayed structures lying on or with the seabed.

3.1.15 This is confirmed by an analysis of the Identified wreck sites by period contained within the Record supplied to Bournemouth University in September 2005, shown below. It can be seen from this that 64% of the record were lost during the 20th century's two World Wars and 97% of them within a 100 year period 1845-1945, see Figure 2.

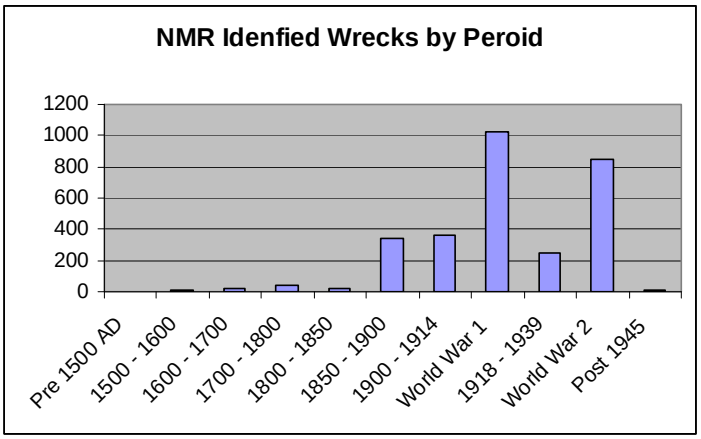


Figure 2

[6] Swath Bathymetry is an acoustic technique used for the production of bathymetric maps.

3.1.16 The peaks during the two World Wars are atypical of shipwreck history as they typify a change in shipping loss brought on by the changes in ship building and naval warfare as a result of the industrial revolution.

3.1.17 The interaction of mariners with environmental factors like tides and winds depends upon their own experiences and the size and type of their vessels but that interaction will essentially be the same, regardless of position in time or culture (Deeben, 2002). This broadly accepted concept allows us to use data from the latter stages of sailing ships to hypothesize in what circumstances shipwrecks occurred in earlier periods. The Royal Navy's *Cruiser* / *Cherokee* gunbrigs[7] built between 1796 and 1830 were the largest class of sailing vessels constructed and included HMS *Beagle*, on which Charles Darwin developed his thinking for the *Origin of Species* and HMS *Racehorse*, a protected wreck on the Isle of Man.Three others, HMS *Primrose* (HOB UID 919157) HMS *Weazle* (HOB UID 832383) and HMS *Wild Boar* (HOB UID 1120018), form part of the Record. The analysis of the known fate of the 217 vessels built makes interesting reading, The biggest lost type at 27% is wrecking (lost following a collision with navigational hazard, usually in shallow water) followed by foundering (lost by stress of weather in deep water) at 7%, with only 1% lost to enemy action, see Figure 3. In an era of ships built from inherently buoyant material and the nature of warfare encouraging capture rather than destruction of enemy ships losses in deepwater were relatively rare.

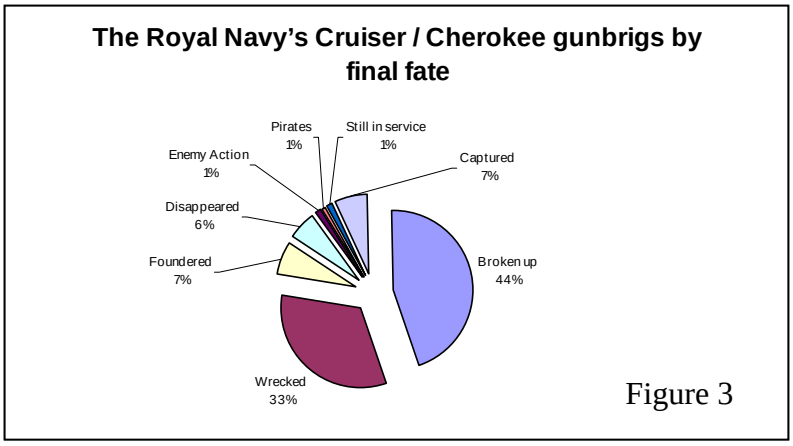


Figure 3

3.1.18 This is confirmed by the legal case of R v Dudley and Stevens (1884) 14 QBD 273 which permitted an opportunity to settle in law a 'custom of the sea 'the custom of cannibalism amongst mariners trapped in lifeboats or aboard damaged ships that could not be sailed but refused to sink, where victims were killed after drawing lots to save at least some of the group.

3.1.19 The development of iron and later steel ships during the industrial revolution created for the first time ships that, whilst much stronger and less susceptible to damage, lacked inherent buoyancy from the material of which they were built and therefore much more likely to sink once heavily damaged.

3.1.20 The industrial revolution also brought the development of steam engines which freed shipping from courses dictated by the wind. Sailing ships can only

[7] Based on data from Lyon, 1993

sail at certain angles into the wind and thus tended to sail on similar compass bearings which meant that their paths were not inclined to cross. Freeing ships from the dictates of wind-orientated courses gave them great freedom but also meant that shipping could steam on any point of the compass at any time thus vastly increasing the chances of their paths crossing and a collision taking place. Such an incident was likely to cause the heavy structural damage which could endanger an iron or steel ship.

3.1.21 Nineteenth century developments in naval warfare, in weapons and tactics vastly increased the likelihood of losses in deep water. Weapons such as the torpedo had greater accuracy and capability to cause much greater structural damage to ships than those that had come before and the reasons behind the World War One development of unrestricted submarine warfare meant ships were sunk rather than captured (Hough, 1987).

3.1.22 An analysis of the final fate of the Royal Navy's 20th century V&W class destroyers [8] provides an interesting comparison to that of the *Cruiser* / *Cherokee* gunbrigs a century before. Built between 1917 and 1919 the class saw active service in both World Wars and a number of minor wars, the last member of the class, HMS *Verity* being broken up in 1947. At 66 units the class forms the largest class of major British warship constructed since the Industrial Revolution. The analysis of the known fate of these show a different pattern of loss type. The biggest lost type is no longer wrecking (lost following a collision with navigational hazard, usually in shallow water) but loss due to enemy action at 27% (usually in deep water) followed by wrecking at 8% with the remaining 65% of the class being broken up at the end of their useful lives. No losses are recorded due to foundering (lost by stress of weather in deep water), capture, disappearance or (not surprisingly) pirates, see Figure 4. It can be seen from these figures in an era of ships built from inherently non-buoyant material and the nature of warfare encouraging destruction rather than capture of enemy ships, losses in deepwater became common. Four of these HMS *Venetia* (HOB UID 904809), HMS *Vimiera* (HOB UID 904747, 904752 & 904753), HMS *Vortigern* (HOB UID 907560) and HMS *Warwick* (HOB UID 907765) form part of the Record.

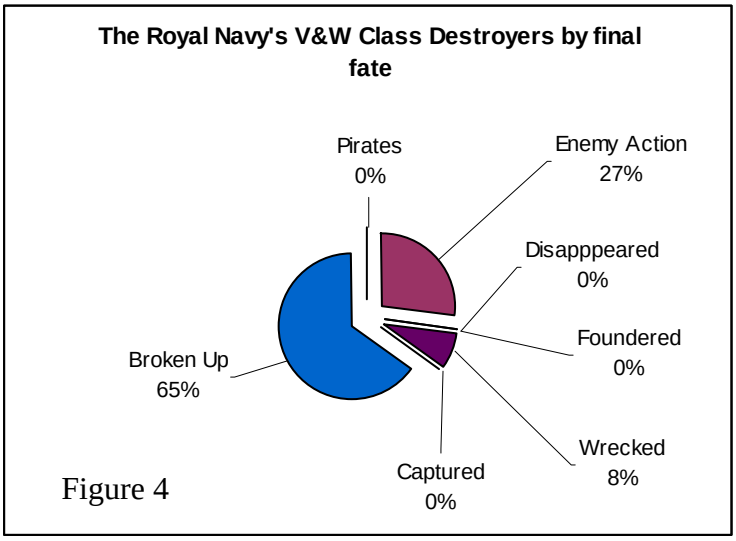


Figure 4

3.1.23 From the above it can be seen that pre-industrial revolution shipping was highly likely to be lost in relatively shallow waters in unstable environments

[8] Based on data from Dittmar & Colledge 1972

which would have either broken up relatively quickly or even if this break up did not occur immediately would have occurred well before the development of modern hydrographical surveying techniques, which because of the nature of their use is less likely to be employed in these waters and may not be capable of wreck detection.

