University of Southampton

Faculty of Humanities

Archaeology

Of Small Ships Forgotten

Volume 1 of 2

by

Jack William Francis Pink

ORCID ID https://orcid.org/0000-0002-8525-7969

Thesis for the degree of Doctor of Philosophy

August, 2022

University of Southampton

Abstract

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Ordinary ships such as merchant schooners—and most importantly the people involved in their lives—are often absent from contemporary discussions and narratives of the 19th century. Those ships have the potential to improve and refine our understanding of the 19th century Maritime World. Their absence from contemporary discussions suggests there are gaps and blind spots in our understanding of the period. A challenge faced by archaeologists and historians is that only a small number of such ships have been explored in any detail. It is also clear that archaeology has a lot to add to and challenge about our understanding of the 19th century more generally. Therefore, this thesis introduces new material through the material culture documentation of several hundred ships, sourced from the archives of the Lloyd's Register which at the time was the world's largest shipping registration organisation. That material will be used to move beyond individual vessel-narratives to produce new knowledge and ideas of seafaring and shipbuilding from this period.

This thesis presents a theoretical and methodological framework to integrate large documentary datasets into an archaeological investigation. Part of this process includes a re-evaluation of the 19th century Maritime World through the lens of Britain's coastal merchant shipping and the systems and forces that industry operates within. That revaluation provides the backdrop and context to a large-scale evaluation of British shipping numbers in the 19th century, setting those numbers against key events and changes that have previously been attributed to changes in the shipbuilding and seafaring industries. The investigation then becomes more granular. First, by taking the registration records of 200 individual merchant schooners and exploring their biographies to extract information about their construction and use. Then two of those ships will be examined in the finest detail possible by including archaeological investigation of their material remains and other relevant documentary sources to set out their story in detail.

Presenting those stories allows this thesis to create two anchor points in the dataset which have the investigation of their documentary record supported by real material evidence. Anchoring the documentary evidence in this way deploys an explanatory and narrative power to convey a story of the 19th century Maritime World and expand our understanding of the events that took place and the role Britain's shipbuilding and seafaring technologies played in industrialisation and globalisation. This use of narrative also allows this thesis to better move between scales, link different sources, and ensure the investigation focuses more effectively on the people involved with the ships discussed here. Therefore, this thesis presents an understanding of 19th century ships that is supported by relevant data and a record of individual ships that is larger than any other study undertaken for this topic.

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Research Thesis: Declaration of Authorship

Print name: Jack Pink

Title of thesis: Of Small Ships Forgotten

I declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. Parts of this work have been published as:-

Pink, J., & Whitewright, J. (2022). A Life Less than Ordinary: The Schooner Ocean (1821–1865). *Historical Archaeology*, *56*(1), 3-15.

Signature: ..... Date: 22nd May 2023

Acknowledgements

This section feels like the hardest one to write, because it can be so easy for words to sound hollow, I trust everybody knows how deeply felt my words are and how significant their support and encouragement has been to me. So, to begin, thanks to all those who have made this PhD possible. To the people at CITiZAN especially Dr. Gustav Milne and Caroline Barrie-Smith for their support, not least the provision of a bursary to fund the fieldwork conducted as part of this thesis. To the Maritime Archaeology Trust for sharing resources related to the East Winner Bank shipwreck. To the University of Southampton, and the Archaeology Department in particular, for the opportunities granted by my studies, and for the Lawrence Arthur Burgess scholarship without which this would have taken years longer to complete. Thanks, must also go to the Honor Frost Foundation (especially Dr. Lucy Semaan) for the support and opportunity to work on their projects in Lebanon as an unfunded and unproven PhD student.

I would not have started this journey without Professor Jonathan Adams. Thank you for everything from my first visit to Southampton at a University Open Day to the final days of my PhD, inspiring me and driving me to be the best archaeologist I could be, providing me with opportunities to do things I dreamt of doing, and who's advice, support, and guidance made all the difference in finishing this thesis. To Dr. Lucy Blue, who gave me opportunities and support at every stage of my studies. To Dr. Kristian Strutt and Dominic Barker, for years of experience and opportunities. You two taught and developed the field skills I leaned on so heavily to facilitate my studies, but also thank you for your relentless friendship, kindness, and support in the toughest times. To Dr. Andrew Jones for stopping to talk to me at the end of the first Symposium I ran to challenge me on how I approached my project, guiding me through areas of archaeological theory, throwing piles of literature at me to read, and your advice and friendship. To Professor Josh Pollard for stepping in as an entirely new supervisor for a post-medieval maritime PhD in the middle of a pandemic and departmental changes, thank you, your support, comments, and advice has made all the difference in the final stages.

To Professor Fraser Sturt, your input drove me to change and improve, for your tireless support of me at every stage of my studies. I can never thank you enough for, or ever forget, the support and guidance you offered at the start of my Maritime Archaeology MA so many years ago. Special thanks to Professor Sturt and Dr. Jones for sending me back to resubmit my confirmation when it wasn't right, that process—whilst hard at the time—made this thesis and me better.

To my family, especially my mother and father, for supporting me and being behind me all the way. For questioning me when it was needed, for encouraging me constantly, proofreading drafts, and for attending conferences and reading papers about archaeology just to hear what I was saying and show your support, I couldn't have done it without you. To my friends for encouraging me and loving me even when I was tired, short-tempered, and so completely disorganised I forgot every appointment and trip.

To Dr. Julian Whitewright. For everything from my Undergraduate to this. Your support and encouragement have been endless, inspiring, and humbling. For being my supervisor three times. For reading countless pages of my writing from the terrible drafts of my undergraduate dissertation to the terrible drafts of this thesis. For opportunities to go places and work on things I never thought I would even get to see. For helping me when I didn't know where to turn. For bluntness and reservedness. For being a completely unbeatable friend. Thank you for everything.

To Makanani Bell, mahalo iā ʻoe no nā mea a pau, ua manaʻo ʻoe i ka honua iaʻu.

Definitions and Abbreviations

HEC..... The Lloyds' Register Foundation Heritage and Education Centre. This is the organisation that maintains and enhances the archive of the Lloyds' Register, including the *Lloyds' Register of Shipping* and associated survey documents.

Lloyds' Register (LR) ..... Defined here as it is the foundation of many of the abbreviations subsequently used in the thesis text. The Lloyd's Register was established in 1760 to establish if ships were safe and seaworthy using a system of characterisation based upon the condition of the hull and ship's equipment (discussed in more detail in Chapter 5) in response to increases in ships, and cargoes, lost at sea.

LRF..... The Lloyds' Register Foundation owns Lloyds Register as it exists today including the archives and historic material that have been generated since the Lloyds' Register's inception. Most of the archival and documentary material from Lloyds' Register used in this project was accessed through the Lloyds' Register Foundation.

LRS..... The *Lloyd's Register of Shipping* often referred to elsewhere as "The Register" this is a record of merchant shipping published annually since 1775. Prior to 1870 only vessels classed by Lloyds' Register were included. After 1870 all self-propelled, sea-going, merchant ships over 100 tons were recorded regardless of classification.

Maritime World..... Used here to describe the assemblage of systems, people, objects, forces, machines, countries, and places that exist in the period.

Paper Ships..... The term used for the ships selected from the *Lloyds' Register of Shipping* that exist as entries in The Register without any material remains currently identified.

Paper Fleet ..... The collective term used for the 200 Paper Ships

The Record ..... The narrative presented through historical and archaeological sources, rather than seeing the "archaeological record" and the "historical record" as distinct entities.

Schooner ..... A carvel-built ship rigged with a fore and aft sail on each mast. In this thesis the term includes both two and three-masted vessels.

"…[Stories] open a door on Other Time, and if we pass through, though only for a moment, we stand outside our own time, outside Time itself, maybe."

- J.R.R. Tolkien (1947: 21)

Chapter 1. Introduction

In the first few months of 1821 the shipbuilder Daniel Dewdney finished a ship at his yard in Brixham, Devon. That ship was no more remarkable than any other being produced anywhere else on the coast of Britain. In the context of ships built in the South West it was an ordinary merchant schooner, with two masts and a single deck measuring 59 feet and 2/10^{ths} long by 17 feet and 5/10^{ths} wide. These ships were ubiquitous in the South West of England, often with small crews. For the next forty-four years it went on to serve in Britain's coastal trade. In that time the ship also made longer journeys to Portugal and Ireland, demonstrating one of the schooner's key traits: its use in "middle-distance" voyages, not exclusively as a coasting ship. An ordinary existence for an ordinary ship, one of hundreds of similar working vessels. That is, until Saturday the 14th January 1865 when the ship was caught in a storm in the Solent. It foundered on a sandbar at the entrance to Langstone Harbour, eventually being abandoned to the sea following a dramatic rescue in which three of the five crew were saved. That ship was called *Ocean* and 149 years later emerged from the sandbar again. Shortly after its re-emergence it was visited by a group of archaeologists who, at the lowest tide, began the process of recording what remained. The process of that recording has taken some six years involving intermittent visits, and specialists in metallurgy and ship construction. This ship is remarkable because of its previous non-remarkableness, it is a site that bears witness to a world that is rarely seen, the everyday coastal trade that supported an empire. What follows is a voyage through that seafaring world of Britain in the 19th century and the people involved in it.

This is a world that it is impossible to really visit without being able to engage with those ordinary ships and people tasked with maintaining the great system of empire. Whilst this is a global period, and certainly the genesis of issues like globalisation, the focus will remain almost exclusively on the coast of Britain. Some small adventures may take place along the way, following a schooner to Portugal or tracing shipbuilding timbers to the forests of New England and the Baltic, but the main stage is resolutely, unquestioningly, and unapologetically the coastal waters and shoreline of Britain. This century sees the British Empire as the world's dominant maritime power, connected to a vast array of colonies and outposts through a network of ships and people. That wide array of maritime connections was built upon a system of coastal trade and waterborne movement of materials around the British Isles. Britain itself was the industrial heart of its empire, dependent on the movement of raw materials and people to produce consumer goods driving the systems of trade, exchange, and exploitation sustaining Imperial Power. Despite their importance to this story those ordinary ships, and essentially their people, are often missing entirely from discussions and narratives of this period.

Their absence is a problem. Not just because it reveals an incompleteness in the record or a focus on specific tiers of society, which it does. But because of the potential of the ordinary to inform our understanding of the Maritime World of the 19th century. There is already a considerable body of work looking at the 19th century from a variety of perspectives, and this is explored in Chapter 2. The importance of maritime trade is highlighted in these works, making it even more surprising that ordinary merchant vessels make up only a small part of the literature. To present a better picture of how these ships and people fit into 19th century maritime connections and events, Chapter 3 sets out the historic context of the period with a focus on events and changes connected to those ships and people. The 19th century is a period of great technological change, industrialisation, and increasing globalisation, themes which can be viewed through the lens of the ships impacted by, and impacting upon, all three. There are also legislative changes dealing directly with trade and shipping that have considerable implications for shipbuilders. As already mentioned briefly and dealt with in more detail in Chapter 5, schooners (such as that in Figure 1.1) are a ship type well positioned to inform on technological choices in this period as they are involved in both coastal and middle-distance maritime trade.

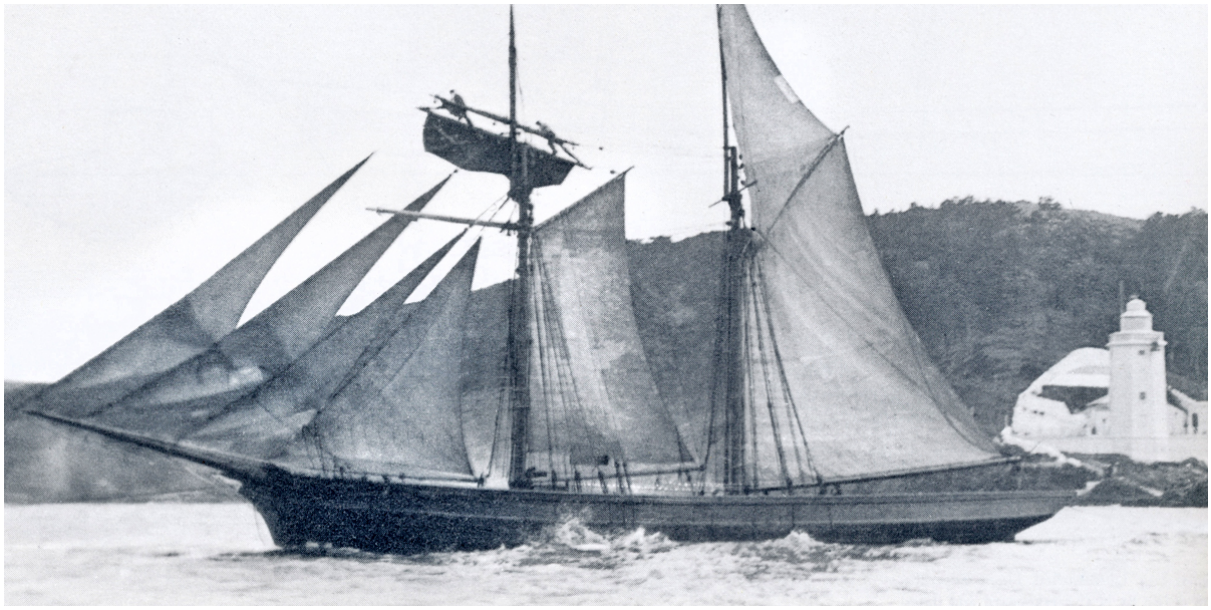


Figure 1.1:The schooner Rhoda Mary *entering the Carrick Roads (Image courtesy of the Rhoda Mary Project)*

With the schooner secured as the means to undertake our voyage through this Maritime World we can approach the two research questions that direct this project:

1. In what ways do schooners, as a medium size ship type, reflect the trends thought to occur in 19th century British shipbuilding?

2. What is the potential for ships in the overall shipwreck record to unlock documentary components of the record thereby revealing relationships and meaning that would otherwise remain obscure in investigations of either source material on its own?

These questions direct our investigation of the various sources available to this thesis. This study takes on a considerable time period in the 100 years from 1800-1899, whilst also encompassing a substantial geographic area in the entirety of Britain's shipbuilding coastline. Embracing a temporal and spatial challenge of this size creates the opportunity to examine how a substantial documentary archive such as that held by the Lloyd's Register Foundation Heritage and Education Centre (HEC), can contribute to studies of this type. The integration of documentary components with archaeological material creates a diverse and mobile record to explore (this is a concept dealt with by Lucas (2018:62) and explored more thoroughly in Sections 2.4 and 2.5). We can use that diversity of sources to investigate the existing narrative for shipbuilding and the development of maritime technology. One of the biggest strengths of a dataset of this type is that it can be used to challenge and, where necessary, reject master narratives and themes for this period such as technological choice driven by invention and inevitability (Reid 2020: 57-8), or capitalism (see DeCorse 1996:19; Hicks and Beaudry 2006: 1; Orser 1996: 7, and the discussion in Section 2.4) as the driving force behind new materials or changes in ship construction. The perceived trends in British shipbuilding must be examined in this way to gain a better understanding of how ideas are moving and what is driving people to make their choices. Looking at the remains of ships in this way allows us to test the documentary evidence and begin to tackle one of the largest and most unexplored datasets available for the study of the Maritime World and its people. The documentary components of the record, when used in conjunction with archaeological material and theory, have the potential to allow archaeologists to ask new questions about ordinary merchant ships and shipbuilding.

The challenge that remains is that there are relatively few extant archaeological examples of 19th century working ships. There are certainly shipwrecked examples of the working vessels targeted by

this project. However, only a handful have come to the attention of archaeologists. Many have not survived to a degree that provides material remains that can be examined, or their remains have not yet been encountered, whether that be emerging from the sands of a beach or on the seabed. Those that have survived, and been recorded by archaeologists, are not complete. Such is the nature of archaeology; we are gifted fragments of the past with which to construct some means of looking at a world that is not our own. There is such a range of technologies, with such a range of implementations that it is almost impossible to definitively establish their presence or absence from even the best-preserved sites. Furthermore, the limited number of sites that have been explored mean it is not possible to look at shipbuilding in the 19th century on a macro scale without turning to alternate sources. Needing to look beyond the archaeological record is not an issue and in fact should be seen as something that strengthens this investigation. With the added information from the HEC archive this thesis can look at that elusive larger scale. Ships can be compared across the entire 19th century and different technologies can be searched for. There has already been a call for archaeologists to expand their studies of 19th century shipbuilding in exactly this way, with the caveat that these have implied expanding the archaeological record (e.g., Reid 2020:17). In fact, archaeology can already contribute significantly to studies of the 19th century Maritime World with the sources and material currently available to the study of merchant ships.

The work which has already taken place on vessels like these is set out in Chapter 2, primarily consisting of literature from the 1970s and 80s incorporating extant ships, wrecks, and hulks into typologies and historic narratives. There are also some more recent, and more focused, investigations into individual shipwreck sites establishing the story and detail of each individual vessel. The case studies dealt with in Chapters 6 and 7 will be approached with a different goal in mind. The objective in these investigations is to relate the story of these ships, utilising a concurrent approach to sources, that does not seek to place the vessel in a pre-existing narrative or context. This is challenging and may seem like a fable, since Chapter 3 sets out a historic context of the 19th century. However, the aim with these sections is not to suggest an absolute understanding of 19th century seafaring but to look at key events and technologies in the context of the ships themselves. Throughout the 18th and 19th centuries industrialisation had considerable impact on different industries, Chapter 3 highlights some of these in detail. Shipbuilding is no different. Although, the scale of individual shipbuilders' operations raises a question of how susceptible they were to industrialisation. In large shipyards such as those for the Navy, there is considerable evidence for the industrialisation of different processes and the adoption of new technologies. For an individual shipbuilder such as Mr. Dewdney, in a small town like Brixham, there is far less. This thesis will explore the impact, if any, of industrialisation. Each case study will serve as a waypoint in the dataset and as a means by which to drive our investigation of it. We will use these ships to chart a course to study the development of shipbuilding technology in the 19th century. That overall dataset is substantial, an ocean to stretch a metaphor, despite the limited number of archaeological examples available.

Most of the data available to this project is not the archaeological remains of ships but instead the documentary archive of the Lloyds Register, now cared for by the HEC. In fact, the scale of the HEC dataset poses a further challenge to this project. It is not feasible to suggest that the whole archive, over one million documents, should be examined in their entirety here. Instead, a more targeted approach to this dataset will be taken. The archaeological case studies are being used as waypoints to allow the use of ships within Lloyd's Register for which there are no accessible or extant remains. The means by which the archaeological sites are investigated, and other sources incorporated, is set out in Chapter 4. The selection of ships from the Lloyd's Register can be refined first by targeting schooners, as this correlates with the archaeological examples, and second selecting a limited number to prevent the dataset becoming unwieldy and to keep it a realistic size for a detailed investigation. The data from the Lloyd's Register, its scope, and its relationship to the ships chosen for this project, is set out in Chapter 5. The level of detail just contained within the entries in the Lloyds' Register is significant. When

utilised as part of the investigation of a shipwreck site they can provide considerable information. Furthermore, all the ships around the coast of Britain are being looked at in the same way, at the same time, due to the standardised nature of the Lloyd's Register. There are many different influencing factors on technological uptake, and this is explored in Chapter 5. However, the nature of the Lloyd's Register and the associated surveys means it is possible to examine the adoption of technologies across different shipbuilders in different locations in Britain. This is a key part of looking at the technological developments in shipbuilding. The documents that make up the archive are even more significant because of the role they play in the assemblage of each ship. Although they have, to an extent, always been physically separated from the ship to which they relate, they are nevertheless a vital part of the material culture of each vessel. Looking at documentary sources, that have traditionally been used as an exclusively "historical" record, as components in an overall assemblage is not new. Indeed, much of the methodology set out in Chapter 4 builds on techniques and approaches utilised elsewhere (Satchell and Whitewright 2014; Whitewright and Satchell 2011). What is being done here is a refinement of these ideas, alongside assembling a strong framework of archaeological theory that can be used as a means for the exploration of technology and connectivity. An approach that should be relevant to the study of any period due to its use of different source types.

The objective is to approach the sources available to this project as components of "The Record" a single collection of material including documents, material remains, intangible aspects such as natural forces, and any other witnesses to the past. The basis for this approach is set out in Chapter 2, but this specific approach to multiple source types can be found in the work on *Stirling Castle* (Whitewright 2020). Recognising the role certain documents played in the function of a ship strengthens the case for drawing out examples of ships from those documents. In turn, adding ships to the overall numbers of case studies and increasing from the two extant examples to 200 in total, makes it a more realistic proposition to identify changes and shifts in the dataset and to prove if those changes are more than individual outliers. This dataset is a considerable amount of qualitative material, records of different kinds, surveys, manifests, pay books, to name just a few. Furthermore, there is a considerable difference in how some records are compiled. The Lloyds' Register itself undergoes several revisions in format and the information included for each ship throughout the 19th century. A dataset this large makes it possible to examine whether sources such as the Lloyd's Register can actually be used to give a comprehensive account of shipbuilding. We will rely on these 200 ships to enable the study of certain key elements of shipbuilding. Establishing a sample of this size will enable comparison between ships, or between regions, to see if there is any difference in the technologies being employed.

This thesis is the first step in looking at shipbuilding on this larger scale. The next chapter will set out the context of this project and how it fits into current approaches to the archaeology of ships and the archaeology of historical periods. A theoretical framework for the study of large, complex, and varied sources is also assembled in that chapter, showing how an assemblage-based approach can resolve many of the issues identified. Chapter 4 sets out a methodology to implement that theoretical framework recognising the scale, complexity, and multi-layered nature of the assemblage. That approach will enable examination of the source material concurrently and ensure the right questions are asked for each part of the record. The two research questions seek to establish the effectiveness of this approach using schooners as a test case. The first question focuses on "The Record", and our ability to see differences between individual ships' construction. Central to this project is the impact of industrialisation and whether this can be seen in The Record. The final question returns focus to the sources being used, examining the utility of the HEC archive and the potential for it to inform our understanding of 19th century seafaring. To aid that understanding a period-specific context is set out in Chapter 3. The way this approach is extended across the project's dataset is summarized in Chapter 5 with data from the HEC. Chapters 6 and 7 demonstrate this method on two shipwreck case studies. They provide proof of concept and show the amount of information that can be extracted from the

source material. Chapter 8 uses the results from these investigations to look at technological development and the wider picture of the 19th century Maritime World. Chapter 9 presents the project's conclusions.

This is new ground for the study of ships of this type. There is no doubt that excellent work has taken place on shipwreck sites dating to the 18th and 19th centuries (e.g., Auer and Belasus 2008; Cumming and Carter 1990; Ossowski 2008b; Whitewright and Satchell 2011 to name a few). However, there have been few examples of studies of 19th century ships that take on a total dataset the same size as this one. There have been some works that seek to relate ships from this period into a wider understanding of the technological development of the 19th century, such as Adams' (2013) discussion of the shipwreck *SL4* and the technological and social context for shipbuilding in that period. This thesis develops some of that work by expanding those discussions on a larger dataset. This is the next stage, the case studies in this thesis, alongside ships extracted from the documentary evidence and, where relevant, existing archaeological literature will be used to begin this process. This can only be a beginning; the scale of the shipbuilding industry in 19th century Britain alone dictates that anything further, within the limits of this thesis is unrealistic. The hope is that the discussions contained here, and the framework presented here, will be a useful starting point for further exploration of this area.

Chapter 2. Scholarly Context

2.1. Introduction:

The interpretative framework needed to undertake a study of 19th century shipbuilding develops through the following chapter. This review is essential to constructing the integrated theoretical framework around which the study of these topics can be built. Any framework will need to be able to interpret multiple source types consisting of both qualitative and quantitative data from a range of different origins. This thesis covers a significant timespan, 100 years (1800-1900), and tackles a dataset of considerable size (see Chapter 5, Appendix A, and Lloyd's Register Foundation Heritage and Education Centre 2022c, for more detail). In order to set out the context for this study and explain why it is necessary to engage with the data available in this way, this chapter will journey through a range of topics.

Central to the issues encountered in this review is the need for an investigation of the wider Maritime World within which ships are operating during the period under study. In short, looking at the bigger questions than the investigation of individual ship-finds. This need is raised throughout the literature dealing directly with ships and that focused on the archaeology of historic periods. A further challenge is presented by the fact that this area of study involves two separate archaeological sub-disciplines: "The Archaeology of Ships" in Section 2.2 and "Historical Archaeology" in Section 2.4. Each of these come with their own academic context and established methods of practice that must be reviewed and explored to be effectively integrated in the following discussion. However, even at this early stage the difficulties resulting from that sub-categorisation of archaeology are somewhat evident. There are useful data, analytical models, and ideas across the discipline. The only effect this categorisation has is to reduce the mobility of those ideas, which can be applied so effectively beyond their point of origin. What arises from this chapter is a suite of theoretical and methodological tools, showing that working beyond those self-imposed sub-categories can only improve the effectiveness of the investigation undertaken in this thesis.

The first topic to be dealt with to establish this framework in Section 2.2, is the issue of how shipbuilding has been approached and understood previously, in both archaeological and historical studies. The emergence and development of Maritime Archaeology as a scientific discipline in the mid-to-late 20th century was based around the study of shipwrecks which led to the discussion of shipbuilding. Throughout this early establishment of maritime thought the study of ships needed to be justified as a worthwhile archaeological pursuit. The determination to provide that justification encouraged significant work to set out, principally, how underwater sites could be investigated scientifically (e.g., Bass 1966 and especially 2011: 4-9; Bowens 2009; du Plat Taylor 1965; Gould 1983; Muckelroy 1978). Alongside this effort to demonstrate that a scientific method could be achieved, was the detailed publication of the archaeological investigations of ships. These publications showed the technological complexity of ships and the potential to inform about the Maritime World and its people (e.g., Adams *et al.* 1990; Bass 1967; Crumlin-Pedersen 1997; Green 1977; Martin 1975). Muckelroy's (1978:3) assertion that ships are *"the largest and most complex machines produced… [by a society]"* shows their importance to any investigation of past people. This scene setting helps to explain how and why the methodologies to investigate ships were established and how the current issue in Nautical Archaeology came to be, using ships as a means to approach wider themes and questions and challenge pre-existing narratives around seafaring and maritime connectivity. These works show that despite the efforts of what is even now a growing discipline, the wealth of information from individual sites and the true potential of ships to contribute to discussions of the past, is still developing. This sets out the first area in which this study can make its mark, looking beyond the individual archaeological examples in Chapters 6 and 7 (along with other published archaeological excavations and surveys) to study the forces and influences upon the 19th century shipbuilding industry in a way that the following review suggests has not been done before.

Whilst exploring the "the archaeology of ships" is a necessary undertaking, the focus must narrow onto British Shipbuilding in the 19th century. Specifically, the archaeology of Schooners, the ship-type this project will focus on as its case study. The reasons for this selection are set out in Section 2.3. The study of shipbuilding in this period has predominantly been dominated by naval historians (e.g., Grove 2017; Herman 2004; Robson 2014; Rodger 2005) and those concerned with the large trading entities such as the East India Company and its peers (e.g., Bowen 2002, 2006; Bowen et al. 2011; Nolan 2011; Woodman 2009a, 2009b). Meaning most of these studies are focused on large organisations with high investment and greater and greater forms of industrialisation. Most of these have been primarily historical in nature, drawing on the documentary evidence that makes this period so rich in information. It is that wealth of documentary evidence that draws the attention of this project and specifically the potential of combining those sources with the archaeological material. A detailed discussion of data collection for this project will be undertaken as part of the Methodology in Chapter 3. Some archaeological investigations must be explored as they are relevant to forming an understanding of how the Maritime World of the 19th century has been examined up to this point. What is clear from Section 2.3 is that despite an extensive documentary record, there are comparatively few completed archaeological investigations of merchant ships from this period. The limited archaeological footprint is despite a preponderance of surviving sites. The lack of investigation is in part down to a combination of an underdeveloped strategy for maritime archaeological investigation in the past leading to disjointed funding available for underwater investigations and inconsistent support for shipwreck studies (for a detailed discussion of this see Whitewright, 2020: 25). There has also been little interest in the hulked remains of ships beyond a few dedicated studies such as those by Milne *et al.* (1998) or a handful of commercial archaeology projects (Isle of Wight County Archaeology 2000; Museum of London Archaeology 2013). By far the most common origin of those hulks was as merchant ships that did not belong to any major trading concern like the EIC. It is possible this lack of interest is down to the sheer number of hulks that have been present on the coastline, although this is an assumption. Furthermore, it would appear from the literature that there has been only a limited engagement with the documentary evidence and none in the way this project sets out to do. Previous work with the *Lloyds Register of Shipping* (LRS) or the *Shipwreck Index of the British Isles*—published by the Lloyds Register—has mainly utilised these sources for single-ship investigations (e.g., Ossowski 2008a). Here is the next place this project can contribute, by expanding on the work done on 19th century ship-finds to examine how artefacts, people, ideas, and other forces impact upon one another. Therefore, allowing a study of how the period's key themes of industrialisation and globalisation affected (or not) the implementation of technologies.

The 19th century contains some of the most extensive historical material of any period. Planting the project firmly in the world of "Historical Archaeology", a field that has undergone considerable change since the archaeology of ships was established and is discussed in Section 2.4. Conducting archaeology in a historical period was another area that went through a process of justifying its own existence. Particularly in the 1990s there were pieces of literature that tried to establish the need for historical archaeology to move away from being history's wingman. It is now the case that both historians and archaeologists rely on an approach that takes advantage of both "documentary sources" and "material culture". For example, the approach by some historians in reading artefacts as "text" (Gallagher and Greenblatt 2000). However, there is more to do here. More recent publications highlight the importance of considering the role of documents as material culture and integrating them into archaeological studies more completely (Hodder 2012). This presents the possibility that the assemblages being encountered when examining a ship in this period are far larger than just the physical remains of the vessel itself. Those assemblages would include at the very least, the material remains of the ship, documents associated with its crew and ownership, surveys and insurance documentation, port records and cargo manifests. Those entire ships are just components of other larger assemblages in a period of global scope. Two remaining issues are how can a dataset of this

size be tackled, and how the huge range of sources contained by archives like the Lloyds' Register, can be managed.

Approaches to large datasets are a relatively new area for archaeologists. It is only recently that the tools have become available to engage with datasets of the size set out here. A review of "Big Data" and how it can be managed is in danger becoming dry and straying to areas of Computer Science and data modelling which are not the focus of this investigation. Nevertheless, a limited examination of what techniques are available to archaeologists is necessary. Primarily these are methodological concerns, and a full methodology is set out in Chapter 3. A point to make now, which will be reiterated throughout this thesis, is that the following study is not an attempt to examine anything close to the entire Lloyds Register. To do so is simply beyond the scope of this work and would require a much larger infrastructure. Nevertheless, the pieces that will be engaged with still represent a considerable and unwieldy chunk of information that presently does not reside in an easily accessible format.

It may seem impossible then to retain focus on what should be the core of any archaeological study of this nature: people and their stories. Is what is awaiting us a dreadful and dry thing full of nautical terms nobody understands and charts of numbers so numerous and vast as to have lost all meaning? No. Throughout this journey of context and background runs a central thread of archaeological understanding. By keeping our hand on this rope, it is possible to draw out stories and discoveries that will examine how change manifests, new technology is received, and why some things seem to stubbornly continue on in the face of all those other factors. This is not an under-studied period, there has been a lot of work focusing on shipping in the Royal Navy, or the East India Company, or more generally on the development of maritime trade. However, it is a period with no small amount of complacency regarding the capability of the data available to completely answer questions with relatively little reference to or inclusion of alternate sources, due in no small part to the presence substantial archives with very little incomplete material. "Archaeological Theory", that subject so dreaded by undergraduate students, will become our rope and stick. In Section 2.5, tools from Assemblage Thought and Process Archaeology will create the framework around which a methodology can be assembled and can be used to engage with the questions of technological change, globalisation, and industrialisation in shipbuilding. This thesis must ensure interpretation is presented in as straightforward a manner as possible. An approach will be taken that lends equal weight to things and people, recognising that ships can be considered as individual artefacts and as assemblages. Those "assemblages" should not just include traditional (in an archaeological sense) material "things", but also the ideas that went into their creation, the documents, the people involved, and the forces acting upon them (Jervis, 2019: 37).

2.2. The Study of Shipbuilding

The first timber in the hull is the considerable body of work represented by the archaeology of ships and shipbuilding. This section seeks to break down how this study of shipbuilding has developed, identifying the need for approaches to adapt and grow in response to changing datasets and modern archaeological techniques. Modern data management tools, computer processing, and in-field data collection, have radically changed what even a lone researcher is able to attempt (see Bransden 2022: 11-34). It is in this area that archaeologists are in danger of becoming complacent. Simply because something is well published does not mean the complete picture is available, or just because a massive dataset is stored somewhere does not mean it has been properly investigated, or even that the dataset contains everything we are told it does.

The first focused application of archaeological principles to an underwater shipwreck site took place in the late 1960s with the excavation at Cape Gelidonya (Bass 1967). The study of ships, often referred to as "Nautical Archaeology", is arguably the foundation of Maritime Archaeology as a

modern academic discipline (Bass 2011: 4-5; Muckelroy 1978: 10-11). Some areas related to the study of ships have changed very little over time. It is entirely reasonable to say that a comprehensive understanding exists of the basics of ship construction, in particular the areas below the waterline. Despite this the archaeology of ships was not always accepted as relevant to the study of archaeology. In the 1970s and 80s there were several publications justifying the work being done by archaeologists underwater (Gould 2000; Green 1990; Muckelroy 1978; Staniforth 2003; Steffy 1978; White 1995). Gould (1983) and Watson (1983), in the same volume, set out the merits for ship investigation, highlighting the potential of shipwrecks to contribute to the wider understanding of maritime connectivity and the development of technology.

Discussions around processual archaeology are deeply embedded into many of these first applications of archaeological techniques to underwater shipwrecks. Muckelroy deploys scientific, processual, perspectives and is a proponent of them in his book (Muckelroy 1978). The work on *Kennemerland* is an excellent example of this through the deployment of statistical analysis and modelling (Price and Muckelroy 1974). Another example specifically relevant to this project are McGrail's (1977, 1978) statistical approaches to shipbuilding traditions. These go on to include the work of Greenhill (1995; and Greenhill and Manning 1988) who will be encountered later as a major player in the study of 19th century shipping in Section 2.3. Gould's (1983) work represents a different, but no less significant approach. Gould's approach is best summed up by the title of his book "Shipwreck Anthropology" (*ibid.*). The aim being to study the social life and context of sites. This also encouraged a wider examination of 'world-systems' or the colonial archaeology of Europe's maritime empires. A point to make here is that these two approaches are inseparable and are not incompatible. Both represent essential lines of enquiry for a study of the 19th century Maritime World. The issue for this thesis is that addressing all these approaches within the word limits is challenging. Flatman and Staniforth (2006: 170) highlight a further influence on maritime archaeology that is directly relevant here. Studies in North America have been influenced by the work of Deetz (1977), a specifically contextual and historically particular approach.

These historically particular studies produce excellent, detailed, accounts of shipwreck sites. A good modern example is the work on *Stirling Castle* (Whitewright 2020), and whilst this is not exclusively a particularist study it does implement contextual approaches that would not be unfamiliar to Deetz. This is particularly effective when establishing the assemblage of individuals, events, other ships, organisations, and natural forces that *Stirling Castle* engaged with throughout its life (Whitewright 2020: 182). The outcome of that is an incredibly detailed account of the shipwreck extracted from key archaeological investigations over a 30-year period. This detail then allows for an investigation of that ship's connection to a wider system of Britain's Restoration-era and early 18th century Navy. What this means is that none of these individual approaches should be seen as exclusive or precluding the use of different cognitive tools or approaches. There will be detailed investigations of two shipwreck sites in this thesis (Chapters 6 and 7) which informs and is informed by, wider contextual discussion (Chapter 4 and 5) drawn from a macro-scale analysis of the archive of the Lloyd's Register. Together these different phases of the investigation will allow the exploration the 19th century Maritime World from a new perspective, that of working coastal shipping.

A principal part of the investigation of shipwreck sites was the study of how those ships were built. As most wrecks were found devoid of any rigging or topside infrastructure, focus was given to the hull components that were most commonly preserved. A lot of focus was given to understanding site formation processes and systems of wrecking, first by Muckelroy in his work on the *Kennemerland* excavation (Price and Muckelroy 1974: 260-62). This was yet another part of the process by which archaeologists focusing on ships set out to ensure their sites were seen as a relevant field of study. From the very beginning, Muckelroy (1978) deals directly with ships excluding terrestrial ship-finds, and shoreline and coastal communities as these were already the domain of terrestrial archaeologists

and not part of the new area of study he was arguing for. These are types of sites areas now considered as part of modern maritime archaeology. Muckelroy (*ibid.*) did not limit his focus to ships however, he included all other aspects of seafaring although did omit other areas such as the study of submerged landscapes. His book details the basics of how to investigate shipwreck sites (*ibid:* 157-214) and concepts of ship-construction (*ibid*: 59-69 and 131-38). It is certainly the case that maritime archaeology is a good area to test and develop approaches to archaeology more generally, both methodologically—as this section has explored—and theoretically (see Basch 1972; Gibbins and Adams 2001; Dolwick 2008, 2009; Adams 2013 and Section 2.5). The study of ships was certainly the dominant force in maritime archaeology prior to the 2000s, due in no small part, to the degrees of preservation available to different periods and the prevalence of ship-finds—especially in historic periods. The focus on watercraft is a product of this prevalence and the level of detail it is possible to extract from such sites. It is also likely that the existence of distinct genres of history (such as naval history) and English (in the form of maritime literature and works contemplating the sea) muddies the waters and makes studies of historic ships seem far more numerous in the discipline today. However, as this thesis will show, the study of ships whether through archival analysis or archaeological investigation also has considerable potential to inform on the wider Maritime World. The study of shipwrecks is a considerable part of the literature in Maritime Archaeology towards the end of the 20th century. This focus resulted in a clear methodology to investigate a shipwreck archaeologically. Scientific investigations were now possible even in very challenging conditions resulting in detailed archaeological outputs, such as those from the Goodwin Sands (Pascoe *et al.* 2015), Thames Estuary (Auer and Maarleveld 2014), and the Solent (Rule 1982; Middleton *et al.* 2017) to name just a few local examples.

Methodological processes are not the primary concern of this section. Nevertheless, they are an essential part of the discussion around individual shipwrecks that are needed to understand the context of the wreck and how the site should be approached. There are broadly speaking, two main ways archaeologists approach the recording of a ship. Each of these convey very different information and are useful for very different types of sites. Lines plans convey details about hull-form and design. They are primarily used to record extant and complete vessels to provide the shape of the entire hull in the manner a shipbuilder might use to build that same vessel. Archaeological site plans focus on recording what is *in situ* in detail, therefore picking up individual components and their context. Upsettingly the detail within an archaeological site plan can vary considerably. The importance of detailed and clear archaeological recording cannot be overstated. Good examples of this are the excavation at Cape Gelidonya (Bass 1967) and the excavation of *Mary Rose* (Rule 1982). These sites, both in difficult conditions to conduct any form of excavation, produced high quality and detailed data. The archaeological investigations of ships in the 'intertidal zone" are where things become more frustrating. Often these investigations were surveys made of hulked ships and wreck sites, such as those recorded by MacGregor (1980: 126). Whilst these have produced extremely detailed lines plans for the ship, there is no archaeological site plan as would now be expected from an archaeological investigation today. This, in part, may be due to the reasons for these investigations. MacGregor's recording was used to place ships within his own dataset ordered by ship type and hull form. In this case detailed archaeological plans would have been of limited use, however helpful they would be to us now. By contrast an exploration of the Medway in the 1990s produced only archaeological recordings, without lines plans (Milne *et al.* 1998). The choice of plans on the Medway might also have been influenced by the fact this was a rescue operation trying to record the hulks rapidly before they could be cut up or destroyed (Milne *et al.* 1998: 1). For this project the work on the Medway has considerable utility due to the ability to examine and compare archaeological results. Although as both examples deal with extant ships and hulks (ships moored or abandoned permanently) the lack of both types of output in each study is a shortcoming and reduces their utility.

A good example of the issues raised by not completing a detailed site plan is the *Rhoda Mary* (built 1864), a ship that will be returned to in Chapter 7 as one of this project's case studies. The site was visited and surveyed by MacGregor and Greenhill whilst mostly complete and the lines were taken (MacGregor 1982 and in detail in MacGregor 1997: 62-5). The hulk has since been subject to major degradation in the form of a fire alongside normal processes of erosion, leaving a much-reduced archaeological footprint. The use of lines plans is limited to sites where the hulk or wreck is relatively complete, and where the understanding of the ship's hull form and design is fairly comprehensive. Studies such as those conducted by McKee (1983) in his study of working boats produced detailed line plans of boats that were still in functioning service. If the design method of a ship can be identified from the archaeological remains a lines plan can be reconstructed. Although this does require a specialist and technical understanding of ship design and hull form. Lines plans can inform on how ships will function and are particularly useful when combined with modelling techniques from ship science and marine architecture that can relate details on performance. In a purely archaeological study, their utility can be more limited and certainly do not relay the same type of information as an archaeological site plan. There is no need for this project to discuss 19th century ship design and performance as this has been thoroughly studied already (Cannon 2019).

Modern maritime archaeology has shifted to include a focus on materials and understanding technologies alongside hull form and ship design. However, there are still issues with how sites are recorded. The advent of Real-time Kinematic (or RTK) GPS systems has made it possible for sites to be recorded with millimetric detail relatively quickly (Leckebusch 2005: 199-200). Unfortunately, these systems are not always employed, and where they are the data is not always processed to a final plan beyond a series of points (for example Berry, Stratford, and Brown 2018: 65). Furthermore, the advent of digital photography has made it possible for very rapid surveys to take place simply taking a visual record of a site (Schlitz 2018). These are a useful tool in management and monitoring but cannot substitute for an actual archaeological site plan. The latest revolution in UAVs and Drones along with the integration of photogrammetric techniques into archaeological methodologies is another area with the potential for varied data quality (Campana 2017). Utilisation of drone photography to produce ortho-rectified photographs and Digital Elevation Models means a significant amount of data can be generated from very little time in the field. These outputs can contribute to the production of detailed site plans and records useful for both archaeological studies like this one and monitoring or management strategies. As with RTK data this requires some post-processing to make it usable by a wider audience. Chapters 6 and 7 in this thesis set out to demonstrate how shipwrecks can be investigated, using many of the above techniques to produce a detailed record of an archaeological site.

However, it is not just about producing a detailed report of an individual wreck site. Recent developments in Maritime Archaeology have focused on a perceived lack of scope in archaeological investigations. Harpster (2013: 611) explains that an issue arising from the literature is the focus on producing detailed individual reports without any work to integrate these into a wider Maritime Cultural Landscape. Harpsters comments point us toward a similar point by Gould (1983: 8-9), that archaeologists must come to a point where the sites being explored are carefully selected and collected data is being subject to detailed analysis, not a continuation of shipwreck sites being investigated based on what is encountered by chance with no wider strategy. This in turn is similar to comments Flatman (2003; Flatman and Staniforth 2006: 172) has made that the trajectory for maritime archaeology remains driven by reactions to chance vessel discoveries and not a coherent research strategy. However, this feels like an unfair generalisation. A research strategy does exist for Maritime Archaeology in England (Dellino-Musgrave and Ransley 2013) and this thesis will relate some of its findings to the key questions it asks for the 'Early Modern' period that covers the 19th century. Furthermore, there are significant pieces of work taking place in maritime contexts that are entirely driven by a progressive focus on wider interdisciplinary opportunities—such as the recent

Black Sea Maritime Archaeology Project (2022) and the UKRI's Towards a National Collection (2022) (TaNC) project for Maritime Heritage Data: Unpath'd Waters.

From these arguments it seems more must be done than excavate a shipwreck site and produce a detailed report identifying the individual vessel and a location it started its journey from or its country of origin. A further point Harpster (2013: 589) makes is that Maritime Archaeology in very historical periods has been historically particular, relying on fitting ship finds into a pre-constructed historical narrative. There are aspects of Harpster's analysis that this thesis takes exception to. Harpster's (ibid.) paper fails to reasonably evaluate the reasons for certain individual reports and the scope of the projects that produced them because ship archaeology is often being deployed in a rescue or reactive context. Critiquing reaction to chance finds ignores the fact that these are becoming increasingly more common. This increase is due to process of coastal erosion and sea-level rise that are either exposing sites previously unknown or demanding intervention of archaeologists for sites now at risk of loss which often must be limited to rapid, descriptive, recording. It is unavoidable that work on these types of sites would have an impact on the overall focus of maritime archaeology. However, there is a more explicit issue with Harpster's (ibid.) assertion which is that many reports are not isolated from a wider context at all. Some of the most detailed pieces of work undertaken in the last thirty years utilise that focus and the fine-grained nature of their work to inform significant studies of the wider Maritime World (e.g., Adams *et al.* 1990; Graham *et al.* 2019; Ossowski 2008b; Whitewright 2020). These publications may seem site-specific and particularist but provide a lens through which wider aspects of their relative contexts can be seen in new or different ways. Adams (2013) has also addressed this issue. One of the central examples is the focus on finding the name and identity of an individual ship. Adams (2013: 48) explains that ship-finds do not require identification and dating via historical sources to be useful. They have their own story to tell and that can be extracted through archaeological interpretation. In Adams' own words (*ibid*: 48):

"Their remains carry meaning in ways that both complement and add to historical texts..."

That is not to say that the identification of a ship has no use at all. Identification is the only way to extract specific biographical details of the ship and its life, which in turn has considerable influence on public engagement and establishing a site's wider context. To understand how the Maritime Cultural Landscape (Westerdahl 1992 and 2011) of a period developed and how people engaged in maritime connectivity, all the components of ship must be considered. This is because development of shipbuilding was not driven solely by new designs and hull forms but also included new materials, structural components and, eventually, propulsion systems and more. It is not enough to look at one piece of a ship above any other, such as considering the surviving hull timbers as more relevant than a contemporaneous surveyor's report. Each of these components is part of a wider assemblage of people, tools, ideas, artefacts, and forces acting upon and influencing each other. Approaching the development of shipbuilding technology in this way is set out most significantly in Adams' work (Adams *et al.*1990; Adams 2001, 2013). It is these works, particularly *A Maritime Archaeology of Ships* (2013), that establish fundamental ideas of how to look at shipbuilding and the Maritime World. This book also set out the need to critically engage not only with archaeological material but also other source types, such as historical documents. To fully examine the development of shipbuilding technologies it is essential to work beyond a single source (see Section 2.4). The need to interpret ship-finds in this way is further supported by Pomey (2011:25-6). Due to the size and variety of the dataset for the 18th and 19th century, a concurrent methodology is essential to enable the use of multiple sources to study ship construction. Adams (2013: 48) advocates for this approach in historical periods, although his example is a century earlier than the period this thesis examines. To properly implement this methodology the way different source types, such as documents and ship-finds, are approached must be made clear. Adams' approach allows us to examine the complex,

interrelated nature of the components of a ship and recognises it is a component of another much larger system.

The system ships operate in is subject to a wide variety of influences. Adams's (2013: 23 Figure 2.1) widely cited diagram (Figure 2.1) effectively explains what these factors are, even though its focus is on the influences on how watercraft came into being. At present the historical accounts for 19th century shipping consist of narrative and descriptive material, so the incorporation of archaeological materials to this study will be extremely valuable. The detail offered by an assemblage as complex as just a single ship could be vastly useful in our understanding of the impacts of globalisation and industrialisation in the 19th century. Increasingly "Archaeological Theory" has become a vital component of the archaeology of ships, encouraged by that previously mentioned potential for ships to contribute to discussions of technology and the society of a period. One issue that is continuously highlighted is the need for an understanding of the social elements impacting the construction of technology alongside mechanical and functional factors (Oldenziel, 1996: 55; Dolwick 2008: 25; Dolwick 2009: 21-22). The construction of technology, or how ideas change, are implemented, and abandoned has been the subject of a much wider debate. Oldenziel (1996) and Dolwick (2008) have each shown different social influences on technologies. The work of Ingold (1993) has also explored a more practical perspective around implementation and use. This matters in the study of ships which, alongside being machines have at times been considered societies in their own right (Muckelroy 1978: 221). The external social pressures that can influence development or continuation of a technology include issues that are economic, political, and the need to define a group's identity (Ingold, 1993: 123-4). This is a wide range of pressures and serves to illustrate how ships not only comprise a social space but are also an individual actor in a much wider network. Choices can also be deeply personal, factors like the geographic origin of the timber used, can have a significant impact on how the ship is viewed (Whitewright and Satchell 2011: 52). This shows that such considerations reflect the social environment of the period as well as the physical one. The construction of a ship and the ship itself are multi-levelled networks, influenced by a multitude of actors other than just the social component.

The archaeological study of ships offers the chance to examine these technological influences and allows for an examination of the extent to which technologies are implemented. Technological development is not always a straight line from A to B (Whitewright 2008: 17), although things are more complicated even than this. Over the timespan of a single cultural context, in other words in a short period of time, development can seem linear (Whitewright 2008: 10), but this does not reflect technological change in the long-term. Sometimes development does take place in a straight(ish) line but over shorter timescales, with technological change really being multiple lines of development taking place concurrently (Whitewright 2008: 194). Therefore, instead of studying technology as a sequence of steps from one to another, it should be thought of as a more nuanced situation. This will become relevant to this thesis in Chapter 8. There are a wide range of influences on and reasons for, a new technological adoption (see Figure 2.1 and Adams 2001: 301; Whitewright 2008: 17). The study of technology and the dissemination of knowledge is an area of thought that has been especially strong within the study of ships. Understanding how shipwrights approached the construction of a vessel, their conceptual process, is an essential part of drawing together all the different parts of the assemblages we are concerned with. The current literature suggests that where boat builders are concerned their process of conceiving and realising the boat is almost entirely mental (McKee 1983; Dhoop and Olaberria 2015; Olaberria 2018). The boat is not made up as the builder goes along but relies on a mixture of habit, an expert eye, and the use of rules of thumb (McKee 1983: 45). Dhoop and Olaberria (2015) have also identified the use of shipbuilding techniques of this type in an earlier archaeological context of wooden shipbuilding. This is not all that different to how shipbuilders would have approached their task for larger vessels. Supporting this project are McKee's (1983) thoughts on the attitudes of boat builders to their own individuality and to change. As boat or shipbuilders require

a customer base it is important to establish a reputation that will encourage people to continue using the boats they produce. McKee explains that boat builders have an individualistic approach to their work, believing that the way they conceive and build a boat is the best way (1983: 45). Captain Washington's Report on fishing vessels in Scotland conducted in 1848 seems to support this as he, in an aside, appeals to Scottish boatbuilders to not be prejudiced against elements of boat designs taken from areas like Cornwall (Washington, 1848: xxii Appendix No. 21 & 23).

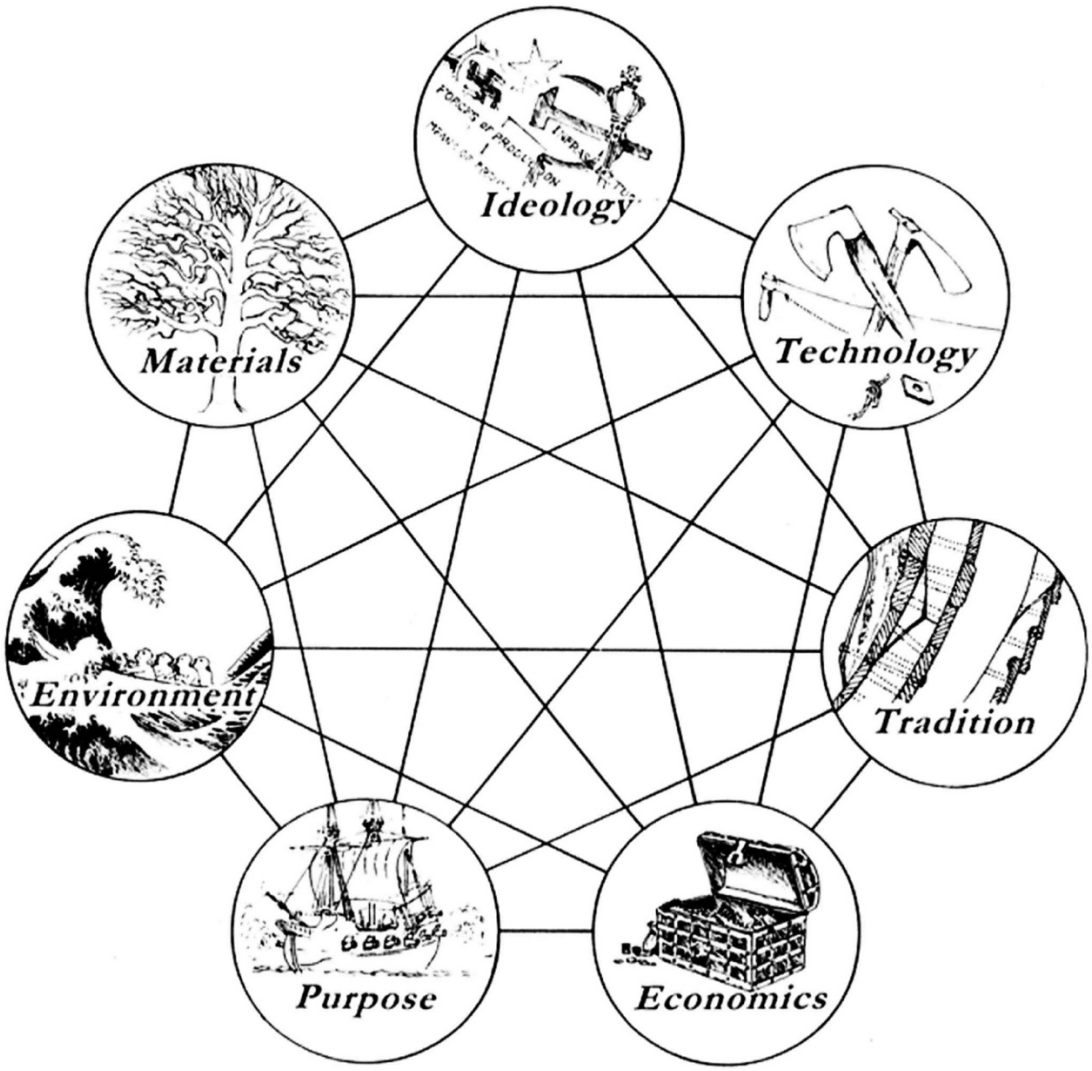


Figure 2.1: Adams' (2013: 23 Figure 2.1) diagram showing a basic outline of how different factors can influence the whole process of how watercraft come into existence.

This is the current state of the archaeological study of ships. The investigation of a vessel can provide an identity, an origin, and the details of cargo or armament. However, this is often seen as the end point of archaeological investigation being the final points made in site reports (for example: Adams 1974; Johnston *et al.* 1978; Karklins 1991). This has been the norm in Maritime Archaeology for some time despite legitimate criticism of a lack of wider focus and the issues conferred by historical particularism when dealing with individual ships. These are issues archaeology is now beginning to move past. Adams' work (2013: 48) is the first step in encouraging an archaeology of ships that takes the information found from the investigation of a site and uses it to study the Maritime Cultural Landscape and wider world that ship was a part of. There are now detailed and in-depth studies of the development and adoption of technology. The inclusion of social and archaeological theory is allowing investigations that do not depend on tying a site to an existing narrative. This thesis intends

to continue this pathway, studying ships as a means to examine changing technologies and the impact of industrialisation and globalisation on people in this period. This is something that has not yet been performed in the study of 19th century ships: an integration of documentary and archaeological evidence to look at the key themes and influences on people and their stories.

2.3. 19th Century Shipbuilding

Maritime processes of globalisation are increasingly identifiable in the 18th and 19th Centuries through establishment of global empires, colonialism, and trade systems. This follows a period of state formation by Europe's maritime powers in the 15th, 16th and 17th Centuries (Adams 2013: 86-87). Maritime activities are at the heart of the period's political, economic, and social influences. Shipbuilding was the most visible of those activities, as demonstrated by the appearance of large warships and the economic importance of seaborne trade (McAleer 2011: 14-15). Britain, as the pre-eminent seagoing empire, is essential to any study of globalisation in the 18th and 19th Centuries (Ferguson 2007: 51-52). In Britain's case, local maritime activity around the coast has been argued to support international trade and colonialism (Finch 1976: 14-17). Discussions of maritime routes from other periods suggest a different role, as for maritime expansion in the Mediterranean, that local trade systems provide the seafaring knowledge to sustain larger, longer, and more complex routes (e.g., Broodbank 2013; Horden and Purcell 2000). Regardless of the role of this local-level trade, the domestic movement of goods in this period is primarily maritime and carried in coastal vessels. Ships were needed for bulk supply and the fast transport of cargo. Their effectiveness was constantly influenced and refined by a range of factors like insurance requirements, cargo and tonnage calculations, and crew size. These influences and the importance of the role they play, make ordinary coastal vessels the ideal candidate to examine the extent to which technologies are changing in ship construction, if at all.

The vessels that will be used in this thesis to explore changes in technology are schooners. There has been some previous work carried out by MacGregor (1973; 1982; 2001) and Greenhill (1941; 1978; 1980; 1988; 1993; Greenhill and Manning 1988) on the subject of merchant schooners. The definition of a "Schooner" as used throughout all these works is the one chosen for this project, that of a ship with a fore-and-aft sail rigged on each mast. However, MacGregor's (1973; 1982; 2001) works also identify the range of different schooner-type rigs available and therefore the diversity represented in just one ship type. Consequently, a clear picture of what a schooner is defined as for this project is needed. For the purposes of sampling the dataset used for this project any other schooner-type rigs will be avoided to minimise the chance of introducing extra complexity or misunderstanding. This means type of ship of interest to this project is a wooden-hulled sailing vessel with two or more masts, rigged with fore-and-aft sails on every mast, regardless of how many masts there are. These are the ships labelled as 'Schooner' or 'Sr' in the Lloyd's Register of Shipping. In the 19th century schooners were most commonly rigged with two or three masts but could have as many as seven. In fact, ships are regularly converted between the two and three-masted rigs with masts added or removed depending on an owner or master's preference or need. Chapter 7 explores a ship that underwent this modification. So, we should not consider the number of masts as a limit on a ship being defined as a schooner or not, as long as there is more than one, as one mast rigged with a fore-and-aft sail would be a cutter. In the 19th century ships were identified by the rig they carried. In the 17th and 18th centuries ships were often identified using their hull forms, such as a snow or cat defined by the shape of the stern, towards then end of the 18th century and then in the 19th century sailing vessels were instead identified through their sailing rig.

The wider Maritime World of Britain in the 18th and 19th Centuries those schooners were active within has been subject to a significant amount of literature. Primarily originating from a naval history position, often looking at the development of Britain as a naval power (e.g., Cock 2001; Lincoln 2002; Knight 2003; Gardiner and Lavery 2004; Rodger 2004). There is also a considerable body of literature

that deals with the East India Company (EIC) due to its role in the development of the British Empire and its dominance of trade to and from India and China (e.g., Keay 1991; Bowen 2002, 2006; Bowen *et al.* 2011; Lawson 2014). These are large-scale studies of two of the biggest "maritime institutions" (the Royal Navy and the EIC) in this period. There is some value for this project in the background provided by the research focusing on these institutions. Research on the Royal Navy highlighted the role of private shipyards (e.g., Knight 2003), such as that at Buckler's Hard in the New Forest (Holland 1985), in producing warships. However, studies of ships in this period predominantly focus on large vessels or warships. There has been much less work looking at those smaller coasting ships which are involved in every industry, such as through supply chains supplying raw materials.

The existing scholarship on the Royal Navy and EIC are for the most part large-scale studies attempting to cover all the activity of each establishment over a given timeframe. The EIC has been subjected to many academic studies, based almost exclusively on historical evidence (Chaudhuri 1978; Keay 1991; Baber 1996; Marshall 1998; Tuck 1998; Sutton 2000; Bowen 2002, 2006; Lawson 2014). Perhaps the most interesting to this study is Sutton's (2000) as it deals with the Company's shipping and studies the adoption of metal frameworks, sheathing and other technologies. Sutton's book relies heavily on historical records kept by the EIC. Where framework and hull construction are discussed, no account is made for the variation that may occur from one vessel to another. The same issues can be found in other publications such as Bowen's (2006) mainly focusing on the economics and systems that run the company. Publications relating to the navy deal with a long historical tradition, often broken down by period. Rodger (1986 and 2004) deals with almost all the elements of the Navy's existence between 1649-1815. There are other similar texts that focus on or around this period (Marcus 1971; Goodwin 1987; Lavery 1987, 2004; Harding 1995; Gardiner 2004). These works deal mostly in the historical record, useful as it can help to explain issues behind decisions made within the Navy's complex administration. Private shipyards have very little presence in the historical record. They have previously been studied from the perspective of Navy contracts (MacGregor 1988; Gardiner 2000; Knight 2003;) although some work has been done to look at private yards themselves (Holland 1985; Doe 2006).

By contrast there are relatively few works specifically dealing with Merchant Shipping in this period. Three authors represent almost the entire body of literature focusing on the topic. A series of books by David MacGregor (1980; 1982; 1984a; 1984b; 1988; 1997) and Basil Greenhill (1978, 1980, 1988) utilise original ship plans alongside lines drawings resulting from surveys conducted on shipwrecks and surviving vessels. Secondly, Richard Woodman (2009a; 2009b) has also produced a historical study of the Merchant Navy partly dealing with the period this project is concerned with. These books represent the main research into this period, produced in the latter-half of the 20th century, and there has been no revision of that material since. A point worth making is that these are primarily descriptive historical works, presenting a narrative of the Merchant Navy (in Woodman's case) and ship types (in MacGregor's case).

Specific studies looking at Britain's shipbuilding industry often focus on total tonnage represented by merchant shipping at various periods (Davis 1972). It is possible that these figures are used because the total tonnage figures are relatively easily extracted from data sources like the Lloyds' Register. The investigation presented in this thesis will go on to show some of the other data that could be extracted from the Lloyds Register, particularly with the benefit of modern computing power and advancements in data processing and visualisation software. This represents one of the biggest gaps in studies of 19th century shipbuilding. There is an enormous amount of data available in a variety of formats which has hardly been explored at all. Convenient statistics such as "tonnage" are used despite the fact that such figures are rarely as simple as they may seem. Tonnage is calculated in multiple different ways across the period. Much the same is true of the Lloyds' Register which itself undergoes several revisions in format and the details it records as the period goes on, meaning it is

not as simple as generalising the data across the period as has been suggested in some literature (Gould 1983:6-7; Staniforth 2003:17). The result is that what is often held as a vast and complete dataset awaiting dedicated study is in fact a complex range of different data sources and formats, of varying degree of completeness, and gathered under a single name, an issue explored in more detail in Chapter 5. Fortunately, recent maritime archaeological studies have begun to test this data source (e.g., Ossowski 2008a; Satchell and Whitewright 2014). It is here that the archaeological literature shows its relevance to this project.

Those recent archaeological studies relate to shipwrecks of British ships that have been subject to archaeological investigation. From the outset it is obvious that the level of detail these investigations have gone into varies considerably. This variance is due to the reasons each study has been undertaken, ranging from rescue archaeology (such as Stratford and Berry 2008 or Whitewright and Tidbury 2014) to the detailed investigation of shipwreck sites by Maritime Archaeology focused research organisations (such as Ossowski 2008b, or Whitewright and Satchell 2011). It was briefly discussed in Section 2.2 that there are several different methodologies open to archaeologists looking to investigate an archaeological site. It is apparent from these sites that the archaeological data available for this study is not consistent and is limited to only a few vessels. The methods used and the nature of the investigations undertaken are essential to understanding that variety in archaeological data. Often these are rapid surveys or "rescue" investigations as sites emerge from storm events (e.g. Bamburgh: Stratford & Berry 2013) or hulks are broken up and removed from riverbanks and coastlines (e.g. Milne *et al,* 1998). The most common type of ship that has been studied are collier-type vessels (Adams *et al.* 1990; Auer and Belasus 2008; Ossowski 2008b). Even though these are not the "schooner" type ship defined for this project, the information from these publications is still useful. The dating evidence from non-schooner ship types in this period is helpful when identifying the presence or absence of certain technologies. As Section 2.2 discussed, the archaeological study of ships even where the number of case studies are limited, can contribute significantly to projects like this one. The combination of the detail available from these sites with the expansive documentary evidence from this period, will only make that contribution more significant.

Adams *et al*'s (1990) work on *SL4* is a guide to the amount of information that can be obtained from even a partial ship-find. This work presents key ideas and theories utilised regularly by archaeologists dealing with ships from this period. Specifically, the use of certain fastening types and the presence of sheathing to identify and date ship-finds (*ibid* 1990: 124 & 130). These ideas are used frequently in the study of ships from the 18th and 19th Centuries. In part this is because clear dates have been established for the introduction of some of these technologies. For example: the introduction of metal sheathing (McCarthy 1996: 203), the patenting of Muntz metal (Carlson *et al.* 2010: 80), the use of iron framework (Stammers 2001: 115), and the introduction of copper-fastenings (McCarthy 1996: 203), see Section 5.4.3, and Tables 5.3 and 5.4 for a full breakdown of these technologies. Already the considerable contribution provided by the extensive historical information present from this period is apparent in providing these dates. However, these studies continue to be limited to individual ship-finds. Unlike with the Royal Navy or EIC there is no wider study of these ships and the impact of changing technologies on how they were constructed. Both the *Water Nymph* (Auer and Belasus 2008) and the *General Carlton* (Ossowski 2008b) are extensively surveyed and recorded sites. Unfortunately, as with the other examples the identity and individual history of the vessel are the primary aim of those investigations. The work done on the *Flower of Ugie* (Whitewright and Satchell 2011) comes closest to resolving this issue. The ship is identified with some certainty, detailed recordings have been made of the remains present on the seabed, and the vessel's biography is established. This is then expanded upon to show the ship's role in the wider Maritime World of the mid-19th century (Whitewright 2011c: 55-62). This work was done utilising the information contained in the Lloyd's Register along with other historical documentation (Whitewright 2011c: 49-52). This

builds on the information regarding the dates for the introduction of certain technologies by establishing some of the reasons for their adoption.

