Wessex Archaeology

Assessing Boats and Ships 1914-1938

Archaeological Desk-based Assessment

1914

1920

1925

1930

1935

1938

Ref: 70861.02

February 2011

ASSESSING BOATS AND SHIPS 1914-1938

ARCHAEOLOGICAL DESK-BASED ASSESSMENT

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ASSESSING BOATS AND SHIPS 1914-1938

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Summary

Wessex Archaeology has been funded by English Heritage through the Aggregates Levy Sustainability Fund to provide a national stock-take of known wrecks in waters off England and review it in the 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 second phase of study: the assessment of boats and ships lost between 1914 and 1938.

As of May 2009, the National Monument Records listed 1358 known wrecks lost during the period 1914-1938. 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.*

The results of the queries were then used to conduct a thematic review of the NMR dataset of wrecks, 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 1914-1938 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 269 vessels on the National Small Boat Register and 550 on the National Historic Ships Register has therefore been collated and integrated into the thematic review.

The period is very much dominated by the event with which it commenced - the First World War. Overall, it is arguably appropriate to see it informally as two sub-periods: the war of 1914-18 and the interwar period from 1918-1938. Far more wrecks originate from the first period than from the second. It may be the case that the wrecks recorded by the NMR for 1939-45 include more vessels of relevance to the inter-war years.

The First World War saw a massive maritime effort and the introduction of new technologies and methods of fighting at sea. It saw also the first really widespread and intensive use of submarines and mines. The introduction of unrestricted submarine warfare in 1917 marked a genuine but unsuccessful effort on the part of the Germans to win the war by sinking merchant ships faster than they could be built. This led in turn to a massive and ultimately successful fight-back that allowed import-dependent Britain and its allies to win the war through counter-measures such as the convoy system and a huge programme of shipbuilding.

The interwar period saw an initial boom in merchant shipbuilding turn to bust. Slow stagnation caused by a worldwide depression followed. This stagnation was mirrored in naval fleets. Technological innovation slowed after the war, with little sign of the revolutionary changes that characterised the second half of the 19th century. Some aspects of maritime use prospered however. The interwar years saw a boom in leisure sailing and what came to be known as the 'Golden Age of the Liner'.

The special interest of boats and ships of 1914-1938 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:

- Illustrates a key narrative, for example the unrestricted submarine war of 1917-18;
- Represents a distinct and tangible link to significant persons or events, for example association with famous (or infamous) naval battles or campaigns such as Jutland and the Dardanelles;
- Is representative of significant loss of life or related responses in seafaring safety, for example where great loss of life has occurred;
- Has made a distinct cultural contribution, for example having been used in the making of a film about the events;
- Has 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, for example welded, oil-fired or diesel vessels and certain categories of vessel use including the transport of people, military and industrial;
- Representativeness, for example wrecks which are representative of the birth of naval aviation during this period;
- Diversity, for example the wide range of civilian craft types that were requisitioned for naval service;
- Survival, most importantly the diminishing number of wrecks that are in relatively intact condition and the extremely small number of vessels that have been investigated archaeologically;
- Setting and Context, for example wrecks of 1914-18 in the Thames Estuary and parts of the east coast where particularly high wartime losses occurred.

ASSESSING BOATS AND SHIPS 1914-1938

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

ASSESSING BOATS AND SHIPS 1860-1913

ARCHAEOLOGICAL DESK-BASED ASSESSMENT

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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 the 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. Despite this abundance of known and dated wrecks of the period between 1860 and 1950, 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. Whilst this approach enables a particular wreck to be considered of special interest in respect of one factor or another, 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. Through undertaking a national stock-take of wrecks dating to this period 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.

1.1.5. According to the Historic Ships Committee, a vessel below 40 tons and 40ft (*c.* 12m) is designated as a boat (http://www.nmm.ac.uk/explore/sea-and-ships/facts/faqs/what-is-the-definition-of-a-boat-versus-a-ship). There are, however, some exceptions, such as submarines and fishing vessels, which are always referred to as boats regardless of their size. Whilst this project includes the review of both boats and ships for the period 1860-1950, the wrecks have not been divided as such within this review. In many cases, information relating to known wrecks is fragmentary and ambiguous, and an attempt to divide the wrecks on the basis of this definition may prove to be more misleading than beneficial. Therefore the project considers known wrecks as a single entity; comprising both boats and ships.

1.1.6. 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 second phase of study; the assessment of boats and ships lost between 1914 and 1938.

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 1914-1938

2.1. INTRODUCTION

2.1.1. There are 1358 NMR records relating to the wrecks of boats and ships which were lost in the period between 1914 and 1938 (**Figure 1**). In order to provide a stock-take of these sites the records were subjected to a series of queries. In the first instance, the queries were conducted relating to key factors which outline the biography of a boat or ship.

2.1.2. In order to assess supplementary data relating to extant boats and ships, where possible datasets relating to vessels in preservation have been incorporated alongside the NMR queries, namely the National Small Boats Register (NSBR) and the National Historic Ships Register (NHSR). The NSBR and NHSR list 269 and 550 vessels respectively for the period between 1914 and 1938.

2.2. BUILD

2.2.1. The build of a vessel encompasses its construction, including date and place of build, the object material in which it was constructed, its dimensions and tonnage, the means by which it was propelled and any fittings. Build can also encompass re-building or re-fitting, whether incremental or as a distinct event.

2.2.2. Boat and ship design evolved slowly during the period 1914-1938. There was no revolutionary new type of engine or material for construction (Lavery 2004:269). Technological advances continued to take place, although not at the breakneck pace or revolutionary manner which had been seen in the period before 1914 (Van der Vat 2001:166).

2.2.3. A notable change in hull construction in the period 1914-1938 was the increasing use of welding to join component parts in place of riveting. Steam plant remained largely constant in design in the period, although developments led to the production of more reliable engines with a greater efficiency and with the increased use of the steam turbine. The efficiency of steam engines was further enhanced by the gradual shift from coal to oil-firing, which enabled greater speeds to be attained for the same weight of fuel. The steam engine saw increasing competition from internal combustion engines during this period, such as the diesel engine, which became increasingly widespread amongst all classes of shipping.

2.2.4. In comparison to the preceding period, developments in marine engineering were thus steady but undramatic in the period 1914-1938, and emphasis was placed on the construction of larger vessels which could attain speeds greater than those achieved previously.

Date of Build

2.2.5. A query conducted on the project dataset shows the temporal distribution of vessels according to their date of build (**Table 1** and **Figure 2**). Of the 1358 wrecks lost between 1914 and 1938, the date of build of 866 wrecks is unknown. Of those records for which a date of build was known (492 records), just under two-thirds or 60% are recorded to have been built between 1900 and 1919 (298 records). Three wrecks have a date of build prior to 1850, including two built prior to 1820. Pre-1820 wrecks in particular are rare survivals.

Date	No.
1800-1809	1
1810-1819	1
1820-1829	0

Date	No.
1830-1839	0
1840-1849	0
1850-1859	1
1860-1869	6
1870-1879	22
1880-1889	47
1890-1899	109
1900-1909	143
1910-1919	155
1920-1929	5
1930-1938	2

Table 1: Records queried by Date of Build

2.2.6. The period 1900-1913 was characterised by a naval arms race. This resulted in a regular and progressive annual building programme (Wilson 1992:156) which stemmed from the 1884 'Northbrook Programme' and the 1889 Naval Defence Act. The arms race took place not only between the traditional naval powers of Great Britain, France and Russia, but also the new and powerful fleets of the United States, Germany and Japan.

2.2.7. The shipbuilding boom of the early 20th century was not confined to military vessels alone. Britain retained its position as the world's premier merchant ship building nation up to WWI and had 61% of the world's ship building market in 1913 (Friel 2003:271). The period is also described as the golden age of the ocean liner and saw the construction of larger and faster liners that undertook frequent passages between Europe and the United States.

2.2.8. Of the vessels built between 1900 and 1919, just under a third (86 records) were constructed between 1914 and 1918. The majority of these (68%) were British. This was a consequence of the great number of shipping losses by enemy action and the pressure on British shipbuilders to construct vessels more quickly than the enemy could sink them (McGreal 2008:127). With the British merchant fleet suffering the greatest number of losses during WWI, it is unsurprising that a high proportion (65% or 38 wrecks) of the wrecked British vessels built in the period 1914-1918 were cargo vessels. The loss of vessels by enemy action is considered in greater detail in **Section 4.4**.

2.2.9. There is a considerable drop in the number of vessels built in the 1920s and 1930s, with only five and two wrecks built within these decades respectively (**Table 1**). As the records for known wrecks are sorted by date of loss, vessels built in the 1920s and 1930s are likely to have greater representation in the Phase 3 report which assesses known wrecks of the period 1939-1950. In comparison, vessels built in the 1930s predominate in the NSBR and NHSR records for the period 1914-1938 (167 and 340 records respectively). The NSBR and the NHSR index vessels queried by date of build, and it is thus unsurprising that these results are at odds with the wrecks. However, the greater potential for vessels of this date to survive and thus warrant registration under these inventories should not be discounted as an explanation. This points to an overall tendency for the wrecking incidents of vessels to occur at a much later date than their build, incidicating the longevity of vessels of this period.

2.2.10. The low number of vessels built in the 1920s and 1930s may also be seen to reflect the inter-war shipping slump, although given the discussion above this would need to be reconsidered following the query results of Phase 3: 1939-1950. A short-lived post-war ship building boom occurred in 1918-1921 as lost merchant shipping

tonnage was replaced. However, a decline in world trade resulted in a reduced demand for shipping services, overcapacity and consequent significant reduction in the number of newbuilds (Friel 2003:272). The Wall Street Crash of 1929 added to this decline. The 'Great Depression' which followed saw consolidation and the closure of a number of shipbuilding yards across the UK. For example, in 1921 there were 15 yards on the Wear, but by 1937 this had decreased to only six. Although world trade began to increase towards the end of 1933, it was not until the rearmament prior to WWII that the industry became fully revived. This enabled shipbuilding yards to return to their 1920s employment levels by 1939 (Friel 2003:276).

Place of Build

2.2.11. The place in which a particular boat or ship is built is listed as either the name of a town, city, or a country and the query produced 89 different locations. The results of this query are shown in **Appendix I: Table 1**.

2.2.12. The locations have also been grouped into countries to identify international trends. The total number of vessels built from each country is shown in **Table 2** and **Figure 2**.

Country Built	No. of Vessels
England	202
Scotland	80
Germany	26
Norway	20
Northern Ireland	9
Netherlands	5
Sweden	4
France	3
Spain	2
USA	3
Wales	2
Denmark	1
Ireland	1
Italy	1
Japan	1

Table 2: NMR records queried by country of build

2.2.13. The results of the query show that the majority of wrecks were built in England, a total of 202 (**Figure 2**). The high proportion of vessels built in England is unsurprising given that the study area is English territorial waters. It is also unsurprising because Britain continued to be the largest shipbuilding nation for much of the period. In 1913 Britain had 61% of the world's merchant shipbuilding market (Friel 2003:271). Although the British merchant fleet remained the largest in the world in the 1920s and 1930s, ship owners were reluctant to accept new technology (Lavery 2004:301). Towards the end of the period the technological stagnation and lack of investment that resulted from this caused a steady decline in both the British merchant fleet and shipbuilding (Friel 2003:277).

2.2.14. Of the wrecked vessels built in England, the greatest number were constructed in Sunderland, a total of 53. The second greatest number, 35, were constructed in Newcastle. Of the wrecks built in England, 72% (145 records) were built in the north-east of England (**Figure 2**). These records are marked with an asterisk (**Appendix I: Table 1**). The second most common country was Scotland with 80 wrecks, 76% of

which were built on the Clyde (**Figure 2**). These records are marked with a double asterisk in **Appendix I: Table 1**.

2.2.15. At the outbreak of WWI the shipbuilding yards of the North-East of England and the Clyde dominated the UK shipbuilding industry. Boosted by cheap coal and cheap electricity, the first two decades of the 20th century were a boom time for the shipyards of the northeast, and the Tyne turned out an large proportion of the world's shipping (Moffatt and Rosie 2006:287). The wartime demand for coal, coke, steel, iron, ships and engineering products gave a boost to the industry in the north-east (Moffatt and Rosie 2006:304). In WWI, the Admiralty commandeered some 80% of the Tyne's ships, with the remaining vessels under constant threat from Germany submarines and surface raiders (Moffatt and Rosie 2006:304-5). In response, the Tyneside shipbuilders achieved levels of productivity that had never been seen before, with shipbuilding objectives predominantly focussed on the production of cargo ships, in order to keep supply lines open and replace the great number of ships lost at sea.

2.2.16. In 1913 figures show that approximately 16.6% of the world's merchant tonnage was built in the Clyde shipyards (Friel 2003:271). Towards the end of the 19th century these yards were beginning to obtain Admiralty orders and their role in WWI was a vital one (Walker 1984:133). War requirements altered the work undertaken in the Clyde shipbuilding yards to one which encompassed the construction of both merchant and naval vessels, with an unprecedented demand for specialist services. As the war progressed, some shipyards such as William Beardmore and Co. undertook only defence contracts, whereas others concentrated almost exclusively on the equally vital task of building huge numbers of easily-produced and inexpensive cargo vessels (Walker 1984:135). The high number of Clyde-built vessels is mirrored in Scotland.

2.2.17. Whilst a large majority (nearly 80% or 1075) of the wrecks of this period were lost during the five years of WWI, the much longer interwar period of 21 years accounts for only 20%. However, vessels constructed in this period are likely to be well represented in the 1939-1950 review.

2.2.18. The dominance of vessels built in the north-east of England and along the Clyde amongst the wrecks is not mirrored in the NHSR records for this period. Northwich in Cheshire was the most common place of build, accounting for 62 records or 11% of the total. Northwich was home to the shipbuilding company W.J. Yarwood & Sons Ltd. Yarwood's built some 1,030 vessels between 1896 and 1966, mainly coasters, tugs and barges (Guthrie 1996). Of the 62 records listed by the NHSR, a total of 57 were constructed by W.J. Yarwood & Sons Ltd in the interwar years. These were mostly narrowboats.

2.2.19. The areas of Cowes and Woolwich are also well represented as areas of shipbuilding by the NHSR. Of the 28 vessels built in Cowes, 22 were service vessels, mainly lifeboats. Cowes is also the most commonly represented place of build in the NSBR, with 16 boats. The majority of these were recreational vessels. Each of the 31 vessels recorded by the NHSR as built in Woolwich was built by Harland and Wolff Ltd., a shipbuilding company with headquarters in Belfast, Northern Ireland. The Harland and Wolff shipbuilding and repairing yard opened in Woolwich in 1924. Most of the NHSR listed vessels built there were narrowboats. Despite the shipbuilding slump of the 1920s and 1930s, Harland and Wolff managed to expand and prosper, and by 1927 was employing 35,000 men across the UK (Friel 2003:272).

2.2.20. The difference in date of build between the wrecks and the datasets relating to vessels in preservation may be due to the character of the individual datasets and the increasing polarisation of ship and boat building in the period 1914-1938. Wreck

sites in British territorial waters provide a high representation of cargo vessels, which were the type of vessel most commonly targeted by the German U-boat offensive in WWI. The North-East of England and the Clyde were among the most significant regions in Britain for the construction of cargo vessels during this period, hence their high representation amongst the wrecks. Conversely, whilst the NHSR also contains a high representation of cargo vessels for this period (161 records), a large proportion of these are narrowboats (80 records); the construction of which was not necessarily dominated by the North East and the Clyde, but rather by areas such as Northwich. The predominance of vessels built in Cowes in the NSBR, mainly consisting of leisure and recreational vessels, can be explained in a similar way.

Object Material

2.2.21. The use of steel in shipbuilding was well established by the beginning of the 20th century. A query conducted on the wrecks on the basis of their object material therefore revealed an unsurprising predominance of steel vessels (**Table 3** and **Figure 3**).

Object Material	No. of Vessels
Steel	603
Iron	70
Wood	40
Metal	19
Concrete	2
Brass	1
Oak	1

Table 3: NMR records queried by object material

2.2.22. One of the most significant changes in the period 1914-1938 was the transition from riveted steel plates to welded hulls. The first all-welded ship was the small merchant ship *Fullagar,* a British vessel built by Cammell Laird in 1920 (Brown 1992:11).

2.2.23. In the interwar period, the use of welding increased rapidly, becoming almost universal in the United States. It became clear that welded construction was most economical and quickest if prefabricated units were built under cover and then assembled on the slip (Brown 1992:13). Further advances allowed for the welding of reactive metals, leading to a major expansion in arc welding during the 1930s. However, despite the advantages that welding offered over riveting, many British ship owners and shipbuilders were initially reluctant to accept the new technology.

2.2.24. Despite these significant changes in hull construction, it is often the case that the source material upon which the NMR dataset is based does not explicitly state whether welding or rivets were employed in the construction of individual vessels. As a result, there are no wrecks for which the use of welding as the primary method of joining components is conclusively recorded. The only reference to rivets occurs in the wrecking account for the *Herzogin Cecilie* (NMR **UID 832170**) where it is recorded that a 'south-easterly gale into the bay popped rivets and the decks buckled'. The importance of this transition is thus not currently evidenced in the archaeological record.

2.2.25. Both the NHSR and NSBR contain more information about the use of riveting and welding. This may be due to the survival of the vessels in question and their consequent ease of investigation.

2.2.26. For the period 1914-1938, the NSBR holds three records for vessels described as metal and riveted; the *Princess Marina* (*c.*1920), the *Marsden* (1930) and the *Stratford* (1930). There are no vessels listed by the NSBR which are described as

having been welded. This information would probably be present in the NSBR if there were craft dating to this period which incorporated welding in their construction. Small vessels incorporating welded construction are more likely to date to WWII onwards, when welded construction became more common (George Hogg, pers. comm.).

2.2.27. A large proportion of vessels listed by the NHSR are recorded as having been riveted (85 vessels riveted and a further two iron riveted). Only three records (the *Calshot* (NHSR ID 1), the *Bream* (NHSR ID 1427) and the *Radiant* (NHSR ID 1876) are recorded by the NHSR to have been welded. The presence of such few welded vessels in preservation for this period not only indicates that its use in vessel construction was not widespread in the UK, but also suggests that if welded vessels were to exist in the wrecks of this period, they are likely to be considered as rare.

2.2.28. In contrast to the wrecks, the vessels listed by the NSBR mainly consist of wooden vessels (223), the majority of which are carvel-built (93). A significant proportion is also listed to be clinker-built (86). The high representation of wooden vessels may be seen to represent the continuity of the more traditional methods of wooden boat building technology. Whereas larger vessels utilised in competitive markets such as trade, large-scale passenger transport or the military are likely to be subject to modernisation and incorporate advances in naval engineering in their construction, the design of smaller vessels is less likely to be driven by such innovations. Alternatively the predominance of wood may represent preferential preservation of vessels built of this material.

2.2.29. The NHSR dataset for this period also indicates a predominance of wooden hulled vessels in the period 1914-1938. Whilst the hull material most commonly represented in the NHSR is steel (135 records), there are 242 records relating to wooden material, including wood, pine, timber, mahogany, teak, elm, oak, larch, pitch pine and redwood. Whilst this predominance may indicate recording biases, where it may be regarded of greater priority to ensure the preservation of vessels which represent wooden shipbuilding traditions, it certainly suggests the continued use of wood in shipbuilding construction amongst larger vessels well into the 20th century

Propulsion

2.2.30. Another category explored by queries was the propulsion of boats and ships within the period 1914 to 1938 (**Figures 4** and **5**). The NMR lists four types of propulsion for wrecks dating to this period, as illustrated in **Table 4**. 'Engine' is defined by the NMR in this respect as meaning internal combustion engine.

Propulsion	No. Of Vessels
Steam	978
Engine	79
Sail	69
Towed	14

Table 4: NMR records queried by propulsion

2.2.31. The NHSR and the NSBR were also queried on the basis of their propulsion, the results of which are shown in **Tables 5** and **6** below.

Propulsion	NHSR Quantity
Motor	192
Engine	145
Sail	85
Towed	46

Propulsion	NHSR Quantity
Engine Steam	13
Auxiliary Sail	10
Paddle	7
Sail/Engine	6
Gaff Sail	2
Oar	2
Manpower	1

Table 5: NHSR records queried by propulsion

Propulsion	NSBR Quantity
Sail	97
Engine	57
Sail/Engine	41
Oar	18
Oar/Sail	17
Paddle	4
Towed	3
Steam	2
Pole	1

Table 6: NSBR records queried by propulsion

2.2.32. The largest proportion of wrecks are detailed to have been steam propelled (978 records), comprising 72% of the total number of wrecks listed for this period.

2.2.33. This result is not reflected in the datasets for vessels in preservation. With 13 and two records respectively, the NHSR and NSBR provide a relatively low representation of steam propelled vessels for this period. Greater representation in the preserved record for vessels dating between 1914 and 1938 occurs for vessels equipped with a motor or engine. It is possible that this difference is partly due to the differing sorting methods adopted by the NMR and the NSBR and NHSR. Sorted according to date of loss, the wrecks contain a large number of vessels built in preceding periods when the steam propulsion predominated. Conversely, the NSBR and NHSR records are sorted by date of build, and thus indicate a shift from the construction of steam propelled vessels to those incorporating a motor or engine. It is also noteworthy that the method of propulsion most commonly represented by the NSBR is sail. Whilst this may indicate the continuation of smaller craft to adopt sail as a means of propulsion, it must be borne in mind that a large proportion of the vessels listed by the NSBR comprise leisure or recreational vessels used in ocean racing; a sport which relied on the skills associated with a sailing rig.

2.2.34. A query was also conducted on 'propulsion specifics' relating to this theme, as shown in **Table 7** and **Figure 5**.

Propulsion Specific	No. of Vessels
Triple Expansion	344
Oil Engine	22
Steam Turbine Engine	15
Diesel Engine	6
Reciprocating	2

Table 7: NMR records queried by propulsion specifics

2.2.35. The engine most commonly represented amongst wrecks for the period 1914-1938 is the triple expansion (steam) engine; employed by 25% (344 records) of the total

number of vessels for this period. The development of the three cylinder triple expansion steam engine took place over many years, the progression of which is outlined in the Phase 1 report. By the period 1914-1938, that form of steam engine had become a standard design. It was subject to limited change, with only the size and power differing much in order to suit the ship in which the engine was to be installed (Griffiths 1997:160). Cargo vessels in particular continued to be equipped with the triple expansion steam engine in the period 1914-1938, hence the high number of records relating to this method of propulsion.

2.2.36. Modernisation in terms of steam engine machinery in this period was largely confined to the adoption of the steam turbine engine (Griffiths 1997:176). Whilst the steam reciprocating engine was reliable and relatively easy to construct, the steam turbine engine offered many advantages over the reciprocating engine, such as no vibration and less space required for the same amount of power (Blum 1975:147). However, it was not until the introduction of gear-cutting machinery, which reconciled the rotational speed requirements of the turbine and propeller, that the full advantages of steam turbines could be fully recognised.

2.2.37. Geared turbines provided a beneficial means of propulsion for a number of classes of shipping use. Naval ships and large passenger ships, where vibration had to be kept to a minimum, quickly changed to steam turbines (Blum 1975:147). By 1915 it was decided that all new warships ordered for the Royal Navy should have geared turbines (Brown 1992:7). However, due to their size and weight ratio, turbines were not suitable for the propulsion of slower ships which comprised the majority of those at sea during the early 20th century (Griffiths 1997:146). Reciprocating engines were still far more economic in terms of fuel consumption (Griffiths 1997:146).

2.2.38. This may account for the low representation of vessels equipped with steam turbines, which comprises 1% of the overall records for this period (15 records). However, if this is the case, it does not follow that there should be so few vessels equipped with reciprocating engines (2 records). It is likely that a number of vessels for which the source material is fragmentary were equipped with a reciprocating or steam turbine engine, despite this not being stated. However, the low representation of vessels equipped with a steam turbine engine in the preserved record is further illuminating. The NHSR lists only four vessels to have been so equipped, whereas no such vessels are present within the NSBR for this period.

2.2.39. This low representation may be due to the fact that just before the steam turbine engine reached the peak of its development, a new source of power appeared. This was the internal combustion engine in the form of the diesel engine (Blum 1975:147). The diesel engine matured rapidly during and after WWI, and in many countries, the diesel engine found increasing favour with ship owners in the 1920s and 1930s. Not only were diesel engines more economic and practical to operate than coal- or oil-fired (steam) ships, they were also faster. A vessel equipped with a diesel engine motor could achieve speeds of 12-17 knots in comparison to an average steamer which could only operate at speeds of 8-10 knots (Friel 2003:277).

2.2.40. The popularity of the diesel engine is not represented in the wrecks and there are only six vessels or less than 1% equipped with diesel engines. However, by sorting vessels on the basis of their date of loss, it may be that there is greater representation in the following period (1939-1950). The NHSR and NSBR provide a higher representation of vessels equipped with a diesel engine, listing 355 and 31 records respectively.

2.2.41. Arguably the most notable change in relation to propulsion which occurred in the period 1914-1938 was the conversion of steam engines from coal to oil fuel. The advantages of oil firing over coal were manifold. Due to its greater inherent thermal output per ton, the firing of oil enabled vessels to attain greater ranges and higher

speeds than could be obtained for the same weight of coal (Gibbons 1983:179). Oil was much lighter than coal and took up much less storage space. Used bunkers could simply be filled with seawater to preserve stability. These advantages were critical to both merchant and naval ship design (Friel 2003:282).

2.2.42. The use of oil also required less manpower and time. Loading a vessel with coal and the disposal of ash were both time consuming tasks and required a large number of deck hands. Fuel oil could be pumped between ships or from a shore facility by fewer people and in less time than the equivalent amount of coal could be transferred (Griffiths 1997:155). For safety and ease of unloading and storage, specialised oil terminals were developed in the interwar years (Friel 2003:268). Coal burning itself also required more engine-room hands to tend the boiler (Griffiths 1997:163). A further disadvantage in the use of coal was the prevalence of poor quality coal, which presented problems for the fireman, often preventing a ship from making its required speed (Griffiths 1997:155).

2.2.43. Despite the advantages of oil over coal, only 1% (19 records) of the wrecks are recorded as having been equipped with an oil-fired engine. Whilst it is likely that a number of oil-fired engines were not specifically stated as such in the source material upon which the NMR Complete Monument Records are based, a relatively low quantity of oil-fired vessels may also be considered unsurprising given the initial reluctance for Britain to convert from coal. There are no references to oil engines under the fields of propulsion and engine in the NHSR and NSBR.

2.2.44. Before the outbreak of war, the bulk of world trade was carried in steamships powered by coal and most of the world's navies relied on coal (Griffiths 1997:154). By the end of WWI, although the Royal Navy had largely converted to oil power, the Merchant Navy continued to rely on coal-powered steamships (Friel 2003:277). During the interwar period, coal was still a plentiful commodity and vast quantities were available on the market from mines in former German territories now occupied by France and Poland (Griffiths 1997:156). British ship owners continued to have strong coal interests, and the extensive bunkering facilities which had been developed ensured its ready availability, further endearing coal to the ship owner (Griffiths 1997:154).

2.2.45. The continued use of coal by ship owners led to a degree of technological stagnation in Britain. Oil was not only rapidly replacing coal as the fuel used to produce steam for turbines, it could also be used to power the new marine diesel engine in motorships (Friel 2003:281). The 1912 *Selandia* was the first sea-going motor ship, yet it was Danish and not British (Batchelor and Chant 2007:8).

Summary

2.2.46. This assessment of the national stock-take of the NMR records with regard to the build of vessels raises a number of factors which may be considered to contribute to an understanding of the special interest of vessels from the period 1914-1938.

2.2.47. During the industrialisation of Britain in the 19th century, shipbuilding migrated to areas which could best meet its technological demands in engineering and metallurgy. In the late 19th century areas with industrialising hinterlands emerged as important shipping areas (Jackson 1986:102; Ville 1993:xi); a factor which was well illustrated by the NMR records assessed as part of the first phase of the project (1860-1913). The areas of build most commonly represented by the NMR for the period 1860-1913 were the North East and the Clyde; both of which benefitted during this period due to the growth of Industrialisation. A review of the 1914-1938 data shows a continued predominance of vessels built in these areas.

2.2.48. Vessels built in these and similar regions are thus likely to be of special interest on the basis of their association with areas that had become major centres of shipbuilding during the industrialisation of Britain. This special interest will be

enhanced if they are also representative of wartime demand for industrial products and if they have a group association with vessels in the 1860-1913 dataset that were built at the same yard or region. However, the abundance of such wrecks makes it likely that this association with major yards or shipbuilding regions will not in itself be sufficient to denote special interest.

2.2.49. Vessels may be further considered to be of special interest on the basis of their association with an individual shipping yard. Information relating to the ship yard for each vessel was only found (where present) in the free text of the NMR Complete Monument Record, and thus it has not been possible to query the records on this basis. However, a consideration of the identity of the builders and their yard would certainly contribute towards an assessment of the special interest of any individual wreck. For example, a vessel built by Harland and Wolff may be considered as being of special interest on the basis of its association with an iconic shipbuilding firm and yard of the period. Special interest in this respect must therefore be considered on a site-by-site basis.

2.2.50. Due to the often fragmentary nature of the source material upon which it was based, the wreck dataset contains no reference to welded hulls and only one reference to rivets (*Herzogin Cecilie* NMR **UID 832170**) for the period 1914-1938. The transition from riveted to welded hulls is arguably one of the most significant changes relating to hull construction in this period. On that basis, a vessel of this period which is considered to provide an early example of a vessel with a welded hull, or a late example of a riveted vessel which incorporated elements of structure welded together, will almost certainly be regarded as being of special interest on the basis of its rarity and of the fact that it represents this transition. Due to an abundance of examples, it is unlikely that a steel vessel will be considered to be of special interest by merit of its construction material alone.

2.2.51. Vessels dating to this period which are recorded to have been oil-fired are such a small proportion of the wrecks that they are likely to attain special significance on the basis of their rarity. However, this must be regarded with a degree of caution. In many cases, source material relating to a wreck site does not explicitly state the type of fuel utilised by that vessel, and therefore this information is often not present for the wrecks. For example, of the 1358 records for the period, no vessels are specifically recorded as having used coal as the fuel for their steam engines, despite the fact that a significant number probably had coal-fired engines.

2.2.52. On this basis it would seem likely that more oil-fired vessels may be present amongst the wrecks than are currently recorded. This aside, early examples of oil-fired vessels would still be regarded as of special interest on the basis of their representation of the shift from coal to oil; which was arguably one of the most significant factors in the development of propulsion in the period 1914-1938. Vessels adapted to utilise both fuels would be of particular interest in representing this transition.

2.2.53. Vessels equipped with a steam turbine engine are fairly rare and are likely to have a degree of special interest. This is also the case in respect of the increasingly rare use of sail power, particularly for ocean-going merchant ships late in the period.

2.2.54. In providing a more economic and practical method of propulsion, the use of the diesel engine became more widespread throughout the period 1914-1938. Whilst its representation amongst the wrecks (6 records) is limited, due to the high representation of diesel-driven vessels in the preserved record, such vessels are unlikely to be considered of special interest on the basis of their rarity in this respect. Early examples of such vessels (particularly those refitted to operate a diesel engine) may be considered to be of special interest on the basis of their

representation of the period in which the steam engine is first challenged by the internal combustion engine.