3.1.24 Whilst ships built after the industrial revolution had a much greater chance of loss offshore, particularly during wartime, in a more stable environment the stronger construction of their hulls are more likely to survive (see Figure 5 artists impression of the remains of the SS *Maine* (HOB UID 832169 compared to Figure 6 that of an unidentified wooden shipwreck in Salcombe Harbour) Their loss dates are within the period of the development of modern hydrographical surveying techniques, indeed the V&W class destroyers formed part of this development. The material from which they are made and the upstanding form which they still take makes them relatively easy to locate.

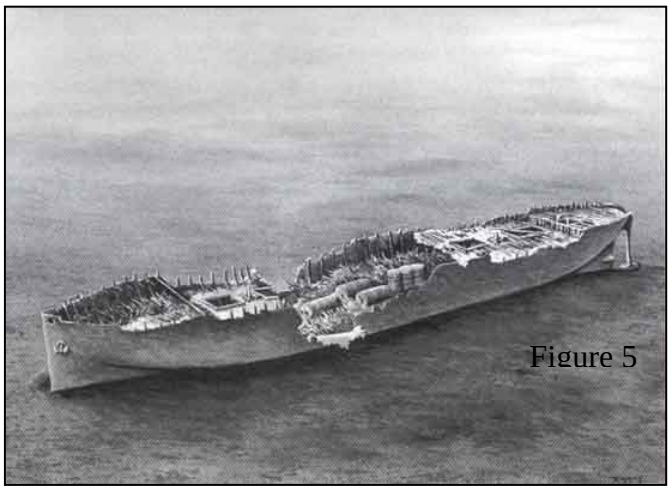


Figure 5


Figure 6

3.1.25 The development of ship construction, navigation and hydrographic survey have created a situation where older pre 1850 shipping losses are highly unlikely to be located by the sources from which the Record is created while post 1850 ships are more likely to be located and therefore form part of the Record, facts which are born out by the Records contents.

3.1.26 NMR data supplied to Bournemouth University was divided into the following fields

- UID - The HOB UID is the Heritage Object Unique Identifier, a unique number automatically generated by the NMR database when a new record is committed
- NMR NUMBER - The NMR number comprises two elements. The first part is the OS 1:10,000 map sheet on which the monument falls. The second part is an automatically generated sequential number which, when linked to the 1:10,000 map sheet, provides a unique reference for the monument, e.g. SU 38 NW 23.
- SUMMARY – This is a free text field of up to 2000 characters in length, which is used to give a "word picture" of the monument. The following information should be included for maritime records

recorded within the last couple of years. Previous to that only the name of the maritime monument was recorded in this field.

1. Vessel type
2. Vessel loss (absolute or period)
3. A brief history of the vessel
4. Survey - date of survey for any Hydrographic Office records
5. Short history (a brief history of the vessel - Maritime)
6. Nationality of vessel

- DATE OF LOSS: The date the maritime craft was wrecked
- PRECISION: A qualifier used to quantify the date of loss, this has not been used too much, detail allows: C = Precise to the Century, D = Precise to the Day, X = Precise to the Decade, Y = Precise to the Year , M = Precise to the Month
- MINIMUM DATE / MAXIMUM DATE - This is used to indicate the most precise date recorded for the loss of a vessel.
- PERIOD: The period from which the wreck, etc. dates.
- PLACE OF LOSS – Self explanatory, qualifiers such as 'off' or 'near' are commonly used.
- NAME: Name of wreck.
- TERM: This column records the classification of the monument. You should find the following information for maritime records in this column: *Cargo, Construction, Departure, Destination, Manner Of Loss, Nationality, Port Of Registration, Propulsion*.
- POSISTION: given in Latitude and Longitude

3.1.27 As can be seen from the examples listed below the NMR dataset is not sufficiently detailed to provide the level of information required to judge the significance of individual sites.

3.1.28 Typical of a loss report is that of the SS *Butetown*. Her loss details are recorded by UKHO as position Latitude 50 12'.075 N Longitude 004 43'.365 W '*torpedoed by submarine en route Glasgow to Portsmouth'* (UKHO reference 17592) which is repeated in similar detail with some unreferenced general information (possibly inferred from the suffix 'SS' and taken from the HMSO publication *British Vessels lost at Sea 1914-1918*) by the Record which records the '*possible remains of the steel British steam powered cargo vessel Butetown 1.5 miles south of Dodman Point on 29th January 1918 carrying coal en route from Glasgow to Porstmouth'* position (in decimal degrees 50.200667 -4.721667 (HOB UID[9] entry 919758).

[9] HOB UID is the Heritage Object Unique Identifier, a unique number automatically generated by the NMR database

3.1.29 Another example is that of the SS *Alexander Kennedy*, Figure 7. the UKHO records her loss details as position Longitude 50 08'.335 N Longitude 004 45'.364 W *'supposed to be part of Alexander Kennedy but also thought to be remains of steel hull 4 masted barque which locals remember sinking some time ago'* (UKHO reference 17544). The NMR records *'possible remains of British steel steam powered collier Alexander Kennedy with a cargo of coal en route from Barry in South Wales to London, Eddystone, 5m NW of Plymouth 22-Feb-1945'* position (in decimal degrees 50.116667 -4.742222 (HOB UID entry 919213)

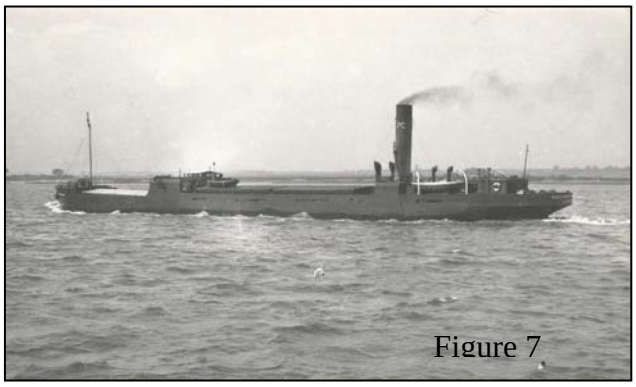


Figure 7

3.1.30 A better example, as it explains more about the ship and its loss and is therefore, less typical of the Record, is that for the UK's last commercial sailing ship loss, a major event at the time which involved an important and very famous ship, the 4 masted Finnish Barque *Herzogin Cecilie*, Figure 8, Position Latitude 50 12'.861 N Longitude003 47'.087 W *'went aground at Soar Mill Cove, while on passage Port Lincoln, Australia to Ipswich, via Falmouth. was later refloated and beached at Starehole Bay where she capsized '*(UKHO reference entry 18071). This is largely repeated by the record that states "*Remains of 1936 wreck of a Finnish barque in Starehole Bay. She grounded twice and was later beached at Starehole Bay where she capsized. En route from Port Lincoln to Ipswich, and having called at Falmouth, she was laden with grain. This steel sailing vessel, with auxiliary steam power, was built in 1902.*" Position (in decimal degrees) 50.213750 -3.783620 (HOB UID entry 832170).


Figure 8

3.1.31 Perhaps one of the most comprehensive examples is that of the *Orchis*, Figure 9. UKHO records her loss details as position Latitude 50 14'.200 N Longitude 004 35'.067 W Type (SS) Flag (British) Tonnage (483 Gross) Cargo (China Clay) Length (45.7m) Beam (7.9m m) Draught (3.7m) Date Sunk (30/11/1935) '*Foundered. Cause not known, sprang a leak and sank while on passage Par to Dundee and Aberdeen sank approx 6m SE from St Catherine's Lt'*. (UKHO reference entry 17613). The Record gives us a somewhat downgraded record of '*Remains of British cargo vessel lost on 30th November*

1935 close to Owen Rock near Pencarrow Head whilst carrying a cargo of china clay from Par to Aberdeen via Dundee'. Position (in decimal degrees) 50.278056 -4.573889 (HOB UID entry 832093).