A further point raised by some of the above literature is the presence of a regional shipbuilding tradition in Britain. Specifically, a tradition has been suggested for shipbuilding in the North-east of England (Adams *et al* 1990: 124; Whitewright 2011a: 42). From historical studies it appears ships built in the North-east were renowned as strong and seaworthy vessels (Whitworth 1991: 15). A reputation supported more than once in the literature by the anecdote of Captain James Cook's *Endeavour* purportedly chosen by the Admiralty specifically due to the strength of the reputation of Whitby built ships (Baines 2008: 101-103; MacGregor 1980: 47-50). The archaeological basis for a shipbuilding tradition in the North-east has been established by several different sites. One of the first cases of a regional identification can be found in Adams *et al.*'s (1990: 124) investigation of *SL4*. The presence of different techniques to fasten treenails (see Figure 2.2) and the use of iron straps to secure deck beams (*ibid:* 114, 124*)* which were a technique specifically the product of Sunderland's shipbuilders, is used to establish a North-east of England origin for the ship. This regionality has then been further developed, two of the most detailed studies of this type are that of *General Carlton* (Ossowski 2008a: 37) and the *Flower of Ugie* (Whitewright 2011a: 42). Regionality has therefore been securely established in the archaeological literature. Meaning that whilst this project is examining technological change, the effect of a regional shipbuilding tradition should be borne in mind. It is possible that certain technological choices are made within a regional tradition and this may impact the implementation of new technologies.

The ship's intended trade destination also has an impact on the technologies implemented in its construction. It is accepted wisdom that ships employed in trade to areas where shipworm is prevalent, require hull-sheathing, such as copper sheets, to protect their hulls from being eaten away by those marine borers (e.g., Whitewright 2011a: 40). This highlights the need to incorporate historical data. Shipwrecks are limited in the contextual information they can provide, with an assemblage that covers a much larger time depth than the immediate wrecking event (Adams 2013: 20). Context can be inferred from associated finds, such as ceramics or cargo. But, in reality, the wreck can provide very little certain information on where ships have been. This is particularly important in a period where there are exceptionally long lives for ships which can make multiple long-distance voyages a year. Extracting details about individual voyages from a shipwreck assemblage, even their final voyages, is extremely difficult (*ibid*: 20). It is also very easy to miss or misidentify other destinations in a ship's life, an issue complicated further by practices like transhipment (moving cargo to an intermediate destination and then on to its final delivery). Furthermore, ships remain an "open" context after their deposition. The two examples used in later chapters were both in service for over forty years (See Chapters 6 and 7). Other authors suggest that the destination, or trade market a certain ship is intended to be involved in, determines the rig-type selected and has a bearing on considerations such as crew size (Davis 1972: 197). However, even here things are not that simple. Ships frequently changed owners and would often be utilised for different trade routes and cargoes. What the interpretation of shipwreck assemblages does highlight is how historical records can contribute to the investigation of sites like these. The material remains on the site serve as an unassailable record of what took place, although with varying levels of completeness depending on the condition of the site. However, it is not always possible to extract all the forces, agents, and influences from the archaeological assemblage alone. Information contained within historical sources can support investigations, fill in gaps, and as will be explored in Section 2.5 forms a vital component of the shipwreck assemblage. The information it contains is as essential to the study of ships as the material remains of the ship itself. In short, it is clear that ships and shipbuilding technologies in this period are subject to a number of highly complex influences and their remains form similarly complex assemblages. Unfortunately, there is a limit to which of these influences can be dealt with in this thesis so the investigation here must be targeted carefully. It is important that the dataset chosen can well represent the large number of factors impacting shipbuilding and seaborne trade in this period.

Figure 2.2: Treenails from the wreck SL4 securing hull planking. The top treenail is secured with a square plug, indicative of a ship built in the North East of England (Adams et al. 1990: 117 Figure 146).

There is a huge range of new technologies in this period (Hobsbawn 1999: xi-xii), influencing almost every stage of the construction process. The ships used for coasting around Britain and Ireland were predominantly built locally rather than being the products of centralised yards, such as the East India Company's docks at Blackwall. Some coasting ship types are better studied than others. Colliers,

meaning ships that transport coal, have been subject to investigation through more (though a still limited number of) archaeological examples, than any other (e.g., Adams *et al.* 1990; Auer and Belasus 2008; Ossowski 2008b). Studies of colliers illuminate other industries, such as the Baltic timber trade, as the same hull form was used (Litwin 2008: 22-23). Another coasting ship-type, "Schooners" (ships with a fore-and-aft sail on each mast) have been studied in detail using historical sources (see Sections 2.1 and 2.2) but little work has been done from an archaeological perspective. Schooners have been chosen as the case study for this project due to their role as coastal trade vessels, as well as involvement in longer voyages, such as those to the Mediterranean and Baltic. Schooner rigged ships therefore sit in the marches between international merchant shipping, on routes such as those to India or China (a larger scale endeavour than the Mediterranean or Baltic trades), and local-scale coasting (an industry they participate in alongside the middle-distance voyages) (Greenhill 1988: 148-9). As a result, schooners are sensitive to influences from both scales, potentially meaning technologies were implemented on a case-by-case basis. Resulting in vessels of this type being subject to a perhaps the widest range of influences of any ship type in this period.

The development of schooners in Britain compared to North America, is another feature raised by MacGregor and Greenhill's work. According to MacGregor, schooners in Britain were sometimes built from "cutters", a small sailing ship built with a single mast rigged with a fore-and-aft sail. This process involves lengthening the cutter and adding another mast by sawing the cutter in half and inserting an additional section of hull (MacGregor 1997: 42-43). It is unclear how widespread such an approach was, and MacGregor is unclear on this point in his discussion. It seems highly suspect that this is how most schooners were built. Greenhill suggests schooners in North America were a highly specialized ship-type (Greenhill 1988: 8-9), often built on extreme lines such as the "Baltimore Clippers" prioritizing speed over cargo capacity. What this perhaps reflects is the nature of schooners in Britain being related to a merchant seafaring tradition that primarily sought cargo capacity over speed compared to an American tradition emphasising the opposite. There has already been some work exploring the construction tradition of American shipbuilding (MacGregor 1997; Thiesen 2006; Harley 2010). It is certainly the case that schooners were involved in bulk trades around the coast of Britain. Even fast schooners from Britain differ markedly from the Baltimore Clippers, misleadingly named as they are a schooner, which have a very different hull form to achieve the desired speed.

These differing building traditions raise the question of how influential these fast and specialised American designs were on British shipbuilding. The Royal Navy certainly purchased fast American schooners for use as packet vessels (MacGregor 1997: 41-42), an application that required fast ships at the expense of cargo space. This shows that even within quite a restricted dataset there are significant questions regarding the nature of maritime connectivity and the development of technologies. It is certainly possible that in studying the development of ship-types with this in mind further areas from the *Maritime Research Agenda for England* (Dellino-Musgrave and Ransley 2013: 176-182) could be addressed, specifically around the impact of maritime networks in the Early Modern and Industrial period. This publication is the research agenda discussed in Section 2.2 and shows the relevance of the work being done in this thesis for key issues that have been highlighted for investigation using Britain's Maritime Heritage Record. The aim is not to answer these questions explicitly in this thesis, but to contribute information and highlight a dataset that is relevant to the agenda. The most relevant, but not the only, areas for this project are the following:

"What were the non-naval influences on innovation in ship design? Can we see the effects of industrialisation and expansion of certain industries or the interaction between shipbuilding traditions in colonial and English yards?" (ibid: 176)

and

"To what extent was the implementation of design principles consistent? Can shipwrecks demonstrate the small variations in naval ship design and nuance the prevailing, rather hegemonic narrative of ship design and maritime conflict?". (ibid: 176)

Although the second set of questions references naval ship design, the question is no less relevant for non-naval shipbuilding. The divergence of civilian shipbuilding from naval shipbuilding is referenced elsewhere in the same chapter (ibid: 173). Merchant shipping in 19th century Britain would have been built in one of two types of location. Either within formal shipyards, such as those at Blackwall in London used by the EIC, or Whitby in Yorkshire for example. Or, in much less formalised coastal and riverine contexts. These latter shipbuilding sites would be much more ephemeral and all that was really needed was a suitably open stretch of riverbank and access to a supply of timber. There are several areas where the exploration of shipbuilding sites is highlighted as an area that could shed light on questions around the impact of expanding global trade and industrialisation (ibid: 176). The exploration of shipwreck sites can be used to answer the same questions. The use of a different dataset should provide another perspective on these themes and highlight further research areas. The need to integrate other source types from the period, such as those documentary sources represented by the Lloyds' Register, is therefore quite clear.

The key source this thesis seeks to explore is the documentary archive of what is today the Lloyd's Register Foundation, a charitable organisation that owns and operates Lloyd's Register. At the time of writing Lloyd's Register enacts maritime surveying and registration of vessels and is particularly important to merchant shipping and as part of the process by which ships are sold and insured. Lloyd's Register Foundation also presents a clear message that the organisation's aim is to advocate for and enhance safety at sea through its work and the deployment of its resources. In the 19th century things were slightly different. For a start there was no charitable organisation responsible for the operation of these services. Lloyd's Register was a for-profit organisation that existed to protect the interests of merchants and shipowners by establishing the condition of ships and by creating a system that would allow new ships to be rated based on the quality of their construction, materials used, and the rigging and other operational components deployed. There is a deeper examination of this process presented in Section 3.6 and Section 5.4. The core document this thesis is most interested in is the *Lloyd's Register of Shipping* (LRS) this was a book published annually for its subscribers, in two volumes, one for shipowners and one for insurance underwriters, although each contained broadly the same information. Each year the book detailed all the individual ships that had been registered with Lloyd's Register. It is worth noting that they were not the only organisation of this kind in operation in the 19th century, often there was a register related to a specific port, such as Plymouth, and other nations had their own versions as well. Ships were entered into the LRS through the process of registration. To undergo registration a ship had to be surveyed by the local surveyor who was based at one of the Lloyd's Register's official survey ports. The list of survey ports was updated every year and a copy is included in the preamble of each year's LRS. The process of survey recorded the different components and materials used in the ship's construction following a predesigned template and recorded in a standardised form, although the exact wording and format of these documents changes throughout the century. The investigation of the *Rhoda Mary* demonstrates the utility of these documents to an archaeological investigation. Although at the time of writing for this thesis the survey reports for other vessels were unavailable due to issues created by the Covid-19 pandemic which closed the archive of the Lloyd's Register Foundation. The information from the survey was then used to establish the characterisation rating for that ship which was recorded when it was entered into the LRS.

The main function of the LRS was to establish the characterisation of each ship and so allow the owner to obtain insurance for the cargo. Characterisation was was done through a series of letters and numbers and refers to the age of a ship, how well a ship conformed to the requirements for each

rank and its general state of repair and upkeep. The system itself is straightforward once explained. To aid in that explanation this section references ships from the dataset used later in this thesis and recorded in Appendix A, the process for the selection of these ships is explained in Section 4.4. Ships are given an "A" rating when new and this progressively downgrades through "AE", then "E", and eventually "I" as they age. As an example, this can be seen in the life of the schooner *Quarry Maid* (1841-66, Appendix A.132) which moves from A to AE before it founders. Sometimes, repairs are undertaken which restores a ship's characterisation back to "A" as is the case with another schooner *Napthali* (1843-86, Appendix A.113) which is restored in 1864 from an AE rating to an A. Essentially the longer a ship is alive, the lower its characterisation will be unless there has been a repair of some kind. The nature of that repair will be specific to each ship and the regrading, from AE to A for example, would only take place following a new survey being undertaken by a Lloyd's surveyor. This does get slightly complicated towards the end of the 19th century and into the 20th with the use of Special Surveys, denoted by the letters S.S. followed by a location, date, and a time period—e.g. SSApl10-11yrs for the schooner *B.I.* (1875-1927, Appendix A.18) denoting a Special Survey in Appledore in 1910 fixing the character of the ship (in this case A1) for 11 years. Special Surveys are undertaken outside of the usual pattern required by the rules of the LRS, normally to have them take place earlier in the cycle, so if a ship was granted an 'AE' rating for eight years an owner might seek a Special Survey after two years to secure a new 8-year AE rating rather than risk an aging ship being downgraded at its next mandatory survey—ships had to be resurveyed no later than halfway through their current characterisation, so for our 8-year AE rating it would have to be resurveyed by year four. In this way seeking a Special Survey ensured the ship remains at its current characterisation rather than risk two more year's worth of wear and tear. This has some bearing on how that ship can then be used as ships with a higher characterisation (closer to or at 'A') can be insured to carry more valuable cargoes than those of lower characterisation only allow ships to be insured for more robust cargoes, such as those for bulk aggregates or timber.

The other piece of information to relate here are the ratings given to a ship's running gear. Denoted by a numeric value alongside the characterisation. For all 200 ships the running gear is recorded at the best value of "1". In later Register Books this is combined with the note "A&CP", "AP", or "CP" indicating a ship's Anchors and/or Chains have been proven at a public machine. In the case of A&CP this is an abbreviation of something like 'Anchors and Chains Proven' although the exact wording for the abbreviation is not noted in the LRS only the long form explanation. A public machine refers to the system used for testing anchors and chains for their tensile strength. Therefore, proving their compliance with various pieces of legislation related to the use of anchors, chains, and cables for shipping and other fields of industry. This took place at licensed 'proving houses' managed by a variety of different organisations, including a different, and separate, organisation named "Lloyd's" in the "Lloyd's Public Proving House Company". Both characterisation and rating are of limited use in isolation. That information must be examined in context of the life of the ship and the relationship between repair/restoration and characterisation cannot be overlooked. Characterisation certainly has a role to play in the period by denoting which ships are perceived as seaworthy and capable of carrying certain cargoes.

This thesis will demonstrate how characterisation was inextricably linked to the process of shipbuilding. This is particularly evident in the investigation of the ship *Rhoda Mary* in Chapter 7. Characterisation was determined by establishing how closely a shipbuilder had adhered to Lloyd's Registers rules governing how each level was applied. For example, in 1864 the rules require the bolts used in the construction of a ship's keel to be a minimum of 13/16ths of an inch in diameter (Lloyds Register of Shipping 1864: 15), and other rules govern the dimensions and materials to be used for other components. At the beginning of the 19th century the rules were shorter and generally no prescriptive in the size or material required to achieve a certain grade. As the century went on more and more rules appear in the preamble of each issue of the LRS presumably reflecting a change in the

rules applied by the Lloyd's Register surveyors that year. The way ships are built changes to reflect this, and shipbuilders actively engage with the rules to ensure ships are compliant if they want to secure the highest characterisation and be eligible for the best cargoes. This brings in the final element of characterisation, the grade applied to a ship would be given for a fixed amount of time. For example, the longest a ship could be graded A1 would be 12 years, this was the best rating a ship could be given by Lloyd's Register. The amount of time a ship would be granted its characterisation would depend on how well the surveyor felt the ship conformed to the rules for each level.

The work on *Flower of Ugie* (Whitewright and Satchell 2011) shows the tremendous potential of the documentary evidence from the 19th century. The Lloyds' Register of Shipping alone represents 1.25 million individual documents. These were used effectively to piece together the identity and life of the ship. The report on *Flower of Ugie* (ibid.) is the benchmark for the shipwreck investigations in Chapters 6 and 7. Whilst providing an identification is still a major theme of the work on *Flower of Ugie,* it is not the sole aim (ibid.). Furthermore, the *Flower of Ugie* shows that a detailed archaeological approach combined with investigation of documentary sources, can provide a much more complete understanding of a wreck than archaeological investigation alone (ibid.). The aim here is not to suggest that establishing an identification for a shipwreck is not worthwhile. There can be no doubt that if a ship can be identified it becomes not only easier to establish a site's "significance" but also to draw out elements of its biography and context that may not be easily established from archaeological remains alone. The ships used as case studies in Chapters 6 and 7 have identifications and biographies established from the work done as part of this project. What this discussion does try to highlight, as is the case with *SL4* (Adams *et al.* 1990) which presents a summary of 400-years of carvel shipbuilding and technological change, is the fact that valuable and informative work can be done on sites where an identification cannot, or has not, been established.

All the archaeological works into shipwrecks from the 19th century show the significant impact the study of archaeological examples can have on an understanding of 19th century shipbuilding. However, as has been shown in Section 2.2 this is the new stage for the archaeology of ships. The integration of multiple source types and large datasets to look beyond single-ship discussions and examine the wider system within which people and things are operating, requires a theoretical and methodological framework. The impact of this multiple source approach can vary. There is no doubt that for periods where there is a considerable body of documentary material, there are major benefits and not taking this approach misses a considerable part of the total assemblage. Other periods, particularly chronologically earlier where the survival of other source types is much more limited or much harder to verify, incorporating documentary sources may not contribute as much. However, one point to make here is that this approach is not solely to be used with documents/historical data. Rather than becoming overly concerned with the type of sources being integrated, focus can be on establishing a complete "record" for the site in question that includes these different source types. The issue then is to approach this record with the right questions, and to remain aware that there are limitations to all these sources. For example, the information that can be obtained from documents cannot be used as a replacement for archaeological material. The two are not proxies for one another and inform different aspects of seafaring or ships.

2.4. Historical Archaeology

Integrating different source types with archaeological material from this period plants us firmly within yet another sub-category of archaeology "Historical Archaeology". For some time, archaeology in historical periods has been locked in a similar position to the archaeology of ships. Often sites were investigated and published by fitting them into an existing historical context. This led to "Historical" archaeology subjecting itself to considerable self-explication (e.g., Austin & Thomas 1990: 43). During the 1990s the debate within history focused on the concept of historical knowledge (Munslow 1996; Jenkins 1991). The thought was that historical knowledge depended on texts and texts were created

through human intervention and given meaning through interpretation (Ankersmit 1989: 137; Austin & Thomas 1990: 45). Resulting in the criticism that: what historians wrote was artificial and not representative of events in the past. Following this debate separate approaches within history developed much as has taken place within archaeology (Johnson 2010: 186). Traditional studies of history focused on a narrative of events: wars, treaties, kings, and so on (Carr 1961: 131). However, things have moved towards a history that deals with wider themes and issues rather than individuals or events (Cannadine 2002: viii). Typified by the *Annales* School, a fancy name for history that looks beyond a social elite and towards studying cultural systems in a way which would not be alien to an archaeologist (Johnson 2010: 186-187). Things then became complex with the Linguistic Turn at the end of the 20th century (Johnson 2010: 188), which is to blame for people today using phrases like: "that's a social construct". This encouraged historians to include ontological and ideological factors (thoughts and ideas) in their studies, again not unfamiliar to an archaeologist. In short, a history that reflects many ideas within archaeology, such as the subjective nature of interpretation (Johnson 2010: 188). There was a shift in the focus of historians away from economic determinism and producing impressive stories of great events towards an examination of people (Evans 2001: 8-9), much as an archaeologist seeks to do.

The multi-scalar approach typified by *Annales* social history seems like a good fit for this project. It certainly starts to address some of the cognitive challenges around deploying a rich historical source alongside archaeological material. However, looking at reviews of *Annales* studies also reveals a further challenge, that either an event-based (smaller scale) narrative is preferred, or an enduring narrative (larger scale) is presented (Lucas 2006: 38). This problem is broadly like the one faced in this thesis. We need to find a way to bridge the gap between the large-scale view of the 19th century Maritime World, which is admittedly a reduced one through the focus on schooners and coastal seafaring, and the small-scale stories of the individual ships investigated for this project. This must also be done within the word count of the thesis. The elephant in the room for a study of the 19th century Maritime World is capitalism. This project is studying a mercantile system and therefore the development capitalism is a relevant area of interest. However, the gauntlet laid down is to break out of these "grand narratives" (Johnson 1999) but these must not be rejected entirely (Lucas 2006: 39). Whatever the outcome of this project it is essential that the story that is told retains its broader relevance to our understanding of the period. To return to the question of capitalism then, it is not going to be an explicit theme within this work. Instead, capitalism will be seen as one of the many forces at play in the wider assemblage of the 19th century Maritime World. The role of people in the study of history had previously been a major sticking point for historical archaeologists (Austin & Thomas 1990: 53). Often the people who were studied in historical investigations were the elite and powerful. This differs to archaeology, which increasingly focused on the ordinary people not always included in the written record. In a similar way that the archaeology of ships turns to ordinary ships and their everyday role in coastal trade and maritime connections.

Historical archaeology as a sub-discipline, possesses a range of different pathways and approaches. The aim here is not necessarily to set out a full history of historical archaeology as a sub-discipline but instead to try and extract some of the key approaches and cognitive tools that exist for its study. Some of these will be directly relevant to this project, others not so much. This is not to say other approaches irrelevant or incorrect, merely that the aim of this thesis—the production of an explanative narrative built from multiple source types—will benefit from a specific toolkit. In the latter half of the 20th century approaches to studying the past gave history primacy over archaeology. The reference to archaeology as "the handmaiden of history" first emerges from the work of Ivor Noël Hume at Colonial Williamsburg in the 1960s (Orser 2016: 35). It is likely that this perspective and others like it set the course for later challenges for historical archaeology to cut itself out of a position as history's wingman. However, it is also possible this statement is slightly misrepresented. The choice of "handmaiden" for the name of the role is unfortunate and implies archaeology is the secondary

subject—something we rail against today. However, archaeology then and now serves to offer different perspectives, narratives, and evidence that history, and indeed other disciplines, would be unable to imitate. Archaeology is uniquely placed to extract information about the human experience. Over time the view that history was the leading role was challenged and one of the clearest places this is set out, particularly relevant here given its consideration of maritime themes, is in the work of Austin and Thomas (1990). Here it is strongly suggested that that archaeology should avoid using any other data sources, like documents, rather than become supporting evidence in a historical study (Austin & Thomas 1990: 43). This approach is not one that will be utilised in this thesis, but the relevance of the argument, that considerable detail about things often not recorded at all by the historical record can be gained from archaeological material, is undeniable. Some literature dealing with historical archaeology towards the end of the 20th century sets out to challenge the attitude that archaeology is a supplement to history (e.g., Muckelroy 1978: 6). The core of this argument is the fact that archaeology is not restricted to the issues and events recorded in the historical records (diaries, letters, books, etc.). Furthermore, archaeology deals with an indisputable material record of past events, however complex that record may now be. This argument developed through the 1990s, Austin and Thomas' (1990) suggestion that archaeology avoid any historical material whatsoever did not survive. Instead, the result is an archaeology that utilises all the different sources for material about the past. Adams (2013: 48) and Johnson (2010: 191) set out this approach, as a concurrent approach to both archaeological and historical material. Archaeology no longer taking a lesser role, instead archaeological method and thought serves as the directing force utilising the multitude of source types available as set out in Section 2.6.

So far, this section has discussed how historical and archaeological data can be explored together. However, there is still an underlying problem. How to deploy the different types of sources this thesis is interested in and what sort of questions will it then be able to answer? To address the first part, the key is to look at how the narrative constructed from the sources available for this project is being written. The model this thesis will try to follow is that set out by Joyce (2006) but also exemplified by the work of Deetz (1977) who's book "*Of Small Things Forgotten*" influenced the final title of this work. That is not to say this is going to be an attempt to recreate that classic piece in a maritime context. Rather what is presented here will seek to emulate the explanatory power of Deetz's investigations and develop some of the ideas he explored in his 1998 work "*Archaeologists as Storytellers*". The aim being to convey the story of the ships investigated in this thesis and communicate what the results of this thesis mean for our wider understanding of the 19th century Maritime World. It is probably reasonable to suggest that Historical Archaeology is predisposed to detailed accounts of material and narrative (see Joyce 2006: 48-49). That is certainly what happens in Chapters 6 and 7 of this thesis where individual shipwrecks are dealt with. However, Chapters 4 and 5 also seek to render that detail into a wider narrative that has that same explanatory power to address the research questions presented in Chapter 1. This approach recognises that the different sources being used are allowed to provide their unique voices and influences on the narrative being constructed. To paraphrase Whitewright (2017: 223) regarding iconography: we must ask the right questions of the right witnesses of the past, meaning as archaeologists we are able to ask new questions of some source types, such as documents . This thesis is going to tell a story. That story will use our contemporary narrative, as well as a narrative drawn from the past using the historical sources and archaeological evidence being examined. The trick is condensing the richness of the sources involved into key explanatory points that address our questions. As to what sort of questions can be answered, the second part of that underlying problem. The simple answer is that the potential of the sources being dealt with is enormous. The resources of the HEC allow the direct examination of how ships functioned in the 19th century. For the most part those records were not constructed to be records—they are not always intended as an account of events. Instead, they are functional parts of the ships they relate to, as inseparable from the other components as sails or the keel itself. Lloyd's Register is an instrument of British Imperial control and a tool of the "counter-change" Sivasundaram

(2021) highlights. The process of registration and characterisation are a means to assert imperial control, so what this thesis is also studying is the impact of that counter-change on the shipbuilding industry throughout the 19th century. The research questions presented in Chapter 1 and are a toe dipped in the water of the vast seas of information the LRS and other resources like it represent.

Hume's work in the 1960s is an excellent example of historical archaeology as an area of study. His work at Colonial Williamsburg (1969a; 1969b; 1969c; 1970; 1971) and later at Martin's Hundred (1982) demonstrates the two aspects of historical archaeology most relevant to this thesis. As does the work of Deetz (1993) at Flowerdew Hundred. The level of detail available is considerable. Hume recorded thousands of artefacts at each site in Colonial Williamsburg, then connected the artefact finds to surviving records and inventories from museum and gallery collections, and finally created detailed typological records of ceramics, pipe stems, and others (Hume 1969b). His work also informed on people underrepresented or entirely not represented in the historical record. Even more relevant to this project are the ways in which these large assemblages were approached. South (1977: 220) presented a statistical formula using the analysis of Colonial British ceramics from Brunsick, South Carolina as an example to present a mean ceramic date for a site based off the number of sherds found for each date within a site's range. Here historical archaeology's potential is evident in relation to scientific process, substantial datasets, and the emergence of archaeological methods taking advantage of those datasets available for different techniques.

So, it would appear from this short summary that the argument for the role of archaeology alongside history has been made, and the world has moved on. However, debates have raged around what exactly "historical" archaeology should be looking at. Some have suggested its role should be to study European colonialism and/or capitalism. The focus of these ideas clearly being on the period after 1492 (DeCorse 1996:19; Hicks and Beaudry 2006: 1; Orser 1996: 7), this being the arrival of Europeans to the Americas. The idea of a focus on the spread of European culture since the 15th century aligning with Deetz's (1977) definition. This is a debate led by the study of the archaeology of historical periods within North America. Another argument has been whether the study of societies with their own written record should be a discrete area of study within archaeology at all. Keeping a discrete area for historical archaeology has focused on retaining a specific theory and method to deal with documentary sources. However, this is probably no longer the case, Section 2.6 shows there are applicable theories within areas such as the study of prehistory that can make significant contributions to the study of historic periods.

The issue with maintaining historical archaeology as a discrete field is also problematic because this serves to maintain constructs of power and identity. This may be more prevalent in studies from North America where the result can be a distinction drawn between pre-colonial and colonial populations thereby encouraging an "us" and "them" approach to non-literary societies (Goody 1977: 3-4; Wolf 1982; Funari *et al.* 1999: 5). This is unhelpful, archaeology is full of enough dichotomies and creating more based on the types of sources available, creates generalisations that do not reflect the truth of the past. It is worth remembering that even in 19th century Britain writing takes diverse forms and literacy was limited to certain sections of society. Writing is itself a tool for the creation and maintenance of power (Moreland 2001: 110-111; Wilkie 2006: 14-15). As is explored in Chapter 5 the *Lloyd's Register of Shipping* is itself a tool for Imperial Control and to enact imperial systems of change and counter-change. Texts are artefacts produced in a specific cultural-historical context for a specific purpose. Furthermore, the processes put in motion by European expansion constitute the history of non-European populations as well (Wolf 1982: 385). Part of the job of a historical archaeologist is to record and study this European/Euro-American past (Orser and Fagan 1995: 6). To a degree a focus on European history is inevitable, particularly in this period as a study of written history will always highlight the role of European colonial powers (Little 1996: 42), because they were most often the ones doing the writing and were often doing that writing in the service of Imperial Control. What is

shown by this debate is the dominant approach of trying to distinguish historical archaeology as the study of a coherent world system of one kind or another. All this approach has served to do is set up yet more dichotomies where everything must be either one thing or the other, setting up master narratives that sites and events are then slotted into. This is a problem, to quote General Obi Wan Kenobi in *Star Wars: Revenge of the Sith*: "*Only a Sith deals in absolutes"*. The incorporation of archaeological material and archaeological thought has so much more to offer, as Johnson (2010: 34) says:

"*…we should recognize that by definition our work serves to ironicize master narratives. One of the key themes that does hold historical archaeology together is that we walk in a uniquely dangerous space of the human past, a space between often very powerful 'master narratives' of cultural and social identity and much smaller, stranger, potentially subversive narratives of archaeological material. Archaeology does not have a monopoly on the study of the voices of ordinary people, but it does have the ability to render familiar things strange, and reveal timeless things as transient*."

The incorporation of archaeological thought and material leads to that second debate. Whether historical archaeology even needs to be a separate field of study. Multiple authors agree that the incorporation of multiple different source types can substantially increase our understanding of the past (e.g., Watson 1983: 29; Staniforth 2003: 17; Adams 2013: 48). So, should archaeology being done in historic periods shift towards a more contextual approach incorporating every different source type and taking advantage of theories and methods from across both archaeology and history? Yes. The solution may seem simple. Instead of setting up a separate field of study and trying to establish methods and theories specific to the study of historical periods, a more flexible approach would be of benefit (Funari *et al.* 2010: 8-9). At a general level the commonalities across the study of all human societies can be leveraged. Especially in terms of inter-disciplinary theories of material culture engaging with artefacts and assemblages, and their connections and influences (Austin and Thomas 1990:32). Keeping in mind the need for a more specific skillset when dealing with written sources or the roles played by writing and representation. In much the same way as in prehistory there are specialisms focusing on the use of stone tools or iconography. There is no justification for arguing that some theories of material culture are more suited to prehistoric material than to historical material or vice versa.

Therefore, the debate probably needs to be more focused on how archaeologists are approaching documentary evidence. The next stage for the historical archaeologist is to understand how they move beyond the dualities and forced categorisation of source types (Johnson 1999: 23-24). Over the last ten years this is the direction things have started to move. Specifically influenced by work done in North America where a different approach to the use of varied source types is used (Johnson 1999: 23-4 and 2010: 191; Adams 2013: 47). The works of Johnson particularly have encouraged Historical Archaeologists to get more serious about their subject. Johnson's (1999) work sets out the key issues faced by archaeologists working with historical texts and encouraging the use of theoretical frameworks to resolve these issues. Worthy of note is that fact that studies in historic periods such as those written by Johnson (2010), most commonly focus on the study of terrestrial sites. Although Deetz (1977: 5) highlighted themes directly relevant to Maritime Worlds, in particular themes of connection and interaction. To bring ordinary people back into discussions in historic periods, written sources and their relationship with material culture must be taken into account.

Johnson (1999: 23-24) discusses the merits of texts as material culture and these ideas can be built upon further when applied to a topic such as shipbuilding in this period. Documents are an essential part of not just the *chaine-operatoire* of a vessel but its conception, day-to-day use, and end. In this case to see that the information obtained from documents does not only concern a specific ship but also allows an understanding of the wider assemblage and that documents are not only a record of

events but as fundamental a component in those events taking place as any mechanical component of the ship. Again Johnson (2010:31-32) has a response: *"If material culture is text, text is also material culture"*. Therefore, documents should be considered in the same way we would approach any other part of the assemblage, considering how they were made, what their influence was, and how they were shaped by other components of the assemblage.

Ships are an assemblage of artefacts, technologies, and people. For a ship to function in this period there are numerous artefacts that must be created and maintained. The survey conducted by the Lloyd's Register as part of each ship's recording in the LRS, illustrate this point. They became a part of the ship, without which it cannot function. Taking Johnson's (1999) approach these textual artefacts, alongside others such as Pay Books and Logs, must be considered in an archaeological investigation in the same way any other artefact would be. A specific example of this can be found in the work done in *Stirling Castle* where Whitewright (2020: 14) sets out the case that documents such as Logs and Pay Books were essential to the day-to-day function of a ship, a statement as true for a merchant vessel as a Royal Navy warship. At an even more fundamental level, approaching sources in this way allows the investigation to focus more specifically on the people involved with this ship. This is the primary aim of any archaeological investigation, to use the record as a means to investigate individual people and their stories. The level of detail available from physical remains to an archaeological investigation is an excellent resource, amplified when combined with a documentary resource on the scale of that presented by Lloyds' Register. The documents available to this project are those that would have been an essential component of a ship, a part of its material culture. Furthermore, this approach will aid the integration of different source types. Preventing any being given primacy due to the type of source it is and instead upon the information it can provide to this study. This also means historic ships can be examined from both the archaeological record and those extracted exclusively from sources such as the Lloyds' Register.

The approach to the sources being used is therefore essential. Coupled with the debates dealt with in this section, are the issues faced by the archaeology of ships. There is a lot at stake here. By approaching documentary sources in the same way as traditional archaeological material the concurrent methodology called for by Adams (2013: 48) can be employed. Get this wrong and we fall back into arguments around historical particularism and single-site focus. This leads to the single most important point of this section: a concurrent interpretation of sources does not mean the formation of two parallel strands that are never allowed to interact. It is not the end of the world to require consultation of other (non-archaeological) sources and to use them to answer questions posed in this thesis. The challenge is to do so without becoming blinded by the amount of information that can be gleaned from one source type. Just as archaeologists should not allow their entire interpretation of a site to be based on a single find, the interpretation of a site cannot rest on solely the data obtained from a survey report, treatise, or construction plan. It is by combining data sources and remaining aware of the value of each one, that a concurrent methodology can be implemented. It is also essential that the limits of these source types are considered. The task for archaeologists is to ask the right questions of different source types, as they are not interchangeable. Each source is a discrete part of a wider system of human and non-human things, whether that be called the "record" (Whitewright 2020: 14) or "assemblage" (Jervis 2019: 33). Whilst each component has the power to influence others, they cannot all be examined or questioned in the same way, each source type requires specific approaches. Returning to Whitewright's (2017: 223) point about iconography, the challenge is to ask the right questions of the right witnesses to the past.

In the archaeology of ships many of the studies specifically deal with the detail of an individual site. However, towards the end of the 1970s there was an increasing shift to using maritime sites as a lens to study their period or cultural context in detail. Clear examples of this shift being first the work on *Mary Rose* (Rule 1982) and then later the VOC ship *Amsterdam* (Gawronski 1990a, 1990b). What is

certainly a prevailing trend in the study of historical archaeology is the relationship of archaeological sites to processes such as state formation, colonialism, and capitalism (e.g. Gosden 2004). This is not an issue, identifying and studying the development and impacts of these and other major systems, is essential. However, as discussed there is an argument to be made for breaking away from these grand narratives (Lucas 2006: 39). Focusing on narratives of capitalism (and other themes) in this way does not mean it is impossible to extract the subaltern voices or evidence of groups and people not normally in the historical record. However, it doesn't make it any easier to do either.

Taking the archaeology of ships and historical archaeology together for a moment— this can be seen as an interim summary for Sections 2.2-2.4—some useful approaches begin to emerge. Throughout these sections there are elements of the discussion that might seem like a direct criticism of an approach. Whilst there is a degree of this, it is mainly the product looking back with hindsight and being able to highlight potential issues from today's position that could only have developed from that earlier work. Section 2.2 explored the benefit of embracing historical particularism for the archaeology of ships. The detail available from studies approached in that way provides an excellent basis for the fine-grained analysis of ships. However, there are some problems with recent approaches, Flatman and Staniforth (2006: 172) make a good point that there are a range of different sites beyond individual famous vessels that can make significant contributions to the study of the past. This does slightly oversimplify the role of individual named or celebrated ships in both our understanding of their specific contexts and for the archaeology of ships. There can be no doubt that the examples of *Mary Rose*, or HMS *Invincible* make a statement in and beyond the discipline. Compared to the outcomes of the excavations of *SL4* (Adams *et al.* 1990)*, Flower of Ugie* (Whitewright and Satchell 2011), or even *Rooswijk* (Manders and Langemheen 2018) which certainly inform studies of their respective contexts but do not reach as far as more celebrated and famous ships. Nevertheless, the information available to us now—because huge datasets and archives can be interrogated in a way that couldn't be done previously—provides a different narrative to what might be extracted even from the study of a particular famous ship.

The new landscape for both areas of archaeological study encourage a wider consideration of ideas. There is an integration of different data sources and a severing of the reliance on narrative and fitting sites and finds into a pre-existing context. The major challenges today are what actually falls under the study of historical archaeology and the presence of a perceived divide between "prehistory" and "historical" periods. However, it is clear that Archaeology as a discipline should be able to draw on resources from any area of study such as prehistory, art, or literature. Ideas from prehistory, particularly theoretical approaches relating to the relationships between artefacts, materials, people, and other forces, have the potential to contribute significantly. Once again, it is in the work of Adams (2013: 48) an answer can be found, namely that ship-finds do not require identification and dating via historical sources to be useful. They have their own story to tell and that can be extracted through archaeological interpretation.

2.5. Theoretical Framework

This project faces a messy pile of different data sources and previous studies that must be approached effectively to actually understand the process of technological change in 19th century shipbuilding. The challenge is to ensure this is done in a simple and straightforward way to avoid adding unnecessary complexity through the action of this project. There is a developing body of literature focusing on defining and interpreting archaeological assemblages (e.g., Witmore 2007; Alberti *et al.* 2013; Jervis 2019). In fact, our messy pile of data sources can be approached as assemblages. This project will tackle the objectives and areas needing attention set out in this chapter by utilising a series of case study shipwrecks, two of which have already been selected with identities reasonably well established. In his book, Jervis (2019: 31) suggests burials lend themselves well to assemblage analysis, and it could be argued that shipwrecks represent an even better candidate for

this form of study. A shipwreck is a delineated assemblage, a dramatic intervention into a landscape formed of materials, people, ideas, and forces. It is also simultaneously an object forming part of a much wider network of communication, ideas, people, and other objects.

An interesting notion of assemblage archaeology is that no primacy is given to the human element of an assemblage over the non-human part (Lucas 2012: 262-263). Instead, both the human and non-human are themselves assemblages (Jervis 2019: 33; Gilbert 2017: M83-M84). There is a danger of the argument becoming quite confused and almost circular, becoming dragged into philosophical debates around agency and "humanocentrism". The language to explain these concepts is also often frustratingly complex and impenetrable. In the simplest terms possible: people are influenced by objects, ideas, forces, and other people in exactly the same way non-humans are and so must be seen in the same way as assemblages composed of these relationships and engagements. In the interests of keeping things as straightforward as possible, the intent of this project is to approach the human and non-human in the way advocated by Jervis (2019: 33). The challenge this presents is to not view them as equivalent or interchangeable, this does not mean a ship is the same as a person or can do the same things instead that it has the same ability to influence the world around it, form connections, and be influenced as a person does. As an example, Dolwick (2008: 16) showed that steamboats both shaped and were shaped by society. Power comes from the networks and relationships within messy assemblages. It is this power that shapes and changes entities (Hodder 2012b: 214). The following framework will enable a better study of how shipbuilding technologies do or don't change, and how those technologies were implemented in this period. This project will take its things seriously (Jervis 2019: 25).

Alongside the idea of the assemblage, is the notion of "process" (Gosden and Malafouris 2015). Once again, the language becomes somewhat complex and impenetrable. The salient point being that things (including people) are not fixed or constant but are actually processes, they are "happening". The same is true of the non-physical world, such as ideas or forces (Bennett 2010: 20). This has a significant impact on the study of technological change. Gosden and Malafouris (2015: 712) suggest technologies, in their case agriculture, *"could be better seen as part of a set of changing relations between people and the world around them"*. What Assemblage Thought and Process Archaeology both do is encourage a focus on the relations/connections/engagements between things (including people). Although perhaps a better word for "thing" would be "entity" (Lucas 2012: 193). Seeing different entities as processes seems to fit the archaeology of ships well. From the harvesting of raw materials, the generation of ideas, the construction of the vessel to its often extended use, through the *chaine-operatoire* to its wrecking and deposition, on to the present moment, the ship is a constant process. At the same time, returning to its nature as an assemblage, the ship is influencing the world around it. It seems important here to reinforce the inclusion of "forces" in that assemblage (Bennett 2010: 20; Jones 2019: *Pers. Comm.)*. The storms that cause so many wrecking events are excellent example of this, they are a key part of the story of a ship alongside tides and a wide variety of other elements.

Ships form part of a much wider set of connections and relationships. They are part of maritime communities, trade networks, and global systems. In Section 2.3 it was shown that North American schooners may have impacted British domestic shipbuilding. Studying these connections will allow a better understanding of how technologies travelled and the level of adoption that follows. It is therefore essential that this project looks at both the ship itself and the larger scale context it sits within. The need for studies of this type has been made clear in the above review of recent literature (primarily: Adams 2013; Dellino-Musgrave and Ransley 2013; Harpster 2013) focusing on the nature of the archaeology of shipwrecks. Section 2.2 showed that this is an area that Maritime Archaeology needs to focus on. Assemblage Thought allows this issue to be tackled using a dataset with the

potential to shed a light on an industry that has until now been extremely difficult to examine. It also allows us to account for the wide range of influences upon ships in this period.

The incorporation of Process Archaeology (Gosden and Malafouris 2015) discussed above allows us to examine those social elements in much more detail. In fact, this thesis suggests that where there appears to be technological continuity over a long period of time archaeologists should raise an eyebrow and wonder why (Whitewright 2008: 21, 197, 206 and 2018: 29). It is change that is primarily of interest here. Furthermore, continuity is a hard concept to define. It is not simply a case of saying things do or don't change over time, in fact the components of the assemblage, both human and non-human do both. It is even harder to see change or continuity in the record of the past represented by archaeological remains, documents, and other witnesses, because it is incomplete. Looking at perceived continuity with suspicion whilst also being aware that change is a complex product of a wide range of forces. Change is operating on different scales and happening in different ways—through environment, changes in social structures, technologies, and so on. It is important to remember change is a tool of Imperial Power and control. This will be dealt with more explicitly in relation to the historical context of the 19th century in Section 4.4. However, to outline the idea, the British Empire specifically becomes specialist in co-opting change and counter-change for its own ends (Sivasundaram 2021). Imperial control is enacted through revolution and counter-revolution alongside traditionally understood imperial tools such as capitalist systems and recognition and support of local leaders. Whilst the material components in a system may look the same, it is not possible to definitively state if they were used in the same way as another identical assemblage of components. This is because they do not represent a complete assemblage. There are components missing, one of which being the person or people involved. Change has taken place from the evidence extracted from the record. However, that change cannot be seen happening because it is the result of forces and actions taking place and not a force or entity in and of itself. Before us now lies a rabbit hole, an unanswered question about the impact of the aggregation of technologies and materials in an assemblage and the level at which they are being examined which would take years to answer on its own. Instead of falling into it and trying to define change and continuity, this thesis will look at technology through the materials and components recorded on archaeological sites and in the documentary evidence.

Sticking to the questions set out in Chapter 1 will allow an investigation of what technologies are present and how these differ temporally and spatially in the record assembled from the case studies and other material used in this project. Looking at perceived continuity with suspicion whilst also challenging the obsession with change. This is a theme emerging from new literature looking at the notion of materiality. Petursdottir (2018) in her paper uses a beach and the objects upon it to suggest a volatility of matter. That things are constantly in flux and those assemblages are never fixed. Change is the constant; the normal. This draws us into a discussion of the life of the assemblages we are approaching. Harman (2016) writes that there is a lasting power in the objects and assemblages being studied, the issue is that things "*endure, outlive us and come back at us with a force we didn't realise they had. A dark force of sleeping giants"*. A key archaeological tenet is that change does not happen overnight. A society does not wake up one morning and decide to universally adopt the steam engine. These processes are gradual and constant. Bennett (2010:6) explains this well, that objects don't stop existing when they are discarded. Things continue to have an impact on the world even as a discarded or unwanted commodity (*ibid* :6), perhaps the best example being the modern issue of plastic pollution in our world's oceans. Indeed, the assemblage approach taken here works extremely well with modern discussions of the "Anthropocene" as we can see how human-made objects and human action impact and influence things around them even when those things are not the direct target. Using the example of plastic again we are now aware that plastic degrades into toxins that build up in certain marine mammals like dolphins, a consequence never directly intended when plastic products were designed. The investigation of the shipwreck case studies within this thesis are intended to fit

within those discussions of the Anthropocene and human action through the investigation and discussion of the lasting effect those ships had both as working vessels then ultimately as shipwreck sites.

The way this project will look at ships is to acknowledge that their influence on the world does not end with their wrecking or discard. In the 19th century the records compiled by the Lloyds' Register are an example of this. Ships are rated based on the perceived effectiveness of the technologies involved in their construction. They are given a certain number of years for their rating at which point they are rated again. Raising the question, to what extent are those ratings influenced by technologies that have been effective before and what is the effect of something new and different? Chapter 5 will show schooners, the case study for this project, are subject to a range of different influences and pressures. Ships are one of the main forms of technology subject to change due to their key role in global economic and social connection, and the movement of people. By the end of the period vessels are being produced that are almost unrecognisable from those at the beginning, alongside ships that do not exhibit any of these new technologies in their construction. To return to the earlier point there is even more nuance than first seems here. Ships are produced that may look identical to one another, or to a ship produced much earlier, but contain technological choices that are very different. Using Assemblage Thought (Jervis 2018), see above, it will be possible to understand how all these factors interrelate encouraging the study of this period to look at how global themes and connections influence technology.

This requires working with a varied and expansive dataset, which in turn will need a framework that acknowledges each document, artefact, person, idea, and force impacts and is impacted by the others. This thesis must ensure interpretation is presented in as straightforward a manner as possible. An approach will be taken that lends equal weight to things and people, recognising that ships can be considered as individual artefacts and as assemblages. Those "assemblages" should not just include traditional (in an archaeological sense) material "things" but also the ideas that went into their creation, documents, people involved, and forces acting upon ships (Jervis 2019: 37). "Assemblage Archaeology" (Lucas 2012; Jervis 2019) when combined with the awareness of "process" advocated by Gosden and Malafouris (2015), recognizes the role of these components whether human, non-human, conceptual, or physical. Those components may not all play a single role, some may be material and functional, whilst others could be expressive (Hamilakis and Jones 2017: 79). Materiality, this study of things, is a process of forming connections and relations, those relationships are what matter (Lucas 2012:167-8).

This approach does not try to artificially simplify the world in which these ships exist, rather it acknowledges the complexity of these ships and this period (Jervis 2019: 33). By approaching this subject with open eyes, it will be possible to better integrate concepts already acknowledged in archaeology, such as: ideas do not emerge fully formed, technological change does not occur overnight, and new technologies are not implemented uniformly. The connections between people and things are messy, convoluted, and tangled (Anderson and Harrison 2010: 18). The shipwrecks at the heart of this study made and still make, demands of people, they influenced and still influence the world around them (Hodder 2012b: 67). Their remains cannot just be examined as representative of the past, they are still living assemblages. Archaeological remains are also not the sole representative of the past but are a part of a range of entities that come together to inform the understanding of the past. Those remains are also living assemblages either actively manifesting and causing an impact or dormant and indirectly acting upon the world around them. The latter is what Petursdottir (2018: 97) calls the 'dark force of sleeping giants' representing the potential those assemblages hold to influence the world even when not being actively used. Only by incorporating the multitude of source types discussed above, alongside other data such as experimental and experiential studies (including

ethnographies) that give a better understanding of the “feeling” of creating and using these ships, can a picture of what took place in the past begin to be assembled.

That methodology should enable this project to effectively take on one of the key themes at the heart of this period, globalisation. This is an area that is now very popular in the social theory and studies of later historical periods. The challenge for the archaeologist is to tackle both global trends and localized events. This project, with its focus on small ordinary merchant vessels employed around the coast of Britain, is uniquely placed to be able to do this. Using those sources allows an extensive examination of individual ships through their archaeological remains and combine this with other sources to create as detailed a picture as possible of that ship and its life. By taking all these ships as individual parts of a wider assemblage the influence of globalization can be examined. From the outset it was made clear that the entire documentary dataset cannot be dealt with by this project alone. What the project will demonstrate though is the potential that exists to expand this study as more archaeological examples become available and as the documentary dataset is made more accessible.

Chapter 3. 19th Century Schooners and The Lloyd's Register

3.1. Introduction

Accounts of the 19th century often take a Eurocentric view (e.g. Hobsbawn 1999; O'Rourke 1999; Herman 2005; Cannadine 2017). The discussion of that century here is certainly one of those as the study area and archaeological sites presented here are all within the British Isles. This is not necessarily a bad thing. However, it is important to retain some awareness that this is a limited viewpoint and to recognise the wider influences acting on the sites and events being studied that originate from beyond the British Isles because of the intricate connections and networks created by the British Empire. Consequently, this chapter will start in Britain and gradually delve beyond into areas such as the Pacific and Indian Oceans or North America. At first this might seem an odd deviation, but their relevance will become apparent. Britain in the 19th century is a component in a globalised imperial system (Killingray, Lincoln, and Rigby 2004: 2-4). A Eurocentric or Britain-centric view that does not acknowledge the circumstances in distant theatres, fails to recognise the interconnectedness of events. As this is a globalised period it is not realistic to suggest anything taking place in the study area happens in isolation. Unfortunately, there is limited scope to consider the full complexity and detail of such happenings in this thesis. To that end the following section will consider 19th century seafaring as a global system and then focus on events through the lens of merchant schooners and their representation in the Lloyd's Register. This requires some work at different scales, not least because this includes themes and issues that have origins long before the beginning of our study period. Chapters 6 and 7 will augment the context established here with the specific detail extracted from extant archaeological examples.

Even with a restricted focus on schooners within 19th century seafaring, this is still a considerable topic. Seafaring and maritime networks are the principal drivers for many of the period's events. The sea was the only route European imperial expansion could take across the globe becoming a vital tool in the consolidation of power, exploitation of people and resources, and the management of colonial systems. Throughout this section we will see how Europe's expansion was a sea-driven global transformation and the sea itself a force of change and counter-change. The systems and organisations that emerged in connection to the seafaring industry are tools of Imperial power and contribute to the period's globalisation and imperialisation. This is also a period of tremendous scientific and intellectual change. Seafaring and maritime systems had contributed to and facilitated, the "Age of Discovery" in the 15th-17th centuries and had enabled scientific exploration and development in the "Age of Enlightenment" in the 18th-19th centuries (Hobsbawm 2010). All of this resulted in huge changes to how the world was functioning, how people moved around it and, as a result, how concepts like time and distance were perceived.

What this begins to show is the tremendous complexity of the 19th century. Seafaring was a vital component of colonial systems. For the British Empire its home seafaring industries provided an essential stepping off point for its vast maritime network (see Section 3.2). The export of shipbuilding ideas and design has been studied elsewhere (e.g. Bennett 2009; Olaberria 2018; Cannon 2019). This resulted in its own technological impact with the adoption of new materials in colonial centres, such as teak for shipbuilding in India (Tripati *et al.* 2016: 1267). The role of mariners and sea-facing communities is also significant. British mariners represented a major force for the export of British Imperial values. The use of Britain's sea-power and the success of its maritime endeavours served to encourage a "Maritime Patriotism" that further fed global transformation (Sivasundaram 2021: 5). This period also saw the emergence of several industries and services that ran in parallel to shipbuilding and seafaring. The Lloyd's Register itself is a component of one such industry: ship registration. These parallel industries soon become intrinsic parts of the maritime economy. They also serve as further examples of the consolidation of European Imperial Power and the expansion of the maritime network that carried it. Registration was another way Britain could extend its control of

maritime trade, by regulating the vessels taking part in trade with Britain's home market after the repeal of the Navigation Act which meant the only way anyone could trade with Britain's market was using British owned and operated ships.

There are now clear starting points for a contextualisation of the 19th century. The first is to acknowledge that this context will be presented from the perspective of the schooner-borne trade. This sets our scope and means we can specifically focus on the Maritime World of the 19th century. The second, in Section 3.3, is the role of the "Age of Enlightenment" and the use of maritime technologies and systems in the process of cataloguing and recording the world (Andaya 2006; Burnett, 2001; Creighton and Norling 1996). The scientific revolution and the industrialisation of transport and industry combine, causing significant change for people and result in a period that has been described as "the Age of Revolutions" (Hobsbawm 2010) or the "Age of Change" (Sivasundaram 2021) because of the scale and speed of those changes. Throughout all the aspects of the 19th century dealt with in this section, runs the influence of Imperial Power. This influence is often not any explicit force but instead is systemic and present in many systems. However, understanding the influence of Imperialism and Imperial values, is essential. The systems and processes established in this period were often appropriated and utilised as tools to extend and consolidate colonial control and imperial values (Sivasundaram 2021: 38-39). The third part of this chapter will focus on exploring these processes and their impact. There were also explicit processes, protectionist policies, and legislation designed to proselytise Britain's economic and imperial interests (see Section 3.5). An examination of the role of some of these influences will form the fourth part in section 3.4. The Lloyd's Register is one of those processes that has some explicit role in the expansion of British maritime interest. That introduction to the Lloyd's Register, its role in this century, and the introduction to the ships extracted from its archive for this project, are the final piece in Section 3.6.

3.2. Schooners in the 19th Century

Traditional summaries of events in the 19th century focus on key milestones in the period and can become quite descriptive (e.g., Hobsbawn 1999; Darwin 2012; Scott 2014; Cannadine 2018; Levine 2019). These are often used to bookend discussions and combine with key themes of capitalism and globalisation (e.g., Akita 2004; Dumett 2014). Economic historians have produced a wealth of detailed information about the growth of certain industries and the economic changes that took place (e.g., Stobart 2001; Hopkins 2013; Floud *et al.* 2014). However, it is clear from recent scholarship (Reid 2020: 80 Note 2, 132 Note 76) that there are gaps and issues in the approaches taken to some of these elements. Principle among these is the role of maritime connectivity. Seafaring in this period was the only way much of the globe could be traversed. The interconnectedness of imperial systems means that events in Europe could have dramatic impact on events on the other side of the world, and that an act on an island in the Pacific could influence decisions and events in the centres of Imperial Power. Ships working the waters around the British Isles could be undertaking a variety of tasks. Most famous and perhaps most well-known would be the Royal Navy (Herman 2004; Rodger 2004; Robson 2014; Grove 2017) and, as they passed on to far-flung colonial interests, the ships of large joint-stock ventures such as the East India Company (Sutton 2000, 2010; Bowen 2002, 2006; Bowen *et al.* 2011). However, working alongside the ships of these globe-spanning organisations were vessels that focused on a smaller, but no less vital set of maritime connections.

The type of ships being looked at in this project are primarily involved in trade and connectivity around the British Isles, the English Channel, and its immediately neighbouring European coastlines of the North Sea and Western Iberian Peninsula. Schooner rigged ships are certainly involved in other trades, and there are very large examples that were built to cover much longer routes (Brock and Greenhill 1973: 75). So, as we have already noted, we are looking at a very small piece of a much larger picture. However, it is a very important piece. Books that specifically deal with the working boats and ships of Britain's home maritime industries reference the role these played in developing

British sea-power. This is important because sea-power was the only way Imperial Ambitions could be spread and control and access maintained across Britain's Empire (McAleer and Petley 2016: 7). The same systems are certainly true for the other European Empires although the degree to which a home maritime industry contributed to their maintenance is less obvious. It is certainly the case that by the mid-point of the 19th century Britain controlled the largest maritime network of all the Imperial Powers. This was a maritime network that was supported by Britain's coastal merchant fleet.

Schooners played a significant role in the maintenance of that maritime network, as merchant and cargo vessels. Some literature reports an increase in schooner numbers through the century (Greenhill 1988: 10-11; MacGregor 1997: 86). However, schooners are mercurial. The definition of these ships as a "coaster" in Register entries or historical narratives, does not show the full extent of their role. Schooners demonstrate this complexity through their ability to participate in both coastal trade and middle-distance voyaging in the Baltic, Iberian, and Mediterranean markets. Furthermore, fishing schooners from Britain's home fishing fleet worked a vast range across the North Atlantic. The context, cargo, and owners of a ship all have bearing on what industry it is serving and this changes easily as shown in Section 5.4.7. Our list of schooners contains ships built for one industry or task that move into other trades or regions. By this point you might be asking, why did this study choose to use schooner-type ships as the candidate rather than any other merchant ship type, like a sloop, or brig? The answer is simple, there had to be some refined selection to allow us to focus on a certain part of the dataset. Colliers could have been chosen just as readily, but there is already a degree of published material present looking at their construction (e.g. Adams *et al* 1990; Ossowski 2008a; Whitewright and Satchell 2008). We have extant, and accessible, remains of schooners wrecked on the coast of Britain which have never been subject to detailed investigations to the same degree as those square-rigged colliers. The ability of schooners to work in multiple trades and engage different cargoes is another trait that makes them a good candidate for this study. Even with that range, these ships are not regularly undergoing long and complex blue-water voyages in the way clippers or Indiamen do. That range of utility is another influence to consider when examining the development of shipbuilding technology. There are different factors to consider for a ship making both coastal voyages and longer trips out of sight of land across the North Sea or along the Iberian Coast than for a ship only working in Britain's coastal trade. Studying schooners therefore allows this project to consider influences and pressures on ship construction that relate to a wider system of maritime connection and still retain the scope of small and middle-distance voyaging.

Our field of view for this period is restricted to the range of schooners. There are certainly schooner-rigged ships working in overseas British territories such as North America, Australia and so on (Greenhill 1978:21-26). However, our focus is those serving Britain's trade directly. This means at the largest scale we have a middle-distance range. Our farthest reach being the Baltic or Western Mediterranean. It is worth noting that there is an emerging discussion in North American maritime studies of the role of American-built ships on the British home seafaring industry (Reid 2020: 80-107). This argument can be found in comments from Davis (1972: 66-68) and Greenhill (1988: 10). There are several questions relating to that subject which cannot be answered from the American perspective alone. However, to take on those ships in addition to ships built in Britain is not realistic and there is not sufficient scope in this thesis to add those questions to our list. To do it justice we should also consider the role of ships built in Australia and the Indian subcontinent, which are also shown to produce ships comparable to those of Britain's shipbuilders (Bullers 2006; Staniforth and Shefi 2014; Tripati *et al.* 2016). However, as discussed in Chapter 2, from the current state of the literature it does not appear that such a competition in shipbuilding exists. Indeed, it appears that the American and British shipping industries have markedly different aims and influences (see Section 3.5). As will be explored in Section 3.6 and Section 7.8 far more importance appears to be placed on classification and conforming to Lloyd's Register rules and regulations. Much more significant to our understanding of the 19th century is the impact of the domestic seafaring/coasting industry on

Britain's Empire and colonial possessions. The British Isles were the administrative and industrial heart of the empire. Britain's industrial systems were entirely dependent on the movement of large quantities of raw materials that could best be undertaken on the water, meaning rivers and canals as well as the sea. The shipbuilding industry itself came to depend on importing timber to the British Isles by ship (Hutchison 2012). Seafaring was how colonialism and imperial ambition were actioned and became the way to consolidate control.

3.3. Revolutions and Counter Revolutions: "The Age of Enlightenment", and "The Age of Change"

From the 18th century into the 19th century, the world underwent continuous and at times rapid, change. Most famously the forces of mechanisation and invention produced by the industrial revolution. But change is also taking place socially and the impact of such dramatic technological change mean there is also a change in how people are experiencing the world. Recent scholarship has started to demonstrate how this change was leveraged to the Empire's advantage (Sivasundaram 2021). The process of colonisation and the resulting globalisation were imperial systems. The latter was not an uncontrolled by-product of capitalism and maritime networks. Globalisation was actively created and used as a means by which to advance imperial agendas and solidify control or support for British interests. This section will show how all of this was completely dependent on seafaring which in turn was contingent on Britain's coastal shipping. The skills mariners learned in the fishing fleet, as longshoremen, or on coastal merchant ships made them an invaluable resource for the Royal Navy and for ships bound for longer-distance trade (Finch 1976: 14-17). Those home industries provided the British Empire with a source of ready-made experienced mariners (Finch 1976: 14-17). Finch (*ibid.*) makes it clear that he sees the pathway for mariners very much as one starting as part of the coastal trade industry and developing on to foreign-bound roles.

The development of industrial systems in Britain was a further support for the shipbuilding industry. As the 19th century progressed easily accessible sources of shipbuilding material became increasingly scarce (Hutchison 2012: 581). Britain's shipbuilding industry came to rely on timber sources in the Baltic and this became a significant trade route for ports on the East Coast (Baines 2008: 74-83). Iron became an essential component for shipbuilding in this century. The use of iron or iron-and-wood composites to replace wooden knees, has been well documented for larger shipyards such as those of the Royal Navy and in ship designs used by the East India Company (Sutton 2000). These components are also present in ships built outside those large shipyards including the two discussed in Chapters 6 and 7. The creation of these components and others such as copper sheathing, or the use of yellow-metal fastenings, depended on industrial processes (Bingeman 2018: 460-462). These were sometimes part of large, industrialised shipyards. However, those materials could also be the products of individual factories and workshops bought by a shipbuilder as needed (*ibid:* 462). These allowed Britain to respond to increasing demand for ships, resolve the pressures on the supply of materials for those vessels, and mitigate the issues around their longevity in warmer-water locations ships due to the susceptibility of unsheathed vessels to ship worm (Staniforth 1985: 21-22).

All these advancements and technologies for ship construction contributed to Britain's ability to consolidate its control of the Maritime World. It is easy to see this process of establishing control as a primarily military or naval process involving wars of conquest and the clash of European Empires on a secondary stage away from their European homelands. However, the processes were far broader than this. One of the most successful of these was the use of science, voyages of discovery, and the advancement of systems of natural philosophy and categorisation (Andaya 2006: 674). Science in this period was anything but impartial. The naturalists and explorers involved were as effective imperial agents as the army officers and envoys involved in the more direct process of acquiring land and exploiting native populations. The effort to consolidate the Empire sees men of science, natural philosophy, astronomy, surveying, and time keeping, working to control the shape of the globe and

control knowledge of it (Manning and Rood 2016: 9-11; Sivasundaram 2021: 38). For example, it is certain that maintaining this system of maritime networks and transport, the Empire came to depend on would have been impossible without the work of John Harrison to create a timepiece that could be relied upon to calculate longitude (Harrison and Maskelyne 1767; Spencer 2012: 40).

Scientific discovery in the 18th and 19th centuries was a maritime process. The "Age of Enlightenment" relied on ships to transport the world's great minds to new frontiers and relay their findings, specimens, and artefacts to a waiting European theatre. Many of these voyages, such as Cook's circumnavigation, Flinders' tours of Australia, Vancouver in America's Pacific Northwest, and even the voyage of the *Beagle,* were also directly responsible for mapping coastlines and recording the extents of landmasses (Raj 2000: 90). Britain's local Maritime World had further involvement in these changes and scientific advances through the production of the ships they depended upon. James Cook began this process in his selection of a ship type ubiquitous to Britain's coastal trade, the collier brig *Earl of Pembroke,* to become his scientific platform *HMS Endeavour* (Baines 2008b: 101-102). That decision was then immediately echoed by France's response to his voyage and La Pérouse chose a similar vessel type as the platform for his own mission (Sorrenson 1996). The world had to be mapped and surveyed to allow movement of trade and seafaring. In many places these surveying practices and their materials preceded the Empire and were the origin point for the networks and connections that followed (Sivasundaram 2021: 5; Sorrenson 1996: 227-228). So, science became the next great competition between European empires. Science had a further contribution to make in the emergence of systems to catalogue and classify new animals, plants, places, and people. Much has been made of the impact of great scientists and their "voyages of discovery". Most of today's scientific disciplines can trace their establishment to the works of natural philosophers, antiquarians, or astronomers who relied upon seafarers to conduct their work (Sorrenson 1996: 227-228). However, there is a second impact of these events. The classification and measuring of the world serve to irrevocably change how people engage with it. To return to our earlier example, Harrison's watches enabled ships to precisely locate themselves on a chart and in doing so gifted Britain another stride forward in its colonial control and competition with rival European Maritime Empires.

3.4. Change and Imperial Power

The physical setting of the story matters. Some changes or revolutions in this period are responses to challenges raised by real-world forces (such as storms and weather, marine borers, reliable navigation between two points etc.). The result of this period of intellectual upheaval is that advances in science and natural philosophy are changing how the world seems to people (Gamble 2021: 40-44). The concept of Time itself is changing, compressing, and creating the concept of leisure time (for those in the right social circumstance). Continued advancements in maritime technologies mean long-distance sea travel and immigration to colonial possessions or amenable foreign nations is accessible to more and more people. Sivasundaram (2021: 5) suggests we use the concept of "waves" to understand the process of globalisation in this period. Advances in connections are pulling people outwards, it is easier and safer to travel further and further. This combines with a disconnection created by space and time to travel across the water. People are then pushed by desires for opportunity, space, or in response to famine, war, and lack of opportunity.