2.2.55. Due to their relatively high representation in the NMR for the period 1914-1938, vessels equipped with a triple expansion engine are unlikely to be regarded of special interest in the absence of any other factors. This is further relevant given the high representation of such vessels in the preceding period 1860-1913. However, as consideration should also be given to what was typical, vessels equipped with this method of propulsion may be regarded of special interest on the basis of their representation of this form of propulsion.

2.3. USE

2.3.1. The use of a vessel relates to its function within a particular class of shipping. Use also relates to themes which address issues of distribution, and may refer to the registration of a vessel, its nationality, departure or destination.

2.3.2. The technological innovations of the late 19th and early 20th centuries had huge implications for the use of vessels in the period 1914-1938. They enabled a wide range of purpose-built vessels to be built. However, the use of vessels was not necessarily confined to their normal peace-time function. In contributing to the war effort, requisitioned vessels in their thousands performed many and varied duties.

Vessel Type

2.3.3. The wrecks were queried on the basis of vessel type, the results of which are presented in **Appendix I: Table 2**. For the period 1914-1938 there are 79 vessel types represented.

2.3.4. In order to categorise the craft types listed amongst the wrecks on the basis of their purpose and function, WA consulted the NMR Maritime Craft Type Thesaurus (http://thesaurus.english-heritage.org.uk/thesaurus.asp?thes_no=143). Where possible, a review of the description provided in the Thesaurus for each individual craft type enabled them each to be categorised into the various classes of shipping use outlined in Section 3. For example, craft types such as Submarine or Aircraft Carrier have been assigned to the Military class of shipping use. Where a craft type could not be assigned to a particular class of shipping use, they have been listed as unassigned. One such example is provided by the craft type 'craft', which is described in the Thesaurus as representing 'all vessels'. The craft types and their associated shipping use class are displayed in **Appendix I: Table 2**. It must be noted that in many cases an individual wreck will list multiple craft types. As such, the totals cannot be considered as a percentage of the total number of wrecks, but rather as quantitative representations of the various classes of shipping uses for this period.

2.3.5. Based on a review of the various craft types listed amongst the wrecks for the period 1914-1938, the records represent eight classes of shipping use: Domestic; Fishing; Health and Welfare; Law and Government; Military; Recreation; and Transport. The class most commonly represented is cargo transport vessels. This is consistent with the NHSR record for the period which lists 165 cargo vessels. This is almost a third of the total number of vessels listed. The second most commonly represented class of shipping amongst the wrecks is military, followed by fishing. There is relatively low representation of the remaining classes of shipping use.

2.3.6. As an island nation dependent on exports and imports, the quantity of cargo vessels traversing the waters around the British Isles was considerable. More than any other country, Britain depended on the sea. The whole economy rested on the operation of a large merchant fleet, at that time by far the greatest in the world (Kemp 1969:212). The fact that 'cargo transport' is the most common class of vessel is consistent with the fact that the British and Allied merchant fleets were targeted by

the German U-boat offensive during WWI. By late 1916, the Allies were losing an average of 65 merchant ships for every U-boat sunk, a figure which rose to 167 in April 1917 (Friel 2003:238).

2.3.7. Whilst it would be expected that a significant number of military losses occurred in the period, there were very few actions during WWI in which battleships faced each other (Sumrall 1992:24). The only time that the main battle fleets of Britain and Germany clashed during WWI was at the Battle of Jutland in 1916 (Sumrall 1992:24); a battle which took place beyond British territorial waters. In the absence of any large-scale naval battles, it would be expected that fewer military than cargo wrecks would be present.

2.3.8. Of the vessels listed by the NHSR for the period 1914-1938, the least represented function, with only 19 records, is military. Eight of these vessels are recorded as having been built during WWI, with the remainder built during the interwar years. Given that the most significant maritime event in the period 1914-1938 was almost certainly WWI, it is notable that so few military vessels exist in preservation. The absence of military vessels in the preserved record is most likely due to the standard procedure of sending warships for breaking at the end of their useful lives.

Departure, Destination and Registration

2.3.9. The wrecks were queried on the basis of their place of departure (**Appendix I: Table 3**). A total of 223 individual places of departure are recorded. In order to identify broad scale trends and distributions the results were grouped by country (**Figure 6**). The ten most common countries of departure are shown in **Table 8**.

Country of Departure	No. of Vessels
England	347
Wales	132
France	73
Scotland	38
Spain	31
USA	26
Sweden	16
Algeria	14
Belgium	12
Norway	10

Table 8: NMR records queried by country of departure (top ten)

2.3.10. The wrecks were further queried by place of destination. There are 205 individual places recorded (**Appendix I: Table 4**). These areas were grouped by country (**Figure 6**). The ten most common countries of destination are shown in **Table 9**.

Country of Destination	No. of Vessels
England	316
France	202
Wales	55
Scotland	34
Italy	24
Norway	14
Belgium	10
Spain	8
Egypt	7
India	6

Table 9: NMR records queried by country of destination (top ten)

2.3.11. The results of the query based on vessel departure and destination show that the majority of the wrecked vessels either departed from or were destined for England. The greatest number had cleared from or were due to enter London (48 and 65 vessels respectively). The second most common place of departure and destination in England was the River Tyne (46 and 24 respectively). **Tables 10** and **11** list the ten commonest places in England with regard to departure and destination.

Place of Departure (England)	No. of Vessels
London	48
River Tyne	46
Newcastle-Upon-Tyne	31
Liverpool	16
Blyth	15
Kingston Upon Hull	15
South Shields	10
Southampton	10
Portsmouth	9
Sunderland	9

Table 10: NMR records queried by place of departure (England top ten)

Place of Destination (England)	No. of Vessels
London	65
River Tyne	24
Middlesbrough	18
Liverpool	17
Falmouth	13
Kingston upon Hull	11
Newcastle upon Tyne	11
Southampton	11
Sunderland	11
Portland (Dorset)	9

Table 11: NMR records queried by place of destination (England top ten)

2.3.12. A further query was conducted on the wrecks by place of registration (**Appendix I: Table 5**). There are 119 places of registration recorded. These have been grouped by country (**Figure 6**). The five most commonly represented countries are shown in **Table 12**.

Country of Registration	No. of Vessels
England	236
Norway	59
Scotland	59
France	18
Spain	10

Table 12: NMR records queried by country of registration (top five)

2.3.13. The results of the query show that the largest number of wrecked vessels were registered in England. London is the most common place of registration with 80 wrecked vessels registered there.

2.3.14. The query results for the place of departure, destination and registration clearly point to the importance of the port of London amongst vessels lost in 1914-38.

2.3.15. By the beginning of the 20th century, rapid advances in technology and naval engineering had led to the port of London becoming increasingly inefficient. In order to rectify this, the Port of London Authority (PLA) was established in 1909. This took over all the powers of the existing private companies and began a process of modernisation (www.portcities.org.uk/london).

2.3.16. The PLA began to improve the docks and port facilities. It was responsible for the reduction and regulation of docking charges and introduced a registration fee for lighters. In order to cater for the modern vessels which had a much larger tonnage than their predecessors, the PLA ensured that the river was dredged to a depth that modern ships of deep draught could navigate (www.portcities.org.uk/london). To further enhance the port and to extend the trade that was passing through the Royal Victoria and Albert Docks, the King George V Dock was constructed in 1921, which could accommodate ships of up to 30,000 tons (www.portcities.org.uk/london).

2.3.17. The enhancements to the docks and port facilities initiated by the PLA enabled London to maintain its traditional position as the world's largest and most important port. In the 1920s and 1930s the port handled an increasing amount of goods despite the major trade depression of the 1930s. Between 1909 and 1939 the total tonnage of shipping passing through the port rose from less than 40 million tons to more than 60 million (www.portcities.org.uk/london). By 1939, the PLA had built more than 30 hectares of new dock water and nearly 10km of extra quays and had dredged a channel 80km long, 300m wide and nearly 10m deep at low water to take larger ships (www.portcities.org.uk/london).

2.3.18. The importance of the River Tyne as a place of departure or destination is most probably largely due to the continued importance of the east coast coal trade in the period 1914-1938. Of the 46 wrecked vessels recorded as having departed from the River Tyne, 39 or 85% were laden with coal.

2.3.19. During WWI, coal was Europe's most important fuel and a sufficient supply of coal was critical to the war fighting capacity of Britain and its allies. Britain's mining industry fuelled the navy, the home transport system and the output of the war industries, as well as being by far the most common domestic fuel.

2.3.20. By the early months of 1915 France had lost half her mines and was effectively dependent on British coal. Coal was also carried to France to fuel the war effort (Cant forthcoming). Half of the wrecked vessels laden with coal which departed from the River Tyne were destined for France.

2.3.21. The transportation of coal by sea continued in the interwar period, although at a declining rate. Nevertheless, a large amount of coal was still carried coastwise. The average tonnage of coasters clearing the eight major coal ports was 7.9 million in 1926/1930, compared with 10.1 million in 1913 (Jackson 1983:141).

2.3.22. There are a number of ports which are not well represented in certain respects. For example, although Southampton was one of the major ports of the UK and prospered greatly during the 'golden age' of the passenger liner in the early 20th century (http://www.plimsoll.org/StartHere/Timeline/ 19001920/), there are few wrecked vessels which had cleared or were due to enter Southampton on their final journey (10 and 11 wrecks respectively).

2.3.23. Another port that is not well represented is Manchester. The construction of the Manchester Ship Canal in the late 19th century enabled larger ocean-going vessels to reach the terminal docks, and by 1913 Manchester was regarded as England's fourth port in terms of value rankings (Jackson 1983:136). However, it was during the interwar period that Southampton and Manchester truly prospered. Possessing the facilities to cope with the growing sizes of cargo ships and liners, both ports experienced an increase in trade during this period. It is possible that these ports may be more commonly represented in the period 1939-1950.

Nationality

2.3.24. The wrecks were queried on the basis of vessel nationality (**Appendix I: Table 6** and **Figure 6**). The five commonest nationalities are shown in **Table 13.**

Country	No. of Vessels
British	522
English	244
Norwegian	141
German	67
Scottish	65

Table 13: NMR records queried by nationality (top five)

2.3.25. The nationality most commonly represented amongst the wrecks is British (522 records). Vessels of English nationality are second with a total of 244 records.

2.3.26. Britain retained its position as the world's premier merchant ship-owning and shipbuilding nation during WWI and in the interwar period. However, the extent of its dominance declined and Britain's shipbuilding industry failed to maintain a technical lead, partly due to the conservative nature of British shipowners. By 1920, the growth of new competitors meant that Britain's share of world shipping market was down to 40% (Friel 2003:272). As Germany, the USA and Japan strove to build new merchant fleets, particularly in the passenger and cargo liner trades, the relative world position of the British Merchant Navy shrank (Friel 2003:277).

2.3.27. Until 1914, British naval strength was maintained at a level that was equal to the combined strength of the next two most powerful navies (Kemp 1969:212). However, WWI brought to full fruition the naval aspirations of the USA, Japan and others (Kemp 1969:212). Although the British navy continued to be very strong in the interwar years, it was unable to maintain the same pre-war level of dominance.

2.3.28. Vessels of Norwegian nationality are also well represented amongst the wrecks for the period 1914-1938, with a total of 141 records. In the late 19th century, Norway's merchant fleet was said to be the third largest in the world, after Britain and the United States (Samstag & Joshi 2009:27). The Norwegian merchant fleet comprised mostly wooden sailing vessels. It proved reluctant to embrace the advances in marine engineering which eventually saw the introduction of steel steam-propelled vessels and in the first decade of the 20th century nearly a third of Norway's fleet was still under sail (Samstag & Joshi 2009:28).

2.3.29. Norway continued to trade with Britain during WWI, exporting copper ore and fish to Britain in return for cargoes of coal. With their well-established involvement and familiarity with North Sea trade routes and seafaring conditions, Scandinavian vessels were crucial to the continuing battle to get coal supplies through the North Sea minefields to London (Cant forthcoming). This attracted the attention of German submarines, and Norwegian vessels trading with Britain became exposed to the U-boat offensive. The loan of Norwegian vessels to Britain under the 'Tonnage Agreement' in 1917 further subjected these vessels to unrestricted warfare. A total of 177 Norwegian sailing ships were sunk during WWI, reducing the total tonnage

under sail by more than a half. In the course of the war, just over 250 Norwegian vessels were lost in English waters alone (Cant forthcoming).

2.3.30. Of the 141 Norwegian wrecks, 85 or 60% were lost whilst laden with coal, one of the cargoes most commonly exported to Norway. All but one of these losses occurred in WWI and over 80% (69 wrecks) were lost having been torpedoed, mined or sunk by gunfire. As in Britain, the drive to replace lost tonnage saw a post-war shipbuilding boom in Norway, but this was followed by a slump in the 1920s when Norway's position fell to the seventh among the world's leading maritime nations (Samstag & Joshi 2009:30). The industry was saved by a growth in oil transport, and by 1932 the Norwegian tanker fleet had grown to 1.5 million tons, a substantial proportion of the world tonnage.

Summary

2.3.31. 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 5** and will not be repeated here.

2.3.32. With regard to departure, destination and registration, a vessel may be regarded as having special interest on the basis of its setting and context. An example of this would be vessels associated with the modernised port of London, which dominates the wrecks of the period in this respect.

2.3.33. Vessels associated with the River Tyne may also be regarded of special interest on the basis that they represent the North East coal trade and the subsequent high volume of shipping traffic to and from the area. However, due to the large quantity of vessels recorded as having cleared, entered or been registered to London and the River Tyne in this period, the special interest of such vessels is likely to depend upon there being additional factors.

2.3.34. Where vessels cleared or entered important ports which have relatively low representation, such as Southampton and Manchester, special interest may be assumed on the basis of rarity. With all of these ports however, the strength of the association will be the key to the level of special interest.

2.3.35. With regard to nationality, a wreck may be regarded to be of special interest on the basis that it is unique or representative of a significant group, for example a dominant nationality such as Britain. Where that group is very large, as in the case of British vessels, the extent of an individual vessel's special interest will almost certainly depend upon additional factors.

2.3.36. The above analysis suggests that Norwegian vessels lost during WWI may also be regarded as being of special interest. Those wrecks are representative of the involvement of a key non-belligerent element of the British war machine.

2.4. Loss

2.4.1. Loss explores the numerous different circumstances in which a boat or ship may be lost; whether intentionally or unintentionally. Loss therefore encompasses cause as well as date and place of loss. It also includes loss of life, which undoubtedly plays a part in determining the special interest of a vessel.

Date of Loss

2.4.2. A query by decade was conducted according to date of loss, the results of which are shown in **Table 14** and **Figure 7**. The results show that the greatest number of vessels were lost between 1910 and 1919, a total of 1096 records. Unsurprisingly, the majority of these were lost in WWI, nearly 80% (1075 records) of the total number of wrecks for this period. This figure does not take into account wrecks for which no precise year of loss is recorded (i.e. where the date of loss is described as

a date range such as 1914-1918) and it can therefore be assumed that the number of WWI wrecks is even greater.

Date of Loss	Quantity
1910-1919 (1914-18)	1096 (1075)
1920-1929	161
1930-1938	71

Table 14: NMR records queried by date of loss

2.4.3. A further query was conducted on the wrecks to examine the number of losses which occurred on each year during WWI (**Table 15** and **Figure 7**). The query shows that the greatest number of losses (402 records) occurred during 1917. This equates to some 37% of the total number of vessels lost during WWI and more than the total losses recorded during the subsequent 20 interwar years. The second greatest number of losses occurred in 1918, comprising 323 records or 30% of the total number of vessels lost between 1914 and 1918.

Date of Loss	Quantity
1914	45
1915	126
1916	179
1917	402
1918	323

Table 15: NMR records queried by year of loss (WWI)

2.4.4. The pattern of loss revealed by these figures closely reflects the events of the war and the changing strategies adopted by the combatants. As an island nation, Britain was dependent on foreign imports and by 1914 some 60% of the food consumed in Britain came from overseas (Friel 2003:236). This vital import was vulnerable to disruption in times of war. Aware of this vulnerability, the Germans launched a major U-boat offensive against Allied merchant shipping.

2.4.5. The use of submarines in WWI to interdict trade had profound implications on the nature of naval warfare. Whilst raiding had been a feature of sea warfare since the middle ages, the objective was generally to capture an opponent's merchant shipping rather than to sink it (Friel 2003:236). Submarines did not usually possess the ability to capture ships as they could not spare sufficient men to crew them; for the most part they could only sink them (Friel 2003:236).

2.4.6. Furthermore, the time needed to comply with international law by stopping a merchant vessel to determine whether it was a legitimate target could expose a submarine to destruction by hostile craft (Bennett 1969:192). The German U-boats responded by frequently defying international law by attacking without warning. As a result the German government declared a war zone around the British Isles in which submarines would not necessarily surface to warn their intended victims.

2.4.7. Believing that victory could be attained by strangling Britain's imports, Germany placed greater emphasis on its U-boat operations and eventually abandoned the limitations which it had imposed on itself. Unrestricted submarine warfare commenced in February 1917 and resulted in a dramatic rise in the number of merchant ships sunk, including neutrals (Bennett 1969a:204; McGreal 2008:124). In the first three months of unrestricted warfare, British merchant shipping losses alone amounted to 1,250,000 tons (Bennett 1969a:204) and by late April 1917 an average of 13 Allied ships were being lost daily (McGreal 2008:145). This dramatic increase

in losses can be seen in amongst the wrecks, with the number lost increasing from 179 in 1916 to 402 in 1917.

2.4.8. To counter U-boat attacks, the British at first concentrated on ambushing them on the surface using Q ships – armed Admiralty vessels disguised as helpless merchant ships (McGreal 2008:68). While the Q ship tactic operated with intermittent success, it also undermined claims that U-boat tactics were illegal and gave the Germans an excuse to attack merchant ships without warning (Lavery 2004:289).

2.4.9. Although shipping losses remained high in 1918 (323 records), they were brought down to a survivable level due to greatly improved anti-submarine measures. By far the most important of these was the widespread adoption of the convoy system. This method of anti-submarine warfare, which became truly effective towards the end of 1917, eventually won the campaign against the U-boats and ensured that Britain continued to receive the imports it needed to win the war (Bennett 1969a:205, 209; Watts 1994:122).

2.4.10. By the end of 1917, a total of 16,404 ships had sailed in convoys with the loss of just 147 vessels (Lavery 2004:292). Ultimately the mandatory use of the convoy system in British waters brought the merchant ship loss rate down to only 2.4% (Watts 1994:122). By May 1918 the convoy system had become so effective that the tonnage of newly built British ships exceeded the tonnage lost by enemy action (Bennett 1969a:205). Despite this, U-boats remained a serious threat and losses remained high, with 2.75 million tons of world shipping sunk in 1918 (Friel 2003:238). These continuing high losses are reflected in the wrecks, with 323 dating from 1918.

Manner of Loss

2.4.11. The wrecks were also queried by manner of loss (**Appendix I, Table 7** and **Figure 7**). A total of 22 types of loss are recorded.

2.4.12. In order to provide maximum retrievable data about the manner of loss, the NMR often lists multiple manners of loss for single wreck sites. An example of this is the *War Knight* (NMR **UID 805357**), an armed cargo vessel which was lost in 1918. The NMR long report describes this vessel as having been in collision with an American tanker loaded with naphtha. This ignited, enveloping the *War Knight* in flames and presumably disabling it. Whilst subsequently being towed, the vessel hit a mine laid by a German submarine. It was then abandoned and deliberately sunk by Allied gunfire in the hope that it could be salvaged at a later date. The NMR lists nine manners of loss for the *War Knight*: collision; mined; beached; explosion; burnt; scuttled; torpedoed; foundered; and gun action.

2.4.13. The multiple terms used by the NMR for manner of loss undoubtedly reflects the complexity of the series of events that led to the ultimate loss of the *War Knight*. This complexity and the lack of a hierarchical structure does, however, make it difficult to interpret the single-attribute queries used in this project. As this example well illustrates, individual wrecking incidents often involve a series of events which each contribute in some way to the final loss of a particular vessel and it is not always possible to highlight an individual event as being the principal cause of loss.

2.4.14. The results of the query revealed that foundering was the most common cause of loss between 1914 and 1938 (799 records) (**Appendix I: Table 7**). A further query showed that of the 799 records which list foundering as a manner of loss, a significant 86% (690 records) occurred during WWI. However, only 3% (20 records) of the vessels which foundered in WWI listed foundering as the sole manner of loss. The remaining 670 records had multiple entries for manner of loss. Vessels described as having been mined and foundered or torpedoed and foundered dominate the records for vessels lost in the period 1914-1918.

2.4.15. As might be expected, there is high representation of vessels which were either torpedoed (463 records) or mined (329 records). The sea mine and torpedo were developed in the 19th century and initiated a new form of warfare. In response to the threat of these weapons, new ships were brought into existence, both to deploy and to counter them (Bride 1992:110).

2.4.16. The use of naval mines became a matter of major concern during WWI. Before war had even been declared, a German minelayer had been sent to sea to plant a minefield near Lowestoft, resulting in the loss of a British cruiser (Levie 1992:65). In the years which followed, the waters around the British Isles were declared a war zone and German mine-laying submarines were instructed to release mines in seaways frequently used by enemy shipping (Friel 2003:236). In response, Allied forces laid extensive minefields and sea barrages as a form of coastal defence against the U-boats and as part of the Allied blockade of German sea trade. The greatest number of mines was laid in the North Sea, with perhaps the most significant minefields being the Northern Barrage, the Strait of Dover and the Heligoland Bight (Bernaerts 2005:286). Some 190,000 mines are thought to have been deployed in the North Sea, with the total number of mines laid during the war amounting to approximately 235,000 (Bernaerts 2005:286).

2.4.17. Torpedoes (self-propelled explosive projectile weapons) were developed in the late 19th century and were used widely during WWI. Prior to the invention of the torpedo (and the mine), large armoured warships could generally only be attacked by similar vessels. The torpedo enabled surface vessels and submersibles that were too small to mount large-calibre guns to destroy enemy ships of all sizes, including capital ships. They also greatly increased the effectiveness of submarines against merchant ships and even allowed them to attack the much faster liners. The effectiveness of torpedoes during WWI is illustrated by the large number of wrecks that were torpedoed (463 records). By comparison only 37 were lost by gun action.

2.4.18. The higher representation of vessels lost by torpedo in comparison to those lost by gunfire further indicates the type of vessels targeted during WWI as illustrated by the known wrecks of this period. Torpedoes were expensive and so were not expended on smaller vessels which could easily be sunk by gun- or shell- fire. Smaller vessels are not well represented amongst known wrecks as, due to their size, they frequently remain unidentified in geophysical and hydrographical surveys. Those which are charted often remain unnamed with very little information available relating to the nature of the vessel, due to contemporary recording biases which often focussed on larger vessels. If additional smaller vessels are identified, it is possible that there would be a greater number of records of vessels lost by gun-fire.

2.4.19. The depth charge provided a further anti-submarine measure employed during WWI. Early depth charges were steel canisters filled with high explosives (normally TNT), which were dropped off the side or stern of a ship, to explode at depth. The charges rarely scored direct hits sufficient to sink the submarine outright. Instead most U-boats were forced to the surface by the damage caused by the nearby detonation of multiple depth charges. Once on the surface the disabled submarine could then be sunk or captured.

2.4.20. The depth charge first appeared in 1915, but its development and production were slow (Watts 1994:102). It was not until 1916 that the use of depth charges became widespread and not until July 1917 that the first truly effective depth charges were introduced (Bride 1992:114; McGreal 2008:157). During the war the Royal Navy does not seem to have been regarded as having great success with the weapon, sinking only 22 U-boats by this means (Hutchinson 2001:68). Nevertheless the 14 wrecks lost by depth charge are a significant proportion of German U-boat losses in UK territorial waters and account for about two-thirds of the total number of U-boats

sunk with the weapon. The archaeological record therefore suggests that the weapon was arguably more successful historical sources have given it credit for.

Place of Loss

2.4.21. In order to identify and assess patterns of distribution, a 20km grid square was incorporated into the project GIS. This was compared with a point shapefile containing all of the wrecks (**Figure 7**). The number of wrecks within each grid square was then calculated, to highlight areas of high shipwreck density.

2.4.22. The results of the query show a particularly high concentration of wreck sites along the east coast. This is unsurprising given that the large volume of shipping plying up and down the east coast attracted much U-boat activity during WWI (Young and Armstrong 2006:45).

2.4.23. Along the east coast, the largest concentration of wreck sites fall within two broad areas: firstly, in the approaches to the Thames Estuary including coastal waters off parts of Suffolk, Essex and Kent; and, secondly, the east coast from the north-east of England to north Lincolnshire.

2.4.24. Each of these areas was subject to a high level of hostile activity during WWI which accounts for a large proportion of the losses. The north-east was subject to hostile activity early in the war with the bombardment of the coastal towns of Scarborough, Whitby and Hartlepool on 16th December 1914 (Marsay 1999; Watts 1994:99) and continued to be the scene of relentless U-boat attacks throughout the war (Young and Armstrong 2006:45). Despite such hostilities, the north-east was the last area to see the introduction of the convoy system, in January 1918 (Young and Armstrong 2006:45).

2.4.25. The long and vulnerable Yorkshire and Lincolnshire coast also witnessed a major struggle between British anti-submarine forces fighting to keep the sea-lane open for coastal traffic and the U-boats (Young and Armstrong 2006:87). The coastal stretches from the Farne Islands to the Tees, and from Flamborough Head to the Humber were declared by the British Admiralty as major danger areas for shipping during WWI (Marsay 1999:9).

2.4.26. Further to the south, the U-boats plied the East Anglian coastline because of its strategic proximity to the Flanders bases (Young and Armstrong 2006:141). The east coast traffic and intense activity around the mouth of the Thames provided further incentive to mount patrols in this area (Young and Armstrong 2006:141).

2.4.27. The waters off the coast of Kent also saw a large number of shipping losses during WWI. Folkestone, the nearest point to continental Europe, was at the northern end of an Allied deep mine barrage known as the Folkestone-Gris Nez Barrage or the ‘Submarine Graveyard’. By 1918 as this area posed a highly dangerous and near impenetrable barrier to U-boat activities (Young and Armstrong 2006:216). The high wreck count (encompassing 34 wrecks) in the 20km grid square which borders Folkestone notably includes the wreck sites of eight German submarines – 22% of the total number of known U-boat wrecks for the period 1914-1938.

2.4.28. The place of loss query further brought to light areas in which a low density of shipping losses is indicated by the known wrecks. Of particular relevance here is the area encompassing the Wash and the north Norfolk coast. The low density there is surprising, in one sense, given that the Wash has been categorised as an Area of Maritime Archaeological Potential; an area in which a high potential for ship losses coincides with a high potential of archaeological material (Parham and McElvogue 2005). The approaches to the Wash were highlighted as one of the areas in which these trends coincided (Bournemouth 2007a). With difficult navigation, many

hazardous banks and shoals, and little shelter from prevailing north-easterlies, it may be surprising that there are so few wrecks here of this period.

2.4.29. There are several potential reasons for this. The principal explanation is that the Wash was off course for east coast shipping with the exception of vessels which were bound to or from specific Wash ports such as Boston or King's Lynn. Amongst the known wrecks for this period, none are recorded to have departed from or to have been destined for either of these ports during this period. Due to the hazards described above, a passing ship would not enter the Wash and would instead keep to the shipping lanes plied by the east coast traffic further out to sea, between the Humber and the North Norfolk coast. The avoidance of this area is further supported by the records of shipping casualities, which list only one vessel as having been lost in the Wash during this period. There are, however, 111 recorded shipping casualties on the North Norfolk coast for this same period. Further factors may thus be considered, including the greater propensity of vessels which were lost in this area to be buried under mobile sand, the difficulties of hydrographic survey and an understandable reluctance by submarine commanders to operate there.

Lives Lost

2.4.30. The wrecks were queried on the basis of whether any loss of life was associated with the loss of each vessel. The query results are presented in **Table 16**.

Category	Quantity
Loss of Life	214
No Casualties	1144

Table 16: NMR records queried by lives lost

2.4.31. The results of the query show that of the 1358 records of wrecked vessels, only 16% contain information recording loss of life. The total number of lives lost was 4770. This figure does not include wrecking incidents for which the total lives lost is recorded as 'all'. Where conflicting sources are present relating to the number of lives lost, the highest loss of life was used.

2.4.32. Of the 214 wreck sites which are associated with loss of life, the majority (200 records or 93%) refer to casualties of between one and 50 persons. A further eight records refer to wrecking incidents where 50-200 lives were lost. There are three cases in which more than 500 lives were lost at sea; HMS *Bulwark* (NMR **UID 904919**), the *Mendi* (NMR **UID 1244387**) and HMS *Formidable* (NMR **UID 1449548**). Together, these records account for less than 1% of the total number of wrecks.

2.4.33. Whilst these figures indicate that 1144 of the vessels lost between 1914 and 1938 are not associated with loss of life, this may not actually be the case and may result from gaps in the NMR source material. As a result, recourse to additional sources may be required in order to assess loss of life.

2.4.34. The inventory entitled 'Greatest Loss of Life in WWI' lists Allied ships which were hit by U-boats suffering in excess of 250 fatalities (http://www.uboat.net/wwi/ships_hit/greatest_loss_of_life.html). The list comprises 34 vessels with the accumulative loss of 19,986 lives.

2.4.35. The Commonwealth War Graves Commission has recorded 16,547 servicemen lost at sea during WWI while working as part of Mercantile Marine forces. Other sources state that approximately 21,000 merchant seamen were lost throughout WWI as a result of actions, accidents and disease (Hope 1990:349-356). The Commonwealth War Graves Commission records a further 760 Merchant Marine lives lost at sea following the end of WWI to the year 1921.

2.4.36. While these figures are worldwide in context, they are indicative of the significant loss of life that occurred at sea during this period. They also suggest that loss of life may be under-recorded and, given the current public interest in family history, an arguably undervalued aspect of special interest.

Summary

2.4.37. Wrecks may be of special interest because they were lost as a result of new features of early 20th century naval warfare: mines, depth charges and torpedoes.

2.4.38. Vessels lost during the period of unrestricted warfare in 1917-18 may have special interest because they represent of a new form of warfare which not only came close to winning the war against Britain but also influenced the conduct of the Second World War.

2.4.39. These representative groups are very large. Therefore additional contributory factors would probably also be required before any individual wreck could attain a high degree of special interest.

2.4.40. Vessels can also have special interest as a result of their setting and context, where they are associated with places relating to key themes in the period 1914-1938. For example, the approaches to the Thames estuary (including part of the coasts of Suffolk, Essex and Kent) and an area of coastline extending from the north-east to north Lincolnshire can arguably be regarded as discrete battlefields during WWI, as can the area offshore of Folkestone that is particularly significant for U-boats.