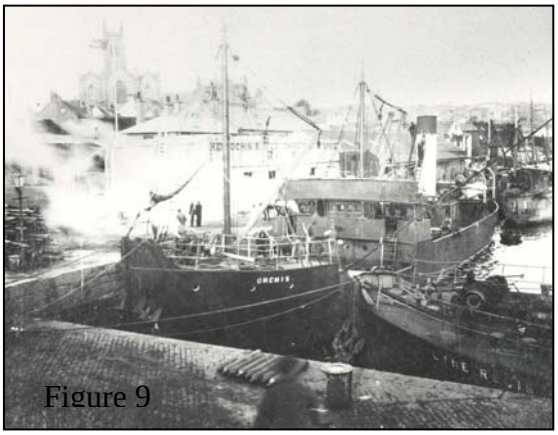


Figure 9

3.1.32 It can be seen from the above therefore that the source from which the Record was compiled focused on the event of the loss of the ship rather than the archaeological entity that is the ship itself and its physical remains. As a result the Record as it stands for located shipwreck sites is heavily biased towards relatively modern iron and steel shipwrecks and the collation of basic details of their loss, rather than the details or context surrounding their design, construction etc., as is explained below, are required for significance to be established.

3.1.33 In addition, during the construction of the Record the NMR used control terms to describe maritime craft at time of loss by function of the vessel as the method of primary classification. The most common term used was CARGO which accounts for 63% of the Record. All of the above used examples have been defined as CARGO but in fact they have widely different purposes and design concepts.

3.2 The Record's Ability to form a Basis on which to Assess Significance

3.2.1 The relatively modern wreck sites that the Record contains until recently have been considered to be no more than scrap metal, in the same way as 20th century defense sites were seen as blots on the landscape. However, many of these vessels are now recognized as important industrial structures; for example the *Himalaya* in Portland Harbour, or the *Spindrift* off Dungeness. Others, such as HMS *Warspite* in Mounts Bay, Cornwall are vessels that played a major part in world history whilst others such as the *Orchis* and *Butetown* whose enhanced entries in the Record suggest they are mundane everyday cargo carriers but whose very typicality gives them potential significance.

3.2.2 For a number of historical reasons, shipping intelligence and naval regulation amongst others, shipping data has long been classified following specific standards; in the case of British Naval vessels, since the preliminary

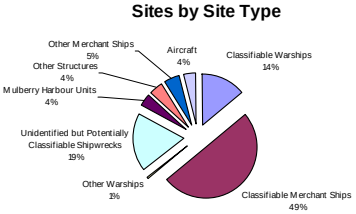


Figure 10

'establishment' (the beginning of uniform naval construction) in 1706 (Lyons, 1993) and in the case of British (1764) and later (1890) foreign merchant ships with the publication of *Lloyds Register of Shipping*. The various sources of information describe and classify vessels according to certain criteria of physical structure and equipment that allow individually identified vessels to be directly compared with one another. An analysis of shipwreck remains from an area of English coastline[10] (that of Hampshire, the Isle of Wight and Sussex) indicates that in this case 94% of the located wreck sites are potentially classifiable under these systems, see Figure 10. The shipwreck resource of this area, which whilst distinct in a number of ways (its relatively high concentrations of naval and Mulberry Harbour wrecks) is however broadly typical of the English shipwreck resource.

3.2.3 The key to accessing this information is the vessels name and the period in which it was in use, supported by additional information such as tonnage or type so that the exact vessel can be identified where names are duplicated or the exact period is not known. Where the identity of a ship is not known it is not possible to connect this vessel with the historical record.

3.2.4 It is possible to Identify unidentified wrecks from purely desk based research and this is included in a later stage of the project if funding for the later stages becomes available.

3.2.5 Prior to this project no structured attempt had been made to provide a base level of information about English (or indeed British) shipwrecks in the way proposed here. To date the most notable contribution to this aim has been the work of the 'shipwreck historian' community who have in the past published histories of a number of well known shipwrecks in diving journals such as *Diver* or local 'dive' guide' type publications such as *Dive Wight & Hampshire*. The single most notable contribution has been made by Richard and Bridget Larn's *Shipwreck Index of the British Isles* (see paras 4.2.9) series that now encompasses the entire UK coast. This work concentrates on the circumstances of loss of UK shipwrecks and is comprehensive, although not infallible, in its coverage. Like the other sources listed above, the *Index* series deals in the main with the loss of the vessel concerned and is considerably less informative about other elements of the ship's character such as builder, owner, engines etc. which are fundamental aspects to establish the potential importance of a given shipwreck.

3.3 *On the Importance of Shipwrecks* (Wessex Archaeology)

3.3.1 This project is linked to another ALSF project undertaken by Wessex Archaeology *On the Importance of Shipwrecks* (OIS) (Wessex Archaeology, 2006) that developed criteria on which judgments can be made on the relative importance of individual shipwrecks. This project defined five factors that represented all phases of a ship's 'career' covering build, use, loss, survival and investigation. The commentary listed below draws together the main attributes

[10] Analysis of information compiled for recreational divers in Hampshire, the Isle of Wight and Sussex, (McDonald, 1989, Pritchard & McDonald, 1991)

of the shipwreck and provides a statement of the shipwreck's archaeological interest.

Build	Interest arising from the vessel as built, rebuilt, fitted, refitted and so on. Including: design, construction, material, technologies, propulsion, fixtures and fitting, armament, etc.
Use	Interest arising from the vessel as used, including : cargo, personal possessions, trade links, wars, life aboard, social organization, etc
Loss	Interest arising from the circumstances of the vessels demise, including last voyage, last action, cause of loss, acts of loss, etc.
Survival	Interest arising from the wreck incorporation into the seabed, both to date and in the future, including condition, preservation, fragility, vulnerability, formation processes, etc.
Investigation	Interest arising from the vessel being examined in the past, or in the future, including place in history of the discipline, legal precedents, methodological developments, archaeological documentation, potential.

(Wessex Archaeology, 2006 para 2.1)

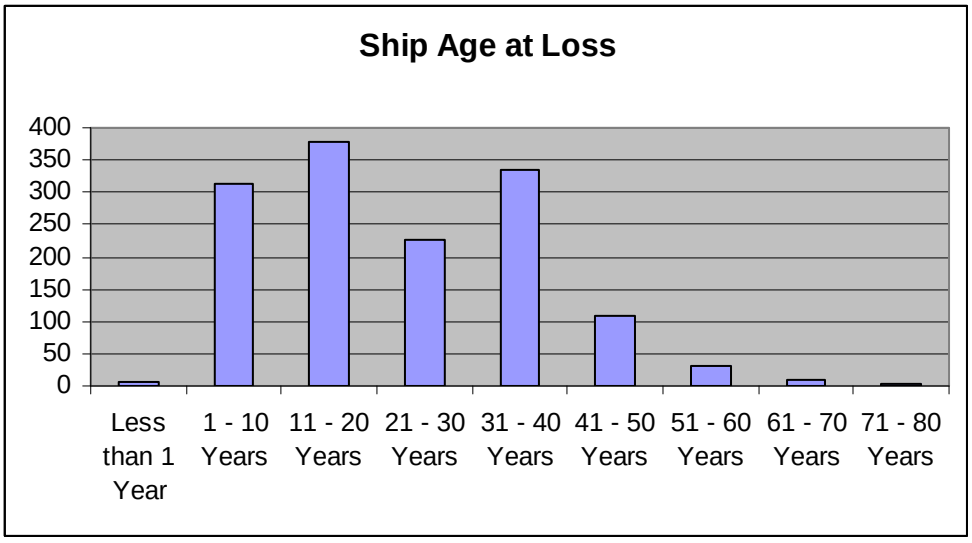
3.3.2 One of the project's conclusions was that judgments of significance of shipwrecks should move on from judgments based on their build or loss (if this was ever the case) to a position where they are examined in the context in which they were built and used, the manner in which they were lost, how they have survived and how they have been investigated. The project considered the use of 'Ship biographies' which detailed the ship's life as an aid to judging significance.