All these changes were to the benefit of European Imperial systems. Britain presented itself as an 'Empire for Liberty' (Ferguson 2012: 18; Sivasundaram 2021: 4). Maritime Patriotism became a key part of how the Empire presented its agenda. Support for that patriotism and the identification of Britain as a place of liberty was generated partly through anti-slavery and anti-piracy initiatives (Bayly 2016). That maritime patriotism then became a means by which the Empire adopted transformation and change. Section 2.3 briefly explored how change should be seen as a norm in this period, and where we find continuity we should be digging deeper and asking why that is the case. The British Empire actively co-opted change for its own ends and thrived through revolution and counter-

revolution. The changes and revolutions taking place outside Europe in the Pacific and Asian spheres were influenced and manicured until they become something that supported the Empire's agenda. Returning to Sivasundaram (2021) the Empire's response is presented as a counter revolution, and perhaps this is a useful way to think about these events. Globalisation at this point encourages the establishment of British values in the ruling demographics of Pacific and Asian nations. Tribal leaders and chieftains are invited to and encouraged to reside in centres of colonial power. There is an argument that Pacific and Indian Ocean inhabitants took ideas of Western monarchy, science, and so on for their own ends (*ibid*: 54-56). However, it is almost certain the adoption of such ideas by these communities was encouraged and only partly accidental. Undoubtedly this is partly a result of a lack of understanding or respect of tribal systems by Imperial agents leading to a reinforcement of a single leader or point of contact and authority. However, there is also a deliberate process of countering non-European identities through the export of Imperial systems (Bayly 2016). This is the revolution that takes place beyond the European Theatre. It is a political and ideological transformation facilitated through seafaring and maritime connections.

Establishing links for a maritime network is essential, even in the 19th century ships must stop at some point for supplies. This becomes even more important as colonies and imperial possessions become spread across greater and greater areas. The British Empire moved itself "*from Sea to Land*" (Sivasunaram 2021: 4). This required that a considerable maritime infrastructure be established to support that system. As we have seen, processes of scientific discovery and surveying were amongst the first stages of this process. Once a port or trading post had been established definitions of sovereignty could be passed from sea to land and on into 'the interior' (Sivasundaram 2021: 5). As they were established ports became a transition point between the sea, its imperial networks and connections, and the interior and hinterland of a place. The sea becomes Imperial Space. However, ships are an unstable but essential platform as the sea was not easily navigated. The result of those navigations often being wreck or loss. Meaning those ports also become surrounded by shipwrecks and the hulked remains of vessels that cannot be revived and returned to service. Innumerable examples can be found but perhaps most obvious is that of the Falklands, home to the remains of *SS Great Britain* before it was recovered and brought back to its present home in Brotsol (SS Great Britain*,* No Date*), Jhelum* (Bound 1990)*,* and others. Around these maritime spaces another phase of the consolidation of Imperial Power takes place. The sailors and mariners upon whom so much of the connectivity, revolution, discovery, and change depended on were the final component. Those seafaring people become shore-farers (Bayly 2016; Sivasundaram 2021: 4). This is a transformation of its own kind as they become respectable residents with families and interests locally. In turn this transforms those port cities and encourages a consolidation of "Britishness" and a population of those Maritime Patriots. In this way, that mariner who developed their skill around Britain's coast or on its home fisheries becomes a tool of Imperial Expansion and a vital component in a much larger assemblage. Finch (1976: 14-17) presents this argument, showing the movement of coastal mariners and longshoremen on to international voyages (and sometimes back the other way). In our own investigation of this period such a transformation can be seen in the ownership of ships. A Master may begin to establish such an existence through the acquisition of shares in his own, or others' ships. Master-owners are a frequent occurrence and the nature of ship ownership in this time encourages the partial ownership of vessels and by its very nature the spread of risk. An example of such a system can be seen with the ownership of *Ocean* (built 1821) in Section 6.4.2.

3.5. Legislation and Corporation

Through the schooners examined in this project we can also begin to see how the different systems required for a ship to function also consolidate and reinforce Imperial control of the Maritime World. Trade to and from Britain had been bound up by two principal factors prior to the 19th century. The first was a series of Navigation Acts that meant all trade with Britain and its colonies must be carried in first English and later British, owned, and operated ships (Corlett 1975: 1; MacGregor 1980: 11).

Although it is worth noting they did not have to be ships built in Britain. A British merchant could obtain a Dutch-built ship and legally engage in Britain's trade. These acts essentially begin in 1381 where Richard II passes an act restricting commerce to ships belonging to the king's subjects (Liddy 2001: 342). Although this was not named a "Navigation Act". The Tudor monarchs Henry VII, then Henry VIII, and finally Elizabeth I, each introduce a similar restriction during their reigns (Powell and Cook 1977). Almost identical rules are applied to the American colonies in 1621 for the export and sale of their products. These require any commerce between Europe and the colonies to be undertaken by British citizens or the colonists themselves (Conway 2016: 80). Meaning direct trade between British colonies and other European nations had to take place in a British owned and operated ship. In fact, there is a historical debate examining the impact of the Navigation Acts on America and their role as a catalyst for independence (Conway 2016; Lynd & Waldstreicher 2011). The Acts that more directly relate to our study of 19th century shipbuilding were those passed from 1660 although many of their key details can be traced to those earlier Royal Acts and legislation enacted by the Commonwealth of England.

The overall effect of these pieces of legislation was to cement Britain, and specifically London, as the gateway to American trade (Baugh 1994). The Navigation Acts post-1660 are a series of protectionist legislation that effectively exclude Europe's other dominant maritime powers, the Dutch and Spanish, from participating in the supply of trade goods for Britain's burgeoning industrial workforce. The only way raw materials from anywhere could be sold to the British market was for them to be brought to Britain on a British owned and operated ship, this was only enforced in countries and ports controlled by the British Empire. The 1660 Act remains in force, with some additions and refinements in 1663, 1673, and 1696 for the next 200 years (Hope 1990: 282). The other major piece of legislation that contributed to British dominance for Eastern trade markets was the monopoly granted to the English East India Company (Bowen 2008: 1) followed by the ban on ships rounding the Cape of Good Hope without an EIC licence (MacGregor 1984: 161). These Acts and legislative tools effectively cut access to Britain's market off from the rest of the world, access could only be attained by engaging with British owned and operated vessels (Fayle 2013: 189-191). They also meant that both ends of Britain's industrial manufacturing industry utilised British Merchant Ships for the acquisition of raw materials—such as cotton—and the sale of their end products. In the development of British Merchant sea-power the EIC deserves recognition. From the 17th century until the 19th century, the EIC was the dominant force in British trade (Corlett 1975: 1–2). This relative stability in the legislative and market environment meant that there was a similar stability in the shipbuilding industry. Cannon (2019: 140-141) explains that in this period there is relatively little evolution of hull design and performance with the key drivers being cargo capacity. It is in the 19th century that things begin to change.

Britain had become the most dominant European maritime state by the second decade of the 19th century. However, the road to that dominance and especially the impact of successive wars in Europe and North America, had pushed Britain into an economic depression (MacGregor 1984: 10). That economic downturn would last until the middle of the century and have significant ramifications for Britain's Merchant Shipping both in terms of seafaring and for the shipbuilding industry. The first change was the dilution of the EIC's monopoly. This process first allowed non-EIC owned and operated vessels to trade with India without an EIC licence in 1813 (Bowen 2008: 42-43, 187). This was followed in 1823 with permission to trade with all the countries covered by the EIC Monopoly, except China (Bowen 2008: 42-43). With the removal of the monopoly on trade with China coming in 1833 (Bowen 2008: 220). This effectively opened an entirely new market to privately-owned merchant ships. The result of this reopening was to drive increased demand for private merchant shipping throughout this period of reopening, that trend is discussed further in Sections 3.6 and 8.8. This market was particularly attractive to private merchant owners because of the opportunity for low-volume, high-value consumer goods (McDowell 1952: 109).

The other major change for private merchant shipping were the changes to the Navigation Acts that took place in the mid-19th century. The Irish Famine of 1845 led to a temporary lifting of the Navigation Act (Lengel 2002: 73). The following year saw the repeal of Corn Laws allowing non-British ships to sell grain in British ports (Williamson 1990: 144-145). The Navigation Acts applying to the fledgling United States of America were then permanently lifted in 1849 (Mokyr and Nye 2007: 65). For a shipbuilder in Britain these were all significant changes. Perhaps the most important is that the breakup of nearly 200 years of legislative and mercantile protectionism over a very short period of time, introduces a never-before-seen element of competition into Britain's Merchant Fleet. A widely stated point is this also produced a short-term spike in demand for ships to enter the previously restricted EIC mercantile territory (E.g., Albu 1976: 513; MacGregor 1984a: 10-11; Cannon 2019: 8). However, as Sections 3.6 and 8.8 show this does not appear to be the case at all. The impact of changes to this national mercantile legislation is only part of the picture. There is also legislation governing how ships are charged for the access to Britain's trade. The process involves a tax based on the tonnage of a ship, known as Tonnage Laws. In this context tonnage should be seen as a measure of a ship's capacity and not as a calculation of weight. In the earliest part of the 19th century (until 1836) the calculation assumed the depth of the ship as half its breadth (width from side to side) (Lubbock 1914: 105; Corlett 1975: 2; Geels 2002: 1268; Cannon 2019: 8). Shipbuilders actively tried to build around these laws and produce ships that could carry a greater cargo than the calculation indicated and so avoid the increased charges for a larger cargo (Lubbock 1914: 105–106; MacGregor 1988: 98; Cannon 2019: 8). After 1836 the tonnage calculation changed to a cross-sectional area taken at three points (Lubbock 1914: 105–106; MacGregor 1988: 98; Cannon 2019: 8). Once again, shipbuilders tried to build around the new calculation making longer ships with a finer (sharper) run. For a more detailed discussion of the changes in hull design, the consequent impact on their performance, and their effect on the mainstream shipbuilding industry, see Cannon (2018).

The rules set by the Lloyd's Register that govern what classification a ship is given are a serious factor to shipbuilders. This is most evident in the survey report for *Rhoda Mary* in Section 7.8 where the shipbuilder is in contact with Lloyd's Register surveyors to communicate specifics of its construction even before the ship is completed. The degree to which shipbuilders conform to or exceed the rules is part of how the ship is the classified. Other considerations being the age of the ship, its repair history, timber species choice, and so on. The rules are recorded in the front of each year's Register Book and become progressively more detailed as the period develops but do not appear to be a driver in technological adoption. In fact, we can be reasonably confident the Lloyd's Register was reactive to technologies such as iron framework, and copper or yellow metal fastenings. We see technologies first appearing in the register books well after their first introductions. In the case of both iron framework and yellow-metal fastening their entry as discrete items in the Lloyd's Register comes after their first recorded appearances archaeologically (see Section 5.4.4). Lloyd's Register is not mandating new technologies, but it is recognising and recording their presence.

3.6. The Lloyd's Register

As the focus for this thesis is primarily restricted to the British Isles and the ships built there, it is necessary to devote some space to what is being recorded in the Lloyd's Register, and how this develops throughout the 19th century. For the first 60-70 years (from 1800 to 1870) the Register books are focused on ships surveyed in British Ports. This allows quite a broad-brush approach to the ships recorded in those years. It is only necessary to filter out ships built outside the British Isles and, due to the Navigation Acts and Corn Laws, these are primarily Colonial built ships and represent a very small proportion of the register. After 1870, the way Lloyd's Register formats the books changes. From this point the *Lloyd's Register of Shipping* becomes much more international and a "Universal Register" is published from 1880 which includes the ships from "several countries of the world". A transition which also includes surveyors contributing their work from countries and ports beyond the British Isles. At this point the selection of ships needs a little more focus to extract only merchant

schooners that are of interest to this project. It is worth noting that in this late stage of the 19th century it is easier to find wooden merchant schooners than it was in the first half of the century. This supports Greenhill (1941: 245) who sets out that schooners are one of the ship-types that remain active in coastal trades past the end of the 19th century. However, the overall picture gets a little murkier here. It is much harder to extract from these later Register Books what the overall numbers of wooden sailing ships being recorded in Britain as an exclusive area are. From 1890 the format is changed further with a dedicated Register of Sailing Vessels and a dedicated Register of Steamers each being published.

The result of examining the Lloyd's Register in this way is that we can generate an overview of ship recording in this period. Figure 3.1 is a chart that shows how the number of wooden sailing ships recorded in Britain changes over the 19th century. This chart includes ships that have "no character assigned" by the Lloyd's Register. A further complication being that the 1817 register book is missing from both the collection of the Lloyd's Register Heritage and Education Centre, and Southampton City Library—which retains a collection of Registers due to the city's history as a survey port. In the production of the chart in Figure 3.1 a mean calculation has been established from the three preceding and three subsequent numbers to allow a continuous trend to be identified. The data for the final decade, 1890, has been extracted from the Lloyd's Register's *World Fleet Statistics*, also known as the *Statistical Tables* (Lloyd's Register Foundation Heritage and Education Centre 2022b). This shift to the *Statistical Tables* from the information in the *Lloyd's Register of Shipping* was made due to the changes in the Lloyd's Register and the fact that British shipping numbers are no longer separated from those ships built elsewhere in the Empire and therefore do not have a total recorded as a stand-alone figure in the Register Books. For this project the decision was taken to continue to use the figures from the Register Books even during the period the *Statistical Tables* were published (from 1878 onwards), in order to retain some consistency in the dataset. It is only in the final decade that this process could no longer be sustained and a switch to the numbers from the *Statistical Tables* had to be made.

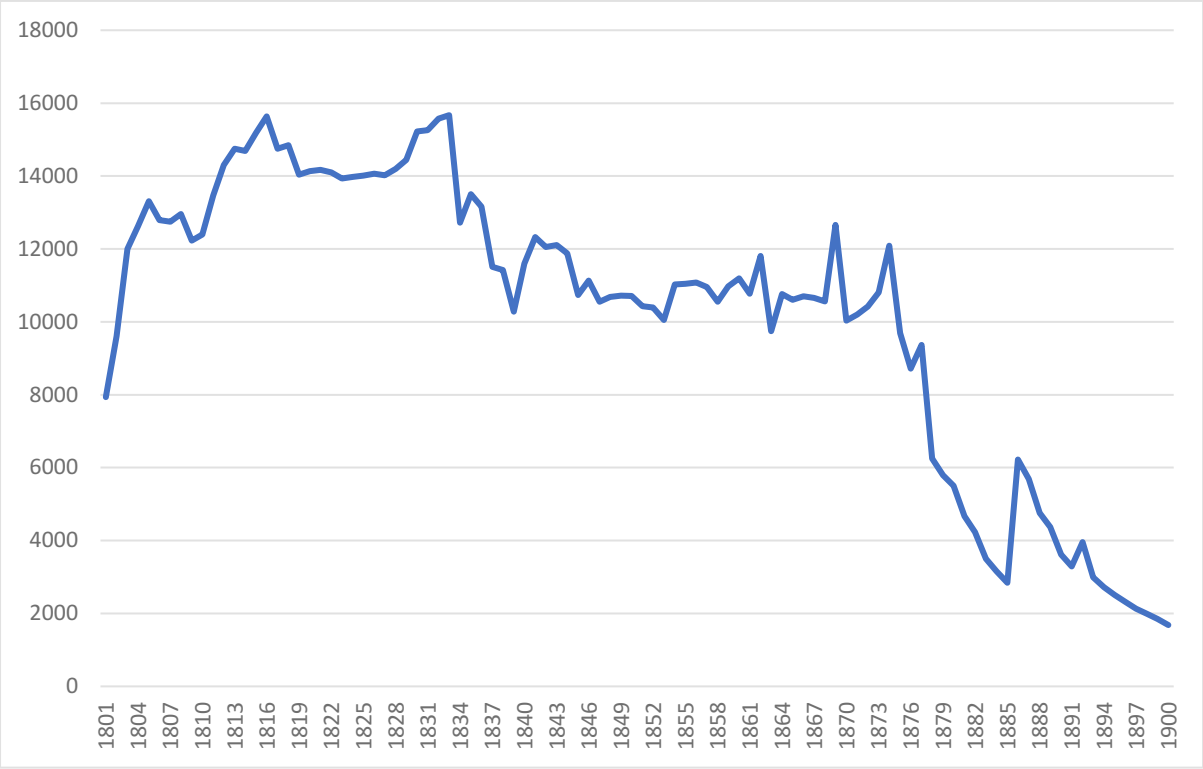


Figure 3.1: Chart of the total number of British wooden sailing ships registered by the Lloyd's Register by year (Chart by the Author).

This chart does have a considerable potential to add to the study of this period. Possibly the only other time a single figure for total shipping by year has been presented is in Davis (1962) for the 17th and 18th century and Mitchell and Deane (1971) for the 19th century. The difference being that Davis, and Mitchell and Deane present their figure as the total tonnage of ships produced per year rather than the number of individual vessels built per year. It is also not clearly explained by any of these authors where the tonnage figures for Britain's entire merchant fleet—used for those studies—were gathered from. There are also separate recordings of the total tonnage of ships by country in the *Statistical Tables*. The use of individual ships rather than tonnage in this study is an important distinction. Tonnage seems to be the figure that is most often quoted when talking about British merchant ships (e.g. Davis 1962; Mitchell and Deane 1971; Finch 1976; MacGregor 1980, 1984a, 1984b). But as discussed in Sections 3.5 and 5.4.2, the calculations for tonnage change during this century and, as Cannon (2019: 129-132) and MacGregor (1988: 105–108) have noted, shipbuilders are intentionally trying to build around the calculations and create ships with larger capacities than are being recorded. Tonnage, therefore, is not the most accurate way to record the size of Britain's merchant fleet and where tonnage figures are being used it should be assumed the actual capacity of the fleet is larger than the listed figures. That said, there is certainly an application for tonnage measurements when looking at volume of trade, efficiency, and performance of ships or ship types. The Lloyd's Register itself records both the old and new tonnage for each ship for nearly two decades after the Tonnage Laws change in 1836. Other studies of ships and shipbuilding have also reached this conclusion. McCusker (1981), Friel (2020: viii), Reid (2020: 10) note the unreliability of tonnage calculations when discussing the size and capacity of both individual ships and for general categorisations of merchant shipping. Unfortunately, the Lloyd's Register figures are also not a definitive record of total merchant shipping in this period. There were other Ship Registers in operation in this period and, as shown in Section 6.4.2 with *Ocean*, inclusion in one Register did not mean inclusion in another. The *Lloyd's Register of Shipping* was certainly the largest but even that did not record every ship in operation. Furthermore, throughout the 19th century there was a lower limit on the size of ships that were recorded in the register: first 50 tons and then in the second half of the century this changed to 100 tons—although as Section 5.4.2 shows there are ships considerably smaller than this recorded in the Register Books suggesting these limits may not be mandatory. The chart in Figure 3.1 is therefore only a piece of a larger picture but it is potentially providing the first route ever to investigate the changes in ship numbers throughout this period. Prior to this the literature has referenced the impacts of legislative changes and innovation in technology but has not presented a quantifiable and measurable change.

Visualising ship numbers in this way allows the direct study of the impacts of those changes and revolutions. This general ship numbers chart can be used as a timeline upon which to plot certain key events (Figure 3.2). For example, by including the dates for the breakup of the EIC's monopoly and the changes made to the Navigation Acts, it is possible to question the increase in ship numbers referenced in the literature. A drop-off of these numbers is also visible following the rapid overproduction of ships, possibly that mentioned by MacGregor (1984b: 10-11), although somewhat earlier than the legislative changes he connects to it. In the latter half of the century, these numbers can be compared to those used by Mendoça (2013) in his study of the 'Sailing Ship Effect". Mendoça (2013: 1726-1728) demonstrates the impact of the arrival of steam through tonnage figures. Paraphrasing his conclusions, steam primarily replaces sailing ships through efficiency. Then including Greenhill's (1941: 245) comments that schooners and other sailing ship types remain as components of Britain's coastal trade, suggests the actual number of wooden sailing ships remains high well into the 1880s. Mendoça (2013: 1727) reports figures that support Greenhill's observations, the average size of a sailing ship falls in the final decade of the 19th century (see Figure 3.3 and Figure 3.4). It should be noted here that Mendoça is not restricting his study to wooden sailing ships in the way this project has done. The ships used by Mendoça include the iron and steel windjammers that are capable of being assembled as much larger ships and become a popular merchant ship type in the

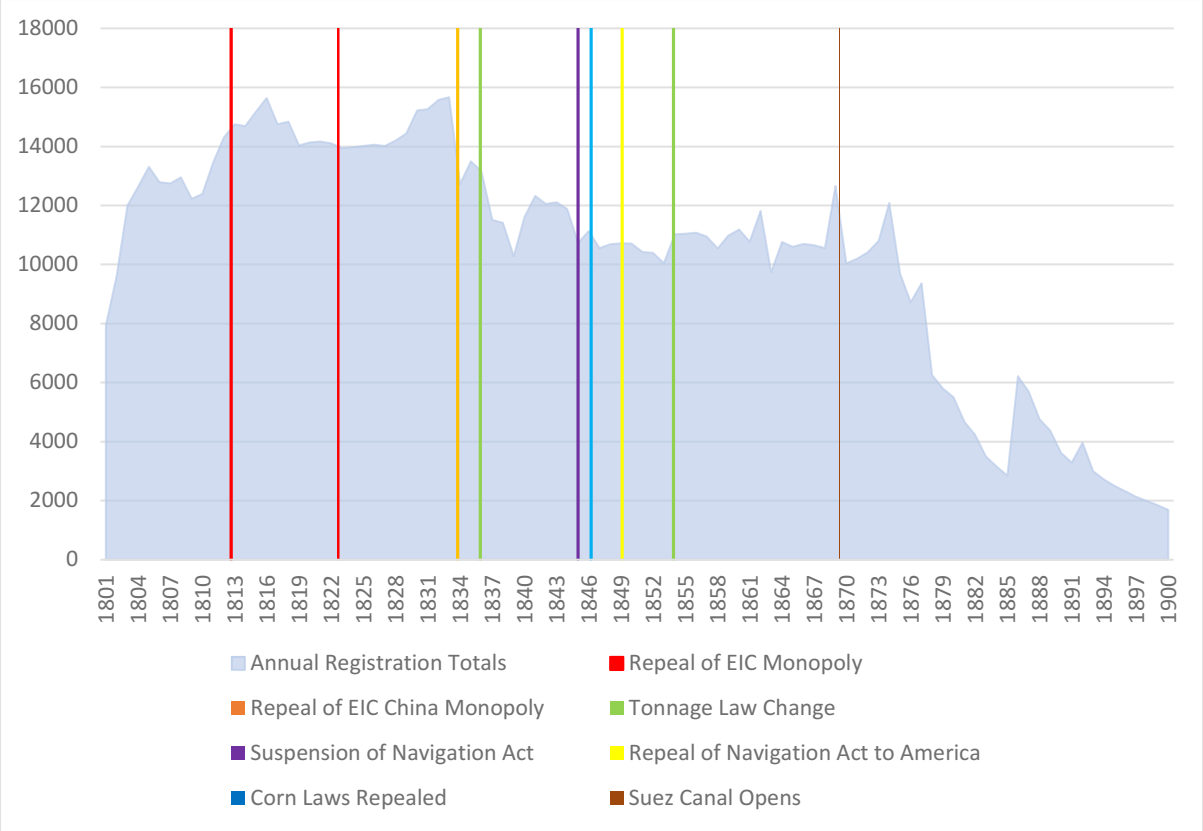


Figure 3.2: Chart showing the number of british ships registered by the Lloyd's Register by year along with certain key legislative changes and events for the period (Chart by the Author).

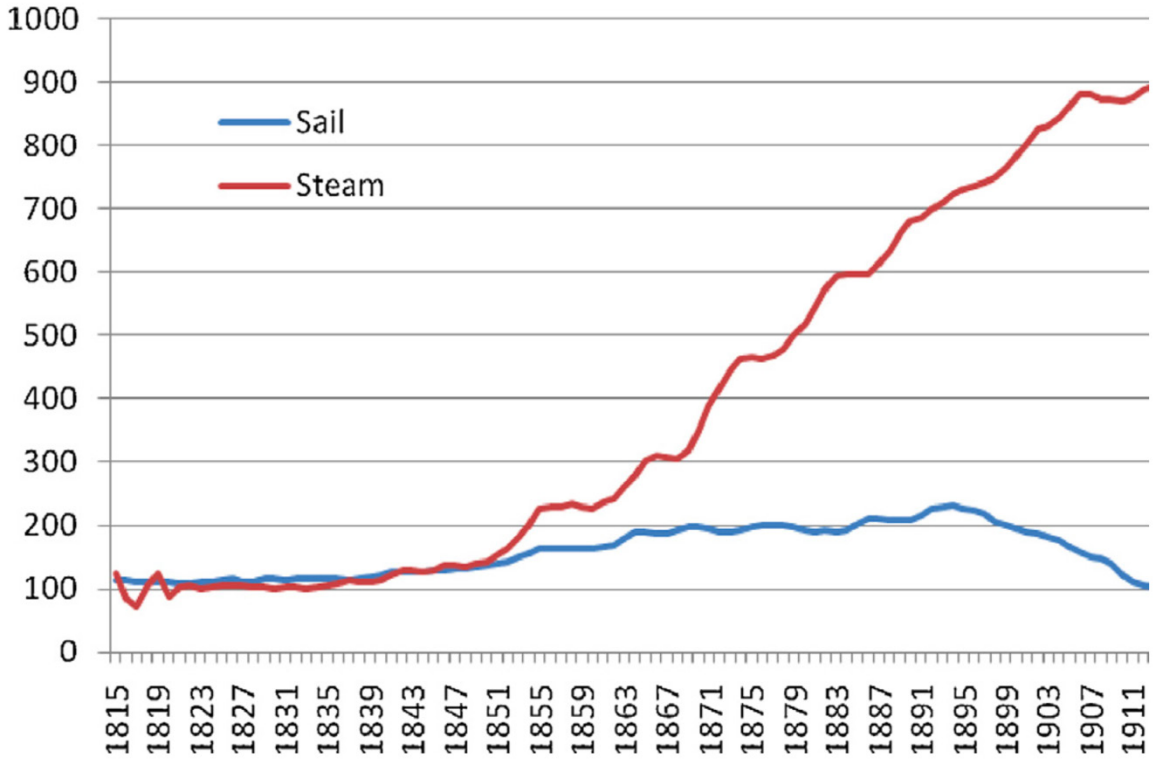


Figure 3.3:Chart taken from Mendoça (2013) showing the average tonnage of sail versus steam ships.

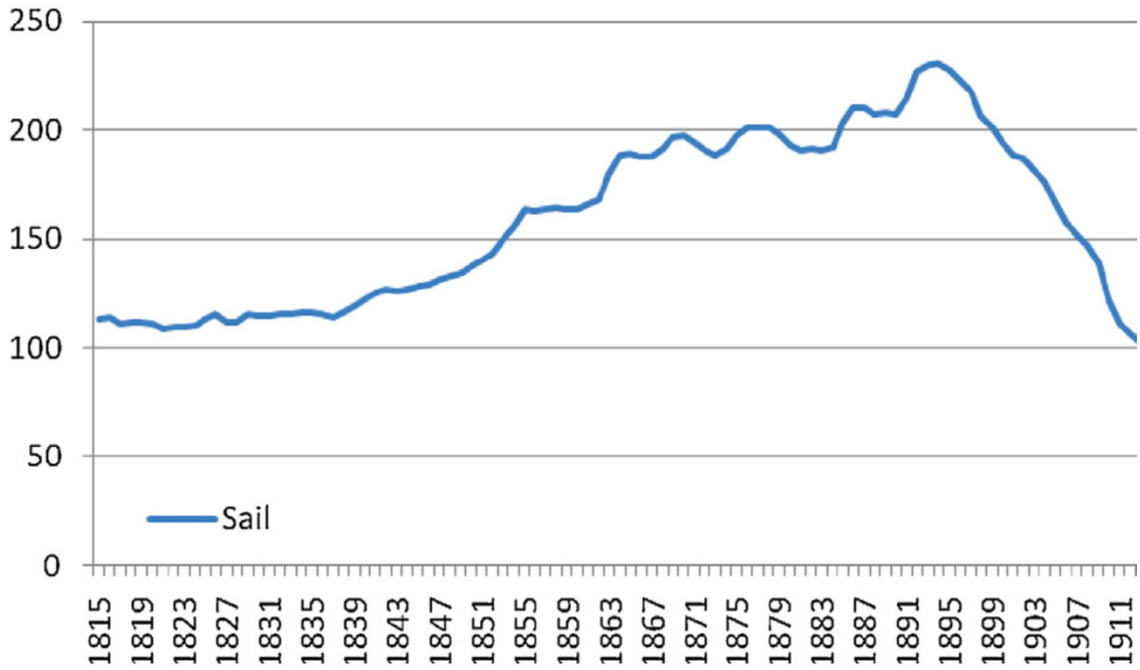


Figure 3.4: Chart taken from Mendoça (2013) showing the average size of sailing ships by tonnage.

final two decades of the 19th century. What this discussion also shows is the complexity developing in merchant shipbuilding at the end of the century. As new materials and technologies emerge and are incorporated into the shipbuilding process, different types of ships effect shorter-term dominance of different industries. Metal windjammers never establish as a ship-type in the same way wooden sailing vessels dominated for the previous 6-7 decades but they receive a spike in popularity. The Maritime World by this stage contained a far more diverse range of ship types and designs.

It is important to be able to establish broad trends in the use of certain technologies and materials from this sample of merchant schooners and their people. What the numbers do show is that wooden hulled ships of various rigs continue to be used in merchant service well past the end of the 19th century (also see Greenhill 1978, 1980). A further part of the picture can be established for the final two decades of the century. Throughout the records of the Lloyd's Register ships built in the United Kingdom and those produced by colonial shipbuilders are combined to give the overall numbers of "British" ships. There is a shift in the mid-1880s with British-built wooden ship numbers falling and "Colonial" ship numbers increasing (see Figure 3.5). By 1889 colonial wooden ships outnumber those built in the United Kingdom (see Figure 3.6). Prior to 1886 the numbers had been vastly different with wooden ships built in the UK outnumbering colonial counterparts by a factor of at least 10. Therefore, whilst wooden sailing ship numbers do fall in the final decade of the century the reality of the picture is much more complex. Wooden shipbuilding in Britain effectively collapses and by the end of the century at least half of the British wooden ships contained in the register are from outside the UK. The numbers for iron and steel ships have not been included here as the focus is on wooden shipbuilding. However, as an example in 1899 a total of 3,161 British sailing ships are registered, of these 1,311 are iron or steel-hulled ships. By contrast, in that same year 7,837 steam-driven vessels were registered. This is of interest because even at the end of the century, with so many different materials and technologies being employed successfully in shipbuilding, entirely wooden sailing ships continue to represent a notable proportion of registered shipping. New wooden sailing ships are still produced and registered although in very small numbers. In 1900 only four wooden or wood-composite ships are entirely new additions to the register, in 1899 there were none.

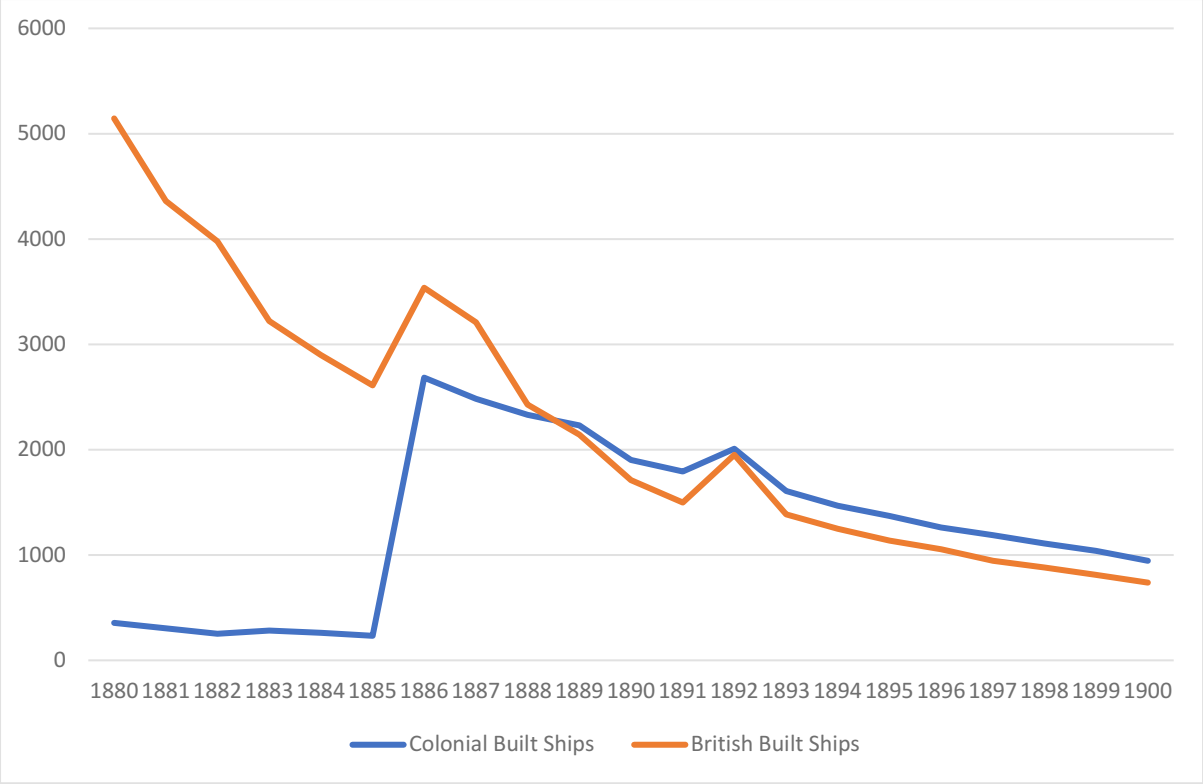


Figure 3.5:Chart showing the comparison of ships built in the United Kingdom against ships built in Britain's colonial territories towards the end of the 19th century (Chart by the Author).

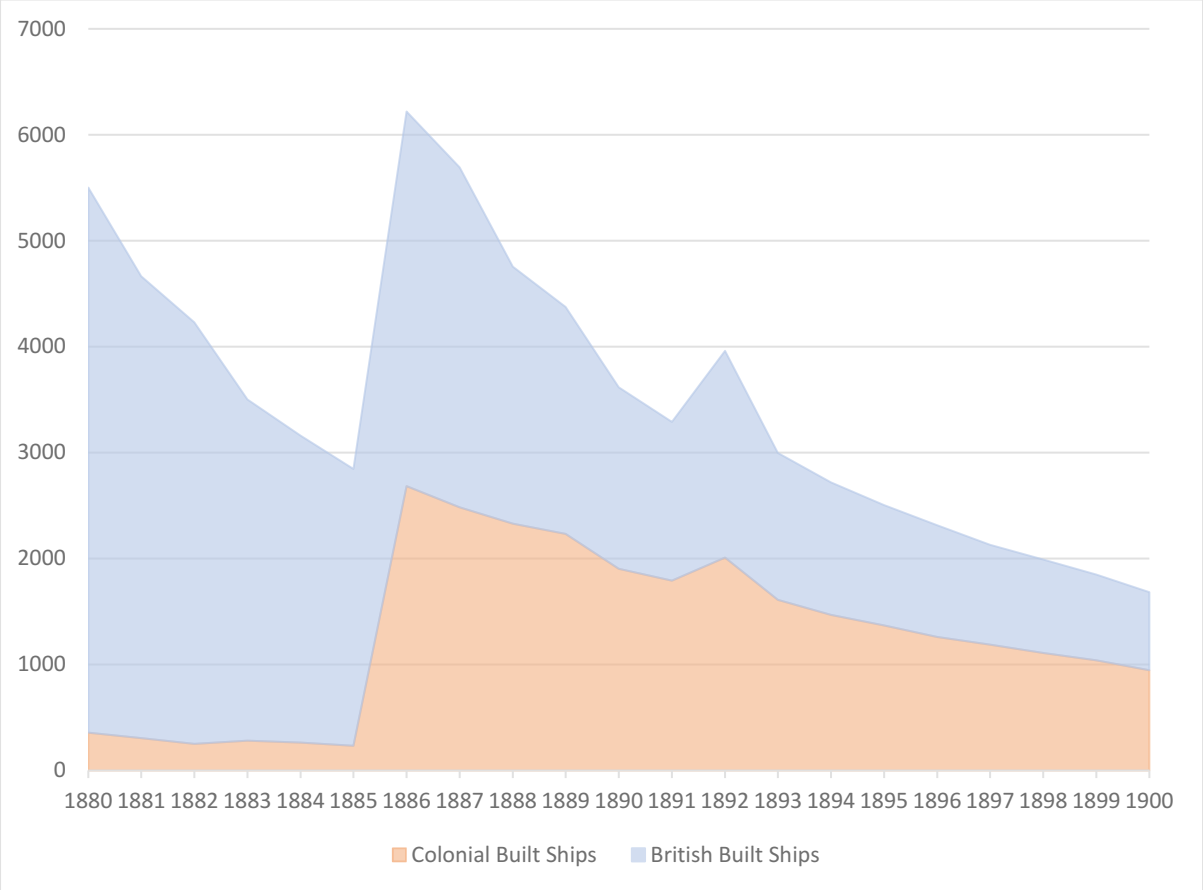


Figure 3.6:Chart showing the ships registered by Lloyd's Register built in the United Kingdom against those built in colonial shipyards as a proportion of the British ships registered by Lloyd's Register (Chart by the Author).

The image presented by Figures 3.1 to 3.4 should be relatively unsurprising and broadly confirms some of the established conventions in the literature. There is a rise in ship production around the time the EIC monopoly and Navigation Acts were lifted. Steam-driven vessels were rapidly replacing sailing ships. Mendoça (2013) and Cannon (2019) both make the point that the priority for British merchant ships for most of this century was not speed, but capacity. This is a picture that has probably been coloured by studies of American shipping where the need to compete with European mercantile power and avoid maritime blockades appear to have created different priorities focusing on speed over capacity (MacGregor 1988: 34-36). Although this is worth further, more detailed, investigation. The principal advantage of metal-hulled ships is that they could be larger with a greater capacity, and steam engines allowed for ships that were more efficient and could take advantage of new routes to key trade destinations, such as the Suez Canal, that were closed to sailing vessels (Mendoça 2013: 1734; Woodman 1997: 173-174). The world of the wooden sailing ship was becoming smaller and smaller, reducing to primarily Britain's coastal trade and the carriage of bulk cargoes such as china clay, coal, aggregates, and so on. The sail-steam transition also demonstrates the time investment for such a profound technological shift. That shift to steam-powered shipping has a secondary effect on Britain's seascape and the wider assemblage of our merchant schooners. Greenhill (1978: 194) explains that merchant sailing ships can only operate in an environment that considered their technology and ship type the norm. Once sailing vessels begin to become the minority their ports and harbours can no longer provide the shore-based infrastructure to support their economic operation. Essentially creating a situation where sailing ships are on course for a rapid decline once this stage is reached. It is likely developments in land transport and canalisation also have a detrimental impact on sailing vessels. These systems would also reduce the volume of coastal trade by presenting alternative, sometimes more direct, routes for the movement of material.

This relatively simple set of charts allows a quantitative study of Britain's Sailing Merchant fleet. This is not exhaustive, and it must be assumed it does not represent the total shipping capacity of Britain. However, it is the first time a study of this kind has been undertaken that considers the number of ships rather than tonnage measurements. Measurements of tonnage both for individual ships and for wider more general records, are now widely agreed to be an unreliable representation of merchant shipping in this period. However, this is not the end of what can be achieved by studying the dataset of the Lloyd's Register. The entries for individual ships in the Register Books contain a considerable amount of information. For the 200 ships that form the dataset for this project this will be the primary means to extract information about their Lifeway and details about the technologies used in their construction and repairs they undergo. An investigation of the *Lloyd's Register of Shipping* has not been performed on this scale before. Primarily the records of individual ships in the Register Books have been utilised within historical studies or archaeological investigations of individual ships (e.g., Auer and Belasus 2008; Cumming and Carter 1990; Davis 1962; Ossowski 2008b; Whitewright and Satchell, 2011; also see Ransley *et al.* 2013: 173). For the first time those records will be used so that the ships can become a lens through which we can study 19th century British Merchant shipbuilding. For each specific ship along with the name and type of vessel the Lloyd's Register records the Master, Tonnage, Place of Build, Build Date, Owner, the Port it was Surveyed in and the Intended Onward Destination, and its Lloyd's Register Classification. These details are recorded every year. The Register also makes note of any repairs and their scale, the presence of iron framework, copper or yellow-metal hull sheathing, and the type of fastenings used for the ship's frames (whether iron or yellow-metal). We can therefore extract a huge amount of information about a ship's life allowing us to put together the narrative of a ship's life and to compare one ship to another.

3.7. Summary

This chapter has demonstrated the importance of Britain's maritime industries in the 19th century. The domestic shipping industry, the name used to refer to Britain's combined shipbuilding and coastal merchant seafaring industries, is the basis for the British Empire's maritime dominance. Through the

skills developed in those industries, Britain maintained a substantial reserve of skilled mariners that was instrumental in establishing and sustaining British influence over the 19th century Maritime World. The oceans of the 19th century become a space of change and counter-change. The entire century is a period that is subject to that change and to the process of discovery. This is not an exclusively European process, the wider world beyond the European theatre is also subject to this. Whilst the outcomes and results of these processes are perhaps most well documented from European perspectives, other communities are also harnessing the power for change and discovery. What writers like Sivasundaram (2021) are showing is the way the sea's force of change and revolution is harnessed by different communities. In this century European Empires manage to direct this force. The British Empire becomes the most adept at this. The oceans are not "commanded" or "controlled" by British Maritime Power, but their force is utilised in a system of change, revolution, and counter-revolution becoming an Imperial Space used to enable and advance Imperial Ambition and consolidate Imperial Control.

For the schooners selected for this project the influence of Imperial Power manifested as a system of connections and through the recording and characterisation of ships. In the British Isles "Empire" was not an explicit force, instead there was a systemic application of processes and methods of control. Those same systems are present elsewhere, but sometimes coupled with a more direct process of establishing control through forces such as—but not limited to— naval power, protectionist policy, or mercantile might. The advancements in science and industrial technologies in this period rapidly change how people experience the world. Distances shrink and time expands to fill the gap. As Gamble (2021: 44) explains people now experience George Eliot's "New Leisure" with time to fill with literature, and through engagement with scientific correspondence. As changes in maritime technologies open the world to explorers and scientists so begins a rapid change in how the world is understood. Before long, those scientists advance theories and methods to aid in the classification of the world. These both make things easier to understand but also allow for an increased level of control and monitoring. Cartesian systems to classify animals and plants give way to systems that allow for the classification of other, more human, entities (Andaya 2006: 673). This includes our schooners. Through the establishment of the Lloyd's Register—and its competitors—a system of characterisation is established to survey and record the condition of ships. This is intended to mitigate insurance risk and therefore safeguard investment. Through these advances in how the world is studied and recorded, the "Age of Enlightenment" of the later 18th and early 19th centuries gives way to Sivasudaram's (2021) "Age of Change".

The 19th century Maritime World is at the heart of that change. The British Isles, and England in particular, evolve into the factory of the world (Hobsbawn: 1999: x1-x11). At the beginning of the century legislation such as the Navigation Act combine with territorial possessions like Cape Town, allow British merchants to dominate the chain of supply and the means of production (MacGregor 1984a: 161). Rounding the Cape, the fastest means to reach the Indian Ocean until the opening of the Suez Canal, can only be done with a permit from Britain (McDowell 1952: 117). Trade with key markets in India and China is exclusively controlled by the EIC (MacGregor 1984a: 161). As the century advances much of this legislation is eroded and then removed in response to the challenge of economic depression following Britain's military campaigns in Europe and America (MacGregor 1984a: 10). It is possible that at first this gives a tremendous boost to domestic shipbuilding. Between 1813 and 1833 the *Lloyd's Register of Shipping* records the largest number of sailing ships at any point in the century. This is soon followed by a collapse in numbers as supply exceeds demand and a new equlibrium is established in the merchant ship population (see Figure 3.1).

Even as this new world of private merchant ships is developing, there is a further challenge for our wooden sailing ships. Steam-driven vessels even in the middle of the century, are a relatively minor presence. However, as the latter half of the 19th century progresses the scales shift further and

further with the increase in capacity, and therefore efficiency represented by the industrialisation of shipping. Throughout this change coastal sailing ships remain a key component in the maritime system. Where steam begins to replace sailing vessels in international voyages and iron hulls allow for larger and larger vessels to be built, wooden sailing vessels remain in the ports and harbours of the British Isles. Coastal schooners continue to provide service in bulk trades; china clay, coal, aggregates and so on, well into the 1920s, past the point of concern to this thesis. Chapters 6 and 7 demonstrate the remarkable similarity between a schooner built at the height of Britain's 19th century shipbuilding industry (*Ocean* – built 1825) and one built well into the second half (*Rhoda Mary* – built 1864). The way these ships are understood is vastly improved by the archives and records of the Lloyd's Register. Those records have already allowed the creation of something that has never been done before for this century. In the charts presented in this chapter is a record of every ship registered by Lloyd's in this century. It is by no means every ship working in the merchant service at this time, but as the largest single registry available it is certainly a worthwhile sample. The detail represented by each entry provides a year-by-year account of the life of a single ship ship and is granular enough to outline repairs and changes to ownership and command. Although, as Chapters 6 and 7 demonstrate, things are not always as straightforward as they appear. The current narrative of the 19th century Maritime World is changing, as are the perspectives from which it is being examined. To further add to that changing narrative 200 ships will be selected for this investigation, and the process of that selection is dealt with next, in Chapter 4. This sample represent a fraction of those present in the records of the Lloyd's Register. However, that sample represents a group of people that are often forgotten amongst narratives and studies of the period's great Mercantile Companies or Naval Powerhouses. Through the information contained in this chapter it is possible to position this thesis in such a way as to be able to see through the lens provided by the schooners selected for this project. They enhance the relating of the lifeway and narrative those ships and provide a means to reach the people involved.

Chapter 4. Methodology

4.1. Introduction

This thesis involves the interrogation and interpretation of two related but distinct source materials at both a single-site level and as part of a wider context, over the span of an entire century. A clear methodology is therefore needed by which these sources are approached and integrated into the single assemblage advocated for in Chapter 2. Where material evidence from fieldwork on shipwreck sites is concerned, any methodology will require both generic consistency but must include some flexibility due to the variation between shipwreck sites in their context, condition, and accessibility. Alongside this must be a similarly clear and repeatable method by which the different documentary sources are approached. In the preceding two chapters the importance of asking the right questions of sources was discussed. This thesis has set out with the following overall questions:

1. In what ways do schooners, as a medium size ship type, reflect the trends thought to occur in 19th century British shipbuilding?

2. What is the potential for ships in the overall shipwreck record, to unlock documentary components of the record, thereby revealing relationships and meaning that would otherwise remain obscure in investigations of either source material on its own?

There is some work that needs to be done before these aims can be fully addressed. Firstly, a sample dataset must be established from what is available, especially because the documentary dataset from the HEC is so large. Nevertheless, that sample must be made mindful of key contextual aspects relevant to contemporary maritime industry and seafaring, for example: socio-political, industrial, technological, and legislative drivers. Furthermore, as that dataset deals with non-naval ships of all types and all industries the sample taken for this project must be restricted to coastal shipping in the 19th century. To ensure that focus can be maintained a historical context must be established to allow a more detailed discussion of the individual story of certain ships, including the two archaeological case studies. Thus contextualised the assemblage of sources used for this project will emerge with more clarity, as will the relationships between ship design, construction and seafaring with the events, laws, and other influences on the period that are not necessarily explicit in either the material or documentary sources.

The selection and use of the documentary sources identified for this project are a further component that will be discussed here. A clear methodology is required showing how these are approached. With the context of the period established the next step is to detail the type of ship being used for this thesis and the specific ships being used. As part of this the role of the *Lloyd's Register of Shipping*, and other sources such as the Casualty Returns, crew rosters, paybooks, and port documents, also needs to be set out. Not every ship sampled for this thesis will have all these documents available for study. These documents will also be included for the case studies in Chapters 6 and 7 if they are present. However, these two examples will also be examined through their material remains.

4.2. Context and Background

Understanding the role of each of the different source types is an essential factor when incorporating them into the study of shipping in this period. In Chapter 2 it was shown that the approach that needs to be taken is to ask appropriate questions of a particular source. To do this a degree of understanding of what each individual thing does needs to be established. For example, the *Lloyd's Register of Shipping* was used to rate the seaworthiness of vessels informing insurance, purchase, and use. To gain that understanding, Chapter 4 will set out an overall context of the 19th century Maritime World. One issue is the need to avoid simply inserting these case studies into an existing historic

narrative. This differs from some of the historical literature approached in Chapter 2 as the intention here is not to provide an overall account of the period. Instead, this is an exercise in setting up an investigation of the period using the ships in the two case studies and those extracted from the Lloyd's Register as a means by which a narrative can be created. Chapter 4 will therefore break down the key events of the 19th century through their relevance to the working vessels targeted by this project. This will remain an archaeological investigation. It is not solely the creation of a new historical account, but also the composition of a narrative produced as much from archaeological interpretation as historical documents. That narrative can then be set alongside an overview of certain key themes, such as total volume of shipping, and against a timeline of events and changes such as tonnage laws.

These themes and events present an opportunity to utilise visualisation tools to represent a considerable amount of the data related to shipping in the 19th century. This will then be combined with the information from the case studies. Doing this will produce several plots representing changes over the period and addressing themes highlighted in the wider literature, such as Cannon's (2019) work discussing the impact of changes in tonnage laws on ship performance. In effect this gives the project multiple ways to show the impact of events and forces in this period, such as industrialisation, conflict and so on. All of this is background data that has not really been collated in one place or visualised in this way before but is available in one form or another elsewhere. Including it here adds mobility to this project and allows the case study investigations to be used as a lens through which the people associated with them can be seen. This also helps to resolve another issue highlighted in Section 2.2, that the study of these working ships so far focuses on the investigation of individual examples. The case studies here can now be approached differently.

The overall context, that combination of narrative, statistical overview, and timeline, serves as the backdrop for the investigation of the case studies. It is impossible to see everything here, even though the record is fairly complete, there will always be gaps and parts missing. But establishing a starting point in the form of this overall context is the first step in a concurrent methodology for the study of this period. In this way the ships chosen for this project have informed the context used to approach the source material, such as the documentary evidence. This allows a much more focused investigation which deals directly with the ships themselves and the specific influences and forces acting upon them. It also means the wider body of historical material, such as the publications from Section 2.3 and the sources they utilise, can be incorporated into this project in a way that does not compromise this concurrent approach. This begins to resolve the issue of historical particularism, or relying upon an established narrative, to direct the study of the documentary material and tell the story of the people at the heart of this thesis.

4.3. Evidence from wrecks

The following stages have been set out to direct the investigation of the material remains of the two shipwrecks in Chapters 6 and 7. These are not intended to override the overall aims of this thesis. But it is necessary to set out aims for the archaeological investigation to ensure the sites are covered in a way that is in line with the theoretical framework and methodological choices in Section 2.5 and in Section 4.4. This approach also ensures the fieldwork methodology for this project is clear and repeatable, as any expansion on the work presented within this thesis will rely on a repeatable method by which the sources used are approached and interpreted. These stages also relate to the incorporation of documentary material, as it is important to maintain the concurrent approach to sources discussed in Section 2.4. The objectives for the archaeological investigations are as follows:

1. Establish the overall; geographical, temporal, and material context of the shipwreck
2. Position the ship within historical background of the period
3. Calculate the total number of ship losses in the area within a time frame established from dateable material on the shipwreck site

4. Identify a shortlist of potential candidates for the identity of this shipwreck
5. Use details from the archaeological remains to "test" candidates on the list and establish a most likely candidate(s).

It may not be necessary to resolve each of these points for every shipwreck. For example, the second Case Study in Chapter 7 was abandoned rather than wrecked, meaning there is already an identification and background for the ship in the existing literature. This will be discussed further in that chapter. For the "Paper Ships' drawn from the Lloyd's Register in Chapter 5 there is no archaeological investigation planned although survey reports, where available, could serve to develop further specific details of their construction. For the purposes of this thesis however, focus will remain on the *Lloyd's Register of Shipping* for those ships. The same documents will then be utilised for *Ocean* and *Rhoda Mary* in Chapters 6 and 7 with the inclusion of *Rhoda Mary*'s survey report in Section 7.8. In this way some uniformity of approach can be retained between the archaeological case studies and the examples from the documentary sources.

Incorporation of archaeological material alongside documentary evidence is essential for this methodology to work correctly. Adams' (2013: 48) discussion of methodologies of this type shows their effectiveness. The challenge to this thesis is that there are only a handful of archaeologists practicing this methodology and only Whitewright, in the work on Alum Bay (Satchell and Whitewright 2014) and on *Flower of Ugie* (Whitewright and Satchell 2011), discusses its application in any detail. This means that the following section has relied heavily on those examples. Whilst this may appear to be an issue, that same approach has been utilised by the other studies of 18th and 19th century shipwrecks just not detailed in their publications. Therefore, it is only for the explicit description of the methodology that those two publications will be utilised so extensively. Finally, attention should also be drawn to Adams *et al.*'s (1990) work on *SL4* as this is really the precursor to much of the approach that follows.

For the most part the methodology set out here is not entirely new. Existing approaches to the investigation of shipwreck sites and the incorporation of documentary material will be developed and adapted for the specific requirements of this project. There are already effective, and tested, methodologies for dealing with 18th and 19th century ship-finds in a variety of contexts. The intent here is to suggest the state-of-the-art, adapted and refined from these various approaches and in turn proven on the case studies in Chapters 6 and 7 and the documentary archive of the *Lloyd's Register*. The synthesis of this methodological approach and the theoretical tools assembled from Section 2.5, will show the best way to approach an investigation of ships and shipping in the 19th century.

4.4. Documents and Data

Most of the documentary material comes from the archive of the HEC. This, alongside the material remains of the two case studies, makes up the sample of the record being approached by this project. In Chapter 2 the scholarly context for the incorporation of documentary material in the archaeological investigation of shipwrecks was discussed. In the exploration of Alum Bay, Whitewright (2014: 21 and 23) sets out how the resources associated with, or directly sourced from the Lloyd's Register could be utilised. Since the publication of the Alum Bay monograph much of the archival material has been relocated. At the time (2012-13) the material was housed and managed by the National Maritime Museum, Greenwich. Now, the archive has been taken back in hand by the HEC is being made available online through a digitisation and online publication project (Lloyds Register Foundation Hertage and Education Centre, 2022a). Despite this change, the approach to the documents from the work done on the Alum Bay site is still relevant and has been used to inform the method employed here for the study of the individual shipwrecks in 4.4.1. The methodology for the wider focus study of ships from the *Lloyd's Register* is discussed in 4.4.2.

4.4.1. Documentary Sources for Shipwreck Investigations

The first step in utilising documentary material as part of the investigations of the shipwrecks making up the case studies, is to look at the evidence for shipwrecks in that area. The Shipwreck Index of the British Isles, National Record for the Historic Environment for both England and Scotland (NRHE in both countries), and the National Monuments Record of Wales (NMRW), accessed through Heritage Gateway for England, Canmore for Scotland, and Coflein for Wales, will be the primary sources for this stage. In Figure 4.1 the area covered by the Hampshire section of the Index shows the locations of the East Winner Bank shipwreck (the case study in Chapter 6). In Whitewright's approach to Alum Bay, which is only 43 kilometres west of the East Winner Bank shipwreck, the need for an understanding of how shipwrecks in this period are recorded, is set out (Whitewright 2014a: 21-23). Shipwrecks for which the exact point of loss is not known are located through "Named Locations" (NLOs). These NLOs are not absolute reference points for where a ship went down. Instead, these the NLO serves as the nearest known point on the coastline to where the loss occurred. For example, the NLO for the East Winner Bank, where the case study in Chapter 6 site is located, is "East Winner". However, there are 39 NLOs in the Solent, a small area that even today this is one of the busiest areas for shipping in the world. In the 19th century things would have been no different. The East Winner Bank is an active sandbank, evidenced by the fact the shipwreck itself is subject to widely varied degrees of burial. When examining sites of this type, we must consider the nature of the sandbank and the processes of wrecking on this coastline.

There has been much written about the site formation processes of shipwreck sites. In both the investigation of the Alum Bay (Satchell and Whitewright 2014) and *Flower of Ugie* (Whitewright and Satchell 2011) shipwreck sites the need to account for shipwrecks drifting after foundering or breaking up is highlighted (Whitewright 2014a: 18). Elsewhere, there are examples of ships foundering on sandbanks and shoals and their remains spreading across a considerable area or being located some distance from their recorded point of loss (Gibbs 2006: 13-15). Only *Ocean*, the ship dealt with in Chapter 6, required an approach of this type. *Rhoda Mary,* the ship in Chapter 7, was intentionally moored and then abandoned at its current position. *Rhoda Mary*'s identity is therefore already well established. The next stage for an unknown site such as that in Chapter 6 is to establish a survey area to look for candidates for the identity of the shipwreck sites. This will be achieved through establishing "buffer zones" around the wreck-site's location and the including the NLOs they cover. In the case of *Ocean* (AKA the East Winner Bank Shipwreck) these buffer zones do not need to be big since the site appears to be a ship that was initially deposited in its current location through running aground. Once the list of NLOs is established from these buffer zones the next step is to use the available sources to create a shortlist of candidates based on the results of archaeological recording methods (set out in 4.5) and other available sources such as newspaper reports, or local knowledge. The shortlist of candidates, and the recorded losses for each of the NLOs within the search area will then be tabulated. In the process of doing this it will also be possible to give an overview of the data relating to ship losses in the specific areas of the site, adding to the wider contextual data from Chapter 4 described in 4.2. This will be particularly helpful when looking at the relationship between losses in the immediate area of the site against the wider coastline. Continuing to enable the case studies to be examined in the wider context of 19th century shipping.

Once the shortlist of candidates has been identified, the next stage is to eliminate potential candidates using specifics from the archaeological remains. This is to take the archaeological data a step further than that used alongside the Shipwreck Index. This data will be used alongside the *Lloyd's Register of Shipping* for the relevant years of each identified candidate. The detail contained within each entry in the Register can include the types of fastenings employed in ship construction, the presence of hull sheathing and details of repairs undertaken. By comparing this to diagnostic elements from the archaeological site it will be possible to refine the shortlist even further and begin

to suggest a tentative identification. Developing this will involve utilising, where available, the original surveys undertaken by Lloyd's Register surveyors when the ship was entered or re-entered into the register. At present these are held by the HEC, however access is currently limited due to an ongoing refurbishment meaning enquiries for archival material are unavailable.

Information within the Lloyd's Register will also make it possible to trace the life of the ship. Each year the survey port and intended destination is included within each entry. For some this will be a named port however for working ships of the suggested size of the East Winner Bank shipwreck they are often listed with *"Coaster"* as their intended voyage. Investigating these voyages is harder and requires the inclusion of other documents such as newspapers and port/harbour records and is a level of detail beyond the scope of this thesis. Regardless of the different sources required a biography will be constructed from these records showing the ship's life in as much detail as possible from its creation to its sinking. A ship's loss and the aftermath are the final parts of the story to explore. From the documentary information it is possible to establish the day of loss. We are then able to explore newspaper archives and other sources such as the Lloyd's List which record wrecking events and the loss of ships. In the 19th century this practice was commonplace, casualty returns from sources such as the Lloyd's List were an important way merchants and shipowners kept informed of the state of their investments and ships. Following on from the life of the ship will be as detailed a narrative as possible of the loss of the vessel utilising relevant documentary material and evidence from the shipwreck itself.

4.4.2. Documentary Sources for the Study of 19th century Shipping

The wider study must be approached slightly differently. The record that can be used for this part of the investigation is more restricted as there are no material remains for the ships included here. This is not necessarily a problem. There is considerable detail within the survey reports and the LRS itself and having a more restricted dataset allows for the inclusion of more examples. The two case studies that do include material remains, show the accuracy and detail of those records. There are some issues, but the documents do show a fair account of the technology and detail of the ships they relate to. For example, the dimensions of framing timbers, the materials used for fastenings, thickness of planking, and even the type of timber used for different sections of the ship. Therefore, the first step is to establish a sample of ships from the thousands recorded in the Register.

The total sample is 200 ships, because that is a realistic number to deal with in the time frame available for this thesis. The selection process takes two ships per year for every year from 1800-1900. The two case studies will form part of this overall 200, other ships will be selected by taking the first new ship in the register for each year. To avoid an entire dataset of schooners with names beginning with "A" each year will advance one letter of the alphabet, 1800 being "A", 1801 being "B" and so on. The two case studies will break this pattern, however as they are examples with accessible material remains this trumps any other criteria for the years they relate to. Each of these ships can then be followed through their entries in the *Lloyd's Register of Shipping* in the same way, with the same information regarding voyages and construction details being drawn out. These records can then be tabulated for each ship meaning the same information for every ship can be presented regardless of which "edition" of recording has been used to enter them into the *Lloyd's Register of Shipping*. This data can be represented in several ways but one of the clearest is to demonstrate the types of voyages being undertaken and the places these are directed to. Focus will first be brought onto vessels listed as "schooners" as explained in Chapter 2. Then focus can be narrowed to those recorded as "*Coaster"* to ensure some uniformity in how the ships were being used. Finally, as this thesis focuses on 19th century British shipbuilding, that sample will comprise of schooners that are from shipbuilding sites covering as much of the coast of Britain geographically as possible. Those ships will also need to represent instances of shipbuilding spread throughout the century temporally. The selection will not require a discrete number of ships from a particular county or region, as different

regions have wildly varying outputs in terms of shipbuilding. The focus is on a sample that is large enough and with enough detail to ask the questions set out in Section 4.1.

The two case studies in Chapters 6 and 7 are ships that had quite long sailing careers. This is of benefit to this study but not necessarily the norm for ships in this period. In the sample for the "Paper Ships" finding examples with a similar history is not so easy to guarantee and would be problematic. It would be unrepresentative to only focus on ships with a career longer than 10 years for example. It is important that the sample taken is as non-selective as possible including ships that may have been lost very quickly after their building, alongside those with much more extensive careers. To that end, there is little to add to the criteria for taking this sample. Ensuring the selection of 200 ships is representative of coastal schooners is a different challenge because the only evidence for a ship's role is the port of survey and intended destination, not all are specifically recorded as "Coasters" in the LRS. Furthermore, it is likely some ships undertook more than a single voyage in any given year when involved in coastal trade as an onward voyage to "Liverpool" from a survey port like "Plymouth" will not take 12 months, but there is only one onward destination listed. The best approach may be to simply select a certain number of ships a year that have a British coastal destination recorded from a British survey port and work from there. Therefore, a selection of 200 makes the sample large enough that a good coverage different of lifespans is attained. However, looking at lifespan raises the spectre of "success vs failure", an old argument made by critics of shipwreck archaeology that the examples found as shipwrecks only represent failed versions of a ship type or shipbuilding technology. In this period unequivocally this is not the case, as the ship dealt with in Chapter 6 had a 40-year career before being lost in a storm, and Chapter 7 is a ship that was hulked on a riverbank after an even longer career. Neither can be seen as a failure. There will certainly be examples that sank because they were flawed but these will not be the only thing represented by shipwrecked vessels.

There are a lot of potential criticisms that can be levelled at the sample chosen for this project. But that would be true regardless of what sample was taken and what means were used to select the individual vessels within it. By trying to minimise the selective criteria involved in establishing the sample, there should be fewer ways the selection has been made unrepresentative of coastal schooners in the 19th century. From this dataset of 200 ships a high-level examination of certain traits can be performed. The Register records details such as the presence of iron framework or copper fastening, although this is not necessarily consistent and depends on the surveys undertaken for the ship. Despite inconsistencies in the records a picture can be rapidly put together of the types of technologies being employed. This could then be further improved through the incorporation of the survey documents discussed in Section 2.3 produced as part of the registration of each ship. These are detailed documents and contain a lot of data that would be essential to a modern archaeological site report, such as the dimensions of timbers and the material composition of components. For this thesis there is sufficient data in the entries of the Lloyd's Register alone to contribute meaningfully to the investigation. However, to show the utility of the survey report documents a survey report has been incorporated into the study of the ships used as a case study in Chapter 7 that has been subject to archaeological investigation. Information relating to the use of different technologies, such as yellow-metal fastenings, can then be extracted and looked at from the perspective of the entire dataset rather than individual ships by establishing the proportion of ships across the entire dataset that utilise such technologies and the different ways they were implemented whether in the initial construction or as a repair. This will specifically address the adoption of technologies by "private" shipyards to look at how widespread certain techniques were and so on. The level of detail in these surveys will also allow us to look at how the building of schooners and the technologies utilised change throughout the century which, as discussed in Chapter 2, may not be visible in any other source. All this data can be tabulated to show the presence or absence of certain technologies and visualised as maps to show the levels of adoption around the coast.

By taking the same approach for the "Paper Ships" as is used for the documents involved in the two case studies themselves, it will be possible to show the level of detail that can be extracted from the documents within the HEC archive for the study of an individual ship and establish the details of a ship's working life. Furthermore, that information can then be amalgamated to look at the entire selection, establishing averages of tonnage, lifespan, and so on. This also means that it is possible to keep the overall methodology relatively simple. The utility of the archive can be demonstrated because we are able to use two detailed archaeological examples to show the effectiveness of the Lloyd's Register as a source for single-site investigations. In turn this means we can have some confidence in extending the use of the Lloyd's Register to ships where there are currently no material remains. A potential future step would be to incorporate more examples where there is material evidence to continue to build the case for these sources. To ensure this can be done the shipwreck sites themselves need to be investigated using the most appropriate methodology.

4.5. Shipwrecks and Stories

The first step in engaging with the shipwrecks targeted for this thesis is establishing as much detail as possible about the archaeological material present. The main aims of this project are to set out the context of the East Winner Bank shipwreck and the hulk of *Rhoda Mary* in the Medway (see Figure 4.1). Identifying their position in the Maritime Cultural Landscape of the period, and to suggest or confirm the identification of vessels. Fortunately, the existing work on shipwrecks of this period has established an outline methodology that will be developed slightly for use on this project. Perhaps the most relevant of these previous studies is the work done at Alum Bay (Satchell and Whitewright 2014), as that site is not a great distance from Hayling Island and therefore sits within the same overall maritime landscape.