2.4.41. Vessels associated with loss of life can have special interest with regard to the issue of respect. This is likely to be particularly relevant where the casualties were high. Sites such as HMS *Bulwark* (NMR **UID 904919**), the *Mendi* (NMR **UID 1244387**) and HMS *Formidable* (NMR **UID 1449548**) may be regarded as of special interest on this basis, whereby over 500 lives are recorded to have been lost at their time of sinking.

2.4.42. This special interest will be enhanced if the loss of life has special features. For example they may have resulted from a notorious incident. Alternatively the subsequent commemorative activity or contemporary resonance may be particularly strong or unusual. The continuing association that commemoration of the *Mendi* loss has with the Anti-Apartheid movement in South Africa is a particularly good example of this.

2.4.43. Wreck sites may further be considered of special interest where the lives lost relate to another country. In this context special interest depends on its ability to be identified as historically significant to the people of the country concerned. Again the wreck of the *Mendi* is a good example of this, resulting as it did in the second greatest single loss of South African lives in a maritime incident in WWI (http://www.wessexarch .co.uk/projects/marine/eh/ssmendi/aftermath.html).

2.5. SURVIVAL

2.5.1. The special interest of a boat or ship will be affected by the degree to which the physical remains giving rise to that interest have survived on the seabed (Wessex Archaeology 2008:9). The completeness of a wreck or crucial parts of it is therefore relevant to special interest. However, the interest of a wreck may be so great that even fragmentary remains are considered to be of 'special' interest (Wessex Archaeology 2008:9).

Seabed Survival

2.5.2. The wrecks were queried on the basis of their seabed survival. The results are shown in **Table 17** and **Figure 8**. Nine distinct classes of seabed survival were used, based upon hydrographic terminology. Where no reference is made to the

condition of a wreck in the NMR record, its seabed survival has been classed as unknown.

Seabed Survival	No. of Vessels
Unknown	867
Broken Up	195
Dispersed	107
Mainly Intact	91
Partially Intact	40
Partially Buried	15
Buried	12
Poor	9
Flattened	6

Table 17: NMR records queried by seabed survival

2.5.3. The largest proportion of wrecks (867 records), comprising around two thirds of the total number of records, are classed as of unknown condition on the seabed. This is unsurprising given that a large number of known wrecks remain undived or otherwise investigated (or at least not recorded as such) and have been identified only by hydrographic surveys. These are not always very informative about what has survived on the seabed. Wrecks classed as of unknown seabed survival may be regarded as being a priority for further NMR enhancement.

2.5.4. The second most common category is 'broken up' (195 records). Only 7% (91 records) of the total number of records are described as being 'mainly intact', with a further 3% (40 records) described as 'partially intact'. This equates to 19% and just over 8% respectively of the total number of wrecks for which we have information. Based on the information currently recorded by the NMR, intact or partially intact wrecks of this period can therefore be described as unusual. Intact survival is therefore likely to enhance but not determine the special interest.

2.6. INVESTIGATION

2.6.1. The project results suggest that very few wrecks dating between 1914 and 1938 have been subject to documented archaeological investigation.

2.6.2. One exception is the *ss Mendi* (NMR **UID 1244387**), which has been subject to commercial archaeological investigations undertaken by WA. Through work commissioned by both the South African Heritage Resources Agency and English Heritage, WA has undertaken a comprehensive desk-based assessment and subsequent geophysical interpretation of the wreck. The latter was undertaken using data acquired during the South Coast Regional Environmental Characterisation project (Wessex Archaeology 2008a).

2.6.3. Another exception is the *Umba* (NMR UID 911963). This wreck, a steel cargo ship torpedoed and sunk in 1918, was investigated during the Aggregate Levy Sustainability Fund *Wrecks on the Seabed* project for EH. The wreck was subject to geophysical and ROV survey, together with desk-based assessment (http://www.wessexarch.co.uk/projects/marine/alsf/wrecks_seabed/round2/5005/index.html).

2.6.4. A further vessel, the *Glory* (NMR **UID 1464562**), is recorded as having been considered as part of the River Dart Case Study Area Survey; a module undertaken in 2000 as part of the Archaeology course at the University of Plymouth. However, the record as seen does not currently contain any further information regarding the nature of the research or investigation carried out in respect of the site.

2.6.5. A total of five sites (*Herzogin Cecilie* NMR **UID 832170**, *Betsy Anna* NMR **UID 895838**, *Salsette* NMR **UID 904618**, *Kyarra* NMR **UID 904651**, and *Countess of Erne* NMR **UID 904652**) have been subject to investigation by volunteers as part of the Nautical Archaeological Society's (NAS) *Adopt-a-Wreck* scheme. This scheme was introduced as part of the *Dive with a Purpose* initiative in 2000. This initiative has been funded by the Heritage Lottery Fund through the *Diving into History Project*.

2.6.6. The *Herzogin Cecilie* (NMR **UID 832170**) off the South Devon coast has been adopted by a Midlands based sub-aqua club. The NAS website states that the group had planned to conduct a thorough survey of the site during 2002. This was to be followed by regular visits two to three times a year (http://www.nauticalarchaeologysociety.org/projects/sites). No updated information relating to the investigation of the site is available on the website.

2.6.7. The *Betsy Anna* (NMR **UID 895838**), a steel steamer adopted by the University of London Sub-Aqua Club in 2004, is recorded as having been subject to a number of surveys (http://www.ulsac.net/main.php?contenturl=betsy_anna.php&pagetitle= Betsy-Anna &navbarid=navbarid_betsy). No information relating to the nature of the diving investigations undertaken is available on the dive club website, although a biography of the vessel is present with associated photographs.

2.6.8. The *Salsette* (NMR **UID 904618**) is recorded as having been adopted as part of the NAS *Adopt-a-Wreck* scheme. However, the wreck is not listed on the index of adopted sites presented on the NAS website (http://www. nauticalarchaeologysociety.org/projects/wrecks).

2.6.9. The *Kyarra* (NMR **UID 904651**) was adopted by a Poole-based group. The nature of work undertaken on the site by the adopting team is unknown.

2.6.10. The *Countess of Erne* (NMR **UID 904652**), an iron paddle steamer lost inside Portland Harbour in 1935, has been adopted by a local group. The wreck is said to have been visited by the group approximately 20 times a year (http://www.nautical archaeologysociety.org/projects /sites). The wreck has also been subject to additional archaeological investigation undertaken by the NAS as part of the *WreckMap Portland Project* in 2004 (www.nauticalarchaeology society.org/ projects/portland2004.php). A member of the adopting team is recorded as having been involved with the NAS project, which suggests a co-ordinated approach.

2.6.11. None of the adoptees of these wrecks have to date submitted an entry for the *Adopt-a-Wreck Rewards* and thus the NAS currently holds no information relating to the nature of work undertaken on each site (M. Beattie-Edwards pers. comm.).

2.6.12. Of the total 1358 wrecks recorded by the NMR for the period 1914-1938, seven are designated under the Protection of Military Remains Act 1986. Of this total, four (HMS *A7* NMR **UID 919768**, HMS *Formidable* NMR **UID 1449548**, HMS *Bulwark* NMR **UID 904919** and *UB-81* NMR **UID 804831**) are designated as Controlled Sites. Diving operations are prohibited on such sites without a licence. The three remaining vessels (HMS *M2* NMR **UID 904645**, HMS *M1* NMR **UID 1393674** and *UB-65* NMR **UID 1402209**) are designated as Protected Places; a designation which includes the remains of any vessel designated by name which sank or stranded in military service after 4th August 1914. Diving is permitted on such sites provided that there is no interference with the wreck. No details of any archaeological investigations undertaken on these sites have been seen by WA.

2.6.13. Based on information available to date, it appears that wrecks listed by the NMR for this period that have been subject to any significant archaeological investigation are extremely rare. This lack of archaeological investigation is very marked and strongly suggests that archaeology has contributed very little to the study of vessels of this

period and to our understanding of general maritime history of this period. The majority of investigations recorded for the great majority of the wrecks have been incidental and have arisen from hydrographical or geophysical surveys, discovery of wreck-related debris or salvage works. Whilst these can produce archaeologically useful data, they are not generally designed to do so and their value in this respect is therefore normally limited.

2.6.14. The rarity of archaeological investigation of wrecks of this period suggests that previous or planned archaeological investigation (including the existence of a research framework for an individual or group of wrecks) is likely to enhance special interest. Until archaeological investigation becomes more widespread amongst wrecks of this period, it could arguably even determine it.

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, which will each be considered in turn. The purpose is not to produce an inventory of wrecks relevant to each theme, although examples have been selectively given:

Transport (Cargo/Passenger)

Military

Industrial

Fishing

Law and Government

Health and Welfare

Commercial

Agriculture and Subsistence

Domestic

Recreation

3.2. TRANSPORT

3.2.1. Rapid innovations in cargo and passenger transport at sea in the 19th and early 20th centuries meant that by 1914 most of the world had been tied into a massive integrated trading system and passenger network (Couper 2000:108).

3.2.2. The wrecks of the period 1914-1938 are dominated by cargo vessels. There are 16 craft types within this category. These are presented in **Table 18** below and illustrated in **Figure 9**.

NMR Craft Type	Quantity
Cargo Vessel	868
Armed Cargo Vessel	106
Collier	53
Barge	25
Schooner	24
Ketch	17
Coaster	12
Lighter	11
Tanker	11
Barque	5
Freighter	2
Coal Hulk	1
Decoy Vessel	1
Full Rigged Ship	1
Sloop	1
Spritsail barge	1

Table 18: NMR records queried by craft type (cargo)

3.2.3. In many cases, a single wreck site has been assigned multiple craft types. For instance, the *Medina* (NMR **UID 832166**) is described as a cargo vessel, an armed

cargo vessel, a passenger vessel and a liner. Whilst this maximises the amount of searchable information held in individual NMR records, it does present certain complications for this type of query-based analysis. Therefore, in order to prevent duplications and to avoid the complexity of conducting multiple queries, unless stated otherwise the general queries which inform the following discussion have been undertaken with regard to vessels assigned to the generic craft type 'cargo vessel'.

3.2.4. The NSBR and NHSR were also queried for all vessels assigned as cargo vessels within the field of Function Area. The results of the query are shown in **Table 19**.

Resource	No. of Cargo Vessels
NHSR	165
NSBR	6

Table 19: NHSR and NSBR records queried by function type cargo

3.2.5. In the NHSR dataset, as with the wrecks, cargo vessels are the most commonly represented class of vessel. Conversely, cargo vessels were amongst the least commonly represented vessel class in the NSBR, which caters for vessels 10m or less in length.

3.2.6. There appear to be only three craft types amongst the wrecks that can be exclusively termed as passenger vessels. These craft types are displayed in **Table 20** below and illustrated in **Figure 10**.

NMR Craft Type	Quantity
Passenger Vessel	21
Liner	15
Ferry	1

Table 20: NMR records queried by craft type (passenger)

3.2.7. As with the cargo vessels, there are cases in which a single wreck site may have been attributed multiple craft types. However, due to the relatively low quantity of passenger vessels, it has been possible run multiple queries and eradicate any duplicate entries which would otherwise provide misleading results. Taking into account duplications, there are a total of 27 wrecks which were of vessels used for the transport of people (**Appendix 1: Table 8**).

3.2.8. The NHSR provides greater representation of passenger vessels (**Table 21**). This is not apparent in the NSBR. This is perhaps unsurprising given that this dataset is restricted to vessels 10m or less in length.

Resource	No. of Passenger Vessels
NHSR	91
NSBR	2

Table 21: NHSR and NSBR records queried by function type passenger

Build

3.2.9. Whilst the basic design of the steam engine plant remained the same, the period 1914-1938 saw gradual improvements introduced. In particular, reciprocating and steam turbine engines became more widespread in the period, providing a method of propulsion with a much greater reliability and offering a greater speed than that attained by earlier forms of steam engine.

3.2.10. Despite these technological advances, many cargo ship owners were innately conservative and cargo vessels equipped with earlier forms of steam engines remained in common use. The proven technology of triple expansion was still being specified for new merchant ships as late as the 1920s (Friel 2003:282).

3.2.11. Conversely, prestige and the desire to reduce passage times resulted in the rapid adoption of new technologies by passenger liner companies. As a result, during the early 20th century liners become the largest, fastest and most prestigious ships on the high seas (Dawson 2000:27).

Propulsion

3.2.12. The method of propulsion for wrecked cargo vessels is presented in **Table 22**. The most common is steam.

Propulsion	No. of Cargo Vessels
Steam	752
Sail	44
Engine	11
Towed	9

Table 22: NMR records queried by propulsion (cargo)

3.2.13. Although the steam engine was subject to modernisation, its form remained relatively standard in the period 1914-1938, with the majority of cargo vessels utilising screw driven, three cylinder triple expansion engines. The wrecks reflect this. Of the 752 cargo vessels propelled by steam, approximately a third (248 records) were equipped with this combination.

3.2.14. Historical sources indicate that at the outbreak of WWI, the majority of British merchant ships incorporated reciprocating engines in their design (Griffiths 1997:160). The steam reciprocating engine was reliable and relatively easy to construct and presented few problems in terms of maintenance (Griffiths 1997:160). However, only one cargo vessel amongst the wrecks is recorded as having been equipped with a reciprocating engine (the *Greatham* NMR **UID 832197**). This suggests that the archaeological record does not currently reflect what we know from the historical record. This is most likely due to limited information with regard to propulsion in the source material upon which the NMR is based.

3.2.15. The steam turbine engine, developed towards the end of the 19th century, was a great improvement over the reciprocating engine, and provided a more reliable form of steam engine that also enabled vessels to achieve higher speeds. However, despite its advantages, only five steam turbine-equipped wrecks are recorded (the *Queen* NMR UID 901785, the *War Baron* NMR **UID 1084811**, the *War Knight* **UID 805357**, the *Rotorua* NMR **UID 1348927** and the *Rewa* NMR **UID 1442427**).

3.2.16. This low representation is mirrored in the NHSR, which contains the records of no cargo vessel propelled by a steam turbine. As diesels are the dominant means of propulsion in the NHSR, one possible explanation for this could be the practice of refitting steam turbine powered ships with diesel engines. However, it is not clear how practical this would have been and there may be another explanation.

3.2.17. Arguably, the most significant change with regard to propulsion in the period 1914-1938 was the gradual conversion from coal to oil fuel. However, despite the advantages offered by oil (see **Section 4.2**), the burning of coal remained the standard means of generating steam in merchant ships throughout WWI and for many years thereafter (Griffiths 1997:154). Whilst the price of bunker oil fell post-war as military demand fell away, oil did not become a truly viable option until available

in sufficient quantity and at enough ports (Griffiths 1997:155-7). Furthermore the price of coal fell in the years which followed WWI.

3.2.18. Of the 868 cargo vessels listed amongst the wrecks of this period, only three are recorded as having used an oil fuelled engine (the *Innisinver* NMR **UID 904615**, the *Hibernia* NMR **UID 908061** and the *Marie Marguerite* NMR **UID 911744**).

3.2.19. The internal combustion engine in the form of the marine diesel became an increasingly common means of propulsion during this period. Eventually, with the exception of the steam turbine, it was to supplant steam altogether. However, of the 868 cargo vessels listed amongst the wrecks of the period only one, the *Adolf Vinnen* (NMR **UID 918707**) is recorded with a diesel engine.

3.2.20. A review of the NHSR reveals very different results with regard to propulsion than those for the wrecks. Of the 165 cargo vessels listed by the NHSR, approximately two-thirds (108 vessels) are recorded as being equipped with diesel engines. The majority (81 vessels or 75%) were constructed during the 1930s, implying a growing preference for this form of propulsion as the period progressed.

3.2.21. Cargo vessels utilising sail as a means of propulsion also continue to be represented amongst the wrecks. There are 44 wrecks of cargo vessels powered by sail. This is 64% of the total number of sailing vessels (69 wrecks) listed for this period. Sail as a means of propulsion is also represented in the NHSR, which records 16 cargo vessels as having been equipped with sail. A high proportion of these (11 vessels) are also listed as having been equipped with diesel engines.

3.2.22. During WWI, it was still possible to obtain a reasonable return on capital investment in sailing tonnage (Greenhill 19932:102). The requisitioning of some 2000 steamships for military use, the great demands of the war economy and war losses led to a shortage of vessels available for cargo carrying use (McGreal 2008:91). A consequent rise in freight rates resulted in many obsolete vessels, including sailing ships, becoming profitable (Greenhill 1993:102). They were therefore pressed into service.

3.2.23. It is within this context that the sailing schooner once more came into prominence. A large building programme initiated on both sides of the Atlantic resulted in the construction of thousands of new sailing vessels; the majority of which were wooden schooners (Greenhill 1993:103). Of the 44 cargo sailing vessel wrecks of this period, 39% (17 records) were schooners.

3.2.24. There is no British schooner present amongst the wrecks that was built in 1914-1938. This is largely due to the fact that Britain played no part in the resurrection of sail.

3.2.25. The wrecks do not reflect the large building programme of sailing vessels elsewhere. Only two sailing vessels wrecks built in the period 1914-1938 are present, the Norwegian *Hvitveis* (NMR **UID 707859**) and the German *Adolf Vinnenn* (NMR **UID 918707**). Whilst it is possible that a greater representation of such vessels will be found in the 1939-1950 dataset, in many instances the wrecking of such vessels is likely to have occurred outside territorial waters and thus beyond the study area.

3.2.26. Steam propulsion is also the dominant means of propulsion represented by passenger vessels wrecks during this period. Of the 27 passenger vessels, 89% (24 wrecks) used steam as a means of propulsion. In comparison, only seven out of a total of 91 passenger vessels listed by the NHSR for this period are steam-driven.

3.2.27. Only three passenger vessel wrecks are listed as having been equipped with a steam turbine engine; comprising *The Queen* (NMR **UID 901785**), the *Rotorua* (NMR **UID 1348927**) and the *Rewa* (NMR **UID 1442427**). One further vessel, the

coastal cruiser *Queen Mary* (NHSR **ID 495**), is listed by the NHSR as being equipped with a steam turbine.

3.2.28. Steam turbines were of particular advantage to passenger vessels when combined with gear cutting machinery. This reconciled the different rotational speed speeds of the turbine and propeller and enabled the advantages of the turbine to be fully exploited.

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). Despite this, there is no record of geared turbine engines amongst the wrecks. This may reflect the slow adoption of the technology (Brown 1992:7) but equally it is possible that vessels equipped with it during the interwar years will be represented in the wrecks of the period 1939-1950.

3.2.30. The remaining passenger vessels mainly used screw-driven triple expansion engines, equipped with 3, 6 or 8 cylinders (11 records). A further five wrecks are recorded as having been equipped with quadruple expansion engines (*Rohilla* NMR **UID 909206**, *Alaunia* NMR **UID 911905**, *Ballarat* NMR **UID 919785**, *Maloja* NMR **UID 901799** and *Afric* NMR **UID 1440774**). The oldest passenger vessel, HMS *Duchess of Hamilton* (NMR **UID 908098**), is recorded as both being paddle-driven and equipped with a compound engine. Triple and quadruple expansion engines were well proven and retained popularity, particularly for lower-powered passenger vessels of under 10,000 gross tons (Maber 1980:42). Of the triple or quadruple expansion engine-equipped passenger vessels whose displacement is recorded, all but three (*Alaunia* NMR **UID 911905**, *Afric* NMR **UID 1440774** and *Maloja* NMR **UID 901799**) were less than 10,000 tons.

3.2.31. Historical sources state that a large numbers of passenger liners were converted from coal to oil fuel 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 considering the major reductions in manning levels and thus crew costs that ensued (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).

3.2.32. There are no passenger vessel wrecks for this period which are recorded as having been equipped with an oil-fired engine. Rather than indicating a low quantity of oil-fired passenger vessels in this period, it is more likely that passenger vessels constructed in the interwar years are better represented in the period 1939-1950.

3.2.33. Oil-fired passenger vessels are better represented in the NHSR. Of the 91 passenger vessels listed by that dataset, 78% (71 vessels) are recorded as being equipped with diesel engines.

Hull Construction

3.2.34. In comparison with the period 1860-1913, little change occurred with regard to the hull construction of cargo and passenger vessels in the period 1914-1938. The advantages of steel had long been recognised, as evidenced by the high proportion of steel-constructed vessels amongst the wrecks (**Table 23**).

NMR Object Material	No. of Cargo Vessels	No. of Passenger Vessels
Steel	452	16
Iron	54	1
Wood	17	0

Table 23: NMR records queried by object material (cargo and passenger)

3.2.35. The dominance of steel is further illustrated by the NHSR, which lists 64 and 28 vessels constructed of steel and iron respectively.

3.2.36. Although there are few cargo vessels listed by the NSBR, it does suggest a continued preference for the use of wood for small cargo boats during the period. Of the six cargo vessels listed, five are recorded as being constructed from wood. In three cases, the hulls of these vessels were clinker-built.

3.2.37. It is difficult to compare the NSBR figures with the wrecks because the NMR records only a handful of craft which are definitely less than 10m in length. Of these, only one has been identified during the project as a cargo vessel, the barge *Opal* (NMR **UID 904913**). The construction material of the *Opal* is unknown. The small size of these vessels and the consequent difficulty in finding them in the course of normal hydrographic survey is probably the main reason why so few cargo vessel wrecks of this type are known.

3.2.38. With only two passenger vessels listed by the NSBR for the period 1914-1938, little can be said of the material used in the construction of smaller passenger craft in this period. The NSBR certainly provides evidence for the continued practice of riveting amongst smaller craft in the interwar years. For example the passenger vessel *Princess Marina* (NSBR **ID 928**) which was built *c.* 1920 is described as being metal and riveted.

Use

3.2.39. There are a number of themes that are apparent when considered in the context of the use of both cargo and passenger vessels in the period between 1914 and 1938.

Transport Vessels requisitioned as Admiralty vessels

3.2.40. Prior to WWI, the introduction of steam saw a growing divergence between warship and merchant ship design. As a result opportunities for the conversion of civilian ships into military vessels seemed to recede (English 1992:151). However, at the same time warship design became far more complex and expensive, resulting in far fewer warships being constructed than in previous years (English 1992:151). There was thus a greater impetus in times of emergency to supplement regular naval vessels with converted merchant ships. Due to the global nature of WWI, there were a large variety of roles for which merchant vessels were suited. This resulted in a wider range of conversions than previously seen (English 1992:151).

3.2.41. Broadly speaking, there were four main roles for which merchant vessels were used in WWI (English 1992:151):

Cruiser substitutes: armed merchant cruisers, boarding vessels and commerce raiders;

Escort forces: commissioned escorts, armed yachts, anti-aircraft auxiliaries;

Aviation ships: seaplane carriers, merchant aircraft carriers, catapult-armed merchant ships;

Mine warfare vessels: auxiliary minelayers, minesweepers and trawlers.

3.2.42. Alongside the more ‘frontline’ duties, cargo vessels were also requisitioned for support roles by the Shipping Controller as troopships, hospital ships and carriers of so-called ‘Government Stores’.

3.2.43. Notwithstanding the great demand for conversion during WWI, only 17 of the 868 cargo vessel wrecks of this period appear to have performed an auxiliary military role. Of these, one wreck is of an escort vessel (*Mechanician* NMR **UID 767268**) and another is of a mine carrier (*Eleanor* NMR **UID 904620**). A further wreck (HMS *Stockforce* NMR **UID 832147**) was employed as a Q ship or decoy vessel. The

remaining 13 vessels have been assigned the generic military terms 'Admiralty vessel' and 'warship', with their precise function unspecified.

3.2.44. These results indicate that auxiliary military vessels used in WWI are poorly represented as wrecks. The historical record suggests that they should be more common. However, it must be borne in mind that due to the continuing need to bring wartime supplies to Britain, a great number of cargo vessels continued to operate within the industry for which they were intended. Greater numbers of requisitioned vessels are noted amongst other classes of shipping use such as the fishing industry, which hired trawlers and drifters in the thousands to contribute to the war effort (see **Section 3.4**).

3.2.45. The naval hostilities of WWI saw the introduction of a new type of warfare, which involved the greatly increasing use of mines and submarines and the introduction of aircraft. These were threats which had been underestimated or ignored during the naval arms race of the pre-war years. They required new types of ships to counter them. These new ships were needed more quickly than they could be designed and built (English 1992:151). The *Eleanor* represents a rapid stop-gap response to these new threats.

3.2.46. Passenger vessels were also requisitioned by the Royal Navy to fulfil military duties during WWI. Of the 27 passenger vessel wrecks, 11 are recorded as having performed military roles (**Appendix I: Table 8**). Passenger vessels are therefore better represented as auxiliary Admiralty vessels than are cargo vessels. This may be at least partly due to the fact that cargo vessels were still needed to carry cargo and passengers (the *Mendi* was carrying South African labourers to the Western Front on special mezzanine decks in its holds at the time of loss).

3.2.47. As ships of various nations were requisitioned, charted or seized as prizes of war, passenger vessels were for a time used as troopships, often being filled to several times their original capacity with troops (Dawson 2005:75). Other ships became ocean hospital ships, where the injured were received, treated and returned home (Dawson 2005:75).

3.2.48. Of the 27 passenger vessel wrecks, six have been assigned the NMR craft type 'troop ship'. A further six vessels have been assigned as 'hospital ships'. These are considered in greater detail in **Section 5.5**. A further vessel, HMS *Duchess of Hamilton* (NMR **UID 908098**), has been listed as a minesweeper. There are also a number of passenger vessels which have been assigned the craft type 'Admiralty vessel', although in each instance this craft type is accompanied by any one of the three craft types described above.

Armed Cargo Vessels

3.2.49. With the exception of the craft type 'cargo vessel', the type of cargo vessel most commonly represented is the armed cargo vessel (106 wrecks). Whilst the development of regular navies and then armoured ships meant that merchant vessels now played no part in battle fleets, they were nevertheless subject to attack and benefitted from being able to defend themselves.

3.2.50. The Admiralty was initially ill-prepared to meet the large-scale U-boat attack on merchant shipping and the tally of mercantile marine vessels lost to submarines rose steadily. The British response to the German submarine campaign at first was restricted to fixing the arrival and departure times of merchant ships to coincide with hours of darkness (Watts 1994:102). Additional methods, such as the use of Q ships, submarines and decoy vessels were also employed as anti-submarine measures with variable success.

3.2.51. However, by 1916 a large proportion of merchant ships had been equipped with guns. Although generally of small calibre, these were quite capable of piercing the

vulnerable pressure hulls of submarines and therefore of crippling them (Watts 1994:117). Whilst in July 1915 only 250 steamers were armed or fitted to receive a gun, by April 1916 about 1100 had been defensively armed (McGreal 2008:68).

3.2.52. The survival rate of armed cargo vessels that were attacked was much greater than that of unarmed merchantmen. Records indicate that 76% of armed cargo vessels survived attacks, in comparison to only 22% of unarmed ships (Watts 1994:117). However, armament was only likely to protect a vessel that had warning of an attack. A U-boat captain who could see that the target was armed was likely to attack at range or whilst submerged. For example the armed merchant ship *Umba* (NMR **UID 911963**) appears to have been torpedoed without warning.

Supplying the World

3.2.53. The dependence of Britain upon imports ensured the continued transportation of cargo by sea even through the most hostile of war environments. During the war the primary task of British vessels was to carry imports. The increased demand for cargo vessels caused by the greater demands of the wartime economies, war losses and the withdrawal of British vessels from some traditional but non-essential routes contributed to a growth in the use of neutral shipping (Couper 2000:108-109).

3.2.54. The turn of the century saw the emergence of a new type of cargo vessel: tankers. These were specifically designed for the carriage of oil. By 1912 there were 258 oil tankers carrying oil around the world (Lavery 2004:211). With the growing use of internal combustion engines, oil became a vital commodity and tanker fleets grew rapidly in size (Couper 2000:107). Oil became so important that the German U-boat offensive in WWI specifically targeted oil tankers (Couper 2000:110).

3.2.55. Oil was initially a one-way cargo and the tanker returned to the source of supply in ballast. However, this changed with the development of the ore-bulk-cargo carriers (OBO). These were vessels equipped for carrying bulk cargoes such as ore and coal or crude oil. They had the ability to carry a return cargo and to engage in whatever bulk trade was the most profitable at the time. The first such vessel was constructed in 1921.

3.2.56. There are 11 tankers lost during this period. None post-dates 1927. All of the five which have a recorded date of build were built prior to 1914 (*Wapello* NMR **UID 804631**, *Oriflamme* NMR **UID 804897**, *Vedra* NMR **UID 909290**, *Mira* NMR **UID 911907** and *Ponus* NMR **UID 919233**).

3.2.57. The reason why no tankers were lost after 1927 is unclear and it may be just co-incidence. They are well represented in the period 1939-1950, which has 32 wrecks.

3.2.58. Despite the increase in oil trade throughout the period 1914-1938, the transport of coal continued to take place, though at a declining rate. At the end of WWI the Merchant Navy continued to rely largely on coal-powered steamships (Friel 2003:277) thus ensuring the steady transportation of the commodity. However, the conversion from coal- to oil-powered vessels became an increasing occurrence in the interwar years, hitting Britain's most major export. Whilst still a plentiful commodity in the interwar years, the tonnage of the British coal exports in the late 1930s were almost half of what they had been just before WWI (Friel 2003:267).

3.2.59. The wrecks recorded by the NMR illustrate the gradual decline of coal trade. In the period 1914-1938, 25% of wrecked vessels were carrying coal at their time of sinking, whereas only 12% of those lost between 1939 and 1950 were carrying coal.

3.2.60. In the interwar period, changing patterns of trade further acted against British interests. The 1920s and 30s saw a growing surplus of world shipping alongside intensified foreign competition, with foreign ships (most notably those from the United States, the Scandinavian countries and Japan) becoming a more common sight in British ports. British shipping struggled to compete with these foreign

competitors (Divall 2003:388; Glynn and Oxborrow 1976:105). Furthermore, there was a worldwide shift away from coal, the single most important UK export (Divall 2003:288; Glynn and Oxborrow 1976:105).

3.2.61. The impact of the growth of foreign competition, together with the effect of the worldwide interwar depression and the vulnerability of freight markets, was particularly severe upon the British tramp shipping industry, leading to a reduction in tonnage of over a half between 1913 and 1933 (Divall 2003:288). In order to save the tramping industry from collapse, in 1935 the British government introduced an annual subsidy of £2 million to assist the industry (Glynn and Oxborrow 1976:105).

3.2.62. The representation of the tramp shipping industry amongst the wrecks for the period 1914-1938 is limited in so much as 'tramp ship' is not an NMR craft type. Along with the liner trade, 'tramping' dominated the merchant shipping industry in the interwar years and it is now common to refer to the vessels regularly engaged in this trade as 'tramp ships'. However, while the term 'tramping' was a term in contemporary use, vessels are seldom referred to as such in wreck reports. Analysis of this trade in terms of ships involved in it is thus not straightforward. There is no fixed definition of what a 'tramp ship' is or does and, strictly speaking, tramping refers to a specific type of charter agreement rather than a type of ship. Ships could and did shift between the trades, depending upon opportunity and the potential profit to be made. As such, it is not always possible to tell whether a vessel was 'tramping' at its time of loss.