3.3.3 The concept of the use of 'ship biography' developed by the OIS project is a 'simple' concept that experience has shown, see (Parham, 1996a Parham, 1996b, Parham, 1998 and McElvougue & Parham, 2002) is difficult to achieve in practice. Data relating to the lives of major warships such as HMS *Victory* or *Warspite* are relatively easy to obtain and often appear in secondary sources such as detailed histories or even coffee table type books. However the same can not be said for data relating to minor warships and most merchant vessels. This information is usually hidden away in official returns such as *Board of Trade Casualty Returns*, *Lloyds List* personal accounts, newspaper records, photographs, port returns and owners' accounts. The movable nature of shipping means that these are often spread throughout the country and aboard. Research conducted by Parham for one site, the SS *Orchis* (HOB UID 832093) (Parham, 1996a & Parham, 1998), involved research in Birmingham, Devon, Cornwall, Kent, Anglesey, Gwynedd, Carmarthenshire, Cardiff, London and Newcastle upon Tyne, for example, over a period of 10 years. Information is not readily available but has to be sought and uncovered, a task that cannot be done to any particular timetable. This project will therefore use a cost effective modification of this concept that will be explained in the Project Design for Stage 2.

3.3.4 Many historic assets remain in use for considerable period of time, as do a small number of historic ships such as HMS *Victory* (built in 1763 and now 244 years old and HMS *Warrior* (built 1860 and now 147 years old) and pass though a range of different uses in that time. An example that matches the period over which most of the wrecks within the Record have been lost is that of the Registered Historic Vessel (no 16) HMS *Handy*. Built in 1883 as a floating testbed for guns, purchased later that year by the Royal Navy as a gunboat, renamed HMS *Excellent* in 1891 as a gunnery trials vessel, renamed in 1916 HMS *Calcutta* (role unknown), renamed again in 1917 HMS *Snapper* (role unknown), then in either 1922 or 1929 to *Demon* as a floating crane and finally decommissioned in 1971/72, it is now awaiting disposal or conversion to a museum ship (Dittmar & Colledge 1972).

3.3.5 However, this is not typical of most ships whose lives can be measured sometimes in months, often in years and usually in a few decades. The average age at loss of the ships in the Record is 17.6 years with the Swedish steamer SS *Emma* (HOB UID 813830) the oldest at 72 years and the Dutch Tin dredger *Kantoeng* (HOB UID 919770 & 919772) the youngest, just over 2 months old at the time of her loss. As can be seen in Figure 11 below most ships are lost within a few decades of their launch.

Figure 11



3.3.6 The Industrial Revolution and the 19th century saw huge developments in ship construction and massive changes took place in the way that ships were conceived, designed and built (Greenhill, 1993). One of these was the specialisation and most vessels were specifically designed for one purpose and spent their entire lives in that role as they were unsuitable for other task. The oldest vessel (at the time of her loss) in the Record is the Swedish SS *Emma* (HOB UID 813830), built in 1868 as a cargo ship and lost following a collision in 1940 performing the same role. These ships are the exception to the rule, particularly in wartime when auxiliary warships were taken up from trade such as the SS *Corfield* (HOB UID 913047) built in 1937 as cargo ship

and converted in February 1940 to the experimental Mine Destructor[11] HMS *Corfield* and loss in September of that year. In common with most auxiliary warships, whilst the ships' roles changed, constructional differences were only relatively minor and the ship would, should it survive, be capable of an easy return to trade once the war ended.

3.3.7 The OIS project sets out to establish the relative importance of individual shipwrecks by asking a series of questions relating to the factors listed above which are designed to consider the full range of possible areas of interest that may be associated with a shipwreck.

3.3.8 As an example: *'Were there any significant features or innovations in the methods employed to build the vessel'*, whilst relatively simple in themselves require a great deal of research to be answered. In order to establish these significant features the intended purpose of design, time and location of construction, and builder of the vessel need to be established. In addition to these, the place of that design in shipbuilding development, the builder's reputation and the number of other surviving vessels of similar design also need to be identified. As far as can be established it is not possible to retrieve this information from any of the present NMR records, see para 5.2.3 below.

3.3.9 The completion of the OIS project created a situation where the maritime archaeological community had a set of criteria with which to establish the significance of individual shipwrecks and the Record, a list of known shipwrecks which did not contain the information needed to use these criteria. In addition the OIS project also demonstrated that the broad knowledge required to make these judgments is very rare in the UK's maritime archaeological community.

3.3.10 As part of the OIS project a trial was conducted using data held within the Record to test the system, lack of data within the record preventing the evaluation of importance from the record alone (Wessex Archaeology, 2006) An assessment was made at the beginning of this project of the level of data held within the Record as to whether each entry was capable of answering the questions required to establish the significance of individual shipwrecks, these results are detailed in para 5.2.3 below.

[11] A Mine Destructor was an experimental ship that used electromagnetic fields to detonate and therefore destroy magnetic mines, these ships lead to the development of the Double Longitudinal (Double L) Sweep used during WWII, see Lund & Ludlam 1979

4 DATA SOURCES

4.1 Sources of Data

4.1.1 For Stage 1 the project made use of the relevant sources of data listed below. Only those sources, which it is believed are relevant to vessels known to have been lost in English waters, were used. The Results section (Section 5) gives examples of difficulties in using these sources.

4.1.2 The sources were chosen to provide information about the five factors listed in the *On the Importance of Shipwrecks* project, namely Build, Use, Loss, Survival and Investigation.

Factor	Sources
Build	*Lloyds Register of British and Foreign Shipping* *Mercantile Navy Lists* *Jane's Fighting Ships* U Boat Net *The Sail and Steam Navy List* *The Sailing Navy List* *International Journal of Nautical Archaeology* *Mariner's Mirror*
Use	*Lloyds Register of British and Foreign Shipping* *Mercantile Navy Lists* *Jane's Fighting Ships* U Boat Net *The Sail and Steam Navy List* *The Sailing Navy List* Diver Guides *Shipwreck Index of the British Isles* *Diver* *International Journal of Nautical Archaeology* *Mariner's Mirror*
Loss	U Boat Net *The Sail and Steam Navy List* *The Sailing Navy List* Diver Guides *Shipwreck Index of the British Isles* *Diver* *International Journal of Nautical Archaeology* *Mariner's Mirror*
Survival	U Boat Net Diver Guides UKHO Wrecks Database *Diver* *International Journal of Nautical Archaeology* *Mariner's Mirror*

Investigation	Diver Guides UKHO Wrecks Database *Diver* *International Journal of Nautical Archaeology* *Mariner's Mirror*

4.2 Sources Appraisal

4.2.1 The various sources used or intended to be used by the project are listed below. The practicalities of dealing with them are detailed in section 5 below Results

Lloyds Register of British and Foreign Shipping

4.2.2 The Register is produced in printed volumes that vary in size over the history of the publication. All information is indexed alphabetically by vessel name and it contains no illustrations or drawings. The Register records, describes and classifies merchant vessels according to criteria of physical structure and equipment. The earliest surviving volume of the Register dates from 1764 and the Register has been published annually since at least 1775. Until 1875 the Register only listed those vessels that it had surveyed and classed and therefore many smaller vessels and early steamships do not appear. Since 1875 the Register has included all British vessels of 100 tons and over, along with some foreign vessels that traded regularly with Great Britain also included until 1890. Since this date the Register has listed all British and foreign sea-going merchant vessels of 100 tons and over. Smaller British vessels are listed in the *Mercantile Navy Lists* from 1856-1976.

4.2.3 Between 1800 and 1833, two separate registers were issued, but in 1884 steamers are in Roman and sailing vessels in italics, changing later on into 3 volumes. Within these volumes the order and division of the vessels changes too, going from all inclusive to a division between steamers with more or less than 300tons, and sailing vessels. Between 1786 and 1871 British vessels were forbidden from changing names; but 1875 volumes include the changes of names. This of course raises the point of retrieving information from the sources before and after the change happened, bearing in mind that the changes are not always reported.

