Wessex Archaeology

Assessing Boats and Ships 1939-1950

Archaeological Desk-based Assessment

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Ref: 70861.03

February 2011

ASSESSING BOATS AND SHIPS 1939-1950

ARCHAEOLOGICAL DESK-BASED ASSESSMENT

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February 2011

Ref: 70861.03

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Title	Assessing Boats and Ships 1939-1950
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Origination date	February 2011
Date of last revision	n/a
Version	70861.03 / Version 2
Status	Final
Summary of changes	Revised following receipt of client comments
Associated reports	Period Report 1860-1913; Period Report 1914-1938; Methodology Report
Client approval	Yes

ASSESSING BOATS AND SHIPS 1939-1950

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Summary

Wessex Archaeology (WA) has been funded by English Heritage (EH) through the Aggregates Levy Sustainability Fund (ALSF) to provide a national stock-take of known wrecks in waters off England and to review it in light of the framework for assessing special interest prepared in the *Marine Principles of Selection* project (ALSF 5383) and historical thematic studies.

Through undertaking a national stock-take of wrecks dating to the period 1860-1950 within English territorial waters, this project provides supplementary guidance on the key themes and interests represented by such wrecks in order to inform decisions regarding importance and mitigation.

The *Assessing Boats and Ships* project comprises a series of three desk-based studies of the special interest of wrecks from 1860 to 1950, split into the periods 1860-1913, 1914-1938 and 1939-1950. This report presents the third phase of study; the assessment of boats and ships lost between 1939 and 1950.

As of May 2009, the National Monument Records (NMR) listed 861 known wrecks lost during the period 1939-1945. There are a further 49 known wrecks recorded by the NMR for the period 1946-1950. These records were collated in a GIS-linked project database. The collated records were then queried in accordance with an attribute framework informed by WA's 'BULSI' system of wreck assessment and by the integral and relative factors for assessing the special interest of boats and ships identified by the 2008 ALSF project on *Marine Principles of Selection.*

Chronologically the period comprises three sub-periods: a few months in 1939 at the end of the interwar period during which future combatants were hurriedly re-arming; World War II from 1939-45; and the post-war peace period from 1946-50.

With regard to 'build', the stock-take identified the following distinctive features of the wreck evidence:

- The ubiquity of steel hulls;
- The appearance of welded and pre-fabricated vessels;
- The appearance of wartime standard designs;
- The significance of US-built ships;
- The continued popularity of mature forms of steam engine such as triple expansion;
- Associations with famous shipbuilding regions such as the north-east of England and the Clyde;

- The presence of large numbers of vessels built during the earlier periods studied during this project and the extreme longevity of some vessels.

With regard to use, the stock-take identified the following:

- The importance of both cargo and passenger transport and military vessels;
- The relatively large numbers of military vessel wrecks present as a result of it being a period dominated by war;
- The impact of the war in changing the use of vessels through requisitioning;
- The large number of vessels involved in the transport of coal;
- The importance of key regions and ports, for example the Thames Estuary and the Port of London;
- The significance of groups of wrecks linked by their use, for example the wartime importance of Norwegian and Dutch cargo vessels and the post-war rise of Greek and American merchant fleets.

With regard to loss, the following features of the wrecks have been identified:

- The overwhelming impact of World War II on both the numbers and cause of loss;
- The key significance of loss of life in this relatively recent phase of the project;
- The impact of new or developing weapons, such as the mine and aircraft;
- Significant ‘settings’, for example areas of high intensity conflict such as the Thames Estuary and the approaches to convoy ports such as Liverpool.

With regard to survival, the following is apparent:

- The extent to which almost half the wrecks survive is unknown;
- Of those wrecks for which there is information, most are broken up and only 12% are known to be largely intact.

With regard to investigation, the stock-take has shown that:

- Most information about investigation recorded by the NMR comes from hydrographic sources;
- Archaeology-led investigation of wrecks of this period as recorded by the NMR is very rare;
- A single development-led project in the Thames Estuary appears to be responsible for most of the archaeological investigation.

The results of the stock-take were then used to conduct a thematic review of the NMR dataset with regard to the known resource to provide a basis upon which special interest can be assessed. The following classes of vessel use were reviewed, with particular emphasis on build, use and loss:

- Transport (Cargo/Passenger);

- Military;
- Fishing;
- Industrial;
- Law and Government;
- Health and Welfare;
- Commercial;
- Agriculture and Subsistence;
- Domestic;
- Recreation.

Unlike earlier periods, many vessels of this period survive, either in use or as static displays. The existence of such vessels must be taken into consideration when assessing the special interest of boats and ships of this period that survive as wrecks. Information about 116 vessels on the National Small Boat Register and 168 on the National Historic Ships Register has therefore been collated and integrated into the thematic review.

The results of the thematic review include:

- Cargo vessels and in particular transport vessels requisitioned for military service are plentiful as wrecks in this period;
- In contrast passenger vessels are relatively rare;
- Cargo vessel wrecks are representative of the German attack on Britain's vital sea trade during World War II;
- Ships operating in the important tramping trade are currently not adequately identified;
- Cargo vessels powered by internal combustion engines are relatively rare compared to steam ships;
- World War II means that military vessel wrecks are fairly common and far more common than wrecks from the peaceful 1860-1913 period;
- Several key military themes are represented by the wrecks, including submarines, trade defence and anti-submarine and mine warfare, coastal naval forces, amphibious warfare, naval aviation and capital ships;
- Not all of these key themes are well represented, for example only one wreck has been linked to naval aviation during the study;
- Civilian vessels requisitioned as military vessels are well represented, just as they are in relation to World War I;
- Fishing vessel wrecks appear to be more common as requisitioned military vessels;
- Wrecks of this period probably represent a particularly valuable archaeological resource for the study of early 20th century fishing vessels;
- The health and welfare theme is of particular interest in this period as it includes vessels whose role was a feature of modern warfare, for example fast launches for aircrew rescue, and vessels such as Trinity House buoy tenders that were particularly exposed to enemy action.

- Recreational vessels, particularly yachts, are well represented amongst both wrecks and preserved vessels;
- The themes of industrial, law and government, commercial, agriculture and subsistence are less well represented by the wrecks of this period.

The special interest of boats and ships of 1939-1950 is likely to be multi-faceted. For a wreck of this period to be of special interest it is likely to have to make a distinctive contribution in respect of one or more of the following:

- Illustrate a key narrative of the period;
- Represent a distinct and tangible link to significant persons or events;
- Be representative of significant loss of life or related responses in seafaring safety;
- Have made a distinct cultural contribution;
- Have current relevance or parallels.

In addition, in order to have special interest a wreck must be considered to have relative merit in comparison to other wrecks or surviving vessels of the period. The factors used to express relative merit are likely to include the following:

- Rarity;
- Representation;
- Diversity;
- Survival;
- Setting and Context.

In terms of special interest, the broad conclusions reached by the report include:

- The great impact of World War II and the potential impact of the presence of substantial numbers of military wrecks on special interest;
- The potential significance of trends and events that occurred during the earlier 1914-38 period in determining special interest;
- The potential impact of the relative rarity of post-war 1946-50 wrecks in determining special interest;
- The potential impact of the relatively large number of preserved vessels built in this period on the special interest of certain types of vessel, for example small military vessels and yachts.

ASSESSING BOATS AND SHIPS 1939-1950

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Acknowledgements

This assessment was commissioned by English Heritage. The assistance provided by Helen Keeley of English Heritage is gratefully acknowledged. Further thanks go to the National Monuments Record Heritage Data Team for their assistance throughout this report (in particular to Serena Cant).

Wessex Archaeology would also like to thank the following people and organisations (in alphabetical order):

- Tom Burns, Nautical Archaeology Society
- Stephen Courtney, Curator of Photographs, Royal Naval Museum
- Hannah Cunliffe, Policy and Project Manager, National Historic Ships
- George Hogg, Collections development and National Small Boats Register
- Paul Whittle

Diana Donohue carried out the assessment and compiled the report. Kitty Brandon prepared the illustrations. Graham Scott edited the report and managed the project for Wessex Archaeology. Dr Antony Firth carried out quality assurance.

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HMS *King George V* (top) and HMS *Vanguard* (bottom) (photographs courtesy of the Royal Naval Museum ©).

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1. INTRODUCTION

1.1.1. Wessex Archaeology (WA) has been funded by English Heritage (EH) through the Aggregates Levy Sustainability Fund (ALSF) to provide a national stock-take of known wrecks in territorial waters off England and review it in light of the framework for assessing special interest prepared in the *Marine Principles of Selection* project (ALSF 5383) and historical thematic studies.

1.1.2. The known maritime resource in waters off England is dominated by wrecks dating between the mid 19th and mid 20th centuries. Through a consideration of the known wrecks listed by the National Monuments Record (NMR), the *Marine Principles of Selection* project (ALSF 5383) revealed that a total of 96% of known and dated wrecks were lost in the period between 1860 and 1950. It therefore follows that wrecks from these periods are the most commonly encountered by the aggregates industry in the course of the licence application process.

1.1.3. A consideration of the special interest of any particular wreck from this period is currently gauged in the wider national context of historic shipping activity and a national stock-take of comparable surviving examples. This approach enables a particular wreck to be considered of special interest in respect of one factor or another. However, it does not enable the relative or absolute importance of a particular wreck to be ascertained. The difficulties in assessing wrecks dating between 1860 and 1950 thus arise from the absence of any agreed corpus of work upon which the assessment of individual wrecks from this period can be based.

1.1.4. This project undertakes a national stock-take of wrecks dating to this period within English territorial waters. It therefore provides supplementary guidance on the key themes and interests that they represent. This can be used to inform decisions regarding importance and mitigation.

1.1.5. The *Assessing Boats and Ships* project comprises a series of three desk-based studies of the special interest of wrecks from 1860 to 1950, split into the periods 1860-1913, 1914-1938 and 1939-1950. This report presents the third phase of study; the assessment of boats and ships lost between 1939 and 1950.

1.1.6. Data for wrecks lost in the period 1946-50 was being compiled by the NMR during the course of the project and was not therefore available until a late stage in the compilation of this report. As a result, whilst this dataset was subject to a number of simple queries, it could not be fully integrated into each query undertaken for the wrecks of the period 1939-1945. Therefore data for wrecks of this five-year sub-period is considered as a separate dataset which is incorporated into discussions where relevant, in order to provide examples of post-WWII wrecks. Accordingly, this data is referred to throughout the report as 'post-WWII wrecks'.

1.1.7. A separate document dealing with the methodology of the project has been prepared (WA 70861.04). This enables the project methodology and the issues that have arisen to be discussed without distracting from the core purpose of the project.

2. NATIONAL STOCK-TAKE OF WRECKS 1939-1950

2.1. INTRODUCTION

2.1.1. The NMR contains records of 861 wrecks of vessels lost in the period between 1939 and 1945 (**Figure 1**). In order to provide a stock-take of these sites the records were subject to a series of queries relating to key factors which outline the biography of a boat or ship (**Appendix I**). Records of wrecks dating to the period 1946-1950 were not subject to the same series of queries but are incorporated into discussions where relevant as examples of post-WWII wrecks.

2.1.2. Supplementary data relating to boats and ships of this period in preservation has been compared and contrasted with the results of the NMR queries. The National Small Boat Register (NSBR) and National Historic Ships Register (NHSR) list 116 and 168 vessels respectively that were built between 1939 and 1950.

2.2. BUILD

2.2.1. The build of a vessel encompasses: date and place of build; the material from which the hull was constructed; principal dimensions and tonnage; the means by which the vessel was propelled; and any notable features of the vessel's fittings. Build also includes information concerning re-building or re-fitting, whether incremental or as a distinct event.

2.2.2. There were no rapid or revolutionary changes in shipbuilding technology which occurred in the years both prior to and during the period 1939-1950. Although the period saw an increase in the utilisation of new technologies such as welding, advances did not occur at the same rate that they had done in the late 19th and early 20th centuries. In the post-war period after 1945, the glut of both merchant and naval vessels discouraged investment in both new ships and new technologies.

2.2.3. The major developments that did occur, particularly in the United States, were a shift from riveted to welded hull construction and a move from individually constructed vessels towards shipbuilding programmes based on standardisation and prefabrication.

2.2.4. There was a continuing shift from the use of coal to oil fuel. Vessels equipped with internal combustion engines became far more widespread amongst all classes of shipping in this period. However, the expense of oil and the cost of diesel engines meant that motor ships (ships powered by diesel engines) did not supplant steamships during this period. Indeed steamships were still being built in the 1960s (Friel 2003:282). Steam engines were at a very mature stage in their development and were regarded as an economic and safe investment. There was a growth in the use of high-powered steam engines such as the steam turbine and this type of engine remains in use today.

Date of Build

2.2.5. The results of a query on date of build are shown in **Table 1** and **Figure 2**. The date of build for 498, or over half of the wrecks, is not recorded by the NMR. Of those records for which a date of build is known (364 records), just over half (200 records) are recorded to have been built in the interwar period; the 1920s have the highest number of wrecks, with 107 records.

Date	Wrecks	Post-WWII Wrecks	NSBR	NHSR
1800-1849	2	1		
1850-1899	12	2		
1900-1909	28	5		

Date	Wrecks	Post-WWII Wrecks	NSBR	NHSR
1910-1919	91	6		
1920-1929	107	7		
1930-1939	80	3	13	15
1940-1945	44	12	35	91
1946-1950	-	1	66	61

Table 1: Records queried by date of build

2.2.6. Following WWI there was a post-war shipbuilding boom as shipowners rushed to replace the tonnage lost during the hostilities. Many ships were built speculatively in the hope that global demand for shipping services would continue to increase. However, the worldwide recession experienced in the 1920s resulted in a decline in trade. This in turn resulted in serious overcapacity amongst shipowners and a consequential decline in the demand for new ships. The effect of this on the British shipbuilding industry was a serious slump in business. This is reflected in official statistics for the tonnage of British merchant shipping, which did not increase significantly between 1919 and 1931 (Friel 2003:277).

2.2.7. In the early 1930s world trade began to recover. This and the military rearmament that occurred in the late 1930s gradually revived the industry. By the end of the decade employment levels in shipbuilding yards had returned to those of the early 1920s (Friel 2003:276).

2.2.8. Relatively few of the wrecks lost in 1914-38 were actually built during that period. By contrast the post-war shipbuilding boom that occurred following WWI is well represented amongst wrecks of the 1939-50 period. A total of 114 of the vessels wrecked in 1939-45 were built in the 1920s. Compared to the wrecks of 1914-38, the 1939-45 dataset contains relatively few 19th century vessels. This is due to their age and the high loss rate that occurred in WWI.

2.2.9. The 97 wrecks built in the period 1910-19 probably represent emergency efforts made to replace war losses during WWI. Similarly the high number of wrecks built in 1940-45 almost certainly reflects emergency war building.

2.2.10. It is quite remarkable that a small number of the vessels wrecked during this period are recorded as having been built prior to 1850. These vessels will have had a service life of at least 100 years. In fact the date of build figures suggest that a small but nevertheless significant 4% of the vessels lost in 1939-45 had very long careers of at least 40 years.

2.2.11. One vessel, the HMS *Implacable* (NMR **UID 1480987**) is recorded to have been constructed as early as 1800. The HMS *Implacable* was constructed as a French 74-gun ship the *Duguay-Trouin.* Lost in 1949, the vessel was 149 years old at her time of loss, having survived action at Trafalgar in 1805 as a Third Rate Ship of the Line and both world wars of the 20th century as a training ship.

2.2.12. A significant number of the wrecks recorded by the NMR were built in 1939-45. These are shown on a year by year basis in **Table 2**. The 53 wrecks represent 15% of the total number of wrecks for which the date of build is known.

Date	NMR	NSBR	NHSR
1939	9	13	15
1940	9	6	6
1941	2	1	12
1942	5	7	17

Date	NMR	NSBR	NHSR
1943	21	6	20
1944	6	3	21
1945	1	12	15

Table 2: Records queried by date of build (WWII)

2.2.13. Significantly more wrecks lost in 1939-45 appear to have been built in 1943 than in any other war year. The reason for this is unclear but may be linked to increases in war production to cope with loses suffered during the Battle of the Atlantic or may represent the shift in German efforts to the inshore and continental shelf areas around the British Isles, following their failure to win the Battle of the Atlantic in mid-ocean.

2.2.14. There are a total of 33 wrecks recorded as having been built between 1942 and 1945. This reflects what is known about shipbuilding at this time. By 1941 British yards were unable to keep up with the scale of losses being suffered in the Battle of the Atlantic. The British government therefore sought ships built overseas, at first to keep up with these losses and, later on, to cope with the wider demands of the war, including the liberation of Europe. American yards were the main suppliers, particularly after the entry of the USA into the war. Between October 1941 and the end of the war, some 5000 merchant vessels were constructed in American yards as part of their emergency shipbuilding programme.

Place of Build

2.2.15. A total of 79 places of build are recorded by the NMR for wrecks lost in 1939-1945. These are shown in **Appendix I**: **Table 1**.

2.2.16. In order to identify any national trends, places of build have been grouped into countries. The total number of vessels built in each country is shown in **Table 3** and **Figure 2**. The majority of the wrecks were built in England, (137) and Scotland (57). This is also the case for the1946-50 wrecks (13 and 7 respectively).

Country	No. of wrecks (1939-45)	No. of wrecks (1946-50)
England	137	13
Scotland	57	7
Germany	15	1
Netherlands	10	2
USA	8	6
Denmark	6	-
France	4	1
Belgium	3	-
Norway	3	-
Japan	2	-
Northern Ireland	2	-
Canada	1	1
Egypt	1	-
Italy	1	-
Poland	1	
Sweden	1	1
Spain	-	1

Table 3: Wrecks queried by country of build

2.2.17. Place of build is only recorded for 20 wrecks built between 1942 and 1945. However they reflect this dependence on the USA. Six are American-built in comparison to three from England and two from Scotland. The most common country of build is in fact Germany, due to the very active German submarine campaign that occurred in UK territorial waters during the war.

2.2.18. A review of the results of similar queries for 1860-1913 and 1914-39 reveals a steadily declining proportion of British-built vessels. The results for all the periods are presented in **Table 4**.

Date of loss	Total wrecks with country of build	Total British-built wrecks	% British-built
1860-1913	167	138	83%
1914-1938	359	284	79%
1939-1945	252	194	77%
1946-1950	33	13	39%

Table 4: Percentage of wrecks British-built 1860-1950

2.2.19. This apparent decline is consistent with historical sources, which state that Britain's share of the world shipbuilding market decreased because of the growth of new foreign competitors during the first half of the 20th century. In 1913, Britain had 61% of the world's shipbuilding market, but by 1920 this was down to 40% (Friel 2003:271-2). During the shipbuilding boom that followed WWI, the worldwide shipping industry was appreciably larger than it had been prior to the war but there were many more foreign yards chasing orders (Lindberg & Todd 2004:70). This made it harder for British yards to win orders abroad. Prior to WWI, British yards typically sold in excess of 300,000 gross tons of export shipping, a figure which had decreased to 38,000 gross tons by 1934 (Lindberg & Todd 2004:70). Furthermore, British shipowners demonstrated increasing willingness to order abroad, particularly from new and highly competitive shipbuilding yards in Scandinavia and Holland (Lindberg & Todd 2004:70).

2.2.20. As a major international trading and shipowning nation, Britain suffered more than most from the weakening of the international economy that occurred in the 1920s (Jackson 1983:140) and this contributed to placing the British shipbuilding industry amongst the hardest-hit. Whilst rearmament and the great demand that arose for emergency tonnage during WWII meant that between 1939 and 1945 British yards were as busy as they had ever been, in the long term the war disrupted the normal replacement cycle through which British yards could normally rely on a steady stream of orders to replace worn-out vessels (Lindberg & Todd 2004:70).

2.2.21. Of the wrecked vessels built in England, the greatest number (22) was constructed in Beverley. Each of the vessels constructed there was built by the shipbuilding firm Cook, Welton and Gemmell Limited. This firm was established at Hull, Humberside in 1883 before moving to Beverley on Humberside in 1901. The shipyard specialised in the construction of trawlers, tugs, coasters, estuarial tankers, dredgers, lightships and light floats (Ritchie 1992:68). All of the 22 Beverley-built wrecks are fishing vessels. Apart from the *Salacon* (NMR **UID 913067**) and the *Tetrarch* NMR **UID 1001488**), which were on fishing voyages from Grimsby and Northumberland when lost, all of the vessels were engaged in military service at the time of loss.

2.2.22. The fact that the largest number of wrecks had been constructed in Beverley does not of course mean that it was the most important shipbuilding yard during this period. Rather it is a reflection of the large numbers and vulnerability of requisitioned fishing vessels used during WWII. The use of these vessels is considered in greater detail in **Section 5.4**.

2.2.23. The results of the query do however show the continuing importance of the north-east of England as a major centre for shipbuilding. After Beverley, the most common places of build are Sunderland with 20 records and Newcastle with 18. In fact, a total of 66 wrecks of this period were constructed in the north-east (**Table 5**). However, the results also suggest that the north-east was declining in importance during this period, from a peak in 1914-38 when the region was responsible for 72% of English-built wrecks.

Date of loss	Total wrecks built in England	Total wreck built in North-East	% of English wrecks built in the North-East
1860-1913	96	53	52%
1914-1938	202	145	72%
1939-1945	137	66	48%
1946-1950	13	7	54%

Table 5: North-east-built wrecks shown as percentage of total English-built wrecks

2.2.24. **Table 6** suggests that whilst Clyde-built wrecks continue to comprise a significant proportion of the Scottish-built wrecks, the proportion falls from 76% in 1914-38 to 61%. Records for the period 1946-1950 show a continued decline of Clyde-built vessels to just 29%, which suggests a serious shipbuilding slump on Clydeside in the immediate post-war period. A large proportion of vessels lost in 1914-38 were in fact constructed between 1900 and 1919.

Date of loss	Total wrecks built in Scotland	Total Clyde-built wrecks	% of Clyde-built wrecks
1860-1913	38	26	68%
1914-1938	80	61	76%
1939-1945	57	35	61%
1946-1950	7	2	29%

Table 6: Clyde-built wrecks shown as percentage of total Scottish-built wrecks

2.2.25. The declines in the numbers of both north-east and the Clyde-built wrecks in this period are consistent with what we know from historical sources about the decline of these regions as shipbuilding centres. It also reflects the wider economic malaise experienced by these highly industrialised regions in the inter-war period (Walker 1984:137).

2.2.26. Nevertheless regions played a vital role during WWII. For example, the shipyards along the Clyde produced nearly 2,000 new ships and carried out some 600 major conversions alongside countless thousands of dry dockings, voyage repairs and minor war damage repairs and several long-closed shipyard sites were reopened to contribute to the war effort (Walker 1984:140). This is not represented by the post-WWII known resource, which lists no Clyde-built vessel constructed during WWII.

2.2.27. Places of build most commonly represented in the NSBR and NHSR differ from those of the wrecks. Hythe is the most common place of build in the NHSR, with 14 records. Each of the vessels constructed in Hythe listed by the NHSR was built by the British Power Boat Company (BPBC); a British manufacturer of motor boats established in 1927. During WWII, the BPBC built large numbers of motor torpedo boats, high speed motor launches and motor gun boats for the Admiralty. Of the 14 BPBC vessels listed by the NHSR, seven have been assigned a military function. These vessels include: an Admiralty launch (*Regulus* NHSR **ID 1369**); two motor gunboats (*MGB 81* NHSR **ID 524** and *MGB 60* NHSR **ID 1931**); a motor torpedo

boat (*Sungo* NHSR **ID 2030**); two Royal Army Service Corps (RASC) fast launch vessels (*Humber* NHSR **ID 542** and *Avon* NHSR **ID 2090**); and a Dickens Type 2 general service launch (MV *Griffin* NHSR **ID 2354**). Other vessels assigned a service function seem to have been used by the military, including two seaplane tenders (*ST 1500* NHSR **ID 1223** and the *ST 358* NHSR **ID 1229**) and an RAF Air Sea Rescue launch (*2561 Blue Leader* NHSR **ID 1302**).

2.2.28. Cowes on the Isle of Wight is the most common place of build for NSBR boats. However, with only six of a total of 116 boats, Cowes could not be said to have dominated boat building. Of the six vessels constructed in Cowes, four are leisure vessels (*My Dainty Duck* NSBR **ID 1350**, *Coweslip K 192* NSBR **ID 186**, *Pegasus UK 1* NSBR **ID 1521** and *Metis K 522* NSBR **ID 105**). The remaining two vessels are lifeboats classified as service vessels (*Welsh Maid CO 332* NSBR **ID 1493** and *Thomas Kirk Wright* NSBR **ID 900**).

2.2.29. This analysis of the places of build for wrecks and preserved vessels demonstrates a clear distinction between the location of large-scale centres of shipbuilding on the one hand and small-scale centres specialising in the building of boats and small ships on the other. Large ships do not generally appear to have been built in boat building centres and vice-versa. Large ships relied upon and therefore tended to be built in large heavy industrial regions such as the north-east. Boat and small-scale ship building did not have to be located in these regions and could survive successfully away from them in light industrial or even rural locations. They often prospered in areas that had formerly been important for wooden shipbuilding and that maintained maritime-orientated industries and work forces, such as the Thames and Solent.

2.2.30. Thus the marine industry of Cowes not only encompassed the construction of small vessels for recreational purposes and local services, but also saw the construction of larger commercial and naval vessels. For example, the shipbuilding firm J. Samuel White, established in Cowes in the early 19th century, became a world leader in the design and construction of small to medium naval and merchant ships, and also built numerous small craft including lifeboats such as the *Welsh Maid CO 332* (NSBR **ID 1493**).

Object Material

2.2.31. For the vessels lost between 1939 and 1945 there are five types of object material recorded (**Table 7** and **Figure 3**). Steel is very dominant, being used to construct over 90% of the wrecks of this period for which we have relevant information.

Object Material	No. of wrecks	No. of wrecks (1946-50)
Steel	368	40
Wood	13	4
Metal	10	-
Concrete	4	1
Iron	3	-

Table 7: Wrecks queried by object material

2.2.32. The benefits of using steel had been long recognised. However, that is not to say that wood was no longer utilised in hull construction. For example, the German *Schnellboots,* known as E-boats to the British - a term derived from the designation of the vessels as Enemy Boats - had hulls of wooden and metal construction, with keels, longitudinals and deck beams in wood and the frames and diagonal stringers in light alloy metal (Williamson 2002:11).

2.2.33. Amongst some classes of vessel, the use of wood as the primary construction material is not unusual. Of the 116 boats listed by the NSBR, approximately two-

thirds (72 vessels) are primarily constructed of wood (**Table 8**). Of these, 71 are leisure vessels. Only 12 boats are constructed of metal. Eleven of these are made of light alloy and one is of steel. Each of these vessels performed a military function, with vessel types including military canoes and a motor submersible canoe (http://en.wikipedia.org/wiki/Sleeping_Beauty_(canoe)). Amongst vessels required to perform tasks requiring a higher level of durability, metal seems to have been preferred. The military canoe was one such example. These were designed so that they could be air dropped or deployed by submarine. Early designs were of a ply and canvas construction with the ability to collapse, although later designs in 1945 were of a more rugged sectional aluminium design that was bolted together.

Material	Total
Wood, Clinker	24
Wood, Carvel	22
Wood	16
Light Alloy	11
Wood, Chine	3
Canvas/ply Collapsible	3
Wood, Moulded	2
Wood, Fastened Veneers	1
Steel	1
Wood Diagonal/Canvass Lining	1
Wood, Double Diagonal	1
Wood, double veneers	1
Wood/Canvas	1
Canvas	1
Canvas/ply	1

Table 8: NSBR records queried by object material

2.2.34. However, a review of the NHSR data (**Table 9**) reveals that the continuing use of wood in hull construction was not confined to smaller craft. Wood is the primary construction material of 70% of the preserved ships recorded for this period (118 vessels). Of the remainder, 51 are recorded as being built entirely of metal.

Material	Total
Wood	41
Steel	40
Timber	35
Mahogany	16
Oak	8
Larch	8
Iron	7
Pine	5
Metal	4
Concrete	4
Teak	3
Elm	2
Composite	1

Table 9: NHSR records queried by object material

2.2.35. The reason why a greater proportion of preserved ships are constructed of wood than are wrecks is unclear. The ships recorded by the NHSR have a wide variety of functions and include service, passenger, fighting, cargo and fishing vessels. Those

that have metal hulls do not appear to conform to a particular type of vessel or function. It probably has something to do with the fact that wooden vessels are anecdotally regarded as being more attractive by those seeking to preserve historic ships. Another explanation, particularly amongst smaller craft of this period, is the increasing use of wooden vessels as houseboats or for other functions in inland waters as they fall out of sea-going use, and which ultimately pass into preservation, resulting in fewer recorded wooden wrecks. Additionally it may be because wooden wrecks are less likely than metal wrecks to survive in a condition that enables them to be easily recognised during hydrographical and geophysical surveys and that the statistics with regard to wrecks are therefore distorted. Recorded losses of wooden ships in 1939-50 total 102; given that only 17 wrecks are known, this does suggest that the latter reason may be a factor.

2.2.36. The absence of evidence for early welded hull wrecks and preserved vessels was noted in the 1914-38 report. Metal ships had traditionally been constructed of iron or steel plates joined by riveting. However, in the interwar years the advantages of welding came to be gradually appreciated.

2.2.37. A welder could be trained in less time than a riveter. Welding was also a less time-consuming working process in comparison to riveting. These factors combined made welding more economical (Lavery 2005:316; Maxwell 1943:142). This advantage was especially valuable during times of war when skilled labour was in short supply. Welding also offered a smoother and stronger join, using less weight of metal (Lavery 2005:316). This enabled, for example, larger warships to be constructed within the limits imposed by the 1922 Washington Treaty (Brown 1992:10, 1992a:58) and increased the safe diving depth of submarines (Wilson 1992:107).

2.2.38. Despite its many advantages, British yards were reluctant to adopt welding (Brown 1992:11). This reluctance was not entirely unjustified. Much of the steel being produced at the time was unsuitable for welding and the tools required, including electrodes and transformers, were in short supply (Brown 1992:11). Furthermore early welding was not entirely successful (Brown 1992:11). For example, following the use of electro-welding in the construction of the German *Deutschland* 'pocket battleship' in 1929, German yards used electro-welding extensively but during use the ships tended to suffer from serious problems with cracked welds (Brown 1992:11; Frere-Cook & Macksey 1975:165).

2.2.39. Welding also made prefabrication easier. Traditionally ships had been constructed on the slip from which they were launched, from the keel up, in one lengthy process. Prefabrication involved the assembly of separate sections of the ship. These were then fitted together on the slip. The use of prefabrication could greatly reduce the time it took to build a ship and was particularly suited to the mass-production of simple 'standard' designs such as Liberty ships in times of war (Maxwell 1943:142). Prefabrication helped the Allies to win the Battle of the Atlantic during WWII by enabling them to build cargo ships faster than the Germans could sink them (Lavery 2005:334).

2.2.40. Liberty ships were built in American yards using the same British design, welded construction and identical parts manufactured in factories across America. They took an average of just 60 days from keel-laying to launch (Elphick 2006:17; Lavery 2005:317). During the war, American shipyards operated so efficiently using welding and prefabrication that at the peak of production they were able to build these ships in just a few days. The record set during the war for the construction of a Liberty ship (the *Robert E. Peary*) was less than five days (Elphick 2006). Altogether some 19.4 million tons of Liberty ships were built. American yards produced 2710 Liberty ships, over half of their output of merchant vessels during 1941-45 (Elphick 2006:

17). The wreck of the Liberty ship *Richard Montgomery* in the Thames (**UID 904735**) is a good example of this type of ship.

2.2.41. The advantages of prefabrication were recognised in Britain during the war but it was not widely adopted. Some vessels were pre-fabricated, such as the Loch class frigates. Vessels pre-fabricated in British yards during the war were often riveted rather than welded. It was found that whilst building time was considerably reduced by prefabrication, the manpower required was greater and the space available in British yards was often inadequate. Furthermore shortages of material and manufactured parts often made prefabrication difficult (Brown 1992:13).

2.2.42. There is only one reference to welded construction amongst the NMR wrecks and that is for the *Shoal Fisher* (NMR **UID 919755**), an English cargo vessel. In addition welded construction can be implied for the 12 Liberty ship wrecks that are recorded.

2.2.43. The *Himalaya* (NMR **UID 904647**) is described as a riveted vessel with some welded fittings. The *Interlane* (NMR **UID 908720**) was a British tanker which is recorded as having had a temporary welded repair to its bow after having been damaged by a mine. The last reference to welding is for the *Kenton* (NMR **UID 907494**) where reference is made to a welding torch recovered from the site.

2.2.44. There is no record of welded construction for the 1946-1950 wrecks. However, three Liberty ships (the *North Eastern Victory* NMR **UID 1523927**, *Luray Victory* NMR **UID 1523903** and *Ira* NMR **UID 1523933**) can be implied as having had welded construction.

2.2.45. Welded vessels do occur amongst the vessels in preservation. The NHSR lists 10 ships of welded construction: a cargo vessel (*Flobster* NHSR **ID 1422**); three fighting ships (*Landfall* NHSR **ID 713**, HMS *Stalker* NHSR **ID 1789** and *X4* NHSR **ID 1843**); two passenger ships (*Balmoral* NHSR **ID 128** and *Southsea* NHSR **ID 1080**); and four service vessels (*Brent* NHSR **ID 3**, *TID 164* NHSR **ID 70**, *TID 172* NHSR **ID 71** and *VIC 96* NHSR **ID 78**). All of these were built between 1943 and 1949. The *Southsea* (NHSR **ID 1080**) is an archived vessel listed by the NHSR and it is not clear whether it actually remains in existence. There are no boats listed in the NSBR for this period which had welded construction.

Propulsion

2.2.46. Five types of propulsion are recorded by the NMR for wrecks dating to this period (**Table 10**; **Figures 4** and **5**).

Propulsion	No. of wrecks	No. of wrecks (1946-50)
Steam	508	32
Engine	126	13
Sail	13	3
Motor	3	1
Towed	4	7

Table 10: Wrecks queried by propulsion

2.2.47. Most of the wrecks are recorded as having been steam-propelled (508 records or 59%). Steam is also the most common method of propulsion recorded in 1946-50 (32 records or two-thirds).