3.2.63. Nevertheless it is possible to consider vessels which might be part of the industry on the basis of their cargo. Broadly speaking, tramp steamers tended to carry lower value bulk cargoes such as grains, coal, ores and timber, taking cargoes as and when available. Liner cargoes by comparison tended to be general, higher value cargoes. It could therefore be suggested that there is a good chance that any wreck recorded as carrying a bulk cargo operated as a tramp ship at some point during its working life. For example, the British vessel *Tunisiana* (NMR **UID 912928**) which was carrying a cargo of grain from Montreal to Kingston-upon-Hull may have been tramping at the time of loss. Tramp ships also made many voyages under ballast to pick up their next cargo. In this respect, it is possible that a significant number of the 130 vessels listed to be travelling in ballast at their time of loss were operating as part of the tramp shipping industry during this period, although the possibility for vessels in ballast not operating as part of this industry should not be discounted.

3.2.64. This approach must be regarded with caution and can only be considered conjectural in the absence of additional information. For example, whilst coal was a common cargo amongst tramp steamers, it would be wrong to assume that all vessels recorded to have carried coal at the time operated as part of the tramping industry. A significant number of colliers did not operate as part of the tramping industry, and instead ran regular routes between fixed ports of call.

3.2.65. There are no ships described as tramp ships in the NHSR for this period. However, SS *Robin* (**NHSR 1794**), built in 1890 and the last remaining steam coaster in the world, probably undertook considerable tramping work in the 80 years that it was working as a cargo vessel.

3.2.66. There are no cargo liners listed by the NHSR for this period. Of the 15 liners amongst the wrecks, seven (*Medina* NMR **UID 832166,** *Galicia* NMR **UID 832227,** *Aparima* NMR **UID 904616,** *Armagh* NMR **UID 906940,** *Valeria* NMR **UID 906991**, *Afric* NMR **UID 1440774** and *St. Croix* NMR **UID 1468964/1468967**) are thought to have operated as cargo liners at the time of sinking. Ships working in the liner trade operated regular schedules between advertised ports of call. Although ships regularly moved between the tramp and liner trades, cargo liners normally operated a passenger service in addition to carrying what tended to be general cargo.

3.2.67. The distinction between cargo and passenger liners is potentially confusing because a cargo liner also carried passengers and a passenger liner might carry cargo. However, on the basis that a typical cargo liner might typically carry no more than 12 passengers (Lavery 2004: 210), any liner known to have been carrying in excess of 12 passengers is likely to be a passenger liner.

3.2.68. Cargo liners were often associated with the trade in higher value general goods rather than the bulk goods typically carried by tramp ships (Kirkaldy 2009:180). Of the seven vessels thought to represent cargo liners, the recorded cargoes included general cargo, meat, brass, tin, wood pulp and ballast.

The Golden Age of the Ocean Liner

3.2.69. The period between the start of the 20th century and the outbreak of WWII is generally considered to have been the 'golden age' of the ocean liner. Throughout WWI the use of passenger liners was predominantly confined to troop ships and hospital ships (as discussed above), in order to contribute to the war effort. However, in the years which followed WWI, the use of the passenger liner was to face another change.

3.2.70. In 1921, the USA Quota Acts for the first time placed significant restrictions on immigration. This had severe implications for the Atlantic passenger trade. Up to then, the success of the ocean liner was based on the high-volume low-fare emigrant trade between Europe and North America, particularly the USA (Batchelor and Chant 2007:12). As a result of the quotas placed on immigration, liners could no longer carry large numbers of immigrants in steerage. Consequently many ships built primarily for the mass migrant trade were reconfigured for the tourist trade.

3.2.71. Many passenger shipping lines now relied on the concept of 'Tourist Third' class; a ready market for young and mobile people who were anxious to travel overseas at affordable rates (Dawson 2005:78). In a world traumatised by war, the concept of 'pleasure for its own sake' emerged amongst a more diverse demographic of travellers, and the opportunity of travelling onboard a transatlantic liner gained increasing mass appeal. The trans-Atlantic liners also served the 'old home' trade, whereby former emigrants could visit home or take their families to see 'the New World' (Dawson 2005:78).

3.2.72. The transatlantic trade became an increasingly competitive market in the 1920s and 1930s. The great shipping lines vied strongly with each other, placing even greater emphasis on the size, luxury and speed of their liners, with more frequent and more regular sailings between Europe and North America (Batchelor and Chant 2007:12).

3.2.73. The period 1914-1938 also marked the dawn of a new type of trans-Atlantic service; the airship. The German airship *Graf Zeppelin* began the first scheduled transatlantic service in 1932 (Lavery 2004:298).

3.2.74. Despite their perceived prosperity, the passenger liners were not immune from the effects of the Great Depression. A number of passenger liner companies were bankrupted as a result (Batchelor and Chant 2007:12).

3.2.75. The passenger trades of the 1920s and 1930s are poorly represented in the wrecks of this period. Of the 15 liners listed, only one, the *Armagh* (NMR **UID 906940)**, was lost during the interwar years. It would be expected that liners which facilitated the prosperity and growth of the transatlantic passenger trade in this period are afforded greater representation in the period 1939-1950.

Loss

3.2.76. The loss of cargo vessels in the period 1914-1938 has been largely considered in **Section 4.4**. Cargo vessels are the most commonly represented vessel type in the period 1914-1938, which is unsurprising given that they were the primary target for the German U-boat offensive during WWI. This is well illustrated by the query results

relating to the manner of loss terms 'torpedoed' and 'mined'. As the following table demonstrates, the majority of vessels lost by these means in the waters around England were cargo vessels.

Manner of Loss	No. of Cargo Vessels	Total No. of Vessels	%age of Total
Torpedoed	413	463	89
Mined	183	329	56

Table 24: NMR records queried by manner of loss (cargo)

3.2.77. Passenger vessels were also subject to the German U-boat offensive. Of the 27 passenger vessels, only one vessel (the *Armagh* NMR **UID 906940**) was lost in peacetime. The remaining 26 vessels were lost during WWI and were thus wartime losses.

3.2.78. One of the most significant losses in relation to passenger vessels during WWI was the loss of the *Lusitania;* which sank as a result of a U-boat attack in 1915 with the loss of 1,198 lives (Bennett 1969a:192). The loss of the *Lusitania* provoked international outrage. It was a contributory factor to the USA's subsequent entry into the war and the worldwide outrage at the sinking resulted in the German government modifying their campaign orders to exempt large liners from attack (Friel 2003:236). However, as a result of failed negotiations for peace and Britain's increasingly effective naval blockade of Germany, in January 1917 Germany once again abandoned these limitations, leaving no vessel traversing the war zone safe from hostile attack. Around two-thirds (17 records) of the passenger vessels lost throughout WWI were lost during the years 1917 and 1918. All but two of these vessels (the *Mendi* NMR **UID 1244387** and the *Valeria* NMR **UID 906991**) were lost as a result of enemy action, the majority of which were by torpedo (14 records). Some, such as the *Mendi*, were carrying troops and had been temporarily converted from a cargo liner into a passenger vessel.

Summary

3.2.79. Due to their large numbers, cargo vessel wrecks are unlikely to have special interest on the basis of their use in transporting cargoes alone. Cargo vessels equipped with a triple expansion engine are also common (276 records), although they may be regarded of special interest on the basis that they are to some extent representative of the economic and technical conservatism that in some degree held back the development of ships during this period. Again their commonness means that these too would require further contributory factors in order for them to be considered as having special interest.

3.2.80. Conversely, cargo vessels equipped with reciprocating, turbine and oil-fired engines are likely to be regarded of special interest on the basis of their rarity during this period. Whilst cargo vessels equipped with a diesel engine are also few in number, the abundance of diesel engines in preserved vessels probably reduces their special interest in this respect.

3.2.81. The rarity factor also applies to vessels associated with the tramp and liner shipping industries, industries in which British interests were very active in the period. This rarity may however be deceptive. The tramp ship as a craft type does not exist within the NMR. Therefore, as tramp ships were ubiquitous in this period, a significant number of cargo vessel wrecks are likely to have been engaged in tramping and therefore perhaps identifiable as tramp ships. As only one ship that may have operated in the tramping system is present in the preserved record, the remains of vessels that can be conclusively identified as having operated as tramps are likely to be regarded of special interest, unless or until they become sufficiently apparent as wrecks as to no longer be regarded as rare. This recognition is unlikely,

given that vessels which operated as part of the tramping industry adhered to no specific vessel type.

3.2.82. Sailing vessels, particularly schooners, may also be regarded of special interest on the basis of their representation of the large building programme which resulted in the construction of thousands of new sailing vessels during WWI when the availability of steamships to transport cargoes was limited (Greenhill 1993: 103).

3.2.83. Comprising only 2% (27 records) of the total number of records of wrecks for this period, passenger vessels may be regarded to be of special interest on the basis of their rarity. However, with 93 passenger vessels currently in preservation (as listed by the NHSR and NSBR), the individual craft type would need to be taken into account in order to ascertain the level of this rarity.

3.2.84. Passenger liners in particular are likely to be regarded as being of special interest because in this period they represent the 'Golden Age of the Ocean Liner'. Vessels equipped with methods of propulsion that enabled them to attain greater speeds, such as turbine, diesel or oil engines, would further be regarded of special interest, representing the strong competitive market that existed between shipping lines whose emphasis was on speed.

3.2.85. Those dating prior to 1920 are likely to be attributed special interest if they carried emigrants and are therefore representative of the large-scale emigrant trade. In the same way, passenger liners dating to the 1920s and 1930s are likely to be attributed special interest on the basis of their representation of the emerging concept of the 'Tourist Class', which in effect replaced the high-volume emigrant trade.

3.3. MILITARY

3.3.1. As a period dominated by war and subsequently rearmament, the needs of the military were paramount for long periods between 1914 and 1938.

3.3.2. In the 1914-1938 dataset there are 27 individual craft types which may be considered to be military in origin (**Table 25** and **Figure 11**). In many cases, as with other classes of shipping, an individual record may be assigned to more than one craft type. On closer inspection of these records, it becomes apparent that a large proportion of the vessels which are considered to be military in origin were, in fact, requisitioned vessels originally constructed for an alternative purpose. This is discussed in greater detail in **Section 5.2**. Eradicating any requisitioned vessels reveals a total of 102 purpose-built military vessels (**Appendix I: Tables 9** and **10**).

NMR Craft Type	Quantity
Admiralty Vessel	104
Patrol Boat	51
Submarine	46
Patrol Submarine	37
Minesweeper	30
Warship	27
Mine Laying Submarine	24
Destroyer	15
Troop Ship	8
Torpedo Boat Destroyer	4
Training Ship	4
Battleship	3
Cruiser	3
Gunboat	3
Minelayer	3

NMR Craft Type	Quantity
Motor Torpedo Boat	3
Oiler	3
Escort Vessel	2
Light Cruiser	2
Aircraft Carrier	1
First Rate Ship of the Line	1
Fleet Messenger	1
Iron Clad	1
Mine Carrier	1
Motor Gunboat	1
Q Ship	1
Submarine Seaplane Carrier	1
Torpedo Gunboat	1

Table 25: NMR records queried by craft type (military)

3.3.3. The NHSR provides a moderate representation of military vessels for the period 1914-1938, listing 19 vessels recorded under the class 'fighting vessels'. The military vessels listed by the NHSR comprise 12 different vessel types, as follows: Admiralty Launch, Admiralty Pinnace, Flower Class, Harbour Launch, High Speed Launch, Light Cruiser, Motor Torpedo Boat, Naval Pinnace, Southampton Class, Tender, Torpedo Recovery Vessel and X Lighter. The NSBR provides a relatively low representation of military vessels, with only three fighting vessels. This is unsurprising given that the NSBR caters for vessels 10m or less in length. Of those listed by the NSBR, one vessel type is represented, comprising the Royal Naval Motor Cutter.

Build

3.3.4. In the period 1914-1938, all classes of warships improved in capability with more and larger weapons, higher speed and greater endurance, stronger and better shaped hulls and equipped with more powerful and lighter machinery which improved both the reliability and economy of the vessels. Further developments included the strengthening of protection against enemy weapons by improved quality and disposition of armour (Brown 1992:7).

3.3.5. For example, the capital ship evolved into a fighting unit of unprecedented speed, size and power. Between 1910 and 1920 displacement had all but doubled, gun calibres had increased to the largest ever seen, triple-mounted weapons were in favour in several navies and there were vast improvements in fire control, protection and propulsion systems (Gibbons 1983:176).

Propulsion

3.3.6. A review of the purpose-built military vessel wrecks reveals a predominance of vessels utilising an internal combustion engine as a means of propulsion (**Table 26**). The percentages shown in **Table 26** are taken from the total number of records for each given nationality.

		Propulsion		
Nationality	**Total**	**Sail**	**Steam**	**Engine**
British	42	2% (1 record)	38% (16 records)	41% (17 records)
German	60	0% (0 records)	2% (1 record)	55% (33 records)

Table 26: NMR military records queried by nationality and propulsion

3.3.7. In order to clarify the precise methods of propulsion adopted during this period, a further query was conducted on the field of 'propulsion specifics' (**Table 27**).

Propulsion Specifics					
Nationality	**Total**	**Turbine Engine**	**Oil Engine**	**Diesel Engine**	**Triple Expansion**
British	42	24% (10 records)	7% (3 records)	10% (4 records)	22% (9 records)
German	60	0% (0 records)	20% (12 records)	2% (1 record)	0% (0 records)

Table 27: NMR military records queried by nationality and propulsion specifics

3.3.8. The results of the query indicate a predominance of steam propulsion amongst British military vessels in the period 1914-1938. Only a small proportion of British military vessel wrecks are recorded to have been oil-fired steam vessels. There is no reference to oil-fired vessels amongst the military vessels listed by the NHSR and NSBR.

3.3.9. Arguably the most important innovation during this period in respect of propulsion was the adoption of oil as the principal fuel for warships. Oil offered many advantages for military vessels. Despite these advantages, the Admiralty was initially reluctant to convert to oil-fired vessels, believing that the assured supply of British coal was to be preferred to having to rely on imported oil (Griffiths 1997:155). Not only were oil fuelling stations infrequent, its use had the added disadvantage that it did not provide the extra protection against shell fire given by a coal bunker (Brown 1992:8).

3.3.10. However, despite these early perceived disadvantages, the Admiralty steadily turned towards oil in the early 20th century and in 1914 a report of the Royal Commission came down firmly on the side of oil (Griffiths 1997:155). In order to counter the factors upon which their initial reluctances were based, the British government acquired a 51% shareholding in the Anglo-Persian Oil Company. This guaranteed that fuel for the fleet would be available at source throughout WWI. In addition oil bunker stations were made available at many ports (Griffiths 1997:155). Despite the greatly improved availability, it was necessary for some vessels such as cruisers to be adapted to use and carry both oil and coal (Brown 1992a:55, 57).

3.3.11. With regard to steam propulsion, the triple expansion engine and the steam turbine engine have roughly equal representation amongst military vessel wrecks in the period 1914-1918 (**Table 28**).

Triple Expansion Engine			Turbine Engine		
Name	**NMR UID**	**Date of Build**	**Name**	**NMR UID**	**Date of Build**
HMS *Niger*	904855	1892	HMS *Hood*	904643	1891
HMS *Boxer*	805154	1894	HMS *Coquette*	908082	1897
HMS *Hazard*	805565	1894	HMS *Velox*	805467	1902
HMS *Formidable*	1449548	1898	MTB 10	908144	1907
HMS *Bulwark*	904919	1899	MTB 11	908106	1907
HMS *Falcon*	1456911	1899	HMS *Ghurka*	901723	1907
HMS *Foyle*	919766	1903	HMS *Falmouth*	907931	1910
HMS *Cochrane*	906966	1905	HMS *Arethusa*	912648	1913
HMS *Ascot*	943561	1916	HMS *P12*	805233	1915
			HMS *Minion*	911756	1915

Table 28: NMR military records queried by triple expansion/turbine engine and date of build

3.3.12. Whereas military vessels built pre-1900 were equipped with triple expansion engines, those built post-1900 were equipped with a turbine engine. The first vessel recorded to have been equipped with a steam turbine, the *Turbinia,* was built in 1897 so the earlier HMS *Hood* and HMS *Coquette* (built in 1891 and 1897 respectively) must have been subject to an engine conversion at a later date. The NHSR lists only two vessels (the *M 33* NHSR **ID 430** and HMS *President* NHSR **ID 494**) using a triple expansion engine. In providing greater thermal efficiency and higher power-to-weight ratios, turbines steadily replaced triple expansion machinery in all classes of warships and by 1906 steam turbine machinery was virtually universal in the Royal Navy (Brown 1992a:7).

3.3.13. One of the main disadvantages of the early steam turbine engine was that whilst turbine engines were most efficient at a very high rotational speed (rpm), propellers worked best at low rpm. The introduction of gearing reconciled the rotational speed requirements of the turbine and propeller, and by 1915 it was decided that all new warships ordered for the Royal Navy should have geared turbines (Brown 1992:7). The Royal Navy was the only navy to operate geared turbine ships in any number during WWI, and the effect on fuel consumption and hence endurance, due to increased efficiency of both the turbine and propeller, was dramatic (Brown 1992:7).

3.3.14. Geared turbine machinery in warships became increasingly important during the interwar years, particularly with regard to the Washington Treaty 1922 which restricted the total tonnage for each country. The steam turbine provided a weight-saving and reliable method of propulsion; saving some 300 tons directly and another 700 tons consequential saving in the hull (Brown 1992:7). However, the interwar slump hit the British marine engineering industry badly, and as a result, it was unable to manufacture enough turbines and gearing sets for the WWII fleet of escort vessels and minesweepers (Brown 1992:12). With the exception of the occasional reference to a gearing wheel reported as a droit, the NMR records do not explicitly report whether a vessel was equipped with geared turbine machinery.

3.3.15. There is relatively low representation of vessels equipped with a diesel engine. As an internal combustion engine, the diesel engine enabled greater power for the same amount of fuel to be attained, using about 35% of the energy in the fuel in comparison to only 15% used by the steam engine (Blum 1975:147). Despite these advantages, even the best diesels of the day were big and heavy, offsetting their much lower fuel consumption (Brown 1992:12). In addition to this, in the battleships the vibrations which they cause interfered with gunnery control (Brown 1992:12).

3.3.16. In comparison, the NHSR provides a relatively good representation of military vessels equipped with a diesel engine. Of the 19 vessels listed by the NHSR for this period, over half (10 records) are recorded to have utilised a diesel engine, with the construction of the vessels spanning the period 1914-1938. With only three vessels equipped with a steam turbine engine, the NHSR implies a preference for the diesel engine as a method of propulsion for military craft in the period 1914-1938, and further highlights the difficulties in representation when comparing datasets with differing sorting criteria.

3.3.17. Two vessels which arguably stand outside the main themes addressed in respect to propulsion are HMS *Ascot* (NMR **UID 943561**) and HMS *Ludlow* (NMR **UID 912645**). These were two of 32 paddlewheel coastal minesweeping sloops commissioned by the Royal Navy as the Racecourse class under the Emergency War Programme. The use of the largely obsolete paddlewheel in the construction of a military craft as late as 1916 suggests that this form of propulsion may have been regarded as having retained a technical advantage in this type of specialist use.

Hull Construction

3.3.18. There was little alteration in the hull construction of Admiralty vessels with regard to object material in the period 1914-1938. The material type most commonly represented amongst the purpose-built military vessel wrecks for the period is steel, with the remaining vessels assigned with the object material 'metal' or 'unknown' (**Table 29**).

		Object Material		
Nationality	**Total**	**Unknown**	**Metal**	**Steel**
British	42	16	1	25
German	60	27	4	29

Table 29: NMR military records queried by object material and nationality

3.3.19. In addition to this, there were no serious structural problems, although strained rivets led to minor leaks (Brown 1992:10). One of the most significant changes with regard to hull construction in the period 1914-1938 was the transition from riveted hulls to welded hulls.

3.3.20. The use of welding in the interwar period had particular advantages with regard to weight saving in military vessel construction. Following WWI, the Washington Naval Treaty 1922 set limits on the size and number of armaments of warships that the great powers could possess. The Treaty restricted the total tonnage for each country to vessels with a maximum displacement of 35,000 tons (Sumrall 1992:25). The use of welding provided a legal measure through which weight saving could be attained. By employing welding as a means of joining elements of the hull together, more weight became available for military capacity (Brown 1992a:58).

3.3.21. The introduction of arc welding in the 1930s provided further advantages, enabling reactive metals to be welded and resulting in the extensive use of lighter metals such as aluminium in minor structure (Brown 1992:10). There are no references to welded hulls with regard to military vessels in this period. Additionally none of the military vessel wrecks were built post-1920. It is expected that vessels which were affected by the limitations imposed by the Washington Treaty will be found to have been more common in the period 1939-1950.

Armour and Armament

3.3.22. The armour and armaments used by military vessels in the period 1914-1938 varied considerably. By the outbreak of WWI, super firing turrets were the norm, and subsequent developments saw improvements to gunnery techniques (Gibbons 1983:178). From 1913, all capital ships in the British fleet were fitted with director firing equipment for their main armament (Gibbons 1983:178), a feature which was later fitted to control secondary armament between 1917 and 1918 (Brown 1999:96). Throughout the period, general emphasis was placed on equipping vessels with more powerful guns of higher calibre or increased muzzle velocity in order to increase the range of the weapons and their armour penetration (Friedman 1978:130-1). The availability of more powerful guns meant that fewer guns were needed, and it was common for those present to be mounted in centreline turrets amidships (Friedman 1978:135). There was also an increase in the number of anti-aircraft guns throughout the period (Brown 1999:96).

3.3.23. The development of armour in the period 1914-1938 resulted from the reconciliation of two approaches: the required thickness of plate over a given feature or the ship and best overall distribution (Gibbons 1983:178). The areas for which protection was most essential were the gun's crew and loading system with hoists and turret machinery, the magazines, the conning tower and the machinery (Gibbons 1983:178). In addition to this, an increase in the range of guns resulted in higher

trajectories, which in turn created the need for more effective deck armour (Gibbons 1983:178).

3.3.24. In order to ensure optimum protection, capital ships screened vital areas of the hull with thick belt armour, which was kept as narrow as possible to save weight. It was capped by an armoured deck to protect against plunging shot (Brown 1992:9; Gibbons 1983:179).

3.3.25. The increased calibre of guns during this period had further implications for the design of armoured military vessels. Early in WWI it was realised that 13.5 inch shells were available which could penetrate 13 inch armour at fighting range (Brown 1999:94). In order to counter this threat, sloping armour was introduced so that shells striking at an angle would be less likely to penetrate the armour (Brown 1999:94).

3.3.26. Despite this emphasis on armour, not all classes of military vessels followed suit. Battlecruisers were designed to be capable of fighting alongside battleships but also to be fast enough to catch and destroy enemy cruisers. In order to achieve the very high speed required and to carry heavy guns, armoured protection had to be sacrificed. In order to compensate for this relative lack of armour, design innovations were made. For example, some battlecruisers employed a unit system of machinery, in which engine and boiler rooms alternated so that a single hit on the machinery spaces by a bomb or torpedo would not completely disable the ship (Brown 1992:10). However, the thin armour proved far too vulnerable to long-range shells and a number of battlecruisers were lost as a result, including the *Invincible, Queen Mary* and *Indefatigable* at Jutland in 1916 and the *Hood* in action with the *Bismarck* in 1942. As a result the battlecruiser proved to be a flawed concept. There are no battlecruiser wrecks dating to the period 1914-1938.

3.3.27. With the lessons of war, it became apparent that there was a need for a much improved protection for military ships alongside the need for better torpedo protection (Brown 1992:10). The need for increased armour, larger guns and facilities for aircraft resulted in the need for increasingly large capital ships. However, the Washington Treaty (1922) restricted the total tonnage for each country and resulted in an emphasis on weight saving. General modernisations following the war with regard to armament included the addition of bulges/blisters to increase the depth of torpedo protection, alongside the upgrading of side and deck armour (Sumrall 1992:25).

3.3.28. The armaments employed amongst military vessels of this period varied to such a degree that, whilst they were included within the project database, applying simple queries to them would have achieved little in the way of meaningful results.

3.3.29. With regard to hull protection, there is little information available in the NMR dataset or in the source material upon which it is based. However, a large amount of detailed information relating to naval armour is available in both primary and secondary sources. Whilst the scale of this resource means that it has not been possible to review it in the context of this project, it can be fairly easily accessed on a wreck by wreck basis.

Use

3.3.30. The purpose-built military vessel wrecks for the period 1914-1938 represent 25 distinct vessel types (**Appendix I: Tables 9** and **10**). The craft types assigned to military vessels are in some cases broad terms. For example, the terms ‘Admiralty Vessel’ and ‘Warship’ refer respectively to any vessel which has been hired or impressed for use by the Admiralty or any ship that is built and primarily intended for war.

3.3.31. There are also a number of craft types that may be considered as secondary. For example, the term 'training ship' refers to any vessel used specifically for providing an initial training in seamanship. Such vessels are typically older or outdated, and their primary function may not have been representative of earlier phases of use. For example, to consider HMS *Vernon II* (NMR **UID 911729**) as a First Rate Ship of the Line alone, without reference to its use as a training ship in the period 1914-1938, would be misleading.

3.3.32. In order to analyse the use of military craft, purpose-built military vessels were queried on the basis of their primary function. The results are shown in **Tables 30** and **31**.

British Military Vessels – Primary Function	Quantity
Destroyers	10
Submarines	8
Torpedo Boat Destroyers	3
Battleships	3
Motor Torpedoboat	3
Oiler	2
Light Cruiser	2
Cruiser	2
Minesweeper	2
Ironclad	1
Patrol Boat	1
Torpedo Gunboat	1
First Rate Ship of the Line	1
Lighter	1
Motor Gunboat	1
Gunboat	1
Total	**42**

Table 30: British purpose-built military vessels (craft type)

German Military Vessels – Primary Function	Quantity
Submarines	58
Destroyers	2
Total	**60**

Table 31: German purpose-built military vessels (craft type)

3.3.33. The results show that destroyers and submarines are the most common British military wrecks, comprising 23% and 19% of the naval wrecks respectively. U-boats are unsurprisingly the most common German military vessels, accounting for over 96%. They also comprise over 56% of the military wrecks of all nationalities.

Vessels built without the lessons of war

3.3.34. Over half (23 wrecks) of the British purpose-built military vessels were constructed in the years prior to WWI (**Table 32**). A further 11 vessels are post-1914 in construction (**Table 33**). The construction date of the remaining vessels is unknown.

British Military Vessels Built Prior to 1914	Quantity
Destroyer	6
Battleship	3
Torpedo Boat Destroyers	3
Light Cruiser	2
Motor Torpedoboat	2
Submarine	1
Iron Clad	1
Torpedo Gunboat	1
Cruiser	1
Gunboat	1
Motor Gunboat	1
First Rate Ship of the Line	1
Total	**23**

Table 32: British purpose-built military vessels built pre-1914

British Military Vessels Built Post 1914	Quantity
Submarine	7
Destroyer	2
Minesweeper	2
Patrol Boat	1
Total	**12**

Table 33: British purpose-built military vessels built post-1914

3.3.35. A review of **Tables 32** and **33** reveals the shift in military requirements that took place in WWI. The British military vessels built prior to 1914 are dominated by destroyers, battleships and torpedo boat destroyers (TBD). In comparison, those built from 1914 onwards are dominated by submarines.

3.3.36. The vessels built in the years prior to WWI were constructed during a period characterised by an absence of any major naval warfare and by experimental naval design. This resulted in uncertainty and a seemingly endless array of designs with widely differing capabilities. Warships were ordered and designed to meet each specific situation as it arose, incorporating the latest technological developments as they became available (Roberts 1992:105; Watts 1994:44). The range of British military craft built prior to 1914 serves to illustrate this point, comprising no less than 12 individual craft types.

3.3.37. WWI provided the ultimate test for these late 19th and early 20th century warships. Although a product of a revolutionary period in naval design and engineering, the pre-1914 military craft had been built without the lessons of war, and the technological advances which had made their construction possible had also marked the dawn of a new type of warfare. Furthermore, the period was so revolutionary that new designs had rapidly become obsolete, even without the lessons of war.

3.3.38. Following the construction of the *Dreadnought* in 1906, the world's naval powers built progressively more powerful 'dreadnought' type warships and started to measure national status in terms of the number and firepower of their large battleships (Lavery 2004:283). However, while there were extensive naval campaigns in the Mediterranean, North Sea, and Baltic involving both pre-dreadnought and dreadnought battleships, there were very few occasions during WWI in which different types of capital ships faced each other in the major fleet actions for which they were designed (Sumrall 1992:24). The only time the major

battle fleets clashed was the Battle of Jutland. This occurred outside of territorial waters in the North Sea in May 1916. As a result major fleet actions are not represented amongst the wrecks.

Submersibles

3.3.39. The development of the submarine fundamentally affected the course of naval warfare in the 20th century. The introduction of metal for ship construction in conjunction with the provision of practical propulsion systems for submersible craft and the invention of the self-propelled torpedo allowed the submarine to be developed as a highly effective weapon of war (Akermann 2002:1). It could remain unsupported and undetected in enemy waters for extended periods and thus provided the ideal lone weapon (Akermann 2002:99).

3.3.40. At the outbreak of WWI, Britain possessed the worlds largest submarine arm, comprising 71 submarines (Van der Vat 2001:41). However, only 20 of these were ocean-going, the rest being suitable only for coastal work or training (Van der Vat 2001:41; Wilson 1992:98). In comparison, the German U-boat arm was fourth in size, but first in quality, with ten ocean-going submarines with the longest range and highest performance in the world (Van der Vat 2001:41).

3.3.41. The German Admiralty recognised the great potential of the submarine as an offensive and strategic war craft. As a result they deployed it in WWI to attack the merchant shipping upon which Britain depended (Bennett 1969a:191). Submarines account for over 96% (58 wrecks) of the total number of German purpose-built military vessels of this period. The fact that they also represent most of the military wrecks of this period is testament to the dangerous nature of this deployment and the ultimate failure of the strategy.

3.3.42. By comparison, a large portion of British submarines were allocated to defence duties, predominantly as harbour defence vessels. Nevertheless, British naval thinking changed during WWI. British submarines were deployed extremely effectively against the Germans in the Baltic and against the Turks in the Sea of Marmara. This highlights the fact that British submarines were most effective when operating where the surface fleet could not go and where the enemy depended on the use of the sea (Akermann 2002:101). British submarines were also used to some effect in the anti-submarine role. Despite this, constrained by a somewhat outdated perception of naval warfare, the British Admiralty kept the main force of the British submarines massed in the North Sea, waiting to counter any move that the High Seas Fleet might undertake (Akermann 2002:101).

3.3.43. The effectiveness of the U-boats proved to the British Admiralty that submarines were an important tool of 20th century naval warfare. As a result considerable effort was put into the construction of submarines throughout the war. This is evident in the wrecks. Of the 11 purpose-built British military vessels post-1914 in date, 64% (7 records) were submarines.

3.3.44. The development of the sea mine also had a major impact upon 20th century naval warfare. Mine warfare became a significant component in naval warfare in WWI. It formed the core of the German U-boat campaign in British coastal waters and large numbers of offensive mines were laid as a result.