Jane's Fighting Ships

4.2.4 In 1898 the first edition of *Jane's All the World's Fighting Ships* (later shortened to *Fighting Ships*) was released and almost immediately became an authoritative guide to ship recognition and naval intelligence. It is an essential reference to the contemporary capabilities of navies, their ships, aircraft and weapons systems in service and under construction.

U Boat Net

4.2.5 An extensive web based resource that provides very detailed information about every U Boat from both World Wars. (http://uboat.net/)

The Sail and Steam Navy List: All the Ships of the Royal Navy 1815-1889

4.2.6 Lyon, D. and Winfield, R., 2004 *The Sail and Steam Navy List: All the Ships of the Royal Navy 1815-1889*. A comprehensive listing of all the Royal Navy ships built, purchased or captured in the period of transition from sail to steam propulsion. Includes details of each ship's dimensions, armaments, building data, and fate plus profile draughts of many of the vessels, and information on interior machinery and armor protection.

The Sailing Navy List

4.2.7 Lyon, D. 1993 *The Sailing Navy List.* An authoritative list of Royal Navy ships derived from official sources. A typical entry includes dimensions, tonnage, armament, builder, construction dates, and detailed notes on the fates of individual vessels, with short narrative introductions outlining the principal influences on development.

Diver Guides

4.2.8 A series of definitive guides to popular diving areas around the British Isles. Authors include highly experienced divers and shipwreck experts providing full area descriptions, general dive site information, shipwreck listings with histories and conditions for diving.

Shipwreck Index of the British Isles

4.2.9 Larn, R & Larn, B, 1993 – 2003 *Shipwreck Index of the British Isles: Vols 1 to 6* An extensively researched index of shipping losses around the British Isles. The base information for these volumes formed a significant component of the RECORD. Work on the index continued after the formation of the RECORD and the volumes contain information not held within the RECORD.

United Kingdom Hydrographic Office (UKHO) Wrecks Database

4.2.10 The UKHO's Wreck Information Service is widely used and respected by commercial and recreational fishermen, divers, researchers and members of the public throughout the UK and worldwide. In order to provide this service, the UKHO maintains a comprehensive Wrecks Database containing over 60,000 records, of which approximately 20,000 are named vessels. Although it centers largely on UK territorial waters, the database also includes data on a small number of wrecks in other areas. Data from this database formed a significant component of the RECORD. Work on the database has continued after the formation of the RECORD and the volumes contain information not held within the RECORD.

4.2.11 UKHO wrecks were obtained in a digital GIS format through SeaZone (see www.SeaZone.com). The project's geographical area covers four pre-defined Areas - Bristol Channel & Approaches, English Channel (north) North Sea (West South) and North Sea(West Central).

4.2.12 Vector data is supplied as standard in MapInfo TAB, ESRI Shapefile and Cadcorp BDS in WGS84 to Chart Datum. Raster data is provided as individual geo-referenced images in GeoTiff format. UKHO datasets are protected by British Crown Copyright. Breach of this copyright notice and/or

the Terms and Conditions of the Digital Data License Agreement is a criminal offence.

British Vessels Lost at Sea (1914-18 & 1939-1945)

4.2.13 A HMSO publication listing the British Vessels lost during the two World Wars. It gives name, rough position and some details of the ship lost.

Diver

4.2.14 The official publication of the British Sub-Aqua Club from 1954 until 1999. *Diver* is still published as Europe's best selling diving magazine. The publication has been the major publishing route for information about English shipwrecks.

Diver Guides

4.2.15 Guides and information books produced for and by the amateur community. They usually detail the current (when published) state of the dive sites, often wrecks and some historic details. The most famous are the series of guides produced by the Magazine Diver but others exist as well.

Shipwreck History Books

4.2.16 There are a number of these, notably *World War One Channel Wrecks*, which have been published by the amateur diving community giving historic data about shipwreck sites.

International Journal of Nautical Archaeology (IJNA)

4.2.17 *IJNA* covers all aspects of nautical archaeological research, exploring humankind's use and development of water transport from prehistory to the recent past. The material covered by the Journal ranges from shipwrecks to maritime landscapes and aims to encourage a broader appreciation of our maritime past within its wider cultural context.

Mariner's Mirror

4.2.18 *Mariner's Mirror* is internationally recognized as the pre-eminent English-language journal on naval and maritime history, nautical archaeology and all aspects of seafaring and lore of the sea world wide and in all ages.

National Register of Historic Vessels (NRHV)

4.2.19 The NRHV is a database containing information about surviving historic vessels in the United Kingdom. There are currently over 1,200 vessels listed in the database, which contains information about their designer, builder, dimensions, construction, propulsion, service history, current location and ownership. Ships on this list will not be included on the project database but checks will be made to see if vessels of a similar classification to the shipwreck under consideration are listed in this database (see http://www.nhsc.org.uk/index.cfm/event/newSearch)

4.2.20 Most of the above sources are either held within the Southampton Library Maritime Collection, Bournemouth University Library, the team's personal libraries or over the Internet. Where secondary sources are not held within any of the above locations, they have been purchased.

5 RESULTS OF STAGE 1

5.1 Stage 1 Objectives

5.1.1 The objectives of Stage 1 of the project as commissioned have achieved the above aim by completing the following objectives:

3.2.1 (a) Establishing what is currently known about the located wreck sites and unchecked features or anomalies regarded as potential wreck sites held within the NMR.

3.2.1 (b) Enhancing those Records by adding the basic data available in general shipping registers.

5.1.2 The entire work was focused around the design and population of a database to provide the foundation of knowledge needed for judgments of significance to take place.

5.2 Results for Objective A

5.2.1 Objective (a) was *'Establishing what is currently known about the located wreck sites and unchecked features or anomalies regarded as potential wreck sites held within the NMR'*

5.2.2 This data was provided by the NMR as an MS Excel spreadsheet that was migrated into a MS Access database. The data was then checked, a small sample of it (10 Records) was checked against NMR data gained from other routes to ensure that they matched and that all relevant data had been received by Bournemouth University.

5.2.3 A scan was made of the entire data set with checks being made as to the exact nature of the data held within it against the 5 Criteria supplied by the OIS project, see section 3.3 to ensure that no duplication of data collection occurred. The results of this are tabulated below.

Factor	Information within NMR
Build	Records very occasionally give a date of build and even rarer a place of build but no Record details the builder or provides specific data on construction or design.
Use	Records usually contain brief details of the ships basic function at the time of loss purpose such a 'cargo', 'trawler' or 'leisure' raft. Occasionally a cargo is mentioned or a role that the ship was undertaking at the time of loss. No other details given.
Loss	Most Records contain some limited information about the

	ships loss such as *'foundered after being torpedoed 3 miles NNW of Pendeen lighthouse'* (HOB UID 906517) or *'stranded on the North Wamses'* (HOB UID 1372701). The most common format is typified by *'remains of English cargo vessel'* (HOB UID 911774). The liner *Mohegan* (HOB UID 919160) which was lost in 1898 with great loss of life that had far reaching consequences in terms of emergency procedures (Larn, 1969) is Recorded as *'remains of English liner, 1898'* and the *Hera* (HOB UID 919759), a loss involving substantial loss of life and a famous rescue (Larn 1969) is Recorded as *'remains of German barque, 1914'*
Survival	Very limited data is supplied here commonly *'possible remains of British drifter, 1940'* (HOB UID 908759), a very few have some more detail such as *'thought to have been dispersed*[12] *in 1948'* (HOB UID 908742) or *'Remains of stern section of 1941 wreck of Norwegian cargo vessel'* (HOB UID 909152).
Investigation	With the exception of Designated wreck sites very little is detailed. Examples include the factually incorrect *'1545 wreck of English warship which foundered after capsizing on her departure from Spithead en route to war in France, with enormous loss of life. Constructed of wood (oak and elm) and clinker-built, with the forecastle carvel-built, she was a sailing vessel, and Henry VIII's flagship*' description of the designated wreck of the *Mary Rose* (HOB UID 1121974) or *'Bronze Age wreck and finds'* for the designated wreck in Langdon Bay (HOB UID 1082119). Non Designated sites have no information at all. An example is the wreck of the *James Eagan Lane* (HOB UID 919773), arguably the UK's most famous and dived on wreck in England (Mitchell, 1986) about which much has been published is described only as *'remains of American liberty ship, 1945'* .