2.2.48. A review of the results for each period of the project suggests that the dominance of steam propulsion was declining in 1939-1945 (**Table 11**). The proportion of steam-propelled vessels peaked at 72% in 1914-1938, before declining to 59% in 1939-1945. This decline reflects the growing importance of the marine diesel engine in the mid-20th century.

Period	Total wrecks	Steam propelled wrecks	% of steam propelled wrecks
1860-1913	518	242	47%
1914-1938	1358	978	72%
1939-1945	861	508	59%
1946-1950	49	32	65%

Table 11: British-built wrecks shown as percentage of total wrecks with country of build

2.2.49. Nine and eight types of propulsion are recorded by the NHSR and the NSBR respectively (**Tables 12** and **13**).

Propulsion	NHSR Quantity
Motor	70
Engine	58
Engine Steam	11
Towed	9
Sail	6
Auxiliary Sail	2
Engine Steam Paddle	1
Sail/Engine	1
Manpower	1

Table 12: NHSR records queried by propulsion

Propulsion	NSBR Quantity
Sail	36
Engine	24
Sail/Engine	15
Paddle	8
Paddle/Sail	5
Oar	3
Oar/Sail	3
Steam	1

Table 13: NSBR records queried by propulsion

2.2.50. The NHSR and NSBR have relatively few steam-propelled vessels for this period. The most common method of propulsion recorded by the NHSR for this period is motor (internal combustion/diesel; 70 records or 42%). The most common means of propulsion recorded by the NSBR is sail (36 records, or just under a third). The generic term ‘engine’ is also common in the preserved record (35% and 21% of the NHSR and the NSBR respectively).

2.2.51. These differences may be explained by the differing sorting methods adopted by each dataset, something that is considered in the Methodology Report. However, this does not explain the dominance of sail in the NSBR records. This may instead reflect the growing popularity of recreational sailing and racing as a pastime during the period 1939-1950 and the attractiveness of such vessels to the ‘preservation community’.

2.2.52. Powered vessels in the period 1939-1950 mainly relied on four engine types: the diesel engine; the steam reciprocating engine; the steam turbine engine; and the triple expansion engine. The numbers of wrecked vessels recorded as using each of these is shown in **Table 14** and **Figure 5**.

Engine type	No. of wrecks	No. of wrecks (1946-50)
Triple Expansion	249	17
Oil Engine	53	9
Steam Turbine Engine	18	2
Diesel Engine	8	4

Table 14: Wrecks queried by propulsion specifics (engine type)

2.2.53. The results demonstrate the longevity of the triple expansion engine, first developed in the late 19th century. It was still employed by 29% (249 wrecks) of the total number of wrecks recorded for this period and 35% (17 wrecks) of the total number of wrecks lost in 1946-50.

2.2.54. Although relatively few wrecks equipped with a steam turbine are known, the representation of this type of engine is greater than in 1914-1938 when they equipped just 1% of the wrecks. British shipbuilders and owners often seem to have preferred the tried and tested triple expansion engine in the interwar period. In comparison, the customers of American shipbuilding yards seem to have been more ready to accept the turbine. As a result, by WWII American steam turbine designs were regarded as being far superior to those of the British. No steam turbine-equipped vessels of this period are recorded amongst preserved vessels.

2.2.55. The conversion from coal to oil fuel was a significant feature of the first half of the 20th century. Nevertheless, by 1939-1950 wrecks using oil-fired engines are still relatively few in number, numbering just 53. A review of the query results alongside those undertaken as part of the 1914-38 report reveals a marked increase in the number of these engines, from 1% of the total number of wrecks for 1914-1938 to 6% for 1939-1945.

2.2.56. The likelihood of an oil-fired engine being present in a wreck of 1939-1950 seems to be partly dependent upon the type of ship. Virtually all vessels in the Royal Navy were converted by oil fuel by the end of WWI. However cargo vessels continued to rely largely on the readily available supplies of British coal, probably deterred by the relatively high cost of oil-fired engines and their fuel (Friel 2003:282). As cargo vessel wrecks form a high proportion of the 1939-1945 wrecks, evidence for the use of oil fuel is limited.

2.2.57. Of the 53 wrecked vessels constructed during WWII, the triple expansion steam engines equipped over one-third (19 wrecks). The choice of propulsion amongst vessels constructed in WWII largely depended on the resources available in war-damaged yards (Griffiths 1997:186). Britain's shipbuilding and marine engineering industries had been devastated by bombing during the early years of WWII. The manufacture of diesel engines required specialist manufacturing processes and parts that seem to have been particularly badly affected by war damage (Griffiths 1995, 1997:190). As a result marine diesel engines were less easy to obtain than steam engines. The construction of diesel-powered engines further risked diverting fuel resources from elsewhere in the war effort. With oil as an import product and the potential for petroleum supply lines to be easily disrupted, there was a tendency for British shipbuilding centres to conform to a method of propulsion which relied on the substantial domestic coal reserves which ensured the security of fuel supplies. Adding to this the greater affordability of triple expansion engines and their perceived reliability, it is easy to see why steam tended to be preferred.

2.2.58. American shipyards also relied on steam to a large extent during WWII. For example, Liberty ships used the three cylinder triple expansion engine (Griffiths 1997:187). Steam engines were simple and easy to run and the United States,

which had lacked a large merchant fleet in the interwar years, did not have a big enough pool of experienced marine engineers to favour the diesel (Griffiths 1997:188).

2.2.59. There are few triple expansion-equipped vessels in preservation. The majority of boats listed by the NSBR did not even have an engine. The NHSR lists just three vessels equipped with a triple expansion engine; the *Cervia* (NHSR **ID 5**), the *Waverley* (NHSR **ID 90**) and the *Freshspring* (NHSR **ID 28**). In direct contrast to the wrecks, the majority of vessels recorded by the NHSR were equipped with a diesel engine (60 vessels), although diesels may have been a later addition to some of these.

Summary

2.2.60. The above assessment suggests that there are a number of aspects of build that are likely to be of special interest if present in wrecks of the period 1939-1950.

2.2.61. Date of build may be of special interest if associated with a historical event. For example, a military vessel constructed in the 1920s and early 1930s may be representative of the limitations imposed by the Washington Naval Treaty (1922) which set limits on the size, numbers and armaments of warships. Vessels built during wartime, particularly those constructed as part of an emergency shipbuilding programme are likely to be regarded of special interest on the basis of their representation of the impact of the Battle of the Atlantic and wartime demands generally. However, due to the high number of wrecks constructed during this period, date of build would not, in itself, denote special interest and would have to be accompanied by other contributing factors.

2.2.62. Unusual longevity in use, if linked to build, may also be of special interest. For example HMS *Implacable* (NMR **UID 1480987**) was in use for 149 years (1800-1949). This extremely long service life is probably testament to the strength of the ship's original construction.

2.2.63. A wreck of this period may also be regarded of special interest on the basis of its association with prominent ship or boat building yards or regions, particularly yards that contributed significantly in some way to the war effort. Wrecks constructed in the large yards of the Clyde are one such example, although again, due to their numbers, further contributory factors would probably be required before such vessels could be considered to be of special interest. The role of American yards in helping Britain survive the Battle of the Atlantic means that American-built vessels constructed during the war are likely to be of special interest.

2.2.64. Steel hulls become almost ubiquitous during this period amongst wrecks. They are however simply too common for it to be considered as being of special interest, other than perhaps as examples of the typical. Rare materials such as iron or concrete and wood when associated particularly with large vessels are more likely to add to the special interest of a wreck.

2.2.65. Wrecks of this period that are predominantly of welded construction are likely to be considered of special interest. They represent an important development in ship construction that gathered momentum in this period but which is nevertheless very poorly represented amongst both wrecked and preserved vessels. Wrecks of pre-fabricated construction, such as Liberty and Victory ships, are also likely to be regarded as being of special interest on the same basis.

2.2.66. With regard to propulsion, wrecks equipped with a steam turbine engine are likely to be regarded as being of special interest on the basis of their rarity as both preserved vessels and wrecks. Whilst wrecks of this period equipped with a diesel engine are also few, they are abundant in the preserved record and thus cannot be considered to be generally of special interest on the basis of their rarity alone. However, vessels

recorded by the NHSR are, generally speaking, not of any great size and therefore large wrecks equipped with the type of very large marine diesel that is less likely to be preserved *in situ* may be of special interest.

2.2.67. Wrecks equipped with a triple expansion steam engine are abundant. They are also well represented amongst 1860-1913 and 1914-38 wrecks. Whilst these vessels can certainly not be regarded as being of special interest on the basis of rarity they are, as a group, of special interest, as the most important form of marine steam propulsion. In this period wrecks of vessels constructed with triple expansion provide very late examples of this type of engine, as it was not very long after this that steam engines other than turbines effectively ceased to be produced for marine use. In the same way, the wrecks of non-recreational sailing ships recorded as having been built in this period may be regarded as being of special interest because they represent what was by this time an almost entirely outmoded means of propulsion for large vessels.

2.3. USE

2.3.1. The period 1939-1950 is dominated by WWII, a global conflict which had a major impact on the use of vessels of this period. As an island, Britain depends upon sea trade for its industrialised economy. During the world wars of the 20th century Britain's trade routes were critically important to its war effort and were therefore subject to intensive enemy attack. As a result cargo vessels were targeted and many more military vessels were required to defend them. This inevitably had an impact upon the use of vessels that were wrecked in this period.

Vessel Type

2.3.2. The results of a query of vessel type are shown in **Appendix I: Tables 2a** and **2b**. For the period 1939-1945 there are 87 vessel types. For 1946-1950, 26 vessel types are recorded.

2.3.3. These vessel types can be broadly divided into seven classes of shipping use: fishing; health and welfare; law and government; military; recreation; and transport. The most common class amongst the wrecks is transport, because of the large number of cargo vessels. The second most common is military, followed by fishing. The other classes are uncommon or rare.

2.3.4. It is notable that the order of the three most common classes of shipping is the same as for the period 1914-38. It is no coincidence that both periods are characterised by the occurrence of a major naval campaign in which the main objective of the German forces was to sink as many cargo vessels as possible.

2.3.5. The occurrence of fishing as such a common class of use, particularly in 1939-45, is probably due to the fact that many fishing vessels were requisitioned for often hazardous military service (for example minesweeping) and due to the fact that fishing, a hazardous maritime activity at the best of times, is particularly dangerous in times of war.

2.3.6. In 1939 Britain possessed nearly 18,000,000 tons of merchant shipping, with more cargo vessels than any other country in the world (Evans 1943:4). During the war, losses amongst cargo vessels occurred at a scale which far exceeded those of other classes of shipping. In coastal waters alone, 1,431 merchant ships were lost, a total of 3,768,599 tons (Roskill 1954). The common occurrence of cargo vessel wrecks in territorial waters is therefore entirely consistent with historical sources.

2.3.7. By way of contrast, cargo vessels of this period in preservation are rare. The NSBR lists only two cargo vessels for the period 1939-1950 (*Ron's Boat* NSBR **ID 583** and unnamed vessel NSBR **ID 332**). This is unsurprising as cargo vessels less than 10m in length are relatively inconspicuous targets for hostile action and are probably less

likely to put to sea in any event. There are only 21 cargo vessels listed by the NHSR, just 13% of the total for this period.

2.3.8. The most common function type for vessels recorded by the NHSR for this period is the service vessel (46 vessels). Vessels which fall under this heading performed a variety of roles, generally associated with the war effort. Common craft types include victualling inshore craft, seaplane tenders and RAF Air Sea Rescue Launches. The fact that so many service vessels survive may be linked to the numbers of surplus vessels available after the war and by a desire to commemorate without engaging in the very expensive task of preserving a large ship.

2.3.9. Leaving aside the generic type Admiralty vessels (152 wrecks), the two most common types of military wrecks in the NMR from this period are patrol boats (99) and minesweepers (59). This reflects the wartime need to supplement existing military vessel stocks by requisitioning, and the dangerous roles to which such vessels were often assigned, as well as perhaps the greater vulnerability of vessels that were not purpose-built for the tasks that they were expected to accomplish (see **Section 5**).

Departure, Destination and Registration

2.3.10. Querying departure, destination and registration is a complex and therefore time-consuming task. As a result the discussion below is limited to wrecks of 1939-1945.

2.3.11. A total of 147 places of departure are recorded amongst the wrecks (**Appendix I: Table 3**). These have been grouped by country (**Appendix I: Table 3** and **Figure 6**). The ten most common countries of departure are shown in **Table 15**.

Country of Departure	No. of wrecks
England	273
Wales	28
Scotland	21
USA	18
France	15
Canada	8
Channel Islands	8
Norway	7
Belgium	6
Netherlands	4

Table 15: Wrecks queried by most common country of departure

2.3.12. Altogether 205 individual destinations are recorded (**Appendix I: Table 4**. These areas were grouped by country (**Appendix I: Table 4** and **Figure 6**). The ten most common countries of destination are shown in **Table 16**.

Country of Destination	No. of wrecks
England	270
France	23
Wales	15
Scotland	33
Australia	7
USA	7
Sweden	6
North Sea	5

Country of Destination	No. of wrecks
Argentina	4
Canada	4

Table 16: Wrecks queried by most common country of destination

2.3.13. The results of these queries show that the majority of the wrecks either departed from, or were destined for, England before sinking. The greatest number had cleared (departed) from or were due to enter London (66 and 61 wrecks respectively). Given that the Thames Estuary was arguably the world's busiest seaway during the war, with the Port of London handling a third of British foreign trade (Hewitt 2008:23), this is consistent with historic records. The second most common place of departure and destination in England was the River Tyne (26 records). **Tables 17** and **18** list the most common places in England with regard to departure and destination.

Place of Departure (England)	No. of wrecks
London	66
River Tyne	26
Blyth	17
Kingston upon Hull	17
Falmouth	11
Sunderland	11
Southampton	9
Portsmouth (Hampshire)	7
Hartlepool	6
Southend-on-Sea	6

Table 17: Wrecks queried by most common place of departure (England)

Place of Destination (England)	No. of wrecks
London	61
River Tyne	26
Portsmouth (Hampshire)	15
Kingston upon Hull	11
Blyth	8
Plymouth (Devon)	8
Cowes	7
Fowey	7
Southampton	7
Falmouth	6

Table 18: Wrecks queried by most common place of destination (England)

2.3.14. There are 55 places of registration recorded amongst the wrecks (**Appendix I: Table** 5). These have been grouped by country in **Table 19**.

Country of Registration	No. of wrecks
England	109
Norway	15
Scotland	12
Netherlands	11
USA	6

Country of Registration	No. of wrecks
Wales	5
Belgium	4
Greece	4
Poland	3
Sweden	3
Ireland	2
Denmark	1
France	1

Table 19: Wrecks queried by country of registration

2.3.15. The largest number of wrecks is recorded as having been registered in England. London is by far the most common port of registration with 60 wrecks.

2.3.16. These results suggest that inshore shipping activity was dominated by the ports of London and the Tyne. This is the same pattern that was observed for the period 1914-38.

2.3.17. The common factor explaining this and linking the two ports appears to be the transportation of coal. Of the 61 wrecked vessels that had been due to enter London before they were lost, just under half (46% or 28 wrecks) were carrying coal or coke. Similarly, of the 26 wrecked vessels which are recorded as having departed from the River Tyne on their final voyage, 73% (19 wrecks) were carrying coal or coke as a cargo.

2.3.18. Coal is by far the most common type of cargo in this period and is recorded for 104 wrecks. Other common cargoes included ballast (86 wrecks) and general cargo (48 wrecks). Other cargo types are far less common.

2.3.19. It should be noted that the ordinary meaning of ballast is additional weight carried in a ship to ensure stability and trim (Dear and Kemp2006: 29). Whilst it can be bulk cargo, a ship that is recorded as being in ballast is generally without a cargo.

2.3.20. The east coast coal trade was the most important trade in British inshore waters during the 18th and 19th centuries. Coal was the major fuel. However the coal trade had suffered in the interwar years due to the economic slump and the growing use of oil as a fuel source. Coal ports such as those on the Tyne, which were also often associated with the declining shipbuilding industry, suffered badly (Jackson 1983:142).

2.3.21. However, rearmament and then the demands of war boosted coastal trade (Hewitt 2008:10). The war caused a boom in demand for coal and production increased from 500 million tons in 1940 to 684 million tons in 1944 (Ossian 2007:655). In 1939, the capital alone needed a minimum of 40,000 tons of coal each week (Hewitt 2008:20). The volume of coal required meant that it had to be carried coastwise in order to get it from the north-east coalfields to where it was needed. Unfortunately this route was extremely vulnerable to attack by enemy aircraft, submarines, mines and fast attack craft. This accounts for the prevalence of coal as a cargo and the Tyne and London as departure and destination points.

2.3.22. **Table 20** shows that whilst coal remained a very common cargo in the period 1939-1945, it was less important than in 1914-1938. Somewhat surprisingly, given the growing importance of oil as a fuel, the proportion of wrecks that were carrying oil is very low. Similarly, of the 60 wrecks of the period 1946-1950, only one, the *Saint Guenole* (NMR **UID 1520054**) is recorded to have carried oil as a cargo when lost. This suggests that the decline of coal was not necessarily directly linked to an increase in the use of oil. However, the statistics may be distorted by the fact that

whilst Britain was self-sufficient in coal, it relied for its oil on imports. Therefore, it may be that oil tanker wrecks are more likely to occur outside of territorial waters than they are within them.

Date	Coal		Oil	
	Total	%	Total	%
1860-1913	74	14%	4	<1%
1914-1938	335	25%	13	<1%
1939-1945	104	12%	9	1%

Table 20: Wrecks queried by cargo (coal and oil)

2.3.23. In terms of departure and destination, Liverpool is poorly represented. This is surprising. For the period 1860-1913, Liverpool was the most common place of departure, destination and registration (57 and 36 wrecks and 47 records respectively). Whilst it was less dominant in 1914-38, it remained within the top five places of departure and destination (17 records) and registration (35 records).

2.3.24. By 1939-1945, whilst Liverpool is the second most represented place of registration with eight records, it possess relatively low levels of representation with regard to departure and destination, with just one and four records respectively.

2.3.25. This may, in part, be explained in the same way as that of oil transportation. Liverpool's importance lay in its role as a 'port of empire'. Whilst it had a significant role in coastal trade, its main importance lay in the import and export trade, particularly in terms of its transatlantic links. Liverpool was vital during WWII, when it was both Britain's main base for fighting the Battle of the Atlantic and the main port of entry for American raw materials, manufactured goods and troops. The approaches to Liverpool were well defended and a considerable distance from German air and naval bases. Therefore although huge numbers of ships used Liverpool during the war, most of the ships lost whilst travelling to or from Liverpool were probably sunk at some distance from the port and well outside of territorial waters. Liverpool may therefore be better represented as a port of departure and destination in the deep waters of the Atlantic than it is in Liverpool Bay.

Nationality

2.3.26. The nationality of wrecks was queried and the results are shown in **Appendix I: Tables 6a/6b** and **Figure 6**. The five most common nationalities are shown in **Tables 21** and **22**.

Country	No. of wrecks
British	484
English	118
Dutch	38
Norwegian	38
German	27

Table 21: Wrecks queried by most common nationality (1939-45)

Country	No. of wrecks
British	22
English	11
American	6
Greek	5
Welsh	3

Table 22: Wrecks queried by most common nationality (1946-50)

2.3.27. The most common nationality for 1939-45 and 1946-50 is British (484 and 22 wrecks respectively), with English second (118 and 11 wrecks). Given that English vessels are also British, it can be appreciated that a very great majority of wrecks of this period are British. This is not surprising as the study area is inshore and the bulk of coastal shipping in this period appears to have been British-owned.

2.3.28. The relatively high representation of Dutch and Norwegian vessels (over 10%) amongst known wrecks for the period 1939-1945 is consistent with historical sources (**Table 21**). A large proportion of both Dutch and Norwegian vessels were requisitioned. More than 7,000,000 tons of merchant ships were requisitioned by Britain following German military conquests on the continent, including 3,800,000 tons of Norwegian fleet and 2,620,000 from the Netherlands (Maxwell 1943:134). In addition to those requisitioned, a large number of Dutch and Norwegian ships were also voluntarily offered to the Ministry of War Transport.

2.3.29. At the outbreak of WWII, the Norwegian merchant fleet was the fourth largest in the world (Dear & Foot 2001:640). After the fall of Norway in April 1940 the Germans were able to acquire control of a number of small ships in Norwegian waters. However, 85% (c.1000 ships) of the Norwegian merchant fleet were requisitioned for service with the Allies (Dear & Foot 2001:640). These vessels were administered on behalf of the Norwegian government-in-exile by the Nortraship organisation from its headquarters in London and New York, an organisation which is credited for its major contribution to the Allied war effort. By the spring of 1942, over 40% of the UK's imports of oil and petrol were being transported in Norwegian tankers (Dear & Foot 2001:640).

2.3.30. A similar situation occurred in relation to the Dutch ships. Following the German invasion of the Netherlands in May 1940, the Dutch government moved to England. In the same month it began to send ships across the North Sea to join the British fleet (State 2008:190). As a result, most of the Dutch merchant fleet remained intact but under British control.

2.3.31. The high proportion of German vessels is readily explained by the fact that the German navy was a major combatant, engaging in campaigns in British home waters throughout the war. Of the 27 German wrecks, a large proportion are U-boats (22 wrecks).

2.3.32. In the aftermath of WWII there are a significant number of vessels of American or Greek nationality (**Table 22**). The number of American vessels during this period is probably linked to the very large number of merchant ships built in American yards during the war. Half of the American wrecks of this period were Liberty or Victory ships (*Luray Victory* NMR **UID 1523903**, *North Eastern Victory* NMR **UID 1523927** and *Ira* NMR **UID 1523933**).

2.3.33. Greek shipowners successfully exploited opportunities available in the international bulk freight market in the post-war period (Pallis 2007:4). This was facilitated by the Greek government's purchase of 100 Liberty ships in 1946 (Thanopoulou 2007:51). Of the five Greek vessels listed in the post-WWII known resource, all are cargo vessels. Two are recorded as having been carrying bulk commodities at the time of loss (*Varvassi* NMR **UID 1521915** carrying iron ore and the *Ira* NMR **UID 1523933** carrying coal). Two more were travelling in ballast, presumably after discharging their cargoes (*Thira* NMR **UID 1520969** and *Zephyros* NMR **UID 1525620**). The *Ira,* recorded as both American and Greek in nationality, is a Liberty ship.

Summary

2.3.34. A consideration of the special interest of wrecks on the basis of their craft type is reviewed on a thematic basis in the relevant summary sections of **Section 3** and will not be repeated here.

2.3.35. With regard to departure, destination and registration, a vessel may be regarded as having special interest on the basis of its setting and context. For example, vessels associated with the port of London, which handled a third of British foreign trade during WWII (Hewitt 2008:23), are likely to be regarded of special interest on the basis of their association with the dominant port in Britain during this period. In the same way, vessels associated with the ports of the north-east of England, a region whose export of industrial goods was essential to the survival of Britain, may also be regarded of special interest. It follows that vessels relating to dominant ports are high in numbers and must thus attain further factors which contribute towards special interest.

2.3.36. A key factor and example in this respect brought to light throughout the review in relation to departure and destination is the transportation of coal; an essential commodity, the importance of which was greatly enhanced during wartime. Vessels which may be regarded as representing the east coastal coal trade may thus be regarded of particular special interest on the basis of this representation. Whilst abundant in the known resource for the period 1939-1950, vessels which facilitated the transportation of coal are important insofaras they reflect the continuation of the routine movement of cargo in the face of great adversity. Vessels such as the *Sheaf Field* (NMR **UID 912650**), which was lost whilst en route from Newcastle to London laden with coal, may be regarded as of special interest in this respect.

2.3.37. A wreck may be further regarded of special interest on the basis that it is unique or representative of a significant group. Where that group is very large, as is the case for British vessels, the extent of an individual vessel's special interest will almost certainly depend upon additional factors. Those wrecks that are representative of the involvement of key non-belligerents in the British fleet may also be regarded of special interest. Vessels of Dutch or Norwegian nationality provide examples in this respect.

2.3.38. A wreck may also be of special interest on the basis that it is representative of important post-war developments. For example, the rise of the Greek and US merchant fleets is represented by the wrecks of a number of standard vessels built during the war.

2.4. LOSS

2.4.1. Loss explores the numerous different circumstances in which a boat or ship may be lost. Loss encompasses date of loss and place of loss. It also includes the extent of any loss of life, which undoubtedly plays a significant part in determining the special interest of a particular vessel.

Date of Loss

2.4.2. The date of loss of the wrecks of this period by year is shown in **Table 23** and **Figure 7**. The largest number of losses occurred in 1940 (289 wrecks). The number of wrecks lost in English territorial waters in 1941 was 206. Thereafter the number lost per year declined dramatically to just 53 in 1945. These results are generally consistent with historical sources.

Year of Loss	No. of wrecks
1939	105
1940	289
1941	206
1942	75
1943	42
1944	77

Year of Loss	No. of wrecks
1945	53

Table 23: Wrecks queried by year of loss

2.4.3. With the lessons of WWI very much in mind, the Admiralty instituted the convoy system from the outset of WWII in order to protect merchant shipping against the threat of a submarine offensive. However, the use of convoys did not eliminate the threat to merchant shipping. The fall of France in 1940 provided the Germans with naval and aircraft bases close to the English coast and the convoy routes (Williamson 2007:12).

2.4.4. Realising the importance and vulnerability of coastal shipping, the Germans used submarines, fast attack craft such as E-boats, mines and aircraft to attack it (Hewitt 2008:119). They also used the narrow approaches to some of England's major ports to inflict heavy damage on foreign-going shipping, particularly through the use of mines. Axis successes in other theatres, particularly in the early phases of the Battle of the Atlantic, drew British resources and attention away from inshore waters. While they held the upper hand, the German military forces were able to inflict problematic losses on British shipping in inshore waters. The high number of wrecks in 1939-41 reflects this period of German advantage.

2.4.5. However, as the war turned against Germany and the bulk of its forces were shifted east to face the Soviets, the British gradually gained increasing control of inshore waters through naval and air superiority. Losses, particularly from aircraft, declined. Allied air and naval forces operating in inshore waters grew in strength, aided by the US Navy after its entry into the war in 1941and the release of naval vessels from the Mediterranean theatre (Friel 2003:245). Successful code-breaking gave the Allies a strategic and operational advantage, and increasingly effective anti-submarine tactics and equipment handed them much of the tactical advantage.

2.4.6. As a result of this shift in advantage Allied merchant ship losses had started to fall by the end of 1942. From March 1943 onwards (with the exception of July) merchant ships losses in all theatres never rose above 100,000 tons per month for the rest of the war (Friel 2003:247). This dramatic change in fortunes is also reflected in the wreck evidence.

2.4.7. Having lost the Battle of the Atlantic by 1943, the Germans switched the focus of their submarine campaign to UK continental shelf and inshore waters. Although the losses that resulted were serious, they were also manageable. This is reflected in the wreck evidence, which shows a broadly static loss rate from 1943 onwards.

2.4.8. Overall the evidence from the wrecks demonstrates how great the contribution of WWII has been to the number of wrecks in English territorial waters. This contribution is strongly phased, with most of the wrecks attributable to the period 1939-41.

Manner of Loss

2.4.9. A total of 24 causes of loss are recorded for the period 1939-1945 and 14 for 1946-1950 (**Appendix I: Table 7** and **Figure 7**).

2.4.10. Foundering is the most common cause of loss recorded by the NMR between 1939 and 1945 (424 wrecks). A high proportion of these appear to have foundered as a result of being attacked. The period 1939-50 is a period dominated by war. The fact that enemy action, in the form of mining (333 wrecks), bombing (119), torpedoes (113) and gun action (22), is common as a cause of loss is not surprising. Comparison with the 1914-1938 wrecks reveals significant differences in the character of enemy action during the two world wars. During WWI the number of ships mined is much smaller as a proportion of the number of losses caused by the

four types of enemy action listed above. However, the proportion torpedoed in WWI is much greater. Although a few wrecks were lost as a result of bombing in WWI, this proportion was much greater in WWII.

2.4.11. German reliance in WWII on the aircraft and the mine (often delivered by the aircraft) is linked to interwar technological advances, the emphasis placed by the German submarine force early in the war on their Atlantic campaign, and the intensive defence mounted by British coastal forces against German surface and submarine units.

2.4.12. Aircraft construction and design developed rapidly in the interwar years. By the late 1930s both sides in the future conflict had both single- and twin-engine monoplane bombers capable of being used to attack shipping in both inshore and offshore environments (English 1992:157). These rapidly developed during the war and the British, aided by radar, were able to develop very effective anti-submarine aircraft.

2.4.13. The mine represented a particularly potent and less vulnerable threat. It was cheap, relatively permanent, and could be deployed even in well-defended environments (McBride 1992:110). It is therefore no surprise that analysis of the wrecks of this period suggests that it was the most important offensive weapon of the war in territorial waters.

2.4.14. The effectiveness to the Germans of the aircraft as an offensive weapon was reduced by increasing Allied air superiority. The threat from German bombers was largely eliminated, particularly after the liberation of France in 1944.

2.4.15. The effectiveness of Allied aircraft also diminished late in the war. Their effectiveness as an anti-submarine weapon, so crucial in winning the Battle of the Atlantic, was eroded by the German adoption of snorkel technology and radar detectors. The submerged ambush tactics that snorkel technology allowed meant that the aircraft actually became less effective, at a time when U-boat strategy had changed and the submarine threat had become concentrated in inshore and continental shelf waters around Britain and Ireland. However, this change of tactics and technology came too late to affect the outcome of the war.

2.4.16. The reduction in the effectiveness of aircraft is probably reflected in the cause of loss statistics for the wrecks. These suggest that mines were more than twice as effective overall.

2.4.17. The standard form of mine used throughout WWI and WWII was a contact mine. This was a moored mine laid in comparatively shallow water which exploded on impact (MacArthur 1943:98). This remained the type of mine most widely used up to the end of WWII (Akerman 2002:55).

2.4.18. The development of mine technology also resulted in the deployment of the magnetic and acoustic mines. Invented by the British at the end of WWI, it was the German navy that continued to develop the magnetic mine during the interwar period and who introduced it to combat in 1939 (Hewitt 2008:49). The magnetic mine rested on the seabed and responded to the distortion of the earth's magnetic field caused by a passing ship. Magnetic mines caused damage by their shockwave rather than as a result of direct contact. They were laid by German submarines, destroyers and aircraft in shipping channels around British home ports (Watts 1994:146). In order to meet the threat, the magnetic signature of Allied ships could be temporarily neutralised by a process known as 'degaussing'. Degaussed ships could sail over a magnetic mine without activating the compass needle which controlled the trigger of the mine (MacArthus 1943:98).

2.4.19. The acoustic mine was first used in the war by the Germans in 1940. Acoustic mines were detonated by the sound vibrations produced by the propellers and engines of ships passing close to them. In late 1940, an acoustic mine was

accidentally dropped on Allied territory, enabling it to be dissected and the frequency of the sound waves to which it responded to be discovered (Hewitt 2008:122). This assisted the Allies in developing acoustic countermeasures.

2.4.20. Other developments during the war saw the introduction in July 1941 of the combined magnetic and acoustic mine. However, British countermining specialists had correctly predicted this development and the countermeasures they devised meant that its impact was negligible (Hewitt 2008:142). Pressure mines, code-named 'Oyster' mines by the Allies, were introduced in June 1944. These responded to changes in water pressure caused by a ship passing overhead at high speed (Campbell 1992:186; Hewitt 2008:209). An 'oyster' mine was recovered intact by the Allies. This enabled a table of safe speeds to be calculated for every type of vessel, which helped reduce losses (Hewitt 2008:209).

2.4.21. The Germans continued to lay mines right up to the end of the war. This and the use of increasingly varied mine types meant that sweeping the coast became far more complex. Every convoy was preceded by combinations of acoustic, magnetic and conventional minesweepers (Hewitt 2008:123).

2.4.22. There had been little effort put into the development of minesweepers during the interwar period. Consequently the extensive minesweeping required around the British coast necessitated the requisitioning of a great number of civilian vessels. This lack of preparation arguably contributed to the number of vessels lost and therefore the number of wrecks.

2.4.23. Boats and ships passing through English waters during the period 1946-1950 were not subject to hostile attack. Torpedoing and most other wartime causes of loss are therefore entirely absent. Instead foundering is the most common cause of loss for 1946-1950 (28 wrecks) followed by stranding (13). A significant proportion of wrecks are also reported to have been lost following a collision, indicating that advances in the technology and provision of navigational aids during the 20th century were not yet fully effective. However, shipping remained vulnerable to the legacy of the war. Despite intensive efforts to remove all mines from territorial waters, some losses continued to occur. Of the 49 wrecks recorded as lost in 1946-1950, three were lost after hitting a mine (*Volante* NMR **UID 1472720**, *Betty Hindley* NMR **UID 1525403** and *Denham* NMR **UID 1525739**).

2.4.24. Gun action that was not hostile claimed another vessel, HMS *Buccaneer* (NMR **UID 1521004**). This warship is recorded as having been lost during a gunnery exercise in 1946, when it was accidentally struck by a shell intended for the target it was towing.

Place of Loss

2.4.25. The distribution and density of wrecks of the period 1939-1945 is shown in **Figure 7**.

2.4.26. The results of this study show a notably high concentration of wrecks along the east coast, particularly in the Thames Estuary. This high concentration of wrecks reflects the high number of shipping movements along the east coast during WWII and the vulnerability of east coast convoy routes and the approaches to the Thames to enemy action. It is entirely consistent with historical records of wartime losses.

2.4.27. The Port of London was an important part of Britain's wartime economy. Before the war it was the world's busiest port and despite heavy bombing it continued to provide a vital distribution centre for imported goods and raw materials. The approaches to London were close to German air and naval bases after the fall of France in 1940. Constrained by navigational hazards, ships approaching or leaving London were therefore highly vulnerable to attack, particularly by the aircraft and the mine. It is therefore no surprise that large numbers of wrecks of this period are present in the Thames Estuary and its approaches.