The steps set out in 4.1 dictate how the investigation of these sites will be done. The study of the material remains is closely tied to the study of the related documentary sources discussed in 4.4.1. The first three steps require an investigation of that documentary material. The background information on shipping and seafaring presented in Chapter 4 is an essential part of this. However, a vital stage to deploy the methodology in 3.1 is to assess the shipwreck site for evidence to suggest a rough date for the shipwreck, a detailed example of this process is set out in Chapter 6. This is necessary for each of the following stages but is particularly helpful when refining the list of potential candidates known ship losses for the shipwreck's identification, this process of shortlisting and identification is undertaken in detail in Chapter 6. Building on the initial suggested date for the site it is then possible to assemble other elements of the context for the shipwreck. A method utilised in the Alum Bay report (Whitewright 2014a: 18-21) was to establish a series of buffer zones around the site which could be used to assemble a shortlist of candidates for the shipwreck's identification by identifying known shipwreck losses at certain distances from the site. This method will be incorporated here and allows a limited overview of wrecking events in the early 19th century.

The areas of interest will be represented by "buffer-zones" on a map. These were set at 1km, and 5km (see Figure 6.23) for the East Winner Bank. Hayling Island, East Winner Bank, and the surrounding seascape is an area of considerable maritime activity during the 19th century meaning a larger buffer zone is justified. This level of activity is mainly due to the presence of Portsmouth naval base, the port of Southampton, and Langstone and Chichester Harbours. It is therefore very likely that this process will capture a significant number of wrecking events even when the search is constrained by a 19th century date. The other site, a hulk on a riverbank, poses different challenges and is the result of a different site formation process, intentional abandonment (see Section 2.2). Hulked vessels were common, although they are now becoming rarer through degradation and removal. The process of abandonment involved in hulking a ship means the location can be considered much more secure. In the case of *Rhoda Mary,* the site has been subject to some previous investigation and additional sources such as local knowledge or newspapers, can be relied upon to give specific detail of the site.

As there is a secure identification for the site and different formation processes that resulted in its present condition it is unnecessary to go through the same process as is needed for the East Winner Bank.

Figure 4.1: Location of the two shipwreck sites Ocean *and* Rhoda Mary *chosen for archaeological investigation.*

It is relatively difficult to affix certain date ranges or lifespans to the use of a particular technology. This is discussed in more detail in Section 6.3.1. The earliest possible date the ship could have been constructed will be used as the opening bracket for the shortlist, determined by the evidence on site. Further refinement of the shortlist of potential candidates must come from information obtained from the archaeological material. The technologies used in the construction of the vessel are a part of this, alongside the overall dimensions of the vessel, and materials analysis of components from the site. For example, in the initial site report for the East Winner Bank shipwreck, a list of "Further Work" has been set out which essentially highlights the need for exactly this; a full site plan, metallurgical analysis, and a dendrochronological analysis (Whitewright and Tidbury 2014: 6). This project will seek to complete all three suggestions for both case study sites therefore ensuring, as far as possible, that the same data is available for both.

Establishing the size of the vessel through a site plan and detailed surveys, will allow certain ships to be eliminated from the shortlist. As with the identification of technologies, this is not an exact process as the size of certain vessel types can be quite a wide range. To establish the archaeological material site visits will be required. As both sites lie in the "intertidal zone" these will need to work within tide windows. As a result, techniques need to be employed that can maximise the amount of information gathered from a relatively limited time on site, this is particular an issue for the East Winner Bank where the working window is a maximum of 40 minutes. GPS surveys of the site using a Real-Time Kinematic (RTK) system were the basic investigation tool employed. These systems allow a great deal of precision and accuracy whilst also being quick to implement, individual points can be coded on site allowing for a great deal of flexibility. An added benefit is they give the archaeologist time directly on site, engaging with the assemblage and its context. Diagnostic construction components will be recorded photographically, these photographic surveys took two forms. The first utilised a drone to take aerial photographs of the wreck site which were then processed to produce an orthophotograph, supplementing this was a pole-mounted camera where permissions or access restrictions prohibited the use of a drone. The second form of survey was to photograph specific features in greater detail, allowing targeted photogrammetry of "detail areas". The outputs of all these surveys can be combined to produce detailed maps, plans, and models of the different sites.

Targeted sampling is the final measure to be employed. The objective being to complete metallurgical analysis to obtain additional data regarding the components within the site. Sampling of metal bolts on the East Winner Bank shipwreck was undertaken by the Oxford Materials Lab (Northover 2017 and Appendix B.1) and for the hulk of *Rhoda Mary* (Northover 2022 and Appendix B.2). The information from these surveys is then compared to the information within the Lloyd's Register archives. Alongside the detail extracted from the archaeological remains it is also necessary to review the geographical context of the shipwreck site. This will assist in the identification of the shipwreck site as well as contributing to discussions of the shipwreck in this period's historical context. By establishing the geographical and historical context of the site we can present a more complete story of the shipwreck. These elements will be incorporated into the overall narrative of the ships in Chapters 6 and 7.

4.6. Summary

As stated at the beginning of this methodology, there are already several examples of the archaeological investigation of post-Medieval shipwrecks. Often the methodologies employed on these sites are not explained in any detail beyond some discussion of archaeological process (e.g., Adams *et al*. 1990; Auer and Belasus 2008). In the investigations of *Flower of Ugie* (Whitewright 2011b: 43-49) there is a description of the process followed when investigating sites of this date, which is then refined in the publication for Alum Bay (Whitewright 2014a: 18-24). That methodology has been used as the basis for the methodology in this section due to the apparent effectiveness

shown in the publications of those sites and for its compatibility with current discussions on how to investigate shipwreck sites in historic periods. It is also a good starting point for this project as there have been only a handful of investigations of the shipwrecks of 19th century working vessels. Adapting an existing methodology with a proven effectiveness using current discussions in historical archaeology will maximise the information that can be drawn out of the assemblage of sources utilised by this project. The intention is to produce the "state-of-the-art" here with a methodology that will also complement the cognitive framework outlined in Chapter 2.

The total assemblage available to the investigation of each of the case study sites is considerable. A unique feature of late-18th and early-19th century ships is the survival of an extensive documentary record, a fact that by this point in this thesis should be firmly established. This confers a considerable opportunity upon our investigation to draw out a reasonably secure identification and subsequently the story of the shipwrecks being dealt with. However, the presence of a record this extensive also confers a challenge, we must not become blinded or overwhelmed by the amount of information available. As the *Lloyd's Register of Shipping* contains so much detail about each individual ship it is possible to see how different ships were built and used around the coast. By assembling a sample of ships from this resource it is possible to trace broad trends and look at differences in construction between different ships, locations, and in different decades.

It is also important to bear in mind that whilst the documentary archive is substantial it is not infallible. This is a major advantage of an approach that sees documents and archaeological material as part of the same assemblage, forming "The Record" (Whitewright 2020: 14). Primacy is not given to one source, or to people over non-human components and invisible or intangible factors are not overlooked. One such intangible factor would be the industrialisation of much of Britain's domestic industry because of the industrial revolution which led to the increased use of copper-alloys and iron in ship construction as a result of the technological innovations around metallurgy (Northover 2011: 32). Using a methodology and cognitive approach that recognises this will allow the dataset to be used to look at the impact of these kinds of influences. All these factors act upon and are acted on, by one another. This method therefore seeks to avoid trying to place any of these components into a preconceived idea of 19th century shipping.

The ships targeted by this thesis have therefore been used to inform the historical context set out in the following chapter. That context is intended to reflect the world these ships worked in rather than taking an approach that tries to fit those ships, and their people, into a prebuilt model or story. This makes our approach more flexible as we can take the lead from the sources used in this investigation and include new questions arising from the information they present. This also avoids the issue of "historical" sources or previous historical literature being used to direct the investigation of the archaeological finds used as the two case studies. By removing any form of primacy like this, the ships that are solely extracted from the documentary record can be looked at as equals to those that do have extant remains investigated here. Those extant ships can begin to demonstrate the utility and effectiveness of the documentary sources. Therefore, allowing a small snapshot of the data to offer answers to the questions around technological uptake in the British shipbuilding industry in the 19th century.

The documentary sources are approached the same way for both the ships pulled from the Register and the extant shipwrecks. This consistent approach is necessary because these documents are as much a part of the assemblage as the ship timbers. The methodology is designed to allow this study to be expanded. It is hoped that additional ships, whether purely from the documentary sources or archaeological investigations, can be added. Doing this will continue to test the question of whether the HEC archive can provide a comprehensive account of a ship's construction and use-life. Adding more ships will also allow a more detailed investigation of trends in shipbuilding in this period.

However, this thesis will be able to offer an answer to that question, but it cannot be unequivocal due to the sheer scale of the dataset it represents. Continued work is necessary to establish any understanding of what the archive contains and the people it relates to.

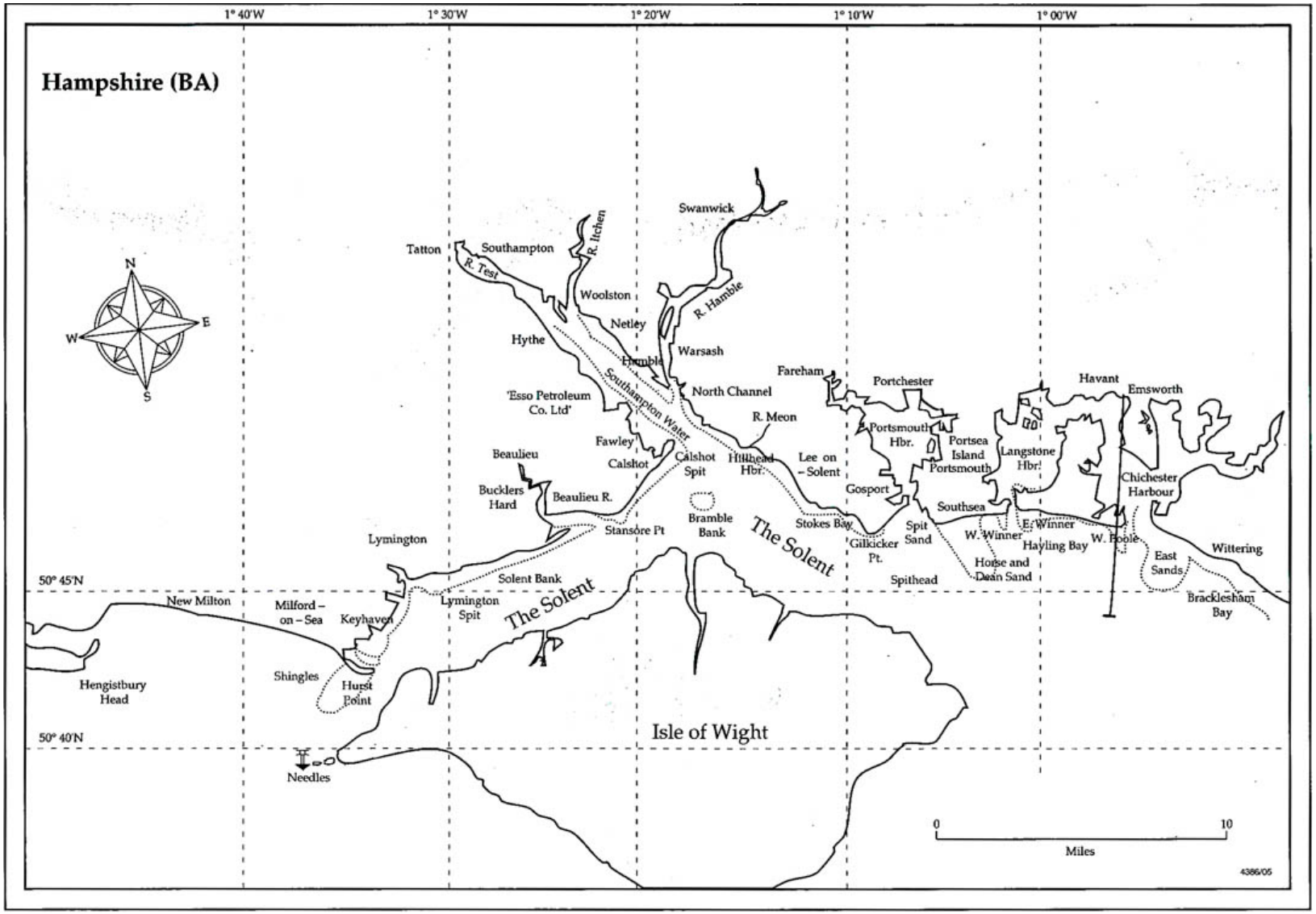


Figure 4.2: Map taken from "The Shipwreck Index of the British Isles: Volume 2" showing the area covered by the section dealing with Hampshire (Larn and Larn 1995

Chapter 5. The Paper Fleet

5.1. Introduction

Perhaps the best way to introduce the 200-strong fleet of Paper Ships, is to start at the largest scale possible. This chapter is going to set out the 200 ships chosen following the criteria set out in Section 4.4.2 and extract some of the key themes and factors identifiable from their lifeways. The biggest challenge this presents is information overload. To avoid that issue, this chapter will study the dataset of ships by looking at what information they provide about the 19th century Maritime World. The fleet has been assembled as a snapshot of the vessels recorded in the *Lloyd's Register of Shipping* (LRS). As Section 3.6 showed, that record encompasses a very large number of ships. Despite the fact the following is only a snapshot of data available from the LRS the examination will still take a zoomed-out perspective to examining so many ships. This is relatively new territory for an investigation of ships and seafaring archaeologically. Even for historical studies this is a huge number of individual examples to integrate into a single examination. The challenge is how to represent these ships and extract information about their lifeway, assemblage, and people. To that end examples from the fleet for each key area of study have been set out here. There are also biography tables created using the information on the ships from the LRS showing the full history of the ship, included in their entirety as Appendix A. Finally, the map in Section 5.2.1 details the place of construction for each of the ships.

Chapters 2 and 4 highlighted the key issues in maritime archaeology, the study of ships, and our understanding of the 19th century Maritime World. In this chapter, the main theme is what can be extracted from the types of information held within the LRS. This is again different to how that resource has been used in the past. It is not about trying to relate these individual examples to any other source of information, for 198 of the 200 in the Paper Fleet ships what is written in the register books is the only source with a level of detail appropriate for an archaeological understanding of their materiality. As previous research and investigations that have utilised the LRS have shown, and as has been advocated for by this project in Section 2.4, this information has been used by archaeologists to inform a wider exploration of the period. Here those records are going to be the central source of much the information for this project, incorporating the questions and research avenues identified in Section 2.3. Developing from this will be the two ships dealt with in Chapters 6 *Ocean* and 7 *Rhoda Mary*. Setting this intention from the outset guarantees a phase of our investigation that will become much more granular. The investigations of *Ocean* and *Rhoda Mary* will extract site specific detail and work to place those ships in context with the other examples dealt with in this chapter.

Already we can start to see the versatility represented by the sources being investigated for this project. This returns to Lucas' (2018: 3 & 16) point, that a multitude of sources and viewpoints can strengthen an investigation when approached in the right way. By exploiting such a range of information, it is possible to work across multiple scales which in turn allows an examination of the period and the people involved from different perspectives. As the work on both *Ocean* and *Rhoda Mary* will show, ships have significantly different lives and different stories to tell. At this point it is worth noting that individual ships may have lives that extend beyond the end of this period (i.e., past 1899) or indeed begin before the start (i.e., they were built before 1800). The latter factor is more of an issue, although 1800 is really an arbitrary point in time selected more for the convenience of the 100-year temporal study area than for any event or distinct reason. To some extent this issue is unavoidable due to the selection technique used to establish the 200 Paper Ships, there are after all only so many schooners in 1800 who's names begin with "A". However, wherever possible efforts have been made to mitigate this and make sure there are not too many ships that predate the century. It is of lesser concern that ships might have been built within the 100-year period but survive into the 20th century. In fact, this is useful for the investigation because studying the longevity of wooden schooners contributes to the understanding of this technology and how it did and did not change.

Our voyage with the Paper Fleet will therefore be approached following this idea of multiple scales. The first part of this chapter, Section 5.2, deals with how the ships were selected and how that information will be used. The process for this was outlined in Section 4.4.2. However, here more time is devoted to the details and some of the unique challenges presented by the LRS, some of which will reflect issues already identified in Section 3.6. Then this chapter will dig a little deeper into the concept of scale and the level of detail that can be obtained alongside the question of absence, or emptiness, and what the spaces in and around the dataset mean for this investigation. The overall dataset is briefly outlined in Section 5.3, then Section 5.4 will break down some of the trends emerging from the dataset. This will be combined with a series of different visualisations as relevant to the information coming from the ships. This section combines quite a large range of different aspects of 19th century seafaring. Following from these trends Section 5.5 deals with the extraction of a handful of specific examples that illustrate certain stories or parts of the overall picture. Both Section 5.4 and 5.5 will be relatively broad overviews of the information coming from the data with Section5.4 the first stage of zooming in on the information. Finally, a brief reflection on this approach will be made in Section 5.6, as well as reinforcing the links between this Chapter and the subsequent investigations of individual ships in Chapters 6 and 7. Setting the scene for the investigation of those two members of the fleet is our final task here.

5.2. What is the Paper Fleet?

Taking an approach that includes documentary material means our fleet can include ships that may not have archaeological remains associated with them. This is true for 198 of the 200 ships, the two exceptions being the ships discussed in Chapters 6 and 7. Including these ships that only exist only in the world of archives and documentary records means it is possible to expand the reach of this investigation. The nature of the resources available allows the implementation of a genuine archaeological methodology and the inclusion of the 198 ships in the same study as the two that exist as material remains. It is the nature of their existence that gives rise to the name chosen for them in this project, Paper Ships, and collectively, as has been used here, the Paper Fleet. Investigating a collection of ships of this size archaeologically, directly responds to calls in other areas of maritime studies, particularly by economic historians, for maritime archaeology to expand the footprint of its studies (Reid, 2020: 80 Note 2 and 132 Note 76). This helps to expand the contribution the archaeological study of ships can make to the understanding of shipbuilding and seafaring in the 19th century. Reid is writing from the perspective of an economic historian studying British merchant shipping in the 18th into the 19th century and makes the point that the contribution from archaeological sources is significant but there needs to be more material. As explored in Section 3.2, this also allows a review of some of the accepted wisdom and long-standing explanations of shipbuilding and seafaring in the 19th century. However, taking a sample of this size does raise the issue of scale and the level of detail that can be extracted, this is an issue that warrants further discussion, as will be dealt with in Section 5.5.

5.2.1. How it was Assembled (Review and Challenges)

The basic outline for how the Paper Fleet was assembled has been set out in Chapter 3. However, it is worth reviewing that process here and discussing in more detail the potential issues and challenges examining a dataset such as this presents. There are only a handful of other studies in maritime archaeology that have attempted to take on a dataset of this size explicitly related to shipbuilding and shipping numbers (e.g. Parker 1984, 1992a, 1992b) so the process used to create the total sample is important to relate here.

The first challenge was to decide how big the total sample could be. As this project was undertaken as a PhD there were constraints on the amount of time available to the study of the archive of the Lloyd's Register. However, with such a large total archive available it would be ineffective if the sample was only a handful of ships or a few dozen total examples. It was also important that the

sample represented a decent coverage of the time period, as the period chosen was a full century (1800-1899) this meant an approach was needed that could capture continuity, change, or difference over 100 years. The chosen route to achieve is to select at least one ship for each year of the century. Giving a minimum of 100 ships for the selection. Given the available timescales and the work required to extract individual ships from the records of the LRS a slightly larger dataset was thought to be a realistic prospect. To that end a maximum size of 200 ships was set for the dataset, even though this is a fraction of the overall records held by the HEC it is still the largest single study of 19th century shipping undertaken from the perspective of addressing individual vessels.

Selecting the 200 ships was the next challenge. As discussed in Section 4.4.2, it is unrealistic to suggest that a sampling methodology could be chosen that would not present opportunity for challenge or critique. However, the aim was to establish a selection that would allow for a reasonable understanding of the ships in the register at any given point in time. The entries in the LRS are sorted by vessel name arranged alphabetically, not by rig type, size, or date of build. This provides an opportunity for our sample selection as there appears to be no correlation between a ship's name and the means of construction or rig type. Ships were therefore selected by taking two individual vessels from each year within a certain entry on the alphabet. Meaning that for 1800 two ships whose names began with "A" were selected, then for 1801 two ships with names beginning with "B", and so on through the century resetting the alphabet each time "Z" was reached and restarting from "A". Using the ship name to select the members of the Paper Fleet also means that the selection was partly made for this project by shipowners and shipbuilders 200 years ago when they named their respective schooners, as they determined which ships will fall into each year's letter sample. There are some features of the Register Books that make this process slightly more complicated. "X", "Y", and "Z" are grouped into a single entry in some books, in others separated to "X&Y" and "Z", and in the later books (post-1860) they are each a separate entry. So, for these and other similar cases such as "I" and "J", the rule was to take two from each grouping, so two from X&Y instead of one from X and one from Y as they are not separate entries. This also allowed the flexibility to adapt to years when there were no schooners with a name beginning with a certain letter, often "X", in later books where this occurred that letter was skipped and the next viable one chosen.

This has produced a relatively mixed sample of ships. Ships that were recorded as being built outside the British Isles were not selected as the focus is the British shipbuilding industry. As the aim of this project is to examine British Shipbuilding this was necessary to ensure the sample dealt with only British ships. Some effort was also made to ensure a decent geographic spread of ships around the British Isles. A point to make here is that these included ships built in Ireland, including what is today not part of the UK—the Republic of Ireland. A map showing the geographic spread of the ships (representing the places they were built, not the places they were registered) can be seen in Figure 5.1. The broad geographic spread of origins is a good sign for this sample, as it suggests the selection process was able to pick a diverse spread of vessels even when restricted to schooner-rigged vessels. There is similar support for this from the registered tonnages of the vessels. Most of these ships sit at between 100 and 200 tons. This certainly captures the ship sizes we are interested in. There are also a handful of helpful outliers representing both the largest and smallest ends of the spectrum for ship's tonnage. Finally, as mentioned in Section 5.1, one issue that has been encountered is the inclusion of ships that were built before 1800. This is an issue that it is not immediately possible to resolve, especially for the earliest decade (1800-1809). We are reliant on ships within a certain alphabetical grouping being built in the right year, there are several years where there is no ship in a given letter such as "A" built in that year. In these cases the closest build date was taken. From the process of selecting ships, it does not appear that there is always a ship available that was built after 1800 in those earliest years, the ships are often built in the closing decades of the 1700s. However, it is felt this does not necessarily preclude those ships from inclusion in our study as long as they are within the preceding decade (1790-1799) as their existence in the Maritime World of the early-19th century

is still relevant to discussions of shipbuilding, ship-use, and ship technology. They are also certainly relevant when considering the lifespan and lifeway of ships.

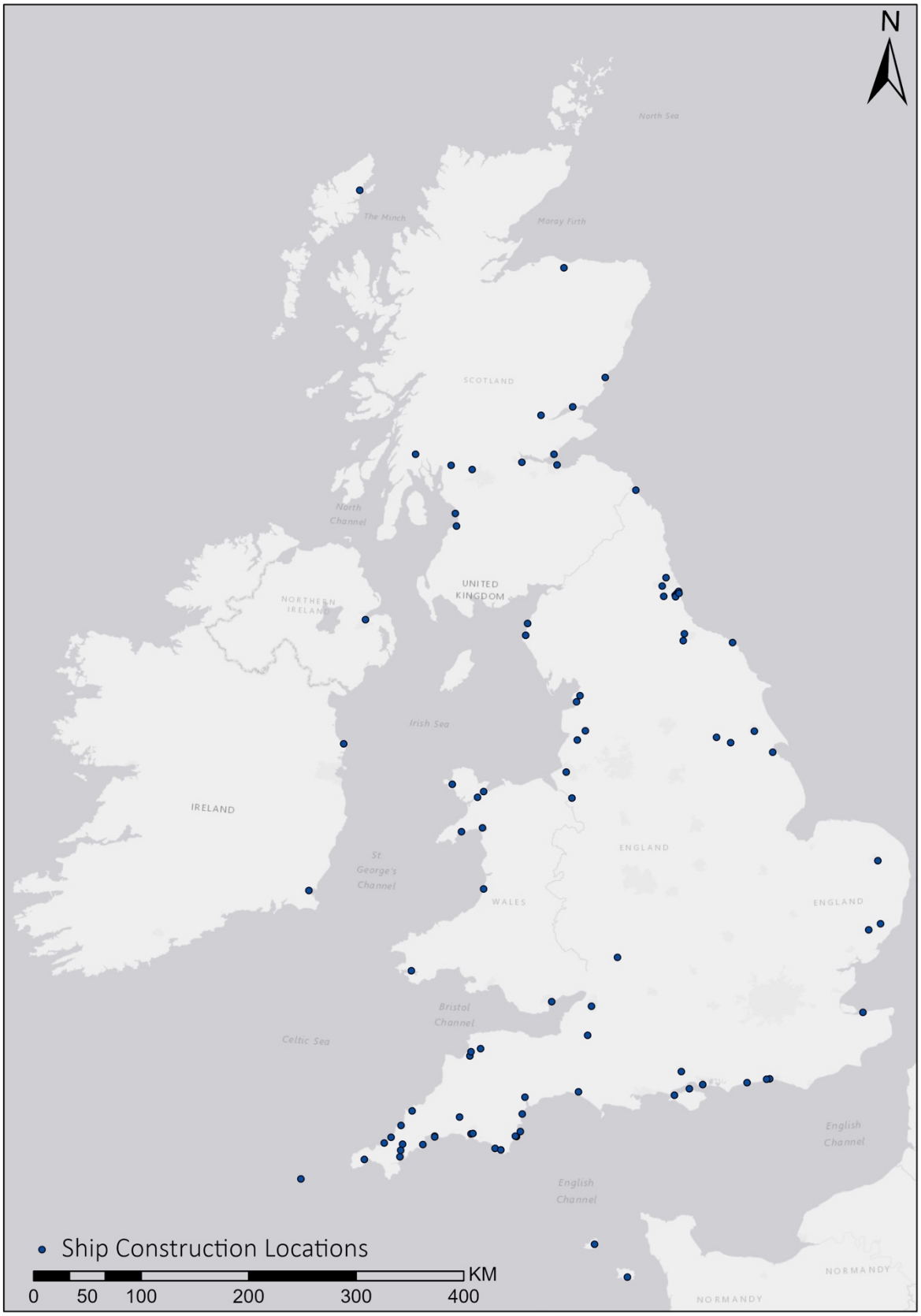


Figure 5.1: Map showing the place of construction for each of the Paper Ships. Where more than one ship was the same town or village one point has been used to identify that construction location (Map produced by the Author with data taken from the Lloyd's Register of Shipping).

5.2.2. How the Dataset will be Used

The concept of lifeways is certainly one of the most obvious uses for the Paper Fleet. The nature of the information held within the LRS lends itself to this sort of examination. Taken as a whole, the 100 years of Register Books allow us to trace the lives of ships in a broad fashion. We can establish changes from year to year and gain some idea of the kinds of voyages they were embarking upon. This is something that we very rarely get to do as archaeologists. When dealing with an individual ship-find we are often dealing with the final moments of the ship, or the remains of a ship that has been salvaged or scavenged. There is some temporal complexity as ships can become repositories for artefacts, objects, and things from any stage of its existence but broadly speaking it is difficult to disentangle these items from the final assemblage (Adams 2013: 20-22). The LRS means we can approach the life of a ship with information not available in the archaeological assemblage normally assembled from a ship-find. This only deals with a small piece of the information we can extract from these records. The places ships visit is certainly a major part of their story, the schooner *Rare Plant* worked transatlantic crossings for the first ten-years of its life travelling to the Caribbean and Canadian coast, before shifting to shorter voyages to the Channel Islands or around Britain's coast after 1876 until it leaves the register in 1901. As Section 3.4 discussed, seafaring was used as a major means to maintain Imperial Power. However, there are a range of other areas the Register Books can contribute both to the study of individual ships and to the large-scale study such as that presented here.

A second theatre the Paper Fleet can be deployed to, is to look at how ships change across the century. A good example of this is changes in tonnage. There has already been some time spent in Section 3.5 explaining why tonnage is a problematic concept with issues in its calculation and how shipbuilders were able to "build-around" such measurements. However, it remains one of the only ways available to establishing cargo capacity in the Register Books for the first half of the 19th century. After 1863 hull dimensions (length, breadth, and depth) are included as part of each entry in addition to the ship's tonnage as a separate entry. So, tonnage can be used—with some very heavy caveats—to look at changes to ship capacities throughout this period. We can then use the included dimensions in the later Register Books to establish a similar understanding of ship sizes for those latter decades. Where tonnage is concerned, a further rule that should be imposed on the discussion is to only compare like with like. It would produce strange and incorrect results if this review of the dataset were to try and compare tonnage on a longer timescale from the 1820s to the 1880s, because the two values were calculated differently. However, comparing tonnage on a shorter timescale can be done as long as the two values were achieved with the same calculation and is especially useful when working out the size of ships built or entered into the LRS in the same year. Once again this is a broader scale examination, and these measurements and weights are not definitive, but it does allow for some idea of the changes taking place throughout the century as technologies and materials influenced ship construction.

The presence of those technologies is a further way to use the information in the Register. There are some limits on what is included regarding ship construction and materials. The Survey Reports undertaken for the entries in the Register Books are much more complete in this area. However, even though this study is restricted to the Register Books, it is possible to establish the presence or absence of certain key technologies in the construction of an individual ship. These are: copper sheathing, iron framework, iron bolts for framing components, and copper or yellow-metal fastenings. Now it is worth reinforcing the point that the recording of these features in the Register Books does not appear to be consistent. There are ships in the Paper Fleet where the presence of a technology is noted for a few years and then is absent from subsequent entries, this is the case for *Lady Bute* (1872-1888, Appendix A.96), and *Oban* (1861-1881, Appendix A.117). It is difficult to explain exactly why this might be, other than error or inconsistency in how the information is being recorded. However, where the recording of this technology is a new intervention in an existing ship's record and coincides with a

repair, it may be a result of that technology being added to the ship as part of the repair or refit. There are examples of other inconsistencies in the Register Books, a good example is the record of the ship *Ocean* detailed in Section 6.4.

The question of repairs and the lifespan of ships is the final piece of knowledge extraction this section will deal with. This needs its own section as there is a degree of built-in complexity to how the LRS records the details of repairs. To resolve some of this complexity Figure 5.2 breaks down a page of the LRS, in this case the page including the ship *Ocean* discussed in Chapter 6. The entire page refers to different ships with the name Ocean as the entries are organised alphabetically, therefore the entry specific to the ship dealt with in Chapter 6 has been enclosed in a red box. The image breaks down as follows: the columns on the page detail the entry number for the ship in that issue of the Register (1), the Name of the Ship (2) and its Type (3). The ship's Master is recorded in column 4 and its Tonnage (5), Place of Build (6) is followed by Year of Build (7). The Owner of a Ship is column 8 with the Ship's Draught in feet as 9. Survey Port and Onward Destination are in column 10, Survey Port is recorded in an abbreviated entry these are standardised and the survey ports are listed with their abbreviations in the opening pages of each LRS book. For the example of *Ocean* in Figure 5.2 this is "Co" for Cork, Ireland, followed by "Coast." indicating the ship will be a coaster. The final column (11) contains the details of the ship's registration, this is discussed in more detail in Section 2.3. Other information is included in these columns as annotations or inferior text below the main entry. Point 12 in Figure 5.2 shows an updated characterisation for a ship (although in this case it is the same as that originally entered), point 13 shows the date a ship was registered, or the years left in the characterisation. In the example at point 14, the registration took place in 1826 with a characterisation of "E1", in the case of *Ocean* there are 2 years left in its registration at a character of "A1". There are a series of terms given for types of repairs including (but not limited to): "some repairs", "damage repairs", "large repair". There are also a series of headings given for other interventions into a ship's condition. These sometimes coincide with a repair type, such as "New Deck" or "New Topsides" however these can also be found alone. The Register Books also record where ships have undergone refits, been lengthened, and later in the period changes to the number of masts with the inclusion of a separate entry for three-masted Schooners. All these terms are recorded as abbreviations as inferior text below the main Register entry for each ship (points 13, 15, and 17 in Figure 5.2). By extracting this information, it is possible to assemble the repair patterns for ships in this period and how they relate to a ship's lifespan, ownership, voyage history and so on—repairs are discussed in more detail in Section 5.4.3. These are all areas that have been linked to one another or linked to the use of certain technologies and so serve as a good starting point for our study of the Register Books. Key details about the ship's equipment and rigging are also included here, such as at point 16 where the text "PIC" indicates the ship was equipped with a "Proved Iron Cable". We can see at point 18 in Figure 5.2 some inferior text that indicates a ship has been sheathed in copper in the first month of 1824 ("s. C. 1m. 24."). It is much simpler to extract the details of a ship's lifespan from the Register Books. This is simply a case of establishing when a ship first appears, and which book is its final entry. That said, this leads to several assumptions. It is relatively certain whether this is a ship's first appearance as a build date is given with each ship in its entries. However, the final date a ship appears is not necessarily the end of its life. Just because a ship has ceased to be entered does not mean it wrecked that year, it may have moved to a different register or was sold outside the British Isles. For the purposes of this study, we will assume that once a ship has left the records of the LRS its use-life has ended. If a ship's name has changed then it will continue to be followed through the Register Books until it is no longer recorded.

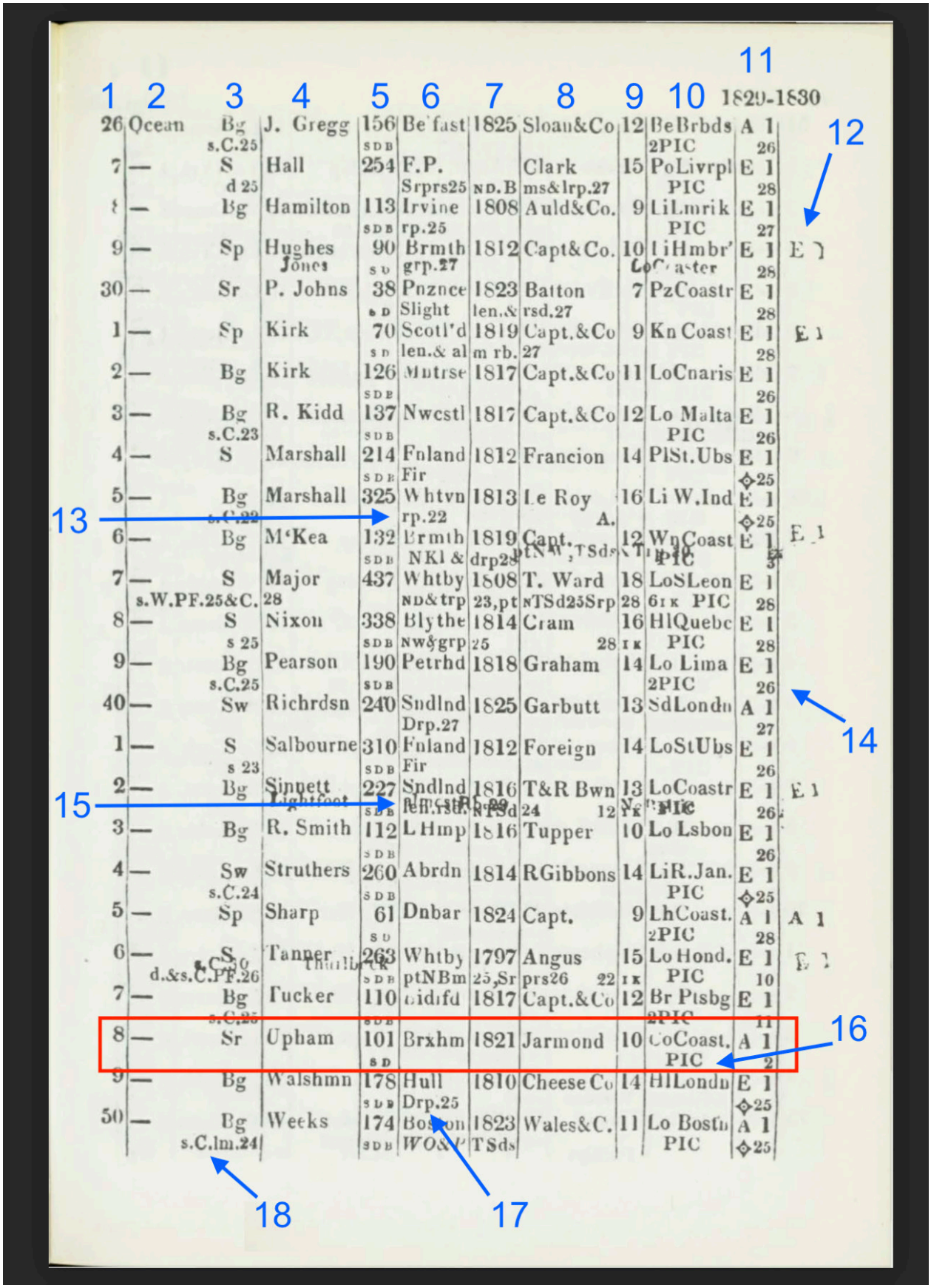


Figure 5.2: A page taken from the 1829 Lloyd's Register of Shipping *showing the entry for the schooner Ocean highlighted in red and detailing key components of the Register* (Image modified by the Author from Lloyd's Register Foundation Heritage and Education Centre 2022c).

Studying the Paper Fleet in this way means a considerable amount of information has been assembled for what is a relatively small selection of the ships in the LRS. Most of this information is in the form of snapshots into a ship's story at annual intervals. This does leave work to do. Chapters 6 and 7 will delve deeper into the specifics of individual ships, a process made more possible through the implementation of archaeological method and theory. The use of archaeological theory raises the final area that warrants consideration when approaching the information within the LRS. The scale of the dataset and the questions being asked by this thesis means this project begins to connect to discussions around how we extract a workable sample from a large body of information and achieve a meaningful knowledge gain.

5.2.3. The Issue of Scale and Granularity

Chapter 2 explored the impact of utilising assemblage thought to progress the aim of a concurrent methodology. Section 5.1 presented a brief review of the benefit of archaeological approaches, including theoretical tools alongside methodological or practical ones, to enhance our investigation of the dataset. Theory is as entwined with the assemblage as any other component—such as a Register Book, or a ship's timber. Our archaeological approach is given its power through this relationship. The components of an assemblage are what enables the theory to speak and so for an archaeological interpretation to take form (Pétursdóttir & Olsen 2018: 101). The study of large-scale and long-term processes, such as technological change in 19th century merchant ships, is something archaeology is suited to. However, the issue with looking at data samples of this size and temporal scales this large is that as we zoom out, we lose detail. Another way of thinking about this issue is the level of granularity our data possesses. Returning to Section 5.2.2 the information from the entries is just a marker in each ship's life, created once a year. This is therefore not the most granular information we could have about each ship. However, it does allow us to look at larger-scale questions and a broader context in a new way.

What this approach does lead to is the inclusion of ships for which there really is very little other information anywhere else in The Record. Or at least very little other information that is readily accessible. So, the investigation and the story we construct for these ships is going to be relatively broad-brush. It has a low degree of granularity. To some extent this is not an issue at all. As seen in Chapter 4 and in Section 5.2.2 there are several areas of knowledge this sort of investigation can inform. Assembling these sorts of trends and contexts across a temporal area as large as a century begins to answer the research questions set out in Chapter 1. So even though there is only a single annual marker for each ship, combining these across the whole fleet creates a better picture of the events of the period. This can be enhanced further by incorporating the historical context outlined in Chapter 4. As that has been established through 19th century merchant shipping and a wider study of the 19th century Maritime World this provides a background to visualise the information from the Paper Fleet against.

Fully answering this project's research question requires more detail than this broad-brush approach. It would also be dangerously close to a purely historical study were it to be exclusively comprised of textual and documentary artefacts alone. Establishing that detail is difficult as for almost all the 200 ships there are no known or accessible material remains and becoming more granular will require more information to be added to the assemblage. A route to achieve this will be set out in Section 5.6. The first step must be to extract as much information from the 200 ships as possible, using the information available from the Register Books. The next two sections will describe the Paper Fleet. First by setting out exactly what ships make up the sample in Section 5.3, and then by extracting the overall trends in Section 5.4. Finally, Section 5.5 will present a few specific stories from the Paper Fleet, either as examples of trends from 5.4 or to demonstrate interesting or distinct features.

5.3. The Fleet

There are 200 individual lifeway tables for the Paper Fleet. Presenting these as 200 separate tables within this thesis would be a major block to the readability of the arguments presented and the following chapters. Therefore, these tables have been made available as numbered entries in Appendix A with individual ships from the list referenced in this chapter. For some idea of the scale of the detail presented by these tables those for *Rhoda Mary* and *Ocean* are also included in their entirety in Chapters 6 and 7. Those lifeway tables are created by taking the information held within the LRS every year for each of the ships and amalgamating these into a table that records the entire record of each ship in one place. The information in these tables has presented the trends identified and discussed in this section. Whilst compiling the information for the Paper Fleet it has also been possible to gain some increased contextual understanding of the ships recorded in the Register Books.

The overall composition of the Paper Fleet is 200 ships rigged as schooners. As has been briefly discussed in Section 2.3, the sailing rig of a ship could be changed throughout its life. This means that some of the examples in the fleet may have been rigged at one time as a Schooner and re-rigged to a Brigantine or other type. Table 5.1 lists the entire fleet including place and year of build and original tonnage. This is a stripped-down record of the information in the Lloyd's Register to only record that which does not change. The Paper Fleet is also shown geospatially in Figure 5.1 where the ships are visualised based on their place of construction. The fleet represents a good level of coverage for the coast of Britain and Ireland in terms of places of construction. This means there can be some degree of confidence that the sample represented by the Paper Fleet provides a good record of shipbuilding around the coast and through the century. The information in each ship's lifeway adds to the detail that can be extracted from the changing elements—such as the port of registration, ownership, and so on—meaning it is possible to extract trends or changes in the lives of these ships and see how they relate to the overall Maritime World of the 19th century.

5.4. Overall Trends in the Dataset

This section has been named "trends" as most of the features extracted from the records of ships need to be looked at across the period. However, there are specific details such as geographic spread which are not really trends but features of a changing period. Where possible this section will also reflect on ships that are outliers from the overall sample. Some examples are obvious such as the 340-ton *Ta Lee* (1864-1888, Appendix A.159) which is much bigger than the average size of ship. Others are less obvious such as the schooner *Abertay* (1877-1927, Appendix A.3) which functioned as a lightship for Dundee Harbour, or the *Oban* (1861-1881, Appendix A.117) which leaves the coasting trade after five years to work out of Boston.

5.4.1. Average Lifespan and Outliers

Perhaps the easiest place to start is to establish the length of the lifespan of these ships. Figure 5.3 is an overall chart showing the full lifespan of each ship. A graph showing the average lifespan of ships in each decade of the century is included in Figure 5.4, this allows us to see the trends in lifespan a little more clearly when combined with the visualisation of every lifespan in the Paper Fleet. The overall average (calculated as a mean) is 20.8 years.

There are of course some ships with very short lives according to the Register Books, such as the *Icon* (1830-33, Appendix A.71) or the *Qua Lee* (1835, Appendix A.133) which wrecks in its first year of registration. Whilst shipwreck is certainly a likely cause for this, that interpretation is not as black and white as it may seem. As discussed in Section 5.2.2, there is not always a reason in the Register for a ship's final entry, most of the 200 simply disappear such as *Babthorp* (1846-65, Appendix A.11) which leaves the register in 1865 after 19 years of entries. *Qua Lee* is an example where the entry is stamped "Wrecked", meaning we know its fate. What an investigation of the lifespan of ships appears to show is an increase in length toward the end of the period. This is an interesting feature. There is

Table 5.1: The 200 ships selected from the Lloyd's Register of Shipping that make up the Paper Fleet (Table by the Author)

Name	Year Used for Selection	Entry Number	Master	Owner	Build Port	Intended Destination	Tonnage
A. D. Gilbert	1873	A-1	S. Wallis	E. Hain & Co	Truro	Cff. Meditrn	177
Abeona	1823	A-16	Patterson	Capt & Co	Scotland	Li.Coaster	77
Abertay	1900	A-55	Swaddell	Trustees of the Harbour of Dundee	Arbroath		117
Abet	1848	A-17	McGregor	J. Masson	Sunderland	Sld. Coaster	129
Acastus	1848	A-31	Rice	Hayes & Co	Mevagissey	Lon.	163
Acorn	1823	A-42	Coverdale	Sanderson	Whitby	Lo Coastr	81
Active	1800	A-85	Mills Jr.	Mills & Co	Dundee	Lh. Riga	110
Ada	1900	A-96	Leaman	R. Cock	Appledore	NFL	113
Advance	1873	A-119	J. Jewitt	W. Cass	Wells	Goo. Coaster	78
Adventure	1800	A-154	Colvill	S. Wall	Ipswich	Ya Baltic	104
B. I.	1890	B-5	Granville	Sailing Ship B. I. Co. Ltd,	Shoreham		100
Babthorp	1849	B-2	Vickerman	Laverack	Southwick	Hull. Baltic	150
Bacalieu	1849	B-3	J. Laird	Stewarts	Troon	Cly. Nwflnd	133
Banff	1874	B-45	A. Leslie	Simpson & Co	Inverness	Cff.	234
Barbara & Ann	1824	B-43	Hustarick	Duuen & C	Yarmouth	Li Gibral	72
Barrow	1801	B-42	H. Atwood	Montefiore	S.P. 99	LoBrbd's	140
Batchelor	1824	B-72	E. Moor	J. Foster	Berwick	Lo Hmbr	144
Betsy	1801	B-200	Steel	Capt.	River	LoJamaica	60
Cabar Feidh	1880	C-16	D. Forbes	AH McKenzie	Stornoway		97
Cadmus	1850	C-4	Stanford	Stanford	Yarmouth	Liv. Rottrdm	109
Caerwys Castle	1875	C-23	J. Hughes	D. Jones	Flint	Bms.	59
Caesarea	1850	C-16	Richards	Orange & C	Jersey	Lon	173
Caithness Lass	1875	C-33	D. Jack	Jack & Co	Perth	Dun.	96
Caledonia	1825	C-33	D. Murry	Capt.	Kirkcaldy	Wy Lond	82
Cambria	1825	C-55	Mulloney	G. Dunn	Wales	Co Coast	72
Clarence	1802	C-399	A. Kerr	Hubbert	Plymouth	LoPtrsbg	50
Clupæ	1802	C-420	Robinson	C. Foss	Scotland	LoEmdn	39
Dahlia	1876	D-21	Stewart	P. G. Tessier	Bideford	Bid.	128
Dairy Maid	1876	D-22	R. Bell	E. Porter &	Glasson Dock	Lan.	155
Daisy	1870	D-19	W. Crofts	Davison	Chester	Chs. Coaster	103
Dalkeith	1851	D-19	J. Wilson	J. Mitchell	Glasgow	Cly. Oporto	100

Dandy	1826	D-9	Kennedy	Aikin	Bridport	Li Lisbon	106
Daniel and William	1826	D-27	S. Arnold	Capt.	Plymouth	Pl Coastr	30
Daniel Morris	1851	D-27	R. Parry	Parry & C	Porthmadog	Bar.	83
Diana	1803	D-121	Cuningham	I. Phillips	Norfolk	LoPhilad	133
Dolphin	1803	D-251	Dodridge	S. Youlden	Teignmouth	Br.Jersey	102
E. C. T.	1877	E-3	H. Toms	T. Guyatt	Falmouth	Ply.	105
Eagle Eyed	1860	E-20	Richards	Richards &	Newquay	Car. Coaster	98
Eaglet	1852	E-21	<Not Given>	Borlase &	Penzance	Pnz. Spain	59
Eaglewing	1852	E-23	P. Varwell	Varwell &	Bideford	Lon. Medit	123
Earl of Devon	1877	E-44	J. Beer	WHShilston	Plymouth	Ply	441
Ebenezer	1827	E-63	Chmpion	Lewis & Co	Brixham	Tn Coast	110
Eblana	1827	E-75	Smale	Bailey	Lancaster	Lo.Dublin	137
Eclipse	1804	E-87	Henderson	Dixon & Co	Glasgow	LoDomi	101
Elizabeth	1804	E-312	W.Dick	Strong & C	Leith	Lh Coastr	113
F.M.C.	1853	F-3	J. Rutter	Carson	Ayr	Liv. Coaster	84
Factor	1828	F-5	Price	Williams	Newport	Lo Coastr	149
Fair City	1878	F-8	F. Black	J. McBride	Perth	Cly.	106
Fairy (1836)	1853	F-13	F. Holmes	F. Holmes	Wells	Yar. Coaster	71
Fairy (1870)	1878	F-23	<Not Given>	C. Wells	Aberdeen	<Not Given>	141
Fairy Queen	1850	F-20	J. Finch	Walker &	Sunderland	Sld. London	159
Faith	1828	F-24	Archer	Capt.	Bridport	Lo Lsbon	68
Fame	1805	F-76	W. Riddle	McKenzie	Berwick	LhDantz	132
Forth	1805	F-361	Shannon	Noble & C	Lancaster	GrLond	94
G. H. Bevan	1879	G-10	J. Smith	J. Reney	Appledore	Liv.	87
Galatea	1879	G-43	<Not Given>	T. Greg	Cowes	<Not Given>	117
Gallovidian	1854	G-9	Murdock	Rae & Co.	Sunderland	Lon. Coast'r	118
Gamma	1854	G-15	P. Frank	H. Hunt	Newcastle	Wtb. Coastr	87
Garland	1806	G-23	Cuthell	Buchanan	Grenock	GrGrnda	107
Gatcomb	1806	G-32	C. Chant	Capt & Co	Brixham	DaCoast.	61
Gem	1829	G-43	Patterson	Allison	Yarmouth	SdCoastr	98
George	1829	G-79	J. Bouch	Buckton	Grimsby	Hl Hmbr	68
Hafod	1855	H-3	J. Thomas	Budd & Co.	Lawrenny	Sws. Rouen	85
Halan	1830	H-25	Kinnear	Gullim & c	Montrose	Lh Riga	130
Halkin	1830	H-35	Ellis	Capt & Co	Chester	Br Medit	107
Halls	1855	H-18	J. Hall	Co'prthwte	Perth	Nwc. Bastia	179
Hannah	1807	H-53	S. Gale	Barker	Newbury	LoGtnbg	70

Hannah Ransom	1880	H-68	L. Davies	J. Ransom	Southampton	Sou.	104
Harkaway	1880	H-95	W. Horton	C. Thompson	Goole	Goo.	75
Hind	1807	H-506	J. Clarke	W. Tower	Berwick	LoOprto	138
I'll Try	1881	I-49	W. Murphy	W. J. Gafney	Bideford	Wex.	61
Icon	1831	I-4	T. Berwick	Capt.	Montrose	Lo Coastr	85
Idas	1856	I-17	J. Care	Harding &	Plymouth	Ply. Medit	106
Idea	1856	I-23	D. Delahyde	Del'hyde &	Bristol	Npt. Medit	87
Ifor	1881	I-43	J. Davies	W. Hoskin	Bangor	Nqy.	98
Imogen	1809	I-301	Arthur	C. Smith	Newcastle	LoGtnbr	71
Industry	1809	I-355	E. Coaker	Coaker, Sn	Brixham	LoLimrk	100
Integrity	1831	I-111	J. Hore	Capt & Co	Topsham	Tu Coast	102
J. B. Gray	1882	J-2	P. Rich	J. Gray & Sons	Falmouth	Fal	193
J. H. Barrow	1882	J-5	D.Owens	J. Bell	Glasson Dock	Lan.	130
Jack Tar	1857	J-8	<Not Given>	G. Ward	Teignmouth	Tgn.	88
James	1808	J-47	W. Muedel	D. Mauet	Liverpool	LiAnena	71
James & Christian	1832	J-113	Stewart	Liddell	Scotland	Lo Brgen	71
Jane	1808	J-96	J. Feeney	Duncan	Scotland	DaSltets	77
Jane Ann	1857	J-137	I. Willimsn	Hughes &	Holyhead	Bms. Coaster	98
Jannet	1832	J-309	Gibbs	Gibbs	Gosport	Lo Rttdm	89
Kate	1858	K-16	T. Jenkin	Jenkins &	Padstow	Pad Coast'r	58
Kayoshk	1883	K-83	R. Tamlin	J. Bartlett	Galmpton	Qbc.	147
Keith Stewart	1833	K-20	Hannah	Capt & Co	Gblstn	Wn. Liverpool	98
Kelpie	1858	K-39	E. Hughes	Horsfall &	Aberdeen	Liv. Africa	117
Killigrew	1833	K-38	Noyes	Capt & Co	Falmouth	Br Lisbon	63
Koh-i-noor	1883	K-231	G. Edwards	G. Edwards	Polruan	Abs.	53
Lady Agnes	1884	L-44	Blowey	M.T.Hitchins	St. Agnes	Pnz.	84
Lady Bassett	1859	L-22	J .Gregory	Tyrer & C	Plymouth	Drt.	110
Lady Brougham	1834	L-13	T. forbes	Forbes & C	Dartmouth	Lon. Lisbon	100
Lady Bute	1884	L-59	J. Williams	T. Doughton	Rothesay	Pmd	67
Lady Duffus	1859	L-38	Roberts'n	Reid & Co	Dundee	Dun Coaster	93
Lady Lowther	1810	L-42	J. Osborne	Blaylock	Bo'ness	Li.Coaster	61
Lady Middleton	1834	L-61	J. Wood	Alexandr	Ipswich	Ips. Ncastl	95
Lark	1810	L-78	Revans	Preston	Hull	LoSeville	114
M. A. Wilkinson	1885	M-2	Skinner	J. Parson	Appledore	Ply	95
Mabel	1885	M-20	G. Dean	W. Anderson	Garmouth	Bnf.	99
Mabon	1835	M-2	T. Calder	H&L.S.C	Leith	Lth. Hull	133

Magic	1835	M-19	Trewavas	Bolitho &	Penzance	St.I. Venice	120
Mainwaring	1811	M-37	Davidson	Hudson Bay Company	Ipswich	LoHdBy	80
Margaret	1811	M-130	D. Wills	Cook & Co	Sunderland	SdCoastr	148
Marion	1860	M-309	D.Corlett	E. Kneal	Bangor	Bng. Coaster	53
Mary Ann	1860	M-472	E. Quick	Balkwill &	Salcombe	Drt. StMich	144
Naiad	1861	N-8	S. Saul	Saul & Co	Stonehouse, Plymouth	Fal. Coaster	122
Nairnshire	1886	N-32	<Not Given>	H. Mackintosh	Inverness	Inverness	99
Nancy	1812	N-13	J.Askew	Askew & Co	Whitehaven	LiCoastr	73
Nanteos	1861	N-26	L. Edwrds	Rowlands	Aberystwyth	Abs. Coaster	78
Naphtali	1886	N-74	<Not Given>	F. Evans	Newquay	Cardigan	83
Native	1836	N-51	P.Codd	C. Archer	Wexford	Lon. Dublin	119
Navarin	1836	N-73	Mitchell	Catto & Sn	Aberdeen	Abn. Coastr	103
Neptune	1812	N-190	Hutchins	J. Ibbeston	Littlehampton	DuBaltic	61
Oban	1862	O-7	M. Muir	Craven &	Sunderland	Sld. Coaster	63
Ocean	1822	O-50	Tennant	J.German	Brixham	Liv. Coaster	101
Ocean Pet	1887	O-75	Noel	W. Pickford	Jersey	Jersey	74
Ocean Wave	1887	O-90	Cobden	M. Ellis & Co.	Milford	Carnarvon	157
Olivia	1862	O-94	J. King	J. King	Sunderland	Sld. Coaster	146
Omnibus	1837	O-81	R. Warner	J.Williams	Yarmouth	Lon. Swans	71
Orielton	1837	O-112	Williams	W. Morgan	Milford Haven	Lon. Ireland	115
P. M. Willcock	1888	P-8	P Willcock	P. Willcock	Mevagissey	Fal.	74
P.H. Dawson	1888	P-5	W. Taylor	J. & I. Platt	Tarleton	Bel.	89
Palladium	1863	P-18	G. Yuill	Duncan &	Perth	Dun.	158
Pallas	1838	P-28	C. A. Green	Greens	Brixham	Drt.	116
Palmyra	1838	P-38	A. Croal	G. Booker	Southampton	Sou. Medit.	127
Paria	1813	P-74	Tomstall	Stewart	Argyle	Gr Nflnd	79
Pelican	1813	P-180	Mudge	Capt & Co	Wales	Ex Coast	30
Penpoll	1863	P-163	J. Crocker	Martyn &	Padstow	Pad. Coaster	58
Qua Lee	1865	Q-1	F. Collens	Grant & Co.	Liverpool	Liv. China	343
Quarry Maid	1864	Q-2	Williams	Williams	Pwllhli	Pmd. Coaster	89
Queen Charlotte	1814	Q-20	Thompson	Capt.	Dumfries	LoCork	109
Queen of Clippers	1889	Q-25	J. Cripsey	J.W.Upham & Co.	Brixham	B'xham	120
Queen of the Isles	1839	Q-21	D. Lewis	Capt & Co	Bristol	Lon. St. Hele	124
Queen Victoria	1889	Q-22	J. Childe	F. Griffin	Skerries	Poo.	78
Quiz	1839	Q-36	Stone	Capt & Co	Liverpool	Ips. Meditr	139

Racer	1840	R-4	T. Barnes	Pnznc.S.Co.	Penzance	Pnz.London	86
Rachael	1840	R-10	Rolling	Reed & Co	Bideford	Brs. Mediter	113
Rambler	1814	R-20	M. Ruth	Wallace	Workington	Li Oporto	69
Ranneys	1865	R-47	P. Pender	Pender &	Scilly	Sil. S.Amer	152
Rantipole	1865	R-48	<Not Given>	Ivens & Co.	Gloucester	Glr.	183
Rare Plant	1890	R-120	Tabb	C. Allport	Dartmouth		128
Reaper	1890	R-153	Dustow	C.B.Kelway	Truro	Par	110
Rebecca	1815	R-59	J. Bennett	Davey & Co	Topsham	Br Lisbon	90
Recovery	1815	R-51	Harkness	Wood & Co	Workington	Wn Liverpool	75
Rhoda Mary	1868	R Supplement	J.Meyrick	Meyrck &	Point	Fal. Baltic	130
Sabina	1841	S-2	T. Davis	Melhuish	Bridport	Lon. Nfdlnd	87
Sabrina	1866	S-4	H. Prtchrd	Prtchrd &	Fowey	Bng. Baltic	101
Sage	1866	S-9	W. Ansell	J. Asplet	Guernsey	Jer. Coaster	37
Saint Anne	1892	S-98	<Not Given>	J. Jamin & fils	Barnstaple		97
Saint Austell	1892	S-100	<Not Given>	T. Hitchins & Co.	Portreath		74
Saint Helena	1816	S-57	Atkinson	East India Company	River	Lo St.Hel	143
Saint Ives	1841	S-40	J. Quick	Wearne & S	Bideford	Bid. Newprt	122
Sally & Ann	1816	S-155	J. Hunter	Capt & Co	Dumfries	Li.Coaster	74
T.P.C.	1867	T-10	J. Jenkyns	J. Jenkyns	Appledore	Pad Coaster	58
Ta Lee	1867	T-16	Wilson	Grant & Co	Liverpool	Liv. China	342
Tagus	1842	T-18	Straiton	J. Straiton	Ipswich	Lth. Stettin	109
Talarvor	1894	T-52	S. R. Ellis	S. R. Ellis	Porthmadog		133
Talitha	1842	T-13	Chapman	Chapman	Stockton-on-Tees	Stk. London	108
Tankerton Tower	1894	T-82	A. G. R. Bailey	A. J. Anderson	Whitstable		119
Telemachus	1818	T-43	Phillips	Capt & Co	Bideford	Lo StAnd	104
Thetis	1818	T-118	S. Vetery	Capt.	Brixham	LoCork	117
U. Larsing	1896	U-1	G. Hughes	W. O. Morris	Newquay		96
U.S.C	1868	U-1	G. Haym's	United Sh. Co.	Dartmouth	Drt. Medit	159
Uganda	1868	U-4	Barlett	H. Willi'ms	Bideford	Bid. Coaster	137
Ulelia	1896	U-12	B. Phillips	G. McF. Hope	Truro		74
Unanimity	1843	U-7	J. Giles	Giles & Co.	Inverness	Cly. Plymth	132
Undaunted	1843	U-16	Wormwll	Clegg	Newport	Lon. Ply. Africa	133
Union	1819	U-60	R. Good	R. Good	Fowey	LoHmbr	75
Unity	1819	U-173	Woolridge	Capt.	Fowey	Li StMic	66

Valeria	1844	V-5	J. Wright	J. Clark	Yarmouth	Liv	122
Vanguard	1844	V-16	Kirkman	Thompson	Sunderland	Lon. Hmbro	191
Veho	1869	V-35	F. Baddrly	Upham & C	Brixhm	Drt. Brazil	199
Velin-heli	1897	V-113	T.M.William	A.Evans	Port Dinorwic (now Y Felinheli)	Bng.	76
Venedocian	1897	V-122	E. Jones	E.Jones (H. Parry Mgr.)	Porthmadog		181
Venus	1869	V-60	T.Iddon	J.Patterson	Port Dinorwic (now Y Felinheli)	Lan. Coaster	80
W. D. Potts	1898	W-2	H. Williams	D. Williams (H. Parry, Mgr)	Pwllheli		112
W. H. S.	1898	W-13	H. W. Huxham	W.H. Shilston	Plymouth		129
Waif	1870	W-11	W. Dens'm	Vittery & Co.	Brixham	Drt. Meditrn.	154
Walker	1870	W-16	A. Morrisn	Gibson & Co.	Montrose	Mtr. Coaster	72
Walter	1845	W-12	S. Sawle	J&R Lake	Barnstaple	Fal. Naples	60
Wanderer	1820	W-22	A. Dixon	Cumings	Bridport	Lo Naples	106
Waren Packet	1845	W-41	T. King	Nairns & C	Tyne	Nwc. Coastr	132
Wasp	1820	W-41	Quinlan	Hilhouse	Bristol	Br Jamai	69
X.L.	1846	XY-1	J. Crosby	Bovil & Co	Whitby	Wtb. Nwcstl	93
Yacht	1846	XY-11	Anderson	J. Ayre	Sunderland	Sld. Petrsbg	190
Yare	1821	Y-3	J. Bailey	Bolingbrk	Yarmouth	Lo Coastr	72
York Packet	1821	Y-14	Wrglswth	Ringrose	Bo'ness	Hl Rttdm	103
Young Dick	1871	Y-22	R. Redman	Hickman	Burton Stather	Goo.	162
Young Hudson	1871	Y-23	J. Hudson	Hudson	Hull	Hul. Coaster	78
Zante Packet	1847	Z-2	P. Brenan	Brenan & C	Southampton	Liv. Zante	213
Zea	1872	Y-50	Livingstn	W. Adamson	Sunderland	Sld. BlkSea	201
Zealous	1847	Z-6	Champion	Champion	Teignmouth	Liv.	76
Zebrina	1899	Z-16	H. Bedwell	Whitstable Shipping Co. (Ltd.)	Whitstable		185
Zeno	1822	Z-18	Matthews	Laing	Sunderland	Lo Coastr	85
Zenobia	1872	Y-65	E. Davies	Davies & Co.	Ipswich	Sws. Meditrn	177
Zephyr	1822	Z Supplement	Owens	Langtree	Belfast	Lo Belfst	165
Zouave	1899	Z-65	T. Gregory	W. Harland	Salcombe		127

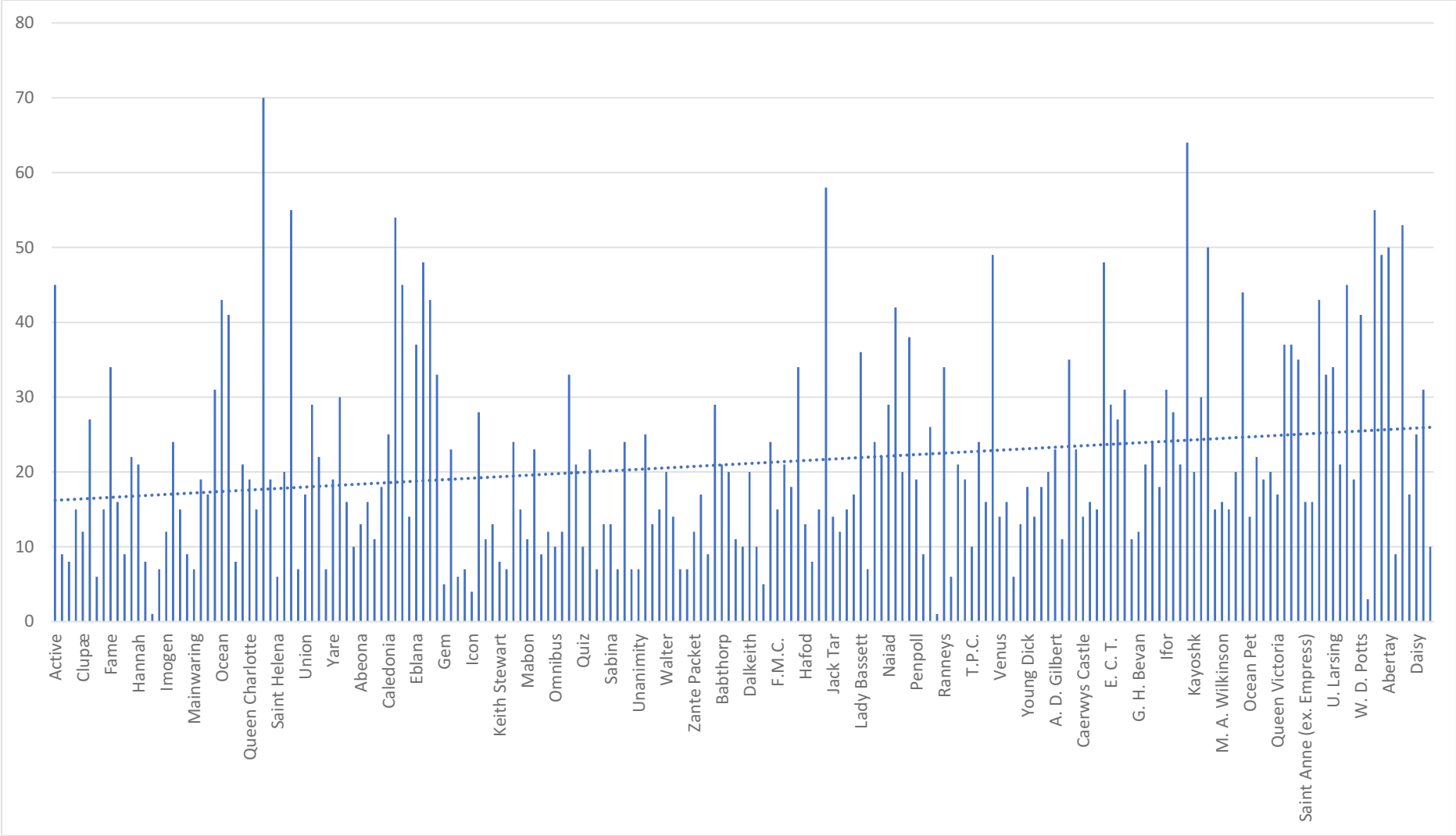


Figure 5.3: Chart showing the lifespan of each of the 200 ships in the Paper Fleet (Chart by the Author using data taken from the Lloyd's Register of Shipping)

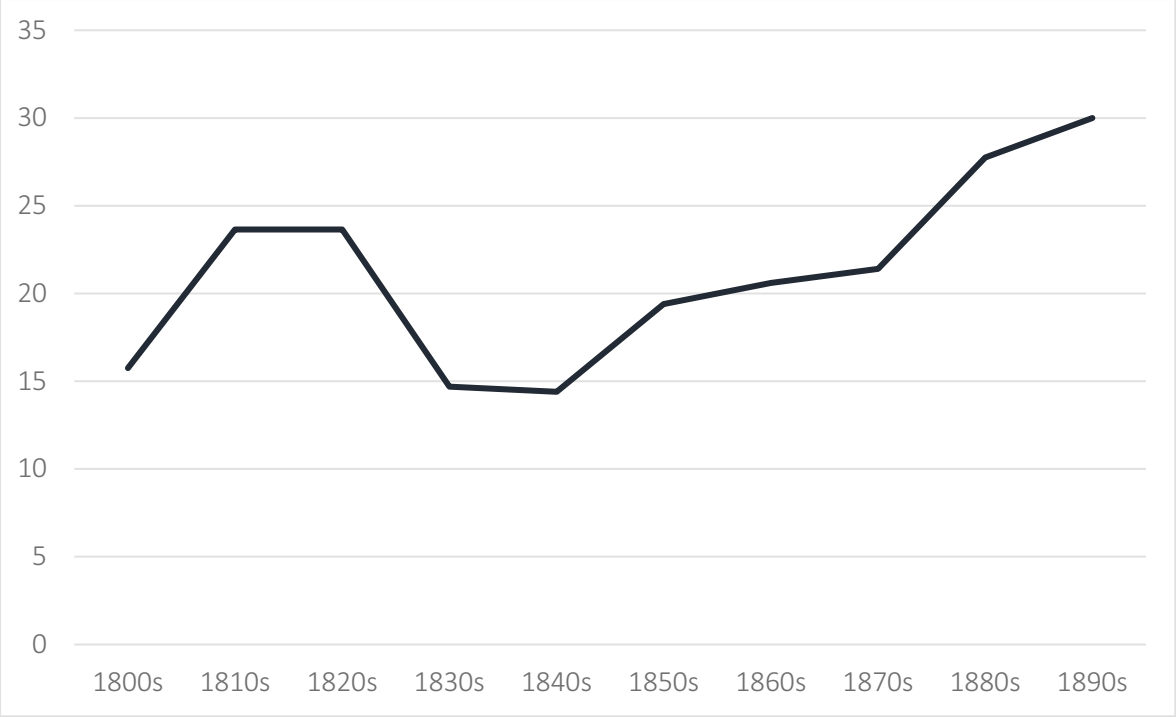


Figure 5.4: Average lifespan of the ships in the Paper Fleet by decade (Chart by the Author using data taken from the Lloyd's Register of Shipping)

an increased use of Special Surveys and of indications a ship has been repaired, and even "Restored". It is therefore sensible to break up the average into sections, first the average lifeway pre-1850 where the average is: 17.8 years and then the lifeway post-1850 where the average is: 24.3 years. This is an interesting development. The latter part of this century is where we see sailing ship technologies replaced and overtaken by steamers, iron-hulled vessels, and finally motorised ships. However perhaps this goes some way to show why these ships are lasting longer. Are wooden sailing ships becoming harder to replace? Are they only economical as existing entities, becoming unviable if they must be built as new vessels rather than by sustaining existing ones? These are questions we can delve into more readily in Chapter 8.