Collation of Electronic Sources

5.2.4 The NMR dataset was combined with UKHO wreck dataset for the geographical area under consideration using spatial querying tools in the GIS to extract duplicates from the datasets incorporated into a MIDAS compliant database. The key identification for each Record has Bournemouth University ID which is listed in the database and associated GIS along with its associated NMR reference number and UKHO reference number.

5.2.5 Enhancing the NMR wreck database required the integration of alternative shipwreck databases into the project database as well as the collation of documentary Records (see section 5.3).

[12] Reduced in size to allow safe navigation over the site

5.2.6 The UK Hydrographic Office holds over 17993 records of sites identified as shipwrecks, regularly maintained through the integration of hydrographic survey results and diver and fishermen reports. The data gathered mainly via sidescan sonar is accurate to a minimum of 20-25m. The UKHO, in contrast with the NMR, do not maintain records of reported losses.

5.2.7 The UKHO wrecks were added to the NMR in 1992-3 during the creation of the database but have not been updated since then. There are therefore extensive discrepancies between the numbers of known and unknown shipwrecks in the two systems.

5.2.8 In order to identify matching records of known shipwrecks, the two databases were plotted in a Geographic Information System (GIS). This showed that although there were potentially 1202 matching records, the NMR shipwrecks are in many cases offset from their original location by up to 200m. This may be due to repeated re-projecting of the data.

5.2.9 Therefore, in order to match the data, the NMR shipwrecks were given a 200m buffer. A join by location was then performed to identify the UKHO data within the buffers. Matching records had to be picked out manually due to variations in the annotations of shipwreck names. Changes in the ID numbers for UKHO shipwrecks made it difficult to match the Record. The results of the analysis showed the following substantial discrepancies between the numbers of records in the two systems and highlighted both the importance of enhancing the NMR database through the Importance of Shipwrecks project in order to potentially identify further sites through desk-based research, and the need for a review of the structure and content of the NMR database

	UKHO wrecks	**NMR wrecks**
Known wrecks	6372	2828
Unidentified wrecks	11621	2349
Anomalies		7348
TOTAL	17993	12,525

Table 1: Comparison of numbers of shipwreck records between the NMR and UKHO shipwreck databases

Assessment	**Total**
Number of matching records	2082
Number of proximal but mismatching records	746
Records held by the NMR, not the UKHO	143
Records held by the UKHO, not the NMR	4166

Table 2: Summary of results of the comparison made of UKHO and NMR wreck database using GIS. Figures will be verified as part of the AMAP1

5.2.10 Further assessment of the shipwrecks database will be undertaken as part of the ALSF-funded AMAP1 (Areas of Maritime Archaeological Potential Project EH ref 5083) project. The results will be reported on and will then be used to further inform the enhancement of NMR for this project .

5.2.11 The relationships for the project database are given in Appendix 1.

5.3 Results for Objective B

5.3.1 Objective (b) was *'Enhancing those records by adding the basic data available in general shipping registers'.*

5.3.2 Within the database tables were constructed for each particular primary source; Lloyds Register, British Vessels lost at Sea, Jane's Fighting Ships, Dive Guides and a separate table for secondary sources should the relevant information be located. Each table is linked by a Bournemouth University ID for each ship which in turn is linked back to a main table whose primary key is the sites HOB UID.

5.3.3 When the project started the NMR contained records organized by the following fields

- HOB UID
- NMR Number
- Summary
- Date of Loss
- Place of Loss
- Name
- Classification
- Position

5.3.4 The enhanced dataset now contains records organized by the following fields. Not every record has data for each field, this is a product of how accurately the ship could be identified from the NMR and what data is available, but in most cases the data has been recorded for most fields.

- HOB UID
- NMR Number
- Lloyds ID
- Name
- Material
- Rig
- Late Name
- Special Surveys
- No of Decks
- Gross Tonnage
- Under Deck Tonnage
- Net Tonnage
- Character
- Breadth
- Depth
- Port of Registry
- Flag
- No of Cylinders
- Horse Power
- Engine Maker
- Registers in which classed
- Date of Loss
- Type/Class of Ship
- Position of Loss
- Latitude
- Longitude

- Port of Survey
- Year Assigned
- When Built
- Built Month
- Built by Month
- Built by Whom
- Built Where
- Owner
- Deck Erections
- Length
- Cause of Loss
- How Lost
- Lives Lost
- Armament
- History of Ship
- Salvage Details
- Description of Loss
- Seabed Description
- Hydrographic Surveying Details

5.3.5 For example for the site of the SS *Silverlaurial* (HOB UID 919228) as show below

NMR Record

The cargo ship SS *Silver Laurel* (Spelt wrong) The NMR recorded the wreck remains of a London Registered English cargo vessel lost on 18th December 1944, 7 ½ miles South East of Dodman Point in Cornwall. She was a British steel steamship with a mixed cargo including cocoa, coffee, ore, palm oil, timber, rubber and plants en route from Douala in Africa to Kingston upon Hull in position 50.129167 -4.651389 (decimal degrees)

Enhanced Record

The *SilverLaurel* was a British flagged London registered steamship owned by the Silver Line Ltd and managed by Stanley & John Thompson Ld Classified as *100A1 (their highest survey rating) by Lloyds. She was 448.4ft in length, 59ft in breadth and 26.5ft depth and 6142 tons displacement. Built in 1939 by J.L. Thomson & Sons Ltd in Sunderland from steel with a cruiser stern. She was powered by 3 steam turbines with a combined power of 877 horse power built by Wallsend. Ltd equipped with a screw (propeller). She was made from steel with 2 decks and a shelter deck, double bottomed with specialized cargo carrying equipment.

She was defensively equipped with 9 gunners, 48 crew and 9 passengers under Master John Duncan OBE when she was torpedoed on the 18th December 1944 by U 486 whilst in convoy BTC 10, sank in one hour, leaked oil after sinking.
Stands upright 10m proud of seabed in 66m of water on seabed of sand and shell. No recorded salvage or clearing has taken place, believed to be in good condition.

Discussion

This information would suggest that the *Silverlaurel* has little or no local interest other than as an obscure dive site that is rarely visited. She was a relatively new ship that had survived over 5 years of war and she may be

unusual as a survivor of the early years of WWII. She appears to have been a well built high class merchant ship built by a famous and long standing builder for a famous and long standing shipping line. Her builder is known for his innovations and she may be an example of this. She would have been a common type of ship at sea in her time and does not appear to have been specifically involved in great events. Her loss in the defense of the UK in wartime and as a typical cargo carrier on which the world's trade depended at the time makes her interesting as a 'typical' ship and her survival is good and she may be significant as a good well preserved example of a typical merchant ship of the period which may have some technological importance as well.

5.3.6 An example taken from Aggregate dredging area No. 122/1: Owers Bank Zone A

NMR Record

The NMR records the cargo ship SS *Jaffa* (HOB UID 911755) was a steam powered English Cargo Vessel registered in Kingston Upon Hull with auxiliary information such as she was made from steel and was en-route from Boulogne in Southampton in ballast when lost on 2nd February 1918.

Enhanced Record

The *Jaffa* was a British flagged, Hull registered, well decked steamship owned by the Ellerman's Wilson Line Ltd. Classified as *100A1 (There highest survey rating) by Lloyds she was 260.1ft in length, 35.2ft in breath and 16.4ft depth and 1383 tons displacement. Built in 1897 by J Scott & Co in Kinghorn from steel. She was powered by a 251 horse power triple expansion steam engine built by J. Scott & Co., Kinghorn (who also built her engines, equipped with a screw (propeller) positioned aft . She was made from steel with 2 decks, double bottomed.

She was torpedoed on the 2nd February 1918 by UB30 whilst en route from Bologne to Southampton in ballast. Ten of her crew where drowned and the remainder were interrogated by the U Boat crew whilst in her lifeboats. The wreck lies on her port side in 22m with her boilers standing 6m proud of the seabed. There is a heavy scour along the keel which is broken in places. She was identified by dining plates bearing the crest of her owners. She was armed with a 4.7 inch gun.