2.4.28. The wrecks of this period are fairly well distributed. However, there are few of this period in the Wash and its approaches, along the north Norfolk coast and off the north-west coast north of the approaches to Liverpool.

2.4.29. The lack of wrecks in the Wash and north Norfolk areas is also apparent in the 1914-1938 dataset. This is surprising. The area has little shelter from north-easterly winds. It is characterised by many mobile sandbanks and shoals which are not only hazardous to shipping but also tend to provide good preservation environments for wrecks. As a result the approaches to the Wash are categorised as having both a high potential for ship losses and for the survival of archaeological material from them (Parham and McElvogue 2005).

2.4.30. There are several potential reasons for this lack of known wrecks in this area. Arguably the most obvious is that the Wash was off course for east coast shipping, the area being avoided due to its nature as a hazardous environment. As such, only vessels bound to or from specific Wash ports will have passed through this area. With submarines also unlikely to have entered this hazardous environment, those ships which did pass through the Wash are unlikely to have been subject to the same level of hostility as those traversing the principal shipping routes.

2.4.31. There is also a greater propensity for wrecks in this area to be concealed under mobile sand. The NMR is based upon hydrographic survey, which is often difficult and incomplete in its coverage in this type of environment. The NMR appears to record no casualties in named locations associated with the Wash. However, there are 75 associated with the north Norfolk coast, which suggests that there are likely to be more wrecks present than are currently recorded.

Lives Lost

2.4.32. The hostilities of WWII resulted in great loss of life at sea. Some 51,000 seamen serving in the Royal Navy are recorded to have lost their lives during WWII, alongside over 30,000 British merchant seamen and 102 Wrens (Friel 2003:248; Roskill 1998:447; Williamson 2007:5). Thousands more lives were lost from the American and other Allied merchant navies. One in 26 US mariners serving onboard merchant vessels in WWII is recorded to have died in frontline duty (Williamson 2007:5). German losses are also high, particularly amongst the U-boat crews. Just over 30,000 of the 39,000 German sailors who served in U-boats would never return, the highest casualty rate of any branch of any armed force in modern history (Williamson 2007:5).

2.4.33. The records held by the Commonwealth War Graves Commission list a total of 35,978 lives lost at sea between 1st September 1939 and VE Day (8th May 1945). A further 759 lives are recorded to have been lost between 9th May 1945 and 30th December 1947. The lives lost include members of the British, Australian, Canadian, Indian and New Zealand Merchant Navies along with those who were working in the fishing industry.

2.4.34. The results of a query on loss of life shows that of the 861 wrecks recorded by the NMR, 22% contain information relating to loss of life (**Table 24**). The total number of lives recorded as lost in 1939-46 is 3,312 and 26 in 1946-1950. These figures do not include wrecking incidents for which the total of lives lost is not recorded numerically or is unknown, for example if the casualties are simply recorded as ‘all’ (*Irishman* NMR **UID 805557**, *Lion* NMR **UID 904738**, HMS *Avanturine* NMR **UID 911915** and *Marguerita* NMR **UID 1521055**).

Casualties	No. of wrecks (1939-45)	No. of wrecks (1946-50)
Loss of Life	186	6
No Casualties	675	43

Table 24: Wrecks queried by lives lost

2.4.35. Of the 186 wrecks that are associated with loss of life, the majority (169 wrecks or 91%) refer to casualties of between one and 50 persons. All of the six vessels associated with loss of life in 1946-50 fall within this category. Of the 1939-1945 wrecks, eight involved the loss of 51-100 lives. There are five wrecks in which more than 100 lives were lost: the *Sambut* (NMR **UID 901834**); the *Emile Deschamps* (NMR **UID 904914**); the HMS *Vortigern* (NMR **UID 907560**); the HMS *Acheron* (NMR **UID 1163514**) and the HMS *Boadicea* (NMR **UID 1402696**). Together, these amount to about 3% of the total number of wrecks recorded by the known resource for the period 1939-1945.

2.4.36. Whilst these figures suggest that 676 of the vessels lost between 1939 and 1945 are not associated with loss of life, this is unlikely to be the case. The records for only 18 wrecks explicitly state that no loss of life occurred during the wrecking incident. There is therefore potential for a significant proportion of the remaining 658 wrecks to be associated with loss of life which is not currently recorded.

2.4.37. Given the very high crew losses suffered by the U-boats, it is unsurprising that three of the eight wrecks recorded as having involved the loss of 51 and 100 lives were U-boats (*U1018* NMR **UID 918662**, *U247* NMR **UID 919799** and *U323* NMR **UID 1450560**).

2.4.38. By the end of WWII, 329 passenger vessels had been destroyed resulting in 50,329 known casualties (Williams 1997:225). The greatest loss of life occurred as a result of the sinking of the *Emile Deschamps* (NMR **UID 904914**), a passenger ship and requisitioned auxiliary minesweeper, which was lost while transporting troops and refugees during the Dunkirk evacuation on 3rd June 1940. Between 300 and 400 lives were lost. Operation Dynamo, as it was known, resulted in the loss of about 7,000 Royal Naval personnel. It is doubtful whether any other single naval battle was as costly as this during the war (Wells 1994:178).

Summary

2.4.39. With regard to loss, WWII has clearly had a dramatic impact upon England's shipwreck heritage, being responsible for a significant proportion of the known wrecks in territorial waters. It has also added types of vessels to the archaeological record that rarely occur without the involvement of enemy action, most notably warships such as submarines. However, the ubiquity of WWII wrecks means that the involvement of WWII in the loss of an individual vessel is not in itself sufficient to suggest special interest.

2.4.40. A wreck might be regarded of special interest if it was sunk by a new form of offensive weapon. In this respect, vessels which were lost as a result of magnetic, acoustic or pressure mines may be regarded of special interest. Similarly, vessels lost as a result of being attacked by aircraft may be of special interest. However, these representative groups are relatively large. Therefore, unless there was something particularly unusual about it (for example, if it was the first vessel sunk by the weapon) additional contributory factors would be required before a wreck could attain a high degree of special interest.

2.4.41. Setting is significant in terms of special interest. Places of loss in parts of the coast that acquired special wartime importance, such as the major convoy port of Liverpool, is likely to contribute to special interest. Association with areas of

particularly intense hostile activity such as the approaches to London in the Thames Estuary is also likely to add to special interest. If a wreck is in an area that currently has few wrecks of this period, such as the north Norfolk coast and the Wash, then this is likely to contribute to its special interest.

2.4.42. Vessels associated with loss of life can have special interest with regard to the issue of respect. This special interest is likely to be enhanced by the fact that it is still within living memory. Loss of life is likely to be particularly relevant where the casualties were high. Sites such as the *Sambut* (NMR **UID 901834**), the *Emile Deschamps* (NMR **UID 904914**), the HMS *Vortigern* (NMR **UID 907560**), the HMS *Acheron* (NMR **UID 1163514**) and the HMS *Boadicea* (NMR **UID 1402696**) are likely to be regarded of special interest in this respect, as their wrecking resulted in the loss of over 100 lives each. Designation under the Protection of Military Remains Act 1986 (PMRA) is likely to further enhance this (for example, the *Vortigern*, *Acheron* and *Boadicea* are all Protected Places).

2.4.43. However, this in itself should not discount the special interest of vessels with a lesser loss of life. The wrecking of a smaller vessel with the result that all hands were lost may represent a tragedy for a small community with a high impact on living memory. Loss in this respect must not be considered as secondary to wrecking incidents which, whilst resulting in an overall greater loss of life, may represent the loss of a smaller relative proportion of those on board. An example from more recent years (1981) which well illustrates this is the Penlee lifeboat disaster, in which the Penlee Lifeboat went to the aid of the *Union Castle* in heavy seas. During the event both vessels were lost with all hands. The living memory of this incident is such that each year, the Christmas lights in the village are turned off for an hour on the anniversary of the disaster as an act of remembrance. Whilst just 16 lives were lost, tragedies of this scale are nonetheless deserving of special interest on the basis of their local importance and community respect.

2.4.44. The importance of loss of life to the special interest of wrecks of this period is sufficiently high to suggest that this aspect of the NMR is likely to be regarded as a priority area for enhancement in order to make this data more easily retrievable to the user. In order to avoid an assessment of special interest based on value judgements, a field entitled ‘loss of life’ recorded as either ‘yes’, ‘no’ or ‘unknown’ would be useful in enabling a wreck sites which are confirmed to have associated life loss to be easily retrievable from the wreck data.

2.5. SURVIVAL

2.5.1. The special interest of a boat or shipwreck will be affected by the degree to which the physical remains giving rise to that interest have survived (Wessex Archaeology 2008:9). This can be gauged in terms of completeness, although in some cases the interest may be so great that even fragmentary remains are considered to be of ‘special’ interest (Wessex Archaeology 2008:9).

Seabed Survival

2.5.2. Wrecks assigned to each of the nine classes of seabed survival used by the project are shown in **Table 25** and **Figure 8**. Where no reference is made in the NMR record to the condition of the wreck, seabed survival has been classed as unknown.

Seabed Survival	No. of wrecks (1939-45)	No. of wrecks (1946-50)
Unknown	384	14
Broken Up	178	15
Dispersed	130	4
Mainly Intact	60	8

Seabed Survival	No. of wrecks (1939-45)	No. of wrecks (1946-50)
Partially Intact	55	2
Buried	19	3
Poor	19	3
Partially Buried	10	-
Flattened	3	-

Table 25: Wrecks queried by seabed survival

2.5.3. The survival of just under half (45%) of the wrecks is unknown. This is not surprising. A large number of the wrecks remain un-dived or at least not reported as having been dived. Many have been identified by hydrographic survey, which may provide little or no evidence concerning the condition of the site on the seabed.

2.5.4. Broken up is the most common class of survival (178 wrecks or 37% of the wrecks with survival information). Only 12% (60 wrecks) are described as being mainly intact, with a further 11% (55 wrecks) as partially intact. The 1946-1950 wrecks are broadly similar. Broken up is the most common survival class.

2.5.5. On the basis of the above, wrecks of this period that are intact or partially intact can currently be described as rare. The reasons for this are likely to be complex and lie outside of the scope of the project. However, many were destroyed by an explosive force from bombs, mines or torpedoes and will have broken up during loss. Others will have been subject to post-salvage salvage and clearance. All will have been subject to the effects of corrosion and some will have been subject to wave action.

2.6. INVESTIGATION

2.6.1. Very few of the wrecks dating to this period are recorded as having been subject to documented archaeological investigation.

2.6.2. Of the 861 wrecks, only two of this period, the *Himalaya* (NMR **UID 904647**), the *Richard Montgomery* (NMR **UID 904735**) and the *Sphene* (NMR **UID 1527827**) are recorded as having been subject to archaeological investigation by the Archaeological Diving Unit (ADU) between the 1980s and 2002.

2.6.3. The *Himalaya* was a three-masted iron vessel constructed in 1853 as a passenger steamship. In 1854, it was purchased as a troopship for the Crimean War and in 1894 became a coal hulk. It foundered in Portland Harbour, having been bombed in 1941. The site of the wreckage was investigated by the ADU in September 1994. The wreck was subject to dispersal in the 1940s and it was noted during the site visit that the wreck was under little threat from diving because it was unattractive and the diving conditions were poor (ADU 1994).

2.6.4. The *Richard Montgomery,* an American Liberty ship which stranded on Sheerness Middle Sand in 1944, has also been subject to a number of investigations. Containing approximately 1,400 tons of explosives within its forward holds, the *Richard Montgomery* is currently designated under Section 2 of the Protection of Wrecks Act 1973. A mix of geophysical and diving survey work has been undertaken in order to monitor the stability of the wreck and its cargo. None of these surveys, including the ADU survey, have been designed primarily as archaeological surveys.

2.6.5. The *Sphene* (NMR **UID 1527827**), a 1946-50 loss, is also recorded to have been investigated by the ADU. The *Sphene* was a Scottish collier en route from Barry to London with coal at her time of loss. The ADU investigated the wreck in August 1989. Previous salvage was noted on the site and it was believed to be visited regularly by sport divers (ADU 1989). The purpose of the ADU work is not known.

2.6.6. The Liberty ship *James Eagan Layne* (NMR **UID 919773**) is the subject of current archaeological research. It was lost after being torpedoed off Plymouth in 1945. In order to mark the 70th anniversary, the Liberty 70 Project has been established with the aim of documenting all aspects of the life of the vessel. Its role as a wartime transport vessel, as a shipwreck site, as a site of commercial salvage and as a wreck dive and artificial reef will be investigated (http://www.promare.co.uk /liberty70/index.htm). In response to the ongoing deterioration of the site under the action of waves and currents, the Liberty 70 Project aims to record the wreck as it is today in a detailed 3D computer model. Work began on the Liberty 70 Project in 2010.

2.6.7. Three wrecks have been adopted as part of the 'Adopt-a-Wreck' scheme run by the Nautical Archaeological Society. Two wrecks, the *Louis Shied* (NMR **UID 832189**) and the *Black Hawk* (NMR **UID 832473, 904592** and **904665**) have been adopted by Two Thirds Blue Sub-Aqua Club and the Winfrith Sub-Aqua Club respectively. The extent to which investigations of an archaeological nature have taken place on these sites is unknown. The HMS *Northcoates* was adopted by the Mole Valley Sub Aqua Club (MVSAC) and is reported to have been the subject of a visual and photographic survey linked to recreational diver training.

2.6.8. Archaeological investigations conducted by Wessex Archaeology in respect of the London Gateway port development have resulted in geophysical and diver surveys on a number of WWII wrecks recorded by the NMR in the Thames. These include:

- the collier *Letchworth* sunk in 1940 (NMR **UID 904766**);
- the cargo vessel *Ryal* (NMR **UID 904811**);
- the requisitioned trawler *Amethyst* (NMR **UID 904800**);
- the Admiralty trawler *Ash* (NMR **UID 904779**);
- the requisitioned yacht *Aisha* (NMR **UID 904791**);
- the Trinity House vessel *Argus* (NMR **UID 904776**);
- East Oaze Light Vessel (NMR **UID 904787**).

2.6.9. Ten of the wrecks lost in 1939-45 are designated under the PMRA. All of these vessels are designated as Protected Places. No archaeological investigations are currently recorded by the NMR as having been undertaken on these sites. No wrecks lost in 1946-1950 are protected under this legislation.

2.6.10. Based on information available, it appears that only 10 of the wrecks listed by the NMR for the period 1939-1950 have been (or are currently) subject to any significant archaeological investigation (the London Gateway wrecks plus the *Himalaya*, the *Sphene* and the *James Eagan Layne*). In addition the survey of the *Richard Montgomery*, although not carried out for archaeological purposes, has provided much relevant information.

2.6.11. The lack of record of archaeological investigation suggests that with the exception of the Thames Estuary, archaeology has contributed very little to the study of the vessels or our understanding of the maritime history of this period. Whilst archaeological investigation has contributed to the special interest of a very few wrecks, it has contributed virtually nothing to our understanding of the special interest of the great majority. Almost all of the investigations have taken place have been incidental, arising out of hydrographical or geophysical surveys, the discovery of wreck-related debris and salvage works.

3. THEMATIC REVIEW

3.1.1. In order to provide a context for the assessment of special interest, the wrecks of this period have been reviewed in the light of published historical thematic studies. This review seeks to identify key trends, events and changes relating to the following classes of shipping use. Each of these is considered in turn:

- Transport (Cargo/Passenger)
- Military
- Industrial
- Fishing
- Law and Government
- Health and Welfare
- Commercial
- Agriculture and Subsistence
- Domestic
- Recreation

3.2. TRANSPORT

3.2.1. The impact of WWII upon transport vessels was significant. Britain's economy depended upon cargo and passenger ships. In 1938, ships brought to British ports cargoes weighing more than 67 million tons (Evans 1943:4). In 1939 Britain had to import 55 million tons of raw material by sea (Thompson 2003:76). Much of this was unavailable other than through imports. For example, every gallon of fuel burned by aircraft, tanks and ships had to come by tanker from North America or the Middle East.

3.2.2. As a result, the war effort required huge quantities of cargo to be carried by sea. Passenger vessels were also affected, with regular services ended and large numbers of vessels requisitioned as troop transports and hospital ships.

3.2.3. The wrecks of 1939-1945 are dominated by cargo vessels. **Table 26** below and **Figure 9** show the number of wrecks that fit into the 11 craft types recorded by the NMR that can be described as cargo transport vessels.

NMR Craft Type	No. of wrecks
Cargo Vessel	389
Armed Cargo Vessel	33
Tanker	32
Barge	31
Collier	23
Liberty ship	12
Coaster	8
Coal Hulk	1
Ketch	1
Tank Barge	1
Trow	1

Table 26: Wrecks queried by craft type (transport)

3.2.4. Although there are a significant number of cargo vessel wrecks, the overall numbers are small compared with the 2,714 vessels of the merchant fleet known to have been lost in WWII (Friel 2003:249).

3.2.5. The 1946-50 wrecks are also dominated by cargo vessels, with six different craft types represented (**Table 27**).

NMR Craft Type	No. of wrecks
Cargo Vessel	30
Coaster	4
Collier	4
Liberty ship	2
Victory ship	2
Tanker	1

Table 27: Wrecks (1946-50) queried by craft type (transport)

3.2.6. The NSBR and NHSR were also queried for all preserved cargo vessels (**Table 28**). It is notable that fewer cargo vessels are present in the preserved record than in previous periods; for example the NHSR listed 102 and 165 for the periods 1860-1913 and 1914-1938 respectively. This is most likely because these date ranges are much longer than the 11 year period of 1939-1950.

Resource	No. of cargo vessels
NHSR	21
NSBR	2

Table 28: NHSR and NSBR vessels queried by function type cargo

3.2.7. Of the recorded wrecks, only three craft types can be conclusively termed as passenger vessels. The number of wrecks recorded as being each craft types is shown in **Table 29** and is illustrated in **Figure 10**.

NMR Craft Type	No. of wrecks
Liner	9
Passenger Vessel	8
Ferry	2

Table 29: Wrecks queried by craft type (passenger vessels)

3.2.8. Taking into account duplications, there are a total of 14 wrecked vessels which were used for the transport of people (**Appendix 1**, **Table 8**). No such vessels are apparent for 1946-1950.

3.2.9. There are just 12 passenger vessels listed by the NHSR for the period 1939-1950. No passenger vessels are recorded in the NSBR dataset.

Build

3.2.10. The majority of transport vessels used during WWII were of pre-war construction and drew on technology which either dated to or did not differ greatly from that of the early 20th century (Lavery 2005:334). There had been a period of stagnation and lack of investment in the interwar years (Friel 2003:277).

3.2.11. The design of transport ships did not change greatly during the war. Shortages of labour caused by the conscription of 42% of the peacetime work force into the armed forces, shortages of raw materials and the difficulty in producing ships fast

enough to keep up with losses kept designs simple and discouraged shipyard innovation, except insofaras it made ships easier to produce. The bombing of shipyards and the demands of warship construction further inhibited innovation (Griffiths 1997:190; Woodman 2004:3). As a result the majority of transport vessels built in Britain during 1939-50 were of fairly basic design.

Propulsion

3.2.12. The most common method of propulsion for transport vessel wrecks is steam (**Table 30**).

Propulsion	No. of cargo vessel wrecks (1939-45)	No. of cargo vessel wrecks (1946-50)
Steam	306	22
Engine	52	10
Sail	5	1
Motor	1	1

Table 30: Wrecks queried by propulsion (transport)

3.2.13. The high proportion of steam-propelled vessels may in part be due to the reluctance of many ship owners to innovate. In the challenging business environment of the interwar years, owners were slow to accept what they perceived as expensive new forms of technology such as the diesel engine. For vessels constructed during the war years, wartime resources and capacity were scarce and the advantages of relying on familiar technology high (Griffiths 1997:197). There was also a greater tendency for ship and boat builders to conform to methods of propulsion which utilised Britain's substantial coal reserves, rather putting themselves in the vulnerable position of relying on foreign oil imports. This trend can be seen in the wrecks. Approximately one-third (133 wrecks) were fitted with a triple expansion engine, a type of engine developed in the late 19th century. Similarly, almost half of the 30 cargo vessels wrecked in 1946-1950 were fitted with a triple expansion engine (14 wrecks).

3.2.14. Although the number of wrecks is small, the NMR dataset also reveals an increasing use of more advanced forms of the steam plant during this period. Ten wrecked cargo vessels are recorded as having been fitted with a turbine engine. This amounts to 3% of the total number of cargo vessel wrecks listed for the period 1939-1945, in comparison to just 0.5% (four wrecks) in 1914-1938. The steam turbine engine became increasingly popular during the 20th century, following the development of the gear cutting machinery which enabled the different rotational speeds of the turbine and the propeller to be reconciled. No cargo vessels equipped with geared turbines were positively identified in the wrecks of 1914-1938. Of the 1939-50 wrecks, one cargo vessel, the 1922-built *Meriones* (NMR **UID 907481**) is recorded as having been equipped with a geared turbine engine. However, the likelihood is that some or all of the other turbine-equipped wrecks had geared turbines.

3.2.15. The conversion from coal to oil fuel is an important feature of the first half of the 20th century. The 1914-1938 wrecks suggest that ship owners were very reluctant to convert, with just four of the 868 cargo vessel wrecks (0.5%) recorded as having used an oil engine. However, as wrecks recorded by the NMR are sorted by date of loss, a significant proportion of the wrecks of 1914-1938 were built prior to and during WWI.

3.2.16. In comparison, the period 1939-1945 is likely to be more representative of the interwar years. Of the 389 cargo wrecks, 9% (34 wrecks) are recorded as having used an oil engine, a notable increase from the 0.5% of the previous period. On that basis it would appear that the use of oil fuel actually gradually increased during the

interwar period. This is probably at least partly because reduced demand from the military in the aftermath of WWI resulted in more bunker oil coming onto the civilian market and a consequential reduction in its price. This made oil-fired engines much more attractive to the cost-driven merchant shipping industry (Griffiths 1997:157). This trend appears to have continued during and after WWII and 13% of the cargo vessel wrecks of 1946-1950 used oil-fired engines.

3.2.17. Although steam remained the dominant method of propulsion amongst cargo vessels during this period, its use was declining. Whereas 35% (306 wrecks) of cargo vessel wrecks of this period were steam-propelled, the proportion was 53% (732 wrecks) in 1914-1938. The use of 'engines' appears to increase to 6% (52 wrecks) of cargo vessel wrecks, in comparison to less than 1% (11 records) in the previous period. A further increase is noted in 1946-1950, with 33% of cargo vessel wrecks propelled by an engine (10 wrecks). However, despite this, just three cargo vessel wrecks are recorded as having been equipped with a diesel engine (*Alex Van Opstal* NMR **UID 904632**, *Elzien* NMR **UID 1001486** and the *Pilsudsk* NMR **UID 1349050**). There are none in 1946-50.

3.2.18. Preserved cargo vessels have different characteristics. Of the 21 cargo vessels recorded by the NHSR, 15 used diesel engines (71%). This is at least partly because the NHSR sorts its records by date of build and thus encompasses vessels constructed within the period in question. Vessels in preservation are also quite likely to have been subject to refit in more recent years. For example, the coal barge *Marjorie R* (NHSR **ID 2277**) was built in 1946 and had a diesel engine installed in 1950.

3.2.19. Only two cargo vessels are listed by the NSBR for this period (*Ron's Boat* NSBR **ID 583** and unknown NSBR **ID 332**). Their propulsion is unknown.

3.2.20. **Table 31** shows the propulsion of passenger vessel wrecks for 1939-45. Half are recorded as having been propelled by an internal combustion engine whilst the other half are recorded as having been steam propelled.

Propulsion	No. of passenger vessel wrecks
Steam	7
Engine	7

Table 31: Wrecks queried by propulsion (passenger vessels)

3.2.21. On a whole, the passenger vessel wrecks do not appear not to have been restricted to older forms of propulsion to the same extent that the cargo vessels appear to have been. Of the seven wrecks listed to have been steam-propelled, just two (*Simon Bolivar* NMR **UID 908117** and *Carare* NMR **UID 1002987**) are recorded as having been fitted with a triple expansion engine. Another had a quadruple expansion engine (*Somali* NMR **UID 943559**). All three of the vessels listed had a tonnage of between 6,000 and 8,500 tons which is consistent with historical evidence that triple and quadruple expansion engines continued to be popular choices for lower powered vessels of under 10,000 gross tons (Maber 1980:42)

3.2.22. HMS *Southsea* (NMR **UID 908746**) built in 1930, is an oddity in that it was paddle-driven and had a compound engine, a combination more commonly encountered in vessels constructed in the mid to late 19th century. However, HMS *Southsea* was originally constructed as ferry operating between Portsmouth and the Isle of Wight, a task for which a paddle-driven compound engine would have been adequate.

3.2.23. Of the 12 passenger vessels listed by the NHSR for this period, just one has a triple expansion engine. This is the famous *Waverley* (NHSR **ID 90**), built in 1946 as an excursion paddle-steamer of 693 gross tons.

3.2.24. Of the remaining wrecks, two were propelled by a turbine engine (the *Cuba* NMR **UID 805091** and the HMS *Prince Leopold* NMR **UID 911734**). A further two had diesel engines (*Alex Van Opstal* NMR **UID 904632** and *Pilsudski* NMR **UID 1349050**).

3.2.25. Vessels equipped with a diesel engine are common in the NHSR, with ten of the 12 vessels listed having one. This comparatively high proportion may be explained in the same way as preserved cargo vessels.

3.2.26. Just under half of the passenger vessel wrecks used oil fuel (six wrecks). This is a significant increase, given that not a single passenger vessel amongst the 1914-38 wrecks used oil fuel.

3.2.27. The higher proportion of passenger vessels utilising oil fuel or more advanced engines is not surprising. For passenger vessels of all sizes the emphasis was often on speed. For cargo vessels it was usually on economy.

3.2.28. Historical sources state that a large numbers of passenger liners were converted to oil-firing in the years after WWI (Griffiths 1997:156; Maber 1980:39). Oil-firing made sense for large liners on short Atlantic routes where adequate supplies of oil could be obtained at terminal ports in Europe and the United States, especially after the major reductions in manning levels and thus crew costs that occurred (Griffiths 1997:163). In addition to the post-war refits and conversions, passenger liners constructed in this period were in many cases oil-fired (Maber 1980:39).

3.2.29. The geared turbine was an obvious choice for passenger liners in the 1920s and 1930s, not only because it increased the efficiency of both the turbine and propeller (Brown 1992:7) but also because the system offered reliability, compactness and a general freedom from vibration (Griffiths 1997:173). Whereas it might be supposed that geared turbine equipped ships of the interwar period might be better represented amongst the 1939-1950 wrecks than amongst the 1914-38 wrecks, just one passenger vessel wreck, the HMS *Prince Leopold* (NMR **UID 911734**) is recorded as having a geared turbine engine. The HMS *Prince Leopold* was constructed as a Belgian cross-channel ferry in 1930, operating between Ostend and Dover. This may be because the fact that a turbine was geared is simply not recorded. Alternatively it may be because the development of gear-cutting machinery was slow (Brown 1992:7).

Hull Construction

3.2.30. Little change occurred with regard to the hull construction of cargo and passenger vessels in the period 1939-1950. The advantages of steel had long been recognised, as shown by the high proportion of steel wrecks (**Table 32**).

NMR Object Material	No. of cargo vessel wrecks (1939-45)	No. of cargo vessel wrecks (1946-50)	No. of passenger vessel wrecks (1939-45)
Steel	210	28	12
Iron	0	0	0
Wood	4	1	0

Table 32: Wrecks queried by object material (cargo and passenger vessels)

3.2.31. The dominance of steel hulls amongst cargo vessels of this period is also illustrated by the NHSR. Of the 21 vessels listed by the NHSR, 16 (76%) are of metal construction, with steel the commonest metal type (nine vessels). Similarly of the 12 passenger vessels listed, just over half are of metal construction (seven vessels), including six steel vessels.

3.2.32. The high proportion of wooden-hulled vessels in the preserved record is notable. Of the 21 cargo vessels listed by the NHSR, four are of wooden construction (the *Clent*

NHSR **ID 1616**, *Usk* NHSR **ID 2052**, *Ian* NHSR **ID 2103** and *Chiltern* NHSR **ID 399**). Both of the two cargo vessels listed by the NSBR are of wooden construction. Of the 12 passenger vessels listed by the NHSR, six are of wooden construction. This indicates the continued use of wood in the construction of transport vessels as late as 1950. The fact that there is a comparatively lower number of wooden wrecks is probably partly due the difficulty of identifying wooden wrecks in hydrographic or geophysical surveys.

3.2.33. Welding and pre-fabricated construction were important and growing features of ship construction in 1939-50. However, only the 1937-built cargo vessel *Shoal Fisher* (NMR **UID 919755**) was definitely of welded construction. The *Shoal Fisher* was an English cargo vessel constructed in 1937. However there are a number of Liberty and Victory ships (including *Luray Victory* NMR **UID 1523903**, *Ira* NMR **UID 1523933,** the *North Eastern Victory* NMR **UID 1523927** and the *Fort Massac* NMR **UID 1524539**) for which the use of welding can probably be implied. Victory ships were a development of the Liberty ship design and were constructed from 1944 onwards.

3.2.34. In total there are 17 transport vessel wrecks of 1939-1950 with welded construction. There is just one transport vessel (the *Persier* NMR **UID 832194**) that is recorded as having been of riveted construction. This may be the result of a lack of information, rather than a lack of vessels of riveted and welded construction.

3.2.35. Further records for welded transport vessels can also be found in the preserved record. Of the 21 cargo vessels listed by the NHSR, a 1944-built narrowboat *The Saucy Mrs Flobster* (NHSR **UID 1422**) is welded. Of the 12 passenger vessels listed by the NHSR, two are described as of welded construction; the 1946-built *Southsea* (NHSR **ID 1080**, Archived) and the well-known 1949-built ferry *Balmoral* (NHSR **ID 128**).

Use

3.2.36. There are a number of themes which come to light when considering the context of use for both cargo and passenger vessels in 1939-50. Due to the fact that there was a major war in both periods, some of the themes from 1914-1938 recur here.

Transport Vessels requisitioned as Admiralty vessels

3.2.37. During WWII, a large number of transport vessels were requisitioned by the Royal Navy to conduct military service.

3.2.38. The widespread use of the relatively new and arguably underestimated threats of the mine, submarine and aircraft resulted in an urgent need for new types of vessels to counter or facilitate them. Wartime pressures meant that demand outstripped the ability to produce purpose-built military vessels and thus requisitioning was required (English 1992:151).

3.2.39. Auxiliary military roles for which transport vessels were assigned during WWII broadly consist of the following (English 1992:151):

- Cruiser substitutes: armed merchant cruisers, boarding vessels and commerce raiders;
- Escort forces: commissioned escorts, armed yachts and anti-aircraft auxiliaries;
- Aviation ships: seaplane carriers, merchant aircraft carriers and catapult-armed merchant ships;
- Mine warfare vessels: auxiliary minelayers, minesweepers and trawlers;
- Troop transportation: troop ships and hospital ships.

3.2.40. Of the 389 cargo vessel wrecks, 14 performed an auxiliary military role. Of these records, one was used as an aircraft carrier/catapult vessel (HMS *Patia* NMR **UID 1001497**) and another as an anti-submarine and patrol vessel (*L Istrac* NMR **UID 767223**). A further wreck (*New Comet* NMR **UID 901774**) was employed as a patrol vessel and minesweeper. Nine wrecks have been assigned the generic military term 'Admiralty vessel' with their precise function unspecified under the field of 'craft type'. Two cargo/passenger vessel wrecks, the *Himalaya* (NMR **UID 904647**) and the *Oslofjord* (NMR **UID 904647**) were requisitioned troop ships. Of the remaining 13 passenger vessel wrecks of this period, three are also recorded as having been requisitioned. One was a troop ship (*Cuba* NMR **UID 805091**), one a minesweeper (HMS *Southsea* NMR **UID 908746**) and another was a hospital and troop ship (HMS *Prince Leopold* NMR **UID 911734**).

3.2.41. Of the 30 cargo vessel wrecks of 1946-50, seven are recorded as having performed auxiliary military roles. The *Zephyros* (NMR **UID 1525620**) was requisitioned as an Admiralty vessel during WWI and can be discounted. The Spanish vessel *Cabo Espartel* NMR **UID 1522917**) was requisitioned by the Spanish Government in 1937. The *Santagata* (NMR **UID 1523956**), the *Fort Massac (NMR* **UID 1524539**), the *Selnes* (NMR **UID 1524589**) and the *Maystone* (NMR **UID 1525637**) are all recorded to have been Admiralty vessels during WWII, although the precise roles they played are not detailed. The *Devonbrook* (NMR **UID 1525602**) is also recorded as an Admiralty vessel during this period, operating as a Defensively Equipped Merchant Ship (DEMS).

3.2.42. One of the two most common auxiliary roles amongst transport vessels (with the exception of Admiralty vessels) is that of patrol craft. This role was undertaken by *L Istrac* (NMR **UID 767223**). Most navies requisitioned a large number of small-medium sized merchant ships to act as escorts and patrol craft during both world wars, although the practice was far more widespread in WWII (English 1992:156). Between 1939 and 1942, Britain requisitioned at least 89 such craft.

3.2.43. Despite the threat that mines had posed during WWI, the Admiralty reverted to pre-war habits in the interwar years, concentrating on large capital ships. As a consequence, the number of British minesweeping vessels at the outbreak of WWII was totally inadequate and the Admiralty had to rely on requisitioned ships (Melvin 1992:1). The second most common auxiliary role amongst transport vessels is unsurprisingly that of the minesweeper. HMS *Southsea* (NMR **UID 908746**), a British paddle-steamer, was requisitioned as a minesweeper during WWII.

3.2.44. The Admiralty had the same difficulties with countering submarines with existing ships, particularly as it had to defend convoy routes world-wide. The French vessel *L Istrac* is an example of its reaction. It was used by the Royal Navy as an anti-submarine vessel following the fall of France in 1940. This was a critical time as the occupation of France had given the U-boats the advantage of forward operating bases. Every available vessel was therefore needed in the attempt to counter them.