5.4.2. Tonnage and Outliers

You will have realised by now that this thesis has a difficult relationship with tonnage measurements. However, they remain the only way to establish the size of individual ships in the Register Books for over half the period in question. Averages are less useful here as tonnage changes throughout the century. Instead, the chart in Figure 5.5 shows the tonnage of all 200 Paper Ships throughout the century. There are many places where the tonnage for individual vessels changes. This is often associated with a repair or lengthening; however, it is sometimes just a change in the figure with no associated intervention to the ship itself. Therefore, the final tonnage measurement in a ship's life have been used as the number for the chart in Figure 5.5. This provides some measure of consistency across the dataset as all the ships subject to some intervention or alteration have been included in their final form.

There are some notable outliers. Chapters 1 and 2 set out that the dataset is made up of schooners plying the coastal trades around Britain. Included in this dataset are two clear exceptions to this. The 343-ton *Ta Lee* and 342-ton *Qa Lee*. These are both schooner-rigged ships destined for the China trade, and as the chart in Figure 5.5 shows are considerably bigger than the other members of the Paper Fleet. Their inclusion in the fleet is useful because they show such a clear exception to the size seen for other schooners and their intended voyage was so much longer than those undertaken by the others. Disrupting this trend, however, is the 447-ton *Earl of Devon* (1877-1903, Appendix A.40)

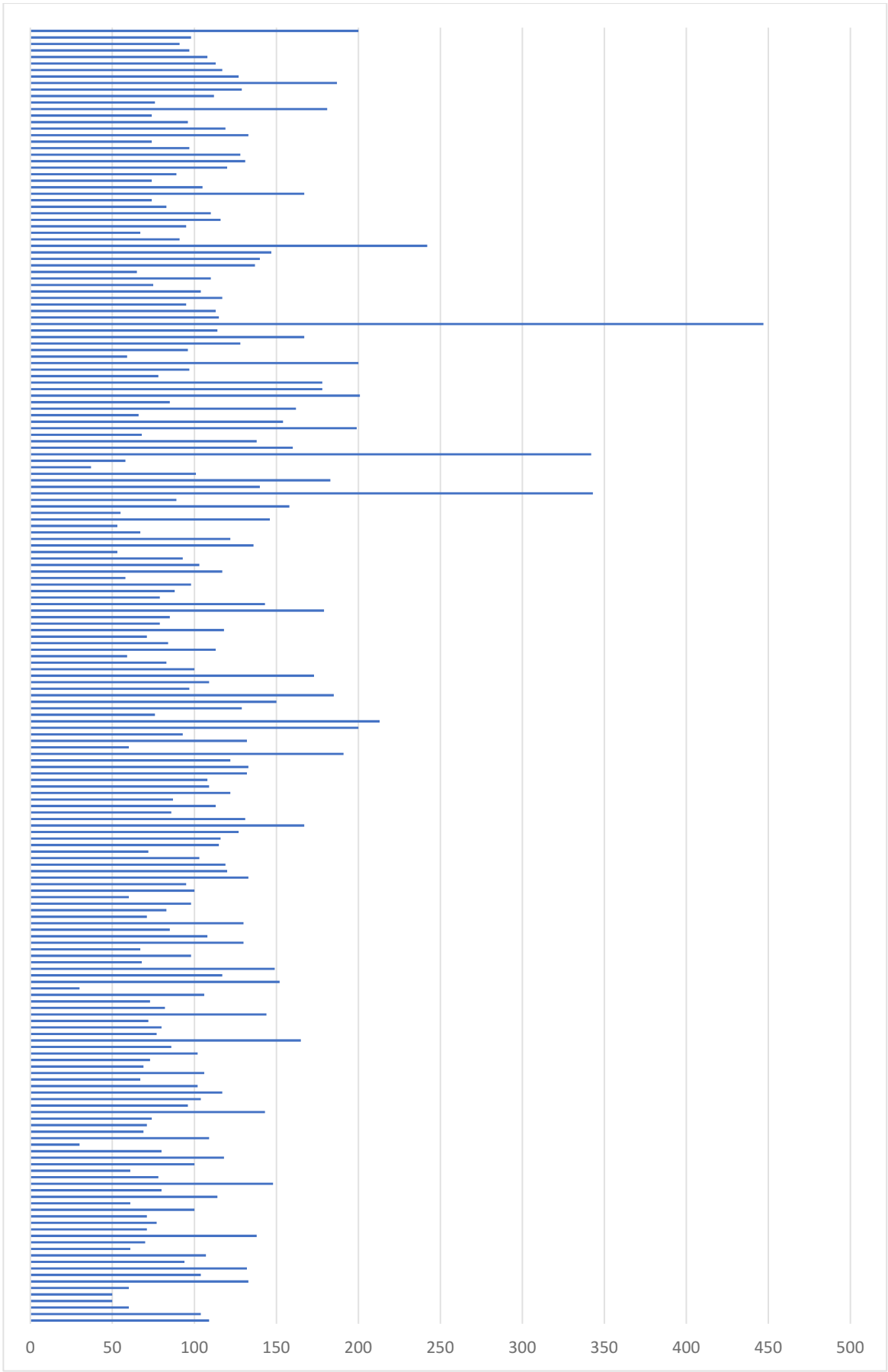


Figure 5.5: Chart showing variance in the final tonnage measurement for each of the 200 ships (Chart by the Author using data taken from the Lloyd's Register of Shipping).

which appears to be engaged in coastal trading. There are also several ships that are much smaller, the 30-ton *Daniel and William* (1813-1827, Appendix A.33) and 37-ton *Sage* (1847-1866, Appendix A.151) are the smallest ships in the sample. These are not necessarily outliers in terms other than their size, as they are still very much part of Britain's coastal trade according to the ports they are registered in and the information we have about their onward journeys which suggest they are engaged in sailing around Britain's ports rather than international trade. In fact, their register entries indicate this is exactly their role. Ships of that size are more restricted to coastal trading than the other schooners of 100 tons or more.

It is also possible to see how tonnage changes across the period in this dataset. Which is to say not very much. Even considering the changes made to how tonnage was calculated (discussed in Section 3.5) there is a surprising degree of consistency in the size of the ships in our Paper Fleet. This is surprising as one of the accepted arguments for shipbuilding posits that new technologies allow for larger and larger ships to be built as the period progresses (Mendoça 2013: 1728). The average tonnage for the paper fleet is 107.2. However, this includes at least two different calculation methods and is not strictly comparing like with like. The tonnage before the main change in calculation in 1836 is an average of 92.7, the average after this change is 115 tons. This gives us some perspective when looking at the very large and very small ships recorded in the dataset, such as *Earl of Devon* at a tonnage of 447, or *Sage* at 37, showing just how different they are from the rest of the ships. This averaging also shows that our selection has been broadly accurate in ensuring ships of similar size are being chosen with only a handful of outliers. Such a considerable range in tonnage from 400% of the average to 30% demonstrates that versatility for schooners as a ship/rig-type. Shipbuilders and ship-users can conceive ships of the same classification in radically different sizes and serve different industries and have different intended destination. This goes some way to further demonstrate that the technological complexity identified at the end of the 19th century seems to be present all through the period, although manifested in different ways. It is likely this is an effect of other technologies acting upon shipbuilding, mainly steel and iron hulls toward the end of the century, having an impact on the size needed for wooden built sailing ships. Iron and steel allowed for the construction of very large ships very quickly, smaller-hulled wooden ships are then pushed out of certain industries and trades. This is discussed further in Section 8.4.1.

5.4.3. Repairs, Refits, and Changes

Tonnage aside, repairs can also provide significant information about a ship's life and when related to factors such as the lifespan of the vessel and the presence of certain key technologies, can provide useful insight into the choices made and ways that ship was used. The changes to tonnage calculations are certainly one. However, it is also true that the repairs, rebuilding, and refits that ships undergo can also change the tonnage. The most obvious way this can happen is through the lengthening of a ship, as in the case of *Queen of the Isles* (1834-1857, Appendix A.136)—lengthened in 1849—whereby additional timber is inserted into the middle of a ship in a major intervention.

By far the most common type of intervention found in the 200 ships are repairs. One issue with this is that there is not a clear description for each level of repair detailed in the Register Books. In other words, we do not definitively know what the difference is between Some Repairs (Srprs) in the case of *Rebecca* (1810-79, Appendix A.146) and Large Repair (Lrp) for *Lady Brougham* (1833-55, Appendix A.95), other than Large Repair probably requires more intervention than Some Repairs. These are not always accompanied by the level of detail as for *Ocean* in Chapter 6 (Section 6.4.2) which detail the parts of the ships that have been repaired and replaced. A further annotation is the inclusion of a note indicating a ship has been "Restored" (Rest.), these become more common towards the end of the century as with the ships *Lady Agnes* (1877-1927, restored 1912, Appendix A.93), *Naiad* (1837-66, restored 1853, Appendix A.109), and *Zouave* (1855-1904, restored 1875, Appendix A.200). In all cases, the note "Rest" accompanies the ship returning to a characterisation of "A". The inference

from this being that the vessel is restored to its former state from an AE or E rating. As there are no examples of I to A restorations in the Paper Fleet, we cannot definitively state this also took place. This use of "Restored" is also slightly different from the modern deployment in relation to ships, where it would indicate a period-specific rejuvenation or refurbishment. It seems entirely more utilitarian in its use for the LRS. Finally, there are damage repairs (Drp) as in the case of *Dolphin* (1799-1826, Appendix A.36), *Palmyra* (1835-56, Appendix A.126), and *Unanimity* (1839-46, Appendix A.168), once again these do not give any detail of their extent however these can be assumed to be a reactionary event.

Half of the 200 ships have had some form of repair or alteration. Table 5.2 gives a breakdown of the number of incidents of each type of repair in the Paper Fleet. This has been assembled by taking each individual incidence of repair indicated by a date—so in the case of the ship *Factor* (1826-69) Srp55, 77, & Drp 57 indicates three instances of repair—and each date is recorded in the table only once. The utility of this sort of information is limited. Whilst it is interesting to see the prevalence of repairs in the Paper Ships information about repair is only useful in context of the lifespan of a ship and the technologies present in its construction. This is especially true when ships are looked at with only the Register Books as a source as there are no material remains to support information around repairs. Understanding what the impact of a repair was on a ship requires this additional context, the exception being a 'Damage Repair' which is clearly a reactionary event to a ship being damaged. It is possible to establish the ratio of repair to lifespan for the vessels within the Paper Fleet. The average is a repair or intervention taking place for every 13.6-year period of service, which is a logical result as the longer a ship lives the more likely it will need some form of intervention to keep it functional. This does not include the standard cyclical maintenance crews might undertake on their ship, such as running repair, painting, and so on. As Chapter 6 shows, the information regarding repairs to a ship is also useful to add detail to the investigation of an individual ship's physical remains. Repairs also reflect an issue of scale and granularity, they add significant granular detail to an individual ship's story however at scale their use is more limited requiring considerable contextual information to add to our understanding.

Table 5.2: The number of incidents of repair or modification by type in the 200 ships (Chart by the Author using data taken from the Lloyd's Register of Shipping)

	Rp (Repaired)	Lrp (Large Repair)	Srprs (Some Repairs)	Drp (Damages Repaired)	Rest (Restored)	Trp (Throrough Repair)	Rb (Rebuilt)	Len (Lengthened)	ND (New Deck)	Almst.Rb (Almost Rebuilt)	Nkl (New Keel)	NtSds (New Top Sides)	Total
Number of Instances	9	14	99	51	13	13	2	11	28	1	15	5	261

5.4.4. Presence and Absence of Technology

One piece of essential information for our investigation of shipbuilding in this period is the technology included in the construction of a ship. This was the field that sparked the initial interest in the Lloyd's Register and the research questions for this project. The LRS can be used to establish rough dates for the uptake of certain key technologies, and for individual ships they also provide considerable context that can be used alongside other elements of their entries. This is explored in detail in Section 6.3.1. One challenge is that the recording of components and technologies is not always consistent. In an individual ship's life, a technology such as iron bolts (for fastening framing timbers) might be recorded in an entry for one year and then absent the next, as is the case for *Kiligrew* (1831-37, Appendix A.91), even though this is a technology that could not be easily removed from a ship without a considerable intervention. The entry of these technologies into the LRS does not appear to be used exclusively where a new technology is added to a ship. It is also used when it is an existing component from a ship's initial construction. In Chapter 6 explores the records of the ship *Ocean* (see Section 6.4.1), and these show that ship was built with iron from the beginning and yet iron is only recorded for a few years in its LRS entries and not at the very beginning.

Aside from this issue there is plenty of detail around technologies and materials being incorporated into a ship. For example, the *Qua Lee* (1865, Appendix A.133) is recorded with a "*Wood & Iron Frame Planked Diagonally"* alongside Yellow Metal sheathing applied in 1864. The sheathing is applied in the same year as the ship was built, so it is possible this was applied as part of its construction. However, it is also possible it was a separate process that took place after the ship had left the builder's shipyard. This level of detail shows how the ship was built and when combined with the recorded tonnage (343) and onward destination of China, offers a better understanding of this ship. That entry also offers a tantalising possibility that this is a concrete datable reference to the use of double diagonal planking as a shipbuilding technology. Diagonal planking over an iron frame is a composite construction method understood from the historical record to be used for shipbuilding in the latter half of the 19th century (King 2022: 443). The inclusion of other key technologies visible in Chapters 6 and 7, such as iron bolts for framing, can also be extremely useful when incorporating documentary material into the investigation of an archaeological site. A final point of interest is the record of the schooner *Zebrina* (1874-1928, Appendix A.196) which is fitted with an Auxiliary Screw Paraffin Motor in 1918, the only one of the 200 ships that is recorded to have received a motor, technically changing its classification in the LRS to "AuxSr" or "Auxiliary Schooner".

Even though the recording of specific technologies is inconsistent, it is not impossible to build up some picture of the different solutions being deployed in the construction of the Paper Fleet. Table 5.3 sets out the individual technologies present in the fleet and the number of occurrences for each one. This can be combined with the information from Table 5.4 which shows the date at which those technologies are included as a separate reference within the LRS.

Table 5.3: Shipbuilding technologies present in the Paper Fleet and the number of instances each technology appears (Chart by the Author using data taken from the Lloyd's Register of Shipping).

Shipbuilding Technology	Number of Entries in the Paper Fleet	Abbreviation or Acronym in LRS	Percentage of the Paper Fleet (%)
iron framework	4	I.K. or Detail given in the Eighth Column of LRS	2
Copper sheathing	30	s. C.	15
Copper fastening	16	C.F. or c.f.	8
Iron bolts	91	I.B.	45.5
Felting	44	F.	22
Yellow-metal sheathing	57	s. YM.	28.5
Zinc sheathing	5	s. Z.	2.5
Galvanised iron bolts	2	G.I.B.	1

Working through the list chronologically, copper fastenings are by far the earliest term given its own entry, closely followed by copper sheathing. This is unsurprising as it has been shown by Bingeman (1996: 180) and Northover & Northover *et al.* (2014: 52) that copper sheathing was already in use at the establishment of the Lloyd's Register in the late 18th century. It is similarly unsurprising to see iron framework given an early reference as this has been shown by Stammers (2001: 115) to be an accepted shipbuilding technology as early as the 1810s. However, the entries for the Paper Fleet show almost no reference to the use of iron knees or iron framework. The exceptions to this being *Ta Lee, Qua Lee* (see Section 5.5), *Mabel* (1882-1897, Appendix A.101) with "Knee bolts pt. Plain Iron" possibly indicating iron knee used in the assembly of its knees, and *Earl of Devon* with "Iron Hold Beams" recorded. In Chapters 6 and 7 both *Ocean* and *Rhoda Mary* have iron framework present in their remains, however neither ship has a record made for this in their LRS entries at any point in their life. It is possible this is demonstrating that fact that surveyors are not recording iron framework or

that it is only included when it is significant to the ship's construction as in *Ta Lee* or *Qua Lee*'s composite structure. It is also possible that the recording of iron frames is dealt with in a similar way to timber types (which also have their own entries in the LRS index), they are only entered into a record when they are a major factor-such as the use of Fir rather than hardwood for the construction of a ship's hull.

Table 5.4: The dates each technology present in the Paper Fleet first appears as a separate entry in the Lloyd's Register and the abbreviation or acronym given.

Shipbuilding Technology	Date of Entry into the Lloyds Register	Date of Adoption Identified in Archaeological Literature	References	Entries in the Paper Fleet
Iron framework	1814	1814	Stammers 2001	2
Copper sheathing	1780	1792	Harris 1996: 565-6	30
Copper fastening	1802	1780	Rees 1971	16
iron bolts	1789 (Pages missing from earlier books, not present in 1783)	Pre-17th century and carvel shipbuilding	e.g. Adams *et al 1990;* Maarleveld, Goudswaard and Oosting 1994; Borrero 2020	91
Felting	1820 (as Patent Felt - P.F.)	Pre-17th century and carvel shipbuilding	e.g. Allen et al 2013; Daly et al. 2021	22
Yellow-metal sheathing	1834	1832	McCarthy 2005	57
Zinc sheathing	1849	Pre-Muntz Metal (1830s)	Staniforth 1985	5
Galvanised iron bolts	1865 ("Key to the Register" missing from 1864 copy but not present in 1863)	late 19th century	McCarthy 1996	2
Yellow-metal fastening	1864	1840s	Northover 2011: 31-4; Satchell and Whitewright 2014: 71	N/A

Fastening types are much more regularly recorded. By far the most common type is iron, although all the ships in the Paper Fleet would have been secured with treenails, however these are not noted separately. Not all the ships in the fleet record their fastening materials. 45.5% are fastened with iron and 8% with copper, the rest are unlabelled. There is no specific rule given to understanding the entry for iron fastenings, so it is assumed these refer to the transverse fastenings used in the framing arrangement to hold floor timber to first futtock and first futtock to second and so on. This assumption is made based on the results of the two shipwreck investigations in Chapters 6 and 7, both of which demonstrate iron fastenings used in this way with no other obvious uses of iron fastenings in their construction. However, copper is also recorded as a fastening type in the same way as iron. Although for copper fastenings the rules given in the Register Books state that the entries for copper fastening refer to the use of copper or copper-alloy spikes to secure butt and hood ends of hull planking to the ship's frames. This entry also shows the hidden complexity often present in the LRS, the entry "C.F." for Copper Fastenings can also refer to copper-alloys like brass—or the alternate name for copper-alloy "yellow metal", even though copper and copper-alloy are not the same material. This suggests that later ships may be utilising yellow metal fastenings even though they are recorded as copper in the LRS. Yellow metal is also present as a hull-sheathing technology. However, yellow metal sheathing is given its own separate entry to copper. There is also an entry in the abbreviations list for "Patent Marine Metal", this does not appear in the Paper Fleet and it is possible this refers to the use of materials like "Muntz Metal" which is a patented copper-alloy used in shipbuilding in the mid-19th century (Bingeman 2018: 466-467). In the Paper Fleet 15% of the ships

are sheathed with copper. Entries for yellow metal sheathing then replace entries for copper sheathing entirely after the mid-1840s with 28.5% sheathed with yellow metal. There are also a handful of entries for the use of zinc as a sheathing metal making up 2.5%, and the use of Felting as part of the system of hull sheathing is also present over 22% of the fleet. These show the considerable detail about ship construction technology that can be extracted from each single line in the Register Books. This presents a more detailed understanding of the 19th century Maritime World explored in more detail in Section 8.4.

5.4.5. Geographic spread

At this point the key information has been set out that can be extracted from the Register Books that relates to the construction of each of the ships. This has been combined with the key dates for construction technologies in the preceding sections and Table 5.4. The other area these books can be of use, is to fill in the backstory of these ships. The entries can be used to generate a picture of where ships were built and where they are working. This includes where their "home port" might be, although this is not always possible. Firstly, by examining the origin of each ship, allows an assessment of how well the total sample covers the coast of the British Isles. Figure 5.1 shows this spread with individual ships' construction locations marked as points on the map. The map shows the sample possesses a decent degree of coverage, with ships present in all the key shipbuilding areas of Britain (e.g., London, the North East Coast, the South West, Wales, and the Clyde).

The second area of interest are the survey ports a ship is recorded at. This information is present for the entire century. These entries help to show how ships are moving around the coast and can be combined with information about journeys and voyages to assemble a picture of schooner-borne trade in this century. This is not fool proof as there are a limited number of survey ports and a limited number of surveyors working. Not every port on the coast of Britain is listed as a survey port, many are small or have a limited amount of shipping traffic, instead larger maritime centres appear on the list such as Southampton, or Liverpool. The set list of ports in any given year will not always include the specific local harbour a particular ship is working out of and it will likely be the main port in a particular region or county. The exact reasons for which ports are chosen are not recorded in the Register books, perhaps the choice relates to which ports receive the heaviest shipping traffic or a choice of ports equidistant from local shipbuilding areas.

5.4.6. Journeys and voyages – local, national, or international

One of the most interesting features of the lifeway tables, is the information about the onward destinations of the ships. Unfortunately, this information is only available until 1874, after this the Register Books stop recording the onward voyages of ships, this change is not explained. For three-quarters of the century there is information on where a ship was destined after its initial survey. It should be unsurprising that for the most part the schooners for this project are engaged in coastal and middle-distance trade from the British Isles. The most common destination outside a location on the coast of Britain or Ireland, is the Mediterranean, followed by the Baltic coast. However, as always, we have some outliers. Unsurprisingly *Qua Lee* and *Ta Lee* are in this bracket with their onward destination of China. There is also the example of *Young Dick* (1870-87, Appendix A.191) which moves from Goole (East Yorkshire) to Wellington (New Zealand) in 1886, or *Mabel* which moves from Inverness (Scotland) to St. Johns (Newfoundland) in 1892. Both the latter examples had lengthy careers in Britain's coastal trade before moving and being registered in their new countries. Their inclusion in the LRS continues once they have moved to their new home country so it is possible to establish their lifeway after this change.

5.4.7. Relating to Datasets in Ch 4

The 200 Paper Ships allow us to view the 19th century Maritime World at a different scale to that achieved in Chapter 4 which assembled a very broad overview of the trends in 19th century shipping

and the impact of some key events. The 200 ships allow a tight focus on some key questions and some of the issues identified in Chapter 4. Most notably the adoption and use of certain key technologies such as yellow-metal Sheathing, or iron bolts, and the specific use of wooden sailing ships in the latter half of the century. They also allow this thesis to revisit some of the accepted understandings of shipbuilding in this period with more confidence in the figures and material used to assemble interpretations as they have been directly extracted from part of each ship's assemblage. In Chapter 2 we saw that there have been studies that look at the British Shipping Industry as a whole (most notably Davis, 1972) however it is difficult to establish for certain where the figures used by Davis (1972), and Mitchell and Deane (1971) originated. For this project's dataset the situation is much more certain. Ships that can be traced back to their original registrations can then have detailed accounts constructed of their working lives from the information held in the LRS. As Chapters 6 and 7 will show this information can then be related to the physical remains of ships and the records of 19th century seafaring held outside the Lloyd's Register in archives such as the National Maritime Museum, or the Plymouth Shipping Register.

To set the scene, the dataset shows; wooden ships are still being widely used even at the very end of the century. It is interesting to note, from Section 3.6, that there appear to be many fewer wooden ships being built in the last decade of the 19th century (1890-99). New wooden ships are not being built in the same numbers they were in the 1870s and 1880s. However, those ships that have been built are continuing to serve for a long time, often well into the 20th century. There is also a migration of wooden sailing schooners to the fringe of the British Isles, ports in places like West Wales and Cornwall away from large maritime centres, this is discussed in more detail in 8.4.1. This is shown by the ports of registration appearing in each ship's record in the LRS. Schooners which for a century served as a sort of liminal craft in both coastal trade and middle-distance international commerce, are now existing on the edges of Britain's Maritime World in small harbours where the infrastructure and local conditions enable their continued use in place of larger iron ships or steam-driven vessels. A wooden schooner can be reliably worked out of a coastal community with no hard infrastructure, being loaded and unloaded on a beach at low tide for example. Our voyage with the Paper Ships is beginning to show the adaptability and longevity of this technology, it is also allowing us to view the coast of Britain in a new way. The impacts of different technological changes are becoming evident not only in the construction of ships but also in the development of the coastal infrastructure and maritime spaces those ships exist within.

5.4.8. Similarities present at beginning and end of the century

Whilst those technologies and the coastal infrastructure of Britain is changing, there is remarkable consistency in the ships throughout the entire century. With the exception of *Zebrina* (1874-1928, Appendix A.196) which is fitted with a screw propellor and a paraffin motor, all our other ships remain as wooden sailing ships with a sailing rig as their only means of propulsion. This can be taken a step further by looking at exactly what the Register Books are recording as the construction elements for the Paper Ships. In almost every ship built after 1870 "I.B." is present denoting they have been constructed with iron bolts to fasten the frames. There is also an entry for Y.M.—or yellow-metal—as a sheathing material, even for ships in the 1880s and 1890s. This is interesting as by this time wooden sailing ships are very much the minority, as shown from the overview of wooden shipbuilding presented in Chapter 4 (see Section 3.6 and Figure 3.1 and Figure 3.3). Even with these ships now the minority, there is a considerable investment in their care and maintenance, as demonstrated by the continued use of yellow-metal.

The use of iron bolts, yellow-metal, sailing-rigs, and wooden hulls shows something else interesting. These are all techniques and technologies that have been in use since the mid-1810s. In fact, according to the Register Books there is very little difference between the wooden schooners built in the 1880s and 1890s—such as *Ada* (1891-1900, Appendix A.8), or *Queen Victoria* (1880-1897,

Appendix A.137)—and those built in the 1820s and 1830s—such as *Lady Middleton* (1825-1840, Appendix A.99) or *Omnibus* (1834-1844, Appendix A.122). What this shows is that from a broad scale there is very little difference in how ships are being built at the beginning of the century to how they are at the end. A layperson, or even an archaeologist, would struggle to distinguish between two of these ships were we to moor them alongside each other (see Section 8.4).

5.5. Specific stories, chosen as interesting or regionally/industry distinct

Within the Paper Fleet there are some ships that, as a result of this investigation, have revealed stories that are unique or clearly illustrative of certain parts of the 19th century Maritime World. These differ from the stories set out in Chapters 6 and 7 in that they are solely drawn from the LRS. In this section the stories of four ships will be briefly relayed and their relevance to our study discussed. The point of this is not to say those ships are any more important than others in the total sample of 200. Instead, these stories further demonstrate the utility of our study of the LRS beyond the averages and totals presented in Section 4.6, or the specific technical detail in the preceding sections of this chapter.

The first ship is *Telemachus* (1804-1857, Appendix A.162). Like the ships in Chapters 6 and 7, this ship had a working life that is considerably longer than the average for the Paper Fleet. In fact, this ship had the longest working life of any of the ships in the fleet. What makes this ship particularly interesting is that alongside that long service, it undergoes more repairs than any other member of the Paper Fleet. There are 12 individual instances of repair to this ship, none of these are lengthening, rebuilding, or restoration. Following from the discussion of repairs in 5.4.3, it seems reasonable to suggest there is a correlation between this considerable number of repairs and the length of the ship's service life. There is also a connection to the ship's owner. The ship changes ownership at least eight times, although a gap between 1834 and 1839 where several details—including the owner of the ship—are not recorded means there could be more changes. There is a repair the year of each of these changes in ownership. This could relate to a new owner refitting the ship for their enterprise, or the old owner repairing the vessel in preparation for sale. The repairs made to *Telemachus* also highlight the role of repair in the characterisation of a vessel, building on the detail of characterisation in 2.3. In 1833 *Telemachus* has the characterisation of "E1", after the break in recordings in 1840 the characterisation has returned to "A1" with only a "Thorough Repair" in 1839 added to the register entry for the ship. This expands on the suggestion made in 5.4.3, that ships were being brought back to an "A" grade character by being "restored" to include certain instances of repair that lead to the same outcome. The final piece of information to draw from the life of *Telemachus,* is the type of work this ship was engaged in. For most of its life the ship served the middle-distance European trades—to the Iberian Peninsula, then Holland, then France, and finally the Baltic. After 1852 the ship moves into Britain's coastal trades. It seems likely that the shift in voyages reflects the fate of an aging ship, as it is slightly too early for these trades to have been totally replaced by steam-driven vessels.

Tracing the deployment of certain technologies is one of the specific advantages of the LRS. Two ships are worthy of further investigation because of the information their stories can provide, and one of their stories is tragically short. *Qua Lee* (1865, Appendix A.133) and *Ta Lee* (1867-88, Appendix A. 159) are a pair of ships built for the same owner and the same voyages only a few years apart. The reason for their temporal proximity is the fate of *Qua Lee*, which wrecks in year after it is built. Both ships list their intended voyage as Liverpool to China in their first year. Both ships are built in Liverpool, but most interestingly both ships are recorded with "*Wood & Iron Frame Planked Diagonally*". This is a construction technology not found anywhere else in the Paper Fleet and may indicate the ships were constructed with Double Diagonal Planking. *Ta Lee*'s life remains firmly that of an international merchant vessel leaving from London, first to China, then Japan, then Hong Kong. The ship is registered in a German port for its entire life, first Altona and then Hamburg, however it still works a British-based route. This is not a surprise. Chapter 3 explored Britain's role in the late-19th century

emerging as the mercantile capital of the world. Ships like *Ta Lee* seeking the best market for their goods would struggle to do better than Britain.

Whilst *Ta Lee* and *Qua Lee* inform on a relatively scarce shipbuilding technology, other ships in the fleet are relevant to our understanding of more mainstream, but no less vital, technologies. *Queen of Clippers* (1864-1900, Appendix A.135) informs on the use of metal hull sheathing. This is particularly interesting because hull sheathing is only deployed when ships will be working in waters that will bring them into contact with marine borers that will damage and ultimately destroy the hull of a wooden ship. Prior to the 19th century the use of this technology is not at all widespread. However, in the 19th century copper sheathing is so widely used it receives its own specific notation in the LRS, as do later developments to the technology, such as the use of Yellow Metal in place of copper.

What makes the stories of these ships and all those in the Paper Fleet so important, is that this project is tasked with the coastal archaeology of a country where the coasting trade was still going strong in the early 20th century. Coastal trade also provided the seafaring knowledge, experience, and systems to support larger, longer, and more complex trade routes (see Section 2.3). These individual stories also demonstrate the depth of information that can be extracted from the LRS for any single ship. It is possible to see how particular technologies are implemented and shows the variety of ships and stories present in even a single class of vessel—schooners. There is considerable potential to deploy the explanatory, narrative power of Deetz (1993, 1996, and 1998) using the information from the LRS and to use those stories as a bridge to draw those detailed narrative resources into a wider understanding of shipbuilding technology in the 19th century.

5.6. The Overview approach, what this adds and how we can look at becoming more granular

The stories these ships have provided, and the trends being drawn out by this project, show how ships were being used in this century and are beginning to establish a picture of 19th century shipbuilding. The next challenge is to look at these trends and features in more detail. There is now an overview of 19th century shipbuilding. The trends established in Chapter 4 illustrate how the numbers of ships being built across the century has changed, and that many of these changes are not as easily explained as any existing account of the period's shipping might suggest. This chapter has also shown that the overall technological changes taking place in shipbuilding get dramatically more complicated through the century. Those technological changes mean steam engines, and iron and steel hull construction, existing alongside the technologies relevant for wooden sailing ships in the same temporal and physical space. The results of this thesis so far are an "overview". It is in essence a pointillist image where the dots are the annual entries for each ship or—in the case of the charts in Chapter 4—the ships themselves. These ships combine to give us an image of the period's shipping. Therefore, this thesis is already working at two scales; the super-wide angle presented by the information from the Register Books and World Fleet Statistics, combined with the middle-scale perspective that is the result of our voyage with the Paper Fleet.

The next step is emerging from the detail provided by the ships in the Paper Fleet. To advance further and achieve a greater level of granularity with which to approach the research questions those ships need to be examined more closely. Chapters 6 and 7 are the next steps in this process. These are the two ships from the Paper Fleet with physical components of their assemblages outside the records and archives of the Lloyd's Register that can be incorporated into our investigation. These will be the clearest test so far of the concurrent methodology. These will also be a means to show if the information within the Register Books aligns with the other components of the assemblage. The lives of these ships will also contribute to our understanding of the period's context, by understanding the events these ships lived through and the influences and forces acting upon them.

5.7. Summary

The 200 ships allow us to do something that has never been attempted before. They represent the largest single sample of 19th century working ships that has been studied in this way. The information they have provided is the key to bridging the gap between the truly macro-scale studies such as that in Chapter 4, or elsewhere in the wider literature (such as Greenhill 1941 & 1993; Davis 1972; Reid 2020). The level of detail held in a single entry of the Lloyd's Register, allows us to construct a full understanding of a vessel's lifeway, right up to the point it disappears from the Register Books for whatever reason. However, there are also challenges. Whilst they are detailed, the Register Books are also frustratingly flawed, with inconsistencies and omissions present in almost every book. To a degree this is almost certainly a product of the period. Not all ships appear in a Ship Register, especially in the early 19th century. Lloyd's Register was also just one of several operating in the same space. As ships are lost their loss is not always reported in time to be recorded in a register book, meaning not all those lost are marked as such and instead just disappear and are not included in the book for the following year. In the ships discussed in this thesis, it is important to remember that a fragmentary record is not our enemy and does not mean the assemblage is flawed or less useful. It simply reinforces the need for an archaeological approach that can deal with voids in our assemblage and still produce knowledge and understanding of the period, this is explored further in Section 8.5. Even a detailed historical study of the LRS and other associated records could learn a lot, as long as the inconsistency and gaps are recognised.

With that in mind the information from the Paper Fleet can be used to enhance the context set out in Chapter 4 and should be discussed in relation to that. The results of the investigation so far have outlined what is going on in this century. The numbers of wooden ships remain remarkably stable for most of the century, before suddenly plummeting in the last two decades. At the same time, the technologies being used to build wooden sailing ships remain consistent. There is a considerable degree of continuity in the nature of the build between ships built at the start of the century and those found in operation at the end. The same is true in terms of the size of the ships. There is a consistent average size, whether we use tonnage or hull dimensions, for ships throughout this period, although there are smaller and larger outliers that reflect the requirements of specific trades. Certain bulk trades such as timber or coal require ships that can carry sufficient cargo to make the trips worthwhile. Meanwhile transhipment services from large harbours on to smaller regional coastal communities require smaller ships. This is tremendously significant. The fact that wooden shipbuilding continues in a manner that would be recognisable to a person from the earliest point in the century, suggests something interesting is happening here. Particularly in the wider context of the period where the shipbuilding industry is in a state of considerable change with the introduction of iron and steel-hulled sailing ships and the various implementations of steam propulsion and eventually petroleum fuelled engines.

What does appear to change quite significantly for these ships are the locations they operate within. Schooner-rigged wooden ships drift to the fringes of 19th century maritime Britain. This raises interesting questions. Is this shift the result of changes to port infrastructure? Is there an either-or situation, that a choice is being made between large metal-hulled ships of various propulsion methods and wooden sailing vessels? Are there coastal communities and harbours that are still suited to working with sailing ships and smaller vessels that can be beached and unloaded at low tide before re-floating as the tide comes in, something that would be impossible with a larger and heavier metal-hulled ship? What we also seem to see is a lengthening of the lifespan of our Paper Ships towards the end of the century. It is possible the increased lives of ships are related to the increase in metal and steam shipping. As these become more dominant are they changing the way wooden ships are seen and used? Is it simply the case that it is better to keep an older ship working than to break them up and commission a new vessel?

The Paper Fleet has started to raise new questions like these for our investigation. Some of these it is not possible to answer with the information gathered for this project. However, some can be developed and potential routes to their answer established. This is also by no means the end of the investigation. Over the next two chapters this investigation will get into more detail about the construction of two of the Paper Ships. This is the most granular phase of the investigation and will involve integrating the relevant documents such as the Register Books, Survey Reports, or Crew Lists, into the assemblage alongside the material remains of the ships themselves. By implementing the best archaeological methodology, the detail from these two ships will contribute to the investigation and allow the results of Chapter 4 and the investigation of the Paper Fleet, to be anchored in the material archaeological reality. It will also be possible to get to the people involved in each ship's life, see how it functioned and extract the individual story of each ship from The Record.

Chapter 6. Case Study One – *Ocean*

6.1. Introduction

6.1.1. The East Winner Bank Shipwreck

Emerging from the sand of the East Winner Bank like the ribs of a great leviathan, are the remains of a shipwreck (See Figures 6.1 and 6.2). The sea is unwilling to fully release the ship and half the site remains submerged even at the lowest tides. Primarily this site consists of the frame timbers of a carvel-built ship and there are areas of ceiling planking visible when the sand is lowest, measuring 23m long by 4m wide at its broadest point. These are the remains of a modest vessel. The site was only rediscovered in 2014 following winter storms and prior to that was completely unknown to archaeologists. The 2014 exposure was also the most exposed the site has been to date and fortunately was recorded by archaeologists from the Maritime Archaeology Trust (MAT). The site is fairly intact. The stern being very well preserved, most likely because this part of the site is always submerged and even at very low tides only rarely clear of sand to the extent that it is visible. Only the port side of the vessel is extant with the starboard thought to still be buried within the sandbank to the west. To date there has been relatively little detailed investigation of the shipwreck since the report published from the MAT's site visit (Whitewright and Tidbury 2014). Section 6.3 presents a refresh of the MAT report and integrates data from subsequent visits including samples of fastenings taken on visits undertaken as part of this project. A detailed discussion of the work done on the site to date is presented in Section 6.2, including involvement and visits by the University of Southampton. It is clear from the material published by the MAT and site visits for this project, that the site is the wreck of a 19th century carvel-built ship. The overall size of the wreck site suggests a ship no larger than 21-26m and 150 tons. The ship is likely a working vessel, one of the small ships involved in coastal trade around the British Isles that were integral to Britain's maritime networks in the 19th century. From those investigations an identity is established in Section 6.3.2 using the methodology detailed in Section 3.3 and 3.5, these are the remains of the schooner *Ocean*.

Figure 6.1: Overview Photograph of the East Winner Bank Shipwreck (Image courtesy of Professor Fraser Sturt using a DJI Phantom 4)

6.1.2. The Role of *Ocean* and its Local Significance

The story of *Ocean* is an example of how archaeology can be used to reveal new stories and information about a place. *Ocean* was an everyday working vessel, one of many that served as vital components in a system of coastal trade. In fact, as Section 6.3.2 shows it is wrecked near a very similar ship, *Fairy King,* undertaking an almost identical voyage nearly fifty years later. Despite the relatively unremarkable nature of the ship itself it has left a lasting and dramatic impact on this coastline. The wrecking of the *Ocean* brought about the establishment of the local lifeboat station on Hayling Island. The shipwreck itself has lasted far longer than any of its contemporaries that made it to the end of their service to be broken up. An object that was lost and discarded has endured and continued to impact the East Winner Bank and the people that visit it. Serving as a dramatic reminder of the dangers of this coastline, a point of interest to beach walkers, and a site of fascination for wave after wave of archaeologists.

6.2. Site Overview

6.2.1. The East Winner Bank

A large sandbank sits off the southwest corner of Hayling Island (see Figure 6.2, 6.4, 6.5, 6.6, and 6.7), frequently covered by just a few feet of water. This bank is mobile, experiencing significant changes in its depth and width, the result of currents and storms shown by the difference in extent in 2013 (Figure 6.4) and 2016 (Figure 6.5). It possesses an unknowable mutability until you have run upon its latest shape and position. Utterly invisible unless the water is in its most tranquil states. The area is extremely tidal, and as the sandbank is so low lying the tidal window to access it is short. The sandbank is a navigational hazard to ships in the Solent and for those attempting the entrance to Langstone Harbour, particularly during storm events. 19th century Britain represented the largest recipient of maritime trade in the world. One of the principal access routes for that was through the Solent. This access was particularly important to Britain's coastal trade. Southampton was a major port for goods moving around the coast (Alvarez-Palau and Dunn 2019: 7).

6.2.2. The Shipwreck

The shipwreck sits at the most eastern edge of the East Winner Bank. This location means the site is only clear of water at the most extreme low tides. The site is subject to periodic covering and uncovering and was first brought to the attention of archaeologists in 2014 when a storm uncovered the site. At this time a significant part of the wreck was exposed. Since that date the site's upper frames have been exposed almost continuously (see Figure 6.3) with a greater extent being exposed occasionally. A rope secured around one of the exposed midship frames is all that remains of a buoy attached to the site by the local kitesurfing club (Whitewright 2020: *pers. comm*.).

The ship lies in an N03°E orientation. The stern facing Hayling Island's southern beach, it appears that the starboard side is mostly buried with some of the stern quarter emerging when the sand is especially low. The port side is exposed, several frame tops are extant, but these are severely degraded. Those exposed frames appear to be second futtocks. The port bow is the most degraded area. Even when the site is most exposed there is almost no material to be seen in the forward section of the ship except some very degraded frames. It is possible that the starboard side has survived much better.

6.2.3. The Fieldwork

The first visit to the site came following its exposure in January 2014. A team from the Maritime Archaeology Trust visited the site and undertook an initial characterisation survey. This is the most exposed the site has been since 2014 and the observations made, and photographic record established, are extremely valuable to this investigation. The tide is the greatest restriction to

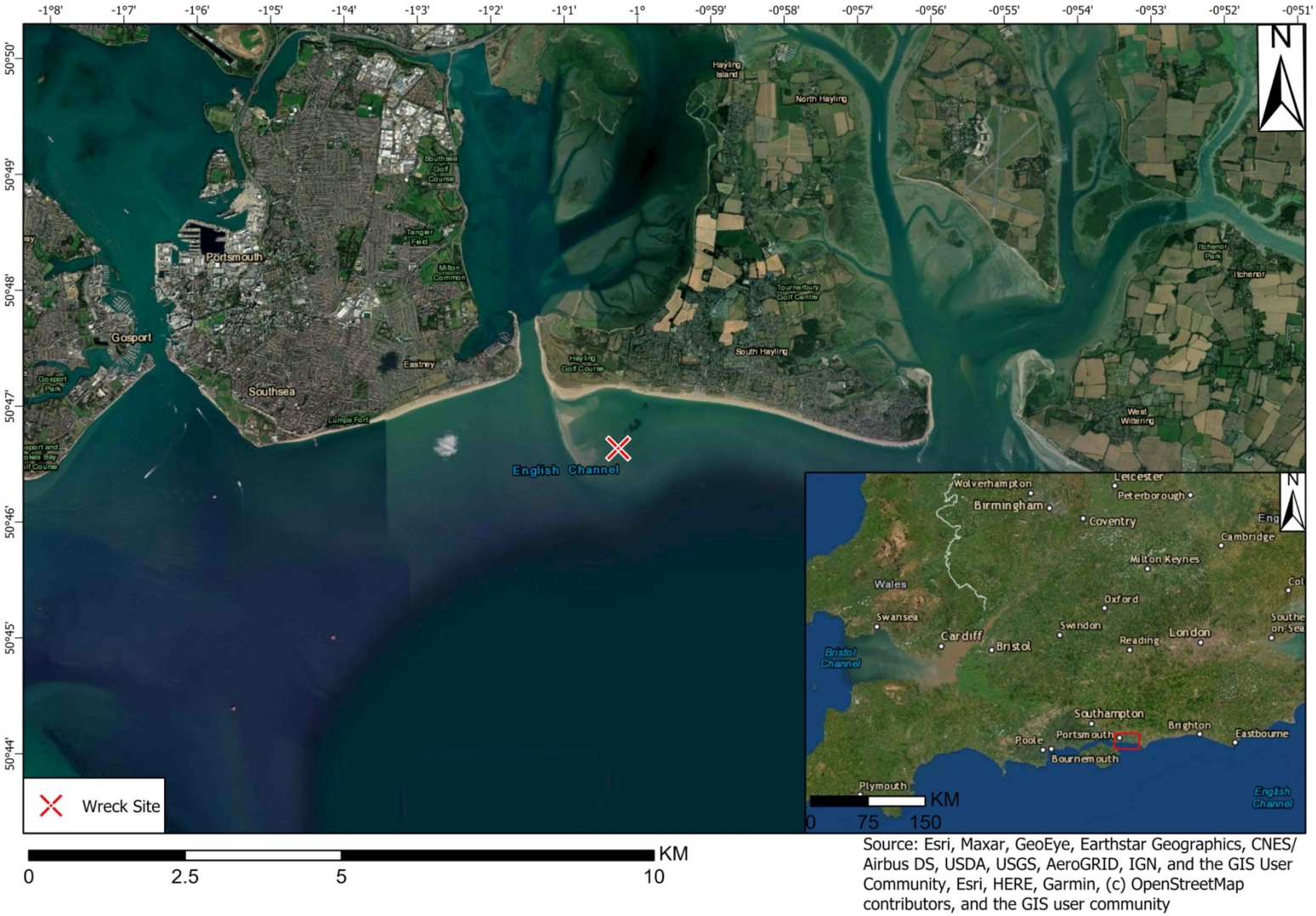


Figure 6.2: Location of the East Winner Bank Shipwreck (Map produced by the Author)

accessing this site. To work effectively and have clear access to the material, the tide must be lower than 1m and ideally at 0.7m above datum, or less. Simple techniques such as those employed on the MAT's site visit (Whitewright and Tidbury 2014: 2) are therefore most effective. Unfortunately, they necessarily lack the ability to produce a site plan because of the lack of time spent on site. Other methods are therefore needed to produce site plans for monitoring purposes, or to record specific features in detail for wider analysis and interpretation.

Figure 6.3: Photograph looking North along the shipwreck towards the stern showing the changing level of futtocks visible (Image courtesy of Professor Fraser Sturt using a Nikon D610)

To that end targeted survey of the shipwreck is required. In 2016 the site was visited by researchers from the University of Southampton's Centre for Maritime Archaeology (CMA). The site was surveyed using an RTK GPS system and photographed using a DJI Phantom drone (see Figures 6.8, 6.9, and 6.10). RTK systems are the best option for rapid intertidal survey and are particularly useful to establish site extents and site plans. This site visit was supplemented by fieldwork undertaken in 2019 and 2020 for this thesis. In 2019 the site was revisited with a GPS system and a drone (see Figures 6.11, 6.12, and 6.13) with the same aims as the visit in 2016 which was to complete the overall site plan. In 2020 the fieldwork was focused on photographic recording of extant elements of the site. The data from the 2016 and 2019 visits where a GPS was used alongside drone photography serves as the foundation of the site plans presented in Figures 6.14, 6.15, and 6.16.

6.2.4. Results

During the 2016 site visit by the University of Southampton, samples were taken of metal fastenings on the site for analysis. These were submitted to Dr. Peter Northover (2017) for metallurgical analysis. The results of this are included as part of Section 6.3.1. This is the first stage of detailed analysis required by the site. Dendrochronological sampling is the next step in the investigation of this site. To date this has not been completed. During the site visits in 2019 and 2020, there was not sufficient

undegraded wood exposed to take a sample and this was not part of the methodology during earlier visits.

The GPS datasets cover the extant timbers at the time of both visits. Both datasets line up very well suggesting a good degree of precision. Due to time constraints, the survey in 2016 focused on recording the forward edges of frames and the plan view of other timbers such as planks. The 2019 survey attempted to cover the outline of the framing timbers although the site was less exposed that year, so GPS coverage is reduced. High quality aerial photographs were also taken in both years, and these have been included as an orthophotograph in Figure 6.8. A combination of the GPS data and photography was used to generate the site plan as Figure 6.11. This plan represents a good starting point for understanding the entirety of the surviving ship structure in conjunction with the initial characterisation undertaken by the MAT. It also provides a basis for ongoing monitoring, as well as targeting future investigations of the shipwreck site.

6.3. Site Interpretation

6.3.1. Archaeological Description

The site is oriented in a north-south axis at the ultimate eastern edge of the sand- bank. The maximum working time on the site is 30-45 minutes depending on the depth of the tide which turns fast meaning the site becomes submerged relatively quickly. Even during very low tides (less than 0.7m) the Northern half of the site remains partially submerged. This section builds on the archaeological survey from the MAT report utilising data collected in the 2017, 2019, and 2020 site visits.

Site Features

The shipwreck measures between 21m and 23m in length dependent on the amount of material exposed. Similarly, the site measures between 2m and 4m wide at its widest part (roughly the centre of the extant remains). The MAT report of 2014 records that the timbers on the site are in overall good condition and describes the wood as “fresh” (Whitewright and Tidbury, 2014: 2). Unfortunately, the condition appears to have degraded somewhat since this visit. That report also records evidence of organic degradation only on the extreme ends of framing timbers and suggests exposure had been limited to only these components prior to 2014. This is the evidence for the site only recently becoming exposed and explains why it had not previously been visited by archaeologists. It is possible that following the major exposure of the site in 2014 the sandbank has not since moved to recover the site to the same extent, allowing for a larger part of the shipwreck to be degraded by external factors.

The stern of the vessel lies at the northern end of the site. In 2014 two rudder gudgeons (the metal sockets used to hang the rudder) were found attached to the sternpost and were still visible during the 2019 fieldwork. In 2020 this area of the site was submerged. The shipwreck hull elements consist of framing timbers: floor timbers, futtocks, and possibly top timbers. During the latest visit in 2020, there were two large planks still articulated to part of the ship’s frame. Different fastening types are evident on the site. The largest is a metal bolt in the butt-end of one of the planks in the centre of the site. There appears to be a second bolt missing from this plank as evidenced by a hole in the timber. There are a variety of other fastenings on the site including treenails, metal fastenings (both copper and iron), and the rudder gudgeon. There is no evidence of any previous cargo or other material on the site. It is possible this has been buried or washed out since the site has now been subject to repeated exposure and partial recovering for several years. Alternatively, cargo may have been salvaged at the time of the wrecking. It is therefore not possible to use any cargo identification to aid in interpretation of the shipwreck.

Figure 6.4: Extent of the East Winner Bank in 2013 (Map by the Author, data courtesy of Channel Coastal Observatory, 2022)

Figure 6.5: Extent of the East Winner Bank in 2016 (Map by the Author, data courtesy of Channel Coastal Observatory, 2022)

Figure 6.6: Bathymetric Survey showing the seabed around the East Winner Bank including the channel entering Langstone Harbour (Map by the Author, data courtesy of Channel Coastal Observatory, 2022)

Figure 6.7: LiDAR Survey showing the topography of the East Winner Bank (Map by the Author, data courtesy of Channel Coastal Observatory, 2022)

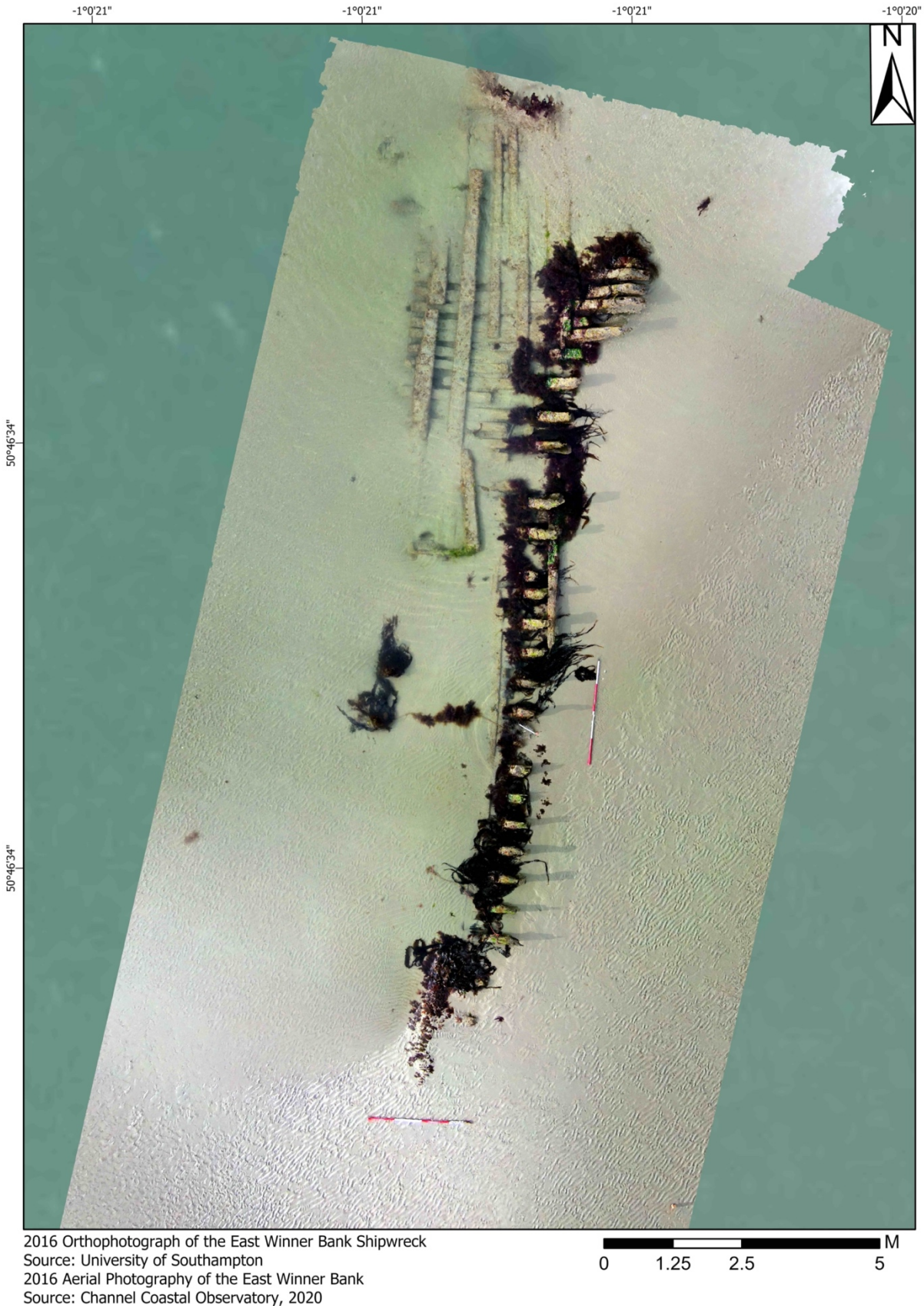


Figure 6.8: Orthophotograph of the East Winner Bank shipwreck in 2016 (Map and Orthophotograph produced by the Author, Images courtesy of Professor Fraser Sturt)

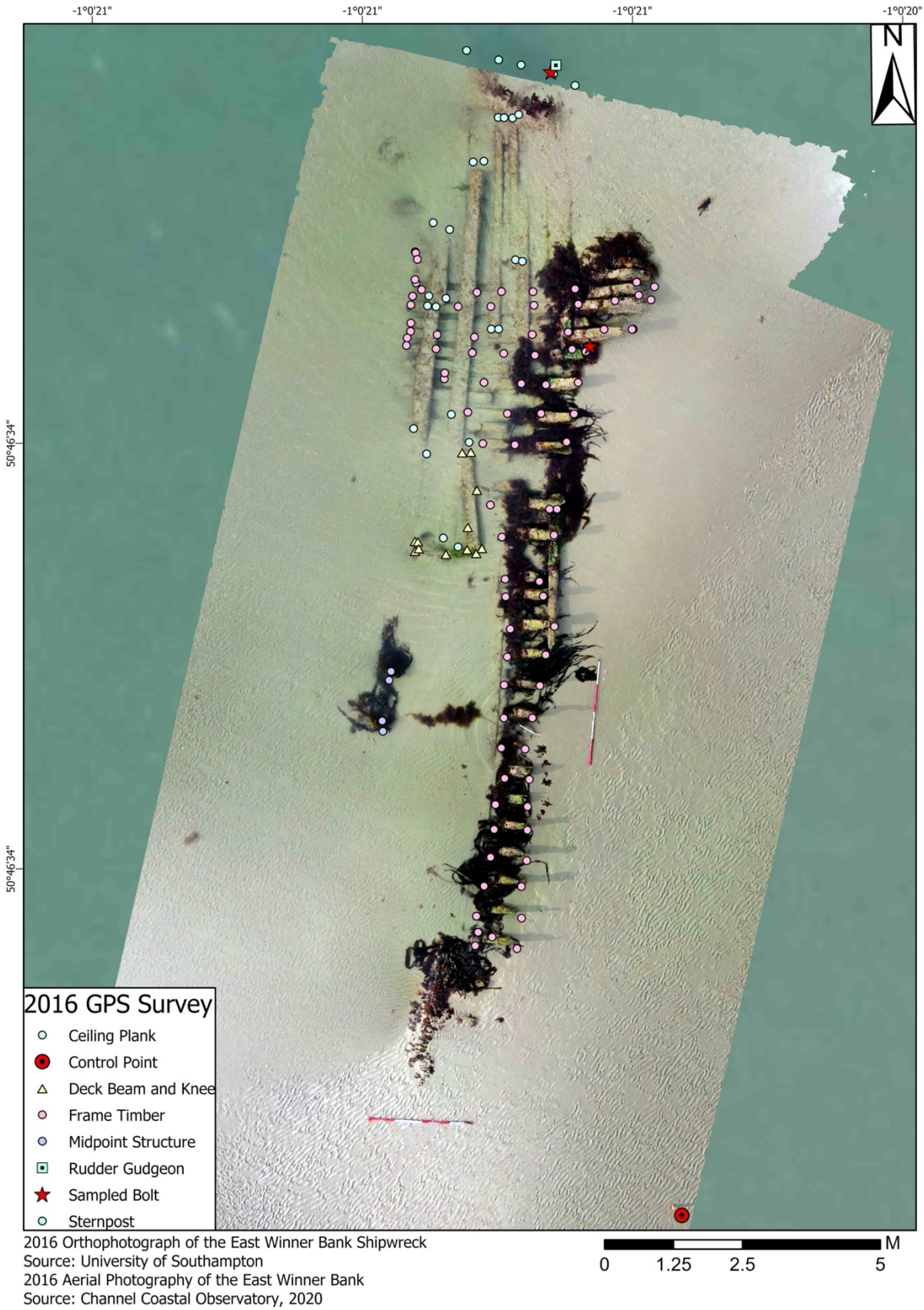


Figure 6.9: Orthophotograph of the East Winner Bank shipwreck with RTK GPS points recording extant features (Map and Orthophotograph produced by the Author, Images courtesy of Professor Fraser Sturt, GPS data courtesy of Dr. Julian Whitewright)

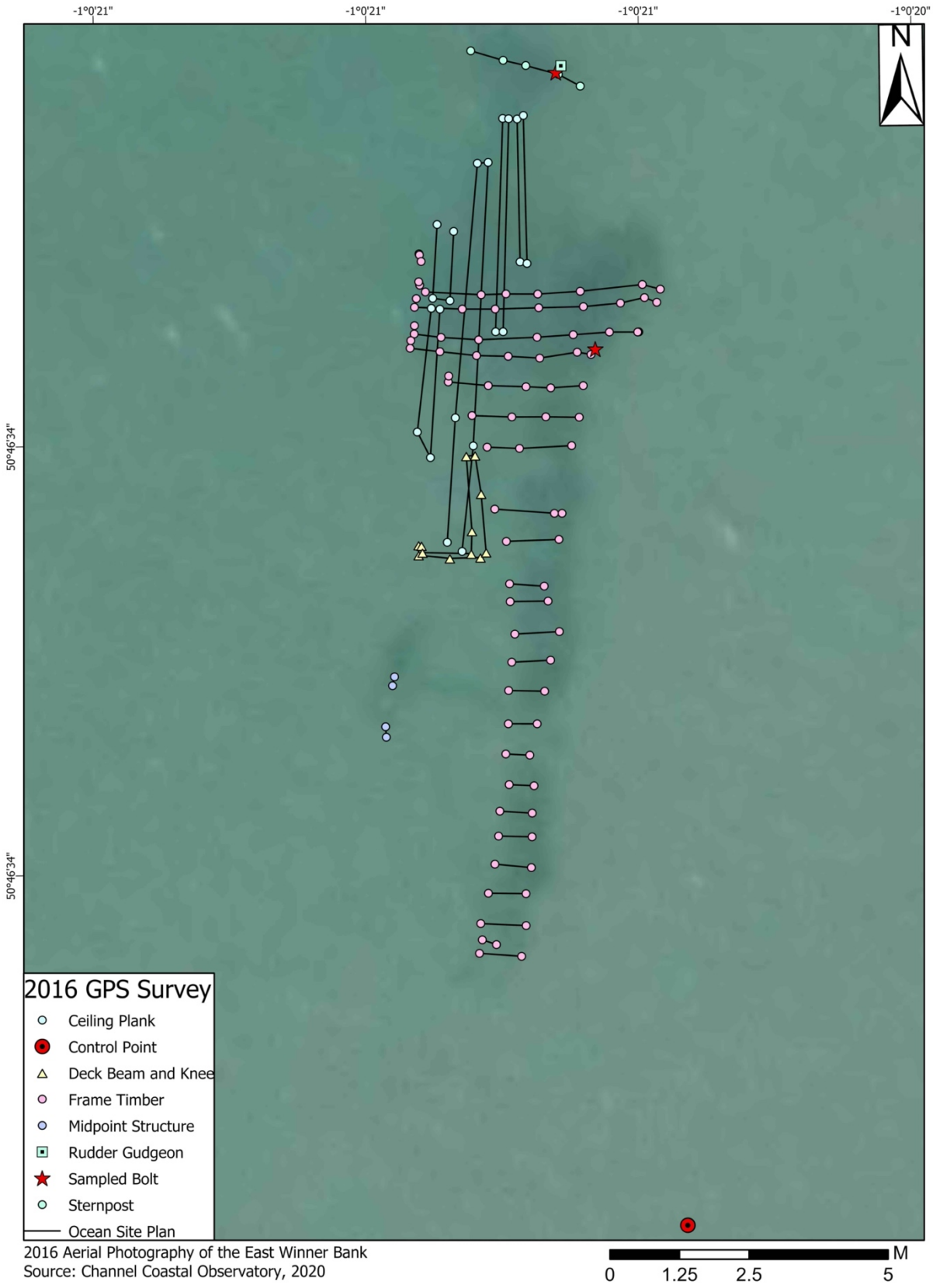


Figure 6.10: RTK GPS points of extant features on the East Winner Bank Shipwreck in 2016 used to create a basic line plan (Map produced by the Author, GPS data courtesy of Dr. Julian Whitewright)