3.3.45. The British Admiralty initially thought that a large mining offensive would impede the Royal Navy's ability to conduct fleet and submarine operations. They were also worried that large-scale mining operations would antagonise neutrals (Watts 1994:89-90). As a result, at the outbreak of WWI no British submarines had been converted to carry mines, and the Navy's minesweeping capacity was confined to ten converted gunboats (English 1992:161; Van der Vat 2001:41).

3.3.46. This cautious strategy did not survive the Admiralty's realisation that mining was a necessity. Extensive defensive minefields were eventually laid in the North Sea and English Channel and important offensive operations were also carried out as part of the naval and trade blockade of Germany. Offensive minelaying capacity was quickly provided by adapting ordinary overseas submarines for minelaying by fitting a mine chute into the main ballast tanks, although the effectiveness of this method of minelaying was limited by the small number of mines carried. It was not until the 1920s that an efficient type of minelaying submarine was developed (Akermann 2002:257).

3.3.47. Improved minelaying capacity was provided by the construction of specialised warships, although the threat from mines remained so serious that large numbers of converted non-military craft continued to be employed in mine clearance. The specialised minesweepers are represented by HMS *Ascot* (NMR **UID 943561**), built in 1916. The *Ascot* was one of 32 Racecourse Class minesweepers constructed under the Emergency War Plan.

The Requisitioning of Non-Military Vessels

3.3.48. It has already been noted that a large proportion of vessels used to fulfil military purposes in the period 1914-1938 were vessels requisitioned from other classes of shipping use. Those vessels which had been requisitioned are considered within the theme section relevant to their primary function and are not therefore repeated here.

3.3.49. The hiring of non-military vessels to perform duties on behalf of the Admiralty during WWI was expedient for a number of reasons. Due to the technological advances of the late 19th and early 20th centuries, the construction of warships was far more complex and expensive than in previous years, resulting in fewer purpose-built naval vessels being constructed. There was a subsequent need for non-military vessels to supplement regular naval vessels (English 1992:151).

3.3.50. The frequent maintenance required further reduced number of naval vessels available for operations. Typically 10% of battleships, 10% of light cruisers and 25% of destroyers were in refit at any one time (Brown 1999:93). In addition rapid advances in naval warfare left the Royal Navy feeling ill-prepared, resulting in the conversion of non-military craft to fulfil duties for which a purpose-built military craft had yet to be developed. For example, at the outbreak of WWI there was no permanently organised force of minesweepers and no modern vessels designed specifically for minelaying (Watts 1994:88). As a result, non-military vessels in large numbers were hired as Admiralty minesweepers throughout the war.

3.3.51. **Table 34** illustrates the significant number of vessels requisitioned by the Admiralty in WWI. The table lists the total number of each craft type of military origin, against which the total number and percentage of vessels requisitioned is listed. The results of the query indicate that the military duties for which the greatest number of wrecked vessels had been requisitioned were those associated with anti-mine warfare and anti-submarine measures. In each of these instances it is apparent that the Royal Navy had suffered by constructing vessels without the lessons of war. Whilst the Admiralty had taken the right measures against the enemy battle fleet, the known record is evidence that it was ill-prepared to face the new threats that arose - U-boats and mines (Van der Vat 2001:140).

3.3.52. An example here may be provided by the minesweepers. Despite the extensive use of mines around the waters of the British Isles (see **Section 4.4**) only two purpose-built military vessel vessels intended to operate as minesweeping craft are recorded as wrecks, HMS *Ascot* (NMR **UID**) and HMS *Ludlow* (NMR **UID 912645**). The remaining minesweepers in the record were all requisitioned trawlers.

NMR Craft Type	Quantity	No. Requisitioned	Percentage Requisitioned
Troop Ship	8	8	100
Mine Carrier	1	1	100
Q Ship	1	1	100
Admiralty Vessel	104	104	100
Patrol Boat	51	49	96
Minesweeper	30	28	93
Minelayer	3	2	67
Escort Vessel	2	1	50
Cruiser	3	1	33
Oiler	3	1	33
Training Ship	4	1	25
Warship	27	2	7
Submarine	46	0	0
Patrol Submarine	37	0	0
Mine Laying Submarine	24	0	0
Destroyer	15	0	0
Torpedo Boat Destroyer	4	0	0
Battleship	3	0	0
Gunboat	3	0	0
Motor Torpedo Boat	3	0	0
Light Cruiser	2	0	0
Aircraft Carrier	1	0	0
First Rate Ship of the Line	1	0	0
Fleet Messenger	1	0	0
Iron Clad	1	0	0
Motor Gunboat	1	0	0
Submarine Seaplane Carrier	1	0	0
Torpedo Gunboat	1	0	0

Table 34: Military craft types showing percentage requisitioned

The Dawn of Naval Aviation

3.3.53. Naval aviation grew rapidly in the period 1914-1938. Initially the focus was on seaplanes, which were preferable to wheeled aircraft as they were able to take off from the sea itself and return to land on it (Friedman 1992:38). Specialist seaplane carriers were developed to carry these aircraft.

3.3.54. However, the floats with which the seaplanes were equipped drastically limited their performance. Furthermore the fact that these aircraft had to take off and land on the sea made it impossible to use them if the sea state was anything other than slight. Therefore the focus shifted to skid- and then wheel-equipped aeroplanes (Friedman 1992:37). These aircraft required a ship with a flat landing surface, in other words an aircraft carrier.

3.3.55. The first operational aircraft carrier was HMS *Furious;* a converted battle cruiser which could launch but not recover aircraft. In the early stages of aircraft carrier development, vessels were refitted with separate short decks for landing and taking off, retaining the original ship superstructure. This design made aircraft landings extremely hazardous as the aircraft struggled to cope with the air currents and turbulence generated by the ship's superstructure and with the limited landing space available (Friedman 1992:38; Fontenoy 2005:71).

3.3.56. Many pilots were killed and aircraft lost as a result. The solution was a completely unobstructed single continuous flat deck. The first flush-decked aircraft carrier, HMS

Argus, entered service before the end of the war in September 1918. Converted from an incomplete Italian liner (Fontenoy 2005:71) the *Argus* quickly demonstrated the superiority of the flush deck (Fontenoy 2005:71).

3.3.57. Thus before the end of WWI the first true aircraft carrier and the prototype for all subsequent carriers was in service (Brown 1999:88; Friedman 1992:38). The Royal Navy embarked on an ambitious wartime carrier building programme (Robbins 2001:9) as well as a programme to equip other vessels with aircraft. By the war's end at least 28 British ships carried up to three aircraft apiece, usually seaplanes (Lavery 2004:291). Development of the aircraft carrier then continued into the Interwar period, although at a much less urgent pace. The Royal Navy focussed on solving the principal problem of making sustained and repeated air operations possible at sea (Friedman 1992:38).

3.3.58. There are two wrecks of vessels referred to as aircraft carriers amongst the wrecks: HMS *Ascot* (NMR **UID 943561**) and the British submarine *M2* (NMR **UID 904645**). Neither were flush-decked carriers.

3.3.59. The *Ascot* was a minesweeper of the Racecourse-class built in 1916, and is described in the NMR Complete Monument Record as being a vessel equipped with a winch and derrick system capable of loading and unloading Sopwith Pup seaplanes onto her deck. It was therefore a seaplane carrier rather than a true aircraft carrier in the sense that the *Argus* was.

3.3.60. The Sopwith Pup was a biplane fighter aircraft which entered service with the Royal Flying Corps and the Royal Naval Air Service in the autumn of 1916. Based on the sources available, it is unknown when the *Ascot* was refitted to accommodate such aircraft, although given that the vessel was lost in 1918, a date range between 1917 and 1918 is most likely. HMS *Ascot* thus provides the only example of a wreck associated with the WWI beginnings of naval aviation.

3.3.61. The *M2* (NMR **UID 904645**) was a British seaplane submarine carrier commissioned in 1918. The *M2*, originally designed as one of the ill-fated K class submarines, had been built as a submarine monitor with a large calibre gun. It was converted into a seaplane carrier in 1925, the gun being replaced with a hangar, ramp and derrick for launching and recovery operations (Hutchinson 2001:92-93). It was lost during exercises in 1932 when the hangar door failed to close correctly during a dive after launching the seaplane (Hutchinson 2001:93). The *M2* is the only example of a submarine seaplane carrier wreck from this important interwar phase in the development of naval aviation.

Loss

3.3.62. Of the 1075 wrecks lost between 1914 and 1918, only 5% (50 wrecks) were German in nationality. Of these 50 German wrecks, almost all (94% or 47 records) were military vessels. The three non-military vessels (*Hera* NMR **UID 1453162,** *Hjordis* NMR **UID 907526** and *Pagenturm* NMR **UID 911879**) are described respectively as a German vessel lost by grounding prior to the onset of WWI and Norwegian and British vessels, which were formerly German in nationality (possibly sold and seized respectively at the beginning of the war). Taking this into account, there are no records of any non-military German vessel wrecks.

3.3.63. Following the introduction of the convoy system in 1917, U-boats were forced to seek their prey in areas where the Allied anti-submarine forces were concentrated. This resulted in heavy losses (Bennett 1969a:205). By the end of the war, some 209 U-boats are recorded to have been lost (Hutchinson 2001:68). Despite this, the number of U-boats in the known record is somewhat lower than might be expected, comprising only 3% of the total number of vessels lost (1075 records) during this period.

3.3.64. Of the 1358 wrecks of the period 1914-1938, only 7% (101 records) were purpose-built military vessels. This is quite significant given that the period is undoubtedly one dominated by war. This relatively low number of military vessels serves to illustrate the fact that naval warfare in WWI was dominated by the U-boat campaign against the Allied merchantmen. This is considered in greater detail in **Section 5.**

Summary

3.3.65. Purpose-built military vessels represent only 7% of the wrecks. They are therefore likely to be considered of special interest on the basis of their relative rarity.

3.3.66. Ships that are linked to new and important forms of naval warfare are likely to be of even greater significance. These will include vessels linked to the use of mines (including minesweepers and minelayers) and those linked to submarines (including anti-submarine vessels).

3.3.67. Wartime emergencies created urgent requirements that could not be met by new builds. Requisitioning was a particular feature of WWI that led to a plethora of vessel types that are likely to have special interest.

3.3.68. The early development of naval aviation during this period was particularly important. In this respect the only two seaplane carrier wrecks, HMS *Ascot* (NMR **UID 943561**) and the *M2* (NMR **UID 904645**), are of special interest because of this link because of their resulting rarity.

3.3.69. Military vessels may be further regarded of special interest on the basis of their association. There are no known wrecks for the period 1914-1938 which are described in the NMR Complete Monument Records as having been associated with the Battle of Jutland, the largest and most significant naval battle to occur in WWI. Any vessels having had a past association with the Battle of Jutland, for example because they were present in one of the fleets, would be assigned special interest not only due to their association with this key event, but also due to their apparent rarity.

3.3.70. Arguably the lack of wrecks associated with Jutland further highlights the importance of vessels in preservation such as the *Caroline* (NHSR **ID 430**), a cruiser thought to be the only ship now surviving from the battle (Brown 2009:102). HMS *Fauvette* (NMR **UID 904912**) may have similar special interest in this respect because of its association with the infamous Dardanelles Campaign. The *Fauvette* served as a fleet auxiliary during the campaign, carrying troops to and from Gallipoli and Salonika.

3.3.71. Military vessels may also be regarded of special interest in respect of an aesthetic context derived from literary and artistic associations. An example of this type of wreck could be the submarine *H52* (NMR **UID 919757**). The submarine was sold to the film company New Era Productions and sunk by gunfire during the production of the film 'Q-Ships' in January 1928.

3.4. FISHING

3.4.1. Fishing vessels have relatively good representation in this period and are the third most common type of wreck. The craft types which have been assigned the class type fishing vessel are presented in **Table 35** and illustrated in **Figure 12**. In a number of cases, an individual record may be assigned more than one of these craft types.

Craft Type	Total
Trawler	126
Fishing Vessel	63
Drifter	17
Smack	3

Table 35: NMR records queried by craft type (fishing)

3.4.2. They are also relatively well represented in the NHSR and NSBR, which respectively hold the records of 53 and 29 vessels assigned the function type 'fishing vessel'.

Build

Propulsion

3.4.3. The construction of the *Zodiac* in 1881, the first purpose-built steam trawler, heralded the dawn of a new era of commercial fishing. The *Zodiac* and her sister ship, *Aries*, brought home catches four times that of their contemporary sailing trawlers, and demonstrated the advantages of steam engines in enabling fishing vessels not only to work in spite of tides and winds, but to make quicker passages to the more distant fishing grounds of Iceland, Newfoundland and Greenland (Gale 2000:197).

	Propulsion		
NMR Craft Type	Steam	Engine	Sail
Trawler	85	6	3
Fishing Vessel	40	9	6
Drifter	9	0	0
Smack	0	0	2

Table 36: NMR records queried by propulsion and craft type (fishing)

3.4.4. The majority of fishing vessel wrecks is recorded as having been steam-propelled (**Table 36**). By the early 20th century, steam trawlers had almost completely replaced their sailing counterparts. Coal was cheap and abundant, and by the outbreak of WWI, steam trawlers were the norm in most offshore fishing fleets in Northern Europe and along the coast of North America (Lavery 2004:257).

3.4.5. Although initially viewed as slightly less advantageous for drifters, which were designed to move with the tide once they had cast their nets, many drifters were also converted to steam power in the early 20th century (Lavery 2004:257). Of the 17 drifters, steam is the only method of propulsion recorded.

3.4.6. The widespread introduction of the marine diesel engine in the interwar period made smaller boats, often originally drifters, much more versatile. Although officially classed as inshore vessels, smaller British vessels could now work as far afield as the Norwegian coast (Gale 2000:199).

3.4.7. No fishing vessel wrecks are recorded as having been equipped with a diesel engine. By sorting records by their date of build, the NHSR and the NSBR provide better representation of fishing vessels equipped with diesel engines in the period 1914-1938. Of the 53 fishing vessels listed by the NHSR, 55% (29 vessels) are recorded to have been equipped with a diesel engine. Additionally, of the 29 fishing vessels listed by the NSBR, 45% (13 records) are recorded to have been equipped with a diesel or petrol engine.

3.4.8. Only one fishing vessel wreck is recorded to have been equipped with an oil-fired steam engine; the *Linnet* (NMR **UID 1316587**). The *Linnet* was the largest of the Eastbourne fishing fleet at the time of her loss (1925). There are no details which

suggest whether the *Linnet* was first constructed as an oil-fired vessel or was a coal-fired vessel which was subject to a refit. However, the presence of the *Linnet* in the record could be seen as representative of the gradual shift from coal to oil that occurred in the years following WWI.

3.4.9. Many sailing fishing boats were converted to diesel engines after WWI to enable them to compete with the larger steam-powered vessels. Furthermore, a significant number of steam trawlers and drifters were converted to utilise oil or diesel engines. As steam engines were by then becoming relatively uneconomic for fishing vessels, this prolonged their useful working lives. It is expected that a large number of vessels subject to these conversions are likely to be present in the known record for the period 1939-1950.

3.4.10. Although few in numbers, sailing fishing vessels continue to be represented amongst the wrecks and also in the NHSR and NSBR for the period 1914-1938 (**Table 36**). Of the 29 fishing vessels listed by the NSBR, around two-thirds (19 records) are recorded as having had sail as a means of propulsion, although a significant proportion of these (14 records) also incorporated an engine. Similarly, the NHSR lists 22 sailing fishing vessels (43% of the total number of fishing vessels), of which 16 are also equipped with a diesel or petrol engine. This suggests that fishing vessels powered only by sail became a rarity during this period.

3.4.11. However, the sailing trawler fleet survived into the 20th century. Sailing trawlers mainly operated in the English Channel (e.g. Brixham sailing trawlers) or within the relatively shallow waters of the southern North Sea (Engelhard 2008:5). They targeted flatfish which had a relatively high market value. They used beam trawls which were more suitable than the otter trawl that tended to be used by steam trawlers (Engelhard 2008:5). Whilst this, along with the low running costs, often enabled sailing trawlers to compete with their steam counterparts, it did not prevent the eventual demise of the sailing trawler fleet during this period (Engelhard 2008:5). The total number of British first-class sailing trawlers is recorded to have declined from 925 in 1900 to only 380 in 1920 (Engelhard 2008:6).

Hull Construction

3.4.12. A query on the object material of all fishing vessel wrecks revealed a predominance of steel-constructed vessels, as shown in **Table 37**.

	Object Material		
Craft Type	**Steel**	**Iron**	**Wood**
Trawler	60	8	3
Fishing Vessel	30	7	6
Drifter	4	0	3
Smack	0	0	2

Table 37: NMR records queried by object material and craft type (fishing)

3.4.13. There were no significant changes in hull construction during the period 1914-1938 that had any major impact on the fishing industry. The advantages of steel constructed hulls had long been recognised, although the presence of many iron- and wooden-hulled vessels amongst the wrecks certainly suggests the longevity of earlier methods of construction. This is further illustrated by the predominance of wooden fishing vessels in the NSBR, comprising 93% (27 records) of the total number of fishing vessels listed by the dataset for this period.

Use

Fishing Activities

3.4.14. The offshore fishing fleets operating in the waters around England became increasingly mechanised from the late 19th onwards, with bigger and fewer vessels. In broad terms, there were two scales of fishing which took place during this period: the local inshore fisheries which were often family-run, often using traditional inshore vessels that were rowed or sailed; and the larger offshore fisheries that used seagoing vessels powered by modern steam and later diesel engines.

3.4.15. In the source material relating to individual wreck sites there is little in the way of information relating to the use of fishing vessels for the period 1914-1938, and the majority of the information that is available is detailed in free text within the NMR Complete Monument Records. Therefore obtaining information on the use of individual fishing vessels during this period relies on text searches in the Complete Monument Records.

3.4.16. Local and offshore fishing industries are much less visible in the archaeological record than other classes of shipping use such as military or cargo transport. This is due to a number of factors: the often ephemeral nature of the local fishing infrastructure; the difficulty of identifying them in geophysical and hydrographic surveys because of their generally small size; and under-reporting due to their contemporary perception as a working class activity of limited economical importance. Wrecks of early 20th century fishing vessels are rarely, if ever, archaeologically investigated and information relating to fishing activity in this period is therefore drawn from historical sources and oral histories.

3.4.17. Larger offshore fishing boats often went in search of herring, and there was a rapid expansion of the British herring fisheries in the late 19th and early 20th centuries. A text search on the NMR Complete Monument Records for the word 'herring' revealed that only two vessels operated as part of the herring fisheries; the *Woollven* (NMR **UID 919765**), which is described as a converted herring drifter, and the *Linnet* (NMR **UID 1316587**), which was returning from herring fishing when it was lost, following a collision with another vessel. The *Woollven* has been assigned the craft type cutter and is illustrated alongside the other fishing vessels in **Figure 12.** The lack of any further vessels associated with herring fishing is likely to be partly due to the limited source material available when compiling the respective NMR records for this period. Despite this, it could be argued that one would not expect to see fishing vessels associated with herring fishing in any significant numbers, for although the British herring industry prospered until WWI, the economic disruption that followed the conflict led to a steady decline thereafter (Friel 2003:282). By 1937 Germany had overtaken other nations and had Europe's most successful herring fleet (Lavery 2004:248).

3.4.18. An additional six vessels are recorded to have operated on 'fishing and return' trips (*Olympia* NMR **UID 1001484**, *Rambler* NMR **UID 1380574**, *Recorder* NMR **UID 908777**, *Merrie Islington* NMR **UID 908604**, *Ionic* NMR **UID 907858** and *Fraternal* NMR **UID 1491103**). Three of these vessels (the *Olympia,* the *Ionic* and the *Merrie Islington*) were lost whilst operating out of Grimsby or Kingston-upon-Hull. These were fishing ports whose development was largely founded on late 19th century prosperity produced by the increasing use of steam fishing boats and the exploitation of new trawling grounds around Dogger Bank. The *Fraternal* operated out of Lowestoft which had benefitted from the herring boom in the early 20th century. The *Recorder* was on a fishing and return trip out of a similarly prosperous North Shields when it sank.

3.4.19. The paucity of information relating to the use of fishing vessels in fulfilling the roles for which they were intended may be largely due to the effects of WWI, which

caused significant reductions in the steam trawl effort and landings. This was partly based on the fact that vessel movements were restricted or vessels themselves were lost during the hostilities (Engelhard 2008:5). Many parts of the North Sea were closed to commercial fishing during WWI.

Requisitioning of Fishing Vessels by the Royal Navy

3.4.20. A further factor which could be seen to account for the limited information relating to fishing activities in the period 1914-1938 is the requisitioning of a great number of fishing vessels employed on war service in WWI. Steam trawlers provided cheap and easily replaceable minesweeping, anti-submarine and patrol vessels for the Royal Navy (English 1992:161). A large proportion of the fishing vessel wrecks are recorded as having performed these tasks during WWI (**Appendix I**, **Table 11**). A total of 73 fishing vessels are recorded to have performed as auxiliary military vessels during WWI. The tasks performed by these vessels are illustrated in **Table 38**.

Military Use	No. of Fishing Vessels
Patrol	36
Minesweeping and Patrol	19
Unspecified	9
Minesweeping	7
Minelayer	1
Patrol and Warship	1
Total	73

Table 38: Admiralty duties for fishing vessels during WWI

3.4.21. The use of fishing vessels to perform military service resulted in temporary but substantial reductions in fishing pressure during WWI (Engelhard 2008:5). Based on the wrecks alone, it would appear that the use of fishing vessels in the period 1914-1938 is dominated by the requisitioning of such vessels to contribute to the war effort. Little additional information is present relating to the primary function of these vessels during this period.

3.4.22. Following significant losses amongst fishing vessels in WWI, the interwar period was one of stagnation or decline for many trawling ports, with only the distant-water trawl fisheries expanding in those years (Robinson 2000). It is expected that the loss of vessels operating as part of the distant-water trawl fisheries are most likely to have occurred beyond the limits of British territorial waters.

Loss

3.4.23. As with all other classes of shipping discussed so far, the majority of losses amongst fishing vessels in the period 1914-1938 occurred during as a result of enemy action in WWI (**Table 39**). While relatively few are recorded as having been sunk by torpedo, as a high proportion of fishing vessels operated as minesweepers or patrol boats, the high representation of vessels lost by mines is unsurprising.

Craft Type	Total	Lost between 1914-1918 (%age of Total)	Mined (%age of Total)	Torpedoed (%age of Total)
Trawler	126	77.8	53.2	0.8
Fishing Vessel	63	74.6	31.7	1.6
Drifter	17	58.8	23.5	5.9
Smack	3	100	0	0

Table 39: NMR fishing vessels queried by date and manner of loss

3.4.24. There appear to have been a great many more losses of fishing vessels than there are wrecks. This is well illustrated by the records of shipping casualties, which list no less than 371 fishing vessels to have been lost in WWI. A further inventory listing British fishing vessels lost at sea due to enemy action (http://www.naval-history.net/WW1LossesBrFV1917-18.htm) indicates that some 170 British fishing vessels were lost in the first 6 months of 1917 alone. The limitations of this inventory are unclear, although it is possible that it contains reference to fishing vessels lost beyond the 12nm limit which are not under the jurisdiction of the NMR.

3.4.25. The use of fishing vessels to perform military service in WWI resulted in a great number of losses, which in turn had significant implications for the fishing industry. Those steam trawlers, which had been employed on War Service during WWI, had often been the largest and most modern available, and as a result vessels operating as part of the fishing industry in the interwar years comprised a relatively large proportion of older vessels (Engelhard 2008:7).

Summary

3.4.26. Fishing vessels of this date are rarely, if ever, archaeologically investigated. Although much information exists relating to the industry in the form of historical documentation and oral histories, archaeology has contributed little. The vessels present as wrecks therefore offer a potentially unique source of information. On this basis, 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. The special interest of fishing vessels may be partly ascertained from a review of the methods of propulsion employed. For example, as the only fishing vessel recorded to have been equipped with an oil-fired engine, the *Linnet* (NMR **UID 1316587**) may be regarded of special interest due to the rarity of oil-fired fishing vessel wrecks in this period.

3.4.28. Sailing fishing vessels may also be regarded of special interest on the basis of their representation of the last days of the sailing trawling fleet. Sailing fishing vessels are relatively poorly represented in the NSBR and NHSR, whereby only five and six vessels respectively are detailed to have utilised sail alone as a means of propulsion. Although rare, fishing vessel wrecks equipped with a diesel engine are common in the NHSR and NSBR and thus would require further contributory factors in order to be considered of special interest.

3.4.29. With so little information available in source material regarding the type of fishing operations undertaken, it could be argued that any wreck with this information should be regarded as being of special interest on the basis of both rarity and representative qualities.

3.4.30. One factor relating to the use of fishing vessels which would most certainly contribute to special interest is the requisitioning of fishing vessels by the Royal Navy. A significant proportion of fishing vessel wrecks (73 records) is recorded as having been hired by the Admiralty. Such vessels may also be regarded of special interest through their representation of measures undertaken by the Admiralty to supplement the military vessels in operation during the period.

3.5. OTHER THEMES

3.5.1. There are so few records relating to the following themes listed in the wrecks for the period 1914-1938 that little can be said on the basis of the queries conducted. Therefore this section will present an abbreviated discussion of each theme and the relevant wrecks.

Industrial

3.5.2. Industrial vessels are those which are designed or adapted to undertake specific industrial tasks, including dredgers, hoppers and sheerhulks (Wessex Archaeology 2008:17). There are five craft types represented by the wrecks of this period which can be grouped under the shipping class use of 'industrial' (**Table 40** and **Figure 13**).

Craft Type	No. of Vessels
Dredger	6
Bucket Dredger	5
Cable Layer	2
Pile Driving Barge	1
Whaling	1

Table 40: NMR records queried by craft type (industrial)

3.5.3. In some cases an individual wreck site has been assigned more than one of the craft types listed in **Table 40**. Due to the low number of vessels relating to this class of shipping, it has been possible to eradicate duplication, revealing a total of 12 relevant wrecks (**Appendix I**, **Table 12**). An additional eight vessels relating to this theme are listed by the NHSR.

3.5.4. The majority of the wrecks have been assigned the craft types 'dredger' or 'bucket dredger' (eight records). The term 'dredger' is defined in the NMR Maritime Craft Type Thesaurus as a craft which is used to deepen shipping channels, harbours and other water courses. A bucket dredger is described as a self propelled vessel used for deepening harbours by using a continuous chain of buckets. Those vessels recorded in the NHSR include bucket dredgers, although a hopper barge and five grab dredgers are also present. A hopper barge is defined as a vessel which carries sediment away from a dredger in order to discharge it elsewhere. A grab dredger is a vessel with a grab hung on ropes and chains.

3.5.5. It is likely that the dredging vessels represented as wrecks and in the NHSR for the period 1914-1938 were confined to inshore dredging operations. The dramatic growth in trade in the years preceding WWI and the construction of vessels with ever-increasing displacement resulted in dredging becoming an important inshore operation during the 20th century. The removal of mud, sand and gravel from harbours, river channels and shipping lanes facilitated the use of deep draught vessels (Gale 2000:202), ensuring the free movement of trade.

3.5.6. The wrecks and the NHSR include no purpose-built aggregate dredgers, vessels constructed to extract marine aggregate from the seabed in order to provide the materials of sand and gravel needed for urban development. The use of aggregate dredgers became increasingly widespread in the late 20th century. There is little in the way of historical literature relating to the development of the marine aggregate industry in the waters around the British Isles.

3.5.7. A further aspect of maritime industry that may be considered with regard to the industrial class of shipping is whaling. One whaler wreck exists: the *Nyasaland* (NMR **UID 1348940**). The *Nyasaland* was built in 1896 and was sold to the South African and Mozambique whaling companies in 1913. There are no details regarding the type of whaling in which it operated. At her time of loss, the *Nyasaland* was operating as a cargo vessel.

3.5.8. The technological advances of the 19th century which saw the development of the steam-driven whale catchers marked the dawn of the modern whaling industry. However, by the early 20th century the whaling industry was declining (Lavery 2004:252). In the period 1914-1938, whaling was largely dominated by Antarctic

whaling, an industry based outside of the UK but in which Britain and Norway exercised a near-monopoly into the mid-20th century (Savours 2000:70; Tønnessen and Johnsen 1982:9). The predominance of this geographically remote whaling industry may explain the lack of any significant numbers of whaler wrecks. Very few whaler wrecks across all periods have ever been recorded in English waters (Cant pers. comm.).

3.5.9. Two further wrecks which have been included within this class of shipping use are two cable layers (*Peronne* NMR **UID 832217** and *Monarch* NMR **UID 901780**) and a pile driving barge (*DB 8* NMR **UID 912956**).

3.5.10. Cable layers, also known as cable ships, are deep sea vessels fitted for laying and repairing submarine telecommunication cables. The laying of the trans-ocean telegraph cables revolutionised maritime trading patterns, with the first successful Atlantic cable laid in 1865. The *Peronne* was constructed in 1882 as a cable layer for British service, but became a cargo vessel in 1914. Consequently, although constructed as a cable layer, the *Peronne* was not performing such tasks in the period in question. The *Monarch* has a similar story. Constructed in 1883 as an iron cable layer, it sank in 1915 while being used as a cargo vessel.

3.5.11. A pile driving barge is a flat-bottomed vessel used as a platform for a pile driver; a mechanical device used to drive piles into soil in order to provide foundation support for buildings, wharves and other structures. Little information is recorded relating to the vessel *DB 8*, other than its loss recorded to have occurred in 1920.

Law and Government

3.5.12. Amongst non-military craft associated with law and government are vessels operated to enforce customs and revenue regulations (Wessex Archaeology 2008:17). Examples include a revenue cutter, a single-masted cutter built specifically for the prevention of smuggling and the enforcement of customs regulations, or customs boats, small vessels used as transport for customs officers. There are wrecks of 26 vessels assigned the craft type 'patrol vessel', defined as a vessel used for patrolling inland or coastal waters, such as Coastguard and Customs vessels.

3.5.13. Despite this, each of the 26 vessels assigned the craft type 'patrol vessel' represent those which had been requisitioned to perform the military duties of patrol and minesweeping, and thus do not relate to the shipping class of Law and Government in this respect. One further vessel, HMS *Tyne* (NMR **UID 904921**), has been assigned the craft type Storeship; a ship in government use, used to carry naval or military stores (**Figure 13**). The wreck of HMS *Tyne* is described as 'possibly the remains of a British merchant storeship' which was recorded to have been lost in 1920 having foundered. No further information regarding the vessel is present.

3.5.14. The *Alfred H Read* (NMR **UID 906973**) provides a further wreck site which could be considered to have performed tasks relating to the shipping class of Law and Government (**Figure 13**). The *Alfred H Read* was an examination service vessel; a vessel used to inspect ships and boats entering ports during wartime. The role of an examination vessel was to examine and verify all merchant ships and small craft entering or clearing from a port, whereby their duties included boarding ships, examining papers to establish identity and to inspect cargoes for legitimacy. The *Alfred H Read* appears to have been operating in the Liverpool docks and was lost after hitting a mine in 1917. The NMR Complete Monument Record for the site does not detail any armament onboard, although it is known that vessels of this nature were often equipped with machine guns.