3.2.45. The *Devonbrook* (NMR **UID 1525602**) is an example of a vessel requisitioned to face the general threats imposed by modern warfare, including the aircraft. As a DEMS, the crew of the *Devonbrook* would have included a complement of military personnel manning a number of guns.

3.2.46. The HMS *Patia* (NMR **UID 1001497**) is an example of a transport vessel requisitioned as an auxiliary aviation vessel. Aircraft developed rapidly during the 1930s and became a very serious threat in WWII, with the ability to attack directly with guns, bombs and torpedoes and indirectly by laying mines along shipping routes. Until the widespread introduction of the snorkel very late in the war, aircraft also proved to be of real value in reducing the threat from submarines. They

became particularly effective when used in conjunction with the convoy system (Milner 2005:14).

3.2.47. Large fleet aircraft carriers were vital assets in the war at sea but in very short supply. Smaller escort carriers were therefore built in large numbers to defend convoys, particularly towards the end of the war. However, before they became available in sufficient numbers, the demand for a stop-gap resulted in the conversion of transport ships to MAC and CAM ships. Merchant Aircraft Carriers (MACs) were usually wet or dry bulk carriers fitted with flight decks. This enabled them to continue to carry cargo as well as aircraft (English 1992:159). MACs could both launch and land aircraft.

3.2.48. Catapult Armed Merchant Ships (CAMs) were transport ships fitted with a fixed forward-facing aircraft catapult over the forecastle. They launched a fighter on a one-way mission (English 1992:159). Having completed the mission, the pilot would then have to ditch the plane or use his parachute. The use of a CAM aircraft was therefore regarded as the last resort. As a CAM ship, HMS *Patia* is representative of this innovative and rather desperate use of requisitioned transport ships to defend convoys from both air and submarine attack.

3.2.49. The remaining requisitioned transport vessel wrecks of this period, other than those assigned as Admiralty vessels, are of troop ships Requisitioned or seized passenger vessels of many nations formed the backbone of troop transportation during WWII. They generally carried far more people than would have been the case in peacetime (Dawson 2005:75; Williams 1997:140).

3.2.50. The *Oslofjord* (NMR **UID 904647**) and *Cuba* (NMR **UID 805091**) operated as part of the Ministry of Transport Fleet and the Ministry of War respectively. The *Oslofjord* was sailing between Liverpool and Newcastle at her time of loss and was wrecked having detonated an acoustic mine off the Tyne estuary. The *Cuba* was lost while carrying troops as part of convoy VWP 16 from Le Havre to Southampton having been torpedoed by *U-1195*, despite being escorted by six destroyers. The *Prince Leopold* (NMR **UID 911734**) was used as a troop ship on a number of occasions, taking part in the evacuation of St. Malo, Cherbourg and Brest, but was lost while operating as a landing craft, carrying troops from the Isle of Wight to the Normandy beaches. It was also used as a hospital ship, a vessel type considered in greater detail in **Section 5.4**. The *Himalaya* (NMR **UID 904647**) operated as a troopship in the Crimean War in 1854.

3.2.51. The use of transport vessels to fulfil emergency military roles is an important feature of this period. Wrecks of such vessels are therefore likely to have special interest.

Armed Cargo Vessels and Anti-Aircraft Armaments

3.2.52. The use of armed cargo vessels during WWII is a recurring theme. They are also present amongst WWI wrecks. Armed cargo vessels comprise the second most common category of cargo vessel in 1939-1945 (33 wrecks).

3.2.53. Merchant ships operated in a high-threat environment in WWII. In order to give them a means of defending themselves against submarines, surface ships and aircraft, a large number were equipped with small calibre guns.

3.2.54. Air attack was a major threat, particularly in 1940-41. Round-the-clock air cover was not an option, and so the protection of convoys from air attack relied on barrage balloons and the use of anti-aircraft guns (Hewitt 2008:99-101). Prior to the war, it had become apparent to the Royal Navy that its anti-aircraft capabilities would be insufficient. Therefore plans were drawn up for the conversion of a number of requisitioned transport vessels to act as anti-aircraft ships for convoys. Designs varied but could involve the replacement of all superstructure and the conversion of the holds to magazines (English 1992:517). Other conversions were much simpler,

with vessels simply fitted with a number of anti-aircraft guns and crewed with specially-trained anti-aircraft gunners (Hewitt 2008:101).

3.2.55. Of the 389 cargo vessels wrecked in 1939-45, seven are recorded as having been fitted with anti-aircraft artillery (*Somali* NMR **UID 943559**, *Ezra Weston* NMR **UID 766919**, *James Eagan Layne* NMR **UID 919773**, *Arthurtown* NMR **UID 907768**, *Empire Kingsley* NMR **UID 832068**, *Jan Brons* NMR **UID 911933** and *John R Park* NMR **UID 918750**). A 1946-50 loss, the *North Eastern Victory* (NMR **UID 1523927**) is also recorded to have been fitted during the war with anti-aircraft guns.

3.2.56. The only cargo vessel conclusively recorded as having an anti-submarine gun is the *Empire Kingsley,* a Scottish cargo vessel built in 1941. Despite this relatively low representation, historical sources state that by January 1940, over half of Britain's merchant fleet had been equipped with anti-submarine and anti-aircraft guns (Bacon 1943:293; Maxwell & Bell 1943:230).

Supplying the War

3.2.57. Britain relied very heavily on the import of raw materials and food throughout the period 1939-1950. **Table 33** displays the ten most common cargoes carried by wrecked cargo vessels in the period 1939-1945.

Cargo	No. of wrecks
Coal	104
Ballast	86
General Cargo	48
Cement	15
Wheat	12
Grain	10
Oil	9
Timber	9
Passengers	8
Steel	8

Table 33: Wrecks queried by most common cargoes

3.2.58. The most common cargo is coal, carried by 104 wrecks. Coal is also common in 1946-1950, carried by six out of 30 cargo vessel wrecks (20%).

3.2.59. Maintaining the supply of coal was vital during WWII. The east coast coal trade had dominated trade in English waters for over two centuries, and by WWII the increased wartime demand meant that the trade was busier than ever, with convoys being run on very tight schedules (Hewitt 2008:20).

3.2.60. Oil was regarded as a vital lifeline to Britain's war effort and every effort was made to ensure its safe arrival (Watts 1994:145). Although only nine vessels are recorded to have carried oil at their time of loss, the growth in the bulk transportation of oil that was occurring is evident in the increase in the number of tankers from 11 in 1914-1938 to 32 in 1939-45. There is a single tanker wreck dating to 1946-1950, the *Arinia* (NMR **UID 904773**). Coastal tankers were also starting to appear (Hewitt 2008:10). These would have been targeted by the enemy but it is not clear whether any of the tankers lost in 1939-45 were purpose-built for the coastal trade.

3.2.61. Of the 67 million tons of cargo transported to Britain in 1938, 28 million was raw materials (Evans 1943:4). Wartime construction meant that the demand for raw materials increased. This was carried by both coastal and foreign-going shipping. Unsurprisingly in the context of war, almost all of the wrecks that had been carrying raw materials or partly processed materials seem to have been importing them or

moving them within the UK. For example, of the seven wrecks which are recorded as having been transporting iron ore, six are recorded to have departed from a port overseas. Of the 15 vessels carrying cement at the time of loss, 13 both departed from and were destined for British ports.

The Decline of the Tramp Shipping Industry

3.2.62. The development of the tramp shipping industry dates back to the 19th century and was reviewed as part of the report for 1860-1913. Between the 1930s and 1950s, the composition of the merchant fleet changed significantly, with a decline in the tramp tonnage and a rise in the size of the cargo-liner fleet (Friel 2003:278). During the interwar period, the effect of the growth of foreign competitors alongside the Depression and the vulnerability of freight markets was severe upon the British tramp shipping industry, leading to a reduction in tonnage of over a half between 1913 and 1933 (Divall 2003:288). The tramp shipping sector included many small companies which found it much less easy to survive during times of economic hardship than larger firms. In order to save the British tramping industry from collapsing, in 1935 the British government introduced an annual subsidy of £2 million to assist the industry (Glynn and Oxborrow 1976:105). Despite the financial assistance provided by the government, the industry continued to decline. In 1936 there were 257 tramp-owning companies. This had reduced to just 143 by 1957, just over half of its 1936 level (Friel 2003:278). The decline of tramp shipping during this period may also be due to the control and jurisdiction enforced by the Ministry of War Transport upon merchantmen during the war years in order to ensure both the requirements to ship particular cargoes required for the war effort as well as the implementation of convoys to protect the British merchant fleet.

3.2.63. It is difficult to examine the decline of the tramp shipping industry through a review of the wrecks for 1939-50. Whilst the term ‘tramping’ was a term in contemporary use, vessels are seldom referred to as such in wreck reports. Furthermore, the ships of the tramping industry were very varied and as such it is not possible to define a wreck on the basis of its being a ‘tramp ship’ as such. As a result of these factors combined, the term ‘tramp ship’ is not present in the NMR thesaurus as a craft type ((http://thesaurus.english-heritage.org.uk/thesaurus.asp?thes_no=143). It may be assumed that a significant proportion of wrecks recorded to have carried bulk cargoes such as coal, cement and grain would have been operating as tramps. This approach must, however, be regarded with caution and can only be considered as conjecture in the absence of additional information.

Standardisation and the dawn of pre-fabricated ships

3.2.64. The increasing use of pre-fabricated vessels, particularly by the Americans, was an important development during this period. The merchant shipbuilding industry was under great pressure during WWII to make up losses suffered due to enemy action as well as the general demands of the war.

3.2.65. Faced with the loss of a significant proportion of its peace-time workforce to the armed forces, the shipbuilding industry initiated a plan to reduce the time it took to build transport ships by building to government-approved standard designs rather than the individual requirements of a shipowner (Hewitt 2008:14). Through introducing a degree of standardisation, the average shipbuilding time was reduced. This enabled merchant ships to be constructed at a rate which could potentially keep up with losses.

3.2.66. Standardisation resulted in the construction of the Liberty ship. Restricted by the historical layout of their shipbuilding yards and the short supply of both materials and manpower, Britain sought ships of British standard design constructed in American yards. Between October 1941 and the end of the war, some 5,000

merchant vessels were built in American yards, well over half of which (2,710) were Liberty ships (Hewitt 2008:17).

3.2.67. Liberty ships and other standard vessels performed a multitude of tasks during WWII, serving in all theatres. They were a mainstay in the Battle of the Atlantic and in the Russian convoys. They also proved to be essential for carrying the equipment and supplies of armies serving in Europe and further afield (Hewitt 2008:17). Their overall contribution to the war effort was extremely important.

3.2.68. There are 12 Liberty ships wrecks lost in 1939-1945, 10 of which were constructed in 1943 and 1944 (the remaining two vessels have no recorded date of build). A further two were lost in 1946-50 (*Luray Victory* NMR **UID 1523903**, *Ira* NMR **UID 1523933**). There are also two Victory ships (the *North Eastern Victory* NMR **UID 1523927** and the *Fort Massac* NMR **UID 1524539**). These were built between 1943 and 1945. There is no Liberty or Victory ship amongst preserved ships in the UK.

Loss

3.2.69. Cargo vessels are the most commonly vessel type recorded as having been lost in 1939-1945. This is unsurprising given that, as in WWI, they were once again the primary target for the German U-boat offensive. A query of the manner of loss terms 'torpedoed' and 'mined' reveals that a significant proportion of the vessels lost by these means were cargo vessels (**Table 34**).

Manner of loss	No. of cargo vessel wrecks lost by this means	Total no. by this means	% of total
Torpedoed	68	113	60
Bombed	62	119	52
Mined	153	333	46

Table 34: Wrecks queried by manner of loss (cargo vessels)

3.2.70. Coastal shipping was particularly vulnerable to air attack (Hewitt 2008:50). Of the 119 wrecks lost as a result of having been bombed, over half were cargo vessels.

3.2.71. The convoy system, introduced at the outset of the war, was the principal means of protecting cargo vessels from attack. It was not successful in the Channel in 1940, and convoys were therefore routed north. However, the urgent need for coal on the south coast meant that colliers continued to sail down the east coast (Hewitt 2008:84-6). As a result they suffered heavy losses. This may explain why colliers are the fifth most common cargo vessels amongst the wrecks (23 wrecks) and why coal is the most common cargo (104 wreck). The *Polgrange* (NMR **UID 901805**) is an example of the finite effectiveness of convoys and of the losses that occurred moving coal from the north-east coalfields to where it was needed in the south-east. It was part of a large 23-collier convoy and was lost after being bombed by German aircraft during a day of heavy losses which later became known as 'Black Thursday'.

3.2.72. By 1941, the convoy system, the availability of more escort vessels armed with Asdic and Radar and the withdrawal of German aircraft from western Europe saw losses begin to fall (Williamson 2002:13). By 1943, an average convoy consisted of 30-50 ships in columns with an escort of eight warships (Lavery 2005:317). In the face of strong and experienced escorts and an enemy that had by then established control of the air, it was increasingly difficult for the Germans to mount an effective attack (Hewitt 2008:193). Although the sheer volume of coastal traffic meant that the Germans inevitably scored successes (Hewitt 2008:193), the wrecks of this period support the effectiveness of the convoy system. Only 18% are recorded to have been lost while travelling in convoy.

3.2.73. Passenger vessels were also subject to the German U-boat offensive. Less than eight hours after Britain entered the war, German U-boat *U-30* sank the liner *Athenia*

en route from Liverpool to Canada, with the loss of 19 crew and 98 passengers (Lavery 2005:310). Of the 15 passenger vessel wrecks, 11 are recorded as having been mined (**Table 35**).

Manner of loss	No. of cargo vessel wrecks lost by this means	Total no. by this means	% of total
Torpedoed	2	113	2%
Bombed	2	119	2%
Mined	11	333	3%

Table 35: Wrecks queried by manner of loss (passenger vessels)

3.2.74. The magnetic mine was one of the principal causes of loss amongst passenger vessels at the beginning of WWII. It claimed numerous victims until mid-1940 when de-gaussing was developed (Williams 1997:86). Of the 11 wrecks mined, four (*Dunbar Castle* NMR **UID 904907**, *Terukuni Maru* NMR **UID 908125**, *Carare* NMR **UID 1002987** and *Innisfallen* NMR **UID 906735**) are recorded to have been wrecked by a magnetic mine. They were all lost between 1939 and 1940. A further vessel, the *Oslofjord* (NMR **UID 908737**) was wrecked by an acoustic mine.

3.2.75. The most common cause of loss of transport vessels in 1946-1950 is foundering (19 wrecks). Ten wrecks were stranded and nine suffered a collision. Almost all of the vessels lost by collision in 1946-50 were cargo vessels.

Summary

3.2.76. Cargo vessels are plentiful in the known resource for the period 1939-1950. Although of interest as a group of vessels that were vital to the war effort, they are unlikely to have special interest as individual vessels because they are not unusual.

3.2.77. Cargo vessels equipped with triple expansion engines are particularly common. Again, they have significance as a group, as this engine type is both very important in the history of shipping and, during this period, representative of economic pressures and technological stagnation. However, the numbers that are likely to exist on the seabed and the fact that 20th century versions of the engine appear to be relatively well-recorded mean that additional contributory factors (such as exceptional preservation) are likely to be required before an individual wreck with this type of engine can be considered to be of special interest.

3.2.78. Cargo vessels with oil engines are relatively few amongst the known wrecks and may be considered of special interest on the basis of their rarity. Those using turbine engines are also few amongst both the wrecks and the preserved record for this period and are thus likely to have some special interest on the basis of rarity. Whilst cargo vessel wrecks that used a diesel engine are also unusual, the numerous survivals of such engines in the preserved record probably does reduce their interest. However, wrecks with very large or very early diesel engines may be of special interest.

3.2.79. The tramp ship as a craft type does not exist within the NMR and wrecks that can be definitively described as tramps for NMR records are rare. However, many of the cargo vessel wrecks are nevertheless likely to have been operated as tramps at the time of loss or at some point in their service history. The rarity is therefore probably illusory. Identifying an individual wreck as a tramp is unlikely to confer significant special interest on that ground alone.

3.2.80. The wrecks of cargo vessels that had been requisitioned to perform Admiralty duties during WWII are relatively few. Whilst it should be borne in mind that the proportion of cargo vessels performing auxiliary military roles may be greater than the results of the simple queries of this review suggest, many requisitioned vessels are likely to

have special interest. The very rare CAM ship HMS *Patia* is a good example of such a vessel.

3.2.81. Armed cargo vessels are of interest because they are representative of the great threat to merchant shipping caused by the wars of the 20th century. However, they are very numerous and additional factors will almost certainly be required for them to be described as being of special interest.

3.2.82. The wrecks of pre-fabricated vessels are likely to be considered of special interest on the basis that they are rare and represent an important development in shipbuilding. Liberty and Victory ships are therefore likely to be considered of special interest. Along with other important 20th century ship types, not as much is known from other sources about the detail of their construction as is commonly perceived. The special interest of this type of standard vessel is enhanced by the 'war-winning' role that they are often perceived as playing (Elphick 2006:17).

3.2.83. Comprising just 2% of the total number of wrecks, passenger vessels lost in this period may be regarded of special interest on the basis of their rarity. This interest is enhanced to a degree by the fact that passenger vessels of this period are so few in the preserved record (12 vessels listed by the NHSR and none by the NSBR).

3.3. MILITARY

3.3.1. The period 1939-1950 is one dominated by war. There are 31 individual craft types which may be considered to be military amongst the wrecks of 1939-45 and ten amongst those of 1946-50 (**Table 36**).

NMR Craft Type	Number of wrecks (1939-45)	Number of wrecks (1946-50)
Admiralty Vessel	152	12
Patrol Boat	99	-
Minesweeper	59	-
Patrol Submarine	24	-
Warship	20	6
Anti-Submarine Vessel	17	-
Destroyer	16	1
Submarine	15	2
Escort Vessel	12	1
Landing Craft	11	2
Patrol Vessel	7	-
Landing Craft Tank	5	1
Barrage Balloon Vessel	4	-
Boom Defence Vessel	4	-
Target Craft	4	-
Troop Ship	4	-
Corvette (Non Sail)	3	-
Motor Gunboat	3	-
Motor Torpedo Boat	3	-
Landing Ship Tank	2	-
Minelayer	2	-
Net Layer	2	-
Aircraft Carrier	1	-
Aircraft Catapult Vessel	1	-
Distilling Ship	1	-
E Boat	1	-

NMR Craft Type	Number of wrecks (1939-45)	Number of wrecks (1946-50)
Gunboat	1	-
Landing Craft Infantry	1	-
Mulberry Harbour	1	-
Oiler	1	-
Phoenix Cassion	1	-
Battleship	-	1
3rd Rate Ship of the Line	-	1
Training Ship	-	1

Table 36: Wrecks queried by craft type (1939-50 military vessels)

3.3.2. A large proportion of the vessels which are recorded as military in origin appear to be requisitioned vessels. Excluding these and without taking into account the potential presence of Admiralty trawlers (military vessels built using a trawler type design) leaves a total of 80 purpose-built military vessels lost in 1939-1945 (**Appendix I: Table 9a** and **Figure 11**). Additionally, there are a further eight purpose-built military vessels lost in 1946-1950 (**Appendix I: Table 9b**). They are not all fighting ships.

3.3.3. The NHSR list some military vessels built during this period. A total of 26 are recorded as 'fighting vessels'. They include 20 different vessel types (**Table 37**). Most are small vessels. Although there are no large ships, there are larger vessels in preservation that served during the war, including the cruiser HMS *Belfast*.

Vessel Type	Number in preservation
A Class	1
Admiralty Launch	3
Admiralty MFV	6
Admiralty Pinnace	2
Dickens Type 2 General Service Launch	1
Fairmile B Motor Launch	5
Fairmile C	1
Fairmile 'H' Landing Craft	1
Fast Seagoing Motor Boat	2
Harbour Defence Motor Launch	5
HD Motor Launch	2
Landing Craft Tank	1
Landing Ship Tank	1
Medium Speed Picket Boat	1
Midget Submarine	1
Motor Gunboat	2
Motor Torpedo Boat	4
Naval Harbour Launch	1
RASC Fast Launch	2
X-Craft	1

Table 37: NHSR records queried by vessel type (military)

3.3.4. The NSBR lists 26 military vessels of this period. The various boat types are shown in **Table 38**.

Vessel Type	Number in preservation
Airborne Lifeboat	4

Vessel Type	Number in preservation
Fast Motor Boat	1
Military Canoe	17
Motor Submersible Canoe	1
RN Captain's Dinghy	1
RN Trawler Boat	1
Radio Controlled Target Boat	1

Table 38: NSBR records queried by vessel type (military)

Build

3.3.5. Post-war rationalisation and the impact of arms limitation treaties such as the Washington Treaty and the London Naval Treaties meant that until rearmament began the design of warships, particularly large capital units, was highly restricted. Although some improvements were undoubtedly made and there was a gradual evolution, overall there does not appear to have been any radical change.

Propulsion

3.3.6. A large proportion of the purpose-built military vessels lost in 1939-50 (just under 40% or 35 wrecks) are recorded as having been fitted with an internal combustion engine as their means of propulsion. Just twelve wrecks are recorded as having been steam-propelled. Engines appear to have been the dominant means of propulsion.

3.3.7. **Table 39** breaks the available information for purpose-built military vessels lost in 1914-45 down into engine types. There are 102 relevant wrecks for 1914-1938 and 80 for 1939-1945. The only changes of any significance appears to be a reduction in the number of wrecked vessels using oil or triple expansion engines between 1914 and 1945 and an absence of triple expansion in 1946-50.

Date	Propulsion Specifics (% and number of wrecks)			
	Turbine Engine	Oil fuel engine	Diesel Engine	Triple Expansion
1914-1938	9% / 9	15% / 15	5% / 5	9% / 9
1939-1945	10% / 8	6% / 5	8% / 6	3% / 2
1946-1950	13% / 1	38% / 3	50% / 4	-

Table 39: Wrecks queried by propulsion specifics (1914-45 military vessels)

3.3.8. The records for the 1939-1945 wrecks show that older types of engine, such as the triple expansion steam engine, tend to occur in the context of small warships which performed auxiliary roles such as minesweeping, minelaying and coastal patrol. These include HMS *Medea* NMR **UID 907749**, built in 1915. The use of older engine technology does not mean that the vessels themselves were old. For example HMCS *Regina* (NMR **UID 1102944**) was constructed in 1943 with a triple expansion steam engine. The use of such engines for new escort vessels and minesweepers built during the war may be a legacy of the failure of British shipbuilding yards and shipowners to invest sufficiently in new technology (Brown 1992:12).

3.3.9. By the beginning of WWII, steam, in the form of the steam turbine, was the preferred source of power for most fast warships of any size. Indeed in this role it had become the preferred choice of the Royal Navy by 1906 and by 1915 all fast warships ordered for the navy were equipped with geared turbines (Brown 1992a:7). Turbine technology provided greater thermal efficiency and higher power-to-weight ratios than triple expansion. It was reliable and also provided a weight saving that could be as much as 300 tons in respect of the engine and another 700 tons in the hull

(Brown 1992:7). This was particularly significant in the interwar periods when international treaties imposed limits on warship tonnage.

3.3.10. The historical record in this respect is supported by the wrecks. All of the 1939-45 wrecks that were equipped with a turbine engine were destroyers. The only wreck with a turbine engine lost in 1946-50 was a battleship (HMS *Warspite* NMR **UID 1520024** and **1520032**).

3.3.11. Only one purpose-built military vessel wreck is recorded as having been equipped with a geared turbine engine (HMS *Vortigern* NMR **UID 907560**). The lack of additional military vessels incorporating a geared turbine engine is most likely due to insufficient information explicitly stating turbine engines as geared in the source material upon which the NMR is based. In reality more of the turbine-equipped wrecks are likely to have been geared than those so recorded.

3.3.12. Although the Royal Navy adopted steam turbine technology at a relatively early stage, its development in Britain remained largely stagnant during the interwar period and the early stages of WWII. Content with existing designs which operated at relatively low pressure and temperature conditions, the Admiralty had done little to force turbine development in the 1930s (Griffiths 1997:193).

3.3.13. It was not until a number of old American destroyers were transferred to Britain, after the United States entered the war, that British engineers became fully aware of the superiority of American turbine technology. The better US turbines gave their ships operational advantages over those of the British. The turbines fitted to Royal Navy vessels were less reliable and suffered frequent leaks. Lacking feed-water treatment to minimise scale formation and to avoid corrosion, they also required more frequent cleaning and overhaul (Brown 1992:12; Griffiths 1997:193). As a result British designers were forced to catch up. In 1944, the Parsons and Marine Engineering Turbine Research and Development Association (PAMETRADA) was formed with the aims of modernising existing designs and developing new forms of turbine machinery (Griffiths 1997:192).

3.3.14. The submarine remained the preserve of the internal combustion engine during WWII. The use of diesel technology for other military vessels was limited in the Royal Navy. In the 1920s, diesel engines were used in British cruiser designs, resulting in the construction of the HMS *Adventure* which incorporated a diesel electric engine. However, even the best diesel engines of the day were large and heavy, offsetting their much lower fuel consumption (Brown 1992:12). Diesel engines were particularly problematic in battleships, as the vibrations which they caused interfered with gunnery control (Brown 1992:12).

3.3.15. The historical record is again supported by the wrecks. Each of the wrecks lost in 1939-1945 that was equipped with a diesel engine and for which the date of build is known are submarines built between 1930 and 1944 (HMS *Swordfish* NMR **UID 767220** built in 1930, HMS *Unity* NMR **UID 1001477** built in 1938, HMS *Umpire* NMR **UID 907582** built in 1941, *U1195* NMR **UID 804910** built in 1943 and *U1274* NMR **UID U1274** built in 1944). Of the 1946-50 wrecks, two of the four purpose-built military vessels equipped with a diesel engine are submarines (*Safari* NMR **UID 1520971** and *P 555* NMR **UID 1521066**). The other two are landing craft.

3.3.16. Notwithstanding the ubiquity of diesel in submarines, research into submarine propulsion did take place. In particular, experiments were carried out with turbine drive units powered by High Test Peroxide (HTP). This method was effective as it did not require an air supply and waste products could be discharged (Griffiths 1997:196). The first submarine equipped with such a system was the *V80*, completed in 1940. Although the *V80* shattered underwater speed records, it used a ‘cold’ system which left behind a trail of oxygen bubbles, resulting in the easy detection of the submarine (Griffiths 1997:196). The use of a ‘hot’ system avoided

this, but was not ready before the end of WWII. No submarines wrecks of 1939-50 are recorded as having had HTP engines.

3.3.17. Of the 45 military vessels listed by the NHSR for this period, over half (25 vessels) have diesel engines. Although this includes a range of individual vessel types, they are mostly motor launches. This is a type of small military vessel that was usually fast and was designed for harbour defence, submarine 'chasing' or high speed air-sea rescue. All were built between 1941 and 1946. The NSBR records one fast motor boat of this period, the *FMB 43957* (NSBR **ID 1635**). It was built in 1941 and equipped with a diesel engine. The preserved vessels are therefore representative of an important and commonplace class of small military vessel that is not represented amongst the wrecks.

Hull Construction

3.3.18. There was little change in the material used to construct the hulls of military vessels in 1939-1950. The most common material type was steel, with the remaining vessels assigned with the object material metal, unknown or concrete (**Table 40**).

Date	Concrete	Metal	Steel	Wood	Unknown
1939-1945	1	4	31	0	44
1946-1950	0	0	6	1	1

Table 40: Wrecks queried by object material (military vessels)

3.3.19. It is notable that the military vessels which currently exist in preservation are predominantly of wooden construction. Of the 45 military vessels listed by the NHSR, 37 are of wooden construction. Similarly, of the 26 military vessels listed by the NSBR, nine are of wooden construction. Whilst the vessels in preservation largely comprise small auxiliary warships, they certainly represent the continued use of wood in military boat and ship construction during this period. This is a theme not represented by the wrecks.

3.3.20. Welding became particularly advantageous for the construction of military vessels due to the displacement restrictions imposed by the Washington Naval Treaty of 1922. The introduction of arc welding in the 1930s helped make it more practical, enabling reactive metals to be welded and the extensive use of lighter metals such as aluminium in internal structures and superstructure (Brown 1992:10). By WWII welding was viewed with increasing favour as it sped up the construction process; an advantage that was particularly important for wartime emergency building programmes (Wilson 1992:107).

3.3.21. There are no references to welding being used for the construction of military vessel wrecks in this period, nor is there for 1914-1938. Given what we know from historical sources about the uses made of welding for naval vessels, this is unlikely to reflect reality. In comparison, the NHSR lists three welded military vessels: the tank landing ship HMS *Stalker* (NHSR **ID 1789**) built in 1944; the mini-submersible *X24* (NHSR **ID 1843**) built in 1943; and the tank landing craft *Landfall* (NHSR **ID 713**) built in 1944.

3.3.22. There are two tank landing ship wrecks in total for 1939-1945 (*LST 507* NMR **UID 832476** and *LST 531* NMR **UID 904600**). In addition, there are a further four tank landing craft wrecks (*LCT 548* NMR **UID 767388**, *LCT 921* NMR **UID 766925**, *LCT 1029* NMR **UID 913039** and *LCT 529* NMR **UID 1397644**). Just one of these wrecks, the 1943-built *LCT 548*, has a recorded date of build. It is possible that all of these vessels were welded.

3.3.23. The fighting vessels listed by the NSBR are mainly military canoes of wooden or light alloy construction. There are no references to welding amongst these vessels.

Armour and Armament

3.3.24. The period 1939-1950 marked the end of the battleship era. As a result it also marked the end of the big naval gun (Hodges 1981:85). Battleships traditionally were the product of lengthy development and were slow to build. Therefore the significance of the larger gun-armed fighting ships lost in this period can only be understood in the context of developments that occurred in the interwar years.

3.3.25. The design of a warship represents a compromise between six principal factors: armament, armour protection, displacement, dimensions, speed and power (Sumrall 1992:33). Adequate protection against a comparable adversary was amongst the most important benchmarks for battleship designers. Battleships were therefore provided with a thickness of armour that could be expected to defeat the largest guns with which they were themselves equipped (Sumrall 1992:33).

3.3.26. Prior to WWII, attempts were made to increase the likelihood of defeating the battleships of potential foes. This was usually achieved by increasing gun calibre, which in turn resulted in a need for better armour protection. Attempts were made to prevent the expensive arms race that could have resulted from this cycle of measure and counter-measure in the years following WWI. The Washington Treaty 1922 restricted the upper limit of battleship guns to a 16 inch calibre, which was arguably the last generation of big naval guns (Hodges 1981:85). Despite this, a covert arms race did develop on the Continent and elsewhere.

3.3.27. Concerned that the size of naval guns was escalating, Britain argued to reduce the maximum calibre of guns to 14 inch in the London Treaty negotiations of 1935-6, but other European countries did not sign up to it (Hodges 1981:86). As a result, a clause was added to the treaty to protect signatory nations by allowing the displacement limit to be raised should any non-signatory build vessels beyond treaty limits (Hodges 1981:86).

3.3.28. Unable to await the outcome of these negotiations, the British Admiralty commenced a battleship programme for the King George V class, equipped with 14 inch guns (Hodges 1981:86). However, aware that countries such as Japan had not signed the treaty and were constructing battleships with 16 inch or even larger guns, the Admiralty ordered the 16 inch Lion Class battleships. This class was not built, however, because of the heavy demands that it would have placed upon wartime shipbuilding capacity (Hodges 1981:86).

3.3.29. Following WWI, developments in fire-control made battleship guns much more effective at long ranges, as well as increasing the effectiveness of their defensive anti-aircraft armament (Hodges 1981:116). This required battleship guns to be trained to higher elevations than most existing battleships were capable of. It did not prove to be easy to modify existing ships and as a result many countries had to rely on battleships with outmoded armaments during the interwar period (Hodges 1981:119).

3.3.30. Armour itself was improved during the interwar period. Cemented armour comprised a hard face and ductile back, the hard face breaking up shells, while the soft and tougher back prevented the plate from shattering (Sumrall 1992:34). Cemented armour was primarily used to protect turret faces, barbettes and conning towers (Sumrall 1992:34). In the 1930s the depth of the face of cemented armour increased and the carbon content was reduced to increase toughness (Brown 1992:10). Tough, non-cemented armour, known as homogenous armour, was developed for the auxiliary armour belts of the decks and turret roofs (Brown 1992:10; Sumrall 1992:34). The strength of homogenous armour lay in its ductility and ability to spread the impact of a shell over a wide area.

3.3.31. Despite all the effort put into developing the offensive and defensive power of capital ships, they were rarely tested in combat in 1939-45. The *Bismarck* was the only

modern capital ship to be hit by a very large number of heavy-calibre shells. Although the threat of battleships and battlecruisers was influential, the war confirmed that heavy-calibre gun fire was no longer the most effective way of sinking ships (Brown 1992:10).

3.3.32. Additional armour was also developed in order to protect ships against torpedoes and mines. This threat of underwater explosion was met with the development of multi-layered armour, placed along the sides and across the bottom of the hull (Sumrall 1992:33). Layers of vertical compartments along the sides of the hull were also used to absorb the energy from the shockwave of underwater explosions (Sumrall 1992:34).

3.3.33. In the interwar period, development of armour and armament was largely in the context of capital ships. Smaller military vessels were less of a concern in this respect. For example, the first cruisers constructed following the Washington Treaty sacrificed protection in order to maintain gun power and speed under the treaty limits (Brown 1992a:68).

3.3.34. The armour and armaments employed by military vessels of this period is readily available in the historical literature. Relevant data from the wrecks has proved to be so various that statistical analysis has not been attempted.