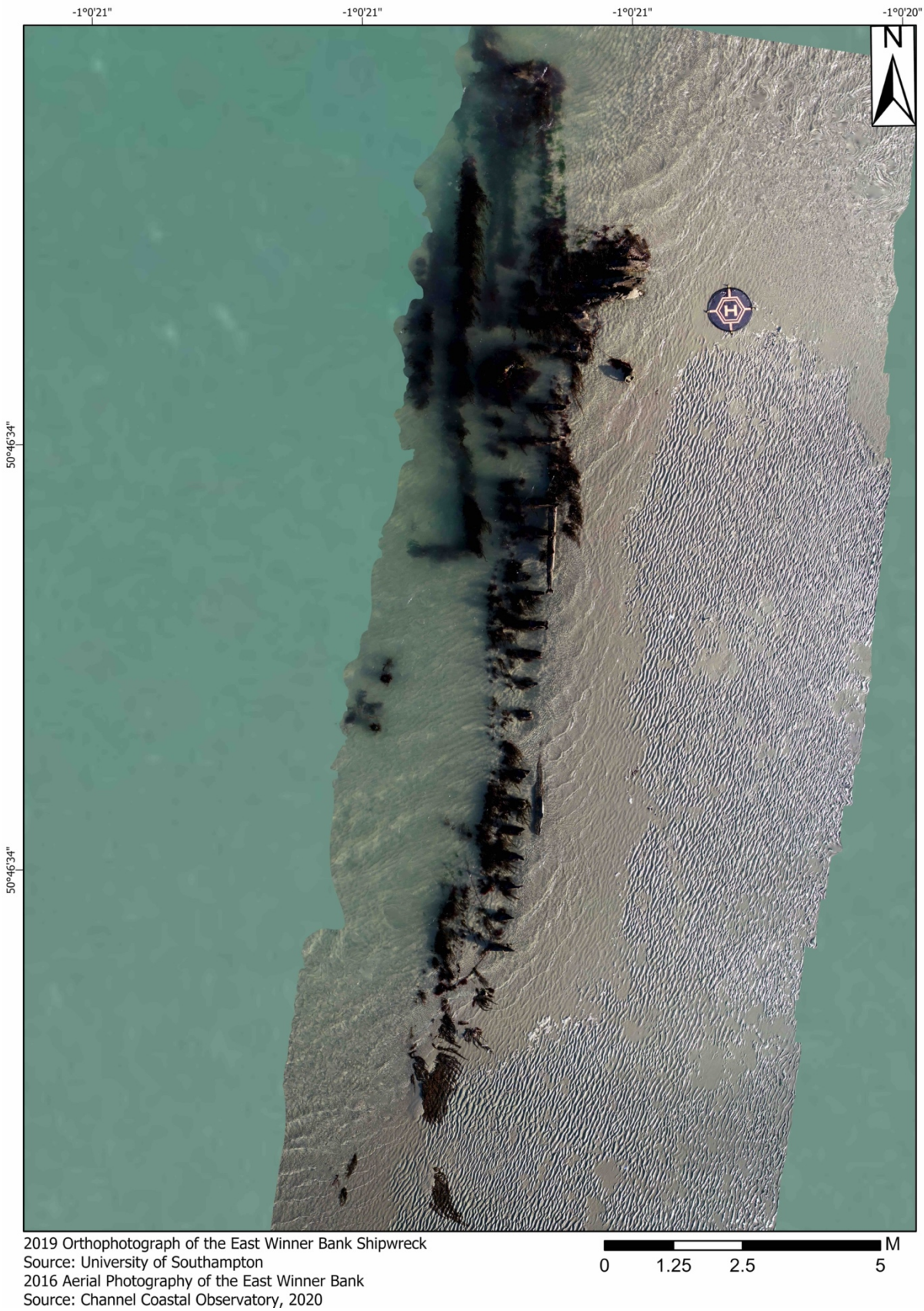


Figure 6.11: Orthophotograph of the East Winner Bank shipwreck in 2019 (Map produced and Orthophotograph by the Author, Images courtesy of Felix Pedrotti)

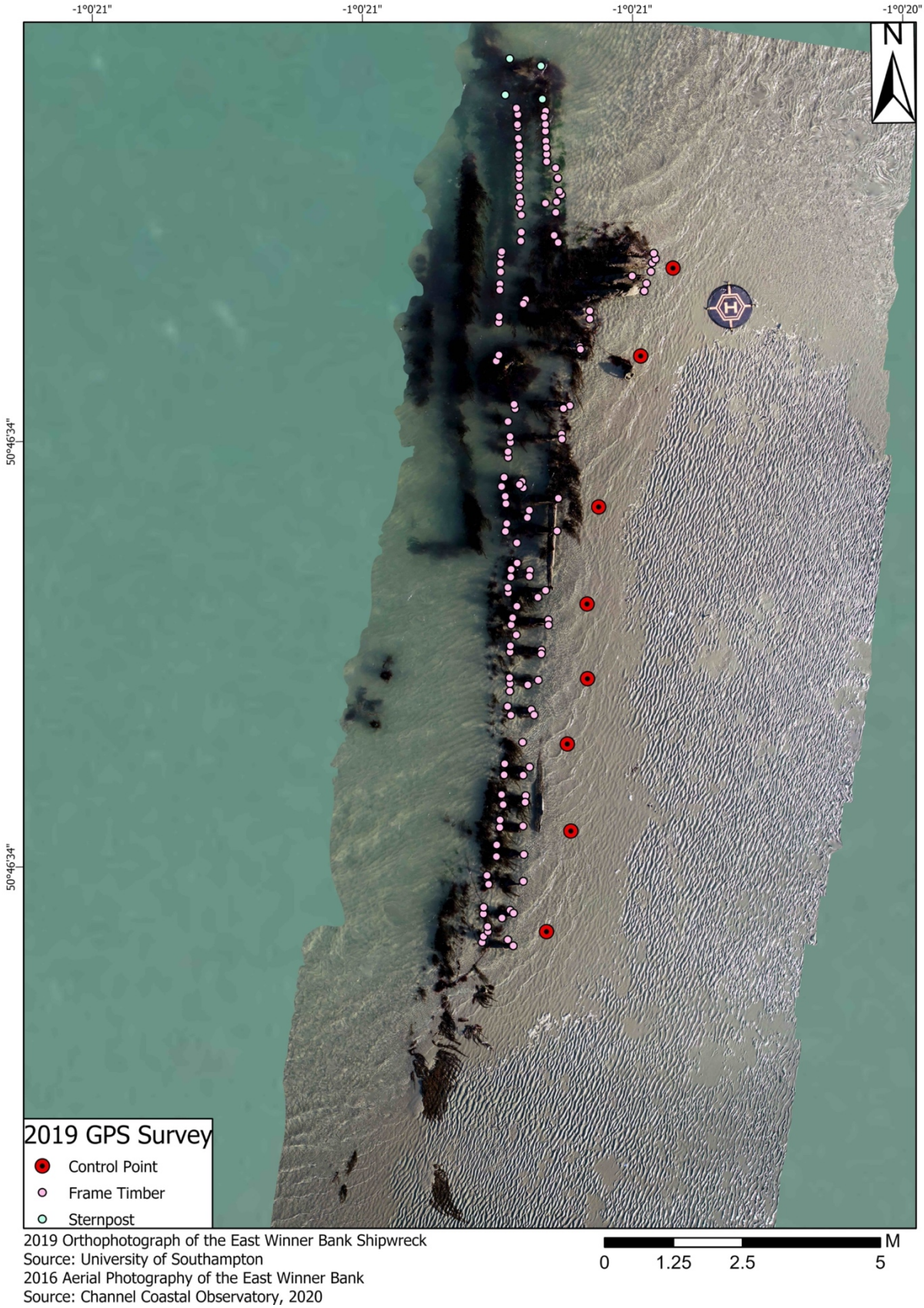


Figure 6.12: Orthophotograph of the East Winner Bank shipwreck with RTK GPS points recording extant features (Map and Orthophotograph by the Author, Images courtesy of Felix Pedrotti)

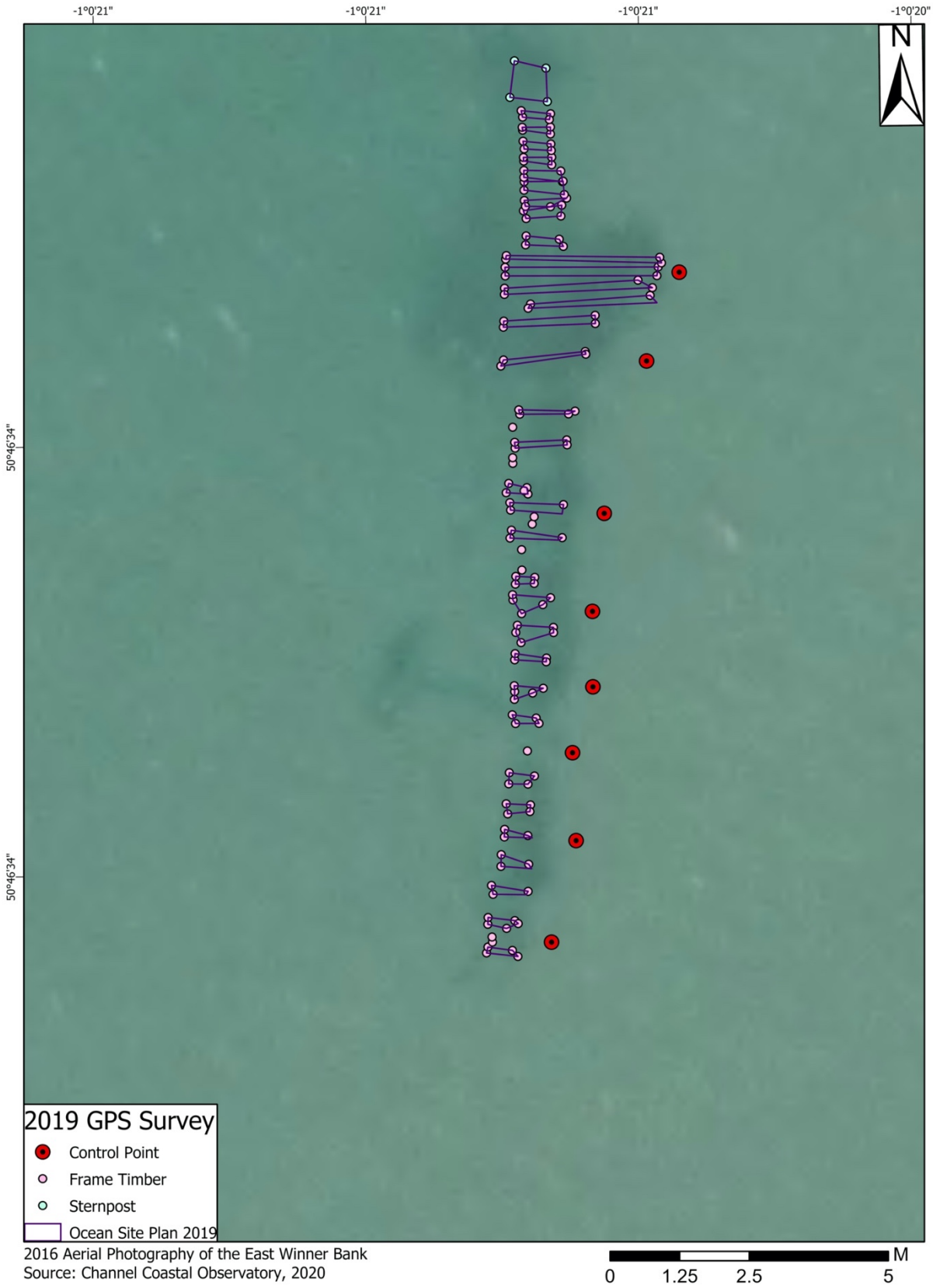


Figure 6.13: RTK GPS points of extant features on the East Winner Bank Shipwreck in 2019 used to create a basic line plan (Map produced by the Author)

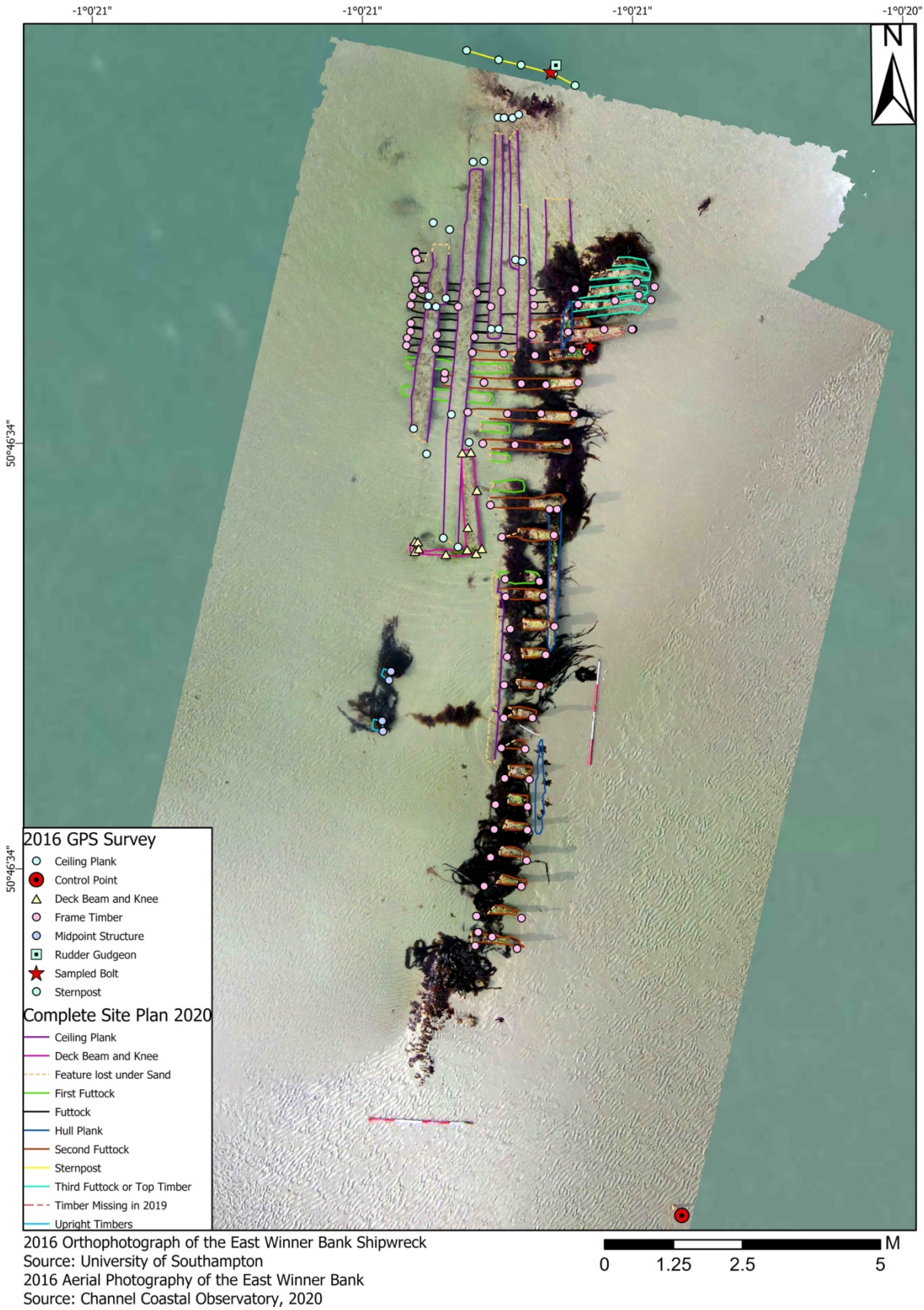


Figure 6.14: Complete Site Plan overlaid onto the 2016 Orthophotograph with 2016 RTK GPS points (Map and Orthophotograph produced by the Author, Images courtesy of Professor Fraser Sturt, GPS data courtesy of Dr. Julian Whitewright)

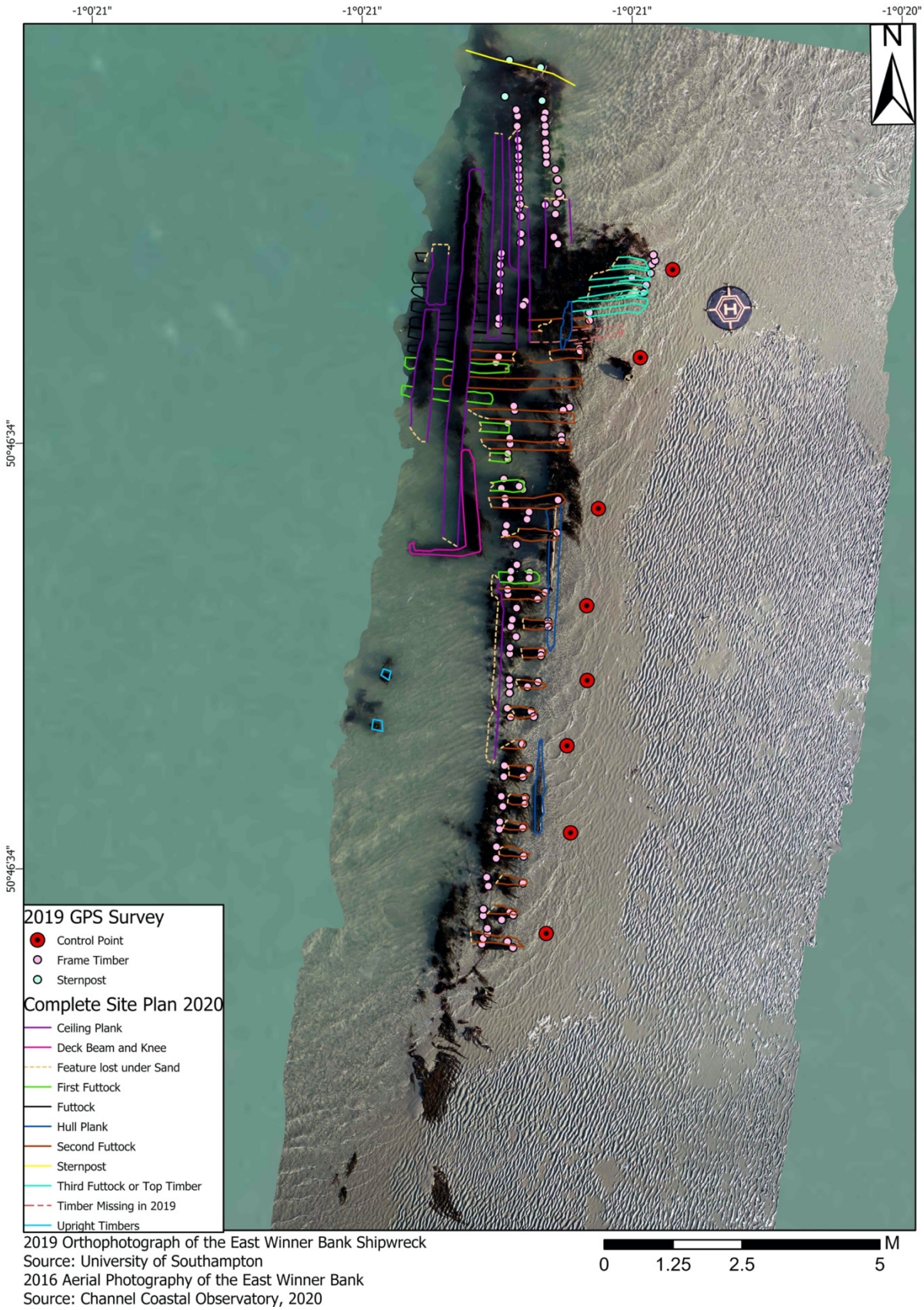


Figure 6.15: Complete Site Plan overlaid onto the 2019 Orthophotograph with 2016 RTK GPS points (Map and Orthophotograph produced by the Author, Images courtesy of Felix Pedrotti, GPS data courtesy of Dr. Julian Whitewright)

Figure 6.16: Complete Plan of the East Winner Bank shipwreck produced from RTK GPS data from 2016 and 2019 and Orthophotographs from 2016 and 2019 (Map produced by the Author)

Framing: The forward section of the ship is more degraded than the stern, particularly the state of the timbers. The stern frames are third futtocks and top-timbers, these remain in good condition and their head ends are finished and squared-off. In the 2014 MAT report these are almost completely exposed, but still submerged. These stern timbers retain a significant degree of articulation although they are collapsed outboard. Moving forward along the ship the level to which frames are conserved gets progressively lower. This is combined with a greater degree of burial making it hard to establish which timbers are represented by the weathered and eroded sections of frame protruding from the sand. Once again, the greater level of exposure in 2014 and the detail recorded in the MAT report, afforded more certainty in identification of components. A comparison of the burial levels is shown in the two orthophotographs (Figures 6.8 and 6.11). The report suggests the eroded sections of frames are the remains of second futtocks. We can be relatively secure in this identification because the site was so exposed that it allowed continuous sight of the framing arrangement from the complete top timbers at the stern along to the more eroded forward section.

Upon more recent site visits it is apparent some degree of degradation is ongoing. Worst affected are the forward framing elements protruding from the sand at the southern end of the site. It is likely this is exacerbated as the timbers go from fully submerged to completely exposed on a low tide, therefore accelerating natural processes of decay. Also present are indications of marine borers attacking these timbers including the better-preserved stern sections. It is possible to infer the presence of floor timbers due to the presence of upper futtocks. However, the state of the lower framework of the vessel is in question as the upper works have fallen outboard at the stern. There has also been no sign of a keel/keelson timber to date meaning it is likely these lower framing timbers are still buried within the East Winner Bank. The location of the centreline of the ship can be inferred by the presence of a pair of smaller, vertical, timbers to the west of the site. The 2014 report states (Whitewright and Tidbury 2014: 2) there were four posts present in this location, however during the 2019 site visit only two were visible.

In both the 2019 and 2020 fieldwork visit, the exposed timbers on the site were heavily overgrown with seaweed (see Figure 6.17). This made it difficult to identify individual timbers and joining points. Weed was cleared from areas where timbers remained square to obtain GPS points and an overall understanding of the structure of timbers. Unfortunately, in both 2019 and 2020 there was very little timber exposed that was uneroded, so true dimensions could not be obtained. Recoded dimensions from the site visit in 2014 (Whitewright and Tidbury 2014: 3-4) were made with better access to timbers with their original shape. The first futtocks provided average sided dimension of 192mm and moulded dimension of 170mm. Second futtocks were recorded with average dimensions of 196mm sided and 174mm moulded. The top timbers and third futtocks in the stern of the ship gave average dimensions of 160mm sided and 240mm moulded. This shows a consistency in dimension for the lower framing timbers (first and second futtocks) whilst the upper frames (top timbers and third futtocks) become taller and slightly narrower. One issue here is the comparison of lower frames from the forward part of the site with upper frames from the stern, meaning we are not comparing futtocks of the same level. There are no upper frames remaining in the forward section and the lower frames are still buried or submerged in the stern making them very hard to access. This makes it difficult to state with certainty that there is a change in frame widths as futtocks progress higher in the construction of the ship. For this certainty to be achieved it is recommended that an attempt is made in any future work to recover the dimensions from lower frames in the stern section of the ship, possibly through excavation of the covering sand.

Figure 6.17: Drone photograph taken in 2019 showing weed growth over the shipwreck and the fact the site is still partially submerged even at very low tides (Image courtesy of Felix Pedrotti using a DJI Phantom 4)

Figure 6.18: Drone photograph taken in 2016 showing the level of exposure over the site and the nature of the low futtocks in the stern section at point "1" (Image courtesy of Professor Fraser Sturt using a DJI Phantom 4).

The arrangement of the frames can be seen in the drone photography undertaken in 2016. Figure 6.8 shows an orthorectified photograph produced from these images. Part of the stern framing is still buried; however, it is possible to make out the most forward of the squared frames. From this the arrangement can be counted down with third futtocks sitting forward of the second futtock to which it is secured and butting against the first futtock below it. The frames are therefore arranged in an ascending arrangement of pairs. A further comment from the 2014 report, suggests the presence of a "Master Frame" on the site (Whitewright and Tidbury 2014: 4). Identification of the Master Frame was made by examining the arrangement of the frames. The master frame sits at the point where the first futtock switched from being secured to the aft side of the floor timbers to the forward side. It has been assumed that this takes place at the midships point reflecting a shipbuilder using the central frame as a starting point or guide for the frame-first construction of the ship (see also Olaberria 2018: 181). A measurement was taken from that central frame to the sternpost and then doubled to give a rough estimate of overall length based off the extant archaeological material. In the orthophotograph it appears that the shipwreck has disarticulated from keel and floor timbers. The top edge of the heels of the first futtocks are visible at point 1 in Figure 6.18. Of particular interest here is the fact that all these bottom edges of the first futtocks are aligned square with one another. The MAT report also makes note of this fact, albeit in a different part of the site for the heads of the first futtocks and heels of third futtocks (Whitewright and Tidbury 2014: 3-4). The butting faces of the futtocks are cut square and are not secured to one another. Instead, the first and third futtocks are secured transversally to the adjacent second futtocks possibly with the hull and ceiling planking providing additional structural support. This may also explain why the stern section of the vessel has fallen outboard. As there is relatively little planking still present on the site it is likely that once this was lost the framing timbers were much more susceptible to collapse.

Invisible during the 2019 and 2020 site visits but identified in the 2014 recording were frame-filler timbers between each paired arrangement of frames at the level of the heads of the second futtocks (Whitewright and Tidbury 2014: 3). These are suggested to be a means to prevent debris falling into the void between framing pairs, possibly indicating the maximum extent of ceiling planking. There is evidence of iron framework for the knees in this vessel in the form of a large partial deck beam lying in the middle of the site at point 2 in Figure 6.19. Attached to this beam is an iron hanging knee used to secure the beam to the sides of the ship. This was first identified in the 2014 MAT visit and has been present on each subsequent visit except for 2020 when it was not visible and may have been buried or submerged.

The floor timbers recorded in the 2014 visit were also not present in the 2019 and 2020 site visits. The arrangement of first futtock and floor timbers is remarked upon in the report. This is the principle means by which the overall length of the vessel is established from the archaeological remains, given at 21-26m. This is an important figure as it is one of ways the ship can be identified in the documentary evidence from the Lloyd's Register. Establishing the width of the ship is not a realistic prospect with only one side exposed and fallen outboard as it now is. From the dimensions of the frames and the overall size of the shipwreck site it is likely that this is not a large ocean-going ship, the frame dimensions are smaller than those recorded for ships like *SL4* (Adams *et al.* 1990: 74). It is certainly not a warship as there is no evidence of any armament or structural reinforcement for gunports—and there is enough remaining of the port side to demonstrate such reinforcement is not present. An overall length of 21-26m would suggest this site is one of the smaller coasting merchantmen working in local trades in this period.

Planking: There are several large planks present on the wreck site. These retain a degree of articulation with the framing. Towards the western side of the site there are two very long and wide ceiling planks affixed to the first futtocks. These presumably relate to the area of planking from the 2014 report averaging 260mm wide and 50mm thick (Whitewright and Tidbury 2014: 4). These

compare to a set of narrower ceiling planks towards the eastern side of the site affixed to the third futtocks, averaging 160mm wide and 60-70mm thick. Both sets of planks are located towards the better-preserved northern section of the site. In the southern section there is one ceiling plank affixed to the upper part of the second futtock which correlates with those narrower planks found at the stern at a similar height.

There was only one accessible hull plank on the exposed area of the site in the 2019 and 2020 surveys, and this is badly degraded. It appears that there were more hull planks exposed in 2014 as the survey was able to identify the type of scarf joints used and a varying thickness across individual planks. The scarf joints employed on this ship are "*simple butt end joints located at a frame station*" (Whitewright and Tidbury 2014: 4). The dimensions given for the hull planking from the 2014 visit, are 140mm wide and between 70mm and 90mm thick. As with the findings of the 2014 report, there was no evidence of any hull sheathing found on the site.

Figure 6.19: Drone photograph taken in 2016 showing RTK GPS recording in progress and the partial deck beam and iron knee in the centre of the site at point "2" (Image courtesy of Professor Fraser Sturt using a DJI Phantom 4).

Fastenings: Across the extant frames there are plenty of holes bored in the timbers indicating the presence of fastenings. On the surviving hull plank there are several treenails. Unfortunately, the degree of degradation and weed coverage on these exposed sections makes it impossible to identify how the outer end of the treenail was sealed (e.g., crosscut, wedges, etc.). A similar problem was encountered by the team from the MAT, however, they indicate one example may have had a cross-cut head. The MAT report also indicates that the treenails appear to be driven blind with no tightening method used for the inner end (Whitewright and Tidbury 2014: 4). It is apparent even in the degraded frames, that planks were secured to each frame via a treenail, and it is likely these were driven into, not through, the hull. Treenails appear to have been driven from the outside of the hull into the frames to secure the hull planking, and inside the hull into the frames for the ceiling planking.

However, establishing the exact dimensions of the treenails is difficult. The remaining examples still inside the frames were badly degraded and the holes where others used to sit are potentially enlarged through degradation. The ceiling planking was more accessible, particularly in the 2019 visit, and treenails could be seen securing these planks to frames measurements confirm the data from the MAT report, putting the diameter of the treenails at around 20mm (Whitewright and Tidbury 2014: 4).

There is also evidence for a variety of metal fastenings on the site. The MAT report identified an area in the centre of the site where copper or copper-alloy bolts were used with yellow-metal washers to secure the ceiling planking in place of treenails (Whitewright and Tidbury 2014: 4). These fastenings were still visible in 2019 and, as with the findings of the 2014 report, appeared to be confined to one location on the ship, potentially suggesting an area of repair. In the stern area of the site, transverse fastenings were found on the upper framing components that had corroded into a black fragmentary state. It is possible these are the remains of an iron fastening used in this area of the ship used to secure the framing timbers transversally (i.e., floor timber head to first futtock heel). In 2014, copper or copper-alloy bolts were also identified securing the butt ends of the outer planking to the frames. These were identified as vertical pairs secured in-line. When the stern was more exposed in 2014 and 2016, it was also apparent that copper or copper-alloy fastenings were used as hood-end bolts along the sternpost. Copper or copper- alloy bolts also protruded through to the internal faces of the frames as spikes, indicating they had been driven through the timbers from the outboard side, likely to secure planking. The measurements from 2014 indicate all these Copper Fastenings shared the same dimensions, possibly indicating they were all the same type. The corroded fastenings in the upper section of the stern indicates the framing fastenings may have been iron. As the stern section has fallen outboard and there are no remaining futtocks higher than the second futtocks in the forward section, it is possible the corrosion and disappearance of the fastenings is not limited to the exposed sections. As iron is the most degradable fastening material this is potentially a further indication that iron was used to laterally secure the frames.

Figure 6.20: Photograph of the butt end bolt (bottom left quarter of image) taken for metallurgical analysis (Image courtesy of Professor Fraser Sturt using a Nikon D610).

Samples were taken from three metal bolts, one from a hood end, one from a butt end (see Figure 6.20), a third, from a disarticulated floor timber, was probably a keel bolt (see Figure 6.21). These were then submitted for metallurgical analysis (Northover 2017 and Appendix B.1). The hood-end bolt was identified as being made of Muntz Metal, a copper alloy with a zinc content of around 40%. The other two bolts had a much lower zinc content of around 30%, not Muntz metal but another copper alloy. All three of the bolts are reported to possess a pattern of impurities that is consistent with brass produced in Britain during the 19th century which favoured lower levels of impurities to make the metal easier to work. Northover (2017: 2) suggests that the two different types of alloy present indicate there are two different productions of bolts and therefore two episodes of construction or repair taking place. However, the two types of alloys could also be evidence of two different manufacturing processes for different sizes or types of yellow metal fastenings.

#R5098	Keel bolt	East Winner Bank	?*Ocean*
#R5099	Floor/timber bolt	Hayling Island	?*Invincible*
#R5100	Sheathing		?*Christiana*
#R5161	Butt end bolt (01)	East Winner Bank	?*Ocean*
#R5181	Bolt (02)	East Winner Bank	?*Ocean*

Figure 6.21: Table taken from Northover's (2017) metallurgical analysis of samples taken from the East Winner Bank shipwreck alongside other unassociated samples submitted for analysis. The hood end bolt is labelled as a bolt (#R5181).

Dating

There are several features on the site that can be used to establish a rough date for the construction of the ship. The most diagnostic features are the fastening and framing components present. The presence of a large iron knee on a beam in the middle of the site, suggests a construction date sometime after the late 18th century when iron framework began to be adopted for ships (Stammers 2001: 115). The Lloyd's Register first included iron knees in 1814 and Stammers (2001: 115) argues that it is likely this indicates a spread to shipbuilders, outside the shipyards of the Royal Navy and East India Company, from this decade onwards.

The fastenings also suggest a build date after the latter 18th century. Copper fastenings are trialled by the Royal Navy around 1769 (Northover *et al.* 2014: 52) and adopted by the Royal Navy in 1783 with considerable time dedicated to sea trials and evaluations. There is considerable literature dealing with the adoptions of copper as a shipbuilding material (e.g., Bingeman 2018; Bingeman et al. 2000; Cock 2001; Harris 1966; Knight 1973). As there are fastenings that appear to be yellow-metal alongside some that are Muntz Metal, it is possible these indicate different phases of construction or repair. Copper fastenings are first included by the Lloyd's Register in 1802. Given the assumed technological spread of iron framework it is possible that the use of Copper Fastenings was spreading amongst shipbuilders around this date. It therefore seems likely that the ship that is wrecked on the East Winner Bank would be built after this. As it is not a warship or an Indiaman the earlier dates for adoption of these technologies presented by Bingeman (2018) or McCarthy (1996) and discussed in Chapter 3 relating to the East India Company and the Royal Navy do not apply.

The presence of yellow-metal fastenings on the site is also diagnostic. As these have been observed in a limited area in the middle of the site it is possible these are indicative of a repair or refit. The Muntz Metal bolt identified from the metallurgical analysis can only date after the Muntz's patent in 1832 (Northover 2017: 1-2). The other yellow metal fastenings are potentially slightly earlier but certainly of a 19th century date given the specific composition of the alloy (*ibid* 2017: 1-2). Yellow-metal fastening became widespread in the mid-19th century (Clarke, 1997: 85) so it is likely whatever intervention introduced these bolts to the site took place around then. Unlike Copper Fastenings and iron framework, neither copper alloy nor yellow metal have a dedicated entry as fastening material in

the Lloyd's Register, although both are present as hull-sheathing material and as fastening materials in the survey reports. This means it is not possible to use the Register as a means by which to identify a technology growing in popularity. The absence of a dedicated entry also means that a ship recorded as being copper fastened may instead be utilising a copper-alloy.

The MAT report highlights the use of a yellow-metal washer with a copper bolt in two locations (see Figure 6.22). Highlighting the fact that this combination is unlikely to exist pre-1830. In all the cases where yellow metal is used this is a differing material choice from the possible Copper Fastenings identified elsewhere on the ship. The metallurgical analysis that has been conducted since the 2014 report was published, supports this hypothesis. It seems likely repairs took place utilising yellow metal and the ship itself was constructed using Copper Fastenings prior to the widespread uptake of yellow metal as a fastening material. The presence of an iron knee on a ship of this type also supports this. The ship must therefore have been constructed sometime in the early 19th century, after 1814, due to the presence of iron knees on the site, and possibly before the 1830s. It is difficult to advocate an "end date" for the use of a particular material or technology. It is entirely possible that shipbuilders utilised a material such as copper to fasten the ship later in the 19th century because that is what was available or requested by a customer or simply because it was their preference. Technological development is not exclusively linear and "older" techniques or technologies do not disappear. The date range of 1814 to 1830 is purely a guide and should not be used to discount any ship that fits other identification criteria.

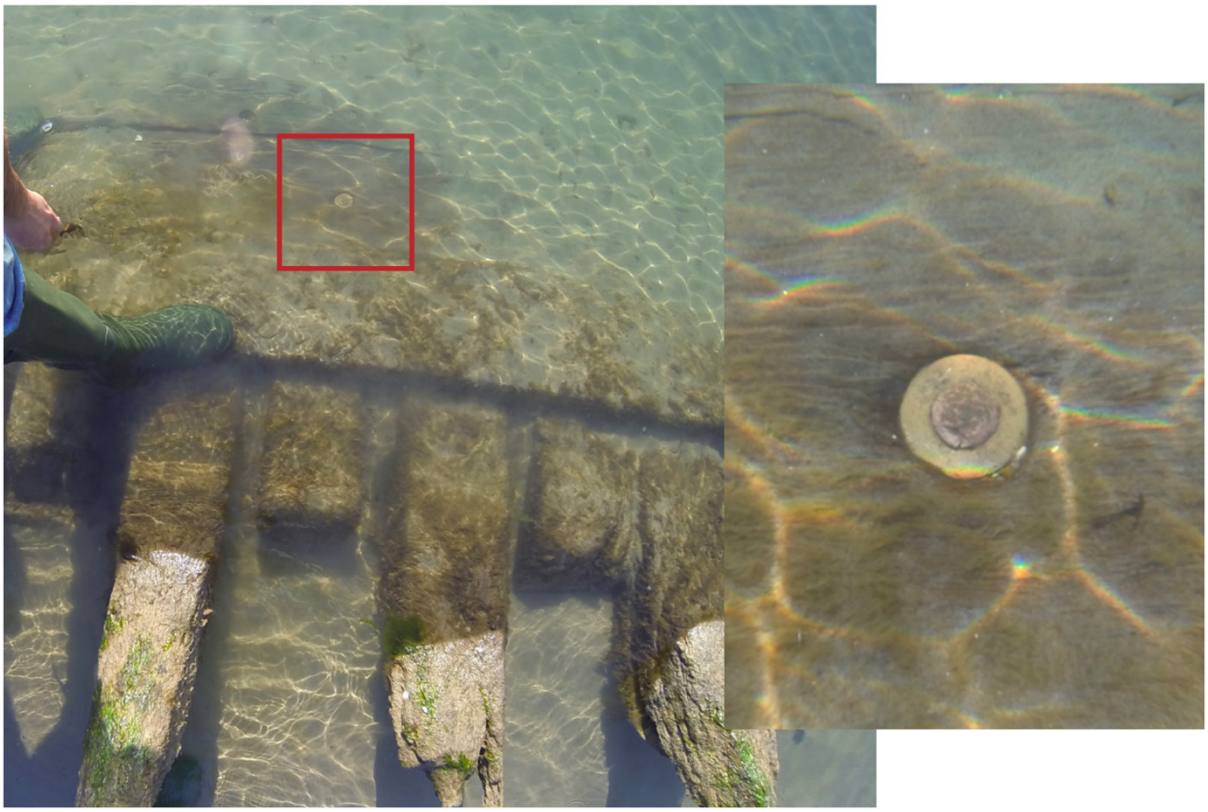


Figure 6.22: Image taken from the MAT report on the east Winner Bank shipwreck showing a yellow- metal and copper/copper-alloy fastening used to secure a ceiling plank to a first-futtock in place of a treenail (Taken from: Whitewright and Satchell 2014: 15).

Interpretation Summary

The measurements presented in the 2014 report suggest a wooden sailing vessel of between 21 and 26m in length. The site is evidently a sailing vessel as there is no evidence of any other form of propulsion such as machinery near the stern post. The calculation of the vessel's total length depends on observations of a potential master frame made in 2014 (Whitewright and Tidbury 2014: 4). The

frames themselves are simply butted together and fastened laterally with no fastening made between elements vertically. The hull and ceiling planking were also butted and secured in a simple fashion, joins between planks were a strait butt joint with each plank secured to each frame station using treenails and the butt and hood-ends with copper spikes. In the visits undertaken since 2014 it has not been possible to identify any sealing method for the treenails. Only one treenail was identified in 2014 with a possible crosscut as the sealing mechanism. It is therefore difficult to utilise treenails to identify the ship as the product of a particular region as has been done elsewhere (e.g., Adams et al. 1990 and Whitewright 2014b: 92).

Dating evidence is good for this vessel. The presence of an iron knee shows the ship is likely to have been built sometime after iron framing proliferated outside of the Royal Navy and East India Company (Stammers 2001: 115). Copper and yellow metal fastenings provide similar evidence, that the ship must have been constructed after these technologies became widespread. The Lloyd's Register provides a very rough guide for these dates. Their first use of a category for iron framework, copper fastening, and copper sheathing can be used to surmise a point by which the use of each technology had become widespread. Using these dates and the studies of other 18th and 19th century shipbuilding discussed in Section 5.4.8 and Table 5.4, it is possible to propose a date for the earliest possible construction of the shipwreck on the East Winner Bank. From the presence of iron framework components, Copper Fastenings, and a potential area of repair, it is likely the ship was built no earlier than 1814. We are therefore looking for a ship built at the beginning of the 19th century with copper fastening throughout. This is a good starting point for our direct investigation of the documentary evidence starting with the Shipwreck Index.

6.3.2. Identification

East Winner Bank Losses

There have been many losses on the East Winner Bank. As set out in Section 3.4.1 this is just one of several NLOs in quite a small area. Figure 3.1 shows the way Hampshire's coastline is broken up by the Shipwreck Index, within each of the zones exist several NLOs. Table 6.1 sets out the NLOs within each buffer zone on the map in Figure 6.23. These NLOs were then used to create a list of wrecks that correlate to the dating evidence established in Section 6.3.1, these wrecks are listed in Table 6.2.

Table 6.1: Named Locations within each buffer zone (Table by the Author).

1km Buffer Zone	5km Buffer Zone
East Winner Bank	Chichester Harbour
	Fort Cumberland
	Hayling Bay
	Horse and Dean Sand
	Langstone Harbour
	Southsea Beach
	Spithead

There are a considerable number of reported wrecks within the buffer zone around the East Winner Bank shipwreck. Many of the ships above can be discounted under criteria other than date. The ketches, smacks, and cutters are all vessel types that are too small to be candidates for the East Winner Bank wreck. The sloops and barques can also be discounted as these are too big along with the transport Incredible. The remaining candidates on the list are a group of schooners and brigs shown in Table 6.3.

Figure 6.23: Overview map of Hayling Island and the East Winner Bank shipwreck site. Two buffer zones have been established to show nearby Named Locations at a 5km and 1km radius from the shipwreck (Map by the Author)

All six of these candidates are potential candidates for the wreck on the East Winner Bank (the other name for the sandbanks either side of the mouth of Langstone harbour is the Woolsteners). It is possible the *Mary Farleigh* could have drifted onto the bank as it was reported last seen on the groynes of Langstone Harbour after coming ashore under Fort Cumberland. However, it is unlikely it would have come to rest on the opposite side of the bank. As the *Julie* came adrift from a tug in Spithead it is possible that it found her way onto the Woolsteners. However, her recorded length of 35m makes her too big to be the East Winner Bank shipwreck. *Amity* apparently filled on the shoal below Fort Cumberland and in a similar way to *Mary Farleigh.* Again, it is unlikely it would now be on the opposite side of the Woolsteners. Therefore, of the ships in the shortlist those most likely to be on the East Winner Bank are *Ocean*, *Johanna Elizabeth*, and *Fairy King*.

Identification of the East Winner Bank Shipwreck

The shipwreck therefore has three potential candidates. Being schooners engaged in coastal trade both *Fairy King* and *Ocean* may be good candidates. Very few details about the ship are recorded for the *Johanna Elizabeth*. However, her recorded voyage at time of wrecking is from Rio Grande (Central America) to Falmouth (Cornwall) carrying "bone dust". It is therefore likely to be a merchantman engaged in international deep-ocean trade, the kind unlikely to have been suitable for a ship not bigger than 26m and unlikely to be greater than 200 tons. The *Johanna Elizabeth* can therefore probably be discounted on the grounds of size. Both *Ocean* and *Fairy King* were schooners carrying china clay, a raw material used for a wide range of industries used in the production of porcelain.

The china clay trade was one of the many that relied upon coasting vessels to move materials around the coast of Britain. Specifics of *Ocean*'s voyage are not listed in the Shipwreck Index, however her cargo and vessel type suggest it was likely to be one of the merchant schooners so integral to Britain's coastal trade. *Fairy King* was not recorded as running aground. Instead, reports were made of wreckage washing up along the Hampshire and Sussex coastlines. The first reports of her loss coming from Itchenor near Chichester Harbour (see Figure 6.23), and wreckage was reported washing up near Littlehampton. This covers an extensive stretch of coastline and might suggest the ship foundered and broke up rather than running aground. It therefore seems unlikely that a substantial part of the wreck would be lodged in the East Winner Bank. By contrast *Ocean*'s entry indicates the vessel was stranded on the East Winner Shoal (Bank) and then lost. This would seem to be more in keeping with the shipwreck site which consists of most of a ship broadside on to the bank.

Looking more deeply into the circumstances of the *Ocean*'s wrecking, further details emerge that seem to support its identification as the East Winner Bank shipwreck. Of particular interest is the circumstance of the wrecking, the ship was reported to be stranded on the East Winner Shoal within sight of the beach on Hayling Island (this is discussed in more detail in 6.4.3). This correlates with the site of the ship today which is within site of the beach on the extreme eastern edge of the bank. Further details of the ship's life, relating to the repairs it underwent (see Section 6.4.2) correlate with findings on the site. So, whilst no identification can be guaranteed without a significant diagnostic find, the contextual evidence presented through detailed investigation of the ship's assemblage does suggest this shipwreck is the *Ocean*.

6.4. The schooner *Ocean* (1821-65)

6.4.1. Construction

The *Ocean* was built in Brixham in 1821 at the shipyard of Daniel Dewdney. The ship was not initially registered by the Lloyd's Register but instead entered into the Shipping Registers of the Port of Plymouth, a separate Registry not related to the LRS. Her first registration and therefore the start of her service life, took place in Dartmouth on the 21st of April 1821, it was assigned the signal letters J.K.V.H. and the official number 5736. The signal letters refer to the way a ship could be identified through flag signals and the official number is given to each ship upon its registration. After 1821 the

Table 6.2: List of Ships lost within the established buffer zone around the East Winner Bank shipwreck (Table produced by the Author, Data taken from Larn and Larn 1995)

Ship Name	Named Location	Date Lost	Date Built	Ship Type
George IV	Hayling Island, Offshore	00/00/1843	Not Given	Sloop
Surprise	Hayling Island, Offshore, 2M	01/07/1853	Not Given	Barge (sail)
Unidentified	Hayling Island, 0.25M offshore	00/00/1900	Not Given	Unidentified wreck
Mary Ann	Hayling Island, Beach, Woolstoners	08/01/1851	Not Given	Ketch
Commerce	Hayling Island, Beach	13/11/1877	Not Given	Barge (sail)
Ocean	Hayling Island, East Winner Shoal	14/01/1865	1825	Schooner (sail)
Fairy King	Hayling Island, East Winner Shoal	10/09/1903	1878	Schooner (sail)
Longest Day	Hayling Island, Eastoke Point	17/02/1890	1871	Ketch (sail)
Caduceus	Hayling Bay, Chichester Bank (Folds)	23/10/1881	1857	Barque (Sail)
Bert	Hayling, Hayling Bay	25/11/1912	Not Given	Cutter (sail)
Johanna Elizabeth	Langstone, Harbour, on the shoals	11/02/1866	Not Given	Brig (sail)
Elizabeth	Langstone, Harbour	15/02/1883	Not Given	Ketch (sail)
Sarah	Langstone, Offshore	00/00/1866	1864	Sailing vessel
Unidentified	Spithead, Horse and Dean Sand, near	04/01/1829	Not Given	Sloop (sail)
Julie	Spithead, The Woolstoners(sic)	08/02/1881	1855	Brig (sail)
Incredible	Portsmouth, Horse & Dean Sand	09/11/1800	Not Given	Transport (sail)
Amity	Portsmouth, Horse Sand, Cumberland Fort, near	26/11/1852	1822	Schooner (sail)
Drover	Southsea, Beach	03/12/1823	Not Given	Smack (sail)
Prince Regent	Southsea Castle, Lumps Beach	18/12/1853	Not Given	Sloop (sail)
Four Brothers	Southsea, 100yds S of Southsea Pier	30/01/1877	Not Given	Ketch (sail)
Heron	Southsea, Beach	12/11/1882	1860	Smack (sail)
Annie Clarke	Southsea, Southsea Castle, near	06/07/1891	Not Given	Barge (dumb)
Leonie	Southsea, Breakwater	14/10/1911	1892	Lugger (sail)
Pearl	Southsea, S Parade Pier	25/03/1922	1889	Barge (sail)
Lancer	Solent, Southsea, offshore	01/05/1905	1895	Cutter (sail)
Mary Farleigh	Eastney, Fort Cumberland	12/11/1902	1864	Schooner (sail)

Table 6.3: Shortlist of potential candidates for the East Winner Bank shipwreck (Table produced by the Author, Data taken from Larn and Larn 1995)

Ship Name	Named Locations	Date Lost	Date Built	Ship Type
Amity	Portsmouth, Horse Sand, Cumberland Fort, near	26/11/1852	1822	Schooner (sail)
Ocean	Hayling Island, East Winner Shoal	14/01/1865	1825	Schooner (sail)
Johanna Elizabeth	Langstone, Harbour, on the shoals	11/02/1866	Not Given	Brig (sail)
Julie	Spithead, The Woolstoners(sic)	08/02/1881	1855	Brig (sail)
Mary Farleigh	Eastney, Fort Cumberland	12/11/1902	1864	Schooner (sail)
Fairy King	Hayling Island, East Winner Shoal	10/09/1903	1878	Schooner (sail)

ship is recorded in the *Lloyd's Register of Shipping* (beginning with 1822 where it is entry number O-50—meaning the 50th entry in the 'O' section of that year's book). The Plymouth register records her as single-decked, Schooner rigged with two masts, square sterned, with no galleries or figurehead. It

is carvel built and recorded to have framework and planking of timber. The Plymouth register does not appear to record the materials used to fasten the ship or any more specific details of the framework, it is therefore unclear if the timber framework mentioned refers to floors and futtocks as well as knees and deck frames.

The data held within the Lloyd's Register adds additional information about the ship's construction. In 1825 and 1826 a note is made on her entries (O-41 and O-38 respectively) that the ship was built with Iron Knees.This is not repeated for any of her other entries. Furthermore, between 1836 and 1857 (except for the 1852 and 1855 entries) the ship is recorded as being fastened with iron bolts. Again this is not repeated in any other entries. However, both are consistent with what appears on the archaeological site and help to corroborate the identification set out in 6.3.2. A period of considerable repairs is also recorded in the Lloyd's Register, this is dealt with in 6.4.2, but it is worth noting here that a significant section of the ship was replaced/repaired.

The dimensions in the Plymouth register are given in feet, the *Ocean* is recorded as fifty-nine feet and two-tenths from the inner part of the main stem to the fore part of the sternpost aloft. This slightly odd-looking measurement reflects the standard practice for ship surveys of using tenths of feet rather than twelfths. Using conversion to metric of 3.3 feet per metre this gives a measurement of 18 metres only slightly less than the estimated length of the ship in Section 6.3.1 based off archaeological measurements. In the Plymouth Register *Ocean*'s tonnage is given at 85 tons, whilst in the Lloyd's Register's first entry it is 101 tons. This variance in two contemporaneous Shipping Registers shows the dangers of relying on tonnage calculations to establish vessel identity. The tonnage calculation depended on the measurements made and the method used to achieve them. Tonnage Laws also changed in 1836 meaning the calculated and recorded tonnage of the ship was also not consistent through her use life.

6.4.2. Life and Career

The first voyage of the *Ocean*, whether from Brixham or Dartmouth, is not recorded in the documents from the Plymouth Shipping Register. The Lloyd's Register includes the intended onward voyage of the ships surveyed. Using the Lloyd's Register, it is possible to trace the sailing life of the *Ocean* from the first entry in 1822 for almost the entirety of its service life (see Table 6.4). From these entries we can see that the ship was engaged in coastal trade; listed as "Coaster" in the Lloyd's Register. The vessel's survey port is listed as Plymouth, Topsham, Exeter, or Dartmouth for every year, with three exceptions: 1822 (Liverpool), 1823 (Cork) and 1832 (Cork). For most of the *Ocean*'s life the ship follows these regular patterns; registration at a survey port in Devon and then pursuing coastal trade around Britain and Ireland. There are, however, some journeys indicating one of the traits of merchant schooners.

Ocean is also no stranger to the middle-distance international trade such as the Iberian wine trades. One example is 1841 where it is bound for Oporto, Portugal, from Dartmouth. This is a window into a much wider world of trade in the 19th century. Trade with the Iberian Peninsula was particularly important to ports like Southampton, which for a long time had held the monopoly on the import of wine from Spain and Portugal (Simon 1964: 105). A further voyage worthy of note is in 1832 where the ship is registered in Cork, Ireland. This is further evidence of the interconnection of the Maritime World of the 19th century and the extensive network of coastal trade that covered the entirety of the British and Irish coast. The final six years of the *Ocean*'s life do not contain details of its survey port or its onward voyage. Some details of its final voyage can be extracted from the casualty return from January 1863 and this is explored in Section 6.4.3, but the five previous years are unaccounted for.

The life of the *Ocean* is also a good example of how ownership and running of a merchant ship was structured in the 19th century. Throughout the course of its life the ship undergoes three ownership

changes. The ship also changes Master nine times, although two individuals cover 24 years of her life. From 1822 to 1825 the ship was owned by J. German, under his ownership the vessel changed Master twice until the owner changes to J. Jarmand in 1825. It is possible that this ownership change is simply a respelling/correction of the owner's name given the phonetic similarity and shared first initial. Jarmand's ownership is the longest of all those for *Ocean* with 23 years recorded in the Registers (no Owner is recorded between 1833 and 1836). Jarmand, or someone of the same name, also served as Master in 1830 and possibly in 1832 when the master is recorded as "Jarmond". There is a brief period from 1833 to 1836 where relatively little is recorded about *Ocean* save Master's name, tonnage, and registration port. Following this, the ship enters a regular routine based in Devon, either registered at Plymouth from 1836 to 1839, then Dartmouth from 1839 to 1851, before returning to Plymouth until Lloyd's stops recording her registration port in 1858. Throughout this period there continues to be some change in Master; Woodgate takes over from Jarmond for 1834 to 1838, replaced by D. Elliot from 1839-40. In 1840 A. Saunders becomes Master for 11 years until 1851, perhaps a relative of H. Saunders the Master from 1823. Ownership changes one final time in 1851 when Stevens takes over the ship and with him comes a new Master, *Ocean*'s longest serving, T. Blackler.

What the Lloyd's Register does not show is the intricate subtleties of 19th century ship ownership. Merchant vessels like this were often broken into "shares" with owners hedging their risk by owning a few shares in multiple ships (Greenhill 1988: 117). Stevens' purchase of *Ocean* in 1850 (before the change is recorded in the 1851/52 Register) shows how these shares can work. In this case Thomas Jones Stevens, a Plymouth Ship Broker, acquires all 64 shares in the ship and then mortgages them all to a different Thomas Stevens, a Plymouth based merchant. That entire mortgage is then paid off by Thomas Jones Stevens on the 16th January of 1857. All 64 shares are then sold to Thomas Stevens the Plymouth merchant on the 21st January 1857. Finally, in 1861 Thomas Stevens sells his entire stake, 64/64ths, in an equal split to Thomas Jones Stevens and Sanders Stevens, both Ship Brokers in Plymouth 32/64th shares each. Thomas and Sanders Stevens are the owners of the ship when it is lost on the East Winner Bank on the 18th January 1865. What this somewhat complex back and forth does show is the nuance hidden within the surname Stevens in the Lloyd's Register. It is not one sole owner for the entire 13 years but actually covers three different individuals in that time.

The Lloyd's Register also records changes to the condition of the ship throughout its life. This is potentially significant to the work on the East Winner Bank shipwreck. The change in fastening technology in the centre of the site and the presence of copper spikes, is currently unexplained. There is no record in *Ocean*'s Lloyd's Register entries that identify the ship was copper fastened. That does not mean the ship had no Copper Fastenings at any stage of her life. As has already been shown with the masters and owners, the Lloyd's Register is not 100% accurate and does omit things. When incorporating it as a source into the investigation of a shipwreck these are important points to remember.

There are four instances of repairs to *Ocean*. The first takes place in 1840 and is listed as both Serious Repairs and Damage Repairs. The Register records that the ship receives new Topsides presumably as part of this repair. This is at the start of the period when the ship moves from coasting to undertaking targeted voyages including the one mentioned earlier to Oporto rather than being listed as "Coaster". There is a further instance of repairs in 1842, again these are marked as Serious Repairs and the *Ocean* receives a partially New Deck and Wale. The *Ocean* is still running targeted voyages, now from Dartmouth to Newport (most likely Wales), before returning to being listed as a Coaster in 1844/5. Potentially the biggest repair takes place in 1850, this is recorded as a Large Repair including a New Deck. A final repair takes place in 1852 listed as a Serious Repair, although the exact nature of this repair is unlisted. The ship continues as a Coaster until the details about her voyages stop being recorded in the Lloyd's Register in the 1858-59 Register Book.

The presence of these substantive repairs is relevant to our investigations so far. The MAT report noted the presence of yellow-metal and copper fastenings used to replace treenails securing ceiling-planking to the frames in the central area of the wreck site (Whitewright and Tidbury 2014: 4). Copper fastenings were also noted throughout the site securing hull-planking butt-ends to frame stations. The yellow metal and Copper Fastenings in the centre of the ship are certainly the product of a repair or refit as they differ so markedly from the rest of the ship, where the ceiling planking is fastened with treenails. It is also possible that due to the more extensive coverage of copper spikes, these are the product of a larger repair or refit. As the repairs in the Lloyd's register all took place between 1840 and 1852, it is likely that different methods for fastening timbers were used than the ship was originally built with. The presence of repairs listed as Damage and Serious may also explain the variance found in thicknesses of hull planking. Again it is unlikely that the same materials and sources were used as in the ship's original construction. The Muntz Metal hood-end bolt identified in Northover's (2017) metallurgical analysis, must certainly have been introduced to the site after the material was patented in 1832, some ten years after *Ocean* was launched from Dewdney's yard. That bolt must therefore have been introduced as part of a refit or repair. Northover's report (2017: 1-2) describes the other two bolt samples as brass. This further indicates the major nature of the repairs made to *Ocean* which required the replacement of the hood end bolts and therefore possibly the planks themselves. As well as at least one keel-bolt suggesting works extended to the lowest frames.

6.4.3. Wrecking

According to the half-yearly account of voyages submitted to Plymouth in 1865 reporting *Ocean*'s loss on 14th January (see Figure 6.24). The *Ocean* departed Par, Cornwall, in 1865 with a cargo of China Clay for Newcastle-on-Tyne. It had a crew of four men and one boy: Ship's Master John Gliddow aged 42 from Guernsey, Master's Mate James Jarvis aged 48 from Salcombe (Devon), Thomas Clark aged 28 from Torpoint (near Plymouth, Devon), William Hooper aged 55 from Mevagissey (Cornwall), and William Geithard aged 13 from Stonehaven (Aberdeenshire). It is worth noting the Master for this voyage is not the same man as that recorded in the Lloyd's Register for either 1862-63 or 1863-64 which was her last registration. *Ocean* again allows us to witness one of the important traits of Britain's coastal trade and the advantage of a Schooner-rigged ship, the crew did not need to be large for a voyage of this kind.

In the Solent the ship ran in to trouble. The Shipwreck Index reports that the ship was stranded on the East Winner Bank in a WSW Force 9 wind. The circumstances of her wrecking were reported in the Western Morning News on Tuesday 17th January 1865, the wreck took place Saturday 14th. The following extracts are from that article:

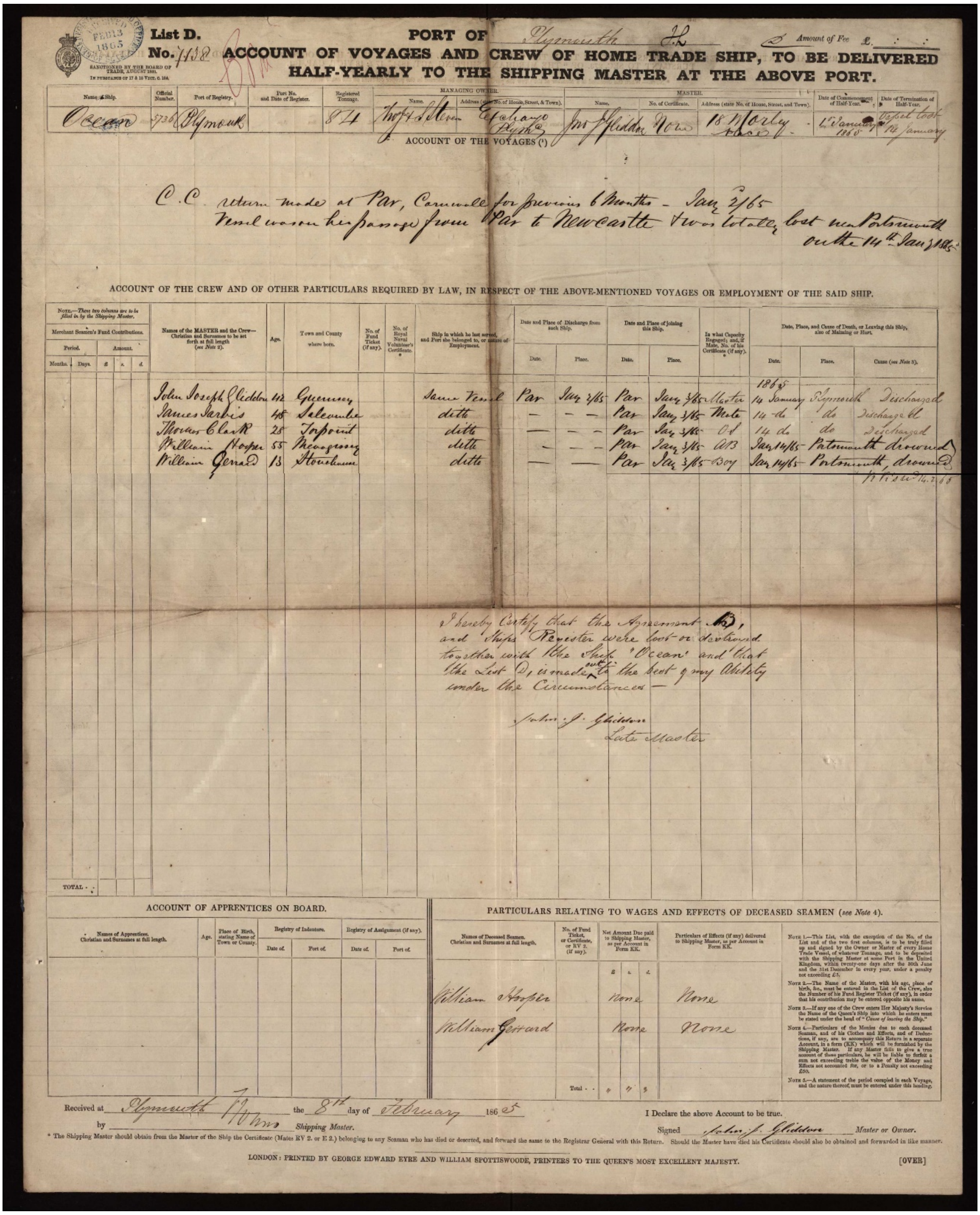
"About 11 a.m. messengers arrived in Portsmouth from Fort Cumberland and the Coastguard at the entrance to Langston [sic Langstone] harbour requesting immediate assistance for a schooner which had gone ashore on the dangerous shingle bank at the entrance to Langston harbour known as the "Woolstenors". The Comet, Government steam-tug, with a lifeboat in tow, in charge of a Government Trinity pilot (W. Main), was sent out to afford assistance, but she could only approach within some 5,000 yards of the wrecked vessel, which could be seen with her crew in the rigging (her hull just below water and her masts standing), in the very midst of the seething breakers, which rose in high sheets of white foam over the hard sand and shingle of the "East Winner", as marked on the Admiralty charts, and forming a portion of the shoals referred to as the Woolstenors. No boat, excepting a lifeboat specially built for service in gales of wind on shallow waters, could possibly have floated over the shallow water intervening between the Comet and the stranded schooner, and the steamer had to return to Portsmouth harbour and leave the men in the schooner's rigging to their fate."

Table 6.4: Annual Record of the ship Ocean as recorded in the Lloyd's Register of Shipping (Table produced by the Author, Data taken from Lloyd's Register Foundation Heritage and Education Centre 2020).