3.5.15. The NHSR lists one vessel for the period 1914-1938 which can be considered under the shipping class of law and government. The *Stork* (NHSR **ID 1985**) is a Customs and Excise Launch which was built in 1926. The combined Board of Customs and

Excise was formed in 1909, employing a fleet of Customs Cutters in UK territorial waters to inspect vessels for illicit cargoes entering and clearing the UK. The *Stork* was sunk by the Luftwaffe during WWII and was re-floated and repaired, serving as a ferry after the war.

3.5.16. Historical literature relating to law and government in the period 1914-1938 is extremely limited and with so few vessels falling within this category, little can be said with reference to this shipping theme.

Health and Welfare

3.5.17. Vessels that might fall under the category of health and welfare include hospital ships, quarantine hulks, floating chapels and missions (Wessex Archaeology 2008:17). For the period 1914-1938, the wrecks include seven vessels which fall within this class of shipping use (**Table 13** and **Figure 13**); predominantly comprising hospital ships although one vessel (the *Kyarra* NMR **UID 904651**) is also described as a casualty clearing ship. No vessels relating to this theme are present within the NSBR and the NHSR.

3.5.18. The onset of a modern mechanised war produced an unprecedented amount of battle casualties during WWI (McGreal 2008:18). To deal with these large numbers of wounded soldiers from the fields of France and Belgium, a number of ocean-going liners were requisitioned by the Royal Navy and converted into hospital ships. By the end of 1914, no less than 22 hospital ships were in operation, a figure which significantly increased in the years which followed (McGreal 2008:22).

3.5.19. With the exception of two vessels, the *Rohilla* (NMR **UID 909206**) and the *Anglia* (NMR **UID 901788**) which were lost in 1914 and 1915 respectively, the hospital ships listed as wrecks were all lost during 1917 and 1918. The predominance of hospital vessels lost in the last two years of WWI is to be expected, given that on the 1st February 1917, the German Government proclaimed that it would 'henceforth tolerate no hospital ship' (McGreal 2008:124). The German basis for their attack on Allied hospital ships was that they believed such vessels were often used for the transport of troops and munitions under the guise of operating as a hospital ship (McGreal 2008:124). All of the five hospital ships listed as wrecks are recorded as having been lost in 1917 and 1918 were torpedoed.

Commercial

3.5.20. Examples of commercial vessels used for face-to-face selling might be limited to small boats selling victuals and stores within ports (Wessex Archaeology 2008:17). No such vessels are listed as wrecks, or by the NHSR or the NSBR for the period between 1914 and 1938.

Agricultural and Subsistence

3.5.21. Craft involved in agriculture and subsistence are largely addressed in **Section 5.2** which considers the transport of cargo. Agricultural and subsistence in this context focuses on vessels which may have been specifically adapted to cultivation, hunting or gathering. No vessels associated with agriculture and subsistence are listed as wrecks or by the NSBR for the period between 1914 and 1938, other than cargo vessels carrying agricultural produce which are considered as part of **Section 5.2**.

3.5.22. The NSBR lists one vessel which may be considered within this class of shipping; the *Wildfowler.* The *Wildfowler* is a gun punt, a type of vessel used during the 19th and 20th centuries for shooting waterfowl for commercial harvesting operations. The craft is motorised, and while built in the 1920s, appears to have been later fitted with a 'Kitchen Rudder' gear; used in many naval craft in the 1940s and 50s.

3.5.23. Due to the poor representation of vessels which fall within this class type and an apparent lack of any focussed historical literature relating to this theme, it has not

been possible to provide a more detailed discussion outlining vessels utilised for agriculture and subsidence in the period 1914-1938.

Domestic

3.5.24. There is a wide range of craft adapted for domestic use in the form of houseboats (Wessex Archaeology 2008:17). The wrecks include only one vessel assigned as a houseboat; the *Glory* (NMR **UID 1464562**) (**Figure 13**). The *Glory* was built in 1906 as a sailing ketch-rigged trawler, but was converted to a houseboat in the late 1920s. She was later sold to the owner of a near by holiday camp as a 'floating adjunct' to the camp.

3.5.25. The lack of houseboat wrecks in any significant numbers is not surprising. As vessels which are commonly moored in benign locations for long durations, houseboats are unlikely to be permanently lost as wrecks. The majority when they reach the end of their working lives are scrapped. It is further likely that a large number become wrecks through abandonment and may be recorded as known wrecks with little written information available relating to their past used.

3.5.26. A further possible explanation for the paucity of houseboats amongst known wrecks of this period is the lack of houseboats in use. There is a notable demise of traditional working vessels in the latter end of the period 1914-1938, and it is possible that their demise is linked to the re-use of such vessels as floating dwellings (Cant pers. comm.).

3.5.27. The period 1914-1938 is also marked by the earliest evidence (as suggested by the wrecks, NSBR and NHSR) of a purpose-built houseboat. *Doris* (NHSR **ID 1936**) was built in 1930 as a private motor houseboat and was described in the 'Brooke Empire Magazine' as *'the most luxurious boat on the Norfolk Broads'* (http://www.Nationalhistoricships.org.uk/ships_register.php?action=ship&id=1936).

Recreation

3.5.28. This section considers the use of watercraft in relation to recreational boating, predominantly focussing on smaller craft used for cruising and racing (Wessex Archaeology 2008:17). Craft involved in recreation activities in relation to cruise liners has already been considered in **Section 5.2** and will not be repeated here.

3.5.29. Of the 1358 wrecks for the period between 1914 and 1938, there are three craft types which may be assigned to the shipping class use of recreation, as shown in **Table 41** and illustrated in **Figure 13**.

Craft Type	No. of Vessels
Yacht	8
Leisure Craft	2
Launch	1

Table 41: NMR records queried by craft type (recreation)

3.5.30. In some cases, an individual wreck has been assigned multiple craft types. Excluding any such duplications, there are a total of nine vessels relating to recreation amongst the wrecks (**Appendix I: Table 14**). These predominantly comprise British yachts.

3.5.31. Records for recreational vessels dating to the period 1914-1938 are plentiful within the NHSR and NSBR datasets. Of the 269 records listed by the NSBR, 78% (207 records) have been assigned the function type 'leisure'. Additionally, of the 550 records listed by the NHSR, 24% (134 records) have also been termed as leisure craft. The NSBR and NHSR list a broad range of particular vessel types within this category, comprising 58 and 37 individual types respectively.

3.5.32. By the early 20th century sailing was already a well established, worldwide pastime for the wealthy. Britain, together with the United States, owned five times more sailing yachts than all other countries combined (Dear 2000:135). Yacht clubs were already in place around the coastline of Britain and by 1910, the Cruising Club and Cruising Association had been founded (Dear 2000:135). In the first quarter of the 20th century, yachts catered for those who wished to cruise for pleasure's sake or for those racing inshore. At this time, ocean racing was still very much in its infancy as it was largely believed that taking risks at sea in order to achieve any sort of goal was unseamanlike (Dear 2000:136). Despite this, the new sport of ocean racing grew steadily, and by 1931, the Ocean Racing Club received its royal warrant (Dear 2000:140).

3.5.33. The growth of ocean racing during this period is well demonstrated by the NSBR record. The vessel type most commonly represented in the NSBR with regard to leisure vessels for this period is the 'International 14' (20 records); a class of racing dinghy regarded as one of the first international racing dinghy classes, having originated in England in the early 20th century. Of the 20 International 14 records listed by the NSBR, 19 were constructed in the late 1920s and 1930s. Two further vessel types well represented by the NSBR are the National 12 (10 records), a sailing dingy developed in 1936 by the Royal Yachting Association as an alternative to the more expensive International 14s, and the Hydroplane (10 records); a motorboat used exclusively for racing. These vessel types were constructed in the 1930s and late 1920s-30s respectively and further illustrate the growth of yacht racing throughout the period 1914-1938.

3.5.34. It is unknown whether the wrecked yachts were utilised as pleasure cruisers or sporting yachts. What is apparent, however, is the use of yachts to fulfil military roles during WWI. Three yachts (HMS *Aries* NMR **UID 904849**, HMS *Marcella* NMR **UID 904863** and HMS *Mekong* NMR **UID 911948**) listed as wrecks are recorded to have been requisitioned by the Royal Navy as boarding or patrol vessels. While major shipping companies are renowned for their contribution to the war effort, these somewhat overshadow those made by several successful entrepreneurs who made their own personal contribution to the war by placing their yacht at the disposal of the Admiralty (McGreal 2008:49). Prior to WWI, few patrol craft of any significance existed, but with the advent of the war and the emergence of submarines as a significant threat, the need for such small craft became apparent. As a result, large numbers of privately owned yachts were pressed into service to perform local escort and patrol duties, few of which were suitable for the tasks required for them (Ross 1992:124; English 1992:157).

Summary

3.5.35. On the basis of rarity and the lack of good representation in the preserved records, wrecks associated with the themes discussed above are likely to be considered of special interest. The one exception is perhaps recreation as many preserved examples exist.

3.5.36. Other factors contribute to the special interest of these wrecks. For example, vessels requisitioned to contribute to the war effort may have special interest on the basis that they represent a shortage of specialist military craft at the outbreak of the world wars and the subsequent effort to supplement the Royal Navy's strength with a wide variety of requisitioned vessels.

3.5.37. The requisitioning of vessels is perhaps most profound with regard to passenger vessels hired by the Admiralty as hospital ships, which were not exempt from the effects of unrestricted warfare during WWI. They may further be regarded of special interest on the basis of respect, particularly when both the wounded and the nursing staff were lost. The *Glenart Castle* (NMR **UID 1440147**) may provide an example of

one such vessel, with the loss of over 150 medical staff and officers (McGreal 2008:178).

3.5.38. Vessels may also be regarded as being of special interest on the basis of their association. One such example of a vessel which may be regarded in this light is the *Anglia* (NMR **UID 901788**), which had the honour of bringing home King George V in November 1915 after he had had an accident during a visit to the Western Front (McGreal 2008:77).

3.5.39. With regard to their representation, the cable layers *Peronne* (NMR **UID 832217**) and *Monarch* (NMR **UID 901780**) may be regarded of special interest as the earliest known cable layers amongst the wrecks. No cable layers are recorded for the period 1860-1913 or in the preserved record for the period 1860-1938. As such, the *Peronne* and *Monarch,* may be regarded of special interest on the basis of their representation of the development of the submarine telecommunication cables which revolutionised maritime trading patterns in the late 19th century and upon which the organisation of international 20th century commerce depended.

3.5.40. In many cases, the research undertaken within the remits of this project indicated that historical literature relating to boats and ships associated with these themes is limited. This apparent shortage of specialist literature and therefore information is likely to enhance the special interest of wrecks examined under these themes.

4. THE SPECIAL INTEREST OF BOATS AND SHIPS 1914-1938

4.1.1. For 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 vessels listed in the national stock for the period 1914-1938 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 may 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. This is 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 1914-38 must 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. 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

4.1.5. 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 or to the globe. This special interest may arise from its relation to a turning point in history or an important overall situation or trend.

4.1.6. The period 1914-1938 encompasses a number of key narratives which are social, economic, political, cultural or technological in context. WWI and the impact of world war arguably represents the overriding theme for the period, and the narratives which relate to it are likely to form a key consideration of special interest for this period. For example, vessels such as HMS *Fauvette* (NMR **UID 904912**) may be

regarded of special interest due to their association with important events during the war; in this case the Dardanelles campaign, where the *Fauvette* served as a fleet auxiliary, carrying troops to and from Gallipoli and Salonika.

4.1.7. WWI proved to be the first real test of new naval technologies introduced in the late 19th century and early 20th century and therefore marked the dawn of a new type of naval warfare. Perhaps the most dramatic example of this was the widespread use of the potentially war-winning sea-going submarine.

4.1.8. Vessels which represent the recognition and response to these new technologies and methods of warfare are likely to be regarded of particular special interest. They need not be new or necessarily military in this respect. For example, trawlers requisitioned by the Royal Navy to perform minesweeping duties in the absence of purpose-built military vessels may be regarded of special interest on the basis that they represent the very urgent response that was needed to cope with an unexpectedly serious and immediate threat.

4.1.9. Where a boat or ship is related to another country, much of its special interest is likely to depend on its ability to be identified as historically significant to the people of that country. A very good example of this is the *SS Mendi* (NMR **UID 1244387**), one of the few WWI era wrecks investigated archaeologically. The accidental sinking of this ship resulted in the second worst loss of South Africans in WWI (http://www.wessexarch .co.uk/projects/marine/eh/ssmendi/aftermath.html). Hundreds of men of the 5th Battalion South African Native Labour Corps died during the sinking, caused by a collision. Despite this and other losses on the Western Front, no members of the South African Native Labour Corps received a British War Medal or ribbon following WWI. Due to the injustice dealt to them, the story of the *Mendi* became an icon of unity and a symbol of injustice in the struggle against apartheid and is still commemorated every year on South Africa's national 'Mendi Day' (http://www.wessexarch.co.uk/projects/marine/eh/ssmendi/legacies.html). The wreck thus attains considerable special interest purely on the basis of its narrative in this respect.

Associations

4.1.10. The wreck of a boat or ship will be of special interest where it presents a distinct 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.

4.1.11. The fields relating to the associations of vessels in the Boats and Ships database, obtained from the free text within the NMR Complete Monument Records, are non-queriable. The review of the themes brought to light as part of the assessment of the national stock for 1914-1938 did however, highlight a number of examples.

4.1.12. One example is the *Anglia* (NMR **UID 901788**) which had the honour of bringing King George V home in November 1915 after he had had an accident during a visit to the Western Front (McGreal 2008:77). Other examples include vessels associated with prominent shipping companies of the period, such as Harland and Wolff, which managed to expand and prosper in the 1920s despite the post-war shipbuilding slump (Friel 2003:272). Harland and Wolff further attain particular general interest on the basis of their association with the *Titanic.*

4.1.13. Event types with which vessels may be associated include military episodes. In this respect, any vessel which played a role at the Battle of Jutland is likely to be considered to have a degree of special interest on the basis of its association with the largest and most significant naval battle of WWI. No known wreck for the period 1914-1938 has been conclusively identified by the project as having been associated with this battle. However, there are wrecks associated with other famous (or infamous) events. For example, HMS *Fauvette* (NMR **UID 904912**) is of special interest because of its association with the Dardanelles campaign. Other examples

of event types with which vessels may be associated are major storms or collisions that occasioned the loss of multiple vessels or many lives.

Loss of life and related responses in seafaring safety

4.1.14. Although safety at sea was improving, loss of life was a common occurrence during the loss of a vessel during this period. Loss of life is therefore only likely to be of special interest if it involved a particularly large number of people, or a famous person, or was otherwise especially tragic. With more than 500 lives lost apiece, the wrecks of HMS *Bulwark* (NMR **UID 904919**), the *Mendi* (NMR **UID 1244387**) and HMS *Formidable* (NMR **UID 1449548**) may be regarded of special interest on the basis of the especially large number of lives lost on each vessel.

4.1.15. Special interest may also arise if notable acts of bravery and self-sacrifice occurred during the wrecking incident. One such example is the hospital ship *Anglia* (NMR **UID 901788**). After striking a mine laid by UC-5, the crew and nurses onboard the *Anglia* worked selflessly and with great devotion to transfer the wounded safely. When the nurses were asked to go to the boat, they refused and insisted that the fighting men went first. One nurse refused to leave the ship altogether and instead remained below sitting with the wounded and bandaging the stretcher cases (McGreal 2008:79).

4.1.16. Shipwrecks where loss of life may be seen to relate to responses in seafaring safety may be of particular special interest. Perhaps the most significant sites in this respect for the period 1914-1938 are those which relate to the measures adopted by the British government to counter the unrestricted warfare proclaimed by the German Government in February 1917. Of the 213 known wrecks associated with loss of life for the period 1914-1938, 77% (163 records) occurred in 1917 and 1918. Although a number of methods were adopted by the British Government to protect merchant shipping from the offensive U-boat campaign, it was the use of the convoy system from late 1917 which operated with the greatest success. In this respect, vessels which travelled in convoy at their time of loss may be regarded of special interest. For example, the *Herdis* (NMR **UID 909178**) and *Florentia* (NMR **UID 909179**) were torpedoed in June 1918 whilst travelling in convoy. Vessels which relate to other forms of anti-submarine methods may also be interest, such as HMS *Stockforce* (NMR **UID 832147**) which was torpedoed while acting as a decoy ship, or any one of the 106 armed cargo vessel wrecks of the period.

4.1.17. The inter-related nature of integral factors can be seen here. Vessels associated with the convoy system introduced in 1917 may be seen as being relevant to both key narratives and seafaring safety.

Aesthetic context and literary, artistic and other associations

4.1.18. The wreck of a boat or ship is likely to be of special interest when it has made a distinct cultural contribution. This may be directly through its design, or indirectly through being represented in artistic media.

4.1.19. 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. In this respect, the wreck of the submarine *H52* (NMR **UID 919757**) may be regarded of special interest. The *H52* was sold to the film company New Era Productions and was deliberately sunk during the production of the 1928 film 'Q-Ships'. It is therefore an example of an individual vessel represented in contemporary artistic media.

Parallels with current shipping themes and events

4.1.20. A boat or ship will be of special interest on account of its current relevance if 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.

Relative Factors

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

4.1.22. The queries which have been used for the national stock (**Appendix I**) lend themselves directly to a review of these relative factors.

Rarity

4.1.23. Rarity reflects 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.

4.1.24. The query results suggest that rarity exists. The national stock for 1914-1938 did not, for example, reflect the ubiquity of certain types of vessels during this period. Particular rarity has been noted in relation to the following examples:

Vessels with welded components

Oil-fired vessels

Vessels equipped with diesel engines

Vessels equipped with steam turbine engines

Vessels equipped with reciprocating engines

Cargo vessels requisitioned as Admiralty vessels

Vessels associated with the Battle of Jutland

Aircraft or Seaplane Carriers

Battle cruisers

4.1.25. However, this analysis of rarity must be treated with caution. The information within the NMR Complete Monument Record is limited to the sources available on compilation and review 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.

4.1.26. Rarity in the national stock for the period 1914-1938 was also noted for examples relating to the following themes:

Transport (People)

Military

Industrial

Law and Government

Health and Welfare

Commercial

4.1.27. The results of the stock-take suggest that there are a number of vessel types and themes which are uncommon or rare amongst the wrecks. 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

4.1.28. Representativeness can be considered in terms of key themes. It can also be considered in terms of what was typical overall.

4.1.29. There are many key themes in this period and examples of relevant wrecks are considered in the summary sections for each theme. A wreck may be regarded of special interest, for example, on the basis that it represents key changes in naval engineering which characterised the period. The remains of vessels adapted to use both coal and oil as fuel may therefore be regarded of special interest on the basis of their representation of this transition. Cruisers are a form of military class known to have often used both coal and oil during this period (Brown 1992a:55, 57). The wrecks of the cruisers HMS *Cochrane* (NMR **UID 906966**) and HMS *Ariadne* (NMR **UID 911926**) may thus be of special interest.

4.1.30. A further example is vessels which relate to the development of naval aviation during the period. Whilst Britain was not alone in developing aircraft carrying ships during WWI, it was by far the most advanced. The WWI experience led directly to the formation of the major naval air arms which would fight in WWII (Friedman 1992:39). In this respect, HMS *Ascot* (NMR **UID 943561**) is likely to be regarded as having special interest, not only because of its rarity as the only wreck related to naval aviation in WWI, but also because of its representative qualities in this respect.

Diversity

4.1.31. 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.

4.1.32. Diversity is particularly important in relation to the many types of vessel used in WWI. In response to new demands and the sheer scale of the war, the British Admiralty requisitioned a large number of non-military vessels of varying types to contribute to the war effort. This had the dual purpose of supplementing the fleet and countering the new threats for which the Admiralty had been somewhat ill-prepared, U-boats and mines. For example, a wide range of cargo, fishing and leisure vessels were used to perform escort and minelaying or sweeping tasks and liners were used as troop and hospital ships. When determining the special interest of WWI wrecks, this diversity must be taken into account.

Survival

4.1.33. It is imperative that consideration of special interest is evidence-based, and is related directly to the surviving fabrics of the asset. Survival is therefore an important relative factor and reflects the degree to which wrecks in the archaeological record are intact and coherent. Survival can therefore be gauged in terms of completeness. For example, of the two light cruiser wrecks listed for the period (HMS *Falmouth* NMR **UID 907931** and HMS *Arethusa* NMR **UID 912648**), it could be argued that HMS *Arethusa* should be regarded as of greater special interest as it has been categorised as ‘mainly intact’, based on the most recent information relating to the survival of the site, in comparison to HMS *Falmouth* which has been assigned as ‘broken up’ with regard to its seabed survival. However, it must be noted that in some instances, the interest of an asset may be so great that even fragmentary remains might be considered ‘special’.

4.1.34. 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. Therefore survival is one of the few relative factors that may be said to be increasing in significance as the wrecks age.

4.1.35. 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. Whilst discourse relating to this topic is gaining momentum in recent years (e.g. Bournemouth 2007a; Cant forthcoming), research relating to the survival of wrecks remains extremely limited and it may therefore be a significant factor in terms of special interest.

Setting and Context

4.1.36. Setting and Context considers places that are particularly associated with themes highlighted in the review that are represented or associated with known wrecks. In this respect, regions such as the north-east of England which owed their prosperity in part to coal exportation may be most notable. While the north-east continues to be well represented amongst the wrecks of this period, the conversion from coal to oil alongside the shipbuilding slump of the post-war period had significant implications for the region, resulting in the closure of many shipbuilding yards and great unemployment.

4.1.37. Special interest on the basis of setting and context may also derive from the location of a wreck site that adds to its understanding or appreciation. The remains of boats and ships can generate interest by evoking patterns of activity that have left no visible trace on the surface of the sea. The wrecks lost within the approaches to the Thames Estuary and along the east coast from the north-east to north Lincolnshire are example of this. These two broad areas are subject to a high concentration of known wrecks for the period 1914-1938. These wrecks are therefore representative of important trade routes and the hostile activity drawn to such routes in times of war.

Grouping

4.1.38. 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 can thus be enhanced by grouping.

4.1.39. For example, the special interest of any of the 725 wrecks lost in the years 1917 and 1918 may be enhanced by grouping. In February 1917, Germany declared unrestricted warfare in the seas surrounding the British Isles. This resulted in greatly increased losses, particularly of merchant ships (Bennett 1969a:204; McGreal 2008:124). By late April 1917 an average of 13 Allied ships were lost daily (McGreal 2008:145). As a group these 725 wrecks reflect this unrestricted warfare, an event that could have eventually resulted in Britain losing the war. However, the very large number of wrecks in this group means that additional factors would probably be required for individual wrecks of this group to have special interest.

Exceptional

4.1.40. This factor provides for the special interest of wrecks which stand outside the main themes and trends. The special interest of these wrecks may lie in the fact that they are ‘exceptional’ and do not bear comparison. This must be considered on a wreck by wreck basis and therefore cannot be considered in relation to the holistic study of the wrecks forming the basis of this discussion.

5. CONCLUSIONS

5.1.1. The period 1914-1938 can be divided into two sub-periods. The first sub-period is undoubtedly dominated by WWI; an event which had significant implications for the build, use and loss of all vessel types during this period. Wartime demands resulted in the extensive use of non-military craft to perform Admiralty duties, placing restrictions on the remaining classes of shipping uses and significantly decreasing the operating efficiency of the merchant marine. WWI is very well represented in the wrecks with regard to the 1914-1938 dataset.

5.1.2. The second sub-period encompasses the interwar period. The Washington Treaty of 1922 placed restrictions on the size and number of military vessels constructed for all counties which had ratified the treaty, and the post-war recession of the late 1920s and 1930s caused a slump in both ship building and in merchant shipping activity generally.

5.1.3. In comparison, leisure craft and the passenger liner trade experienced a degree of prosperity during the interwar period, in which the concept of 'pleasure for pleasure's sake' evolved in a world traumatised by war.

5.1.4. For reasons that are fairly obvious, the interwar period is much less well represented in the wrecks than is WWI. Only 15 records relate to vessels which were conclusively built in the period 1919-1938, and thus a review of the wrecks in this respect of this period is somewhat limited. Vessels built in the interwar period are, however, likely to be provided greater representation in the wrecks for the period 1939-1950, and will be considered in Phase 3 of the project.

5.1.5. Arguably the most significant theme to emerge from the review of the 1860-1913 records was that of technological change and the significant advances in naval engineering which took place, radically transforming the British shipping industry. Whilst technological change continued to take place in this period, it did not occur at the breakneck pace or revolutionary manner which had been seen in the period preceding 1914 (Van der Vat 2001:166). This is evident in the wrecks of this period.

5.1.6. WWI was a major event in modern world history. The scale and geographical range of the war was the largest known up to that point and saw the mobilisation of 65 million soldiers (Tucker 2005:xxix). Alongside the immense human suffering it inflicted, WWI also had political and economic consequences on a global scale. The wrecks of boats and ships of this period in territorial waters off England thus have an inherently high potential for special interest, both nationally and internationally.

5.1.7. There are large numbers of vessels which exist in preservation for the period 1914-1938. It is necessary for these vessels to be taken into consideration when considering the special interest of wrecks on the seabed off England. Where vessel types and classes are provided with low representation in the preserved record, the special interest of such wrecks is likely to be enhanced.

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6.2. WEBSOURCES

Naval History (archived by British Library & U.S. Library of Congress)

http://www.naval-history.net/WW1LossesBrFV1917-18.htm

The National Archives

http://www.nationalarchives.gov.uk

The National Historic Ships

http://www.nationalhistoricships.org.uk/ships_register.php?action=ship&id=1936

The National Maritime Museum:

http://www.nmm.ac.uk/explore/sea-and-ships/facts/faqs/ships-and-vessels/what-is-the-definition-of-a-boat-versus-a-ship

The NMR Maritime Craft Type Thesaurus

http://thesaurus.english-heritage.org.uk/thesaurus.asp?thes_no=143

The Nautical Archaeological Society

http://www.nauticalarchaeologysociety.org/projects

Port Cities

http://www.plimsoll.org/StartHere/Timeline/19001920/

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Uboat.net

http://www.uboat.net/wwi/ships_hit/greatest_loss_of_life.html

University of London Sub-Aqua Club

http://www.ulsac.net/main.php?contenturl=betsy_anna.php&pagetitle=Betsy-Anna&navbarid=navbarid_betsy

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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 are currently stored at WA under project code 70861.

APPENDIX I: RESULTS OF DATABASE QUERIES

Table 1: NMR records queried by Place of Build

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	Country	Quantity
Copenhagen	Denmark	1
Appledore	England	1
Ayr		1
Barrow in Furness		6
Beverley		6
Blyth*		2
Brixham		1
Chatham		1
Chepstow		1
Cheshire		1
Cowes		1
Devonport		2
England		2
Falmouth		1
Flushing (South Cornwall)		1
Greenwich		1
Hull		1
Humberside		1
Kingston upon Hull		8
London		3
Middlesbrough*		7
Milford Haven		1
Newcastle upon Tyne*		35
North Shields*		2
Padstow		1
Portsmouth (Hampshire)		1
Preston		1
Salcombe		1
Selby		7
Shoreham by Sea		1
South Shields*		9
Southampton		3
Stockton on Tees*		14
Sunderland*		53
Truro		1
Tyne and Wear*		1
Wallsend*		1
West Hartlepool*		19
Whitby*		2
Workington		1
Caen	France	1
Dunkirk		1
Nantes		1
Bremen	Germany	3
Bremerhaven		1
Flensburg		2

Place of Build	Country	Quantity
Geestermuende		4
Germany		4
Hamburg		8
Kiel		1
Rostock		3
Dublin	Ireland	1
Italy	Italy	1
Japan	Japan	1
Amsterdam		1
Netherlands	Netherlands	2
Schiedam		2
Belfast	Northern Ireland	8
Larne		1
Arendal		1
Bergen		5
Frederickstadt		2
Grimstad	Norway	1
Moss		1
Oslo		6
Porsgrund		2
Trondheim		2
Aberdeen		4
Alloa		2
Banff		1
Bowling**		4
Campbeltown		1
Dumbarton**		10
Dundee	Scotland	6
Fife		1
Glasgow**		39
Greenock**		8
Irvine		1
Leith		2
Troon		1
Cadiz (Andalucia)	Spain	2
Bjornberg		1
Helsingborg	Sweden	1
Malmo		1
Stockholm		1
Portland (Oregon)		1
Portsmouth (New Hampshire)	USA	1
California		1
Newport (Dyfed)	Wales	1
Pembroke		1

Table 2: NMR records queried by Craft Type and arranged by Class

Craft Type	Quantity	Class of Shipping
House Boat	1	Domestic
Drifter	17	Fishing
Fishing Vessel	63	

Craft Type	Quantity	Class of Shipping
Smack	3	
Trawler	126	
Casualty Clearing Ship	1	Health and Welfare
Hospital Ship	8	
Bucket Dredger	5	Industrial
Cable Layer	2	
Dredger	6	
Pile Driving Barge	1	
Whaling	1	
Patrol Vessel	26	Law and Government
Storeship	1	
Examination Service Vessel	1	
Admiralty Vessel	104	Military
Aircraft Carrier	1	
Battleship	3	
Cruiser	3	
Destroyer	15	
Escort Vessel	2	
First Rate Ship of the Line	1	
Fleet Messenger	1	
Gunboat	3	
Iron Clad	1	
Light Cruiser	2	
Mine Carrier	1	
Mine Laying Submarine	24	
Minelayer	3	
Minesweeper	30	
Motor Gunboat	1	
Motor Torpedo Boat	3	
Oiler	3	
Patrol Boat	51	
Patrol Submarine	37	
Q Ship	1	
Submarine	46	
Submarine Seaplane Carrier	1	
Torpedo Boat Destroyer	4	
Torpedo Gunboat	1	
Training Ship	4	
Troop Ship	8	
Warship	27	
Launch	1	Recreation
Leisure Craft	2	
Yacht	8	
Transport Vessel	5	Transport
Armed Cargo Vessel	106	Transport (Cargo)
Barge	25	
Barque	5	
Cargo Vessel	868	
Coal Hulk	1	
Coaster	12	
Collier	53	

Craft Type	Quantity	Class of Shipping
Decoy Vessel	1	
Freighter	3	
Full Rigged Ship	1	
Ketch	17	
Lighter	11	
Schooner	24	
Sloop	1	
Spritsail barge	1	
Tanker	11	
Ferry	1	Transport (Passenger)
Liner	15	
Passenger Vessel	21	
Craft	128	Unassigned
Cutter	2	
Hulk	2	
Lightship	2	
Mooring Vessel	1	
Paddle Steamer	9	
Pilot Vessel	2	
Pontoon	2	
Salvage Tug	1	
Storage Hulk	1	
Survey Vessel*	1	
Trinity House Vessel*	1	
Tug	12	
Blockship	1	

Table 3: NMR records queried by place of Departure

Place of Departure	Country	Quantity
Africa	Africa	2
Algeria	Algeria	3
Beni Saf		8
Oran		3
Bahia Blanca	Argentina	1
Buenos Aires		1
La Plata		1
Rosario (Santa Fe)		1
Australian	Australian	1
Melbourne		1
Port Lincoln		1
Sydney (New South Wales)		2
Chittagong	Bangladesh	1
Antwerp	Belgium	2
Bruges		1
Ostend		1
Bremer Lehe	Bremen	1
Canada	Canada	1
Montreal		5
New Westminster		1
Trinidad	Caribbean	1
Jersey	Channel	1