Use

3.3.35. The 80 purpose-built military vessel wrecks of 1939-1945 represent 24 distinct vessel types (**Table 41**).

Type	No. of wrecks
Patrol Submarine	24
Warship	20
Destroyer	14
Submarine	14
Landing Craft	10
Escort Vessel	9
Minesweeper	6
Landing Craft Tank	4
Corvette (Non Sail)	3
Motor Torpedo Boat	3
Patrol Boat	3
Motor Gunboat	3
Minelayer	2
Landing Ship Tank	2
Launch	1
Boom Defence Vessel	1
Net Layer	1
E Boat	1
Patrol Vessel	1
Pontoon	1
Mulberry Harbour	1
Phoenix Caisson	1
Barge	1
Gunboat	1

Table 41: Wrecks queried by craft type (1939-45 military vessels)

3.3.36. Many wrecks are recorded as being more than one craft type. Exclusion of very broad terms such as ‘warship’ allows vessel function to be more precisely examined

(**Table 42**). The results for 1939-45 show that patrol submarines and destroyers are the most common military vessel wrecks. The 28 submarines represent over one-third of the purpose-built military vessel wrecks. This is not surprising, given that submarines were the primary means of naval attack for the Germans and given that destroyers were one of the main vessel types ranged against them. The absence of larger warships such as battleships and cruisers can be explained on the basis that these types of ship did not normally operate in inshore waters. After the fall of France in 1940 they were also far too valuable to risk in the often high-threat environments of the Channel and North Sea coasts.

Primary function	Quantity
Patrol Submarine	24
Destroyer	14
Landing Craft	8
Minesweeper	6
Submarine	4
Landing Craft Tank	4
Corvette (Non Sail)	3
Motor Torpedo Boat	3
Motor Gunboat	3
Minelayer	2
Landing Ship Tank	2
Patrol Boat	1
Launch	1
Boom Defence Vessel	1
Net Layer	1
E Boat	1
Mulberry Harbour	1
Gunboat	1
TOTAL	81

Table 42: Wrecks queried by primary function (military vessels)

3.3.37. **Table 42** suggests that there are at least seven significant themes relating to the use of purpose-built military vessels during this period: underwater warfare, trade protection, amphibious warfare, mine warfare, offensive coastal forces, naval aviation and the capital ship.

Underwater Warfare

3.3.38. The near success of the German U-boat campaign during WWI ushered in a new era in naval warfare. It was realised that submarines were a potentially war-winning weapon if deployed against the merchant fleet of a nation dependent upon sea trade.

3.3.39. Realising its vulnerability, Britain fought to have submarine construction prohibited during the interwar period. Whilst such construction continued under the Washington Treaty, the size and number of submarines allowed to each country that ratified the treaty was restricted. Following the London Naval Treaty of 1930, no submarine with a standard displacement greater than 2000 tons or a gun calibre greater than 5.1 inches was permitted (Wilson 1992:102).

3.3.40. Fear of the submarine did not of course stop the British from improving their own. Larger ‘overseas’ submarines with much greater range were developed. These were suitable for oceanic deployment and were a response to similar developments in countries such as Japan (Wilson 1992:103).

3.3.41. Following the outbreak of war, there was an immediate increase in submarine building. The Germans realised that they had come close to winning the war through the use of submarines against merchant ships in WWI and tried the same strategy again.

3.3.42. Improved German submarines such as the Type XXI and XXIII U-boats were built with more reliable torpedoes, greater speed and range, better manoeuvrability and greater diving depth (Wilson 1992:105). Although the Germans made a major strategic mistake in failing to put enough resources into submarine building and design, towards the end of the war they introduced the snorkel. This device enabled a U-boat to operate for extended periods underwater. This effectively negated the crucial Allied advantage of airpower. Although the introduction of the snorkel came much too late to alter the outcome of the war, it did enable the German navy to mount a worryingly effective campaign in coastal waters around Britain in 1944-5.

3.3.43. Although they were important, Britain placed less emphasis on its submarines force. The only new submarine design developed for the Royal Navy during WWII was the 'A' class submarine; a large and faster boat with a welded hull intended for duties in the Pacific theatre. Only two 'A' class submarines were completed before the end of the war.

3.3.44. Of the 28 submarine wrecks recorded by the NMR for this period, 25 (89%) are of German nationality. This number reflects the intensity of effort put into attacking Allied shipping in English waters and of the efforts made to counter it. They were targeting Allied shipping in coastal waters at the time of loss. This shipping will have been either coastal traffic or deep sea traffic approaching the major convoy ports such as Liverpool.

3.3.45. Of the 12 German submarines whose date of build is recorded, all but one were constructed during WWII. This reflects both the wartime effort made by Germany to dramatically increase the size of its submarine fleet and the high losses suffered by that force in what was an increasingly high threat environment.

3.3.46. British submarines were fewer in number and, as they served in all the theatres of war, well spread out. The main operating areas were the Mediterranean, the North Sea, the Norwegian and Barents Seas and the East Indies and Indian Ocean (Thompson 2003:207). There are just three British submarine wrecks for 1939-1945 (HMS *Swordfish* NMR **UID 767220**, HMS *Umpire* NMR **UID 907582** and HMS *Unity* NMR **UID 1001477**). Just one of these wrecks (HMS *Swordfish*) was lost as a result of wartime hostilities, having been mined. A further two British submarines are recorded for 1946-1950 (*Safari* NMR **UID 1520971** and *P 555* NMR **UID 1521066**). This suggests relatively little coastal activity on the part of British submarines during WWII.

3.3.47. There are three vessels currently in preservation which may be considered in relation to underwater warfare: HMS *Alliance* (NHSR **100**), *Expunger* (NHSR **ID 448**, and an unnamed vessel (NSBR **ID 1617**). HMS *Alliance* is an A-class submarine and is the only survivor of the class. The *Expunger* is a midget submarine constructed in 1945, and is of the type that disabled the German battleship *Tirpitz*. The unnamed vessel is a motor submersible canoe, designed to carry explosives and to be dropped near its target by an aircraft.

Trade Defence and Anti-Submarine Warfare

3.3.48. Of the 18 primary craft types listed in **Table 42**, three relate to the theme of trade defence and anti-submarine warfare:

- **Destroyer**: A very fast small warship, armed with small-calibre guns and torpedoes. Used for attacking enemy vessels, escort duties and anti-submarine duties;

- **Corvette (Non Sail)**: A small anti-submarine escort vessel built in WWII;
- **Patrol boat**: A small warship engaged in patrolling coastal waters.

3.3.49. Aware of the great threat posed by the German submarine force, the British sought vessels which were able to defend the merchant fleet from U-boat attack.

3.3.50. At the start of the war, Britain was short of warships suitable for defending merchant ships, particularly from air and submarine threats (Hewitt 2008:31). As discussed elsewhere in this report, a large number of fishing boats and transport vessels were therefore requisitioned to act as escorts. Purpose-built escort vessel wrecks are correspondingly rare in the archaeological record. For example, of the 99 patrol boats wrecks for 1939-1945, just three have been identified as purpose-built (HMS *Chorley* (NMR **UID 832141**), *La Bastiaise* (NMR **UID 908849**) and *Tunisian* (NMR **UID 912633**)). Similarly, none of the 17 anti-submarine vessel wrecks were purpose-built military craft.

3.3.51. The destroyer provides an example of a purpose-built military vessel type which fulfilled the dual roles of trade defence and anti-submarine warfare. The demands of mid-20th century warfare altered the role of the destroyer, from a vessel designed to defend battle fleets against fast surface threats such as torpedo boats, to a more rounded role against air, surface and submarine threats generally (Lyon 1992:92). Its role of surface torpedo attack was largely given to the small motor torpedo boat. Destroyers were fitted with sonar (Asdic) and radar equipment for both detection and fire control. Radio equipment was fitted and destroyers made the first use of electronic warfare at sea (Lyon 1992:92).

3.3.52. The first half of the 20th century was arguably the heyday of the traditional multi-role destroyer. WWII and the introduction of a wider range of smaller, purpose-built escort vessels such as corvettes and particularly frigates marked the end of this era. In the post-war period the modern single-role frigate has undertaken many of the former roles of the destroyer (Lyon 1992:93).

3.3.53. The 14 destroyer wrecks are examples of the destroyer in its traditional sense. As a vessel type it was responsible for sinking a significant proportion of U-boats and undoubtedly played a major role in trade defence throughout the war. One destroyer wreck, the *Witherington* (NMR **UID 1525491**), is a post-WWII loss. The *Witherington* was one of 56 W-class Destroyers ordered in 1918 and operated as a convoy escort during WWII.

3.3.54. The 'non-sail corvette' was another purpose-built military vessel intended to conduct anti-submarine duties. Built during WWII, the design of the corvettes was based upon Antarctic whaling ships. They therefore had a rugged and relatively simple design (Bacon 1943:190; McBride 1992:118). Originally designed for coastal work, by mid-1941 the desperate shortage of destroyers meant that corvettes were being pressed into service in large numbers as Atlantic convoy escorts (McBride 1992:118). There are three corvette wrecks for 1939-1945: *La Bastiaise* (NMR **UID 908849**); HMCS *Trentonian* (NMR **UID 919213**); and HMS *Regina* (NMR **UID 1102944**). As with destroyers, a large proportion of corvette losses occurred outside territorial waters and that is where much of the archaeological resource is likely to lie.

3.3.55. Two other vessels, the *Tunisian* (NMR **UID 912633**) and HMS *Tonbridge* (NMR **UID 907578**) may also be regarded as having contributed to the anti-submarine effort during WWII. As a boom defence vessel and net layer respectively, the *Tunisian* and HMS *Tonbridge* had the role of laying, maintaining and recovering anti-submarine and anti-torpedo nets.

3.3.56. Anti-submarine and patrol vessels were also purpose-built to modified trawler designs. The only examples traced are HMS *Northcoates* (NMR **UID 911763**) and HMS *Ash* (NMR **UID 904779**). Trawlers were also purchased and converted prior to the outbreak of war, an example being the 1934-built *Amethyst* (NMR **UID 904800**), purchased and converted in 1935.

Amphibious Warfare

3.3.57. Amphibious warfare relates to the use of naval firepower, logistics and strategy to project military force ashore. Amphibious operations can range from small-scale commando raids to massive invasions.

3.3.58. Development of purpose-built vessels for amphibious operations in Britain began with the production of a prototype vehicle landing craft during the interwar years. By April 1940, a satisfactory design of assault landing craft had been developed (Friend and Gardiner 1992:142).

3.3.59. Although raids such as Dieppe had already taken place, major Allied amphibious assaults in WWII began during 1942, with landings on the Solomon Islands in August and at Guadalcanal and Tunisia in the November of that year (Williams 1997:140). However, it is with D-Day (Operation Neptune) that amphibious warfare is most commonly associated (Friend and Gardiner 1992:141).

3.3.60. The invasion of Normandy in 1944 involved the greatest invasion fleet in history. It consisted of no less than 1,213 warships, 864 merchantmen and 4,126 landing craft. (Lavery 2005:325). The fleet was assembled at ports all along the coast from South Wales to Suffolk (Lavery 2005:325).

3.3.61. There are 14 wrecks directly associated with amphibious warfare in 1939-1945. Of these, four are tank landing craft (LCT or Landing Craft Tank). These were large inshore craft with a retractable loading ramp in the bow, used to carry tanks ashore for a beach landing or as a tank ferry (LCT 921 NMR **UID 766925**, LCT 1029 NMR **UID 913039**, LCT 529 NMR **UID 1397644** and LCT 548 NMR **UID 767388**). Another two are tank landing ships (LST or Landing Ship Tank), small sea-going vessels which are fitted with loading doors on the bow; used for ferrying tanks or other fighting vehicles to beach landings (LST 507 NMR **UID 832476** and LST 531 NMR **UID 904600**). The remaining eight are landing craft, used for carrying troops and military equipment for beach landings or as a ferry.

3.3.62. There are an additional three amphibious vessel wrecks dating to 1946-1950. Two are landing craft (LCPR 961 NMR **UID 904871** and HM LCT 1068 NMR **UID 1521765**) and one is a tank landing craft (LCT 1068 NMR **UID 767447**).

3.3.63. Only two amphibious vessel wrecks (LCT 548 NMR **UID 767388** and LST 921 NMR **UID 766923**) are confirmed as having taken part in the D-Day Landings. HM LCT 1068 (NMR **UID 1521765**) may have taken part, but conflicting sources leave this unconfirmed. The other vessel, LST 531 (NMR **UID 904600**), is recorded as having been lost during Exercise Tiger, a tragic and infamous rehearsal.

3.3.64. Whilst not strictly speaking an amphibious vessel, the *Phoenix No 194 AX* (NMR **UID 1002986**) may also be considered under this theme. It is a Phoenix Caisson, a floatable concrete vessel used to make up the main breakwater of the Mulberry harbours, used to provide vital temporary harbours for supplying the Allied beachheads after D-Day. This wrecked structure represents an unused and abandoned part of one of these harbours. A significant number of floating structures associated with the invasion are known to have survived on both sides of the English Channel.

3.3.65. There are two amphibious warfare vessels in the preserved record. These are the tank landing craft *Landfall (*NHSR **ID 713**) and the tank landing ship HMS *Stalker* (NHSR **ID 1789**).

Mine Warfare

3.3.66. The sea mine first appeared in the 19th century. Its widespread use in both WWI and WWII in both offensive and defensive roles caused heavy casualties. Countering the threat of German mines placed a heavy burden on British naval forces and resulted in the development of new types of ship to both deliver and counter them (McBride 1992:110).

3.3.67. Broadly speaking, there were two types of minelaying in WWII: defensive or barrier minelaying and offensive minelaying. In UK territorial waters the first was carried out by the British.

3.3.68. The lessons of WWI demonstrated to the British Admiralty the importance of defensive minelaying as a means of protecting vulnerable coastal traffic from enemy surface and submarine forces and of channelling submarine activity into areas where defensive forces could be concentrated (Hewitt 2008:37).

3.3.69. Following the outbreak of WWII, there was no reason to suppose that the strategic situation would differ markedly from that experienced in WWI (Hewitt 2008:37). Defensive mine fields were therefore created using a combination of conventional tethered mines alongside influence mines of the magnetic, acoustic and pressure variety (Hewitt 2008:37).

3.3.70. During the 1920s and 1930s, the Royal Navy constructed the *Adventure* class minelayers and made provisions for destroyer minelaying (English 1992:160). However, defensive minelaying was a task that could be undertaken by almost any vessel large enough to carry mines (McBride 1992:116). Examples of such vessels include merchant ships, old cruisers or even battleships.

3.3.71. In comparison, offensive or 'trap' minelaying was a more demanding and dangerous task. In British inshore waters during WWII offensive minelaying was carried out by the Germans. Small numbers of mines could be laid from the air but after the Allies established air superiority it was mainly done by sea. This required a vessel that could lay mines stealthily or at great speed (McBride 1992:116). The latter required fast vessels with minelaying facilities such as cruisers or destroyers (McBride 1992:116). Minelaying submarines provided a means by which mines could be laid without the minelayer being discovered, and they could do so in areas which were so well protected that no surface minelayer could possibly have reached them (McBride 1992:116).

3.3.72. Despite the perceived importance of laying mines during WWII, minelayers in their purpose-built form were rare (McBride 1992:116). Some vessels, such as the British E class destroyers, were converted to minelaying. Some small minelayers were also constructed, such as the *Abdiel* class. However, these were ultra-fast minelayers designed for the rapid laying of mines in enemy waters.

3.3.73. There are just two minelayer wrecks for 1939-1945, the Dutch vessel *Van Meerlant* (NMR **UID 904749**) and HMS *Medea* (NMR **UID 907749**). There is little information relating to the use of the *Van Meerlant* at its time of loss, although it is recorded to as having been mined in 1941. HMS *Medea* is recorded as a monitor converted into a minelayer after WWI.

3.3.74. Little in the way of development took place in the design and construction of minesweepers during the interwar period. By the end of the 1920s, new minesweeping sloops had been built in small numbers. However, naval attention was focused on larger warships and the navy was left with too few purpose-built minesweepers at the outbreak of WWII.

3.3.75. As a result, minesweepers in WWII were often requisitioned trawlers and few were purpose-built. This is reflected in the archaeological record. Of the 59 vessels minesweeper wrecks, just six (10%) were purpose-built.

3.3.76. Of the six purpose-built minesweeper wrecks, half are *MMS* class minesweepers (*MMS39* NMR **UID 904829** and **904830**, *MMS227* NMR **UID 908141** and *MMS180* NMR **UID 908735**). The *MMS* class comprised coastal minesweepers built for the Royal Navy between 1940 and 1945. They were primarily designed to counter the threat of the magnetic mine, although some later models were fitted with an acoustic hammer in order to sweep for acoustic mines. HMS *Loyalty* (NMR **UID 1469668**) provides an example of an *Algerine* class minesweeper, a type designed to fulfil a variety of roles, including escort duties. Little information relating to the use of HMS *Corfield* (NMR **UID 913047**) and the *Princess Victoria* (NMR **UID 913077**) is available.

Offensive Coastal Forces

3.3.77. Coastal naval forces in WWII can be broadly divided into two types. Firstly, there were those vessels whose primary role was defensive. They were normally assigned to patrol, escort, anti-submarine and minesweeping duties. They tended to be slow- to medium-speed craft.

3.3.78. Secondly, there were small high-speed craft whose primary role was provide or counter a high-speed surface threat (Ross 1992:124). The first type has been discussed under trade defence and anti-submarine warfare theme. Only the second, high-speed type is therefore discussed here.

3.3.79. There are four vessel types relating to offensive coastal forces used in WWII:

- **Motor Torpedo Boat (MTB)**: A small warship powered by petrol or diesel engines and armed with torpedo tubes and small guns. Used for coastal anti-shipping patrols and warfare in coastal waters;
- **Motor Gunboat (MGB)**: A small fast warship powered by diesel or petrol engines. Built during WWII for coastal patrol work and anti-shipping missions close in shore;
- **E-boat**: The name given by the Allies during WWII to the German motor torpedo boat. E-boats carried two torpedo tubes and anti-aircraft guns. They had a maximum speed of 39 knots and were considered superior to their Allied counterparts;
- **Gunboat**: A small warship built to operate close to the shore or in river estuaries. Used for shore bombardment and patrol duties.

3.3.80. Interest in small offensive craft grew in the 1930s. By the end of WWII, all of the major navies had a large number of specialised torpedo boats and gunboats (Ross 1992:129-130).

3.3.81. Three MTB wrecks are known from 1939-1945 (*MTB 218* NMR **UID 901817**, *MTB 16* NMR **UID 908099** and *MTB 15* NMR **UID 908110**). Little information relating to these vessels is available in the NMR Complete Monuments Records. The NHSR lists a further four MTBs from this period (*MTB 71* NHSR **ID 531**, *Sungo* NHST **ID 2030**, *CMB 331* NHSR **ID 1968** and *MTB 219* NHSR **ID 1957**). There are also three MGB wrecks (*Chasseur 6* NMR **UID 1353936**, *Chasseur 7* NMR **UID 1477708** and *MGB 76* NMR **UID 912628**). The *Chasseur 6* and *7* represent French gunboats known as submarine chasers. The *Carentan* (NMR **UID 1477601**) is an example of a French submarine chaser, recorded as being the craft type ‘gunboat’. There are two gunboats listed by the NHSR for this period, *MGB 81* (NHSR **ID 524**) and *MGB 60* (NHSR **ID 1931**, archived).

3.3.82. Of the seven vessels described above, four were lost following an attack by German E-boats (*MTB 218* NMR **UID 901817**, *Chasseur 6* NMR **UID 1353936**, the *Chasseur 7* NMR **UID 1477708** and the *MGB 76* NMR **UID 912628**). The infamous E-boats were fast and highly effective German MTBs which used both the torpedo

and mine as offensive weapons. They operated throughout the English Channel and the southern North Sea (McBride 1992:118). There is one E-boat wreck from this period (name unknown, NMR **UID 1397584**).

3.3.83. E-boats were particularly successful in the period up to 1942 (Williamson 2002:33). The success of the E-boat declined thereafter, because the previously effective E-boat tactic of ambush attacks on known convoy routes was neutralised by the widespread introduction of radar and by Allied air superiority (Williamson 2002:33).

Naval Aviation

3.3.84. Aircraft revolutionised 20th century warfare. From an early stage in WWI they had been used at sea. By 1939 aircraft could be relied upon to effectively deliver torpedoes, bombs and mines at long range from bases on land and at sea. They could deny the use of large areas of sea to naval forces that lacked their own air cover, close trade routes and prepare the way for amphibious invasions. As a result they dominated the war at sea in 1939-45.

3.3.85. During WWII, naval air power conducted four main roles: strike, anti-submarine warfare, reconnaissance/observation, and air defence (Friedman 1992:41). From the point of view of wrecks of this period in territorial waters, coastal patrol and anti-submarine warfare by the British and anti-ship strike and minelaying by the Germans are probably the most important elements.

3.3.86. Aircraft carriers developed from useful fleet auxiliaries in WWI to the most important warships of WWII (Friedman 1992:37). Aircraft carriers were important in protecting convoys out of range of land-based fighter or maritime patrol craft and their aircraft proved to be highly effective against the threat of both submarines and capital ships.

3.3.87. Until very late in the war aircraft carriers were only available in small numbers. They were generally not required in English coastal waters, as land-based aircraft were generally available. They were much more vulnerable in confined inshore environments close to German naval and air bases. As a result they were rarely seen in coastal waters in WWII.

3.3.88. It is therefore unsurprising that the only aircraft carrier type wreck in territorial waters off England is not a purpose-built carrier but a relatively small converted cargo vessel (HMS *Patia* NMR **UID 1001497**).

Capital Ships

3.3.89. Until WWII, the battleship was widely considered to be the most powerful type of warship afloat, the 'capital ship'. It carried the heaviest guns, appeared to have the best protection and was certainly the most prestigious ship in any fleet (Sumrall 1992:14). It was often regarded as a symbol of a nation's industrial capability and scientific achievement (Sumrall 1992:14). Although the battleship remained a potent force during the war, combat experience showed that the fleet with the most powerful force of aircraft carriers was always likely to win naval battles. By the end of the war, the battleship era had given way to that of the aircraft carrier.

3.3.90. During the interwar period, the strategic influence of the battleship remained largely unchallenged. Priority continued to be given to battleship construction (Hough 1975:135). In Britain, interwar plans resulted in the construction of the *King George V* (KGV) class battleships, completed between 1940 and 1942. Plans for the *Lion* class battleship followed, but were cancelled due to wartime labour and material shortages (Sumrall 1992:29). A single battleship, the *Vanguard*, was completed in 1946, designed along lines of the KGV and *Lion* class (Sumrall 1992:29). Wartime experience resulted instead in the construction of several aircraft carriers.

3.3.91. Whilst battleships played an important role in WWII, they were often not employed for the role for which they were designed. Convoy protection, shore bombardment

and the defence of aircraft carriers from surface attack were more usual roles (Sumrall 1992:30). Encounters between opposing capital ships were unusual and did not occur at all in British coastal waters (Sumrall 1992:30). The closest approximation to such an encounter in inshore waters was probably Operation Cerberus, the famous 'Channel dash' by German capital ships in 1942. As a result here are no battleships or battlecruiser wrecks dating to 1939-1945 in English territorial waters.

3.3.92. However, one battleship, the HMS *Warspite* (NMR **UID 1520024** and **1520032**), is recorded for 1946-1950. This was not a wartime loss and the vessel had been under tow for the Clyde where it was to be scrapped. HMS *Warspite* was a Queen Elizabeth class battleship constructed in 1913, and saw action both during WWI and WWII. In WWI it participated in the Battle of Jutland in 1916. In WWII it served in the Atlantic, Pacific, Mediterranean and the North Sea, participating in the Norwegian Campaign, the Battle of Calabria, the Battle of Cape Mattapan and the Battle of Crete. It also provided naval gunfire support for the Normandy landings in 1944.

Loss

3.3.93. The 80 purpose-built military vessels were reviewed according to their cause of loss and the seven categories of use discussed above.

3.3.94. The most common cause of loss amongst submarine wrecks was the depth charge, which claimed 11 vessels or 39%. The second most common cause was the mine, which claimed six.

3.3.95. The depth charge was the principal armament of the escort vessel in the war against the U-boat during WWII. It was either deployed by rolling it off a ramp at the stern of vessel or by throwing it to port, starboard or ahead by a launcher (Williamson 2007:40). The depth charge was a relatively crude weapon with several drawbacks. It disturbed the water, so Asdic could not be used. It had to be preset to explode at a certain depth. As the exact depth of the submarine would probably not be known, a large number could be required. This problem was exacerbated by the deeper diving depths reached by later submarine designs (Williamson 2007:40-41). Nevertheless, the wreck statistics certainly demonstrate the effectiveness of the depth charge.

3.3.96. It is likely that reference to depth charges also includes weapons such as the very effective 'hedgehog'. This threw small bombs similar to depth charges, either forwards or to the side of the attacking ship.

3.3.97. The most common cause of loss amongst purpose-built military vessel wrecks operating as part of trade defence and anti-submarine warfare was the mine. This claimed seven of the 20 wrecks associated with this theme. The torpedo was almost as effective, causing the loss of six wrecks. Mining was unsurprisingly also the most common cause of loss amongst vessels associated with the mine warfare theme, as it was with the offensive coastal craft theme (four out of nine and three out of seven wrecks respectively).

3.3.98. Considerably fewer purpose-built military vessels were lost by gun action or bombing, comprising just four and five records respectively.

3.3.99. Causes of loss amongst those military vessels lost between 1946 and 1950 include foundering, scuttling, leaking, grounding, beaching, stranding, broken up and bilged. The most commonly represented manner of loss for wrecks of this period is foundering (three wrecks) followed by scuttling (two wrecks). Given the number of mines that had to be cleared in the immediate post-war years, it is surprising that no wrecks appear to have been lost as a result of being mined.

Summary

3.3.100. The wrecks of purpose-built military vessels lost in 1939-50 are moderately well represented in territorial waters off England, with a total of 88 identified wrecks.

3.3.101. Military vessels of this period may be of special interest on the basis of a number of factors. Special interest may be acquired through association with WWII, a key historical event. However, there are many vessels with this association and therefore additional contributory factors would probably be required. It follows that military vessels which are associated with more than one key event are more likely to be considered of special interest on the basis of multiple associations. For example, the destroyers HMS *Vortigern* (NMR **UID 907560**), HMS *Venetia* (NMR **UID 904809**) and HMS *Warwick* (NMR **UID 907765**) were each constructed in 1917 and served in both world wars. The HMS *Implacable* (NMR **UID 1480987**) is of particular special interest in this respect, seeing action in the Battle of Trafalgar in 1805 as well as surviving both world wars as a training ship.

3.3.102. A vessel may also be regarded as of special interest on the basis of its association with a particularly significant event or battle during WWII. For example the *LCT 548* (NMR **UID 767388**) and *LST 921* (NMR **UID 766923**) were part of the D-Day landings.

3.3.103. A military vessel may be regarded of special interest when is has design features which are rare amongst wrecks or preserved vessels of this period. For example, military vessel wrecks that were equipped with turbine, oil fuelled engines or triple expansion engines are few in number. As they are also rare amongst preserved vessels they may be of special interest. Wrecks associated with equipment that may be very rare are likely to be of special interest. For example, geared steam turbine engines such as those that equipped HMS *Vortigern* and HMS *Warspite* are currently recorded as being very rare. Whilst there are also few military vessel wrecks equipped with diesel engines, a number exist in preservation. Unless the diesel type is unusual and important, a wreck is unlikely to be considered as being of special interest on the basis that it has a diesel engine.

3.3.104. Special interest on the basis of rarity can also be considered with regard to purpose-built military vessels incorporating welding into their construction. Based on the information received from the NMR, there are no purpose-built military vessel wrecks from this period that can be confirmed to have been welded. Just three military vessels which are recorded as welded exist in the preserved record.

3.3.105. A review of the use of purpose-built military vessels wrecked in 1939-1950 identified five key themes: underwater warfare; trade defence and anti-submarine warfare; amphibious warfare; mine warfare; and offensive coastal forces. These themes reflect the particular nature and diversity of naval warfare in English territorial waters during WWII. Association with these key themes is likely to be a strong determinant of special interest.

3.3.106. Poor representation of a particular theme amongst the wrecks is likely to add strongly to special interest, even if the theme has not been identified as key. For example, the lack of any purpose-built aircraft carrier enhances the special interest of the very rare CAM ship HMS *Patia*, the only vessel identified as representative of naval aviation. Similarly, whilst by 1939 the battleship was no longer the most important type of warship, HMS *Warspite*, the only battleship wreck of 1939-1950, is likely to be of special interest, particularly as it served in both world wars.

3.4. FISHING

3.4.1. Fishing vessels are well represented in the period 1939-1950 and are the third most common type of wreck. The craft types which have been recorded as fishing vessels are presented in **Table 43** and illustrated in **Figure 12**.

Craft Type	No. of wrecks (1939-45)	No. of wrecks (1946-50)
Trawler	129	3
Fishing Vessel	46	4
Drifter	23	1
Smack	1	0

Table 43: Wrecks queried by craft type (fishing)

3.4.2. Omitting duplications, there are a total of 160 wrecks which may be associated with fishing in the period 1939-1945. There are a further four for 1946-1950 (**Appendix 1**, **Table 10**). Fishing vessels are moderately well represented in the NHSR and NSBR, with 26 and 11 preserved fishing vessels respectively.

Build

3.4.3. Broadly speaking, there is little variation in the key build characteristics during this period. Steel is by far the most common material amongst wrecks for which material is recorded (**Table 44**).

Date	Steel	Iron	Metal	Wood
1939-1945	80	2	1	4
1946-1950	0	0	0	2

Table 44: Wrecks queried by object material (fishing)

3.4.4. In contrast, wood is the most common construction material of preserved fishing vessels. Of the 26 recorded by the NHSR, 25 are wood. Of the 11 listed by the NSBR, six are wood with the remainder unspecified. The difference in this respect between the wrecks and the preserved record is probably best explained by the poor survival rate of small wooden craft on the seabed and the consequential difficulty of recognising them during hydrographic and geophysical surveys. The attractiveness of wooden vessels to the preservation community may be another factor. It is also likely that fishing vessels requisitioned for war duties during the war were the largest and newest available and therefore more likely to be made of steel (Engelhart 2008:8).

3.4.5. With regard to propulsion, the great majority of fishing vessels were propelled by steam engine (**Table 45**). The second most common means of propulsion amongst fishing vessels of this period is the internal combustion engine, with 13 wrecks. Only two were sailed.

Date	Steam	Internal combustion engine	Sail	Towed	Motor
1939-1945	89	11	1	1	0
1946-1950	2	0	1	1	1

Table 45: Wrecks queried by propulsion (fishing)

3.4.6. A review of the engine types (**Table 46**) with which fishing vessels were equipped revealed that the vast majority utilised a triple expansion steam engine (78 wrecks). The only other engine type was the oil-fuelled engine, with two records. No fishing vessel wrecks are specifically recorded as having been equipped with diesel or steam turbine engines.

Period	Triple Expansion	Diesel Engine	Turbine Engine	Oil Engine
1939-1945	77	0	0	2
1946-1950	1	0	0	0

Table 46: Wrecks queried by propulsion specifics (fishing)

3.4.7. The evidence from the wrecks suggests both technological stagnation and consistency in the construction of fishing vessels during this period. The high proportion of vessels propelled by steam and using a triple expansion engine reflects the wide use of steam as a means of propulsion in the fishing industry in the first half of the 20th century. This era was known as the golden age of steam trawling (Engelhard 2008:6). However, the dominance of steam may also be related to the particular type of large trawler that tended to be requisitioned for military service.

3.4.8. No preserved fishing vessels currently powered by steam appear to exist. The most common fishing vessel engine of this period recorded by the NHSR is the diesel engine.

3.4.9. It was not until the 1950s that fishing vessels using diesel engines became present in the national fleet in any significant number. Whilst the advent of the diesel engine presented the opportunity to refine the design of the trawler, a lot of work and research was required to improve the performance of the diesel engine before became compatible with fishing boat design (http://www.fleetwood-fishing-industry.co.uk/fleetwood-fishing-history/). It is not surprising therefore that there is no confirmed record of a fishing vessel equipped with a diesel engine amongst the wrecks.

Use

Fishing Activities

3.4.10. The fishing fleets operating in the waters around England became increasingly dependent upon machinery in the 20th century, with fewer but bigger vessels. In broad terms, there were two approaches to fishing that took place during this period. Firstly, there were the local inshore fisheries which were often family-run, using boats powered by oar and sail. Secondly, there were the larger offshore fisheries that operated steam-driven and increasingly mechanised offshore vessels.

3.4.11. Given that so many of the fishing boat wrecks are requisitioned vessels lost in wartime, local fishing industries that used vessels that were too small to be requisitioned or otherwise unsuitable are likely to be relatively poorly represented as wrecks.

3.4.12. Larger offshore fishing boats often went in search for herring, and there was a rapid expansion of the British herring fisheries in the early 20th century. Nevertheless only two wrecks associated with herring fishing have been identified in this period. One is the HMS *Lord St Vincent* (NMR **UID 908126**), a requisitioned drifter previously owned by Lowestoft Steam Herring Drifters Limited. The other is the *Dunbar Castle* (NMR **UID 904907**), a ship that was transporting herring from London to Beirut and South Africa as part of a general cargo when lost.

3.4.13. The lack of records of wrecks associated with herring fishing is likely to be in part due to the limitations of source material from which the NMR is compiled. It is probably also due to the decline in the number of herring boats in the interwar years and the disruption caused to North Sea fishing by WWII (Friel 2003:282). By 1937 Germany had Europe's most successful herring fleet and German herring boats would not of course have fished off England after the outbreak of war (Lavery 2004:248).

3.4.14. There are two preserved fishing vessels records which may have been associated with the herring fishing industry during this period: the *Isabel Deborah* (NHSR

ID 1585 Archived) and *Misty Isle* (NHSR **ID 1667**) are ringnetters, fishing boats which used a ring net to catch pelagic fish, principally herring.

3.4.15. Fishing was restricted but did not stop during the war. The Hartlepool-based *Isabella Fowlie* (NMR **UID 1001547**) is recorded to have operated on a 'fishing and return' trip when lost.