Discussion

This information would suggest that the *Jaffa* has very little local interest other than as one of many ships lost off this coast during the 20th century's two world wars. At the time of her loss she would have been coming towards the end of her years and she is an older than average wreck within the record, although not particularly old or early. The information regarding her current condition is vague but suggests that she may not be in particularly complete or stable condition. Her loss in the defense of the UK in wartime and as a typical cargo carrier on which the worlds trade depended at the time makes her interesting as a 'typical' ship but her survival may be moderate to poor

and it is believed, but not confirmed until this project is finished that there are other better preserved and more significant examples of this ship type.

I would suggest that on current evidence this vessel is of no great local or national significance. This position may be altered as the project develops.

5.3.7 An example taken from Aggregate dredging area No. 122/2: East of Isle of Wight

NMR Record
The Record states that German Submarine UB 21 (HOB UID 805579) is the remains of a German submarine that sank in 1920 and was made from steel and had an engine

Enhanced Record
The UB 21 was a German First World War UBII class coastal submarine. She was 36.13m in length, 4.36m beam and 7.34m high and displaced 263tons on the surface. She was powered by a combined internal combustion and electric engine and armed with 6 torpedoes fired from two bow tubes with an 88mm deck gun.

She was built by Blohm & Voss in Hamburg, launched in September 1915 and commissioned in February 1916. She undertook 26 patrols and accounted for over 38,000 tons of allied shipping including 33 ship sunk and 4 captured, being the first command of the 'ace' Ernst Hashagen. She was taken out of active service in October 1918 for training and surrendered at the end of the War. She sank whilst under tow to the breakers in 1920, 3 miles south of Eastney Point.

Demolition work was undertaken in 1921 and salvage in the 1970's leaving only a broken and disbursed wreck in two parts lying flat on the seabed.

Discussion
The class of warship consisted of 30 units of which 8 are contained within the Record. This class had an active role in the First World War and were in part responsible for the massive shipping losses that brought the UK close to defeat in that war. As the first boat of an 'ace' she is of some historical interest but her poor survival and loss as a hulk rather than the site of a military action reduce this significance greatly if better examples exist within the record. She is an interesting but not significant site. This position may be altered as the project develops.

Problems encountered when matching the Record to Historical Data

5.3.8 Most of the sites held within the NMR benefit from the historic sources listed above. The information held within these is fairly consistent and copious and quite easily accessible, however this does not imply that the capture of this data is a straight forward and easy process. The variable and usually very limited amount of data held within the NMR made the connecting of named vessels within the NMR with their associated historical records somewhat

difficult. This was not aided by the complexities of digitizing an historic record organically developed over time as a manual system. The major problems are listed below.

5.3.9 The registers involved were compiled over the historic period covering massive developments in shipbuilding. This has resulted in a complex and not very intuitive system that varies over time. Records have advanced from single annual volumes to multiple volumes defined by vessel type or size. As the data held within the NMR does not differentiate between sites in this way often many volumes over several years had to be searched to locate the one in question.

5.3.10 Since 1834 Lloyds Register has been published in the middle of the year, covering the period 1 July through 30 June. Where the exact date of loss was either missing or incorrect, matching the right vessel to the right site is a lengthy process requiring the consultation of different volumes in subsequent years.

5.3.11 In a system reliant on the ship's name to identify individual sites, incongruity between the NMR list and historic sources concerning spelling of the name caused many problems. Often, but not always, these mistakes refer to foreign vessels and sometimes this lack of clarity brought up the doubt if it was referring to the same site/vessel: it is possibly quite easy to shed light on examples like *Oil Trader* (HOB UID 912 985) and *Oiltrader* (Lloyds), but less so for *Broad Main* (HOB UID 832202) and *Broadmayne* (Lloyds), (alphabetically not close in the list), but perhaps is a more confusing and time wasting exercise to try to determine if *Marie Marguerite* (HOB UID 911744) and *Marie Margaretha* (Lloyds) are the same vessel: if the names do not help much, the information provided helps even less as on the database it is generally described as "possible remains of cargo vessel, 1924"

5.3.12 It was not unusual, particularly during the war years, to find ships such as the *Kantoeng* (HOB UID 919770 & 919772) built and lost in the same year before they could be entered into the register thus making the establishment of their particulars very difficult.

5.3.13 During the Second World War many minor vessels such as barges like the *Rosme* (HOB UID 908054), lost 3 July 1941, that had been taken out of service (and therefore off the registers) during the 1930s were brought back into service in auxiliary roles such as anti-invasion blockages or barrage balloon vessels and subsequently lost. In these cases it has proved difficult to trace their last register entries and therefore their particulars.

5.3.14 Some minor vessels such as the barge C1619 (HOB UID 901750) have mere temporary numbers that cannot be traced without a very high degree of luck. This should not be seen as an unimportant fact as older vessel were often reused as hulks or barges. The coal hulk C60 (HOB UID 904647) was the former SS *Himalaya*, the largest ship in the world at the time of her construction and when used as a troopship formed a key component of

Britain's ability to project its power aboard and for the first time allowed them to deliver troops in strength on a reliable timescale to any location on earth accessible by sea. Another example is the Second World War oil fuel hulk *C77* at Milford Haven, formally the HMS *Warrior*, the world's first ocean-going iron-hulled armored battleship now preseved as a museum ship at Portsmouth.

5.3.15 Identifying unusual and poorly recorded site types such as the mass produced mulberry harbor units, for example, the Whale Unit (HOB UID 1399645), have proven difficult and in some cases only the broad details of the unit type can be established.

5.3.16 Where ships share names with (or are indeed named after) ships sunk a short time before it is time consuming to establish which ship's particulars are being recorded. For example, the particulars usually recorded for the SS *Butetown* (HOB UID 919578) sunk off the Cornish coast on 29th January 1918 are often confused with her predecessor the SS *Butetown* sank on the 8th September 1916 off Cape Matapan.

5.3.17 Where ships are lost soon after a name change it is difficult to locate their particulars. For example the *Barn Hill* (HOB UID 911966) lost 20th March 1940 off Pevensey had recently had her name changed from *Canadian Challenger* and it is under this name that her particulars are last recorded.

5.3.18 Concentration on loss means that some old vessels are recorded under their last name and not under the original name thus hiding their potential significance. HMS *Fisgard II* (HOB UID 1147324) was the *Audacious* class ironclad battleship HMS *Invincible*, built in 1870 and Admiral Seymour's temporary flagship at the bombardment of Alexandria in 1882. HMS *Vernon II* (HOB UID 911729) was the 131 gun First Rate ship of the line and flagship of the Mediterranean Fleet from 1858-64, HMS *Marlborough*. Lauched in 1857 her class represented the ultimate development of the wooden broadside armed sailing warship that began with the *Mary Rose* in 1509.

5.3.19 Inappropriate and inconsistent use of the prefix 'HMS' for Royal Navy warships causes warships to be alphabetically organised under 'H' and is used for minor numbered rather than named warships such as the tank landing craft HMS LCT809 (HOB UID 805326) which should be listed as LCT809.

5.3.20 Many sites have popular names of which there are many in the registers, such as *Albert* of which there are 4 in the Record (HOB UID's 904725, 906644, 906646, 906661) and many in the various registers consulted. Lack of details within the NMR Record, such as '*remains of vessel*' (HOB UID 906661) with no accompanying information other than a location on Mersyside does not provide enough information to identify her from general registers.

5.3.21 In the case of auxiliary warships taken up from trade, such as the mine destructor HMS *Corfield* (HOB UID 910047) both military and civilian registers have to be consulted.

5.3.22 A high proportion of the Record, 64%, was lost during the 20th century's two World Wars when shipping intelligence was a matter of national survival. Some elements of the historic record, notably the *Merchant Navy List*, were not published during all or part of these periods. This has made the establishment of the particulars of small vessels built and lost during these periods, such as the *Chant 63* (HOB UID 907933), built 1944 and lost 5th June 1944, very difficult.