Place of Departure	Country	Quantity
St Peter Port	Islands	1
Antofagasta	Chile	1
Pisagua		1
Valparaiso (Chile)		1
Aalborg	Denmark	1
Aarhus		1
Copenhagen		2
Faroe Islands		1
Alexandria	Egypt	1
Amble	England	1
Ayr		3
Birkenhead		1
Blyth		15
Bridlington		1
Bristol		1
Brixham		1
Chatham		1
Cowes		1
Devonport		1
Dover		3
Dunston		1
England		4
Falmouth		6
Fleetwood		2
Fowey		2
Garston		3
Goole		1
Gosport		1
Great Yarmouth		1
Grimsby		6
Halifax		4
Hartlepool		7
Harwich		4
Hornsea		1
Immingham		2
Jarrow		3
Kingston Upon Hull		15
Liverpool		16
London		48
Lowestoft		1
Manchester		2
Middlesbrough		8
Milford Haven		1
Newcastle-Upon-Tyne		31
Newhaven		3
Newquay		1
North Shields		4
Par		3
Penzance		1
Plymouth		8
Poole		2

Place of Departure	Country	Quantity
Porthoustock		1
Portishead		1
Portland (Dorset)		6
Portland Harbour		1
Portsmouth		9
Prawle		1
Preston		1
Purfleet		1
River Colne		1
River Mersey		1
River Tees		3
River Tyne		46
Rochester		1
Runcorn		2
Scarborough		1
Seaham		5
Sheerness		2
South Shields		10
Southampton		10
Spithead		1
St Helens Road		1
Straits of Dover		1
Sunderland		9
Thornaby on Tees		1
Tyne and Wear		4
Tynemouth		1
Warkworth		1
West Hartlepool		2
Weymouth		1
Whitby		1
Kotka	Finland	1
Boulogne	France	6
Brest		1
Caen		3
Calais		4
Cherbourg		3
Dieppe		3
Dunkirk		7
La Rochelle		1
Le Havre		17
Le Treport		4
Lorient		1
Nantes		2
Rouen		19
St Malo		2
Brunsbuttel	Germany	1
Emden		1
Germany		2
Hamburg		1
Helgoland		1
Gibraltar	Gibraltar	2

Place of Departure	Country	Quantity
Mudros	Greece	1
Thessaloniki		1
Iceland	Iceland	1
Bombay	India	2
Calcutta		3
India		1
Surabaya	Indonesia	1
Abadan	Iran	1
Agrigento	Italy	1
Genoa		1
Messina		1
Naples		1
Mauritius	Mauritius	1
Myanmar	Myanmar	1
Amsterdam	Netherlands	2
East Friesland		1
Maasluis		1
Rotterdam		4
Texel		1
Wellington	New Zealand	1
Forcados	Nigeria	1
North Sea	North Sea	2
Belfast	Northern Ireland	5
Drammen	Norway	1
Kragero		1
Narvik		1
Oslo		2
Risor		1
Skien		4
Islas Lobos de Afuera	Peru	2
Islas Lobos de Tierra		2
Lisbon	Portugal	1
Aberdeen	Scotland	2
Burntisland		1
Eyemouth		1
Glasgow		9
Granton		1
Inverkeithing		1
Leith		9
Methil		6
Peterhead		1
Queensferry		1
River Clyde		3
Scapa Flow		3
Dakar	Senegal	2
Singapore	Singapore	1
Cape Town	South Africa	2
Durban		2
Barcelona	Spain	1
Bilbao		20
Burriana		1

Place of Departure	Country	Quantity
Cadiz		1
Cartegena		1
Castro Urdiales		1
Sagunto		1
Santander		2
Spain		1
Valencia		1
Villaricos		1
Domsjo	Sweden	1
Gavle		1
Gothenburg		8
Helsingborg		1
Malmo		2
Stockholm		1
Sundsvall		2
Bangkok	Thailand	1
La Goulette	Tunisia	2
Sfax		1
United Kingdom	UK	1
Montevideo	Uruguay	1
Boca Grande	USA	1
Galveston		1
New Orleans		3
New York		9
Norfolk (Virginia)		1
Philadelphia		2
Port Arthur (Texas)		1
Portland (Maine)		2
San Francisco		1
Savannah (Georgia)		1
Texas		1
USA		3
Arkhangelsk	USSR	1
Barry	Wales	28
Caernarvon		1
Cardiff		28
Connahs Quay		1
Fishguard		1
Llandulas		3
Llanelli		3
Mostyn		2
Newport		15
Penarth		13
Port Talbot		5
Swansea		27
Wales		5
Rangoon	Yangon	1
Zeebrugge	Belgium	8

Table 4: NMR records queried by place of Destination

Place of Destination	Country	Quantity
Argentina	Argentina	1
Buenos Aires		4
Adelaide	Australia	1
Australia		1
Sydney (New South Wales)		2
Barbados	Barbados	1
Antwerp	Belgium	2
Belgium		2
Ghent		1
Ostend		1
Zeebrugge		4
Santos	Brazil	1
Gulf of St Lawrence	Canada	1
Montreal		1
St Johns (Newfoundland)		1
West Indies	Caribbean	1
Guernsey	Channel Islands	1
Jersey		1
St Helier		1
St John		1
Aarhus	Denmark	1
Copenhagen		3
Norresundby		1
Alexandria	Egypt	4
Egypt		1
Port Said		2
Avonmouth	England	2
Barnstaple		1
Barrow in Furness		3
Berry Head		1
Blyth		2
Bristol		3
Bristol Channel		1
Brixham		1
Bude		1
Cowes		3
Dartmouth		1
Devonport		1
Dover		5
England		3
English Channel		3
Essex		1
Falmouth		13
Folkestone		1
Fowey		1
Garston		1
Grangemouth		4
Great Yarmouth		1
Grimsby		7
Hartlepool		3

Place of Destination	Country	Quantity
Harwich		2
Immingham		1
Ipswich		3
Isle of Scilly		1
Kingston upon Hull		11
Littelhampton		1
Liverpool		17
London		65
Lowestoft		1
Manchester		3
Middlesbrough		18
Newcastle upon Tyne		11
Newhaven		2
Newport (IoW)		4
North Shields		2
Partington		1
Plymouth (Devon)		6
Poole		2
Portland (Dorset)		9
Portsmouth (Hampshire)		7
Preston		1
Ramsgate		1
River Tees		5
River Thames		1
River Tyne		24
Rochester		3
Runcorn		2
Scarborough		1
Seaham		1
Sheerness		3
Shoreham by Sea		3
Southampton		11
St Helens Road		1
Stockton on Tees		1
Straits of Dover		3
Sunderland		11
Tees Bay		2
Thames Haven		1
The Downs		3
Truro		1
Warkworth		1
West Hartlepool		3
Weymouth		1
Yarmouth		1
St Marys		1
Bayonne	France	4
Blaye		2
Bordeaux		4
Boulogne		13
Brest		5
Caen		1

Place of Destination	Country	Quantity
Calais		6
Cherbourg		7
Dieppe		5
Dunkirk		14
Fecamp		2
France		11
Hennebont		1
Honfleur		2
La Pallice		1
La Rochelle		1
Le Havre		14
Le Treport		1
Marseille		3
Nantes		4
Pauillac		2
Rochefort		3
Rouen		74
Sete		1
St Brieuc		1
St Malo		9
St Nazaire		7
Tonnay Charente		3
Trouville Sur Mer		1
Germany	Germany	2
Hamburg		1
Gibraltar	Gibraltar	5
Salamis	Greece	1
Bombay	India	3
Calcutta		2
Madras		1
Java	Indonesia	2
Ballinacurra	Ireland	1
Dublin		1
Douglas	Isle of Man	1
Isle of Man		1
Civitavecchia	Italy	1
Genoa		3
Italy		1
Livorno		4
Messina		1
Naples		5
Palermo		1
Portoferraio		1
Savona		5
Sovang		1
Taranto		1
Malta	Malta	1
Mediterranean Sea	Mediterranean Sea	1
Tampico	Mexico	1
Amsterdam	Netherlands	3
Delfzijl		1

Place of Destination	Country	Quantity
Flushing		1
Dogger Bank	North Sea	1
North Sea		5
Belfast	Northern Ireland	5
Skien	Norway	2
Bergen		2
Drammen		2
Fredrikstad		1
Larvik		1
Oslo		3
Svolvaer		2
Tonsberg		1
Lisbon	Portugal	2
Oporto		1
Portugal		1
Aberdeen	Scotland	3
Ardrossan		1
Ayr		2
Banff		1
Cromarty		1
Dundee		3
Glasgow		9
Greenock		1
Inverness		1
Leith		8
Methil		2
Peterhead		1
Scapa Flow		1
Dakar	Senegal	1
Singapore	Singapore	2
River Plate	South America	1
South America		1
Bilbao	Spain	3
Cadiz		2
Corcubion		1
Pasajes		2
Colombo	Sri Lanka	2
St Helena	St Helena	1
Sundsvall	Sweden	1
Tunis	Tunisia	1
Istanbul	Turkey	1
Montevideo	Uruguay	2
Norfolk (Virginia)	USA	1
Philadelphia		2
Port Arthur Texas)		1
Puerto Cabello	Venezuela	1
Barry	Wales	19
Barry Roads		13
Cardiff		11
Mostyn		1
Newport (Gwent)		4

Place of Destination	Country	Quantity
Pembroke		1
Swansea		6

Table 5: NMR records queried by place of Registration

Place of Registration	Country	Quantity
Bueno Aires	Argentina	2
Fremantle	Australia	1
Antwerp	Belgium	2
Ostend		1
Rio de Janeiro	Brazil	1
Montreal	Canada	3
Guernsey	Channel Island	1
Shanghai	China	1
Mali losinj	Croatia	1
Aarhus	Denmark	1
Copenhagen		7
Barnstaple	England	2
Barrow in Furness		1
Bideford		2
Blyth		1
Bristol		2
Chester		2
Dartmouth		1
Dover		1
Fleetwood		1
Fowey		1
Gloucester		1
Goole		4
Grangemouth		2
Grimsby		11
Hartlepool		1
Kingston-Upon-Hull		14
Littlehampton		1
Liverpool		35
London		80
Middlesbrough		1
Milford Haven		1
Newcastle		25
Newhaven		2
North Shields		6
Padstow		2
Plymouth		4
Portsmouth		1
Scarborough		2
Southampton		1
St Ives		3
Sunderland		14
Teignmouth		1
Truro		2
West Hartlepool		4
Whitby		2

Place of Registration	Country	Quantity
Whitehaven		2
Helsinki	Finland	1
Mariehamn		1
Vaasa		2
Bayonne	France	2
Boulogne		2
Caen		3
Cancale		3
Dunkirk		2
La Rochelle		1
Le Havre		2
Nantes		1
Rouen		2
Bremen	Germany	4
Bremerhaven		1
Hamburg		2
Lubeck		1
Gibraltar	Gibraltar	1
Andros	Greece	6
Argostoli		1
Piraeus		1
Cork	Ireland	2
Dublin		2
Limerick		1
Douglas	Isle of Man	2
Isle of Man		2
Genoa	Italy	4
La Spezia		1
Naples		1
Riga	Latvia	1
Amsterdam	Netherlands	5
Flushing (Zeeland)		1
Rotterdam		1
Belfast	Northern Ireland	8
Arendal	Norway	1
Bergen		15
Brevik		1
Drammen		1
Fredrikstad		1
Harstad		1
Haugesund		5
Holmestrand		1
Langesund		1
Lyngor		1
Oslo		16
Porsgrunn		1
Risor		2
Sandefjord		1
Sarpsborg		1
Skien		3
Stavanger		3

Place of Registration	Country	Quantity
Tonsberg		3
Trondheim		1
Aberdeen	Scotland	5
Dundee		4
Glasgow		33
Greenock		5
Inverness		1
Leith		9
Methil		2
Barcelona	Spain	3
Bilbao		4
Santander		3
Gavle	Sweden	3
Helsingborg		3
Norrkoping		1
Stockholm		1
Chicago	USA	1
New York		1
Bangor	Wales	1
Cardiff		17
Newport		1
Swansea		5

Table 6: NMR records queried by Nationality

Nationality	Quantity
British	522
English	244
Norwegian	141
German	67
Scottish	65
French	35
Swedish	30
Danish	25
Welsh	21
Dutch	19
Spanish	17
Belgian	15
Italian	15
American	12
Irish	11
Greek	7
Hungarian	7
Russian	6
Canadian	5
Finnish	4
Northern Irish	4
Argentinia	2
Latvian	2
Polish	2
Australian	1
Austrian	1

Nationality	Quantity
Brazilian	1
Channel Islander	1
Chinese	1
Japanese	1
Manx	1
New Zealander	1
Uruguayan	1
Yugoslavian	1

Table 7: NMR records queried by Manner of Loss

Manner of Loss	Quantity
Foundered	799
Torpedoed	463
Mined	329
Collision	123
Dispersed	86
Stranded	86
Scuttled	46
Gun Action	37
Grounded	29
Capsized	22
Leaked	15
Depth Charged	14
Beached	12
Explosion	11
Bombed	9
Burnt	8
Lost	8
Abandoned	7
Ramming	7
Broken Up	6
Wrecked	4
Bilged	1

Table 8: Passenger vessel wrecks for the period 1914-1938

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Specs	Material	Loss	Date of Loss
767226	*Donegal*	Unknown	British	Hospital Ship Passenger Ship	Steam	Unknown	Unknown	Torpedoed Foundered	1917
805024	*Polo*	1913	English	Armed Cargo Vessel Passenger Vessel Cargo Vessel	Steam	Screw Driven 3 Cylinder Triple Expansion	Steel	Torpedoed Foundered	1918
832166	*Medina*	Unknown	Scottish	Passenger Vessel Armed Cargo Vessel Cargo Vessel Liner	Unknown	Unknown	Metal	Torpedoed Foundered	1917
832210	*Sevilla*	1913	Norwegian	Cargo Vessel Passenger Vessel	Steam	Screw Driven 3 Cylinder Triple Expansion	Steel	Torpedoed Foundered	1918
901785	*The Queen*	Unknown	English	Cargo Vessel Passenger Vessels	Unknown	Screw Driven Steam Turbine	Unknown	Scuttled Foundered	1916
901788	*Anglia*	1900	Irish	Passenger Vessel Admiralty Vessel Troop Ship Hospital Ship	Steam	Screw Driven 8 Cylinder Triple Expansion	Steel	Mined Foundered	1915
901789	*Leicester*	1891	English	Cargo Vessel Passenger Vessel	Steam	Screw Driven 3 Cylinder Triple Expansion	Iron	Mined Foundered Dispersed	1916
904616	*Aparima*	1902	English	Passenger Vessel Liner	Steam	Screw Driven 6 Cylinder Triple Expansion	Unknown	Torpedoed	1917
904912	HMS *Fauvette*	1912	British	Cargo Vessel Admiralty Vessel Passenger Vessel	Steam	Screw Driven 3 Cylinder Triple Expansion	Steel	Mined Foundered Dispersed	1916
909206	*Rohilla*	1906	Scottish	Passenger Vessel Liner Cargo Vessel	Steam	Screw Driven 8 Cylinder Quadruple Engine	Steel	Collision Stranded Mined	1914

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Specs	Material	Loss	Date of Loss
				Hospital Ship					
911773	*Shirala*	1901	Scottish	Armed Cargo Vessel	Steam	Screw Driven	Steel	Torpedoed	1918
				Cargo Vessel		3 Cylinder		Foundered	
				Passenger Vessel		Triple Expansion		Dispersed	
911905	*Alaunia*	1913	English	Cargo Vessel	Steam	Screw Driven	Steel	Mined	1916
				Passenger Vessel		8 Cylinder		Torpedoed	
				Liner		Quadruple Expansion		Foundered	
919785	*Ballarat*	1911	Scottish	Armed Cargo Vessel	Steam	Screw Driven	Steel	Torpedoed	1917
				Passenger Vessel		8 Cylinder			
				Troop Ship		Quadruple Expansion		Foundered	
				Cargo Vessel					
1244387	*Mendi*	1905	English	Troop Ship	Steam	Screw Driven	Steel	Collision	1917
				Transport Vessel		3 Cylinder			
				Cargo Vessel		Triple Expansion		Foundered	
				Passenger Vessel					
1348927	*Rotorua*	1910	English	Passenger Vessel	Steam	Screw Driven	Steel	Torpedoed	1917
				Cargo Vessel		6 Cylinder			
				Armed Cargo Vessel		Steam Turbine		Foundered	
1442427	*Rewa*	1906	Scottish	Cargo Vessel	Steam	Screw Driven	Steel	Torpedoed	1918
				Passenger Vessel					
				Liner		Steam Turbine		Foundered	
				Hospital Ship					
				Troop Ship					
1468964 1468967	*St Croix*	Unknown	Norwegian	Liner	Steam	Unknown	Steel	Torpedoed	1917
				Cargo Vessel	Towed			Foundered	
				Passenger Vessel					
1482340 1482391	Warilda	Unknown	British	Transport Vessel	Steam	Unknown	Steel	Torpedoed	1918
				Hospital Ship					
				Passenger Vessel				Foundered	
				Troop Ship					

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Specs	Material	Loss	Date of Loss
				Admiralty Vessel					
1483199	HMS *Moldavia*	Unknown	British	Transport Vessel Passenger Vessel Admiralty Vessel Cruiser Troop Ship Liner	Steam	Unknown	Steel	Torpedoed Foundered	1918
832227	*Galicia*	1901	British	Liner	Steam	Screw Driven 6 Cylinder Triple Expansion	Unknown	Mined Foundered	1917
901799	*Maloja*	1911	Irish	Liner	Steam	Quadruple Expansion	Unknown	Mined Foundered Dispersed	1916
904651	*Kyarra*	1903	Australian	Liner Casualty Clearing Ship Armed Cargo Vessel Hospital Ship Cargo Vessel Admiralty Vessel	Steam	Screw Driven 8 Cylinder Triple Expansion	Metal	Torpedoed	1918
904867	*Montrose*	Unknown	British	Liner Block Ship	Steam	Unknown	Unknown	Grounded Foundered	1914
906940	*Armagh*	Unknown	New Zealander	Liner	Unknown	Unknown	Unknown	Grounded	1923
906991	*Valeria*	Unknown	British	Liner	Steam	Unknown	Unknown	Grounded	1918
1440774	*Afric*	1899	English	Liner Cargo Vessel	Steam	Screw Driven 8 Cylinder Quadruple Expansion	Steel	Torpedoed Foundered	1917
908098	HMS *Duchess of Hamilton*	1890	British	Admiralty Vessel Minesweeper Ferry Paddle Steamer	Steam	Paddle Driven 2 Cylinder Compound	Steel	Mined Foundered	1915

Table 9: Purpose-built military vessel wrecks (British) for the period 1914-1938

NMR UID	Name	Year Built	Craft Type	Propulsion	Propulsion Specs	Material	Loss	Date of Loss
904582	HMS *L24*	1919	Patrol Submarine **Submarine** Mine Laying Submarine	Engine	Screw Driven Diesel Engines with Electric Motor Oil Engine	Steel	Collision Foundered	1924
904645	HMS *M2*	1918	**Submarine** Submarine Seaplane Carrier	Engine	Screw Driven Oil Engine	Steel	Foundered	1932
908736	HMS *J6*	1915	Warship Patrol Submarine **Submarine**	Engine	Diesel Engines with Electric Motor Screw Driven	Steel	Gun Action Foundered	1918
909126	HMS *G3*	Unknown	**Submarine** Patrol Submarine	Unknown	Unknown	Unknown	Stranded	1922
919757	HMS *H52*	1919	Patrol Submarine **Submarine**	Engine	2x Diesel Engines	Unknown	Gun Action Foundered	1928
919768	HMS *A7*	1905	**Submarine**	Engine	Screw Driven Petrol Engine	Steel	Foundered	1914
943553	HMS *G11*	1916	Warship **Submarine** Patrol Submarine	Engine	Screw Driven Oil Engine	Steel	Stranded Dispersed	1918
1393674	HMS *M1*	1917	**Submarine**	Engine	Screw Driven Diesel Engine 4 Electric Motors	Steel	Collision Foundered	1925
908082	HMS *Coquette*	1897	Admiralty Vessel **Destroyer**	Steam	Steam Turbine Engine	Steel	Mined Foundered	1916
1001752	*Creosal*	Unknown	**Oiler** Admiralty Vessel	Unknown	Unknown	Unknown	Torpedoed Foundered	1918
1147324	HMS *Fishgard II*	1870	Admiralty Vessel **Ironclad** Training Ship	Unknown	Screw Driven	Unknown	Foundered	1914
805233	HMS *P12*	1915	Escort Vessel **Patrol Boat**	Engine	Screw Driven Steam Turbine Engine	Steel	Collision Foundered	1918

NMR UID	Name	Year Built	Craft Type	Propulsion	Propulsion Specs	Material	Loss	Date of Loss
			Warship					
805467	HMS *Velox*	1902	Patrol Boat Warship **Destroyer**	Engine	Screw Driven Steam Turbine Engine	Steel	Mined	1915
943561	HMS *Ascot*	1916	Aircraft Carrier Warship Paddle Steamer **Minesweeper**	Steam	Compound Paddle Driven 3 Cylinder Triple Expansion	Steel	Torpedoed Foundered	1918
767384	HMS *Undine*	1917	Warship **Destroyer**	Engine	Screw Driven	Steel	Stranded	1928
805154	HMS *Boxer*	1894	Destroyer Warship **Torpedo Boat Destroyer**	Steam	Screw Driven Triple Expansion	Steel	Collision Foundered	1918
805565	HMS *Hazard*	1894	Warship **Torpedo Boat Destroyer**	Engine	Screw Driven Triple Expansion	Steel	Collision	1918
901723	HMS *Ghurka*	1907	Warship **Destroyer**	Steam	Screw Driven Steam Turbine Engine	Steel	Mined Foundered	1917
904643	HMS *Hood*	1891	Blockship Warship **Battleship**	Engine	Screw Driven Turbine Engine	Metal	Scuttled Foundered	1914
904855	HMS *Niger*	1892	Gunboat Warship **Torpedo Gunboat**	Steam	Screw Driven Triple Expansion	Steel	Torpedoed Capsized Foundered	1914
904919	HMS *Bulwark*	1899	Patrol Vessel **Battleship** Warship	Steam	Screw Driven Triple Expansion	Steel	Explosion Foundered	1914
906966	HMS *Cochrane*	1905	Admiralty Vessel Warship **Cruiser**	Steam	Screw Driven Triple Expansion	Steel	Stranded Broken Up Dispersed	1918
907931	HMS *Falmouth*	1910	Warship **Light Cruiser**	Engine	Screw Driven Steam Turbine Engine	Unknown	Torpedoed Foundered	1916
909232	*Disperser*	1871	**Gunboat**	Steam	Screw Driven	Unknown	Leaked	1934

NMR UID	Name	Year Built	Craft Type	Propulsion	Propulsion Specs	Material	Loss	Date of Loss
			Warship	Towed	2 Cylinder		Foundered	
			Salvage Vessel		Horizontal Compound			
911756	HMS *Minion*	1915	Torpedo Boat Destroyer	Towed	Unknown	Steel	Foundered	1921
			Destroyer	Steam				
			Warship	Engine				
911926	HMS *Ariadne*	Unknown	Minelayer	Steam	Unknown	Steel	Foundered	1917
			Warship				Dispersed	
			Cruiser				Torpedoed	
912648	HMS *Arethusa*	1913	**Light Cruiser**	Steam	Screw Driven	Steel	Mined	1916
			Warship		Steam Turbine Engine		Stranded	
919766	HMS *Foyle*	1903	Warship	Steam	Screw Driven	Steel	Mined	1917
			Destroyer	Towed	Triple Expansion		Foundered	
					Reciprocating			
1164471	HMS *Laforey*	1913	Warship	Engine	Unknown	Steel	Mined	1917
			Destroyer					
1449548	HMS *Formidable*	1898	Warship	Steam	Screw Driven	Steel	Torpedoed	1915
			Battleship		Triple Expansion		Foundered	
							Capsized	
1456911	HMS *Falcon*	1899	**Torpedo Boat Destroyer**	Steam	Triple Expansion	Steel	Collision	1918
			Warship				Foundered	
			Destroyer					
901718	HMS *Myrmidon*	Unknown	**Destroyer**	Unknown	Unknown	Unknown	Unknown	1917
904845	HMS *Kale*	Unknown	**Destroyer**	Unknown	Unknown	Unknown	Mined	1918
904846								
907926	HMS *Fairy*	1897	**Destroyer**	Unknown	Unknown	Unknown	Ramming	1918
							Foundered	
832108	*Vesuvius*	1874	Gunboat	Unknown	Unknown	Unknown	Foundered	1923
			Training Ship					
			Motor Gunboat					
911729	HMS *Vernon II*	1855	Training Ship	Steam	Screw Driven	Unknown	Foundered	1924
			First Rate Ship of the	Sail			Capsized	

NMR UID	Name	Year Built	Craft Type	Propulsion	Propulsion Specs	Material	Loss	Date of Loss
			Line					
908071	MTB12	Unknown	**Motor Torpedo Boat**	Unknown	Unknown	Unknown	Torpedoed Foundered	1915
908106	MTB11	1907	**Motor Torpedo Boat**	Engine	Turbine Engine	Unknown	Mined Foundered	1916
908144	MTB10	1907	**Motor Torpedo Boat**	Engine	Turbine Engine	Unknown	Torpedoed Foundered	1915
907958	*Rosa*	Unknown	**Oiler**	Unknown	Unknown	Unknown	Unknown	1930
805649	*Duddon*	Unknown	Fleet Messenger **Lighter**	Unknown	Unknown	Unknown	Unknown	1921
912645	HMS *Ludlow*	Unknown	**Paddle Steamer** **Minesweeper**	Towed Steam	Unknown	Steel	Mined Dispersed Foundered	1916

Table 10: Purpose-built military vessel wrecks (German) for the period 1914-1938

NMR UID	Name	Year Built	Craft Type	Propulsion	Propulsion Specs	Material	Loss	Date of Loss
804831	UB 81	1917	**Submarine** Patrol Submarine	Engine	Screw Driven	Steel	Mined Foundered	1917
805579	UB 21	1916	Submarine **Patrol Submarine**	Engine	Screw Driven Diesel Electric Engines	Steel	Leaked Foundered	1920
832073	UB 113	Unknown	Submarine **Patrol Submarine**	Unknown	Unknown	Unknown	Gun Action	1920
832137	UC 51	Unknown	Mine Laying Submarine **Submarine**	Unknown	Unknown	Unknown	Mined Foundered	1917
832200	UC 49	Unknown	**Submarine** Mine Laying Submarine	Engine	Unknown	Steel	Depth Charged Foundered Capsized	1918
832201	UB 113	Unknown	**Submarine** Patrol Submarine	Unknown	Unknown	Unknown	Foundered Gun Action	1920
879933	*Unknown*	Unknown	**Submarine**	Unknown	Unknown	Unknown	Unknown	1918

NMR UID	Name	Year Built	Craft Type	Propulsion	Propulsion Specs	Material	Loss	Date of Loss
895338	U 90	Unknown	**Submarine** Patrol Submarine	Engine	Unknown	Metal	Unknown	1919
901730	UC 50	Unknown	**Submarine** Mine Laying Submarine	Engine	Screw Driven Oil Engine	Steel	Foundered	1918
901747	U 8	Unknown	Patrol Submarine **Submarine**	Engine	Unknown	Steel	Scuttled Foundered	1915
901754	UC 78	Unknown	**Submarine** Mine Laying Submarine	Unknown	Unknown	Unknown	Depth Charged Foundered	1918
901756	UB 58	Unknown	Patrol Submarine **Submarine**	Engine	Unknown	Steel	Mined Foundered	1918
901760	UB 56	Unknown	Patrol Submarine **Submarine**	Engine	Unknown	Steel	Mined Foundered	1917
901777	UB 31	Unknown	**Submarine** Patrol Submarine	Engine	Unknown	Unknown	Depth Charged Mined Foundered	1918
901790	UB 109	Unknown	**Submarine** Patrol Submarine	Engine	Unknown	Steel	Mined Foundered	1918
901791	UC 77	Unknown	**Submarine** Mine Laying Submarine	Engine	Unknown	Steel	Depth Charged Foundered Mined	1918
901819	UC 46	Unknown	**Submarine** Mine Laying Submarine	Engine	Screw Driven Oil Engine	Steel	Ramming Depth Charged Foundered	1917
904629	UB 74	1917	Patrol Submarine **Submarine**	Engine	Screw Driven Oil Engine	Unknown	Depth Charged Foundered	1918
904860	*Unknown*	Unknown	**Submarine**	Unknown	Unknown	Unknown	Lost	1917
904880	U 48	Unknown	Patrol Submarine **Submarine**	Engine	Screw Driven	Steel	Gun Action Scuttled	1917
904896	UB 12	1914	**Submarine** Mine Laying Submarine Patrol Submarine	Engine	Unknown	Metal	Mined Foundered	1918
907921	UC 39	1916	Mine Laying Submarine	Engine	Unknown	Steel	Depth Charged	1917

NMR UID	Name	Year Built	Craft Type	Propulsion	Propulsion Specs	Material	Loss	Date of Loss
			Submarine				Foundered Gun Action	
907925	UC 75	Unknown	Mine Laying Submarine **Submarine**	Unknown	Unknown	Unknown	Ramming Foundered	1918
907944	UB 75	1917	**Submarine**	Engine	Unknown	Steel	Mined Foundered	1917
907963	UB 107	1917	**Submarine** Patrol Submarine	Engine	Screw Driven Oil Engine	Steel	Depth Charged Mined Foundered	1918
907973	UC 47	Unknown	Mine Laying Submarine **Submarine**	Unknown	Unknown	Unknown	Depth Charged	1917
909220	UC 70	1916	**Submarine** Mine Laying Submarine	Engine	Screw Driven Oil Engine	Steel	Bombed Depth Charged Foundered	1918
909226	UB 30	1915	Patrol Submarine **Submarine**	Engine	Screw Driven Oil Engine	Steel	Grounded Depth Charged Foundered	1918
911902	UB 130	Unknown	Patrol Submarine **Submarine**	Engine	Unknown	Unknown	Foundered	1921
912961	UC 62	Unknown	Mine Laying Submarine **Submarine**	Unknown	Unknown	Unknown	Torpedoed Foundered	1917
919745	UB 86	Unknown	Patrol Submarine **Submarine**	Unknown	Unknown	Unknown	Unknown	1921
919783	UC 66	Unknown	**Submarine** Mine Laying Submarine	Unknown	Screw Driven Oil Engine	Steel	Depth Charged	1917
943542	UB 115	1917	**Submarine** Patrol Submarine	Engine	Unknown	Steel	Depth Charged Foundered	1918
1006408	UC 63	Unknown	Mine Laying Submarine **Submarine**	Engine	Unknown	Steel	Torpedoed Foundered	1917
1388897	UB 78	Unknown	**Submarine** Patrol Submarine	Engine	Screw Driven Oil Engine	Steel	Foundered Ramming	1918
1402209	UB 65	1917	Warship	Engine	Unknown	Metal	Leaked	1918