3.4.16. Four fishing vessel wrecks are recorded as having been lost in 1946-1950. However, only one contains information relating to specific fishing activities. The *Yarmouth* (NMR **UID 1524965**) was lost while sailing to Ostend with a cargo of white fish. Operating out of the fishing port of Fleetwood, it was part of the rapid expansion and modernisation of the fishing fleet which took place during the aftermath of WWII (http://www.fleetwood-fishing-industry.co.uk/fleetwood-fishing-history/).

3.4.17. The archaeological evidence for fishing vessels is undoubtedly heavily influenced by WWII; however, it not entirely clear how. On the one hand, the war caused significant reductions in the steam trawl effort and landings, as vessel movements were restricted, many boats were requisitioned and many of the crew were called up for military service. This resulted in fewer voyages which could normally be expected to lead to fewer wrecks. On the other hand, the fishing grounds became a more dangerous environment, and transit became more risky with the dimming or absence of navigational aids such as lighthouses. Furthermore, the requisitioned fishing vessels were required to undertake dangerous duties and many were lost as a result. The number of wrecks related to the fishing theme in the seven years from 1939 to 1945 is broadly similar to the number that occurred in the 25 years from 1914 to 1938. Therefore it can probably be assumed that WWII was responsible for a major increase in the numbers of fishing boat wrecks in the first half of the 20th century in coastal waters. However, to date it has not produced a corresponding increase in archaeological knowledge about this resource.

3.4.18. It is notable that of the 26 fishing vessels listed by the NHSR and the 11 listed by the NSBR, just nine (four and five respectively) were constructed between 1939 and 1945. This probably reflects the decrease in fishing activity during this period. The preservation of two coracles built during this period (NSBR **ID 829** and **826**) draws attention to the fact that very small fishing vessels of the type that were built in many places are not present amongst the wrecks.

Requisitioning of Fishing Vessels by the Royal Navy

3.4.19. Trawlers were extensively used for minesweeping duties. Designed to tow a heavy trawl in all but the worst conditions, with appropriate modification trawlers could be capable minesweepers. Coastal convoy escort and general patrol duties also absorbed a large number (Bacon 1943:190).

3.4.20. Chronically short of auxiliary military vessels, the need for requisitioned fishing vessels grew rapidly during the war as losses mounted. In 1939, 31 trawlers were in military service, with an additional 98 under conversion. By 1944, over 650 trawlers were being used for minesweeping. In total, over 1300 trawlers were used on minesweeping, escort and patrol duties during WWII (English 1992:163).

3.4.21. This high proportion of trawlers in military service during WWII is reflected in the wreck evidence. Of the 129 trawler wrecks, 78 and 42 were engaged in patrol duties and minesweeping respectively at the time of loss. Other wrecked trawlers were working as anti-submarine vessels (10 wrecks), boom defence vessels (three) and escort vessels (three). A total of 102 were working under the generic title of 'admiralty vessel'.

3.4.22. Drifters were chiefly employed as tenders to capital ships, although they too performed a variety of roles (Bacon 1943:190). Of the 23 drifter wrecks of 1939-1945, 15 operated on patrol duties and a further five as minesweepers. Other tasks

involved barrage balloon vessels (three wrecks) and those termed 'admiralty vessel' (19 wrecks) with no specific military function recorded (these may have included tenders).

3.4.23. After the war, many of the requisitioned fishing vessels returned to fishing. However, only one fishing vessel wreck (*Marguerita* NMR **UID 1521055**) is recorded as having performed Admiralty duties in WWII and then returned to fishing. The *Marguerita* is also notable because it served as an Admiralty vessel in both world wars. Other fishing vessels continued to perform the dangerous task of clearing mines so that normal commercial traffic could resume. No wrecks of these vessels have been traced.

3.4.24. Purpose-built 'Admiralty trawlers', warships built to trawler designs, served during WWII. The fact that these are called trawlers does lend itself to confusion with fishing vessels. However, only one, HMS *Northcoates*, has been positively identified amongst the wrecks.

Loss

3.4.25. The key themes relating to the loss of fishing vessels in this period do not differ significantly to those considered as part of **Section 2.4** and will not be repeated here. It is however notable that of the 333 wrecks mined in 1939-1945, a large proportion (22% or 73 wrecks) were fishing vessels. It is not clear whether these high losses were principally caused by the use of requisitioned fishing vessels as minesweepers, but the task was regarded as being very dangerous and it seems likely, particularly as far fewer fishing vessels were lost as a result of having been bombed (26 wrecks) or torpedoed (seven) during this period.

Summary

3.4.26. The archaeological investigation of only one fishing vessel has been traced (the requisitioned *Amethyst*) and therefore appears to have been very rare. Although a considerable quantity of other historical evidence exists, archaeology has therefore contributed next to nothing. The fishing vessel wrecks present therefore offer a potentially unique source of information on the detailed construction and operation of early 20th century fishing boats. On that basis, there is an arguable case that all fishing vessel wrecks are potentially of special interest. However, due to their large number it is likely that this alone will not be enough to confer special interest.

3.4.27. Any fishing vessels equipped with a diesel or steam turbine engine may be of special interest on the basis of rarity. This is particularly relevant to early diesel engines. Fishing vessel wrecks using steam are representatives of the 'golden age of steam trawling'. Although there are no preserved steam trawlers, the large number of these wrecks means that special interest would depend upon there being additional reasons.

3.4.28. One factor which undoubtedly contributes towards special interest is the requisitioning of fishing vessels by the Admiralty. A high proportion of trawler wrecks were undertaking the critically important roles of patrol and minesweeping (42 and 78 wrecks respectively). Again, the numbers mean that additional contributory factors would probably be considered to establish special interest. Trawlers engaged in anti-submarine duties (10 wrecks) or those operating as boom defence vessels (three) are much fewer and may thus have special interest on the basis of rarity. Drifters operating on patrol (15 wrecks) and minesweeping duties (five) alongside those operating as barrage balloon vessels (three) are likely to also be considered of special interest on that basis.

3.5. OTHER THEMES

3.5.1. There are very few wrecks relating to the following themes in the period 1914-1938. Each theme has been discussed generally.

Industrial

3.5.2. Industrial vessels are those which are adapted to specific maritime industries and tasks, including dredgers, hoppers and sheerhulks (Wessex Archaeology 2008:17). There are four craft types amongst the wrecks that are industrial (**Table 47** and **Figure 13**). Omitting duplicates, there are eight wrecks that can be classed as industrial (**Appendix I**, **Table 11**).

Craft Type	No. of wrecks
Dredger	4
Cable Layer	3
Bucket Dredger	1
Grab Dredger	1

Table 47: Wrecks queried by craft type (industrial)

3.5.3. Most industrial wrecks are dredgers (five wrecks). They include one bucket dredger and one grab dredger (*Percy* NMR **UID 895519**). An additional grab dredger, the *Gypsey Race*, has been listed by the NHSR (NHSR **ID 460**; archived).

3.5.4. It is likely that these dredgers were confined to inshore dredging operations. The construction of deeper draught vessels during the 20th century meant that dredging became an increasingly important operation in ports and their approach channels (Gale 2000:202).

3.5.5. The wrecks and the NHSR include no purpose-built aggregate dredgers. The use of aggregate dredgers became increasingly widespread in the 20th century but until the 1960s the majority of dredgers were converted merchant ships. Most aggregate dredging seems to post-date 1912, although aggregate dredging did occur before this. For example, between 1896 and 1900 dredging was undertaken to enable land to be reclaimed at Devonport (Paul Whittle, pers. comm.).

3.5.6. Ongoing research for the British Marine Aggregate Producers Association and the Crown Estate has identified about 400 vessels connected with aggregate dredging, although a large number of these may be the same vessel listed two or more times as a result of name changes. A significant number of losses have been traced, although it is understood that most of these were successfully salvaged (Paul Whittle, pers. comm.).

3.5.7. Three other vessels which have been included within this class of shipping use are the cable layers *Alert* (NMR **UID 904899**), HMTS *Monarch* (NMR **UID 912687**) and *Lady of the Isles* (NMR **UID 919750**). The *Alert* and HMTS *Monarch* were carrying out repairs on communication cables at their time of loss. Cable layers, also known as cable ships, are deep-sea vessels fitted for laying and repairing submarine telecommunication cables.

3.5.8. The laying of the trans-ocean telegraph cables revolutionised sea trade worldwide in the years following the first successful Atlantic cable laid in 1865. By 1939 the submarine communications network was a vital part of the worldwide trading system and also very important to the British militarily. This suggests that these rare wrecks are likely to be regarded as being of special interest.

Law and Government

3.5.9. Amongst non-military craft associated with law and government are vessels operated to enforce customs and revenue (Wessex Archaeology 2008:17).

3.5.10. There are four relevant wrecks (**Appendix I, Table 12**): HMS *Ben Ardna* (NMR **UID 1003782**); HMS *Danube III* (NMR **UID 904748**); HMS *Napia* (NMR **UID 904872**); and the *Thistle* (NMR **UID 912949**). Each of these wrecks is recorded as having operated as examination service vessels. The role of an examination vessel was to

inspect all merchant ships and small craft entering or clearing from a port during wartime. Papers would be examined and cargoes inspected.

3.5.11. HMS *Ben Ardna* was a requisitioned trawler which was lost in May 1942 following a collision while on war patrol. HMS *Danube III* and HMS *Napia* were requisitioned tugs, lost after having been mined in 1940 and 1939 respectively. There is little information relating to the *Thistle,* which was lost having been bombed in 1941.

3.5.12. There are no examination vessels recorded by the NSBR and NHSR as built in 1939-1950.

3.5.13. Historical literature relating to law and government in the period 1939-1950 appears to be very limited. With so few wrecks falling within this category, little can be said of any statistical validity. Their rarity is however likely to confer a modest degree of special interest upon them.

Health and Welfare

3.5.14. Vessels which might fall under the category of health and welfare include hospital boats, quarantine hulks, floating chapels and missions (Wessex Archaeology 2008:17). Amongst the seven relevant wrecks are five craft types (**Table 48**, **Appendix I: Table 13** and **Figure 13**). None were lost in 1946-50.

Craft Type	Quantity
Rescue Tug	2
Trinity House Vessel	2
Light Vessel	1
Hospital Ship	1
Lifeboat	1
Refuge Buoy	1

Table 48: Wrecks queried by craft type (health and welfare)

3.5.15. As in WWI, during 1939-1950 a large number of ocean-going liners were requisitioned as hospital ships by the Royal Navy. These were required in order to transport wounded soldiers from the various theatres of war to the UK and to provide mobile facilities where there were insufficient facilities available ashore, for example during the early stages of amphibious operations.

3.5.16. There is only one hospital ship wreck of 1939-1950, HMS *Prince Leopold* (NMR **UID 911734**). Originally a Belgian ferry, HMS *Prince Leopold* is recorded as having been converted to a hospital ship in 1940 before further conversion into a 'landing craft'.

3.5.17. The remaining craft types shown in **Table 48** relate to the welfare of seafarers and aviators during this period. Rescue tugs were equipped to care for survivors from torpedoed vessels and to tow damaged ships into port. There are two rescue tug wrecks (*Roode Zee* NMR **UID 901734** and HMS *Fairplay II* NMR **UID 908828**).

3.5.18. There is one lifeboat wreck, the *RD Barge No 59* (NMR **UID 904821**). Broadly speaking there are two types of lifeboat: those carried onboard that were used for escape, and shore-based rescue lifeboats such as those operated by the Royal National Lifeboat Institution (RNLI). There is little information relating to the use of the *RD Barge No 59* at its time of loss other than that the site represents the possible wreck of a 'rescue despatch boat'.

3.5.19. There are three preserved lifeboats listed by the NHSR as having been built in 1939-1950 (*Southern Africa* NHSR **ID 2262**, the *Manchester and Salford 29* NHSR **ID 2346** and the *William Gammon* NHSR **ID 723**). The *Manchester and Salford 29* operated as a lifeboat during WWII from its base at Pwllheli, Wales.

3.5.20. The role played by lifeboats during WWII was vital, with RNLI crews recorded to have saved 6,376 lives (http://www.rnli.org.uk/assets/downloads/history factsheet.pdf). In 1940, 19 RNLI lifeboats were involved in evacuating Allied troops from Dunkirk. The importance of lifeboats was not of course limited to WWII and during a long RNLI service history the *Southern Africa* saved 196 lives.

3.5.21. The association of any wreck with the saving of life at sea is likely to add considerably to its special interest. This will apply to both rescue vessels and hospital ships.

3.5.22. Trinity House vessels are used for the installation and maintenance of lighthouses, lightships, buoys and other navigational aids. This was a particularly important task in times of war and could be highly dangerous because of the risk of attack.

3.5.23. Following the outbreak of WWII, extensive minefields were laid around Britain. A 'war channel', an area of water kept safe for Allied shipping between the mine barrage and the coast, was created. It was swept daily for mines and marked by floating buoys at half-mile intervals (Hewitt 2008:28). Responsibility for installing and maintaining this huge and complex network of buoys which marked the 'war channel' was given to Trinity House (Hewitt 2008:39). The men who worked on the Trinity House vessels were therefore very much on the frontline of the war, particularly after the fall of France (Hewitt 2008:39).

3.5.24. The *Argus* (NMR **UID 904776**) and the *Reculver* (NMR **UID 907843**) are the wrecks of two Trinity House vessels lost during WWII. Given the dangers that they faced, it is not surprising that they were both lost after having been mined.

3.5.25. Rescue at sea was a highly uncertain business and early in the war the chances of surviving after ditching were only about 20%. Many different ways to improve the odds for mariners and aviators were tried and these included the provision of static floating refuge buoys or floats. These were large buoys fitted with a dry compartment large enough for one or more persons. In Britain, the Air/Sea Rescue Service was formed in February 1941. They installed 16 floats around the coast but nobody appears to have successfully used them. Instead air/sea rescue launches were found to be more successful (http://www.raf.mod.uk/history_old/sar601.html).

3.5.26. There is an example of a refuge buoy amongst the wrecks. *Air Sea Rescue Refuge* (NMR **UID 974938**) was a buoy used by the German to help downed Luftwaffe pilots. The NHSR also lists three preserved air/sea rescue launches for this period (*Jaymac* NHSR **ID 2032**, *2561*, *Blue Leader* NHSR **ID 1302** and *ASRP 1218* NHSR **ID 2061**).

Commercial

3.5.27. Examples of commercial vessels include victualling boats used within ports and anchorages (Wessex Archaeology 2008:17). No such wrecks or preserved vessels are recorded by the NMR, NHSR and the NSBR for 1939-1950. The rarity of any wreck of this type that is discovered will undoubtedly provide a degree of special interest.

Agricultural and Subsistence

3.5.28. Vessels involved in agriculture and subsistence are largely addressed in **Section 3.2** which considers transport vessels. Agricultural and subsistence in this context focuses on vessels which may have been specifically adapted to cultivation, hunting or gathering. No wrecks or preserved vessels associated with agriculture and subsistence are recorded by the NMR or NHSR in 1939-50, other than cargo vessels carrying agricultural produce. These are considered in **Section 3.2**.

3.5.29. The NSBR lists two vessels which may be considered within this class of shipping, the *Duck Punt* (NSBR **ID 688**) and a vessel of unknown name (NSBR **ID 2003**). They are both gun punts, a type of vessel used during the 19th and 20th centuries for

hunting waterfowl, both commercially and as a leisure activity. The *Duck Punt* was a one-man punt built in 1940 by F. Jones of Denhall Quay, Neston, Cheshire. The vessel was used on the Dee estuary and could be paddled or sailed. The other is a single Breydon gun punt built in 1944 by J Pembroke. Breydon gun punts represent a more localised tradition. They were generally built by Yarmouth boat builders. In addition to wildfowling, they were also used for fishing activities. Gun punts were used on the Breydon waters until the 1940s (http://www.nmmc.co.uk/index.php?/collections/nsbr/).

3.5.30. As with commercial vessels the unique nature of any wreck of this type that may be discovered will provide a degree of special interest.

Domestic

3.5.31. A wide range of vessels have been adapted for domestic use in the form of houseboats (Wessex Archaeology 2008:17). However, there are no houseboat wrecks for the period 1939-1950.

3.5.32. This is not surprising. As vessels which are normally static and moored in sheltered locations, houseboats are unlikely to be wrecked on a regular basis. Instead the majority will have been scrapped, dismantled, abandoned or converted for other use when no longer needed.

3.5.33. Detailed examination of the NSBR and NHSR has demonstrated that whilst no preserved vessels built in 1939-50 are categorised as houseboats, they are present. However, the examples found seem to have been converted into houseboats after 1950. For example, narrowboat *The Saucy Mrs Flobster* (NHSR **ID 1422**), built *c.*1944, operated as a Birmingham Canal Navigation day-boat for the carriage of coal in the Birmingham area until 1970. It was then converted to a houseboat and used as such until 1990 when it was altered for cruising.

Recreation

3.5.34. This section considers the use of watercraft for recreation. It focuses on the smaller craft that have been used for cruising and racing and which are recorded as 'yachts' and 'leisure craft' (**Table 49** and **Figure 13**).

Craft Type	No. of wrecks
Yacht	13
Leisure Craft	3

Table 49: Wrecks queried by craft type (recreation)

3.5.35. Excluding duplications, there is a total of 14 recreational vessel wrecks from this period (**Appendix I**, **Table 14**). The great majority are, unsurprisingly, British yachts (12 wrecks). None were lost in 1946-1950.

3.5.36. Preserved recreational vessels of this period are much more common. Of the 116 boats listed by the NSBR, 61% (71 wrecks) have the function type 'leisure'. There are fewer listed by the NHSR. Nevertheless 10% (17) of the 168 vessels listed by the NHSR are leisure craft. In comparison to the NMR, the NSBR and NHSR record a very large range of individual vessel types as leisure craft (45 and seven respectively).

3.5.37. The popularity of yachting and leisure sailing grew enormously during the first half of the 20th century. Sailing was already a well established pastime for the wealthy classes of British society in the early 20th century and there were a number of yacht clubs around the coast (Dear 2000:135).

3.5.38. Inshore racing was well established. Ocean racing was also becoming increasingly common and by 1931 the Ocean Racing Club had received its royal warrant (Dear

2000:140). Technological advances in WWII benefited yachting, particularly in the area of synthetic fibres and resins and high-tensile materials. These allowed the development of stronger and lighter hulls, and synthetic rope that chafed and jammed less than natural fibres (Dear 2000:131). Small dinghy racing also became an increasingly popular (and affordable) sport and pastime during this period. This was encouraged by advances in marine plywood that enabled the home builder to construct his own craft from a kit (Dear 2000:142).

3.5.39. The growth in ocean racing is reflected by the NSBR which records six 'National 12' boats, a class of long sailing dinghy. The National 12 class was started in 1936 by the Royal Yachting Association as an economical alternative to the more expensive 'International 14s'. Other well-represented leisure craft include the International 14 (five vessels) and the Hydroplane (four vessels). These are all racing vessels. A total of 18 of the 71 leisure craft listed by the NSBR were built in 1939-45.

3.5.40. It is hard to know whether the number of racing craft in preservation reflects the popularity of recreational sailing at the time or simply the attractiveness and monetary value of classic racing boats subsequently.

3.5.41. During WWII many yachts were requisitioned to contribute to the war effort. They performed a variety of roles, including: examination duties; harbour defence; auxiliary patrol duties as armed boarding vessels; barrage balloon vessels; and even as targets for the Fleet Air Arm (English 1992:157). Older yachts were also used as accommodation ships for patrol vessels (English 1992:157). In a number of cases, yachts were armed and used extensively as anti-submarine vessels on minesweeping and miscellaneous duties (English 1992:157).

3.5.42. Of the 14 recreation vessel wrecks of 1939-1945, 12 were requisitioned. Most were used at least partly as patrol and escort vessels (9 wrecks). Six performed anti-submarine duties. A further vessel, the paddle-steamer HMS *Snaefell* (NMR **UID 1001757**), was minesweeping when lost.

3.5.43. One of the most notable events with which leisure craft were associated during WWII was the evacuation of Dunkirk. In May and June 1940, over 560,000 British French and other soldiers were evacuated from Dunkirk as part of Operation Dynamo. Hundreds of small craft including yachts and motor cruisers were involved, often voluntarily rather than as requisitioned vessels (Bacon 1943:191; Friel 2003:242). Before being wrecked, the requisitioned leisure craft HMS *Aisha* (NMR **UID 904791**) is recorded to have taken part in the Dunkirk evacuation.

Summary

3.5.44. On the basis of rarity and the lack of good representation amongst preserved vessels, wrecks associated with the themes discussed above are likely to be considered of special interest. The one exception to this may be recreation. As so many leisure craft exist in preservation, a more selective approach might be justified. However, there are notably few boat wrecks in the archaeological record.

3.5.45. Vessels which were requisitioned by the Admiralty may have special interest. For example, HMS *Prince Leopold* was first a hospital ship before further conversion into a landing craft.

3.5.46. Other vessels associated with health and welfare may have special interest because of their representation of loss of life and related responses in seafaring safety. The *Air Sea Rescue Refuge* provides a possibly unique example of one response to the great dangers of combat flying over the sea. The Trinity House vessels *Argus* and *Reculver* are representative of the highly dangerous task of ensuring safe navigation in wartime conditions.

3.5.47. Historical literature relating to boats and ships associated with these themes is fairly limited. This apparent shortage of specialist literature is likely to enhance the archaeological value and therefore special interest of the wrecks involved.

4. THE SPECIAL INTEREST OF BOATS AND SHIPS 1939-1950

4.1.1. For the wreck of a boat or ship to be considered to be of special interest, the remains must be capable of making such a distinctive contribution to our understanding or awareness of people's actions in the past that the remains themselves should be protected from uncontrolled damage (Wessex Archaeology 2008:5).

4.1.2. The wrecks listed in the national stock-take for the period 1939-1950 may relate to more than one of the themes discussed above. Furthermore, these themes are often inter-related. Therefore the special interest of any particular wreck in this period is likely to be multi-faceted.

4.1.3. The Selection Guide for Boats and Ships in Archaeological Contexts (Wessex Archaeology 2008) sets out a framework for determining the special interest of a boat or ship. The factors are divided into two distinct sections: integral factors and relative factors.

Integral Factors

4.1.4. This section considers the integral factors that any wreck of 1939-1950 can be expected to exhibit if it is to be considered of special interest. Integral factors enable a boat or ship to be considered of special interest on the basis of its own merit.

4.1.5. As this project arises from a holistic assessment of the national stock, analysis of individual wreck sites has been minimal. However, examples of wrecks that appear to be relevant to integral factors have been given in places.

Key Narratives

4.1.6. The wreck of a boat or ship will be of special interest if it makes a distinct contribution to understanding overall historical processes relating to England, the UK or internationally. The special interest of a boat or ship may arise from its relation to a turning point in history or an important overall situation or trend.

4.1.7. There are a number of social, economic, political, cultural or technological narratives in this period. The overriding theme is undoubtedly WWII. As a result the narratives relating to it are likely to form a key consideration of special interest. For example, *LCT 548* (NMR **UID 767388**) and *LST 921* (NMR **UID 766923**) are associated with important events during the war, in this case the D-Day landings.

4.1.8. Where a boat or ship is associated with another country, its special interest depends on its ability to be identified as historically significant to the people of that country. For example, HMS *Implacable* (NMR **UID 1480987**) was originally constructed as the French 74-gun ship *Duguay-Trouin* and saw action in Trafalgar in 1805, a key historical event in both French and British history. The *Duguay-Trouin* was one of four ships which escaped capture on the day of the battle, only to be captured by the British in its aftermath. It then saw service in the Royal Navy as HMS *Implacable* as a training ship, until being towed and scuttled, flying both French and British flags as she sank.

Associations

4.1.9. A boat or ship will be of special interest if it has a distinct and tangible link to a person or event. Such special interest will be all the greater where the boat or ship had a distinct role in shaping the person or event.

4.1.10. The fields relating to the associations of vessels in the project database are non-queriable. Association must therefore be assessed on a wreck-by-wreck basis. However, the review of the themes highlighted a number of examples.

4.1.11. No sufficiently tangible association between a prominent individual and a wreck has been identified.

4.1.12. Event types with which vessels may be associated include military episodes such as campaigns or battles. This is a period in which association with military events is likely to be particularly important. Significant military events of this period which are associated with wrecks include:

- the Norwegian campaign of 1940 (e.g. HMS *Warspite* NMR **UID 1520024** and **1520032**);
- the Dunkirk evacuation (e.g. HMS *Aisha* NMR **UID 904791**);
- the Battle of Britain (e.g. HMS *Delight* NMR **UID 1470646**);
- the D-Day Landings (e.g. *LCT 548* NMR **UID 767388** and *LST 921* NMR **UID 766923**).

4.1.13. The significant event can predate the period. For example, there are wrecks associated with:

- the Battle of Trafalgar in 1805 (HMS *Implacable* NMR **UID 1480987**);
- the Crimean War of 1853-1856 (e.g. *Himalaya* NMR **UID 904647**);
- naval battles of WWI such as the Battle of Jutland (e.g. HMS *Warspite* NMR **UID 1520024** and **1520032**).

4.1.14. Another type of event that may be associated with special interest is a storm or collision which resulted in the loss of more than one vessel. An example might be the convoy of vessels which ran aground on 6th August 1941 whilst being escorted by the HMS *Agate* (NMR **UID 907483**), a British trawler on Admiralty convoy duty. Vessels lost as a result of this incident which are recorded as wrecks include the *Oxshott* (NMR **UID 907485** and **907495**), the *Betty Hindley* (NMR **UID 907490**), the *Deerwood* (NMR **UID 907492**), the *Afon Towy* (NMR **UID 907493**) the *Gallois* (NMR **UID 907496**) and the *Aberhill* (NMR **UID 907501**).

Loss of Life and Related Responses in Seafaring Safety

4.1.15. The wreck of a boat or ship can be of special interest if it is the site of major or otherwise tragic loss of life. Whilst human casualties will always have significance, special interest may arise if large numbers of people were killed, if famous persons were lost, or if the circumstances of loss were otherwise very significant.

4.1.16. The *Emile Deschamps* (NMR **UID 904914**) provides a good example of this. The ship was a passenger vessel requisitioned as an auxiliary minesweeper. It was lost after striking a mine while transporting troops and refugees during the Dunkirk beaches on 3rd June 1940. A total of 300-400 lives were lost. The wreck may have special interest on the basis that it is associated with a large loss of life (and with an iconic event).

4.1.17. Shipwrecks related to responses to loss of vessels, aircraft and consequentially life may also be of special interest. Salvage tugs and air/sea rescue launches may be of special interest. A wide variety of craft can be taken into account in this respect. An example is the *Air Sea Rescue Refuge* (NMR **UID 974938**). This was a response to the alarmingly low survival rates experienced by aircrew who had bailed out or ditched at sea early in the war.

4.1.18. Wrecks need not have been involved directly in rescuing ships or crew in order to have significance in this respect. The Trinity House vessels *Argus* (NMR **UID 904776**) and *Reculver* (NMR **UID 907843**) marked safe routes through defensive minefields, helping to minimise losses amongst the ships and crew involved in the coastal convoys. They were therefore indirectly involved in saving many lives. Furthermore the loss of *Argus* claimed the lives of all but one of its crew.

Aesthetic context and literary, artistic and other associations

4.1.19. The wreck of a boat or ship will be of special interest if the vessel made a distinct cultural contribution, either directly through its build or indirectly through being represented in other artistic media. In order for the aesthetics to give rise to special interest, the surviving remains should be expected to provide a tangible, evidential link between the boat or ship and the artistry.

4.1.20. It is not uncommon for boats and ships of this period to be represented in artistic media. Warships were frequently the subject of paintings and drawings during this period, often by important artists. For example, the National Maritime Museum holds within its collection four representations of the battleship HMS *Warspite* (NMR **UID 1520024** and **1520032**). These include two paintings and one etching by William Lionel Wyllie (1851-1931), a famous and important English painter and engraver of ships and other maritime themes. In much the same way as an association between a building and an important landscape painter will enhance the building's interest, the interest of a particular boat or ship will be enhanced if it is the subject of a work by an artist of the stature of Wyllie.

Parallels with current shipping themes and events

4.1.21. A boat or ship will be of special interest if it has current relevance because it embodies distinctive attributes that are also practised or applied today. Current relevance is likely to give rise to special interest in relation to technological innovations in the past that are being developed or re-examined for current use.

4.1.22. An example here may be provided by the HMS *Patia* (NMR **UID 1001497**). This is the only example of the wreck of a vessel which operated as an aircraft carrier during WWII. Furthermore it is a CAM ship and therefore represents one of the more drastic means of providing air cover to convoys. The special interest of the HMS *Patia* relates to the current importance assigned to carrier-based aviation by many of the world's navies, including (despite its travails) the Royal Navy.

Relative Factors

4.1.23. This section considers the 'relative' factors that enable the wrecks of boats and ships to be sorted in relation to one another. Having established that a boat or ship is capable of making a distinctive contribution in terms of the integral factors discussed above, it can then be compared with similar wrecks to determine whether its interest is indeed 'special'.

4.1.24. The queries conducted of the project database lend themselves directly to a review of the relative factors (**Appendix I**).

Rarity

4.1.25. Rarity is considered as reflecting the difference between historic activity and the record of known wrecks. Where there are few other examples of comparable boats or ships, rarity will add to the special interest of a specific asset.

4.1.26. The query results suggest that rarity exists. Particular rarity in 1939-50 has been noted in relation to a number of types of wrecks, including the following:

- Vessels with welded construction
- Vessels of pre-fabricated construction

- Vessels with oil-fired engines
- Vessels equipped with steam turbine engines
- Cargo vessels requisitioned as Admiralty vessels
- Tramp and cargo liner vessels
- Aircraft carriers
- Battleships
- Hospital ships

4.1.27. However, this analysis of rarity must be treated with caution. The information within the NMR Complete Monument Record is based on the sources available at the time the record is compiled or reviewed, and is not necessarily complete. For example, vessels equipped with a certain type of engine may appear to be uncommon in the resource because of the limitations of the available sources, but may actually be quite common.

4.1.28. Rarity was also noted for examples of wrecks relating to the following themes:

- Transport (People)
- Industrial
- Law and Government
- Health and Welfare
- Commercial

4.1.29. A number of vessel types and themes have therefore been identified as being rare or very uncommon amongst the known wrecks for this period. However, special interest may not depend on rarity alone. In order for a vessel to be regarded of special interest, there must also be a tangible link between the material remains and the integral factors discussed above.

Representativeness

4.1.30. Representativeness can be considered in terms of the key themes that the conserved archaeological record needs to reflect. It can also be considered in terms of what was typical overall.

4.1.31. A wreck may be regarded of special interest on the basis of its representation of changes in the shipbuilding technology and construction which characterise the period. The increasing use of welding in boat and ship construction is a key theme and good examples of wrecked vessels with all-welded or part-welded hulls are likely to be regarded of special interest, on the basis that they represent the transition from riveted to welded hulls.

4.1.32. Wrecks that are representative of the development of pre-fabricated ship construction are also likely to be of special interest. Pre-fabrication helped the Allies win the Battle of the Atlantic by contributing to the shipbuilding effort that eventually allowed new ships to be constructed faster than they were lost. The tonnage of Liberty and other standard pre-fabricated cargo ships constructed in the war (19.4 million tons for the Liberty-class) is regarded as key to Allied success (Elphick 2006:17). The 14 Liberty and two Victory shipwrecks are likely to be of particular interest in this respect.

Diversity

4.1.33. Undue concern with rarity can lead to the typical being ignored. It is therefore very important that special interest should take into account diversity, the range of

features that should be reflected in the conserved archaeological record relevant to a particular theme.

4.1.34. Diversity is particularly important in relation to the many types of vessels used during WWII. Naval activities in inshore waters during WWII were very diverse and all led to casualties. Underwater warfare, trade defence and anti-submarine warfare, amphibious warfare, mine warfare, offensive coastal action and naval aviation were all involved. Both the number and variety of vessels involved were very great. Special interest needs to reflect the variety of activities and vessels.

Survival

4.1.35. It is imperative that consideration of special interest is evidence-based. It must therefore be directly linked to the surviving fabric of a wreck. Survival is therefore an important relative factor. It can therefore be gauged in terms of intactness and cohesion, in other words completeness.

4.1.36. For example, of the two net layer wrecks (HMS *Tonbridge* NMR **UID 907430** and HMS *Kylemore* NMR **UID 907578**) it could be argued that the HMS *Tonbridge* is of greater special interest as its wreck has been categorised as 'mainly intact'. In comparison HMS *Kylemore* is categorised as 'unknown'. However, in some instances the interest of a wreck may be so great that even fragmentary remains might be considered 'special'.

4.1.37. In terms of survival, the wrecks are a diminishing asset. The corrosion, erosion and consequent deterioration of wrecks of this period is very poorly researched but is anecdotally accepted to be ongoing and serious. Therefore survival is one of the few relative factors that may be said to be increasing in significance as the wrecks of this period age.

4.1.38. Additional interest may arise where the survival of the asset can shed light on the processes that cause sites to be preserved or deteriorate. This is case-specific and must be considered on a wreck-by-wreck basis. As noted above, research relating to this subject is limited and it may therefore be a significant factor in terms of special interest.

Setting and Context

4.1.39. Setting and context considers places that are associated with known wrecks that add to their understanding and appreciation.

4.1.40. Vessels associated with prominent shipbuilding yards or regions of this period may be regarded of special interest in this respect. Vessels associated with areas renowned for their ship building contribution to the war effort such as the north-east of England and the Clyde are likely to have special interest. However, due to their great numbers (particularly in preceding previous) this in itself would not necessarily denote special interest

4.1.41. Special interest on the basis of setting and context may also derive from the location of a wreck site if this adds to its understanding or appreciation. The wrecks of boats and ships reflect historic activity that may otherwise have little or no archaeological trace, for example a naval battle.

4.1.42. The wrecks lost within the approaches to the Thames estuary during WWII provide an example. The importance of the Port of London meant that the estuary was a battleground throughout the war. The wrecks within are representative of numerous small-scale battles that occurred within the context of this wider campaign. They therefore derive significance from that battlefield setting.

Grouping

4.1.43. Grouping is considered in terms of associations between known wrecks that reflect themes or events highlighted by the review. The special interest of a boat or ship may thus be increased by its being grouped by other assets.