5.3.23 The best information source for the current condition of sites is that gathered by amateur divers and encapsulated in the *Diver* guide series. Whilst highly informative this is usually published as free text and contains a vast amount of anecdotal 'diver's tales' type information from which the relevant data has to be identified and extracted. A good example of this is the popular dive site of *James Eagan Lane* (HOB UID 919733), lost 21st March 1945, about which much has be written, but of little relevancy. This last element has taken considerably longer to complete than was originally anticipated at the outset.

6 CONCLUSIONS

6.1.1 The collation of what has been described in this document as the 'Record' by the then RCHME in the early 1990's made a great contribution to maritime archaeology by placed of the nations marine heritage assets onto one database.

6.1.2 As has been discussed above the sources used to undertake this task greatly limited its content which places limitation on how or for what purpose the data can then be used.

6.1.3 As changes in the management of the MHE have occurred there has been a desire to establish the significance of shipwreck sites, particularly those that lie within areas of extraction or development and which are placed under threat from activities to be undertaken in these areas.

6.1.4 The limitation of the data collection for the establishment of the Record means that as it stood the Record was unable to provide the data needed to establish the significance of individual sites. In fact, as is said in para 1.1.5 above so little was known about the shipwreck resource that every site had to be considered significant as we were not in a position to judge the importance or redundancy of individual sites.

6.1.5 This project aims, and has in part with the completion of Stage 1, to enhance the available dataset to a point were in most cases significance of individual sites can be established and informed decisions made about their management.

6.1.6 In less than 2 person years the project has potentially turned the NMR known shipwreck record from a list of names and dates to a dataset which forms the foundation of a system with which Stage 2 can start to make judgments as to the individual significance of shipwreck sites. Although much more work is required in order to fully examine the Record against the significance criteria already set, this process is well underway.

7 BIBLIOGRAPHY

Davies, RH 1981 *Deep Diving and Submarine Operations Parts 1 & 2* (8th ed)

DCMS 2007 *Heritage Protection for the 21st Century*

DCMS 2005 Review on *Protecting our Marine Environment*

Deeben, J. Hallewas, D.P. & Maarleveld, Th.J. 2002 *Predictive Modeling in the Archaeological Heritage Management of the Netherlands: the Indicative Map of Archaeological Values (2nd Generation)*

Dittmar, F.J & Colledge, J.J. 1972 *British Warships 1914 - 1919*

Francis, K. & Dellino-Musgrave, V. 2006 *Marine Aggregate Levy Sustainability Fund Science and Information Strategy*

Greenhill, B. 1993 *The Advent of Steam; the Merchant Steamship before 1900*

Hough, R.G. 1987 *The Great War at Sea, 1914-1918*

Hydrographic Department Admiralty 1950 *A summary of Selected Manuscript Documents of Historic Importance Preserved in the Archives of the Department* Hydrographic Department Professional Paper No13 (H.21182/45)

Larn, R. & Carter, C. 1969 *Cornish Shipwrecks; The South Coast.*

Larn, R. & Larn, B 1993 *Shipwreck Atlas of the British Isles, Volume 1*

Lyon, D. 1993 *The Sailing Navy List*

Lyon, D. & Winfield, R. 2004 *The Sail and Steam Navy List: All the Ships of the Royal Navy 1815-1889*

Lund, P & Ludlam, H 1979 *Out Sweeps*

McDonald M. 1989 *Dive Sussex*

McElvogue, D.M & Parham, D. 2002 'Maritime archaeology and social inclusion: rescuing the *Ayrshire*' The *Archaeologist* No 48

Michell, P. 1986 *The Wreckers Guide to South West Devon*

NMR 2005 *Introduction To Maritime Data Export*

Parham, D. 1996 The Loss of a 'Teifi' Steamer – *Maritime Wales*, Vol.18

Parham, D. 1996 Shallow Grave *Scuba World*, September 1996

Parham, D. 1998 Lost and Found *Scuba World*, January 1998

Parham, D. 2002 'Tried looking on the chart?' *Nautical Archaeology* 2002.1

Parham, D. & McElvogue, D. 2005 *Identifying Shipwrecks of Historic Importance lying within Deposits of Marine Aggregate* (Project Design 2.2)

Pritchard, M. & McDonald M. 1991 *Dive Wight and Hampshire*

Vallintine, R. 2003 *The Club; A celebration of the History of the British Sub-Aqua Club 1953 - 2003*

RCHME 1996 *The National Inventory of Maritime Archaeology for England*

Roberts, P. & Trow, S. 2002 *Taking to Water*
www.helm.org.uk/server/show/nav.8679

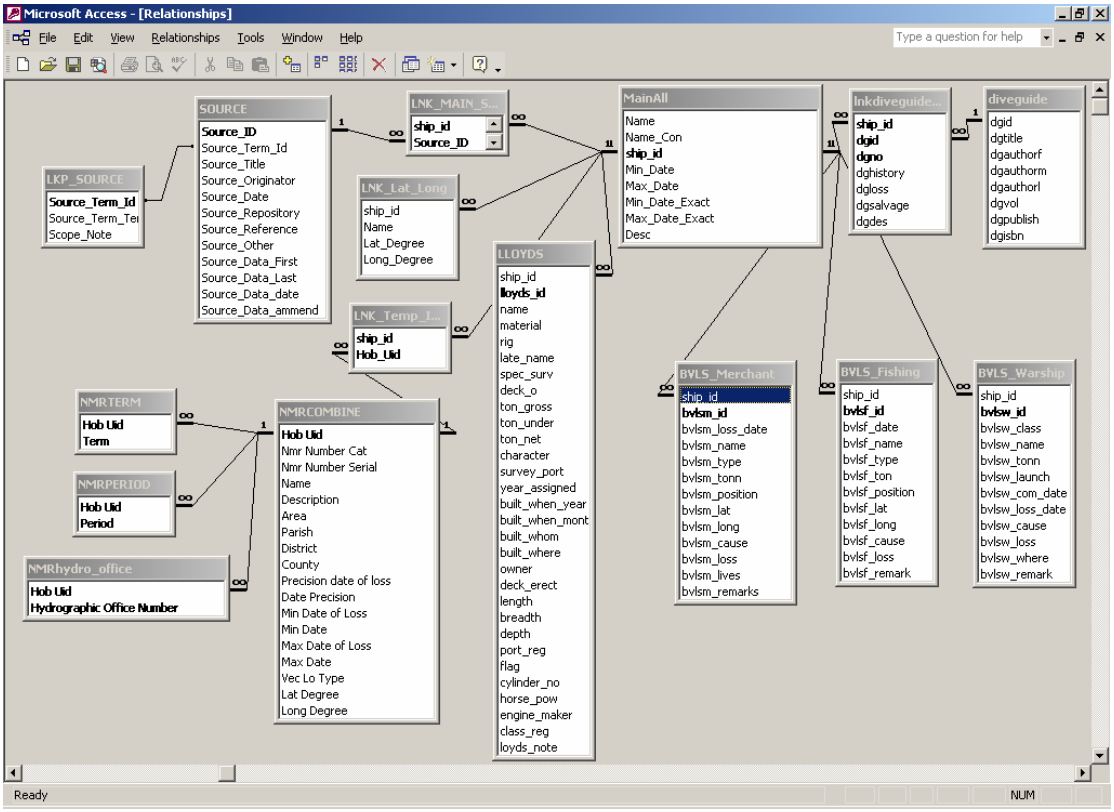
Schelberg, *J.D. 1996* Site Significance in the context of regions, research designs, and redundancy in Briuer, F.L. (ed) *Cultural Resource Significance Evaluation: Proceedings of a US Army Corps of Engineers Workshop 3-4 October 1994, Vicksburg, Mississippi US Army Corps of Engineers :20-27*

The Scotsman 9th November 2006

Trow, S. 1999 *Towards a Policy for Marine Archaeology*

Wessex Archaeology 2006 *On the Importance of Shipwrecks; Applying the Framework*

APPENDIX 1 DATABASE RELATIONSHIPS



APPENDIX 2 EXAMPLE DATA QUERIES

A number of queries have been run in order to demonstrate the ability of the new dataset to represent the English Shipwreck Record and provide comparative data on classes of ship in order to compare them by various factors as are shown below.