NMR UID	Name	Year Built	Craft Type	Propulsion	Propulsion Specs	Material	Loss	Date of Loss
			Submarine				Foundered	
1477356	UB 33	Unknown	Patrol Submarine **Submarine**	Engine	Unknown	Steel	Mined Foundered	1918
1490000	UC 63	Unknown	**Submarine**	Engine	Unknown	Steel	Torpedoed Foundered	1917
901764	UB 108	Unknown	**Patrol Submarine**	Unknown	Unknown	Unknown	Mined	1918
901772	UB 55	Unknown	**Patrol Submarine** Patrol Vessel	Engine	Unknown	Steel	Mined Foundered	1918
901814	U 11	Unknown	**Patrol Submarine**	Engine	Screw Driven Oil Engine	Steel	Mined Foundered	1914
901838	UB 29	Unknown	**Patrol Submarine**	Engine	Screw Driven Oil Engine	Steel	Mined Foundered	1916
907977	UB 41	1916	Mine Laying Submarine **Patrol Submarine**	Engine	Screw Driven Oil Engine	Steel	Foundered Mined	1917
908846	UB 110	Unknown	**Patrol Submarine**	Unknown	Unknown	Unknown	Ramming	1918
912637	UB 117	Unknown	**Patrol Submarine**	Unknown	Unknown	Unknown	Unknown	1919
912995	UB 17	Unknown	**Patrol Submarine**	Unknown	Unknown	Unknown	Unknown	1918
919743	UB 106	Unknown	**Patrol Submarine**	Unknown	Unknown	Unknown	Unknown	1921
919744	UB 112	Unknown	**Patrol Submarine**	Unknown	Unknown	Unknown	Unknown	1921
919746	UB 97	Unknown	**Patrol Submarine**	Unknown	Unknown	Unknown	Stranded	1921
919748	UB 128	Unknown	**Patrol Submarine**	Unknown	Unknown	Unknown	Unknown	1921
901829	G42	Unknown	Warship **Destroyer**	Steam	Screw Driven	Steel	Ramming Torpedoed Foundered	1917
895521	UC 16	Unknown	**Mine Laying Submarine**	Engine	Screw Driven	Metal	Depth Charged	1917
904788	UC 21	Unknown	**Mine Laying Submarine**	Unknown	Unknown	Unknown	Mined Dispersed	1917
908114	UC 72	Unknown	**Mine Laying Submarine**	Unknown	Unknown	Unknown	Bombed	1917
908160	UC 11	Unknown	**Mine Laying Submarine**	Unknown	Screw Driven Oil Engine	Steel	Mined	1918
908712	UC 32	Unknown	**Mine Laying Submarine**	Unknown	Unknown	Unknown	Mined	1917
912939	UC 2	Unknown	**Mine Laying Submarine**	Unknown	Unknown	Unknown	Collision	1915

NMR UID	Name	Year Built	Craft Type	Propulsion	Propulsion Specs	Material	Loss	Date of Loss
919749	UC 92	Unknown	**Mine Laying Submarine**	Unknown	Unknown	Unknown	Unknown	1921
919754	UB 118	Unknown	**Mine Laying Submarine**	Engine	Unknown	Steel	Foundered Gun Action	1920
901822	*G85*	Unknown	**Destroyer**	Unknown	Unknown	Unknown	Torpedoed	1917

Table 11: Fishing vessels requisitioned in WWI

Name	NMR UID	WWI Use
HMS *Scott*	904780	Minelayer
HMS *Banyers*	909137	Minesweeping
HMS *Spider*	912953	Minesweeping
HMS *Evadne*	1483453	Minesweeping
HMS *Japan*	908152	Minesweeping
HMS *Lydian*	904847	Minesweeping
HMS *Yucca*	912934	Minesweeping
Unknown	908508	Minesweeping
HMS *New Dawn*	805122	Minesweeping & Patrol
Angelus	901797	Minesweeping & Patrol
Falmouth III	901784	Minesweeping & Patrol
HMS *Apley*	1487652	Minesweeping & Patrol
HMS *Burnley*	1488653	Minesweeping & Patrol
HMS *Elise*	1472010	Minesweeping & Patrol
HMS *Etoile Polaire*	901836	Minesweeping & Patrol
HMS *Euston*	908852	Minesweeping & Patrol
HMS *Kelvin*	913008	Minesweeping & Patrol
HMS *Lord Roberts*	913019	Minesweeping & Patrol
HMS *Mediator*	907927	Minesweeping & Patrol
HMS *Miura*	907424	Minesweeping & Patrol
HMS *Orianda*	1457283	Minesweeping & Patrol
HMS *Othello II*	813821	Minesweeping & Patrol
HMS *Resono*	908130	Minesweeping & Patrol
HMS *Strymon*	913016	Minesweeping & Patrol
HMS *Tervani*	912686	Minesweeping & Patrol
HMS *Weigelia*	901831	Minesweeping & Patrol
HMS *Worsley*	912657	Minesweeping & Patrol
Benton Castle	832199	Patrol
G & E	912964	Patrol
HMS *Achilles II*	913001	Patrol
HMS *Balfour*	911496	Patrol
HMS *Balfour*	911925	Patrol
HMS *Ben Heilem*	943573	Patrol
HMS *Cantatrice*	907449	Patrol
HMS *Christopher*	912933	Patrol
HMS *Commandmant*	908140	Patrol
HMS *Dane*	912877	Patrol
HMS *Dhoon*	907454	Patrol
HMS *Dirk*	907965	Patrol
HMS *Donside*	912898	Patrol
HMS *Eros*	912677	Patrol
HMS *Fronsolive*	904905	Patrol
HMS *Gambri*	911928	Patrol
HMS *Glen Prosen*	907436	Patrol
HMS *Golden Sunset*	904636	Patrol
HMS *John E Lewis*	908162	Patrol
HMS *Kaphreda*	912973	Patrol
HMS *Loch Ard*	912966	Patrol
HMS *Nadine*	912662	Patrol
HMS *New Comet*	912697	Patrol

Name	NMR UID	WWI Use
HMS *Newbridge*	832154	Patrol
HMS *Numitor*	912997	Patrol
HMS *Orthos*	912923	Patrol
HMS *Recepto*	908854	Patrol
HMS *Sapper*	911747	Patrol
HMS *Saxon Prince*	1399225	Patrol
HMS *Sisters Melville*	912690	Patrol
HMS *Speeton*	912969	Patrol
HMS *Taipo*	911911	Patrol
HMS *Tettenhall*	912963	Patrol
HMS *Thomas Cornwall*	1440784	Patrol
HMS *Whooper*	912893	Patrol
James Fennell	904633	Patrol
HMS *Agate*	911959	Patrol and Warship
Cleon	901779	Unspecified
HMS *Bonar Law*	881550	Unspecified
HMS *Carilon*	904910	Unspecified
HMS *Carlton*	901783	Unspecified
HMS *Drumtochty*	901775	Unspecified
HMS *Hirose*	912705	Unspecified
HMS *Jessie Nutten*	912895	Unspecified
HMS *Lancer II*	911938	Unspecified
HMS *Lord Airedale*	908143	Unspecified

Table 12: Industrial vessel wrecks for the period 1914-1938

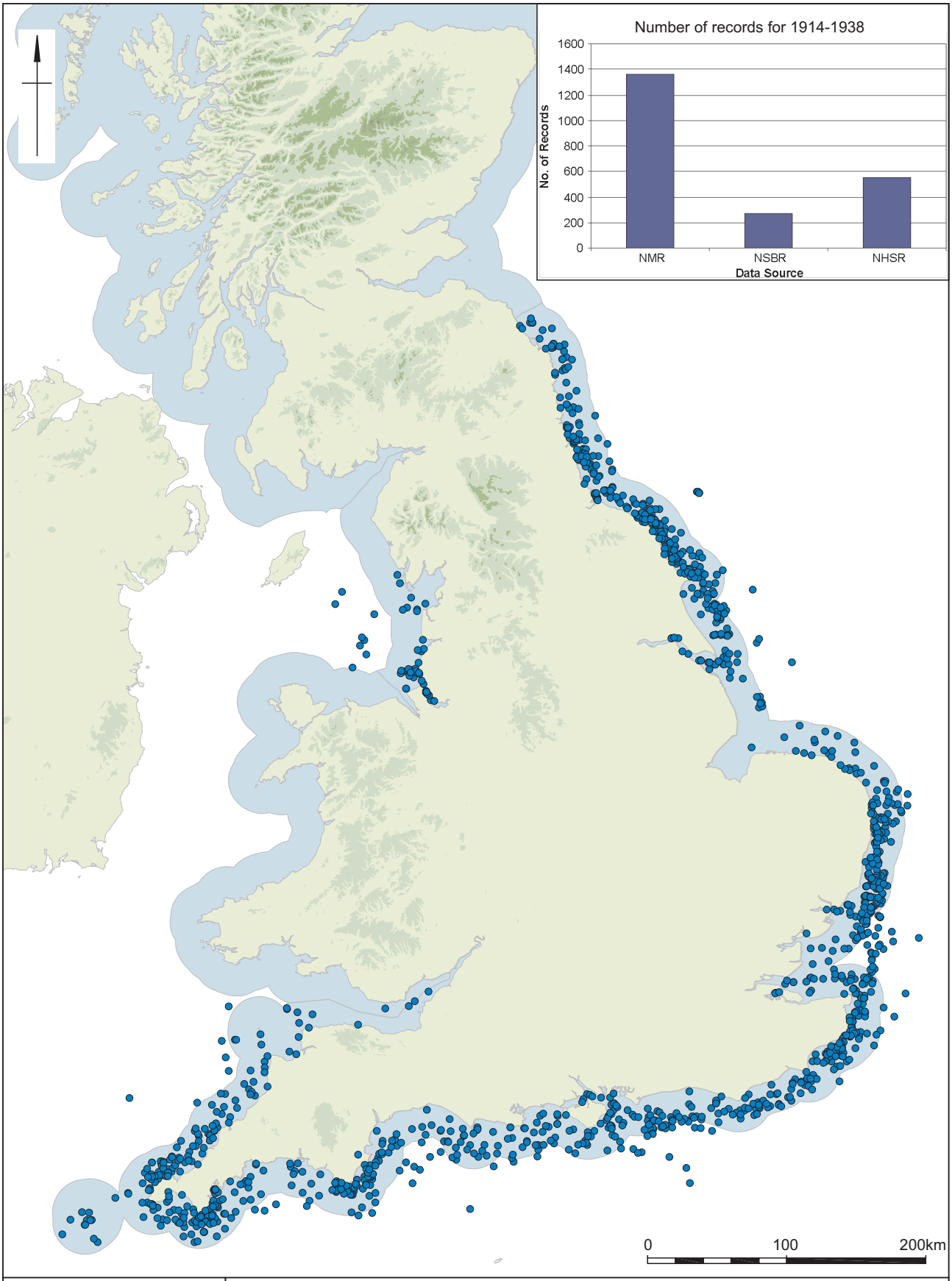
NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Propulsion Specs	Material	Loss	Date of Loss
911957	*Leven*	Unknown	English	Dredger	Steam	Screw Driven 2 Cylinder Compound	Iron Steel	Mined Foundered Dispersed	1917
912925	*Mercurius*	Unknown	British	Dredger	Unknown	Unknown	Unknown	Mined	1916
919770 919772	*Kantoeng*	1936	Dutch	Pontoon Bucket Dredger Dredger	Unknown	Unknown	Steel	Leacked Scuttled Foundered Capsized	1937
943551	*Dutchman*	Unknown	Unknown	Dredger	Unknown	Unknown	Steel	Capsized Foundered	1924
1003001	*Redvers Buller*	Unknown	Unknown	Dredger	Unknown	Unknown	Unknown	Unknown	1932
805709	*Withern*	Unknown	Unknown	Bucket Dredger	Engine	Unknown	Steel	Foundered	1926
904667	*St Dunstan*	Unknown	British	Bucket Dredger	Unknown	Screw Driven 3 Cylinder Triple Expansion	Steel	Mined	1917
908864	*Dredger No. 3*	Unknown	British	Bucket Dredger	Unknown	Unknown	Wood	Capsized Foundered	1927
832217	*Peronne*	1882	French	Cargo Vessel Cable Layer	Sail Steam	Screw Driven 3 Cylinder Triple Expansion Compound	Steel	Torpedoed Foundered	1917
901780	*Monarch*	1883	English British	Cargo Vessel Cable Layer	Steam	Screw Driven 3 Cylinder Triple Expansion	Iron	Mined Dispersed Foundered	1915
912956	*DB 8*	Unknown	Unknown	Pile Driving Barge Barge	Unknown	Unknown	Unknown	Unknown	1920
1348940	*Nyasaland*	1896	Norwegian Brazilian	Whaler Cargo Vessel	Steam	Screw Driven 3 Cylinder Triple Expansion	Steel	Gun Action Scuttled Foundered	1918

Table 13: Health and Welfare vessel wrecks for the period 1914-1938

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Specs	Material	Loss	Date of Loss
767226	*Donegal*	Unknown	British	Hospital Ship Passenger Ship	Steam	Unknown	Unknown	Torpedoed Foundered	1917
901788	*Anglia*	1900	Irish	Passenger Vessel Admiralty Vessel Troop Ship Hospital Ship	Steam	Screw Driven 8 Cylinder Triple Expansion	Steel	Mined Foundered	1915
904651	*Kyarra*	1903	Australian	Liner Casualty Clearing Ship Armed Cargo Vessel Hospital Ship Cargo Vessel Admiralty Vessel	Steam	Screw Driven 8 Cylinder Triple Expansion	Metal	Torpedoed	1918
909206	*Rohilla*	1906	Scottish	Passenger Vessel Liner Cargo Vessel Hospital Ship	Steam	Screw Driven 8 Cylinder Quadruple Engine	Steel	Collision Stranded Mined	1914
1440147	*Glenart Castle*	1900	English	Hospital Ship Cargo Vessel Admiralty Vessel	Steam	Screw Driven 6 Cylinder Triple Expansion	Steel	Torpedoed Foundered	1918
1442427	*Rewa*	1906	Scottish	Cargo Vessel Passenger Vessel Liner Hospital Ship Troop Ship	Steam	Screw Driven Steam Turbine	Steel	Torpedoed Foundered	1918
1482340 1482391	*Warilda*	Unknown	British	Transport Vessel Hospital Ship Passenger Vessel Troop Ship Admiralty Vessel	Steam	Unknown	Steel	Torpedoed Foundered	1918

Table 14: Recreation vessel wrecks for the period 1914-1938

NMR UID	Name	Year Built	Nationality	Craft Type	Propulsion	Specs	Material	Loss	Date of Loss
832387	*Isobel*	Unknown	English	Yacht Leisure Craft	Sail Engine	Unknown	Unknown	Foundered	1930
908774	*Daring*	Unknown	Unknown	Launch Leisure Craft	Engine	Unknown	Unknown	Collision Foundered	1921
832181	*Osprey*	Unknown	British	Yacht Craft	Unknown	Unknown	Unknown	Collision	1919
904782	*Irene*	Unknown	British	Yacht Trinity house Vessel Survey Vessel	Unknown	Unknown	Unknown	Mined	1915
904849	HMS *Aries*	Unknown	British	Yacht Patrol Boat	Unknown	Unknown	Unknown	Mined Foundered	1915
904863	HMS *Marcella*	1887	British	Patrol Vessel Yacht Admiralty Vessel	Steam	Screw Driven 2 Cylinder Compound	Steel	Collision Foundered	1916
908070	*Neptune*	Unknown	Unknown	Yacht Craft	Unknown	Unknown	Unknown	Unknown	1934
909133	HMS *Mekong*	1906	British	Admiralty Vessel Patrol Boat Yacht	Steam	Screw Driven 3 Cylinder Triple Expansion	Unknown	Stranded Dispersed	1916
911948	*Marian*	Unknown	Unknown	Yacht	Sail	Unknown	Wood	Foundered Dispersed	1925

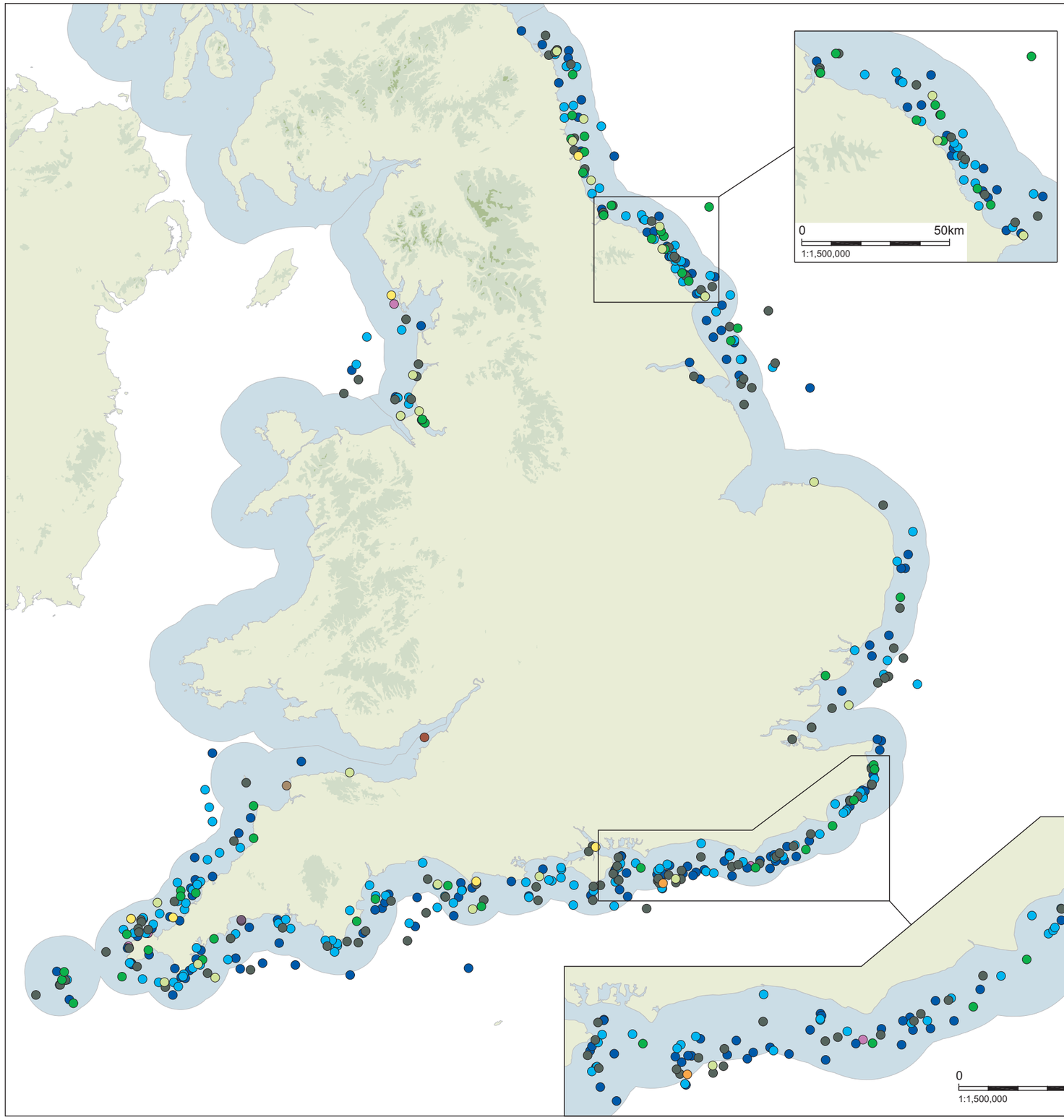


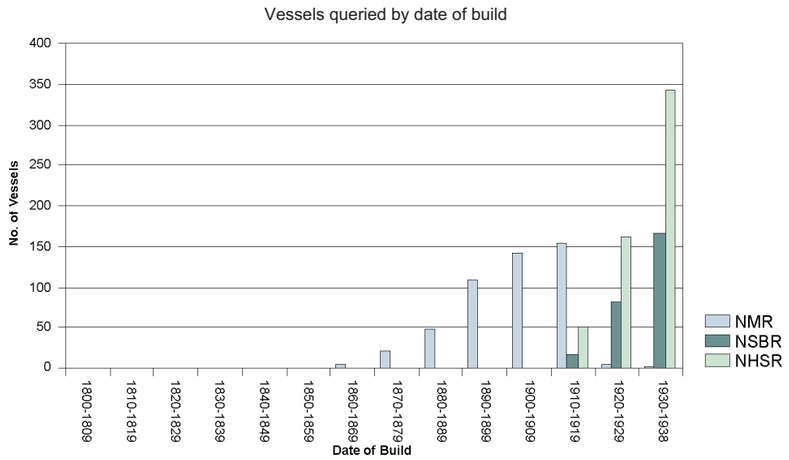
12 Nautical mile limit
NMR records

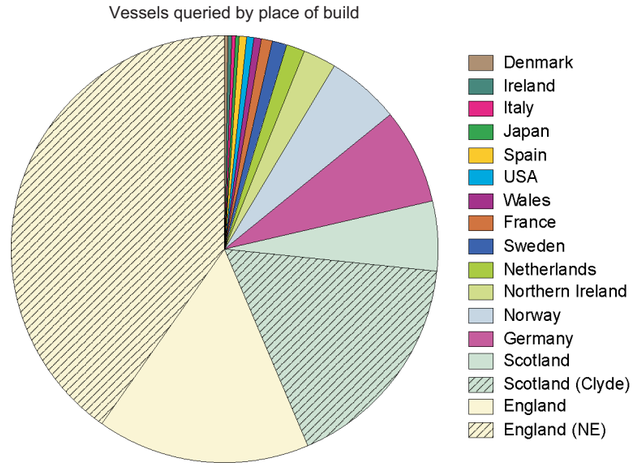
Wessex Archaeology

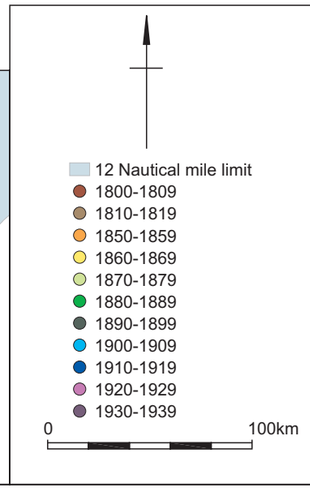
Date:	18/08/10	Revision Number:	0
Scale:	1:4,000,000 @A4	Illustrator:	KJB
Path:	W:\Projects\70861\Drawing Office\Report Figs\DBA 1914-1938\10-08-18		

Distribution of the NMR records for the period 1914-1938 Figure 1









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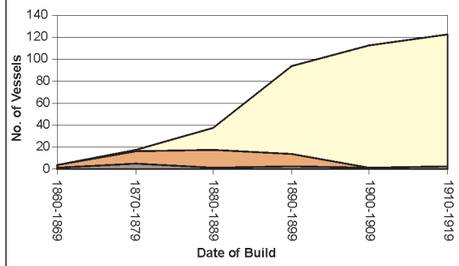
NMR records queried by date and place of build

Figure 2

Wessex Archaeology

NMR records queried by object material and date of build



12 Nautical mile limit
Wood
Oak
Steel
Brass
Iron
Metal
Concrete

0 100km

Revision Number:	0
Illustrator:	KJB
Date:	19/08/10
Scale:	1:3,000,000 @A3
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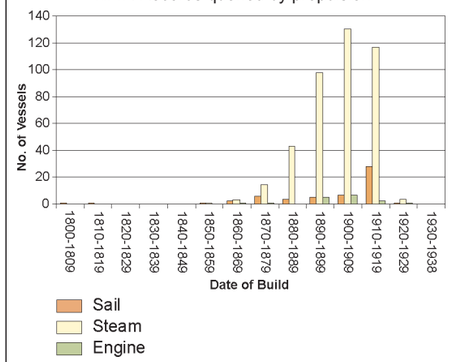
NMR records queried by object material

Figure 3

Wessex Archaeology

NMR Records queried by propulsion



12 Nautical mile limit
Towed
Sail
Steam
Engine

0 100km

Revision Number:	0
Illustrator:	KJB
Date:	19/08/10
Scale:	1:3,000,000 @A3
Path:	W:\Projects\70861\Drawing Office\
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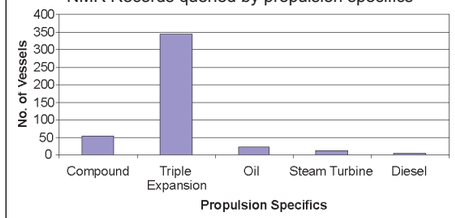
NMR records queried by propulsion

Figure 4

Wessex Archaeology



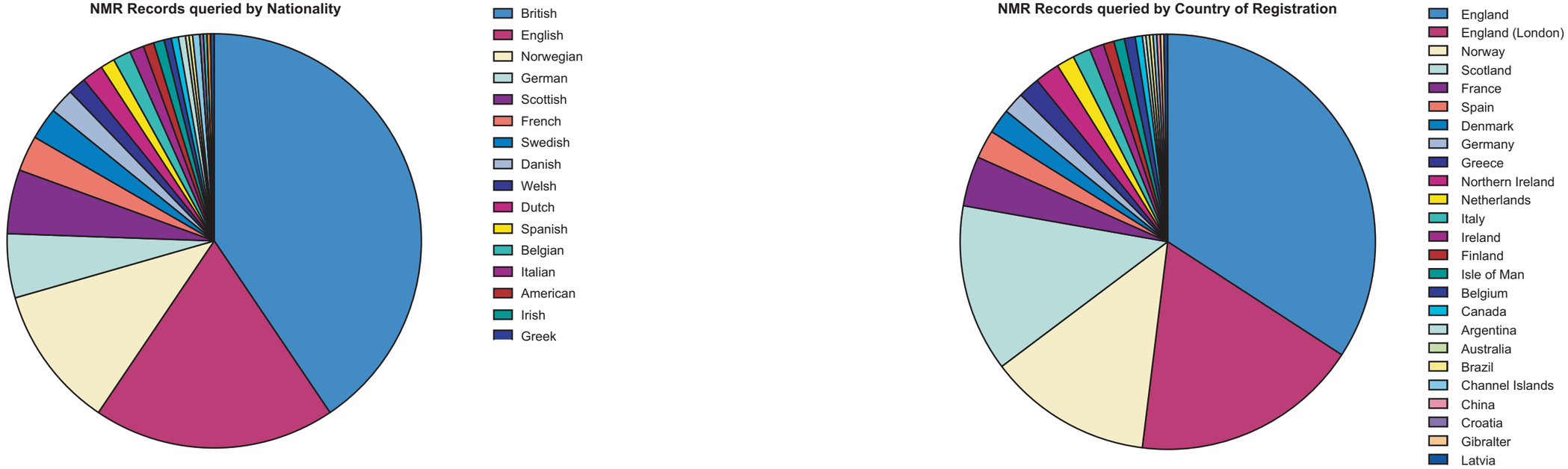
12 Nautical mile limit
Diesel engine
Oil engine
Compound engine
Triple expansion engine
Steam turbine

0 100km

Revision Number:	0
Illustrator:	KJB
Date:	19/08/10
Scale:	1:3,000,000 @A3
Path:	W:\Projects\70861\Drawing Office\
Report Figs\DBA 1914-1938\10-08-18	

NMR records queried by propulsion specifics

Figure 5



Wessex Archaeology

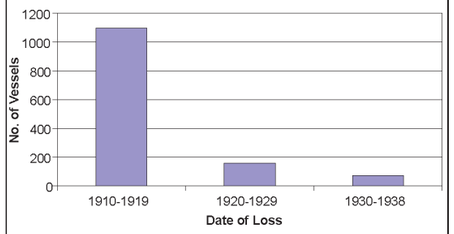
Date:	19/08/10	Revision Number:	0
Scale:	n/a	Illustrator:	KJB
Path:	W:\Projects\70861\Drawing Office\Report Figs\DBA 1914-1938\10-08-18		

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

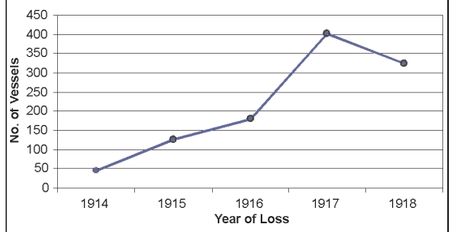
Figure 6

Wessex Archaeology

NMR records queried by date of loss



NMR records queried by year of loss (WWI)



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

Density of wrecks per 20km²:
0
1-10
11-20
21-30
31-40
41-50

0 100km

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NMR records queried by date, manner and location of loss

Figure 7

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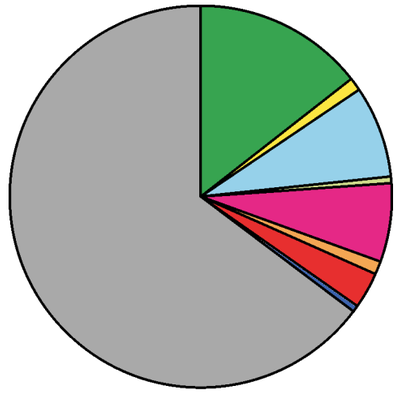
NMR records queried by seabed survival



- 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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Path:	W:\Projects\70861\Drawing Office\
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NMR records queried by seabed survival

Figure 8

Wessex Archaeology

12 Nautical mile limit
Armed cargo vessel
Barge
Barque
Cargo vessel
Coal hulk
Coaster
Collier
Decoy vessel
Freighter
Full rigged ship
Ketch
Lighter
Schooner
Sloop
Spritsail barge
Tanker

0 100km

Revision Number:	0
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Date:	16/09/10
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Cargo vessel wrecks 1914-1938

Figure 9

Wessex Archaeology

12 Nautical mile limit
Ferry
Liner
Passenger vessel

0 100km

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Passenger vessel wrecks 1914-1938

Figure 10

Wessex Archaeology

12 Nautical mile limit
British purpose-built military vessel
German purpose-built military vessel

0 100km

Revision Number:	0
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Date:	16/09/10
Scale:	1:3,000,000 @A3
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Purpose-built military vessel wrecks 1914-1938

Figure 11

Wessex Archaeology

12 Nautical mile limit
Drifter
Smack
Trawler
Cutter
Fishing vessel

0 100km

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Date:	16/09/10
Scale:	1:3,000,000 @A3
Path:	W:\Projects\70861\Drawing Office\
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Fishing vessel wrecks 1914-1938

Figure 12

Wessex Archaeology

12 Nautical mile limit

Industrial
- Bucket dredger
- Dredger
- Cable layer
- Pile driving barge
- Whaler

Health and welfare
- Casualty clearing ships
- Hospital ship

Law and government
- Examination service vessel
- Storeship

Domestic
- Houseboat

Recreation
- Launch
- Leisure craft
- Yacht

0 100km

Revision Number:	0
Illustrator:	KJB
Date:	16/09/10
Scale:	1:3,000,000 @A3
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