4.1.44. The special interest of the wrecks of any vessels which are associated with the east coast coal trade may be enhanced by grouping, whether they are the colliers or the defending naval vessels, or even the attacking Germans. The remains of the very numerous wrecks associated with this trade serve not only to illustrate the importance of this trade but also to delineate the geographical limits of the convoy battles that they were involved in.

4.1.45. This may be particularly true of the five wrecks whose loss was associated with an event which became known as 'Black Thursday' (*Polgrange* NMR **UID 901805**, *Corhaven* NMR **UID 901800**, *Henry Moon* NMR **UID 901768**, *Leo* NMR **UID 901795** and *Portslade* NMR **UID 901752**). These vessels were travelling as part of convoy No.CW8, consisting of 23 colliers from the North country carrying coal or coke, which were attacked by German aircraft in July 1940. Just 11 of the ships reached Dungeness.

4.1.46. These groupings may be so large in terms of numbers of wrecks that additional factors may be required before any individual wreck could be considered to be of special interest.

Exceptional

4.1.47. This factor provides for the special interest of wrecks which stand outside the main themes and trends. Special interest may be generated because some wrecks are 'exceptional' and do not bear comparison. This must be considered on a wreck-by-wreck basis. However, the overall picture can help to define what is exceptional.

5. CONCLUSIONS

5.1.1. The period 1939-1950 can be divided into three relevant sub-periods: the interwar period; WWII; and its aftermath.

5.1.2. Although this period only contains a few months that were actually interwar, when selected by date of loss, the wrecks of 1939-1950 have a large proportion of vessels which were constructed in the interwar period or earlier. Therefore consideration of the interwar period is in fact a very important element of the analysis of this period.

5.1.3. Themes relating to the interwar period are dominated by discussions relating to the build of vessels. The interwar period with respect to build may be regarded as one of two halves. The first half is characterised by post-war restrictions on military ship building, with the Washington Treaty 1922 limiting the size and number of military vessels, and a merchant shipbuilding boom and slump. The second is dominated by rearmament, as world powers, including new players such as Japan, raced to rearm in expectation of war. Much of the naval and merchant shipping built in 1914-38 was lost in 1939-45. This study therefore suggests that interwar shipping is as well as if not better represented in the period 1939-50 as it is in 1914-38.

5.1.4. Most of the themes of this period unsurprisingly reflect and relate to WWII. Whilst many wrecks of this period were constructed in the Interwar years, themes relating to the use and loss of vessels of this date are almost always interrelated to the demands and effects of a war which was arguably one of the most important events of the 20th century.

5.1.5. As a period in which cause of loss is dominated by war, warships are better represented in the archaeological record than is normally the case in the 19th and 20th centuries. The impact of the war also blurred the boundaries between different

classes of vessel and functions, particularly between civilian and military vessels. Civilian ship types appear in the archaeological record not just as passive victims but also in significant numbers as requisitioned military vessels. As a result, WWII is extremely well and widely represented amongst the wrecks of 1939-1950. Due to the great worldwide significance of WWII, the wrecks of vessels lost in this war have an inherently high potential for special interest.

5.1.6. Known wrecks of 1946-50 are few and mainly comprise those constructed in preceding years. The boat and ship construction of the immediate post-war period is thus poorly represented in the 1939-1950 dataset.

5.1.7. There are large numbers of preserved vessels that were built or were active in this period. This will have an impact upon the special interest of wrecks. Vessel types and functions that are poorly represented in the preserved record will be of greater interest as wrecks. Conversely, it may be argued that types of wrecked vessel that are common in preservation will have less special interest, unless they somehow provide something that a preserved vessel will not, such as an intact artefact assemblage. This may be particularly important in terms of boats, which are extremely rare as wrecks but fairly common in preservation.

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7. ARCHIVE

7.1.1. The project archive consisting of WA Access databases, digital photographs and other computer records, together with miscellaneous hardcopy documents is currently stored at WA under project code 70861.

APPENDIX I: RESULTS OF DATABASE QUERIES

Table 1: Wrecks queried by place of build (1939-1945)

Note: Places marked with * relate to areas in the north-east of England. Those with ** relate to areas situated along the Clyde.

Place of Build	No. of wrecks	Country
Bergen	3	Belgium
Canada	1	Canada
Copenhagen	1	Denmark
Denmark	1	Denmark
Nakskov	2	Denmark
Odense	2	Denmark
Alexandria	1	Egypt
Barrow in Furness	2	England
Beverley	22	England
Birkenhead	4	England
Blackwall	1	England
Blyth*	1	England
Chatham	1	England
Cowes	1	England
Dartmouth	1	England
England	4	England
Falmouth	1	England
Gateshead*	1	England
Goole	6	England
Gosport	1	England
Great Yarmouth	3	England
Howden	1	England
Jarrow*	2	England
Kingston upon Hull	3	England
Lowestoft	3	England
Middlesbrough*	8	England
Newcastle upon Tyne*	18	England
Portland (Dorset)	2	England
River Tees*	4	England
Selby	13	England
South Shields*	1	England
Sunderland*	20	England
Tyne and Wear*	1	England
West Hartlepool*	9	England
Whitby*	1	England
Wivenhoe	1	England
Workington	1	England
Dunkirk	2	France
France	1	France
Nantes	1	France
Bremen	2	Germany
Frederickstadt	1	Germany
Germany	2	Germany
Hamburg	6	Germany
Kiel	2	Germany
Tonning	2	Germany

Place of Build	No. of wrecks	Country
Italy	1	Italy
Japan	1	Japan
Tokyo	1	Japan
Groningen	1	Netherlands
Holland	7	Netherlands
Kampen	1	Netherlands
Schiedam	1	Netherlands
Belfast	2	Northern Ireland
Norway	1	Norway
Oslo	1	Norway
Skien	1	Norway
Stettin	1	Poland
Aberdeen	6	Scotland
Alloa	1	Scotland
Ardrossan	4	Scotland
Bowling**	1	Scotland
Burntisland	2	Scotland
Dundee	2	Scotland
Glasgow**	25	Scotland
Grangemouth	2	Scotland
Greenock**	6	Scotland
Leith	2	Scotland
River Clyde**	1	Scotland
Scotland	2	Scotland
Troon**	2	Scotland
Gothenburg	1	Sweden
America	1	USA
Buffalo	1	USA
California	2	USA
Jacksonville (Florida)	1	USA
Los Angeles	1	USA
New Jersey	1	USA
Pascagoula	1	USA

7.1.2.

Table 2a: Wrecks queried by craft type and arranged by class (1939-1945)

Craft Type	No. of wrecks	Class of Shipping
Trawler	129	Fishing
Fishing Vessel	46	Fishing
Drifter	23	Fishing
Smack	1	Fishing
Rescue Tug	2	Health and Welfare
Hospital Ship	1	Health and Welfare
Lifeboat	1	Health and Welfare
Refuge Buoy	1	Health and Welfare
Trinity House Vessel	2	Health and Welfare
Dredger	4	Industrial
Cable Layer	3	Industrial
Bucket Dredger	1	Industrial
Grab Dredger	1	Industrial
Hopper barge	1	Industrial
Examination Service Vessel	4	Law and Government

Craft Type	No. of wrecks	Class of Shipping
Admiralty Vessel	152	Military
Patrol Boat	99	Military
Minesweeper	59	Military
Patrol Submarine	24	Military
Warship	20	Military
Ant-Submarine Vessel	17	Military
Destroyer	16	Military
Submarine	15	Military
Escort Vessel	12	Military
Landing Craft	11	Military
Patrol Vessel	7	Military
Landing Craft Tank	5	Military
Barrage Balloon Vessel	4	Military
Boom Defence Vessel	4	Military
Target Craft	4	Military
Troop Ship	4	Military
Corvette (Non Sail)	3	Military
Motor Gunboat	3	Military
Motor Torpedo Boat	3	Military
Landing Ship Tank	2	Military
Minelayer	2	Military
Net Layer	2	Military
Aircraft Carrier	1	Military
Aircraft Catapult Vessel	1	Military
Distilling Ship	1	Military
E Boat	1	Military
Gunboat	1	Military
Landing Craft Infantry	1	Military
Mulberry Harbour	1	Military
Oiler	1	Military
Phoenix Cassion	1	Military
Yacht	13	Recreation
Leisure Craft	3	Recreation
Transport Vessel	2	Transport
Cargo Vessel	389	Transport (Cargo)
Armed Cargo Vessel	33	Transport (Cargo)
Tanker	32	Transport (Cargo)
Barge	31	Transport (Cargo)
Collier	23	Transport (Cargo)
Liberty ship	12	Transport (Cargo)
Coaster	8	Transport (Cargo)
Coal Hulk	1	Transport (Cargo)
Ketch	1	Transport (Cargo)
Tank Barge	1	Transport (Cargo)
Trow	1	Transport (Cargo)
Liner	9	Transport (Passenger)
Passenger Vessel	8	Transport (Passenger)
Ferry	2	Transport (Passenger)
Sewage Dumping Vessel	2	Unclassified
Craft	100	Unclassified
Tug	19	Unclassified

Craft Type	No. of wrecks	Class of Shipping
Pontoon	9	Unclassified
Block Ship	7	Unclassified
Lightship	6	Unclassified
Tender	5	Unclassified
Paddle Steamer	4	Unclassified
Dan Layer	3	Unclassified
Lighter	3	Unclassified
Launch	2	Unclassified
Schooner	2	Unclassified
Brigantine	1	Unclassified
Depot Ship	1	Unclassified
Hulk	1	Unclassified
Lighthouse Tender	1	Unclassified
Lugger	1	Unclassified
Mooring Vessel	1	Unclassified
Motor Launch	1	Unclassified
Spritsail Barge	1	Unclassified
Storage Hulk	1	Unclassified
Survey Vessel	1	Unclassified
Water Carrier	1	Unclassified

Table 2b: Wrecks queried by craft type and arranged by class (1946-1950)

Craft Type	No. of wrecks	Class of Shipping
Trawler	3	Fishing
Fishing Vessel	4	Fishing
Drifter	1	Fishing
Landing Craft Tank	1	Military
Landing Craft	2	Military
Training Ship	1	Military
Warship	6	Military
Third Rate Ship of the Line	1	Military
Battleship	2	Military
Submarine	2	Military
Admiralty Vessel	12	Military
Escort Vessel	1	Military
Destroyer	1	Military
Transport Vessel	1	Transport
Cargo Vessel	30	Transport (Cargo)
Tanker	1	Transport (Cargo)
Coaster	4	Transport (Cargo)
Collier	4	Transport (Cargo)
Liberty ship	2	Transport (Cargo)
Victory ship	2	Transport (Cargo)
Tug	4	Unclassified
Hulk	1	Unclassified
Spritsail Barge	1	Unclassified
Survey Vessel	1	Unclassified
Pilot Vessel	1	Unclassified
Salvage Vessel	2	Unclassified

Table 3: Wrecks queried by place of departure (1939-1945)

Place of Departure	No. of wrecks	Country
Annaba	1	Algeria
Beni Saf	1	Algeria
Bahia Blanca	1	Argentina
Buenos Aires	1	Argentina
Santa Cruz (Argentina)	1	Argentina
Mackay	1	Australia
Antwerp	4	Belgium
Ghent	1	Belgium
Zeebrugge	1	Belgium
Santos	2	Brazil
Douala	1	Cameroon
Canada	1	Canada
Montreal	4	Canada
Nova Scotia	1	Canada
Vancouver	2	Canada
Alderney	1	Channel Islands
St Helier	1	Channel Islands
St John	6	Channel Islands
Copenhagen	1	Denmark
Amble	1	England
Avonmouth	4	England
Barrow in Furness	1	England
Blyth	17	England
Boston (Lincolnshire)	1	England
Burnham on Crouch	1	England
Chatham	2	England
Dover	1	England
England	3	England
Falmouth	11	England
Fleetwood	2	England
Fowey	1	England
Garston	2	England
Goole	3	England
Gosport	1	England
Greenhithe	1	England
Grimsby	1	England
Halifax	7	England
Hartlepool	6	England
Harwich	1	England
Hayle	3	England
Immingham	4	England
Ipswich	2	England
Isle of Wight	1	England
Keadby	1	England
Kings Lynn	1	England
Kingston Upon Hull	17	England
Langstone Harbour	1	England
Liverpool	1	England

Place of Departure	No. of wrecks	Country
London	66	England
Lowestoft	1	England
Manchester	1	England
Middlesbrough	5	England
Milford Haven	1	England
Newcastle-Upon-Tyne	2	England
Newhaven	1	England
Newlyn	1	England
Northumberland	1	England
Plymouth	2	England
Poole	5	England
Portland (Dorset)	3	England
Portreath	1	England
Portsmouth	7	England
Preston	1	England
Ramsgate	1	England
River Tees	3	England
River Thames	1	England
River Tyne	26	England
River Wear	1	England
Rochester	1	England
Salt End	1	England
Seaham	4	England
Sheerness	1	England
Shoreham by Sea	1	England
Southampton	9	England
Southend on Sea	6	England
St Helens Road	1	England
Stanlow	2	England
Sunderland	11	England
Teignmouth	1	England
Tyne and Wear	2	England
Tynemouth	2	England
Warkworth	2	England
Workington	1	England
Boulogne	1	France
Brest	2	France
Cherbourg	3	France
Dunkirk	1	France
France	2	France
Le Havre	2	France
Nantes	1	France
Normandy	2	France
Rouen	1	France
Bombay	1	India
Calcutta	1	India
India	1	India
Abadan	1	Iran
Tampico	1	Mexico
Casablanca	1	Morocco
Beira	1	Mozambique

Place of Departure	No. of wrecks	Country
Harlingden	1	Netherlands
Netherlands	1	Netherlands
Rotterdam	2	Netherlands
Port Harcourt	1	Nigeria
North Sea	2	North Sea
Belfast	1	Northern Ireland
Bergen	2	Norway
Hommelvik	1	Norway
Horten	1	Norway
Kristiansand	2	Norway
Trondheim	1	Norway
Constantza	2	Romania
Aberdeen	2	Scotland
Borrowstounness	1	Scotland
Burntisland	1	Scotland
Glasgow	1	Scotland
Greenock	1	Scotland
Leith	4	Scotland
Macduff	1	Scotland
Methil	6	Scotland
River Clyde	2	Scotland
Scotland	2	Scotland
Pepel	1	Sierra Leone
Table Bay	1	South Africa
Santander	1	Spain
Kopmanholmen	1	Sweden
Uddevalla	1	Sweden
Boston (Massachusetts)	1	USA
Delaware	1	USA
Galveston	1	USA
Jacksonville (Florida)	1	USA
Jacksonville (North Carolina)	1	USA
Lobitos	1	USA
New Orleans	2	USA
New York	7	USA
Philadelphia	1	USA
Port Everglades	1	USA
Texas	1	USA
Puerto Cabello	1	Venezuela
Barry	7	Wales
Barry Roads	1	Wales
Cardiff	6	Wales
Newport	5	Wales
Penarth	1	Wales
Port Talbot	1	Wales
Swansea	4	Wales
Wales	3	Wales
Trinidad	1	West Indies

Table 4: Wrecks queried by place of destination (1939-1945)

Place of Destination	No. of wrecks	Country
East Africa	1	Africa
West Africa	1	Africa
Bahia Blanca	1	Argentina
Buenos Aires	1	Argentina
La Plata	1	Argentina
Villa Constitucion	1	Argentina
Australia	1	Australia
Brisbane	1	Australia
Devonport	3	Australia
Fremantle	1	Australia
Sydney (New South Wales)	1	Australia
Antwerp	11	Belgium
Bruges	2	Belgium
Ghent	1	Belgium
Great Britain	2	Britain
Freeport (Nova Scotia)	2	Canada
Gulf of St Lawrence	1	Canada
Sydney (Nova Scotia)	1	Canada
St Helier	1	Channel Islands
St John	1	Channel Islands
Hong Kong	2	China
Santa Marta	1	Colombia
Copenhagen	1	Denmark
Amble	1	England
Avonmouth	3	England
Barnstaple	1	England
Blyth	8	England
Boston (Lincs)	2	England
Bridgwater	1	England
Bristol	2	England
Bristol Channel	3	England
Cantley	1	England
Charlestown (South Cornwall)	1	England
Cowes	7	England
Dartmouth	1	England
Dover	2	England
Ellesmere Port	1	England
England	4	England
Falmouth	6	England
Farne Islands	1	England
Felixstowe	1	England
Fleetwood	1	England
Flixborough	1	England
Fowey	7	England
Garston	2	England
Goole	3	England
Great Yarmouth	1	England
Halifax	1	England
Hamble	1	England
Hartlepool	3	England

Place of Destination	No. of wrecks	Country
Hayle	1	England
Ipswich	4	England
Isle of Grain	1	England
Killingholme	1	England
Kingston upon Hull	11	England
Liverpool	4	England
London	61	England
Manchester	3	England
Middlesbrough	1	England
Milford Haven	2	England
Newcastle upon Tyne	4	England
Newhaven	1	England
North Shields	1	England
Norwich	2	England
Penryn	1	England
Penzance	1	England
Plymouth (Devon)	8	England
Poole	5	England
Portsmouth (Hampshire)	15	England
Preston	1	England
Ridham Dock	2	England
River Tees	5	England
River Thames	2	England
River Tyne	26	England
Rochester	3	England
Runcorn	1	England
Salt End	1	England
Seaham	1	England
Sheerness	2	England
Shell Haven	3	England
Shoreham by Sea	5	England
Southampton	7	England
Southend on Sea	1	England
St Helens Road	1	England
Sunderland	6	England
Tees Bay	2	England
Tyne and Wear	4	England
Tynemouth	1	England
Warkworth	2	England
Watchet	1	England
English Channel	2	English Channel
Finland	1	Finland
Bayonne	2	France
Bordeaux	1	France
Brest	3	France
Cherbourg	1	France
Dunkirk	2	France
France	3	France
Marseille	2	France
Normandy	8	France
Rouen	1	France

Place of Destination	No. of wrecks	Country
Gibraltar	1	Gibraltar
Piraeus	1	Greece
Calcutta	1	India
Cork	1	Ireland
Dublin	1	Ireland
Genoa	1	Italy
Livorno	1	Italy
Servola	2	Italy
Mombasa	1	Kenya
Casablanca	1	Morocco
Beira	1	Mozambique
Rangoon	1	Myanmar
Curacao	1	Netherlands
Rotterdam	2	Netherlands
North Sea	5	North Sea
Belfast	2	Northern Ireland
Larne	1	Northern Ireland
Bergen	2	Norway
Norway	1	Norway
Oslo	1	Norway
Aberdeen	2	Scotland
Ardrossan	1	Scotland
Edinburgh	1	Scotland
Firth of Forth	1	Scotland
Grangemouth	8	Scotland
Greenock	1	Scotland
Invergordon	1	Scotland
Inverkeithing	1	Scotland
Leith	5	Scotland
Lossiemouth	1	Scotland
Methil	4	Scotland
Orkney Islands	1	Scotland
River Clyde	4	Scotland
Rosyth	1	Scotland
Stromness	1	Scotland
Dakar	1	Senegal
Senegal	1	Senegal
Pepel	1	Sierra Leone
Durban	1	South Africa
South Africa	1	South Africa
Table Bay	2	South Africa
Paramaribo	1	Suriname
Gothenburg	5	Sweden
Malmo	1	Sweden
Bellingham	1	USA
Houston (Texas)	1	USA
New York	1	USA
USA	4	USA
Barry	3	Wales
Barry Roads	1	Wales
Caernarvon	1	Wales

Place of Destination	No. of wrecks	Country
Cardiff	1	Wales
Llandulas	1	Wales
Llanelli	1	Wales
Mumbles	1	Wales
Newport (Gwent)	3	Wales
Port Talbot	1	Wales
Swansea	2	Wales
Aruba	1	West Indies

Table 5: Wrecks queried by place of registration (1939-1945)

Place of Registration	No. of wrecks	Country
Antwerp	3	Belgium
Ostend	1	Belgium
Copenhagen	1	Denmark
Barrow in Furness	1	England
Bideford	1	England
Fleetwood	1	England
Gloucester	1	England
Goole	3	England
Grangemouth	1	England
Grimsby	5	England
Hartlepool	2	England
Harwich	1	England
Ipswich	1	England
Kingston-Upon-Hull	6	England
Liverpool	8	England
London	60	England
Lowestoft	3	England
Middlesbrough	1	England
Milford Haven	1	England
Newcastle	6	England
Rye	1	England
Shoreham by Sea	1	England
Sunderland	1	England
West Hartlepool	3	England
Whitehaven	1	England
Siros	1	France
Chios	1	Greece
Piraeus	3	Greece
Amsterdam	2	Holland
Groningen	4	Holland
Rotterdam	2	Holland
Terenuzen	2	Holland
The Hague	1	Holland
Cork	1	Ireland
Dublin	1	Ireland
Bergen	4	Norway
Haugesund	1	Norway
Oslo	8	Norway
Sarpsborg	1	Norway
Tonsberg	1	Norway

Place of Registration	No. of wrecks	Country
Gdynia	2	Poland
Szczecin	1	Poland
Aberdeen	2	Scotland
Glasgow	7	Scotland
Greenock	3	Scotland
Gothenburg	1	Sweden
Stockholm	1	Sweden
Uddeholm	1	Sweden
Jacksonville (Florida)	1	USA
New Orleans	3	USA
New York	1	USA
San Fransisco (California)	1	USA
Cardiff	3	Wales
Llanelli	1	Wales
River Severn	1	Wales

Table 6a: Wrecks queried by nationality (1939-1945)

Nationality	No. of wrecks
British	484
English	118
Dutch	38
Norwegian	38
German	27
American	21
French	18
Scottish	13
Belgian	12
Greek	11
Swedish	11
Danish	7
Polish	7
Italian	4
Canadian	3
Irish	2
Northern Irish	2
Welsh	2
Yugoslavian	2
Finnish	1
Japanese	1
Latvian	1
Panamanian	1

Table 6b: Wrecks queried by nationality (1946-1950)

Nationality	No. of wrecks
British	22
English	11
American	6
Greek	5
Welsh	3
Dutch	2
Norwegian	2

Nationality	No. of wrecks
German	2
French	2
Scottish	2
Swedish	2
Spanish	2
Danish	1
Italian	1
Canadian	1

Table 7: Wrecks queried by manner of loss

Manner of Loss	No. of wrecks (1939-1945)	No. of wrecks (1946-1950)
Foundered	424	28
Mined	333	3
Bombed	119	-
Torpedoed	113	-
Dispersed	75	1
Collision	67	10
Stranded	40	13
Gun Action	22	1
Beached	18	1
Depth Charged	11	-
Grounded	10	5
Burnt	8	-
Capsized	8	4
Lost	8	-
Leaked	6	7
Recovered	6	-
Scuttled	6	2
Broken Up	5	2
Explosion	5	3
Abandoned	2	-
Wrecked	2	-
Mechanical Failure	2	-
Back Broken	2	-
Bilged	1	2

Table 8: Passenger vessels in the Known Resource for the period 1939-1950

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Propulsion Specifics	Material	Loss	Date of Loss
805091	*Cuba*	1923	French	Troop Ship Liner	Steam	Turbine Engine Twin Screw Driven	Steel	Torpedoed Foundered Dispersed	1945
904632	*Alex Van Opstal*	1937	Belgian	Cargo Vessel Liner Passenger Vessel	Steam Engine	Screw Driven Oil Engine Diesel Engine	Steel	Mined Foundered	1939
904825	*Spaarndam*	Unknown	Dutch	Liner Cargo Vessel	Unknown	Unknown	Unknown	Mined Foundered	1939
904907	*Dunbar Castle*	1930	English	Passenger Vessel Liner Cargo Vessel	Engine	Twin Screw Driven Oil Engine	Steel	Mined Dispersed Foundered	1940
908117	*Simon Bolivar*	1927	Dutch	Liner	Steam	Triple Expansion	Unknown	Mined	1939
908125	*Terukuni Maru*	1930	Japanese	Cargo Vessel Liner	Engine	Oil Engine Twin Screw Driven	Steel	Mined Foundered Dispersed	1939
908737	*Oslofjord*	1938	Norwegian	Liner Troop Ship Passenger Vessel Cargo Vessel	Engine	Twin Screw Driven Oil Engine	Steel	Mined Beached Foundered	1940
1002987	*Carare*	1925	British	Liner Cargo Vessel	Steam	Screw Driven Triple Expansion	Steel	Mined Foundered Dispersed	1940
1349050	*Pilsudski*	1935	Polish	Cargo Vessel Liner	Engine	Diesel Engine	Steel	Mined	1939
906735	*Innisfallen*	Unknown	British	Passenger Vessel Cargo Vessel	Engine	Screw Driven Oil Engine	Steel	Mined Foundered Dispersed	1940
907030	*Munster*	1938	Irish	Ferry Passenger Vessel Cargo Vessel	Engine	Twin Screw Driven Oil Engine	Steel	Mined Foundered	1940

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Propulsion Specifics	Material	Loss	Date of Loss
908746	HMS *Southsea*	1930	British	Minesweeper	Steam	Paddle Driven	Steel	Mined	1941
				Passenger Vessel				Beached	
				Paddle Steamer		Compound Engine		Foundered	
				Admiralty Vessel				Broken Up	
								Dispersed	
911734	HMS *Prince Leopold*	1930	Belgian	Ferry	Steam	Twin Screw Driven	Steel	Torpedoed	1944
				Passenger Vessel				Capsized	
				Hospital Ship					
			British	Troop Ship		Geared Turbine Engine		Foundered	
				Landing Craft Infantry					
				Admiralty Vessel				Dispersed	
				Target Craft					
943559	*Somali*	1930	English	Cargo Vessel	Steam	Screw Driven	Steel	Bombed	1941
				Passenger Vessel				Foundered	
				Armed Cargo Vessel		Quadruple Expansion		Explosion	
								Burnt	

Table 9a: Purpose-built military vessel wrecks 1939-1945

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Propulsion Specifics	Material	Loss	Date of Loss
832141	HMS *Chorley*	Unknown	British	Patrol Boat	Unknown	Unknown	Unknown	Leaked	1942
908849	*La Bastiaise*	1940	French	Corvette (Non Sail) Warship Patrol Boat	Engine	Twin Screw Driven	Metal	Foundered Dispersed	1940
912633	*Tunisian*	Unknown	British	Boom Defence Vessel Patrol Boat	Unknown	Unknown	Unknown	Mined	1942
904829	*MMS39*	Unknown	British	Minesweeper	Engine	Unknown	Unknown	Mined	1941
904830								Foundered	
904914	*Emile Deschamps*	1922	French	Minesweeper	Steam	Screw Driven Triple Expansion	Unknown	Mined Foundered	1940
908141	*MMS227*	Unknown	Dutch	Minesweeper	Unknown	Unknown	Unknown	Mined	1944
908735	*MMS180*	Unknown	British	Minesweeper	Engine	Unknown	Unknown	Collision	1942
913047	HMS *Corfield*	Unknown	British	Minesweeper	Unknown	Unknown	Unknown	Mined Foundered Dispersed	1941
913077	*Princess Victoria*	Unknown	British	Minesweeper	Unknown	Unknown	Unknown	Mined	1940
1469668	HMS *Loyalty*	1942	British	Minesweeper Warship	Engine	Unknown	Steel	Torpedoed Foundered	1944
904749	*Van Meerlant*	Unknown	Dutch	Minelayer	Unknown	Unknown	Unknown	Mined	1941
907749	HMS *Medea*	1915	British	Minelayer	Unknown	Twin Screw Driven Triple Expansion	Steel	Stranded	1939
907578	HMS *Tonbridge*	Unknown	British	Net Layer	Steam	Unknown	Unknown	Bombed	1941
1397584	*Unknown*	Unknown	German	E Boat	Engine	Unknown	Metal	Ground Foundered Dispersed	Unknown
1477601	*Carentan*	1939	French	Patrol Vessel Gunboat Escort Vessel Warship	Engine	Screw Driven	Steel	Capsized Foundered	1943

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Propulsion Specifics	Material	Loss	Date of Loss
1002986	*Phoenix No 194 AX*	Unknown	British	Pontoon Mulberry Harbour Phoenix Caisson	Towed	Unknown	Concrete	Foundered Dispersed	1944
767220	HMS *Swordfish*	1930	British	Patrol Submarine Submarine	Engine	Diesel Engine Twin Screw Driven	Steel	Mined Foundered	1940
804910	*U1195*	1943	German	Patrol Submarine Submarine	Engine	Diesel Electric Engine Screw Driven	Steel	Depth Charged	1945
832140	*U1063*	Unknown	German	Patrol Submarine	Unknown	Unknown	Unknown	Depth Charged	1945
859156	*U681*	1944	German	Patrol Submarine	Unknown	Unknown	Steel	Bombed	1945
859162	*U480*	Unknown	German	Patrol Submarine	Unknown	Unknown	Steel	Depth Charged	1945
895520	*U95*	Unknown	German	Patrol Submarine	Engine	Screw Driven	Metal	Lost	1945
907582	HMS *Umpire*	1941	British	Submarine Patrol Submarine	Engine	Diesel Engine GEC Electric Motors Twin Screw Driven	Steel	Collision Foundered	1941
911863	*U678*	Unknown	German	Submarine Patrol Submarine	Unknown	Unknown	Unknown	Unknown	1944
911874	*U275*	Unknown	German	Patrol Submarine	Unknown	Unknown	Unknown	Mined	1945
911913	*U40*	1938	German	Patrol Submarine	Unknown	Unknown	Unknown	Mined	1939
912940	*U13*	Unknown	German	Patrol Submarine	Unknown	Unknown	Unknown	Depth Charged	1940
918654	*U399*	Unknown	German	Patrol Submarine	Unknown	Unknown	Unknown	Depth Charged	1945
918662	*U1018*	1943	German	Patrol Submarine Submarine	Engine	Unknown	Steel	Depth Charged Foundered	1945
918687	*U1199*	Unknown	German	Patrol Submarine	Unknown	Twin Screw Driven Oil Engine	Steel	Depth Charged	1945
918713	*U246*	Unknown	German	Patrol Submarine	Unknown	Unknown	Unknown	Depth Charged	1945
919791	*U683*	1943	German	Patrol Submarine	Unknown	Unknown	Unknown	Depth Charged	1945

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Propulsion Specifics	Material	Loss	Date of Loss
919799	*U247*	1942	German	Patrol Submarine	Unknown	Unknown	Unknown	Unknown	1944
919824	*U1209*	1943	German	Patrol Submarine	Unknown	Twin Screw Driven Oil Engine	Unknown	Grounded	1944
943563	*U1274*	1944	German	Patrol Submarine Submarine	Engine	Twin Screw Driven Oil Engine Diesel Engine	Steel	Depth Charged Foundered	1945
1001477	HMS *Unity*	1938	British	Patrol Submarine Warship Submarine	Engine	Twin Screw Driven Oil Engine Diesel Electric Engine	Steel	Collision Foundered	1940
1002048	*U1024*	Unknown	German	Patrol Submarine	Unknown	Unknown	Unknown	Unknown	1945
1450480	*U1021*	1943	German	Patrol Submarine Submarine	Engine	Unknown	Steel	Mined Foundered	1945
1450560	*U325*	1943	German	Patrol Submarine Submarine	Engine	Unknown	Steel	Mined Foundered	1945
1450599	*U400*	1942	German	Patrol Submarine Submarine	Engine	Unknown	Steel	Mined Foundered	1944
767388	*LCT 548*	1943	American	Landing Craft Tank Warship	Engine	Unknown	Metal	Gun Action Foundered Capsized	1944
832138	HMS *Penylan*	Unknown	British	Escort Vessel Destroyer Warship	Unknown	Unknown	Unknown	Torpedoed Foundered	1942
901767	HMS *ML103*	Unknown	British	Launch Warship	Engine	Unknown	Unknown	Mined	1942
904727	HMS *Blanche*	1930	British	Warship Destroyer	Engine	Turbine Engine	Steel	Mined Foundered	1939
907560	HMS *Vortigern*	1917	British	Escort Vessel Warship Destroyer	Engine	Geared Turbine Engine	Steel	Torpedoed Foundered Dispersed	1942

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Propulsion Specifics	Material	Loss	Date of Loss
907765	HMS *Warwick*	1917	British	Escort Vessel Warship Destroyer	Steam	Twin Screw Driven Turbine Engine	Steel	Unknown	1944
912632	HMS *Gipsy*	1935	British	Warship Destroyer	Steam	Twin Screw Driven Turbine Engine	Steel	Mined Foundered	1939
919162	*Eskdale*	1942	British Norwegian	Destroyer Warship Escort Vessel	Steam	Twin Screw Driven Turbine Engine	Steel	Torpedoed Foundered	1943
919213	HMCS *Trentonian*	Unknown	Canadian	Escort Vessel Warship Corvette (Non Sail)	Steam	Unknown	Steel	Torpedoed Foundered	1945
1102944	HMCS *Regina*	1943	British Canadian	Corvette (Non Sail) Escort Vessel Warship	Steam	Twin Screw Driven Triple Expansion	Steel	Torpedoed Foundered	1944
1163514	HMS *Acheron*	1927	British	Destroyer Warship	Engine	Twin Screw Driven Turbine Engine	Steel	Mined Foundered	1940
1353936	*Chasseur 6*	1939	French Polish	Motor Gunboat Warship	Engine	Unknown	Steel	Gun Action Foundered	1940
1402696	HMS *Boadicea*	1929	British	Escort Vessel Warship Destroyer	Engine	Screw Driven	Steel	Torpedoed Foundered Explosion	1944
1470646	HMS *Delight*	Unknown	British	Warship Destroyer	Steam	Unknown	Steel	Bombed Foundered	1940
1477708	*Chasseur 7*	1939	French Polish	Motor Gunboat Warship	Engine	Unknown	Steel	Gun Action Foundered	1940
904747 904752 904753	HMS *Vimiera*	Unknown	British	Destroyer	Unknown	Unknown	Unknown	Mined	1942
904809	HMS *Venetia*	1917	British	Destroyer	Unknown	Unknown	Unknown	Mined	1941
912630 912632	HMS *Gipsy*	1935	British	Destroyer	Unknown	Twin Screw Driven Turbine Engine	Unknown	Mined	1939
919761	*La Suippe*	Unknown	French	Destroyer	Unknown	Unknown	Unknown	Bombed	1941