Year	Entry Number	Rig	Master	Tonnage	Built	Year	Owner	Loaded Draught	Survey Port	Intended Destination	Rating
1821						Not yet in register					
1822	O-50	Sr	Tennant	101	Dartmouth	1821	J.German	11	Liverpool. Coaster	A1	A1
			Saunders	*SD*					*Iron Cable*	*6*	*8*
1823	O-43	Sr	H.Saunders	101	Dartmouth	1821	J.German	11	Cork. Coaster	A1	A1
				SD					*PIC*	*2*	*1*
1824	O-39	Sr	H.Saunders	101	Dartmouth	1821	J.German	11	Topsham. Coaster	A1	
				SD					*PIC*	*2*	
1825	O-41	Sr	R.Smardon	101	Brixham	1821	J. Jarmand	11	Plymouth. Coaster	A1	
				SD				*IK*	*PIC*	*5*	
1826	O-38	Sr	R.Smardon	101	Brixham	1821	J. Jarmand	11	Falmouth. Coaster	A1	
				SDB				*IK*	*PIC*	*4*	
1827	O-37	Sr	R.Smardon	101	Brixham	1821	J. Jarmand	11	Plymouth. Coaster	A1	
				SDB					*PIC*	*11, 2*	
1828	O-40	Sr	R.Smardon	101	Brixham	1821	J. Jarmand	11	Exeter. Coaster	A	A
				SDB					*1 PIC 1H*	*June*	*January*
1829	O-41	Sr	R.Smardon	101	Brixham	1821	J. Jarmand	11	Exeter. Coaster	A	A
		Jarmand	*Upham*	*SDB*					*1 PIC 1H*	*June*	*January*
1830	O-33	Sr	J.Jarmand	101	Brixham	1821	J. Jarmand	11	Topsham. Coaster	A	A
		T.Hall	*R.Smardon*	*SDB*					*1C 1H*	*April*	*January*
1831	O-33	Sr	T.Hall	101	Brixham	1821	J. Jarmand	11	Plymouth. Coaster	A	A1
		J.Upham	*Jarmand*	*SDB*					*2C 1H*	*June*	*February*
1832	O-39	Sr	Jarmond	101	Brixham	1821	J. Jarmand &	11	Cork. Coaster	A1	A1
				SDB					*2C 1H*	*Sept*	*June*
1833						Page missing from scan					
									Port Belonging To		
1834	O-47		Woodgate	100					Dartmouth		
1835	O-50		Woodgate	100					Dartmouth		

1836	O-45	Sr *IB*	Woodgate	100	Brixham	1821	Jarmand	Brixham	Plymouth. Coaster		AE1 *1835*
1837	O-41	Sr *IB.*	Woodgate	100	Brixham	1821	Jarmand	Brixham	Plymouth. Coasting	AE1 *1835*	
1838	O-18	Sr *IB.*	D. Elliot	100 *85*	Brixham	1821	Jarmand	Brixham	Plymouth. Coasting	AE1 *1837*	
1839	O-14	Sr *IB.*	D. Elliot *A. S[aunders]*	100 *85*	Brixham *ptND.W.*	1821 *Tsds*	Jarmand *&Srprs40*	Brixham	Dartmouth. Cardiff *Dartmouth. Wales*	AE1 *1838*	AE1 *4,10*
1840	O-33	Sr *IB.*	A.Saunders	100 *85*	Brixham *ptND.W.*	1821 *Tsds*	Jarmand *&Srprs40*	Brixham *Drp.40*	Dartmouth. Wales *Dartmouth. Oporto*	AE1 *12*	
1841	O-36	Sr *IB.*	A.Saunders	100 *85*	Brixham *ptND.W.*	1821 *Tsds*	Jarmand *&Srprs40*	Brixham *Drp.40 Srps42*	Dartmouth. Oporto *Dartmouth. Newport*	AE1 *12*	AE1 *4, 1842*
1842	O-33	Sr *IB.*	A.Saunders	100 *85*	Brixham *ptND.W.*	1821 *Tsds40*	Jarmand *Srprs42*	Brixham	Dartmouth. Newport	AE1 *4*	
1843	O-33	Sr *IB.*	A.Saunders	100 *85*	Brixham *ptND.W.*	1821 *Tsds40*	Jarmand *Srprs42*	Brixham	Dartmouth. Newport *Dartmouth. Coaster*	AE1 *9, 1842*	
1844	O-34	Sr *IB.*	A.Saunders	100 *85*	Brixham *ptND.W.*	1821 *Tsds40*	Jarmand *Srprs42*	Brixham	Dartmouth. Coaster	 *1843*	E1 *44*
1845	O-28	Sr *IB.*	A.Saunders	100 *85*	Brixham *ptND.W.*	1821 *Tsds40*	Jarmand *Srprs42*	Brixham	Dartmouth. Coaster	E1 *1844*	
1846	O-29	Sr *IB.*	A.Saunders	100 *85*	Brixham *ptND.W.*	1821 *Tsds40*	Jarmand *Srprs42*	Brixham	Dartmouth. Coaster	E1 *1844*	
1847	O-30	Sr *IB.*	A.Saunders	100 *85*	Brixham *ptND.W.*	1821 *Tsds40*	Jarmand *Srprs42*	Brixham	Dartmouth. Coaster	E1 *1844*	
1848	O-34	Sr *IB.*	A.Saunders	100 *85*	Brixham *ptND.W.*	1821 *Tsds40*	Jarmand *Srprs42*	Brixham	Dartmouth. Coaster	E1 *1844*	
1849	O-33	Sr *IB.*	A.Saunders	100 *85*	Brixham *ptND.W.*	1821 *Tsds40*	Jarmand *Srprs42*	Brixham	Dartmouth. Coaster	E1 *1844*	
1850	O-32	Sr *IB.*	A.Saunders	100 *85*	Brixham *ptND.W.*	1821 *Tsds40*	Jarmand *Srprs42*	Brixham	Dartmouth. Coaster	E1 *1844*	
1851	O-13	Sr *IB.*	T.Blackler	100 *85*	Brixham *ptNW,TSds40*	1821	Stevens *ND&lrp.50*	Plymouth *Srprs52*	Plymouth. Coaster	AE1 *5, 1852*	
1852	O-13	Sr	T.Blackler	100 *85*	Brixham	1821	Stevens			 *1850*	
1853	O-12	Sr	T.Blackler	100	Brixham	1821	Stevens	Plymouth	Plymouth. Coaster	AE1	

		IB.		*85*	*ptNW,TSds40*		*ND&lrp.50*	*Srprs52*		*1852*	
1854	O-13	Sr	T.Blackler	100	Brixham	1821	Stevens	Plymouth	Plymouth. Coaster		AE1
		IB.		*85*	*ptNW,TSds40*		*ND&lrp.50*	*Srprs52*			*1853*
1855	O-14	Sr	T.Blackler	100	Brixham	1821	Stevens				
				85						*1853*	
1856	O-14	Sr	T.Blackler	100	Brixham	1821	Stevens	Plymouth	Plymouth. Coaster	AE1	
		IB.		*85*	*ptNW,TSds40*		*ND&lrp.50*	*Srprs52*		*February*	
1857	O-12	Sr	T.Blackler	100	Brixham	1821	Stevens	Plymouth	Plymouth. Coaster	AE1	
		IB.		*85*	*ptNW,TSds40*		*ND&lrp.50*	*Srprs52*		*1856*	
1858	O-11	Sr	T.Blackler	100	Brixham	1821	Stevens				
				85						*1856*	
1859	O-12	Sr	T.Blackler	100	Brixham	1821	Stevens				
				85						*1856*	
1860	O-12	Sr	T.Blackler	100	Brixham	1821	Stevens				
				85						*1856*	
1861	O-11	Sr	T.Blackler	100	Brixham	1821	Stevens				
				85						*1856*	
1862	O-13	Sr	T.Blackler	100	Brixham	1821	Stevens				
				85						*1856*	
1863	O-12	Sr	T.Blackler	100	Brixham	1821	Stevens				
				85	*Dimensions 65.5 x 19.6 x 11.2*					*1856*	
1864	Absent from register due to loss										


List D. PORT OF Plymouth
No. 7138 ACCOUNT OF VOYAGES AND CREW OF HOME TRADE SHIP, TO BE DELIVERED HALF-YEARLY TO THE SHIPPING MASTER AT THE ABOVE PORT.

Name of Ship	Official Number	Port of Registry	Registered Tonnage	Managing Owner	Master	Date of Commencement of Half-Year	Date of Termination of Half-Year
Ocean	4736	Plymouth	84		Jno J Gliddon	1st January 1865	Vessel lost 14 January

ACCOUNT OF THE VOYAGES

C.C. return made at Par, Cornwall for previous 6 Months – Jany 2/65
Vessel was on her passage from Par to Newcastle & was totally lost near Portsmouth on the 14th Jany 1865.

ACCOUNT OF THE CREW AND OF OTHER PARTICULARS REQUIRED BY LAW, IN RESPECT OF THE ABOVE-MENTIONED VOYAGES OR EMPLOYMENT OF THE SAID SHIP.

Names of the Master and the Crew	Age	Town and County where born	Ship in which he last served	Date of Discharge	Place of Discharge	Date of Joining	Place of Joining	In what Capacity Engaged	Date of Death or Leaving	Place	Cause
John Joseph Gliddon	42	Guernsey	Same Vessel	Par	Jany 2/65	Par	Jany 3/65	Master	1865 14 January	Plymouth	Discharged
James Jarbis	48	Salcombe	ditto	—	—	Par	Jany 3/65	Mate	14 do	do	Discharged
Thomas Clark	28	Torpoint	ditto	—	—	Par	Jany 3/65	OS	14 do	do	Discharged
William Hooper	55	Mevagissey	ditto	—	—	Par	Jany 3/65	AB	Jany 14/65	Portsmouth	drowned
William Gerrard	13	Stonehouse	ditto	—	—	Par	Jany 3/65	Boy	Jany 14/65	Portsmouth	drowned

I hereby Certify that the Agreement ... and Ships Register were lost or destroyed together with the Ship "Ocean" and that the List D, is made out to the best of my Ability under the Circumstances —
John J. Gliddon
Late Master

ACCOUNT OF APPRENTICES ON BOARD.

PARTICULARS RELATING TO WAGES AND EFFECTS OF DECEASED SEAMEN

Names of Deceased Seamen	Net Amount Due	Particulars of Effects
William Hooper	None	None
William Gerrard	None	None

Received at Plymouth the 8th day of February 1865
I Declare the above Account to be true. Signed John J. Gliddon Master or Owner.

LONDON: PRINTED BY GEORGE EDWARD EYRE AND WILLIAM SPOTTISWOODE, PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY. [OVER]

Figure 6.24: The half-yearly account of voyages submitted to Plymouth as Ocean's home port in 1865 reporting its loss on 14th January 1865 just 13 days after the half-year had commenced (Image courtesy of the National Maritime Museum 1865).

The half-yearly accounts record the two crewmen lost in the wrecking (see Figure 6.24). These were William Hooper and William Geithard the ship's boy. The description of the wrecking event and the resulting position of the ship correlate with the location and orientation of the site today. The following is from The Standard (1865)—a London Paper—on Wednesday the 18th January five days after the wrecking:

"January 16, the Ocean, Schooner, ashore in the Woolsteners, was bound for Newcastle, reported in yesterday's list. She is embedded in the sand up to her bend; her masts are still standing, and endeavours will be made as soon as the weather moderates to save materials."

The description of the site being embedded up to her bend may be another way of referencing the turn of the bilge. This is broadly how the site is lying today, admittedly more collapsed in its current state. The shipwreck left a lasting impact on this stretch of coastline. Following Major Festing's rescue of the three surviving crew, he was awarded a medal for his heroics. A lifeboat station was also established on Hayling Island which is today the site of the Hayling Island station of the Royal National Lifeboat Institution (RNLI).

6.4.4. Evaluation of Sources

As this section has shown, there is a lot of information that can be obtained by incorporating documentary material into the analysis of a shipwreck site. One of the most valuable contributions these sources make is to the biographical details about the ship and the people engaged with it, not just as crew but also owners, and shipbuilders. An incredibly fine level of detail can be obtained to discuss the ship's wrecking, life, and use that complements the level of detail that can be extracted from the archaeological material. The sources used here show the enormous reach of a ship as relatively small as the *Ocean*. They also shed light on the complex nature of ship ownership, coastal trade, and even repair and construction. Almost all these themes would be impossible to study at this level of detail in the archaeological material alone where, at this site, there is no indication of the people involved with the ship even in its final moments.

As with any investigation of archaeological material it is important not to rely one single document for information. What is clear from the different sources consulted is that some of the information contained within them is contradictory and sometimes just incorrect. An example is the Master listed in the Lloyd's Register prior to the *Ocean*'s wrecking being different to the Master given on the record submitted to the Port of Plymouth. There are also some areas of the historical accounts which cannot be relied upon when investigating an archaeological site. A good example of this is a ship's size and tonnage. The tonnage and dimensions for the *Ocean* vary just within the records from the Plymouth Register where it is first registered in 1821 as 59 feet and 2/10^{ths} then in 1861 at 62 feet and 4/10^{ths}. The vessel's tonnage is also listed differently in the Lloyd's Register and the Plymouth Register, in 1861 the Plymouth Register records *Ocean* as being 84 and 94/100^{ths} tons, whilst for the same year the Lloyd's Register puts the ship at 100 tons. Missing from this discussion are the Lloyd's surveyor's reports related to each of *Ocean*'s registrations.

Certainty about the size, and construction of the ship therefore relies on the work done on the archaeological material being combined with the information contained within these documents. The clearest example of this is the presence of repairs on the ship. Even in the initial MAT publication (Whitewright and Tidbury 2014) the presence of a change in fastening materials was identified in the ship's midsection. Through consultation of the Lloyd's Register, it is possible to identify a phase of the *Ocean*'s life where it underwent considerable repairs. Whilst there are further investigations that could be made it seems plausible that the archaeological finds correlate with this period of repair. This is a further area the surveyor's reports would be of use once they can be obtained from the HEC's archive. Through the synthesis of archaeological material and historical documents it has been possible to establish a record that aligns the historical events of the *Ocean*'s wrecking, and the material remains on the East Winner Bank today. The biographical detail and narrative that can then be pulled from the record and set out for this ship are only possible through the concurrent use of archaeological material and relevant historical documentation.

6.5. Summary

It is now possible to highlight the significance of the shipwreck on the East Winner Bank. It is an example of a type of ship that is largely from archaeological investigations of the 19th century. It is certainly the case that no previous investigation has looked at a ship of this type in the detail presented here. As a working merchant schooner *Ocean* was part of a system of coastal trade and connections that formed the basis of a widespread global trade system. The degree of survival present on the site is a further reason this site has potential to make a significant contribution to our understanding of seafaring and the maritime cultural landscape of the 19th century. The information obtained from the wreck site so far is informative particularly for our understanding of ship construction technologies in the 19th century. That understanding is further improved by the information contained within the documentary evidence from the Lloyd's Register and the Plymouth Shipping Register.

The incorporation of documents alongside archaeological material is another area that this site can make a significant contribution to archaeological methods. There have been several previous investigations of historic period shipwrecks incorporating documentary evidence. The methodology is therefore relatively well established. This shipwreck, because of its status as an everyday working vessel, is a superb candidate to test and further develop these methods. Approaching these documents as parts of the ships entire material assemblage and understanding the impacts the individual components of that have on each other and the wider world. The documentary evidence has also allowed this report to suggest a single identification for the shipwreck and to draw out its story. This identification is relatively secure as there are virtually no other candidates that could be attributed to this shipwreck.

The story it is then possible to extract from the shipwreck, the Register books, and other associated documentation is significant to the local area of Hayling Island. *Ocean*'s wrecking prompted the establishment of a lifeboat station on Hayling Island, a facility that is still in operation today. This is also a story of ordinary people, not of gigantic stock companies or elite individuals. Those involved in *Ocean*'s everyday life were merchants, sailors, fishermen, and shipbuilders. Through studying the *Ocean*, we can see how the ownership of ships in this period was structured, the networks of trade and exchange around the coast of Britain, and even wider connections to Europe and Portugal in particular.

There is no doubt that the site would benefit from further investigation. The findings and data collated in this thesis should be the basis for the record of this ship. The work done to date has created an overview site plan and established the material components of fastenings on the site. Building on this to examine the timbers themselves and, if possible, a more detailed and invasive exploration of the site is the next stage. That work would allow the identification of the site to be established even more securely and answer questions about the construction and repair works that have been done to the ship. As ships of this kind are so rare there may not be a better opportunity to contribute to our understanding of the 19th century. This site allows archaeologists to examine the lives and stories of people who are all too often missing from, or lost in, The Record.

Chapter 7. Case Study Two – *Rhoda Mary*

7.1. Introduction

Three years after *Ocean* was lost on Hayling Island another schooner was launched from a slipway on the Carrick Roads at Point, near Falmouth, in Cornwall. That schooner was *Rhoda Mary* and would not have appeared dramatically different to *Ocean* for anyone watching from the shore. Despite the outward similarity to *Ocean* there are some key elements of *Rhoda Mary*'s construction and life that differ markedly. Firstly, whilst *Rhoda Mary* was built with broadly similar technologies these were implemented differently. The ship was launched with two masts and later refit to be a three-masted schooner, reflecting preferences and priorities of the changing century (Greenhill 1988: 24-5), and further demonstrating the versatility of schooner-rigged ships. Being launched at the end of the 1860s meant *Rhoda Mary* would be part of the process by which Britain's maritime industry shifted from sail to steam. Indeed, *Rhoda Mary* launched into an ocean that was already starting to fill up with merchant steamers. Many of the industries traditionally dependent on schooners and sailing ships were shifting to this new means of propulsion. Despite this, *Rhoda Mary* was not a ship out of time. The story is different to that of *Ocean* offering a glimpse of the changing seascapes of Britain and the people that lived and worked along it.

The location and condition of the remains of *Rhoda Mary* hint at that difference in story. Unlike *Ocean,* this ship was not wrecked in a dramatic event. There was no sinking as the result of a storm. Instead, *Rhoda Mary* was hulked in the Medway Estuary. The term "hulk" has become somewhat interchangeable with "wreck" in modern ship archaeology. However, the two describe a different process. Hulking is a process of abandonment, most commonly leaving a ship on a riverbank or in a harbour (Museum of London Archaeology 2013: 1). This was the fate of *Rhoda Mary* following a long and successful career. The material left on the banks of the Medway indicates a further difference. The end of *Rhoda Mary*'s life was not as a merchant schooner or coasting ship, instead it was converted to a floating home and moored in the Medway. The length of service for this ship, even without including its time as a floating home, means it passes beyond the timeframe chosen for this thesis. Nevertheless, some study of the life after 1899 will be included. This is a significant vessel. It allows an investigation of a ship-type and construction technologies that in some ways differ very little from those deployed at the beginning of the 19th century, whilst also utilising new materials and responding to a changing world. The similarities to those earlier ships are in many ways as informative as the differences.

Rhoda Mary has a story that ends in a different way to *Ocean*, in a slower and more deliberate deposition. The result is a more certain record of the hulk's identity and story. Effectively this means the search for an identity undertaken for *Ocean* in Chapter 6 isn't required. Although some effort will be made here to ensure the information in the record is accurate. The site is also not unknown to archaeologists and heritage professionals. The hulk of *Rhoda Mary* was previously visited by the nautical historians David MacGregor and Basil Greenhill. Their account of the site and some elements of its story are recorded in Greenhill's book *the Merchant Schooners* (1978). This has been used as a starting point for the investigation in the following chapter. What has not yet taken place is a dedicated archaeological investigation of the site. There is no archaeological site plan. *Rhoda Mary* also provides a good example of the need for such an investigation of sites like this is. In the decades following MacGregor and Greenhill's visits the hulk caught fire and the remaining deck structures burned away. In addition to the site plan will be the record of *Rhoda Mary* in the *Lloyd's Register of Shipping*, the archaeological description of the site, and models of the site created through photogrammetry. The chapter will then approach the site in the same way as has been done for *Ocean* to draw out specific technologies, construction choices, and identifiable points in the ship's life.

These components are like those in the preceding chapter. However, this will not be a carbon copy of the structure deployed there. This reflects the need to vary our methodologies and approaches even when presented with similar types of sites in similar environments. *Rhoda Mary* worked in different trades and seas to *Ocean* and was subject to different forces and events. Our approach to its story can be more certain and its incorporation into the wider study will be mindful of different factors. Like *Ocean,* this is a ship that has lasted far beyond its initial purpose. The enduring power here manifests in an influence that is both similar and starkly different. There is no real tangible change in the area surrounding the hulk of *Rhoda Mary* as there is with the lifeboat station on Hayling Island. The lasting effects here are more subtle, a thing performing a series of changing tasks from merchant ship to houseboat, to navigational hazard, to heritage site. The ship instead tells of a changing industry, 19th century shipping, and allows a glimpse of the intangible and forgotten changes to Britain's coastline.

7.2. Site Overview

7.2.1. The Medway

Immediately east of London a second river empties into the Thames Estuary, much smaller than its metropolitan counterpart. There is a significant tidal range here leaving muddy riverbanks as the water retreats to a deeper central channel. It is no surprise that this became the site of one of the Royal Navy's principal dockyards. Following the river upstream from its junction with the Thames, we pass through a wide estuary interrupted by shallows and flat muddy islands. Eventually this tightens and conforms to a river channel running alongside the towns of Rochester and Chatham. On one bank is the shining white regularity of a holiday park, leading to a port housing an indiscriminate collection of ships, boats, and barges. It is an assortment of retired and broken things, occasionally interspersed by a vessel in some stage of regeneration. It is here, outside the boundary of the port and virtually opposite the old Naval Dockyard that we find a small muddy hulk abandoned high on the riverbank (Figure 7.1).

7.3. The Hulk

The hulk lies below the high tide mark on the river. The site is stern on to the bank with its bow angled out toward the river channel. As it is below the high tide mark the site is frequently covered with water and has been marked as an obstruction with a fixed navigational marker. The site is otherwise exposed with only a thick covering of bladderwrack across all the visible timbers. Along the riverbank immediately next to the site is the Saxon Shore Way and 100 metres further up the river are the remains of a brickworks and naval fortification.

The hulk is oriented with its bow facing 134.4°SE. There is still a considerable amount of the ship present. The port side of the ship remains mostly articulated. The lower futtocks and floor timbers are partially or completely buried under a layer of river mud. Towards the extant stern of the vessel some of these lower frames are visible although this area is more degraded. The starboard side of the vessel has collapsed outboard. This collapsed section is still articulated and in places may remain connected to the keel beneath the mud. There is a keelson visible at both the bow and stern ends of the ship, this disappears beneath the mud in the centre of the site. A possible mast-step can be seen on the keelson in the stern. There are areas of both hull and ceiling planking, mainly accessible on the upright port side with hull planking visible under the starboard frames. The bow of the ship is the most degraded section. The stempost is extant and upright and associated with the keelson. There are some lower framing timbers visible, but these are badly degraded. The entire site is surrounded by river mud of varying depths. There is a reliable access point through a gap in the port stern quarter through shallow mud. On the riverward side of the vessel the mud gets rapidly deeper.

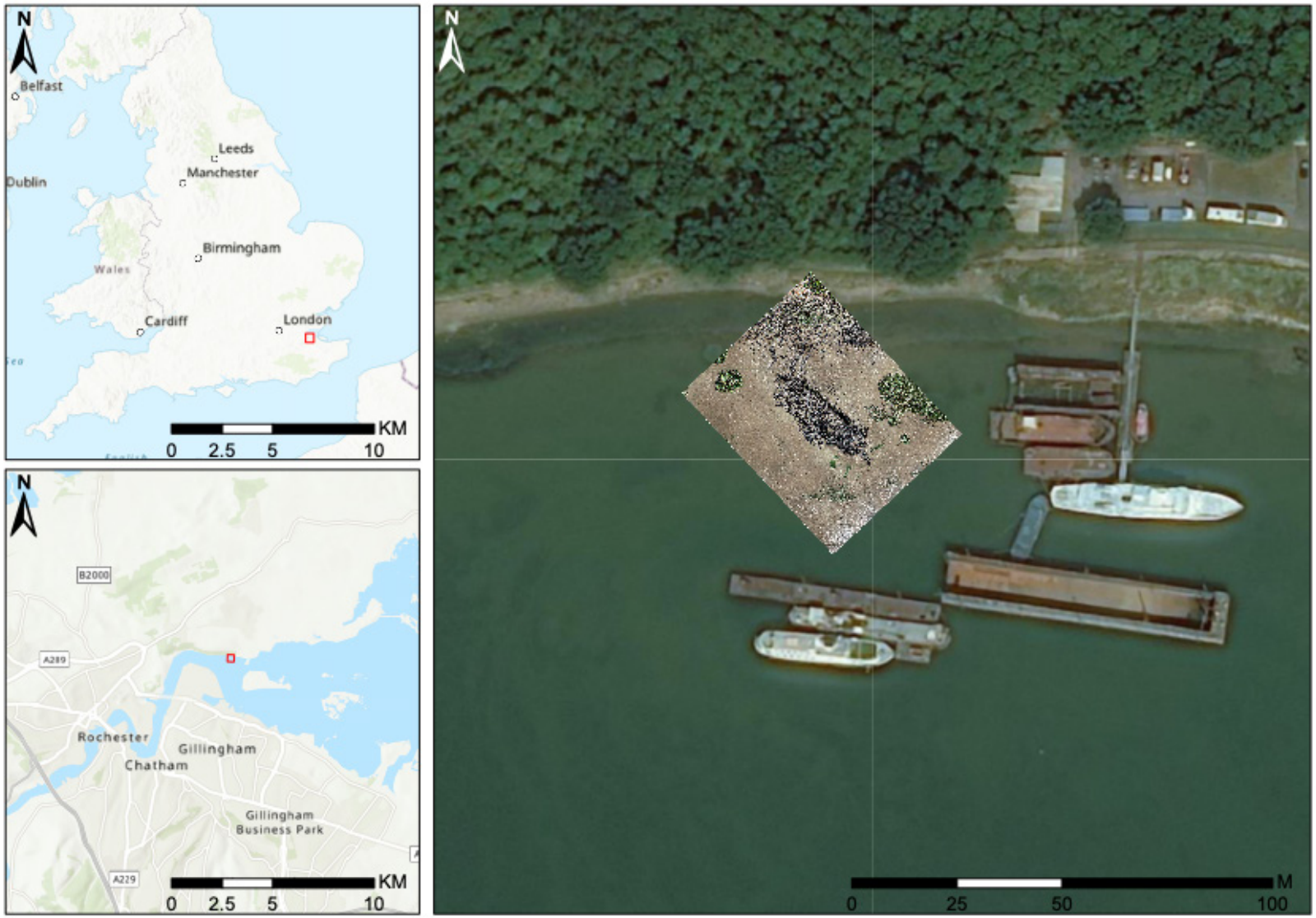


Figure 7.1: Map showing the location of the hulk of Rhoda Mary (Map produced by the Author).

7.4. Work to Date

The first work undertaken on *Rhoda Mary* as an archaeological site was done by Basil Greenhill and David MacGregor (Greenhill, 1978). At this point, in the early 1950s, there was a significant amount of the ship present. The observations made here, and the resulting lines plan are therefore a vital part of the record. The accessibility of this site makes it an ideal candidate for archaeological investigation as more time can be taken over the cleaning and recording process.

The site was first visited for this project in August 2015. At that time the site was cleaned and examined in association with the Rhoda Mary Project. This was a project that set out to restore *Rhoda Mary* as an educational tool to train shipwrights and tell the story of Cornwall's maritime past. The project has since redirected its energy into a shipbuilding training school in Truro, Cornwall. That first investigation reviewed the extent of the site and identify diagnostic features. The aim of that visit was to produce an archaeological description of the remains, something that had not been done previously. This survey was performed over a single day, as the tide window for the site is very long during spring tides, providing ample time for a general assessment of the site and the collection of detailed measurements. The survey was performed using hand tapes to measure the components of the ship and as many components and other diagnostic features as possible were photographed. This photographic record was also taken to produce a subsequent photogrammetric model of the site. A version using the photographs from 2015 generated with the current version of Agisoft Metashape, a still from which has been included as Figure 7.2. This model differs to those from the survey in 2021 as no drone was used and the images were taken by hand using a compact camera with a lower grade sensor. However, the model does allow some idea of the hulk's condition at that time. No site plan was created from the 2015 visit, but it is possible to generate an orthophotograph from the photogrammetry model included as Figure 7.3. When this is compared to the more recent orthophotographs in Figures 7.4 and 7.5 it is possible to see both the improvements in the quality of the overall photogrammetry model and the relative stability of the site except for some minor degradation and considerable weed growth.

In August 2021 the site was visited again with the fieldwork methodology designed for this project (Chapter 3). This took the form of a two-day survey. An RTK GPS and DJI Phantom drone were utilised to record the site. A series of control points and a general scale were set up to allow for the resulting photogrammetry model to be scaled and georeferenced. The plan included targeted sampling of metal features. Yellow metal bolts were identified in 2015 and these were to be sampled for metallurgical analysis. After a short inspection of the site, a pre-disturbance model of the site was created using drone photography (shown as an orthophotograph in Figure 7.4). Once this was completed the site was cleaned of bladderwrack to reveal timbers that sat out of the river mud. The site was left overnight to allow the incoming tide to remove the loose bladderwrack from the site. The RTK system was used to record the key points of interest across the site, the location of the sampled bolts, and the control points for the following photogrammetric model. A second set of site images were then made with the drone to produce an overall site plan with the fullest extent of the hulk visible (see Figure 7.5). Finally, close-up images of certain features were then taken with a digital camera before the control points and fixed scale were removed.

7.5. Results:

Both photogrammetric surveys cover the entire hulk. The 2016 survey was not combined with a GPS survey however it is still possible to georeference the dataset using features from the subsequent 2021 survey. This is mainly done through the extant stem and sternposts and the upright port side of the ship as these are clearly visible in both surveys. The use of the GPS system in 2021 enabled rapid and accurate recording of control points for photogrammetric survey and to mark key diagnostic

Figure 7.2: Side view captured from the Photogrammetry model of Rhoda Mary*'s hulk (Image produced by the Author).*

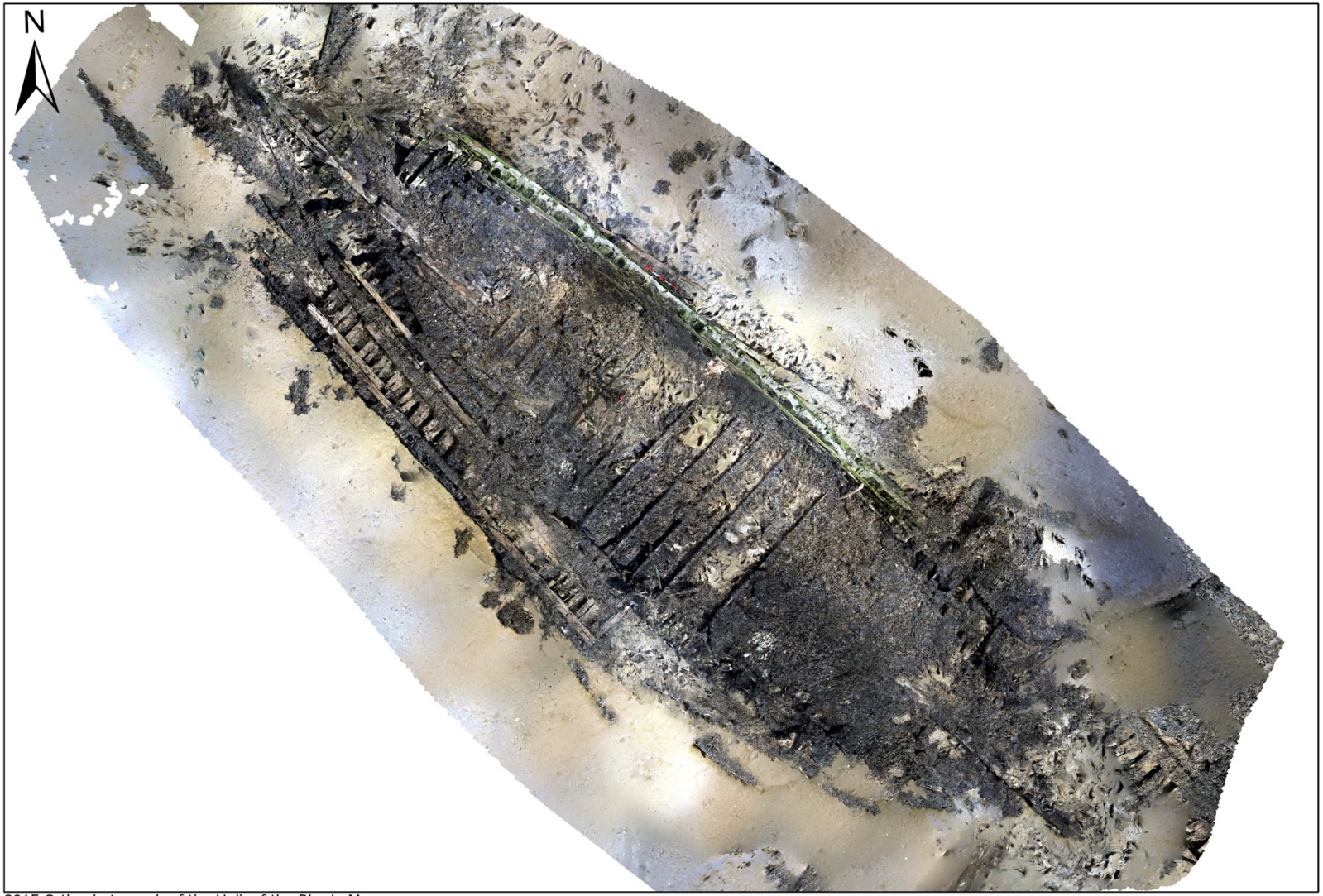


Figure 7.3: Orthophotograph of Rhoda Mary *in 2015 (Map and Orthophotograph produced by the Author, Images courtesy of Dr. Julian Whitewright).*

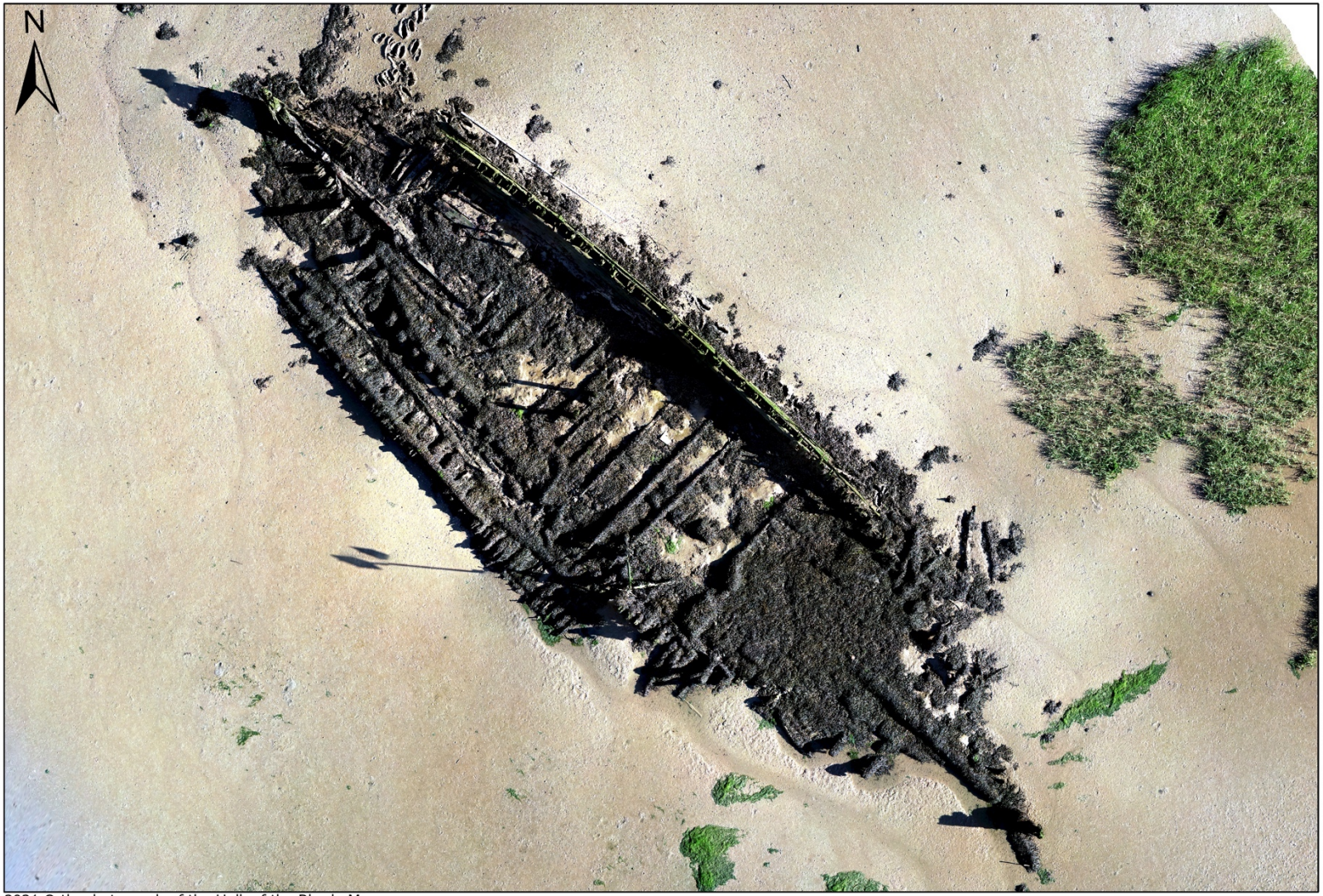


Figure 7.4: Orthophotograph of Rhoda Mary *before the site was cleaned (Map and Orthophotograph produced by the Author, Images courtesy of Felix Pedrotti using a DJI Phantom 4).*

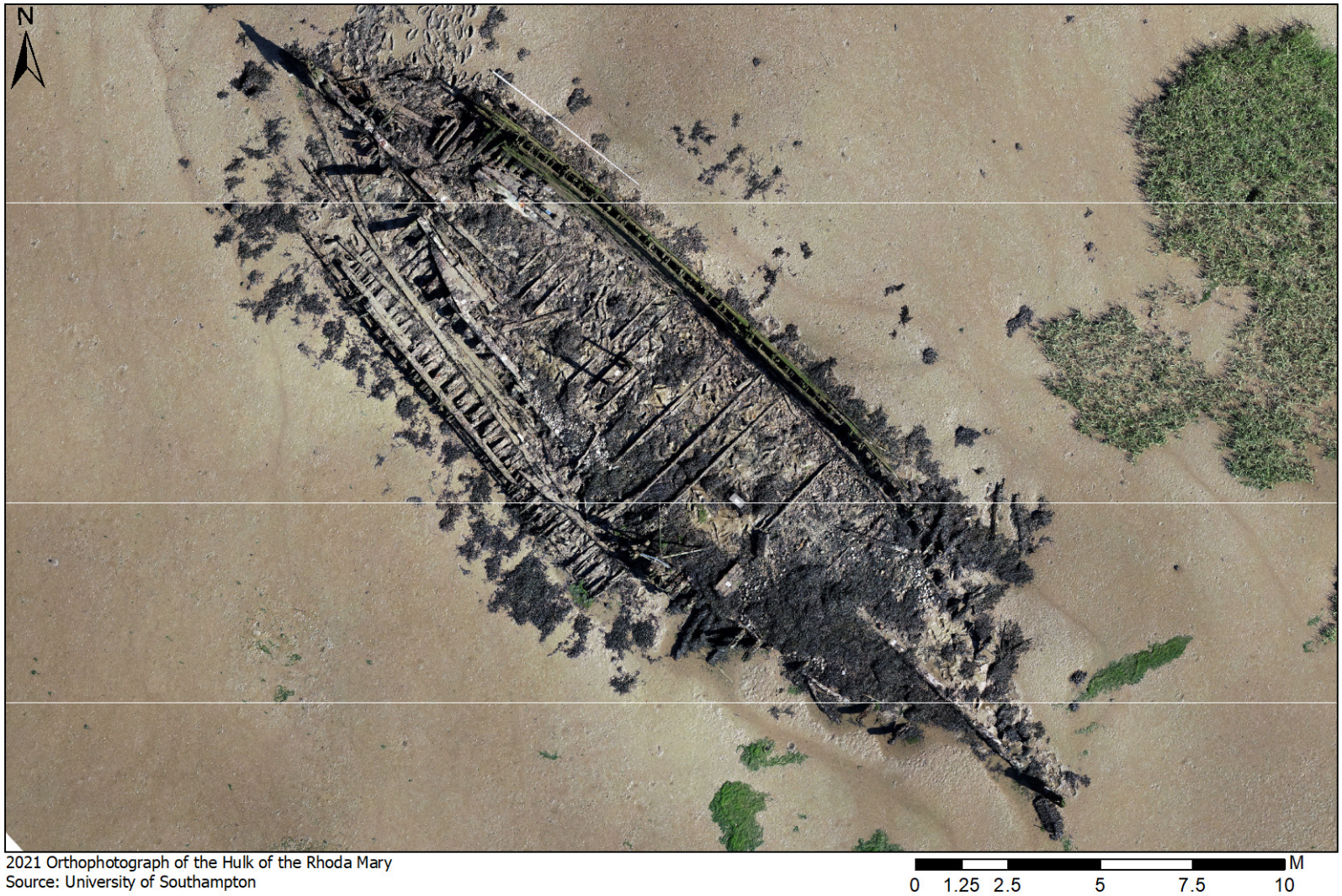


Figure 7.5: Orthophotograph of Rhoda Mary *(Map and Orthophotograph produced by the Author, Images courtesy of Felix Pedrotti using a DJI Phantom 4).*

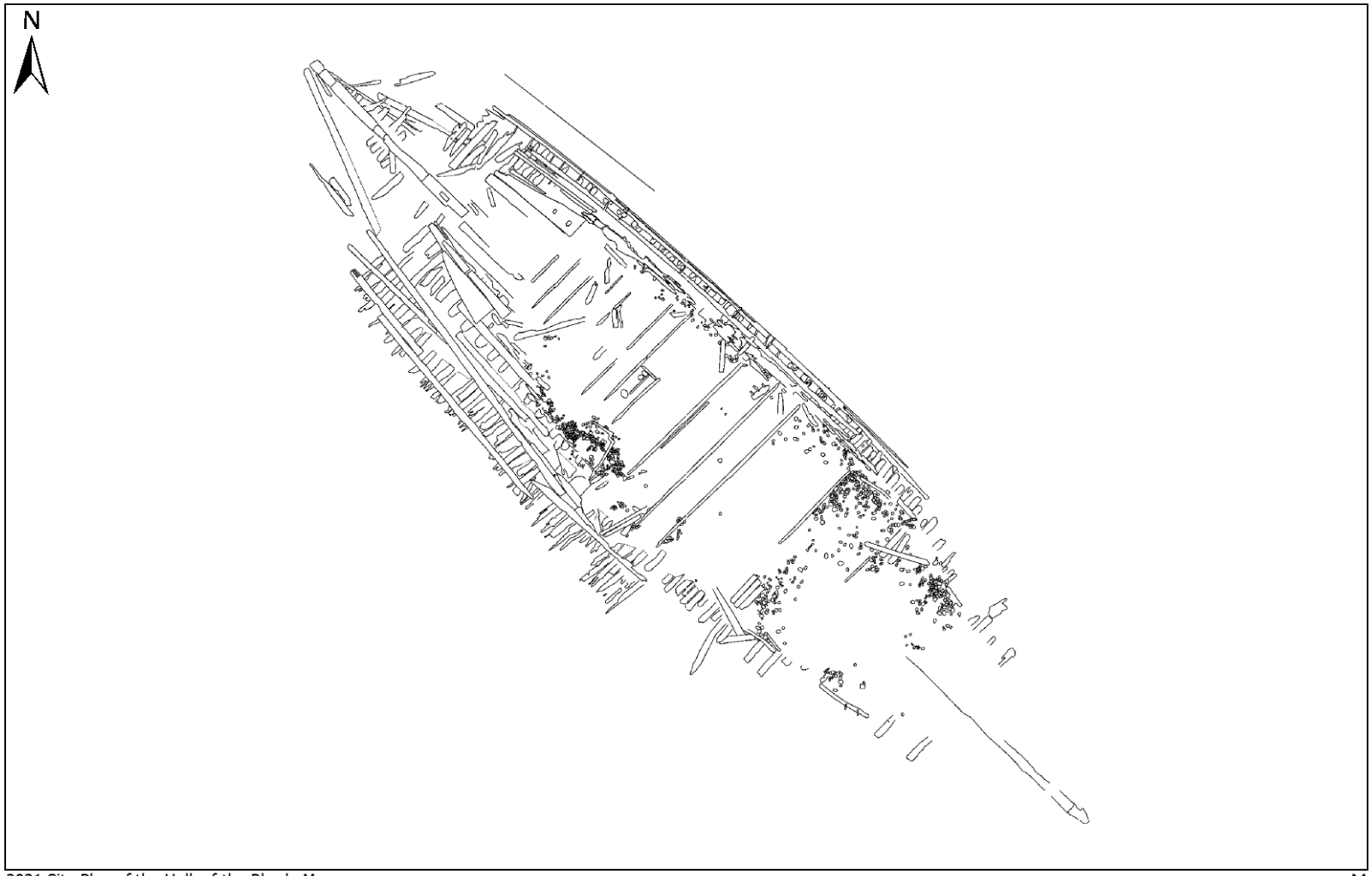


Figure 7.6: Site Plan of Rhoda Mary (Plan by the Author).

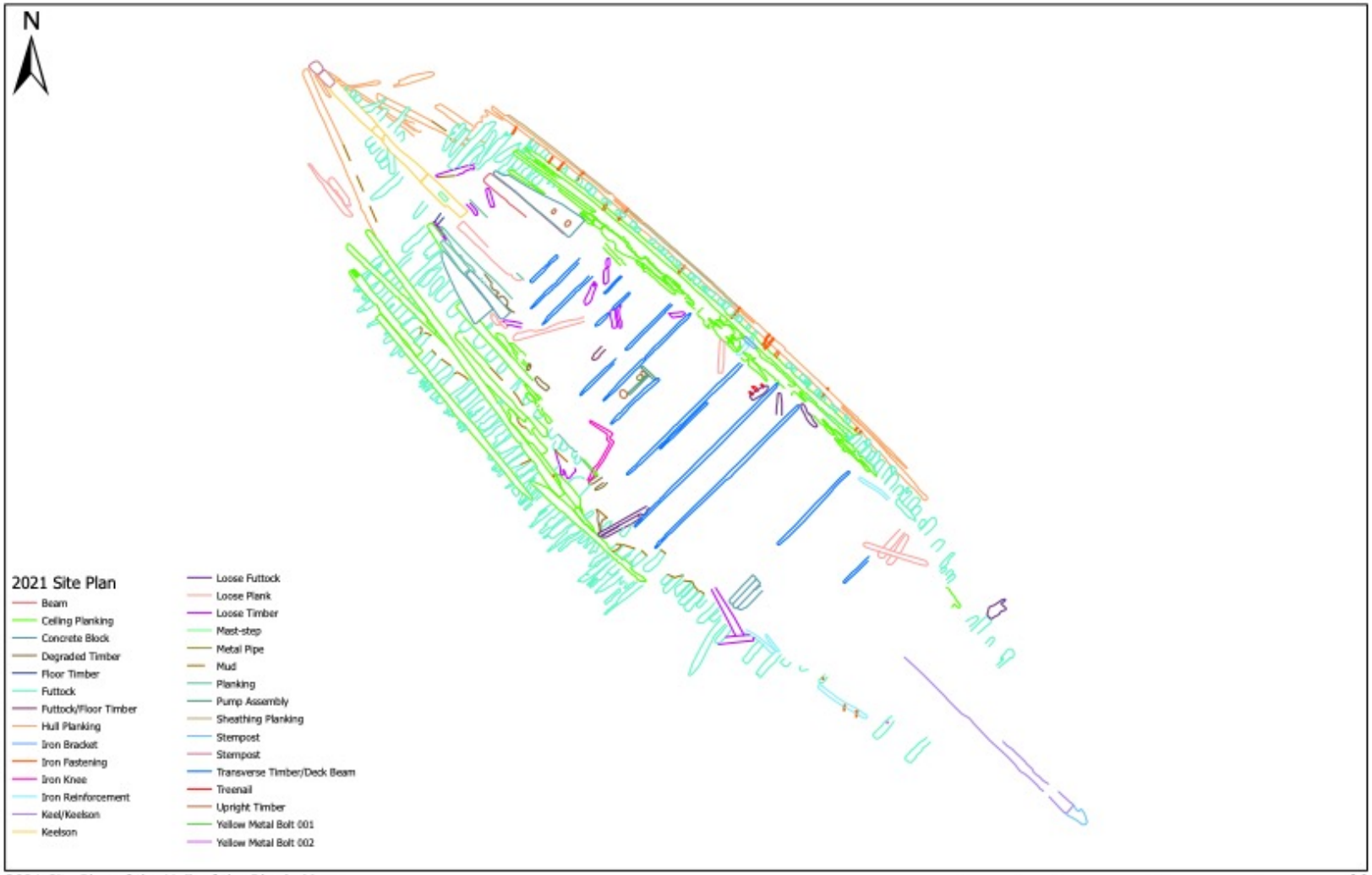


Figure 7.7: Site Plan of Rhoda Mary coloured to show features (Plan by the Author).

components on the site. This ensures the use of those diagnostic components to georeference that past survey will result in a good degree of precision between the two surveys. The 2021 photogrammetric survey was undertaken in bright sunlight, this has had some detrimental impact on the dataset mainly by causing some of the shadowed detail to be lost due to the high level of contrast in the raw images. The images from the survey in 2021 have been used to create the orthophotograph presented as Figure 7.5.

From the orthophotograph and GPS point survey it has been possible to produce a complete site plan, included as Figure 7.6 and Figure 7.7. The two photogrammetric datasets can also be compared against one another. In 2021 two yellow-metal fastenings were located. One at the bow and one at the stern. These were sampled and submitted for metallurgical analysis. The results are presented in 7.6.1. The datasets presented here, two georeferenced and scaled photogrammetric datasets, serve as a baseline for ongoing investigations of the site and future monitoring of a substantial and easily accessible hulk.

7.6. Site Interpretation

7.6.1. Archaeological Description

The hulk is oriented with its bow pointing Southeast toward the main Medway River channel. The stern points Northwest into the riverbank. The site completely drains of water at low tide and the working window is several hours at spring tides. The incoming tide covers the site relatively slowly, although it makes the mud difficult to navigate as it rises. Towards the bow of the site on the starboard side is a navigational marker fixed on a metal scaffold. This has been erected inside the hulk but does not appear to have damaged the site significantly. As this site has been given an identification elsewhere it is tempting to incorporate that into the following examination. However, the following description will focus on the material found on the site and the dating evidence and shipbuilding technologies that can be extracted from it. The measurements and findings presented in this section are summarised in Table 7.1. This is the first time the site has been written up archaeologically. Taking this approach will avoid 'fitting' the material from the initial archaeological investigation into any existing understanding of the site and its history.

Site Features:

The hulk of the *Rhoda Mary* is 28 meters long and is 8.3 meters wide at its widest point. The widest point does not appear to be directly amidships, although this is difficult to establish with certainty due to the collapsed starboard side. The condition of the timbers above the mud is quite degraded. The higher up the structure the material is the worse condition it is in. Upper hull elements retain none of their squared or moulded faces. Frames toward the bow are similarly degraded, even when they are lower in the structure. The mud appears to have preserved lower components better, however the entire site is covered in bladderwrack growing off all the exposed surfaces. It is only possible to recover good measurements from timbers lower in the structure where timbers are still square. The hulk is most complete towards the stern. The sternpost itself is sitting upright and extant and secured to the deadwood. There remains a degree of articulation in the stern assembly including elements of a degraded rudder still attached to the rudder gudgeons. The rest of the site consists of framing timbers, ranging from floors to second and third futtocks, hull and ceiling planking, and structural components such as the keelson and iron braces. There are no topworks or upper hull elements visible. There is evidence of a range of different fastening types, iron, yellow-metal, and wooden treenails. It is possible ballast remains within the lower hull. In some places beneath the bladderwrack are rounded stones that do not resemble any of the other geology on the immediate surrounding riverbank. There is no evidence of any cargo present which is to be expected as the boat was converted to a floating home. In the centre of the ship there appear to be the remains of pumping apparatus and there are pipe fittings or outlets perforating the adjacent section of hull.

Table 7.1: A record of the dimensions recorded from the archaeological investigation of Rhoda Mary's hulk (Table produced by the Author).

Rhoda Mary

Planking			
Type	**Width (Inches)**	**Thickness (Inches)**	
Outer	7.5	3-3.5	
Ceiling	7	2.5	
Sheathing	7-7.5	2	

Fastenings			
Type	**Diameter (Inches)**	**Material**	**Location**
Treenail	1.25	Wood	Throughout the hull, used to secure planking to the frames
Iron Spikes	1	Iron	Used to secure the ceiling planking to the frames
Bolts	1" for Iron, 0.75" for Yellow-metal	Iron	Iron bolts found laterally fastening the frames together
Spikes	0.75	Yellow-metal	One was found securing the butt-end of a plank towards the bow and one toward the stern

Framing Components			
Type	**Sided Dimension in Inches**	**Moulded Dimension in Inches**	**Room and Space in Inches measured from edge of one side of the gap to the other**
Futtock (Number unknown)	4.75-6.75	4.75-6.25	6-8.5
Stem-Post	9.5	8.25	
Stern-Post	10.25	10	
Keelson	11.5	14.5	

Both the stem and sternpost are still extant, each appears to be constructed from two substantial timbers fastened together by iron through-bolts (Figures 7.8 and 7.9). The stem post appears to be missing at least one component further outboard as the spike ends of several iron fastenings protrude forward from the *in-situ* timber. The keelson is still present, and two possible mast-steps were located. Only the port side of the ship remains upright (Figure 7.8), half of the starboard side towards the stern has collapsed outwards into the mud and the remainder has degraded to the level of the mud in places (Figure 7.9). The mud around the site appears to be 6 inches deep at the maximum increasing in depth once some distance from the wreck is achieved. The vessel also appears to be hogged, meaning its bow and stern have bent downwards. This is due to the length of time it was lying on the riverbank with the full weight of the ship on the keel, this can be seen in Figure 7.10. Despite the collapsed section some areas are very well preserved and maintain something close to their original shape. This includes the keel sections that were accessible and some of the collapsed frames. It is certainly because of the protection offered by the river mud that these components have survived so well. If the ship does still contain most of its original ballast it is possible this has contributed to the hogging.

Figure 7.8: The upright Port side of the ship showing the more degraded section toward the bow (Image by the Author).

Figure 7.9: The collapsed Starboard side of the ship. Some of the possible ballast is visible in the lower right (Image by the Author).

When walking the length of the hulk in the middle of the site a solid timber can be felt underfoot beneath the mud. This aligns with where the keelson would be. In places parts of the keelson are uncovered, this suggests that the entire keelson is still present beneath the mud. The areas of keelson that were exposed were 290mm sided. It appears the keelson was assembled from several pieces, although their relationship was difficult to ascertain due to the covering mud, and no fastenings between the keelson and the keel itself were located. The floor timbers of the vessel could not be reached beyond those secured to the base of the sternpost and these were badly degraded. This made it difficult to establish which futtocks were visible above the mud. However, it is thought the second and third futtocks were visible, with first futtocks emerging from the mud in places. These futtocks were measured and ranged in size: from 125-140mm moulded by 130-150 sided on the Port side of the site and 120-170 moulded by 120-170 sided on the Starboard side. The arrangement of the frames appears to be in groups of three. The uppermost futtock, which also happened to be the tallest, towards the stern contacting to the next futtock down which in turn contacts the lowest futtock towards the bow repeating along the length of the ship. These groups of frames are separated from one another by a 150-220mm gap referred to as the “space”.

Figure 7.10: Broadside of Rhoda Mary showing the hogged keel as the bow and stern are lower than the middle of the site (Image by the Author).

The sternpost of the vessel also appears to be constructed from several timbers (Figure 7.11). The outer timber measures 250mm sided by 250mm moulded and the inner timber measures 210mm sided by 250mm moulded. The stern itself is made from multiple different timbers with a stern knee (a large curving timber running from the inside of the sternpost to join the keelson). This timber is 240mm across the top and 370-400mm tall. Below this large timber there appeared to be additional components although it was not possible to measure these as the mud buried them. The stem post (Figure 7.12) was constructed from at least two timbers, with evidence of a third from protruding fastenings. The timbers of the stem post measured 210mm sided by 270mm moulded for the

outermost timber and 270mm sided by 270mm moulded for the internal timber. The inner timber appears to curve to follow the keelson but disappears beneath the mud, possibly the bow deadwood.

The upright section of the hull on the Port side still retained its outer and ceiling planking along with sacrificial wood sheathing. The sheathing planking was 180mm wide and 64mm thick, with outer planking measuring 190 mm wide by 75-90mm thick and finally the ceiling planking measured 180mm wide by 64mm thick. The outer planks were fastened to the frames using treenails 32mm in diameter one for each plank into each frame. The ceiling planking was fastened with iron spikes that protrude through to the outer planking in some places. In two places, one on the port side towards the bow and another starboard towards the stern, yellow-metal fastenings (yellow-metal is a term used for a copper alloy when that alloy's exact nature is unknown) were identified securing the butt ends of the planking. These fastenings passed through the outer planking, frame, and ceiling planking to be secured by clenching the bolt with a washer on the inboard face (Figure 7.13). Clenching here refers to the practice of bending or flattening one end of a bolt to prevent it withdrawing. At the highest level of preserved timbers, a similar technique is noted securing the outer planking, frame, and ceiling planking with one iron bolt through all three components clenched on the inside. The hood ends of the outer planking are secured with 20mm diameter iron spikes (a spike is a term for a large nail). A complete list of these measurements is provided in Table 6.1 along with the measurement ranges of the frames.

The construction of *Rhoda Mary* follows a carvel building tradition. Carvel here is taken in the sense McGrail (2015: 384) defines it in his discussion of the terms used to describe shipbuilding traditions. The *Rhoda Mary* appears to have been constructed frame-first as the planking present was flush-laid and not edge-fastened. The presence of lateral fastening in the frames also suggests these were put in place before planking was applied, as carvel ships are constructed frame-first. This construction sequence indicates *Rhoda Mary* belonged to the same overall carvel shipbuilding tradition as the other ships discussed by this project.

Framing: The bow section of the ship is the most heavily degraded. There are no framing timbers visible above possible first futtocks. The stempost is still upright and extant and retains some articulation with the extant section of keelson. This possibly indicates the keel remains intact beneath. The futtocks that are visible are single timbers projecting from the mud. These retain none of their original faces unless they are still square beneath the mud. Due to their distance from the keelson, it is thought these are most likely the tops of first futtocks or second futtocks, not floor timbers. One of these frame timbers on the starboard side had a yellow metal fastening on its inboard face.

Moving aft through the ship the preservation of framing timbers gets progressively higher. On the port side of the vessel the timbers remain upright and articulated with hull and ceiling planking. It appears this section is comprised of first futtocks, second futtocks, and third futtocks. The arrangement of these frames is noteworthy. The frames are arranged in ascending order, first futtock fastened to an adjacent second futtock on its forward side and the third futtock the fastened to the second futtock on its forward side (see Figure 7.14). Thereby forming an arrangement of three frames rather than an alternating arrangement of two. The identification of first futtocks is established through the same means as those in the bow. Based on the distance between these visible timbers and the buried keelson it is unlikely these are floor timbers. With these frames remaining upright it is likely they remain attached to the keel and floor timbers.

Figure 7.11: The upright sternpost of the ship. There is one rudder gudgeon toward the top of the post and part of the rudder sticking out of the mud at the bottom (Image by the Author).

Figure 7.12: The upright stem post. Some iron spikes can be seen protruding at the front indicating a forward timber is missing (Image by the Author).

Figure 7.13: One of the yellow metal fastenings identified in one of the ship's frames. This fastening was sampled for analysis as YM001 (Image by the Author).

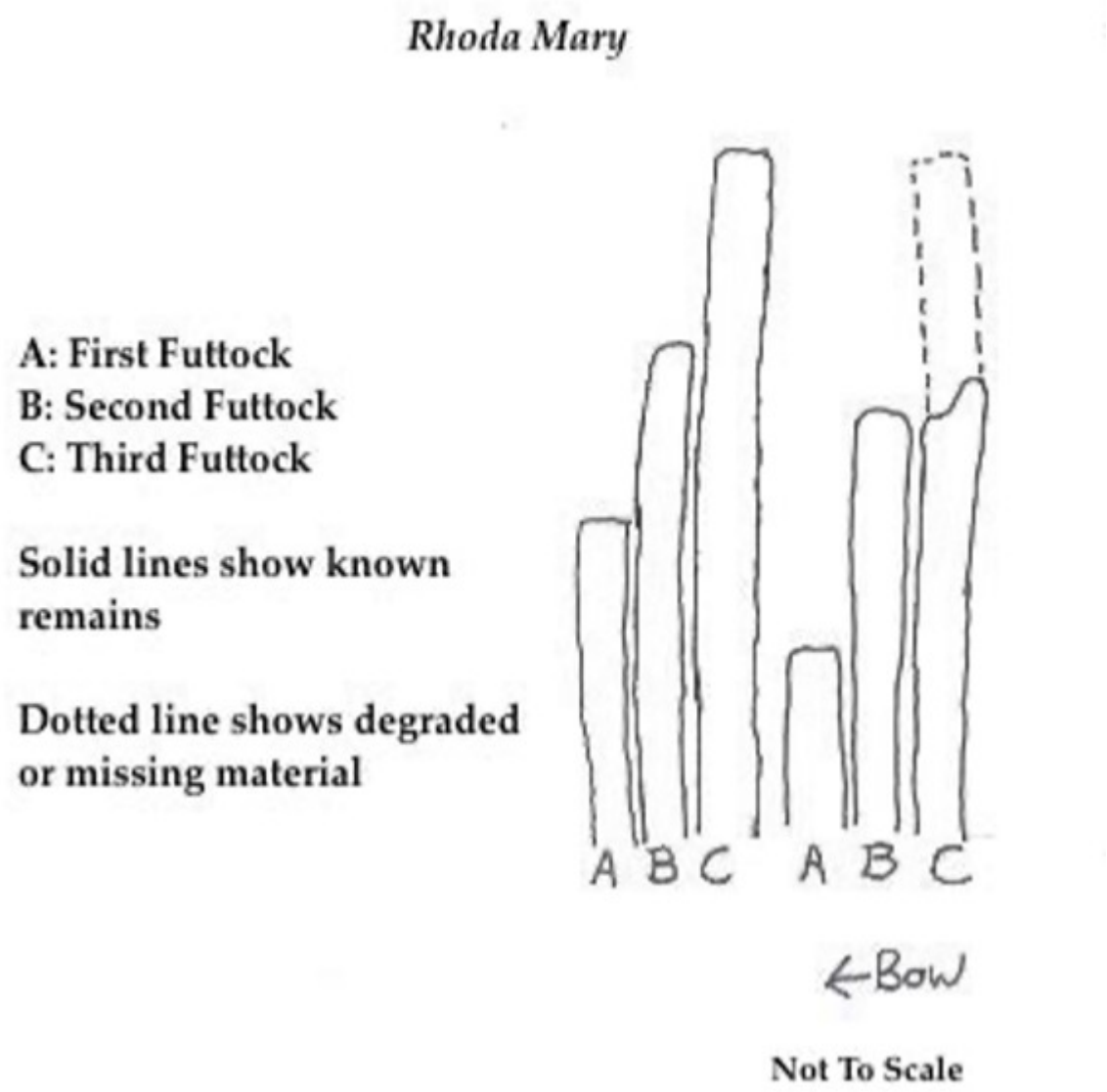


Figure 7.14: Drawing of the Rhoda Mary's frame arrangement, showing the three-piece arrangement of frames. (Image created by Author)

The frames on the starboard side of the vessel have collapsed outboard. That collapsed section otherwise remains articulated. The same arrangement of frames is present here with an arrangement of three frames progressing forward. There is much less ceiling planking preserved here allowing better access to the remaining frames. The heads of floor timbers are visible towards the stern. These floor timbers remain associated with the visible sections of keelson. It appears to be at the junction between floor timbers and first futtocks that the starboard side has separated from the rest of the ship. Further forward in the ship the lowest visible framing timbers appear to be first futtocks in this area. The highest preserved starboard frames are second futtocks. These are heavily degraded with no squared timber visible.

The preserved frames do allow some idea of the shape of the hull. This is most evident when viewed from above using the orthophotograph (Figure 7.5) and site plan (Figure 7.6 and Figure 7.7). The hull

appears to have the widest beam forward of the measured centre of the site. There is a narrowing of the hull from this point back to the stern. There are very degraded floor timbers attached to the sternpost but no superior frames that relate to them can be identified. Hull planking is secured on some of these degraded frames. A keelson or keelson rider can be seen above the mud running from the sternpost. On top of the keelson in the stern is what appears to be a mast step. It is difficult to be completely certain of this identification as there is nothing else to connect the now degraded hole in the keelson to any sailing rig. The works to turn the ship into a floating home discussed in 7.10 further complicate matters as it is unclear what changes were made at this stage. These conversion works are likely to have some relation to certain features in the site.

The 12 visible transverse beams running across the full width of the ship are possibly further evidence of the conversion. These are not fully preserved, only two beams stretch fully from side to side. The others have degraded ends meaning they were probably longer than they are now. The two that do stretch across the site are scarfed to fit the curve of the ceiling planking. There are no obvious fastenings in the timbers or any evidence of fastenings now missing. There is also no evidence of any method used to fasten these timbers into the hull. As they are only partially clear of the mud and stone in the bottom of the hull it is possible there is a fastening system that is not visible.

In addition to the framing timbers there are several iron framing components present on and around the site. Attached to the upright section of hull is a vertical iron brace. This brace follows the curve from the top of the hull disappearing below the level of the mud. It is secured to the hull with iron spikes along its length and an iron bracket at the top. The bracket is also fastened with iron spikes at either end. Across the site there are a further six disarticulated iron brackets. These are the same shape as the in-situ example and retain their iron spikes. There is a disarticulated iron knee in the centre of the hull. This has no remaining fastenings attached. There is another disarticulated iron knee around 50m from the site further up the riverbank. The knee is fastened to a timber beam with iron spikes. It cannot be definitively attributed to *Rhoda Mary,* but it is a very similar size and shape to the one within the wreck.