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Propulsion Specifics	Material	Loss	Date of Loss
901769	HMS *Brazen*	1928	British	Destroyer Warship Escort Vessel	Engine	Twin Screw Driven Turbine Engine	Steel	Gun Action Foundered Bombed	1940
766920	*U1021*	1943	German	Submarine	Engine	Unknown	Steel	Torpedoed Foundered	Unknown
813847	*U16*	Unknown	German	Submarine	Engine	Unknown	Steel	Depth Charged Foundered	1939
904834	*Unknown*	Unknown	German	Submarine	Unknown	Unknown	Unknown	Unknown	1939
908657	*Unknown*	Unknown	German	Submarine	Unknown	Unknown	Unknown	Unknown	1939
766925	*LCT921*	Unknown	British	Landing Craft Tank	Unknown	Unknown	Unknown	Unknown	Unknown
913039	*LCT1029*	Unknown	British	Landing Craft Landing Craft Tank	Unknown	Unknown	Unknown	Explosion Foundered	1944
1397644	*LCT529*	Unknown	British American	Landing Craft Tank	Engine	Screw Driven Diesel Engine	Steel	Foundered Beached Recovered	Unknown
912628	*MGB76*	Unknown	British	Motor Gunboat	Engine	Unknown	Unknown	Unknown	1942
901817	*MTB218*	Unknown	British	Motor Torpedo Boat	Unknown	Unknown	Unknown	Mined	1942
908099	*MTB16*	1939	British	Motor Torpedo Boat	Engine	Unknown	Unknown	Mined Foundered	1940
908110	*MTB15*	Unknown	British	Motor Torpedo Boat	Engine	Unknown	Unknown	Mined Foundered	1940
832476	*LST507*	Unknown	American	Landing Ship Tank Landing Craft	Unknown	Unknown	Unknown	Torpedoed	1944
904600	*LST531*	Unknown	American	Landing Craft Landing Ship Tank	Unknown	Unknown	Unknown	Unknown	1944
766923	*LST921*	Unknown	American	Landing Craft	Unknown	Unknown	Unknown	Torpedoed	1944
832483	*Unknown*	Unknown	British	Landing Craft	Engine	Twin Screw Driven Oil Engine	Unknown	Capsized	1944
832516	*Unknown*	Unknown	Unknown	Landing Craft Barge	Unknown	Unknown	Unknown	Foundered	1944
904733	*LBVM396*	Unknown	British	Landing Craft	Unknown	Unknown	Unknown	Unknown	Unknown

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Propulsion Specifics	Material	Loss	Date of Loss
908086	*LCA551*	Unknown	British	Landing Craft	Unknown	Unknown	Unknown	Foundered	1944
911781	*LCVP1199*	Unknown	British	Landing Craft	Engine	Unknown	Unknown	Foundered	1944
911976	*LCS201*	Unknown	British	Landing Craft	Unknown	Unknown	Unknown	Foundered Collision	1943
974944	*Unknown*	Unknown	British	Landing Craft	Unknown	Unknown	Unknown	Foundered	1944
907430	HMS *Tonbridge*	Unknown	British	Net Layer	Steam	Unknown	Unknown	Bombed	1941

Table 9b: Purpose-built military vessel wrecks 1946-1950

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Propulsion Specifics	Material	Loss	Date of Loss
904871	*LCPR961*	Unknown	Unknown	Landing Craft	Unknown	Unknown	Unknown	Unknown	1946
1521765	*HM LCT1068*	1944	American	Transport Vessel	Engine	Twin Screw Driven	Steel	Leaked	1947
			British	Landing Craft	Towed	Diesel Engine		Foundered	
767447	*LCT1068*	1943	Unknown	Landing Craft Tank	Unknown	Diesel Engine Screw Driven	Steel	Unknown	1947
1480987	HMS *Implacable*	1800	British	Training Ship Warship	Sail	Unknown	Wood	Scuttled	1949
			French	Third Rate Ship of the Line Hulk				Foundered	
1520024	HMS *Warspite*	1913	British	Battleship	Steam	Turbine Engine	Steel	Grounded Beached	1947
1520032				Warship	Towed	Oil Engine Reciprocating		Broken Up Stranded Bilged	
1520971	*Safari*	1941	British	Submarine Warship	Towed Engine	Twin Screw Driven Oil Engine Diesel Engine	Steel	Foundered	1946
1521066	*P 555*	1923	British	Submarine	Engine	Electric Diesel Engine	Steel	Scuttled	1947
			American	Warship Admiralty Vessel		Twin Screw Driven Oil Engine			

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Propulsion Specifics	Material	Loss	Date of Loss
1525491	*Witherington*	1919	British	Escort Vessel	Steam	Unknown	Steel	Unknown	1947
				Admiralty Vessel					
				Destroyer	Towed				
				Warship					

Table 10: Fishing vessel wrecks 1946-1950

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Propulsion Specifics	Material	Loss	Date of Loss
1472720	*Volante*	Unknown	British	Trawler	Motor	Unknown	Unknown	Mined	1950
				Fishing Vessel				Foundered	
1524891	*Thistle*	Unknown	British	Trawler	Towed	Screw Driven	Unknown	Foundered	1948
				Fishing Vessel		Petrol Engine			
1524965	*Yarmouth*	1907	English	Fishing Vessel	Steam	Screw Driven	Wood	Stranded	1950
				Trawler		Triple Expansion			
1521055	*Marguerita*	Unknown	Danish	Fishing Vessel	Steam	Screw Driven	Wood	Grounded	1946
			British	Drifter					
			English	Admiralty Vessel	Sail	Coal Burning		Foundered	
			Welsh						

7.1.3.

Table 11: Industrial vessel wrecks 1939-1950

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Propulsion Specifics	Material	Loss	Date of Loss
911909	*Grabwell*	Unknown	Irish	Lighter	Steam	Screw Driven	Steel	Foundered	1942
				Dredger		Triple Expansion		Leaked	
912629	*Excelsior*	Unknown	British	Dredger	Unknown	Unknown	Unknown	Unknown	1945
943550	*Coquet Mouth*	1926	Unknown	Dredger	Steam	Screw Driven	Steel	Mined	1940
				Bucket Dredger		Triple Expansion		Foundered	
1003011	*Durdham*	Unknown	British	Dredger	Unknown	Unknown	Unknown	Mined	1940
895519	*Percy*	Unknown	British	Grab Dredger	Engine	Unknown	Metal	Mined	1941

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Propulsion Specifics	Material	Loss	Date of Loss
904899	*Alert*	Unknown	British	Cable Layer	Unknown	Unknown	Unknown	Mined Torpedoed Foundered	1945
912687	HMTS *Monarch*	1915	British	Admiralty Vessel Cargo Vessel Cable Layer	Steam	Twin Screw Driven Turbine Engine	Steel	Torpedoed Foundered	1945
919750	*Lady of the Isles*	1875	British	Cable Layer	Unknown	Screw Driven Compound	Steel	Mined Foundered	1940

7.1.4.

Table 12: Law and Government vessel wrecks 1939-1950

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Propulsion Specifics	Material	Loss	Date of Loss
904748	HMS *Danube III*	1924	British	Examination Service Vessel Admiralty Vessel Tug Lighter	Steam	Screw Driven Triple Expansion	Steel	Mined Foundered	1940
904872	HMS *Napia*	1914	British	Admiralty Vessel Tug Examination Service Vessel	Engine	Screw Driven Compound	Steel	Mined Foundered	1939
912949	*Thistle*	Unknown	British	Examination Service Vessel Craft	Unknown	Unknown	Unknown	Bombed	1941
1003782	HMS *Ben Ardna*	Unknown	Unknown	Trawler Admiralty Vessel Examination Service Vessel	Steam	Unknown	Steel	Collision Foundered	1942

7.1.5.

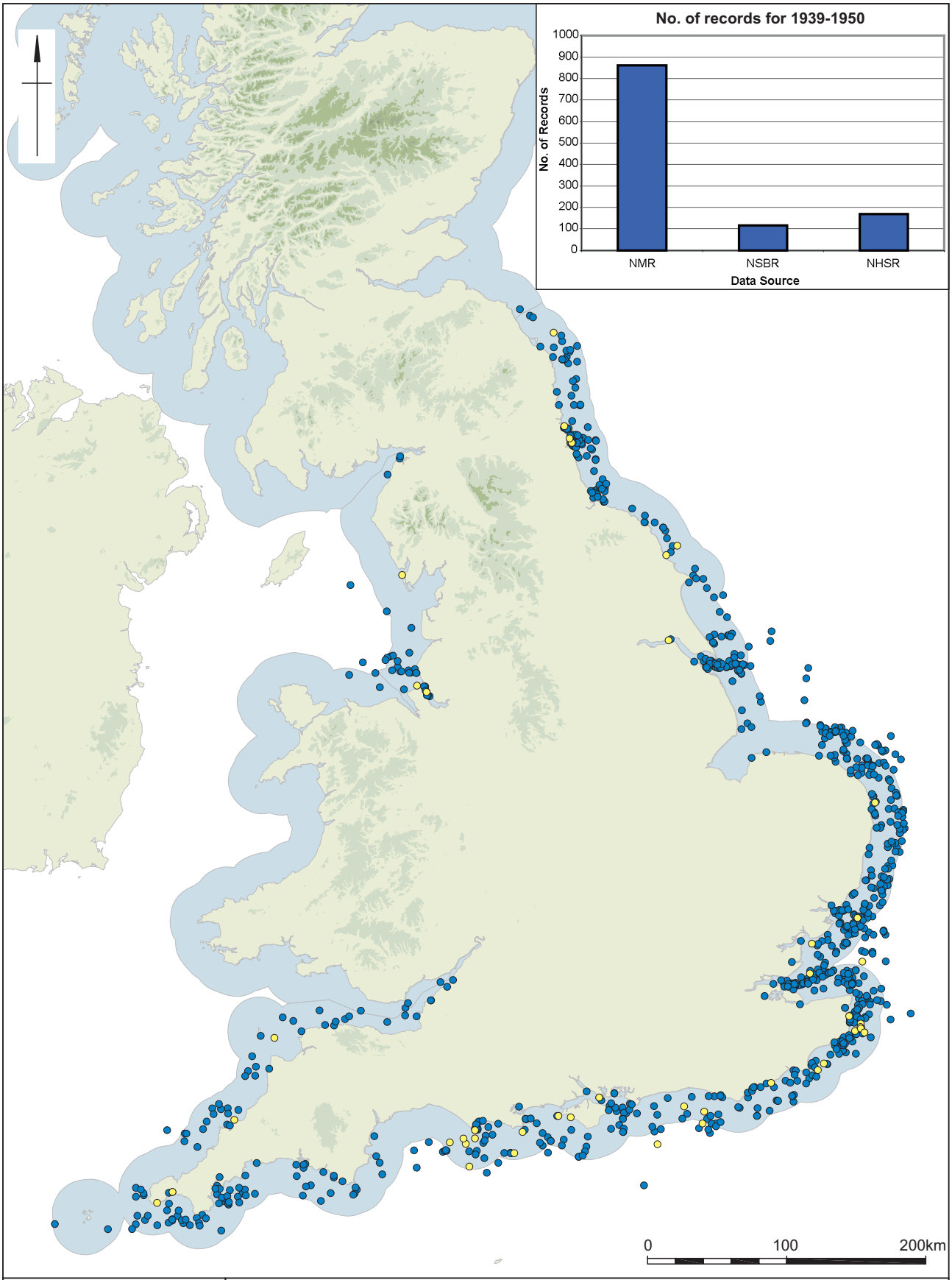
Table 13: Health and Welfare vessel wrecks 1939-1950

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Specs	Material	Loss	Date of Loss
901734	*Roode Zee*	1938	Dutch	Rescue Tug	Engine	Twin Screw Driven	Steel	Torpedoed Foundered	1944
908828	HMS *Fairplay II*	1921	British	Admiralty Vessel Tug Rescue Tug	Steam	Screw Driven Triple Expansion	Steel	Stranded	1940
904776	*Argus*	Unknown	British	Trinity House Vessel Survey Vessel	Unknown	Unknown	Unknown	Mined Foundered	1940
907843	*Reculver*	1934	English	Tender Trinity House Vessel Cargo Vessel	Engine	Screw Driven Oil Engine	Steel	Mined Foundered Dispersed	1940
911734	HMS *Prince Leopold*	1930	Belgian British	Ferry Passenger Vessel Hospital Ship Troop Ship Landing Craft Infantry Admiralty Vessel Target Craft	Steam	Twin Screw Driven Geared Turbine Engine	Steel	Torpedoed Capsized Foundered Dispersed	1944
904821	*RD Barge No. 59*	Unknown	Unknown	Lifeboat Barge	Unknown	Unknown	Unknown	Unknown	1945
974938	*Air Sea Rescue Refuge*		German	Refuge Buoy	Unknown	Unknown	Unknown	Unknown	Unknown

Table 14: Recreational vessel wrecks 1939-1950

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Specs	Material	Loss	Date of Loss
767346	HMS *Campeador V*	1938	British	Admiralty Vessel Yacht Anti Submarine Vessel Patrol Boat	Engine	Oil Engine Screw Driven	Steel	Mined	1940
805447	HMS *Wilna*	1939	British	Admiralty Vessel Patrol Boat Anti Submarine Vessel Yacht	Engine	Oil Engine Screw Driven	Wood	Bombed Foundered	1941
832390	HMS *Princess*	1924	British	Anti Submarine Vessel Admiralty Vessel Yacht	Steam	Unknown	Unknown	Collision Foundered	1940
904580	HMS *Warrior II*	1904	British	Tender Escort Vessel Admiralty Vessel Yacht	Engine	Screw Driven Triple Expansion	Unknown	Foundered Bombed	1940
904627	HMS *Sargasso*	1926	British	Leisure Craft Yacht Admiralty Vessel Dan Layer	Steam	Screw Driven Triple Expansion	Steel	Mined Foundered	1943
904668	HMS *Sona*	1922	British	Yacht Patrol Boat Anti Submarine Vessel	Steam	Screw Driven Triple Expansion	Unknown	Bombed	1942
904791	HMS *Aisha*	1934	British	Yacht Leisure Craft	Motor	Screw Driven	Steel	Mined Dispersed	1940

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Specs	Material	Loss	Date of Loss
				Patrol Boat Admiralty Vessel		Oil Engine		Foundered	
907760	*Viva II*	Unknown	British	Patrol Vessel Admiralty Vessel Anti Submarine Vessel Yacht	Motor Engine	Unknown	Steel	Foundered Bombed	1941
907822	*Yorkshire Belle*	Unknown	British	Yacht Tender	Unknown	Unknown	Unknown	Unknown	1941
908744	*Nyula*	Unknown	British	Patrol Boat Admiralty Vessel Yacht	Engine	Unknown	Steel	Collision Foundered	1941
912891	*Gipsy*	Unknown	Unknown	Yacht Craft	Unknown	Unknown	Unknown	Unknown	1941
909200	HMS *Torrent*	1930	British	Yacht Patrol Boat	Unknown	Screw Driven Triple Expansion	Steel	Mined	1941
943531	HMS *Mollusc*	1906	British	Admiralty Vessel Patrol Boat Yacht Anti Submarine Vessel	Steam Sail	Screw Driven Triple Expansion	Steel	Bombed Foundered	1941
1001757	HMS *Snaefell*	1907	British	Admiralty Vessel Leisure Craft Minesweeper Paddle Steamer	Steam	Paddle Driven Triple Expansion	Unknown	Bombed Foundered	1941



12 Nautical mile limit
NMR records 1939-1945
NMR records 1946-1950

Wessex Archaeology

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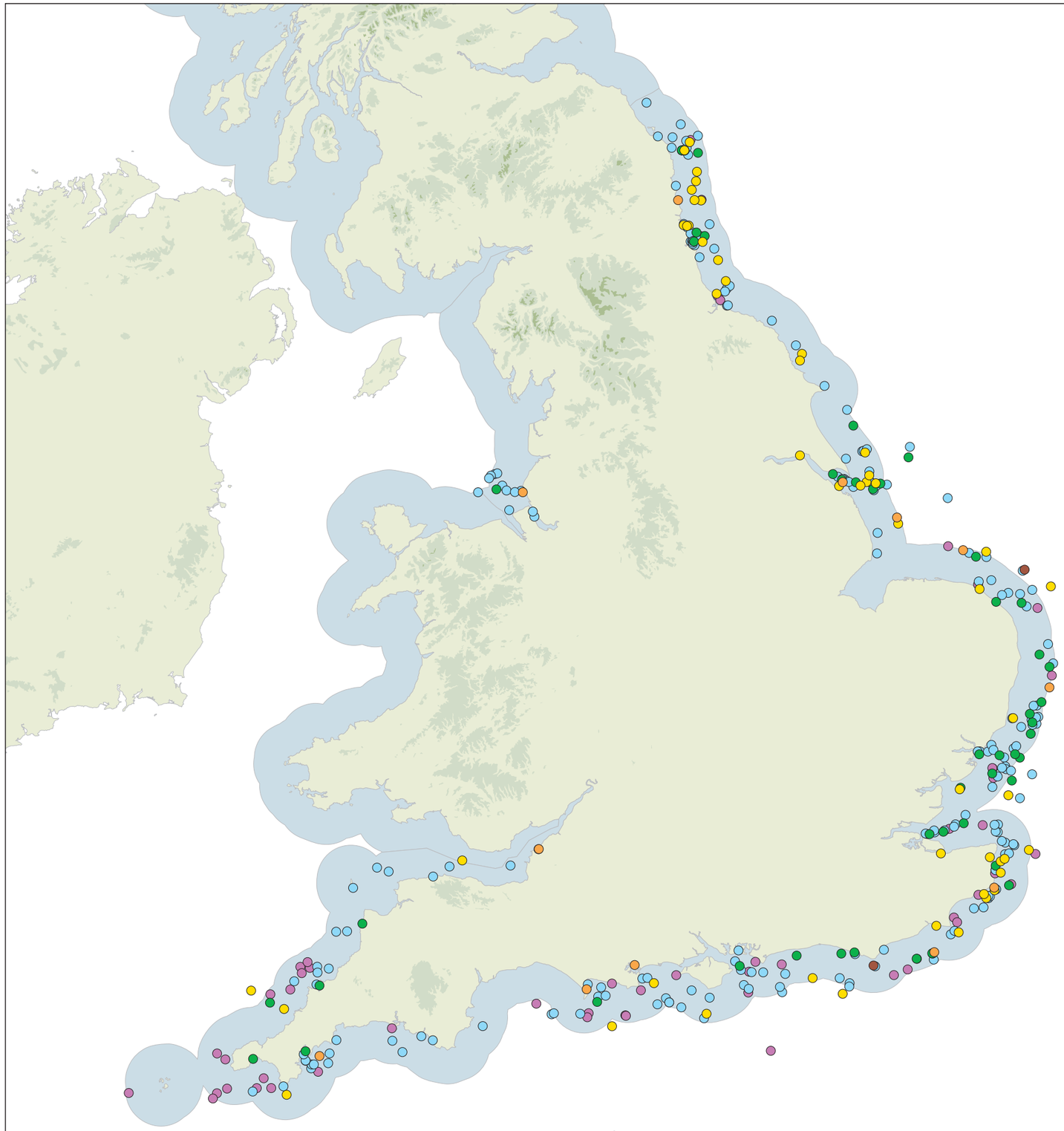
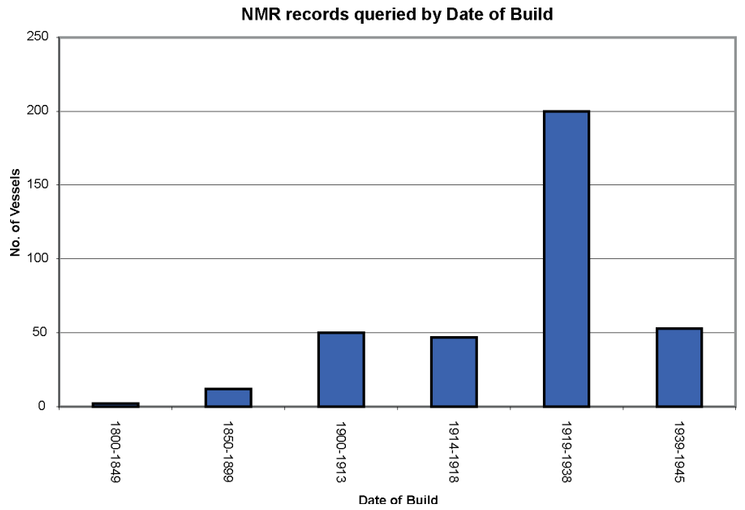
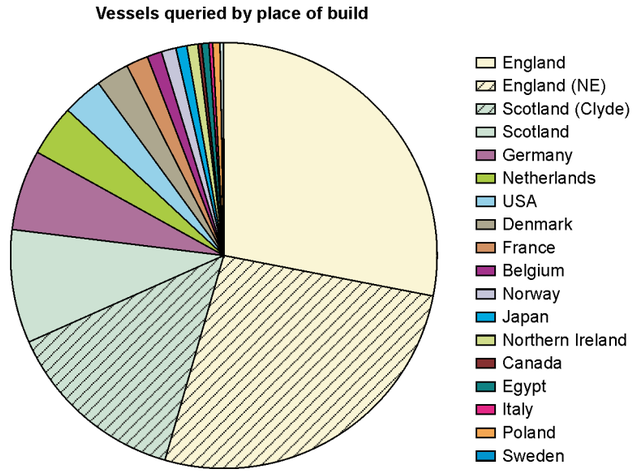
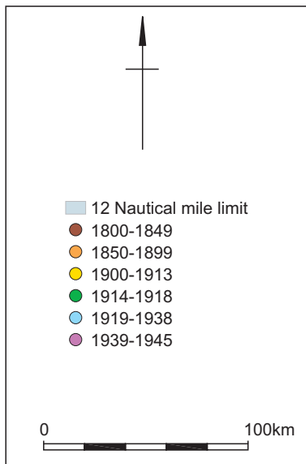
Distribution of the NMR records for the period 1939-1950 Figure 1









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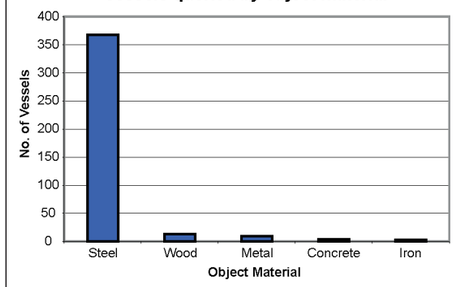
NMR records queried by date and place of build

Figure 2

Wessex Archaeology



12 Nautical mile limit
Wood
Steel
Iron
Metal
Concrete

0 100km

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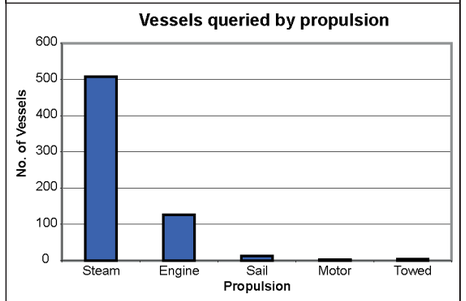
NMR records queried by object material

Figure 3

Wessex Archaeology



12 Nautical mile limit
Towed
Sail
Steam
Engine
Motor

0 100km

Revision Number:	0
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NMR records queried by propulsion

Figure 4

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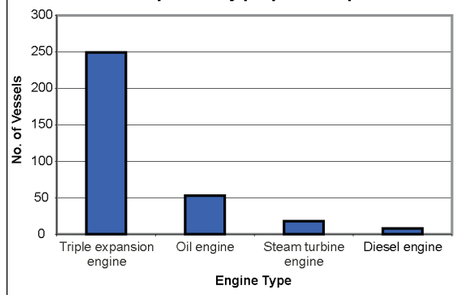
Vessels queried by propulsion specifics



12 Nautical mile limit
Diesel engine
Diesel-electric engine
Steam turbine engine
Geared turbine engine
Oil engine
Triple expansion engine
Paddle-driven engine
Quadruple engine

0 100km

Revision Number:	0
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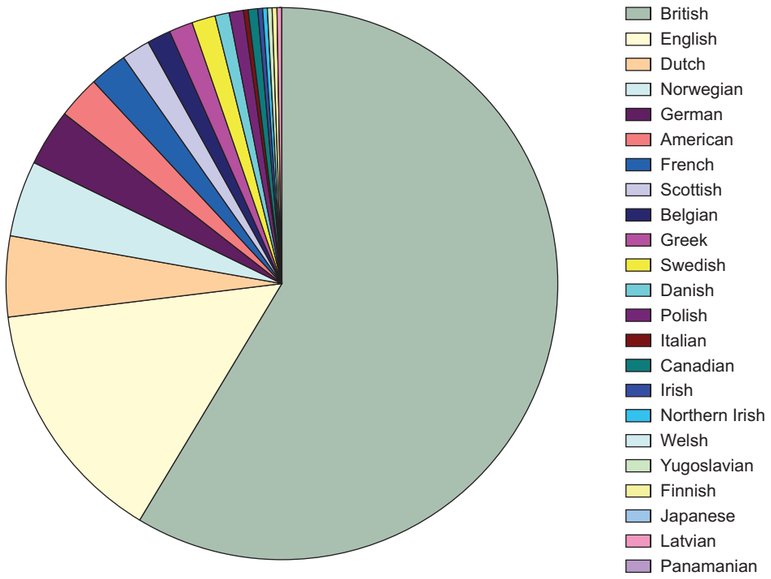
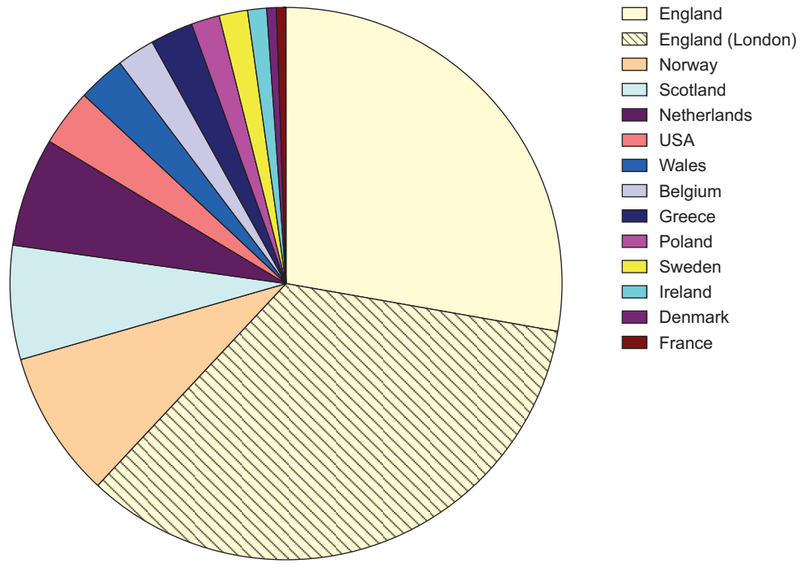
NMR records queried by propulsion specifics

Figure 5

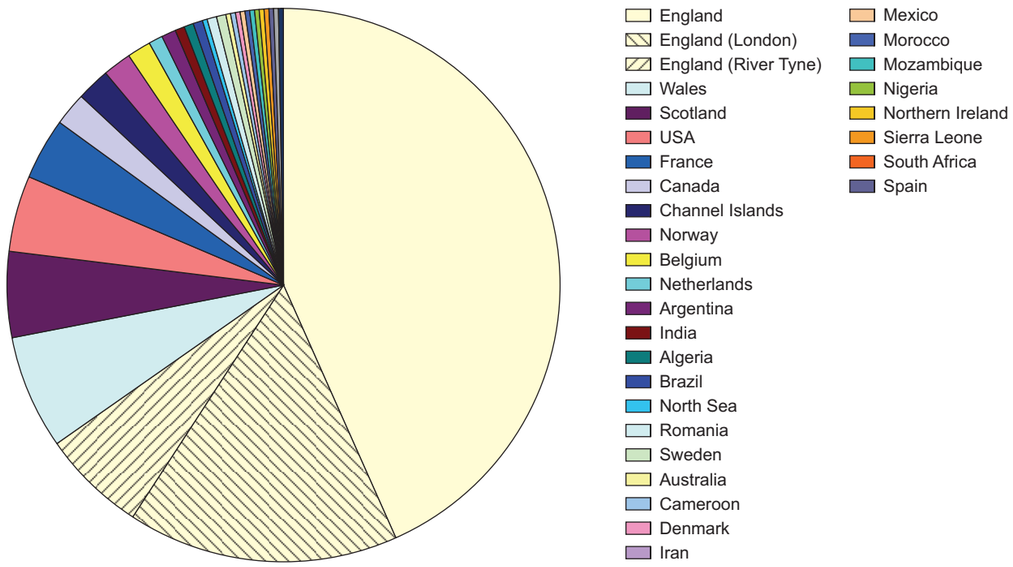
NMR records queried by nationality



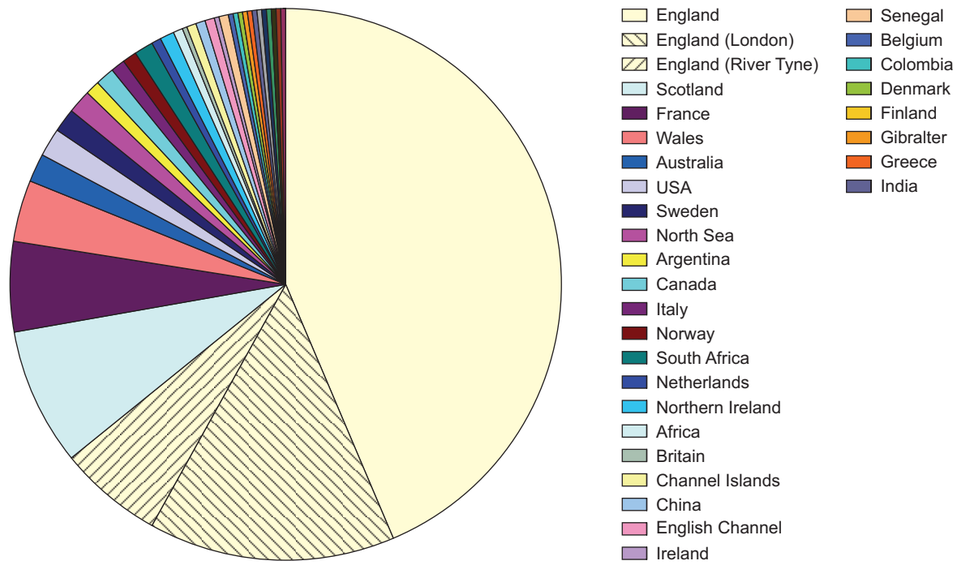
NMR records queried by registration



NMR records queried by departure



NMR records queries by destination



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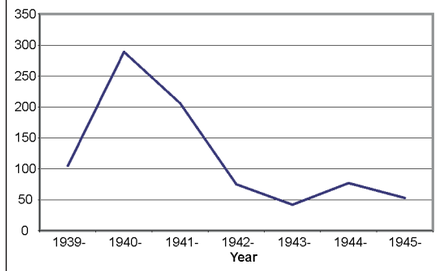
NMR records queried by country of departure, destination, registration and nationality

Figure 6

Wessex Archaeology

Vessels queried by Date of Loss



12 Nautical mile limit
Abandoned
Beached
Bilged
Bombed
Broken up
Burnt
Capsized
Collision
Depth charged
Dispersed
Explosion
Foundered
Grounded
Gun action
Leaked
Lost
Mined
Recovered
Scuttled
Stranded
Torpedoed
Wrecked

Density of wrecks per 20km²:
0
1-10
11-20
21-30
31-40

0 100km

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NMR records queried by date, manner and location of loss

Figure 7

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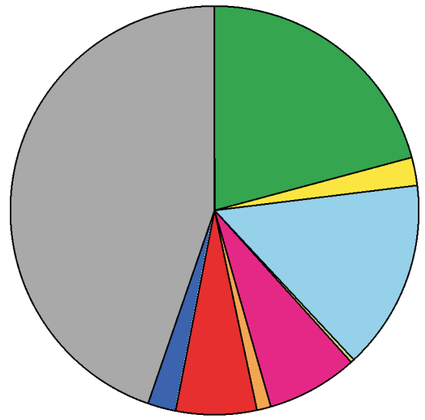
Vessels queried by seabed survival



- Broken up
- Buried
- Dispersed
- Flattened
- Mainly intact
- Partially buried
- Partially intact
- Poor
- Unknown

- 12 Nautical mile limit
- Mainly intact
- Partially intact
- Partially buried
- Buried
- Flattened
- Broken up
- Dispersed
- Poor
- Unknown

0 100km

Revision Number:	0
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NMR records queried by seabed survival

Figure 8

Wessex Archaeology

12 Nautical mile limit
Armed cargo vessel
Barge
Cargo vessel
Coal hulk
Coaster
Collier
Ketch
Liberty ship
Tanker
Tank barge
Trow

0 100km

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Cargo vessel wrecks 1939-1945

Figure 9

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12 Nautical mile limit
Ferry
Liner
Passenger vessel

0 100km

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Passenger vessel wrecks 1939-1945

Figure 10

Wessex Archaeology

12 Nautical mile limit

Purpose-built military vessel

0 100km

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Purpose-built military vessel wrecks 1939-1945

Figure 11

Wessex Archaeology

12 Nautical mile limit
Drifter
Smack
Trawler
Fishing vessel

0 100km

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Report Figs\DBA 1914-1938\10-08-18	

Fishing vessel wrecks 1939-1945

Figure 12

Wessex Archaeology

12 Nautical mile limit

Industrial
- Bucket dredger
- Grab dredger
- Dredger
- Cable layer
- Hopper barge
- Sewage-dumping vessel

Health and welfare
- Life-boat
- Rescue tug
- Refuge buoy
- Hospital ship

Law and government
- Examination service vessel

Recreation
- Leisure craft
- Yacht

0 100km

Revision Number:	0
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Other themes 1939-1945

Figure 13

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