Planking: There is a good degree of preservation to both hull and ceiling planking on the site. Much of this planking remains secured to the frames. There are also several disarticulated planks across the site which are harder to attribute to hull or ceiling planking. Along the collapsed starboard side there is less surviving celling planking. The measurement ranges for the ceiling planking are contained in Table 6.1. On the starboard side the planking survives to the middle of the site. It is also preserved to the top of the surviving frames. Below the collapsed frames there are still areas of hull planking. The topmost of these planks can be recorded for thickness but they are otherwise inaccessible.

On the port side of the ship there is a more extensive preservation of planking. It is possible this is a result of the port side remaining upright. Here the planking covers the entire side up to the bow quarter where the hull is no longer preserved except for some degraded frames. Both the hull and ceiling planking are preserved to the top of the remaining third futtocks. This is noteworthy as it suggests the ceiling planking continued above this level of frames. In the investigation of the wreck of *Ocean* the ceiling planking was identified to only reach to the top of the second futtocks. The hull planking is preserved from the top of the frames down to the level of the mud. It is assumed the hull planking continues below the mud.

The ceiling planking is joined with butt end joints located at frame stations. The hull planking has been joined in the same way. There is no evidence of any metal sheathing. There is a second layer of planking on the outer side of the hull, this is possibly a sacrificial sheathing layer as it is thinner than the hull planking. This is most clearly identifiable at the top of the upright port side, and it is not clear if the strakes below are comprised of two layers of timber or one solid plank. This double layer of

timber could therefore be an external wale secured to the hull planking, rather than a layer of sacrificial timber planking. Due to the level of degradation and coverage of bladderwrack it is difficult to establish this with any certainty. This layer of timber is not visible on the collapsed starboard side. The outer hull planking measurements indicate these are thicker and wider planks than the internal ceiling planking. Finally, it appears there are a range of fastening methods implemented across the site to secure planking to frames at different points.

Fastenings: Since there is a good amount of the structure remaining upright it is possible to identify fastenings used across the ship. There are treenails across the site in both the ceiling planking and for the outer hull planking. However, the heads on the outer hull are particularly degraded. It is possible to identify a single wedge in the inboard face of treenails toward the stern of the ship (Figure 7.11). The treenails that can be measured are on the inboard face of the frames. These are around 20mm in diameter. On the external face of the ship, it is difficult to identify the sealing method for the heads of treenails due to a combination of degradation and bladderwrack build-up on the outside of the hull. During the 2015 survey some treenails were found that appeared to be crosscut on the outboard face

Figure 7.15: Inboard face of a treenail from Rhoda Mary showing a single wedge driven as a caulking method (Image by the Author).

There are also iron fastenings present as through-bolts in the planking. These are particularly visible in the top of the upright hull section. The heads of these fastenings appear to have been clenched confirming they are through-bolts. In two locations on the site there are yellow metal fastenings. It appears these are spikes as they did not penetrate totally through the frame timbers and were driven into first futtocks. Samples of the yellow metal were taken for metallurgical analysis (Northover 2022 and Appendix B.2) which revealed they were composed of brass that was most likely hot worked into a spike (Northover 2022: 1). The composition of the brass alloy is typical of that used in the 19th

century suggesting these were introduced to the ship either at construction or during the time it was working as a merchant vessel (Northover 2022: 2). Elsewhere it appears there are also iron spikes used to secure ceiling planks to frames. These were identified on the collapsed starboard side of the ship. These were a similar size and shape to the yellow metal fastenings and found in the same level of futtock.

The fastenings used in the frame assembly were iron. In all the visible frames through-bolts could be identified securing the framing sequence sided face to sided face. This was the same throughout the ship. There are no fastenings evident in the visible floor timber sections on the collapsed starboard side. It is likely these have been lost through corrosion leading to the collapse of this section of hull. In both the stem and stern assemblies iron fastenings can be seen holding the various timber components together. These are a mixture of through-bolts and spikes. At the stern of the vessel there are the remains of a rudder gudgeon that is still attached to both the sternpost and the eroded pieces of the rudder.

Strange fittings and fixtures: In the upright section of hull there are a series of fixtures that are not fastenings or structural components. There are two threaded metal fixtures that fully penetrate the hull. These are possibly outlets for the pumping apparatus, or a later fixture related to the ship's conversion to a houseboat and engine installation. Located almost directly in the centre of the site are the remains of a pump. This is comprised of two upright pipes and two upright timbers. The entire assembly Is boxed in by thin beams. There are also areas of disarticulated pipework in the centre of the site. It is uncertain if these are directly related to either the pump apparatus or the threaded fixtures. There do not appear to be any other components related to this on the site.

In MacGregor and Greenhill's (MacGregor 1997: 62-5) visit to the site they noted the presence of a windlass. There is no surviving evidence of this on the site today. Toward the stern of the site are two areas of concrete, it is unclear what purpose they served but possibly relate to the ship's conversion to a floating home. These are set into the stern section of the ship. The port piece appears to be *in situ* against the timbers and frames of the hull. The starboard section is likely close to its original position. As the starboard side collapsed it is likely the timbers and other components here have moved leaving the concrete section slightly disarticulated.

7.6.2. Dating

The diagnostic components on this site are primarily the framing and fastening elements. The iron knees found in and near the site indicate this is a ship built after the late 18th century. The use of iron knees and bracing inside the ship confirm this diagnosis. Taking the date of 1814 as the date from which iron framework became widespread, we can be confident this ship was built in the 19th century.

The combination of treenails, and iron and yellow metal fastenings used for the same application—securing hull and ceiling planking—is noteworthy. As was shown in Chapter 5 the treenails are not indicative of the date of ship construction in the same way other fastening types are. The caulking method identified on the inboard face of treenails, a single wedge, is a regular approach to sealing this end of a treenail. Treenails—the wooden nails most often used to secure planking to ship's frames—must be sealed to ensure they are both secure and watertight. This sealing process involves expanding the head of the nail by driving at least one wedge into it. The universal technique for doing this inside the hull is a single wedge driven into the middle of the treenail. The external faces of treenails on *Rhoda Mary* have been sealed with crosscuts. These were identified in the 2015 site visit and are a method used in 19th century shipbuilding in the Southwest (Adams *et al.* 1990: 115-117), however this does not serve to provide a date. The yellow metal fastenings are the second significant

component for dating with the composition of the brass alloy suggesting 19th century manufacture (Northover 2022: 2).

The range of fastenings across the site could indicate different phases of repair or works to the ship. The use of iron alongside yellow metal to fasten hull and ceiling planking is potentially most indicative of this. The yellow metal fastenings have only been located within frames in the bow and stern. The rest of the hull appears to utilise iron and wooden treenails. The mixture of iron spikes and iron through-bolts in the same areas of the hull to affix areas of planking may also indicate two separate stages of construction or repair.

7.6.3. Summary

The hulk measures 28m in length and between 6m and 8.3m in width. We can be confident in the length of the ship. The width is harder to establish as one of the hull sections has collapsed. There is a mast step located in the stern and no evidence of any other propulsion method. The hulk is therefore that of a wooden sailing vessel. The hull framing is of timber with components arranged in ascending order with little space between each set of futtocks. The futtocks are secured to one another transversally using iron through-bolts. There is no evidence of any fastening of the framing timbers vertically. The hull planking has been secured to the hull with a mixture of wooden treenails and iron bolts. Some of those iron bolts appear to penetrate hull and ceiling planking and are clenched. There are yellow-metal spikes found on the inboard faces of two frames at the bow and stern. These were disarticulated from any planking, but it is likely they were used to secure ceiling planking. The treenails identified on the site have been secured with a wedge in their inboard head and a crosscut on the outer face.

There are some dateable components identified on the site. The presence of iron knees and iron bracing suggest the ship was built sometime in the 19th century. Analysis of the yellow-metal fastenings yields a composition of brass, copper alloyed with 30% zinc and trace amounts of other impurities. Using the same information as that in Chapter 6 it is possible to use the rough dates indicated by the Lloyd's Register as a guide. The spread of iron framework indicates a ship built after 1814. Many of the construction elements bear a striking similarity to those employed on the construction of *Ocean.* Further refinement of the date and origin of this ship will require the utilisation of documentary and archival resources. This is the next stage of this investigation.

7.7. Site History and Context:

The results of the archaeological investigation show it is possible to gather significant information about a ship through the study of its material remains. However, that investigation shows the similarity of technologies employed in the construction of *Rhoda Mary* and the construction of *Ocean.* Using the archaeological material, it is possible to establish a date within the 19th century. However, more precise dating is difficult. The results of metallurgical analysis can further focus our understanding but there are still difficulties present. The main issue a comparison of *Rhoda Mary* and *Ocean* highlights is the fact that there is no 'end date' for a shipbuilding technology. It is not really possible to say, "this particular component", or "this way of framing a ship" are exclusively products of a certain decade. The two ships were built 40 years apart and the similarity in their construction despite that intervening period illustrates the need to engage with other resources to refine the results of our investigation.

The identification of the site has been established prior to the involvement of this project. As the site is not a shipwreck a different suite of resources needs to be used. Shipwreck Indexes and Casualty Returns do not record ships laid up or sold out of service. Their concern is the loss of working ships. The first recorded identification of this site comes from Basil Greenhill in his book *The Merchant Schooners* (1978). The site was visited by Greenhill and MacGregor, both of whom are established

maritime historians and experienced ship surveyors. In the process of that visit the two created a lines plan of the ship. Unfortunately, the process by which they identified the site is not fully explained. The details of the ship's history recounted in their work do correlate with the site in both its current location and the structural elements available. However, the origin of much of this information is unclear. It is possible some of this is local knowledge. Or it is due to the fact the site was much more complete when Greenhill and MacGregor visited and therefore more clearly identifiable.

The other major source of evidence about the site is the *Rhoda Mary Project*. This project intended to recover the remains of *Rhoda Mary* from its current location and restore the ship in Truro, Cornwall. Further details about the ship's life resulted from the work undertaken by this project. The relationship of the ship to Cornwall and the West Country is a particular focus of this background. Today the project is no longer focused on the hulk of *Rhoda Mary.* Instead, the project is building a Falmouth Pilot Cutter called *Pellew* at its shipyard in Truro*.* It was the *Rhoda Mary Project* that brought the site to the attention of this thesis. A further result of this project is to make the identification of the site more secure by developing the initial work of Greenhill and MacGregor (see MacGregor 1997: 62-4) and establishing a full record of the site with a straightforward, repeatable, methodology.

The next stage in collating the information and story of *Rhoda Mary* is the evidence contained in the *Lloyd's Register of Shipping*. Unlike *Ocean* it has also been possible to find the Survey Report for the ship. This can be integrated into our investigation alongside the information from the Register itself and adds considerable detail about the ship's construction. That investigation is set out in 6.8 and 6.9. Combining the results of our archaeological investigation with these documents allows us to explore the details of *Rhoda Mary*'s story. It also allows the investigation to consider the site as a more complete assemblage. All these documents would have been essential components for this ship to function during its working life and therefore must be considered alongside the material of the hulk itself. Furthermore, these sources allow us to test and examine elements of the story set out in Greenhill's work and the historical context established by the *Rhoda Mary Project*. A combination of these three sources has been used to assemble the background of the site.

7.8. The schooner *Rhoda Mary* (1868-1925)

Rhoda Mary was built by the shipbuilder John Stephens at his shipyard at Point, near Truro. The ship was surveyed for the *Lloyd's Register of Shipping* by the surveyor F. H. Thomas. It is recorded in the supplement for the 1868 register book. *Rhoda Mary* was given the signal letters M.H.S.L. and the official number 62036. The letters and numbers are not recorded in the early Register books. However, these are recorded for all ships in the register after 1874. The survey was undertaken whilst the vessel was being built. The surveyor may therefore have seen elements of the ship's construction that would be invisible at a later stage of the shipbuilding process or when the ship was afloat. The survey report does give the launch date for the ship, as the 21st of May 1868. It was likely completed after this, once the ship was in the water, as the date for the committee's minutes of the characterisation is given as the 30th June 1868. After this survey the ship is then recorded in the *Lloyd's Register of Shipping* every year until it leaves service. The report describes a two-masted schooner with both iron hanging knees and English Oak framing. There are a range of fastening materials used in this ship, with yellow-metal, iron, and wooden treenails all recorded. The full survey report is included as Figure 7.12 and Figure 7.13. A specific breakdown of the components and dimensions recorded in the document is included in Table 7.2 and Table 7.3. This section will discuss each part of the survey report in order and relate these sections to the findings of the archaeological investigation from Section 7.6.

Table 7.2: A tabulated version of the measurements from the first page of the Survey Report for Rhoda Mary showing timber dimensions (Table produced by the Author transcribed from a Lloyd's Register Survey provided by the Lloyd's Register Foundation).

Length aloft	Feet 101		Inches 2	Extreme Breadth	Feet 21		Inches 9	Depth of Hold	Feet 11	Inches 5	
Do Sec 39 98.5ft											
Scantlings of Timber	In Ship			Required Per Rule			Thickness of Plank				
	Sided	Moulded Middle	Moulded Ends	Sided	Moulded Middle	Moulded Ends	Outside	Inches		Inside	Inches	
Timber and Space	20 inches							In Ship	Required Per Rule		In Ship	Required Per Rule
Floors	9	10	8	7.5	7.5	6.5	Garboard Strakes	3	2.25	Limber Strakes	4	2.75
First Foothooks	8	8	7	6.5	6.5	5.5	Garboard to Bilge	3	2.25	Bilge Planks (2)	5	2.75
2nd Ditto	7.5	7	6.25	6	6	5.5	Bilge Planks (2)	6.45	2.25	Ceiling in Flat	3.5	1.75
3rd Ditto	6.5	6.25	5.5	5.75	5.75	4.5	Bilge to Wales	3.5	2.25	Ditto Bilge to Clamp	3	1.75
Top Timbers	6	5.5	5.5	4.5	4.5	4.5	Wales	4.5	3.5	Hold Beam Clamps	4.5	-
Deck Beams No: 25 Average Space: 3ft	8	8	6.75	7.5	7.5	6.25	Topsides	3.5	2.5	Deck Beam Ditto	3.5	2.5
Deck Beams, length amidships	20.5 ft						Sheer Strakes	3.5	2.5	Ceiling 'twixt Decks	3	1.25
Hold Beams No:2 Average Space: amidships	10	10	10	10	10	8.5	Plank Sheers	3	2.25	Hold Beam Shelfs	-	-
Hold Beams, length amidships	20ft						Waterways - Upper Deck	10 x 8.5	7.5 x 6.25	Deck Beam Ditto	9.5 x 7	7.5 x 6.25
Keel	11	13	13	9	9	9	Waterways - Lower Deck	-	-			
Scarphs of Ditto one of 8ft	By Rule			4ft 3in			Ditto, saying surface against Timbers	7	6.75			
Keelsons	12	25	20	10	10	10	Upper Deck	2.5	2.5			
Scarphs of Ditto. 2 of 6 feet	By Rule			4ft 3in								

Table 7.3: A tabulated version of the fastening types and measurements from the first page of the Survey Report (Table produced by the Author transcribed from a Lloyd's Register Survey provided by the Lloyd's Register Foundation).

Size of Bolts in Fastenings, distinguishing whether Copper, Yellow Metal, or Iron; also of Treenails										Copper or YM. In Ship	Iron in Ship.	Inches required per Rule
	Copper or YM. In Ship	Iron in Ship.	Inches required per		Copper or YM. In Ship	Iron in Ship.	Inches required per	Hold Beam Bolts in	Waterway			
									Knees	—	3/4	3/4
Heel-Knee, & Deadw'd abaft	—	1	15/16	Transoms and throats of Hooks	—	1	15/16		Shelf or Clamp			
Scarphs of Keel, No. 9	—	1,4 3/4	3/4	Arms of Hooks		1	12/16	Deck Beam Bolts in	Waterway		3/4	11/16
Keelson Bolts through Keel	—	1	13/16	Thro' Bilge & Limber Strakes	3/4	—	5/8		Knees		3/4	3/4 or 11/16
at each Floor...				Thickstuff over Double Floors	—	—	—		Shelf or Clamp		5/8	11/16
Bolts thro' Heels of Timbers	—	7/8	11/16	Butt End bolts	3/4	3/4	5/8	Nails or Bolts in Flat of Deck			Iron	
against Deadwood				Pintles of the Rudder	2 1/2		2	Treenails...Inches		1 1/4 + 1 1/8		

The dimensions of *Rhoda Mary* are recorded as 101.2ft in length, 21.9ft in breadth, and 11.05ft depth of hold. The dimensions recorded in Table 7.2 include the framing and planking timbers. These dimensions show a consistency in the sizes of the timbers. There is a gradual reduction in the bulk of futtock timbers as they progress up the ship from Floors to Top Timbers. These dimensions also record that the framing timbers of *Rhoda Mary* exceed the dimensions required by the rules of the *Lloyd's Register of Shipping* discussed in Section 2.3. This included exceeding the required dimensions for the keel and keelson. Therefore, the frames for *Rhoda Mary* were thicker and more substantial than they were required to be. The same general trend of exceeding the mandated dimensions can be seen in the dimensions of the hull planking. Exceeding the mandated sizes is a positive in this context. The planking is a full inch thicker than required but all the external planks are uniform thickness and size. The internal planking deviates from this regularity. The inner planking is much thicker than required by the rules and has less consistency between planking categories. The deck and

hold beams demonstrate the same trend. The report also deals with the fastenings used throughout the ship, the dimensions for these are recorded in Table 6.3. There is a mixture of iron, yellow-metal, and treenails used throughout. The framing uses iron fastenings, again these exceed the required dimensions. The largest bolts are used for the keel and deadwood. The planking is fastened by a mixture of iron and yellow-metal, with the butt ends secured by both yellow-metal fastenings and iron. The hold and deck beams are all secured with iron and the deck is fastened with iron nails. Once again, all these components exceed the required dimensions for the rules set by the Lloyd's survey. The treenails recorded are also larger than required although the caulking method used is not recorded.

The survey report records the floors and futtocks of the ship are built from English Oak. As are the stem and sternpost including their aprons and deadwood. There is an "American Grey Elm" keel, Tamarac keelson, and Tamarac and English Oak deck beams. The frames are bolted together up to the gunwale and the butts of those timbers are close together. The knees are English Oak and iron, comprising iron lodging knees and iron hanging knees. The iron knees and bolted frames correlate with the findings of the archaeological investigation. There is no reference to the curved iron braces recorded during the investigation of the hulk. It is possible these are a later addition and may relate to the conversion of the ship to a floating home. The ship's hull planking is divided into three sections. Lower planking, from keel to the heads of the first futtocks, is American Grey Elm. The mid-level, from the first futtock heads to the Light Water Mark is Tamarac. Then the topsides and wales are Tamarac. The decks and ceiling planking are pine. Yellow Pine used for the decking and Baltic Red Pine for all the areas of ceiling planking. The survey report also records the types of fastenings used. All the butt end bolts are of yellow-metal with one bolt in each butt end driven through and clenched. The bilge strakes are similarly bolted through and clenched. Given that the report seems to indicate all these fastenings are yellow-metal, it does not correlate with the findings from the archaeological site where only two yellow-metal fastenings were identified. Finally, the ship is recorded as not receiving any form of sheathing. This is at odds with the investigation of the hulk's remains which identified a thin layer of timber over the hull planking thought to be sacrificial wood sheathing.

The ship's rig (sails and running rigging) and fittings (Cables, Anchors, Long Boats, Windlass, Capstan, Rudder, and Pumps) are also recorded in this report. These are the elements that relate to the numbered part of a ship's characterisation. These are noted as "Good". The ship is also recorded as having an Iron Chain Cable, an essential component for a ship to reach a characterisation of "1" for rig and fittings. In the "General Remarks" that follow we are given a more detailed understanding of the survey process. This includes dates for different stages of the ship's survey, October 6th, 1867, for the completion of the frames, December 13th, 1867, when the Beams are put in, and May 15th, 1868, at the ship's completion. In the General Remarks it appears that the builders of the ship communicated most of the dimensions of the ship via letter to the Lloyd's Register committee. These were then reviewed by the "Resident Surveyor", F.H. Thomas, and confirmed in this report. This section confirms all the timbers construction exceed the required dimensions although the surveyor notes: "*there is a little difference in the actual measurements and those given by Mr. Chellew* [author of the letter to the Committee]". The only area the ships seems to be lacking is the chain cables: *"although larger than required are each five fathoms short"*. Presumably this means the chain cable is a heavier gauge than required but shorter in length than required by the rules. This leads to a point of interest to this project in the comment that follows: "*the builder places himself entirely in the hands of the Committee on these points, and will carry out whatever wish they may be pleased to express*". This demonstrates the significant influence the process of survey and characterisation has on shipbuilders by this date.

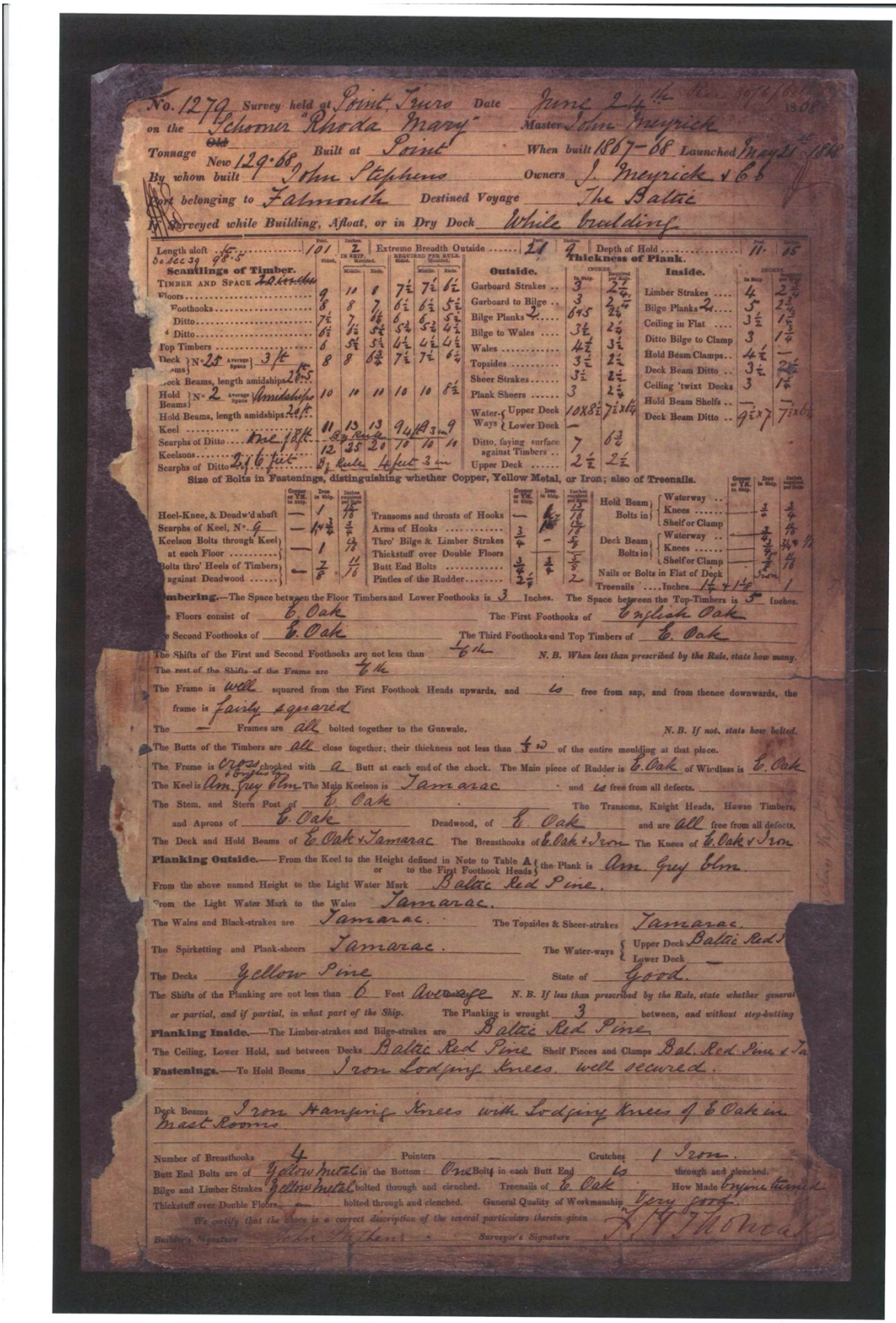
As a result of its survey *Rhoda Mary* was given a rating of A1 for eight years. This reflects the rules for classification in the 1868 register book. This is another area the Lloyd's Register changes throughout

the century. The rules in 1868 specify that the length of time a ship is given a certain classification are determined from the construction and quality of a ship, there is no more specific instruction. At the time of *Rhoda Mary*'s first registration the rules for classification indicated the length of time a ship could be classified as "A" were to be determined from the original construction and quality of the vessels, the materials used, and the "mode of building". The registration also depended on regular re-survey of the vessel "*within periods not exceeding four years in the case of vessels classed eight years and under*" and not exceeding half the assigned time for longer periods. So, a vessel assigned for 10 years needed to be resurveyed within 5 years of that original assignation. The survey also adds the abbreviation A&CP after the characterisation of the rig and fittings. This indicated the Anchors and Cables have been "Proved [Tested] at a Public Machine". This section also notes the condition of the ship's caulking across the Deck, Bottom, and Waterways as "Good". Overall, this report provides an impressive record of the state of *Rhoda Mary* when it was launched in 1868. There is an entry given to the quality of the workmanship which is listed as "Very good", and the surveyor's comments and remarks provide some insight into the relationship between the shipbuilder and the surveying process. Thomas notes he is paid a £2 fee. A further 2 shillings and sixpence are charged for the certificate.

7.9. Life and Career

Rhoda Mary is first entered into the *Lloyd's Register of Shipping* in 1868, matching the date on the Survey Report. As the entries in the register contain the intended destination port until 1874 it is possible to construct an idea of the working life of the ship for the first six years of its life. Table 7.4 sets out the full detail of *Rhoda Mary*'s record in the *Lloyd's Register of Shipping*. These entries describe a typical small merchant ship. The ship's survey ports are listed as Falmouth for the entirety of its service life. The ship only changes ownership once. From 1868 to 1874 the owner is listed as Meyrick & Co., after 1874 the ship enters the ownership of S. T. Westlake & Co. and stays there for its entire working life. The ship is registered in Falmouth every year. Although, in 1904 "Foy" is recorded below Falmouth in reference to the town of Fowey further East along Cornwall's Southern Coast. The ship's Master is recorded as J. Meyrick from 1868 to 1874 after which it is S.T. Westlake until 1900 when the ship begins to change Master more frequently. In 1900 the Master is J. Jordan who holds this role until at least 1902. In 1903 two names are recorded, P. Teague which is then struck out, and E. Vercul. Vercul remains Master until 1905 and his name is listed and then struck out above K. Linden who becomes the new Master.

From the changes in Master and owner it is possible to trace some significant changes in the life of *Rhoda Mary*. The most obvious is the sale of the ship in 1874 from Meyrick & Co to S.T. Westlake & Co. It is worth noting that these names correspond with the ship's Master making it likely that these are likely to be Master-Owners or Owners using family members as Masters. It is also possible, but less likely, that the names correlate due to sheer coincidence. Another useful piece of information is the rating given to the ship. *Rhoda Mary* enters the register at A1 as we saw in Section 7.8. This indicates a ship with the best rating possible for its hull construction "A" and well fitted out suitable to give it the best rating for its equipment "1". This A1 rating was secured for eight years. As outlined in 6.8 this means the ship must be resurveyed within four years. This rating is confirmed again and again until 1884, meaning the ship held an A1 rating for 16 years and must have passed at least three surveys at this level. This re-certification happens despite the ship's registration being allowed to expire in 1878, presumably meaning the ship missed a survey or was not submitted to the Register in time. In 1884 the rating is then downgraded to AE1, a standard process as ships age through their service life. However, *Rhoda Mary* returns to an A1 rating in 1889 and the transition from AE1 to A1 is recorded in the 1889 edition of the register. The "SS Fal. 89-5yrs" noted in this entry refers to a "Special Survey of Wood ships classed AE or E" in 1889. The term the ship will remain characterised as "A" will be five years.



No. 1279 Survey held at Point Tiurs Date June 24th 1868
on the Schooner "Rhoda Mary" Master John Meyrick
Tonnage New 129·68 Built at Point When built 1867–68 Launched May 21st 1868
By whom built John Stephens Owners J. Meyrick & Co
Port belonging to Falmouth Destined Voyage The Baltic
If Surveyed while Building, Afloat, or in Dry Dock While building

Length aloft 101 ft 2 in. Extreme Breadth Outside 24 ft 9 in. Depth of Hold 11 ft 05 in.
Do Dec 29 98·5

Scantlings of Timber. — Timber and Space 20 inches

	Moulded	Middle	Ends
Floors	9	11	8
Foothooks	8	8	7
Ditto	7½	7	6½
Ditto	6½	6½	5½
Top Timbers	6	5½	5½
Deck Beams N° 25 Average Space 3 ft	8	8	6¾
Deck Beams, length amidships 24 ft 5			
Hold Beams N° 2 Average Space Amidships	10	10	10
Hold Beams, length amidships 24 ft			
Keel	11	13	13
Scarphs of Ditto	one 28 ft 4		
Keelsons	12	35	20
Scarphs of Ditto 24 ft 6 feet	8½ Rule	4 feet 3 in.	

	Moulded	Middle	Ends
	7½	7½	6½
	6½	6½	5½
	6	5½	5½
	5½	5½	4½
	4½	4½	4½
	7½	7½	6¼
	10	10	8½
	9	94	3 in. 9
	10	10	11
	20	10	11

Outside.

	Inches	Inches required per Rule
Garboard Strakes	3	2½
Garboard to Bilge	3	2 4/8
Bilge Planks 2	6 4/5	2 4/8
Bilge to Wales	3½	2½
Wales	4½	3½
Topsides	3½	2½
Sheer Strakes	3½	2½
Plank Sheers	3	2½
Water-Ways Upper Deck	10 × 8½	7½ × 6¼
Water-Ways Lower Deck	—	
Ditto, laying surface against Timbers	7	6¾
Upper Deck	2½	2½

Inside.

	Inches	Inches required per Rule
Limber Strakes	4	2½
Bilge Planks 2	5	2⅔
Ceiling in Flat	3½	1⅔
Ditto Bilge to Clamp	3	1¾
Hold Beam Clamps	4½	—
Deck Beam Ditto	3½	2½
Ceiling 'twixt Decks	3	1¾
Hold Beam Shelfs	—	—
Deck Beam Ditto	9½ × 7	7½ × 6¼

Size of Bolts in Fastenings, distinguishing whether Copper, Yellow Metal, or Iron; also of Treenails.

	Copper or Y.M. in Ship.	Iron in Ship.	Inches required per Rule
Heel-Knee, & Deadw'd abaft	—	1	7/8
Scarphs of Keel, N° 9	—	1 4/8	4/8
Keelson Bolts through Keel at each Floor	—	1	4/8
Bolts thro' Heels of Timbers against Deadwood	—	7/8	11/16
Transoms and throats of Hooks	—	1	13/16
Arms of Hooks	3/4	—	11/16
Thro' Bilge & Limber Strakes	—	—	5/8
Thickstuff over Double Floors			5/8
Butt End Bolts	3/4	3/4	
Pintles of the Rudder	2 4/8		2
Hold Beam Bolts in Waterway			3/4
Hold Beam Bolts in Knees			3/4
Hold Beam Bolts in Shelf or Clamp			7/8
Deck Beam Bolts in Waterway			3/4
Deck Beam Bolts in Knees			3/4
Deck Beam Bolts in Shelf or Clamp			7/8
Nails or Bolts in Flat of Deck			5/8
Treenails Inches 1¼ & 1⅛			

Timbering.—The Space between the Floor Timbers and Lower Foothooks is 3 Inches. The Space between the Top-Timbers is 5 Inches.
The Floors consist of E. Oak The First Foothooks of English Oak
The Second Foothooks of E. Oak The Third Foothooks and Top Timbers of E. Oak
The Shifts of the First and Second Foothooks are not less than 1 ft *N. B. When less than prescribed by the Rule, state how many.*
The rest of the Shifts of the Frame are 1 ft
The Frame is well squared from the First Foothook Heads upwards, and is free from sap, and from thence downwards, the frame is fairly squared
The — Frames are all bolted together to the Gunwale. *N. B. If not, state how bolted.*
The Butts of the Timbers are all close together; their thickness not less than ⅓ of the entire moulding at that place.
The Frame is cross & bevel chocked with a Butt at each end of the chock. The Main piece of Rudder is E. Oak of Windlass is E. Oak
The Keel is Am. Grey Elm. The Main Keelson is Tamarac and is free from all defects.
The Stem and Stern Post of E. Oak The Transoms, Knight Heads, Hawse Timbers, and Aprons of E. Oak Deadwood, of E. Oak and are all free from all defects.
The Deck and Hold Beams of E. Oak & Tamarac The Breasthooks of E. Oak & Iron The Knees of E. Oak & Iron

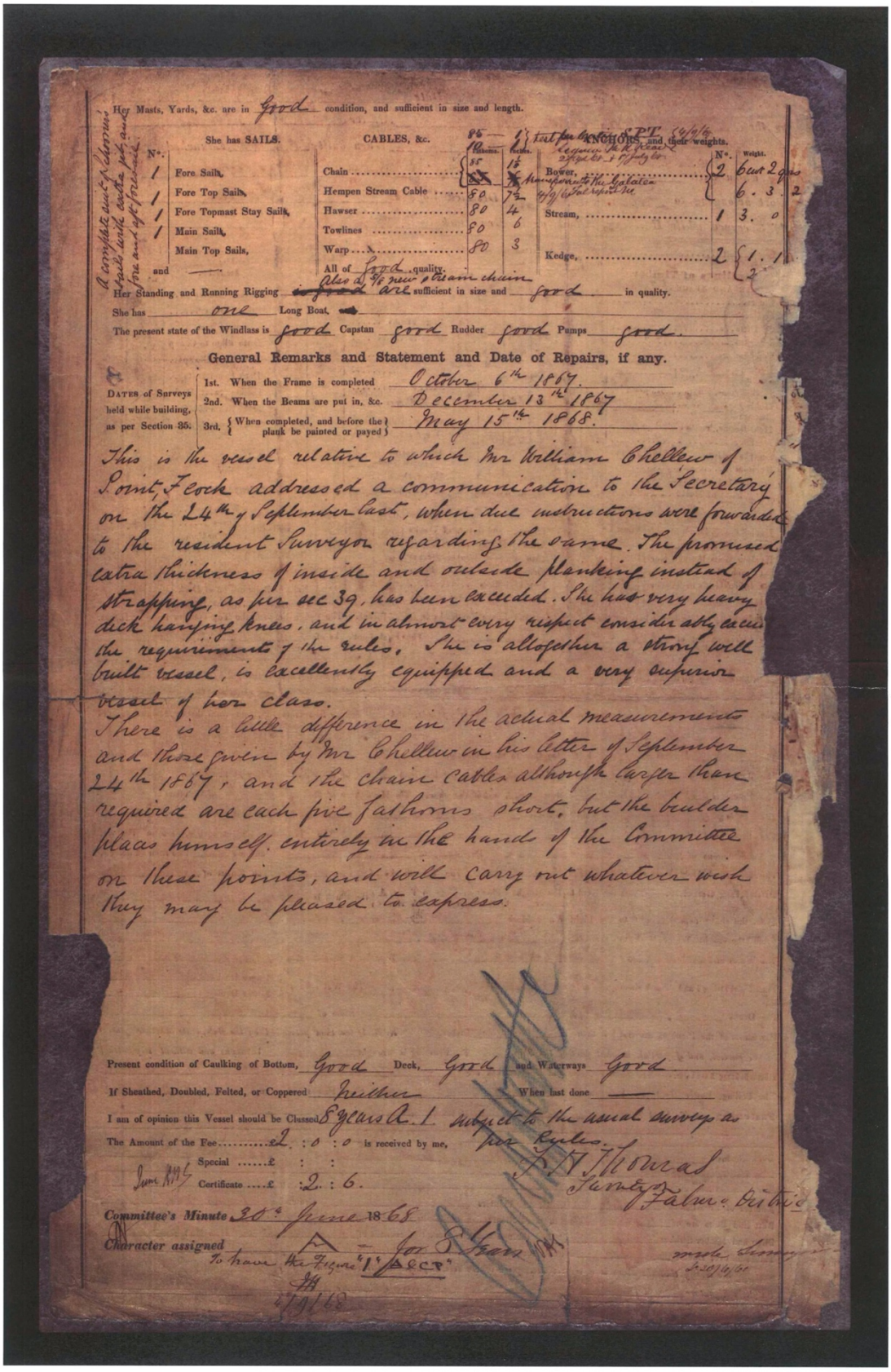
Planking Outside.—From the Keel to the Height defined in Note to Table A or to the First Foothook Heads the Plank is Am. Grey Elm.
From the above named Height to the Light Water Mark Baltic Red Pine.
From the Light Water Mark to the Wales Tamarac.
The Wales and Black-strakes are Tamarac. The Topsides & Sheer-strakes Tamarac
The Spirketting and Plank-sheers Tamarac. The Water-ways Upper Deck Baltic Red P / Lower Deck —
The Decks Yellow Pine State of Good.
The Shifts of the Planking are not less than 6 Feet Average *N. B. If less than prescribed by the Rule, state whether general or partial, and if partial, in what part of the Ship.* The Planking is wrought 3 between, *and without step-butting*

Planking Inside.—The Limber-strakes and Bilge-strakes are Baltic Red Pine
The Ceiling, Lower Hold, and between Decks Baltic Red Pine Shelf Pieces and Clamps Bal. Red Pine & Ta
Fastenings.—To Hold Beams Iron Lodging Knees well secured.

Deck Beams Iron Hanging Knees with Lodging Knees of E. Oak in Mast Rooms

Number of Breasthooks 4 Pointers — Crutches 1 Iron.
Butt End Bolts are of Yellow Metal in the Bottom: One Bolt in each Butt End is through and clenched.
Bilge and Limber Strakes Yellow Metal bolted through and clenched. Treenails of E. Oak How Made Hyne turned
Thickstuff over Double Floors — bolted through and clenched. General Quality of Workmanship Very good.
We certify that the above is a correct description of the several particulars therein given
Builder's Signature John Stephens *Surveyor's Signature* J. H. Thomas

Figure 7.16: Page One of the 1868 Survey Report for Rhoda Mary (Image courtesy of Lloyd's Register Foundation).



Her Masts, Yards, &c. are in good condition, and sufficient in size and length.

No.	She has SAILS.	CABLES, &c.	Fathoms	Inches.	ANCHORS, and their weights.	No.	Weight.
1	Fore Sail,	Chain	55	1½	Bower,	2	6 cwt 2 qrs
1	Fore Top Sail,	Hempen Stream Cable	80	7½			6. 3. 2
1	Fore Topmast Stay Sail,	Hawser	80	4	Stream,	1	3. 0
1	Main Sail,	Towlines	80	6			
	Main Top Sails,	Warp	80	3	Kedge,	2	1. 1
	and	All of good quality.					2

Also a ¾ new steam chain

Her Standing and Running Rigging ~~is good~~ are sufficient in size and good in quality.

She has one Long Boat, ~~a Yawl~~

The present state of the Windlass is good Capstan good Rudder good Pumps good.

General Remarks and Statement and Date of Repairs, if any.

DATES of Surveys held while building, as per Section 35.

1st. When the Frame is completed October 6th 1867.
2nd. When the Beams are put in, &c. December 13th 1867
3rd. When completed, and before the plank be painted or payed May 15th 1868.

This is the vessel relative to which Mr William Chellew of Point Pleasant addressed a communication to the Secretary on the 24th of September last, when due instructions were forwarded to the resident Surveyor regarding the same. The promised extra thickness of inside and outside planking instead of strapping, as per sec 39, has been exceeded. She has very heavy deck hanging knees, and in almost every respect considerably exceeds the requirements of the rules. She is altogether a strong well built vessel, is excellently equipped and a very superior vessel of her class.

There is a little difference in the actual measurements and those given by Mr Chellew in his letter of September 24th 1867, and the chain cables although larger than required are each five fathoms short, but the builder places himself entirely in the hand of the Committee on these points, and will carry out whatever wish they may be pleased to express.

Present condition of Caulking of Bottom, Good Deck, Good and Waterways Good

If Sheathed, Doubled, Felted, or Coppered Neither When last done —

I am of opinion this Vessel should be Classed 8 years A 1 subject to the usual survey as per Rules.

The Amount of the Fee.....£2 : 0 : 0 is received by me,

Special .....£ : :

Certificate ....£ : 2. : 6.

J. H. Thomas
Surveyor

Committee's Minute 30th June 1868

Character assigned To have the Figure "1" Decr

Figure 7.17: Page Two of the 1868 Survey Report for Rhoda Mary (Image courtesy of Lloyd's Register Foundation).

There is no obvious reason for the ship to be returned to character of "A1". There is no recorded repair or refit of the ship in the Lloyd's Register. It is possible the Special Survey determined the condition of the ship's hull was still at a level to warrant characterisation as an "A" grade ship. Retaining the characterisation at "1" for the ship's rig and fittings is less surprising. These elements are easier to replace and maintain than the hull construction. The hull characterisation is recorded as being regraded to "AE1" in 1897. However, the results of the Special Survey in 1889 recorded the A1 character would last for 5 years. The 1894 and 1895 register books do not record the ship's characterisation, so it is possible the downgrade took place in this gap. Finally, there is a major change recorded towards the end of the table. In 1899 *Rhoda Mary* changes from being recorded as a "Schooner" to being a "Three Masted Schooner (or "Wood3MstSr" in the shorthand of the register). Greenhill (1978: 197) notes the addition of a third mast would make the ship easier to handle and cheaper to operate. Such a decision possibly reflects the increased financial pressures of operating a wooden sailing ship in an industry increasingly dominated by iron ships and steam powered vessels. There is no note of a repair or refit in the register however, such a change would have required some works to the ship. Whatever works take place do not influence the characterisation which remains at AE1. The absence of any note of this kind also raises the possibility that other repairs and refits have not been recorded in the register entries for the ship.

The information in Table 7.4 also reflects the changing nature of the *Lloyd's Register of Shipping* through this period. Table 7.4 has been formatted to mirror the structure of the Register and to mirror the changes in formatting and content that take place through the whole life of *Rhoda Mary.* One result of these changes is that the onward destination of the ship is not recorded after 1872. Prior to this the ship is recorded as destined for the Baltic trade. It also appears that *Rhoda Mary* may have had a somewhat spotty survey record. In 1878 and 1906 the Register records that the characterisation of the ship has expired. This possibly also true in 1901 although the note "Expired" is scored through. There is also a discrepancy in the recording of the depth component of *Rhoda Mary*'s Registered Dimensions. These are first included in the register book in 1874. The dimensions that year are Length: 101.2ft, Breadth: 21.9ft, and Depth: 11.0ft. However, in 1877 the Registered Dimensions change to Length: 101.2ft, Breadth: 21.9ft, and Depth: 18.6ft, Depth then changes again in 1881 with Depth: 11.0ft and again in 1882 to 11.5ft. It is interesting to note the Registered Tonnage stays the same throughout at 118 in the old measurement and 130 in the new tonnage measurement. There is no explanation for this change in the register books, so it is possible this is a typographical error or due to a change in how the depth of hull is measured during a survey. Either way the change appears to have no impact on the characterisation of the hull and there is no further change in these dimensions after 1882.

7.10. End of Life and Deposition

Rhoda Mary did not end up on the bank of the Medway as the result of a shipwreck event. There is a considerable portion of this ship's life that is not accounted for in the *Lloyd's Register of Shipping* because it was no longer a working merchant vessel. The timeline for the final phase of *Rhoda Mary*'s life is unclear, the information presented here is courtesy of the Rhoda Mary Project collated in 2015 from local knowledge and discussion (Rhoda Mary Project, *pers comm.*). *Rhoda Mary* ceases operation as a working ship in 1925 and is reported to be laid up at Padstow in the Camel Estuary. At some point the ship is then sold and converted to a floating home and used for accommodation on the Medway. Part of this conversion included the fitting of two engines, the masts and spars are retained but anecdotally never used. From this point on it is recorded that the ship moved very rarely and only undertook occasional journeys up and down the river. The details of the conversion works are not recorded in any survey document or publication beyond comments in Greenhill (1978: 202-3). Those comments are partly removed in the 1988 revision of Greenhill's book, with no explanation, meaning the 1978 and 1988 versions have both been referenced in creation of this thesis. However,

Table 7.4: The record of Rhoda Mary extracted from the Lloyd's Register of Shipping (Data taken from the Lloyd's Register Foundation Heritage and Education Centre).

Year	No.	Rig	Master	Tonnage	Built	Year	Owner	Loaded Draught	Survey Port. Intended	Rating				
1868	Supplement R-6	Sr	J.Meyrick	130	Point	1868	Meyrck&		Falmouth Baltic	8 A1				
		pt I.B			Stephens	5mo				6. 68				
1869	O-224	Sr	J.Meyrick	130	Point	1868	Meyrck&		Falmouth Baltic	8 A1				
		pt I.B			Stephns	5mo				6. 68				
1870	O-187	Sr	J.Meyrick	130	Point	1868	Meyrick&Co.		Falmouth Baltic	8 A1				
		pt I.B			Stephens	5mo				6. 68				
1871	O-188	Sr	J.Meyrick	130	Point	1868	Meyrick&Co.		Falmouth Baltic	8 A1	A1			
		pt I.B			Stephens	5mo			HT, Fal72	6. 68		3.72		
1872	O-195	Sr	J.Meyrick	130	Point	1868	Meyrick&Co.		Falmouth Baltic	8 A1				
62036		pt I.B			Stephens	5mo	H.T. Fal. 72		A.&C.P.		3.72			
1873														
				Registered Dimensions										
1874	R-251	Sr	J.Meyrick	130 101.2|21.9|11.0	Point	1868	Meyrick&Co		Falmouth	8 A1				
62036		ptl.B			Stephens	5mo			H.T.Fal.72 A.&CP.		3.72			
M.H.S.L.														
1875	R-266	Sr	J.Meyrick	118 101.2|21.9|11.0	Point	1868	Meyrick&Co		Falmouth	8 A1	A1			
62036		ptl.B	ST Westlake	130	Stephens	5mo	STWestlake &		Cont. Fal. May 76 A. &CP		3.72	2,76		
M.H.S.L.														
1876	R-269	Sr	ST Westlake	118 101.2|21.9|11.0	Point	1868	STWestlake &		Falmouth					
62036		ptl.B.		130	Stephens	5mo			Cont. Fal. May 76	8 AI				
M.H.S.L.				130					A. &CP.	3 2,76				
1877	R-283	Sr	ST Westlake	118 101.2|21.9|18.6	Point	1868	STWestlake &		Falmouth					
62036		ptl.B.		130	Stephens	5mo			Cont. Fal. May 76	8 AI				
M.H.S.L.				130					A. &CP.	3 2,76				
1878	R-283	Sr	ST Westlake	118 101.2|21.9|18.6	Point	1868	STWestlake &		Falmouth		Expired			
62036		ptl.B.		130	Stephens	5mo			Cont. Fal. May 76	8 AI				
M.H.S.L.				130					A. &CP.	3 2,76				
1879	R-290	Sr	ST Westlake	118 101.2|21.9|18.6	Point	1868	STWestlake &		Falmouth		8			
62036		ptl.B.		130	Stephens	5mo			A. &CP.	C3	2,7			
M.H.S.L.				130										
1880	R-299	Sr	ST Westlake	118 101.2|21.9|18.6	Point	1868	STWestlake &		Falmouth		8			
62036		ptl.B.		130	Stephens	5mo			A. &CP.	C3	2,76			
M.H.S.L.				130										
1881	R-304	Sr	ST Westlake	118 101.2|21.9|11.0	Point	1868	STWestlake &		Falmouth		8			
62036		ptl.B.		130	Stephens	5mo			A. &CP.	C3	2,76			
M.H.S.L.				130										
1882	R-270	Sr	ST Westlake	118 101.2|21.9|11.5	Point	1868	STWestlake &		Falmouth		8			
62036		ptl.B.		130	Stephens	5mo			A. &CP.	C3	2,76			
M.H.S.L.				130										
1883	R-273	Sr	ST Westlake	118 101.2|21.9|11.5	Point	1868	STWestlake &		Falmouth		8			
62036		ptl.B.		130	Stephens	5mo			A. &CP.	C3	2,76			
M.H.S.L.				130										
1884	R-280		ST Westlake	118 101.2|21.9|11.5	Point	1868	STWestlake &	Falmouth	Falmouth		8	AE1		
62036	Sr. ptl.B.	Wood		130	Stephens	5mo			A. &CP.	C3	3,83			
M.H.S.L.				130					-4yrs					
					Moulded Depths (ft ,, in)									
1885	R-271	Sr	Wood	118 101.2|21.9|11.5	12 ,, 0	Point	1868	STWestlake &	Falmouth	Falmouth		8	AE1	
62036			ST Westlake	130		Stephens	5mo		SSFal.85-	A. &CP.	C3	3,85		
M.H.S.L.			ptlB	130					-4yrs					
1886	R-389	WSr	British	118 101.2|21.9|11.5	Point	1868	Stephens	S.T.Westlake	Falmouth					
62036														
1887	R-398	Westlake	WSr	118 101.2|21.9|11.5	Point	1868	Stephens	S.T.Westlake	Falmouth					
					Moulded Depths (ft ,, in)									
1888	R-263	Sr	Wood	9 101.2|21.9|11.5	12 ,, 0	Point	1868	STWestlake & Co	Falmouth	Falmouth		8		
62036		S.T. Westlake		130		Stephens	5mo		SSFal.89	-4yrs	C3			
M.H.S.L.			ptlB	130						A. &CP.				
1889		Sr	Wood	99 101.2|21.9|11.5	12 ,, 0	Point	1868	STWestlake & Co	Falmouth	Falmouth		8	AE1	A1
		ST Westlake		130		Stephens	5mo		SSFal.89-5yrs	A. &CP.	C3		2,88	7,89
			ptlB	130										
1890	R-352	Westlake	WSr	99 101.2|21.9|11.5	Point	1868	Stephens	S.T.Westlake & Co	Falmouth					
62036														
1891														
1892	R-316		WoodSr	130 A1 (In Red)	Fal		8	1868 Stephens	Point	S.T.Westlake&Co.	101.2|21.9|11.5	Falmouth	11 ,, 8	
62036	S.T. Westlake	ptlB	130—99	11,91	A&CP	C3	5mo					British	s1 ,, 9	
M.H.S.L.				SSFal.89-5yrs										
1893														
1894	R-301		WoodSr	130 A1	Fal		8	1868 Stephens	Point	STWestlake & Co	101.2|21.9|11.5	Falmouth	11 ,, 8	
62036	S.T. Westlake	ptl.B.	130-9 9	11,91	A&CP	C3	5mo	N D92				British	1 ,, 9	
M.H.S.L.				SSFal,89-5yrs										
1895														
1896	R-274		WoodSr	130	Fal		8	1868 Stephens	Point	STWestlake & Co	101.2|21.9|11.5	Falmouth	11 ,, 8	
62036	S.T.Westlake	ptlB	130-9 9	7,94	A&CP	C3	5mo	ND92				British	s 1 ,, 9	
M.H.S.L.														
1897	R-248		WoodSr	130 AE1	Fal		8	1868 Stephens	Point	STWestlake & Co	101.2|21.9|11.5	Falmouth	11 ,, 8	
62036	S.T.Westlake	ptlB	130-9 9	9,95	A&CP	C3	5mo	ND92				British	s 1 ,, 9	
M.H.S.L.				86 SSFal.96-4yrs										
1898	R-230		WoodSr	130 AE1	Fal		8	1868 Stephens	Point	STWestlake & Co	101.2|21.9|11.5	Falmouth	11 ,, 8	
62036	S.T.Westlake	ptlB	130-8 6	9,96	A&CP	C3	5mo	ND92				British	s 1 ,, 10	
M.H.S.L.				SSFal.96-4yrs										
1899	R-216	Wood	3MstSr	130 AE1	Fal		8	1868 Stephens	Point	STWestlake & Co	101.2|21.9|11.5	Falmouth	11 ,, 8	
62036	S.T.Westlake	ptlB	130-8 6	11,98	A&CP	C3	5mo	ND92				British	s 1 ,, 10	
M.H.S.L.				SSFal.96-4yrs										
1900	R-212		Wood3MstSr	130 AE1	Fal		8	1868 Stephens	Point	S.T. Westlake &Co.	101.2|21.9|11.5	Falmouth	11 ,, 8	
62036	J.Jordan -99	ptlB	130-8 6	11,98		C3	5mo	ND92				British	s 1 ,, 10	
M.H.S.L.				SSFal.96-4yrs				A&CP						
1901	R-208		Wood3MstSr	130 AE1	Fal		8	1868 Stephens	Point	S.T. Westlake &Co.	101.2|21.9|11.5	Falmouth	11 ,, 8	
62036	J.Jordan -99	ptlB	130-8 6	4,01	~~Expired~~	C3	5mo	ND92				British	s 1 ,, 10	
M.H.S.L.				SSFal.01-4yrs				A&CP						
1902														
1903	R-198		Wood3MstSr	130 AE1	Fal		8	1868 Stephens	Point	S.T. Westlake &Co.	101.2|21.9|11.5	Falmouth	11 ,, 8	
62036	~~P.Teague -01~~	ptlB	130-8 6	4,03	Foy	C3	5mo	ND92				British	s 1 ,, 10	
M.H.S.L.	E.Vercul -02			SS Fal.01-4yrs										
1904	R-199		Wood3MstSr	130 AE1	Fal		8	1868 Stephens	Point	S.T. Westlake &Co.	101.2|21.9|11.5	Falmouth	11 ,, 8	
62036	E.Vercul -02	ptlB	130-8 6	10,03	Foy	C3	5mo	ND92				British	s 1 ,, 10	
M.H.S.L.				SS Fal.01-4yrs										
1905	R-187		Wood3MstSr	130 AE1	Fal		8	1868 Stephens	Point	S.T. Westlake &Co.	101.2|21.9|11.5	Falmouth	11 ,, 8	
62036	~~E.Vercol -02~~	ptlB	130-8 6	10,04		C3	5mo	ND92				British	s 1 ,, 10	
M.H.S.L.	K.Linden -04			SS Fal.01-4yrs										
1906	R-183		Wood3MstSr	130 AE1	Fal		8	1868 Stephens	Point	S.T. Westlake &Co.	101.2|21.9|11.5	Falmouth	11 ,, 8	
62036	K.Linden -04	ptlB	130-8 6	10,04	Expired	C3	5mo	ND92				British	~~s 1 ,, 10~~	
M.H.S.L.				SS Fal.01-4yrs	(in Red)									
1907	R-181		Wood3MstSr	130	Fal		8	1868 Stephens	Point	S.T. Westlake &Co.	101.2|21.9|11.5	Falmouth	11 ,, 8	
62036	K.Linden -04	ptlB	SSFal.01-4yrs	130-8 6 10,04		C3	5mo	ND92				British	~~s 1 ,, 10~~	
M.H.S.L.														
1908														
1909	R-167		Wood3MstSr	130	Fal		8	1868 Stephens	Point	~~S.T. Westlake &Co.~~	101.2|21.9|11.5	Falmouth	11 ,, 8	
62036	~~K.Linden -04~~	ptlB	SSFal.01-4yrs	130-8 6 10,04		C3	5mo	ND92		B.M. Harvey		British		
M.H.S.L.														

there is further information in MacGregor's 1997 book *The Schooner*. Several of the features identified during the fieldwork are likely to relate to the conversion works, particularly the iron bracing and threaded components penetrating the hull. Some of these fittings are obvious such as piping and the threaded pipe fittings. However, the conversion works make it difficult to be certain about other fastenings and fittings that differ from the original survey. These are either a product of the conversion or due to repairs *Rhoda Mary* underwent during its working life.

A further complication to investigating the remains of *Rhoda Mary* is that the hulk caught fire sometime in the 1970s or 1980s. This took place after the visit undertaken by Greenhill and MacGregor in 1949. That fire reduced the hulk to its current state. There has also been some ongoing degradation through environmental factors. The survey undertaken by Greenhill and MacGregor did not produce a site plan, instead the aim was to create a lines plan (MacGregor 1982). Even though it does not record the exact components present on the site the lines plan is still of considerable use to this study. It allows some degree of understanding of the overall shape of the ship's hull. This is an output that is not possible for a more disarticulated shipwreck such as *Ocean*.

The ship came to rest in the Medway just before the Second World War. The anecdotal evidence provided by the *Rhoda Mary Project* indicate the ship was beached in its present location on the North bank of the river following a storm event. The site was presumably abandoned after this and was subject to the processes of degradation we would expect until the fire that reduced the structure of the ship to its present level. The hulk represents the resting place for a ship that not only had a remarkably long and successful service life as a 19th century working ship but through its use as a houseboat then continued to function well into the 20th century. Overall, the ship functioned for close to 80 years and is certainly the longest-lived ship dealt within this project.

7.11. Evaluation of Sources

In this chapter the investigation has utilised the same principal source as that used for *Ocean* through the *Lloyd's Register of Shipping.* However, the investigation has also been able to utilise the survey report from the ship's first registration. This is particularly useful due to the extent of information contained in those reports. It is possible to directly compare the results from an archaeological investigation to the recorded information in the survey. This comparison allows the project to identify key construction components and better understand how the ship was assembled. It is particularly important for sites like *Rhoda Mary* where a considerable amount of the structure has been lost or modified after its working life. This sort of investigation will become more and more valuable in future as already degraded sites become more and more compromised.

The result of the investigation confirms the need to approach our investigation using a broad range of sources. There are inconsistencies in the recorded dimensions and tonnage of the ship in the *Lloyd's Register* and the possibility *Rhoda Mary* was not reliably returned for resurvey. To some extent this can be mitigated through the results of the archaeological investigation. As this ship was built and recorded after the changes in tonnage laws in 1854 (Vasudevan 2010: 18-19) it is unlikely the discrepancy in recorded tonnage and dimensions is down to any such change. Furthermore, the values return to their original numbers after a few years, suggesting it is a typographical error that was then corrected possibly following an interim resurvey.

The alterations made to the ship following its final entry in the *Lloyd's Register of Shipping* are a further reason the information from the archaeological investigation is an essential component. As we have seen it is difficult to be entirely certain about components of the ship that differ from its original construction. However, the findings of the archaeological work correlate with the relevant sections of the survey report. The utilisation of these different source types is therefore an essential part of the investigation of this site. However, the identification of this ship relies on previous

investigations, in part including anecdotal accounts and local knowledge. This is not necessarily an issue. However, the integration of this information needs to be approached on the same lines as the other sources.

7.12. Summary

The Lloyd's Register provides additional information about the construction and working life of the *Rhoda Mary*. In the case of this ship the information from the register primarily concerns its construction. Changes to the information recorded in the Lloyd's Register mean that the details recording the onward voyages of the ship ceased being recorded. However, there is still a considerable level of detail for ownership, management, and administration. Each entry notes the ship has been fastened with iron bolts and from the Survey we know this refers to the through-bolts used to secure the framing timbers (futtocks etc.). This is consistent with the findings from the investigations of the hulk in the Medway where some of these bolts are still present in the frame timbers. The register books also contain further details about the ownership and life of the ship set out in 6.9. A complete account of *Rhoda Mary*'s record extracted from the *Lloyd's Register of Shipping* is included in that section as Table 7.4. As this section has shown there are considerable variations in the recording of some of *Rhoda Mary*'s traits. The recorded dimensions of the ship change between 1877 and 1882. There are also three points where the classification of the ship appears to expire (1878, 1901 and 1906). This suggests an inconsistency in the reporting on *Rhoda Mary* during her working life.

Through examining *Rhoda Mary*'s remains several key diagnostic elements were found still present in the hulk. Firstly, the framing arrangement has futtocks grouped in threes rather than twos. This is not mentioned in the survey report. That arrangement also has a reduced room and space, meaning the frames are closer together. The frame timbers themselves were recorded with very consistent dimensions in both the original survey report and the archaeological investigation. Secondly, in two places the butt-ends of the hull and ceiling planking are fastened with yellow-metal bolts through the entire thickness of the hull and clenched on the inboard face. Again, these are recorded in the original survey report including the thickness of the bolts. However, there is no mention of yellow-metal fastening in the *Lloyd's Register of Shipping* unlike the iron bolts. There were treenails found on the hulk in both 2015 and 2021. Caulking cuts made to the faces of the treenails on this site are crosscut like those found on *Ocean* in Chapter 6. Caulking cuts such as these on treenails are indicative of ships built in the Southwest (Whitewright 2014b: 101). Yellow-metal fastenings were only identified in two places associated with securing the planking during archaeological investigations of the hulk. However, the survey report indicates they were used more widely throughout the ship in the lower portion of the ship. Finally iron fastenings are present as the lateral connection of framing timbers and as spikes to secure hull planks both of which are present in the Survey Report.

The *Rhoda Mary*'s survey adds other important information that cannot be recovered from the hulk given its current state. The report illustrates the types of timber used in the construction. The timbers in the frames are English Oak, with an American Elm keel and lower hull, Tamarac hull planking and Pine decking and inner planking. This is a considerable range of timber types. Some of which are commonly employed in the construction their respective components, especially oak frames and elm for the keel and hull below the waterline. Another feature the Lloyd's survey helps to illustrate are the iron elements of the ship's framework that have either disappeared or become disarticulated from the hulk. The survey report states the knees and breasthooks (a timber securing the stem and stern posts to the adjacent framework) are made from both English Oak and iron. This correlates with the two iron knees found in and near the site. By the time *Rhoda Mary* was in service iron had been used in ship construction for some time. First arriving in ship construction in the UK in 1790 (Goodwin, 1998; Stammers, 2001). However, the survey report doesn't record the vertical iron braces found in the upright port side of the ship and loose elsewhere in the hulk. These were only identified in the

archaeological investigation of the site conducted by this project. It is possible these, along with the pipe fastenings and fittings in the hull, are a feature of the conversion of the ship to a floating home.

Rhoda Mary is a typical example of a carvel-built ship from this period. The ship fulfils all the general criteria for the overall construction tradition as set out by McGrail (2015). This is a site that would benefit from a targeted and more invasive archaeological investigation. So far, a complete site plan has been created, alongside a lines plan from Greenhill and MacGregor's visits. If the ballast could be removed and the lower framing components exposed a better perspective may be possible regarding the arrangement of the framing components. This would also allow an investigation of the method by which they are fastened to the keel. A final area that would benefit from further study would be the controlled sampling of timber components. This sampling would help identify the origin of and felling dates for the timbers and allow further comparison with the registration survey. This is a ship with a different lifeway than that of *Ocean* and as a result our record of the ship is different. As there is still a copy of the registration survey available for study, we can get a better idea of the process of construction. The survey also shows the level of engagement the shipbuilder has with the process of recording and registration and the rules for characterisation set by the Lloyd's Register. It would not be possible to discover that relationship and the details of the people connected to *Rhoda Mary* through an investigation of the hulk alone. Including these documents, such an integral part of the construction and working life of the ship, in our investigation shows the power of considering the wider assemblage.

Chapter 8. Of Small Ships Forgotten - Discussion

8.1. Introduction

The two assemblages looked at in Chapters 6 and 7 present archaeological material that spans a combined 80 years and even extends beyond the period of interest to this project. Returning to part of the results from Chapter 3, the lives of both *Ocean* and *Rhoda Mary* can now be included in the visualisation of the Lloyd's Register's record of ships in the 19th century (Figure 8.1). Therefore, allowing for an examination of the events and changes in Britain's Maritime World those two ships would have witnessed. This then is the state of the world in the 19th century. The next step is to incorporate the 200 ships that represent the remainder of the dataset. These are vessels that do not have any direct archaeological remains, or at least none that have been investigated or published in any detail. The first part of this chapter will introduce these ships as a total dataset. This will include a brief discussion of how the information for each ship has been extracted from the HEC's archive. The result of this first section is the creation of a single assemblage representing 19th century shipbuilding, comprising the overall ship numbers presented in Chapter 3, the 200 Paper Ships from Chapter 5, and the two shipwrecks detailed in Chapters 6 and 7.

Taking a whole assemblage approach like this allows the presentation of a more complete story and prevents us losing track of parts that might not be obvious. There is considerable nuance in shipbuilding in all periods as Olaberria (2018) has established. Furthermore, the story told here continues past the obvious end that isn't actually an end at all—the death of each ship. In many ways there is a more interesting story that then begins to develop from this point. The explanatory process, narrative creation, and forming of interpretation based off the information contained in this thesis, is adding another part to this story. The first piece of interpretation will be to look at the overall picture of shipbuilding in the 19th century Maritime World in Section 8.2. This will be followed by the 200 ships set out in Section 8.3. Then the information afforded by that sample will be used to explore the events and trends in 19th century shipbuilding. That exploration will enable the discussion of whether the ships built at the beginning of the century are as different to those at the end, as has been suggested in other modern studies of British Merchant Shipping (see Greenhill 1980).

In modern studies of sailing ships there is a tendency to romanticise a technology that would have been primarily seen as a tool. The development of sailing ships in the 19th century was not subject to the same pressures and forces as sailing ship technology is today, even for surviving historic vessels or replicas of ships from the 19th century the influences operation upon them are different now. Sailing merchant ships in the 19th century Maritime World were tools, used to for cargo transport, passenger movement, and so on. Those same sailing ships today, with a few exceptions, are pleasure craft, points of interest, or historic artefacts. This shows that the influences acting upon shipbuilders, owners, crew, and the ships themselves are changing. We have seen these in action during the investigation of the two ship sites and these are discussed in Section 8.6. It is this that makes some of the theoretical tools we discussed in Chapters 2 and 4 so essential. In reality, these tools are not going to show us the whole picture, and there may well be parts of the picture we cannot see through our chosen window—19th century schooners. Returning to Whitewright's (2017:223) comment it is the questions we ask to each part of our assemblage and to the assemblage as a whole, that will dictate how much we see and understand of shipbuilding in this period. There is an obvious relationship between the way we frame our questions and the data we extract to answer them.

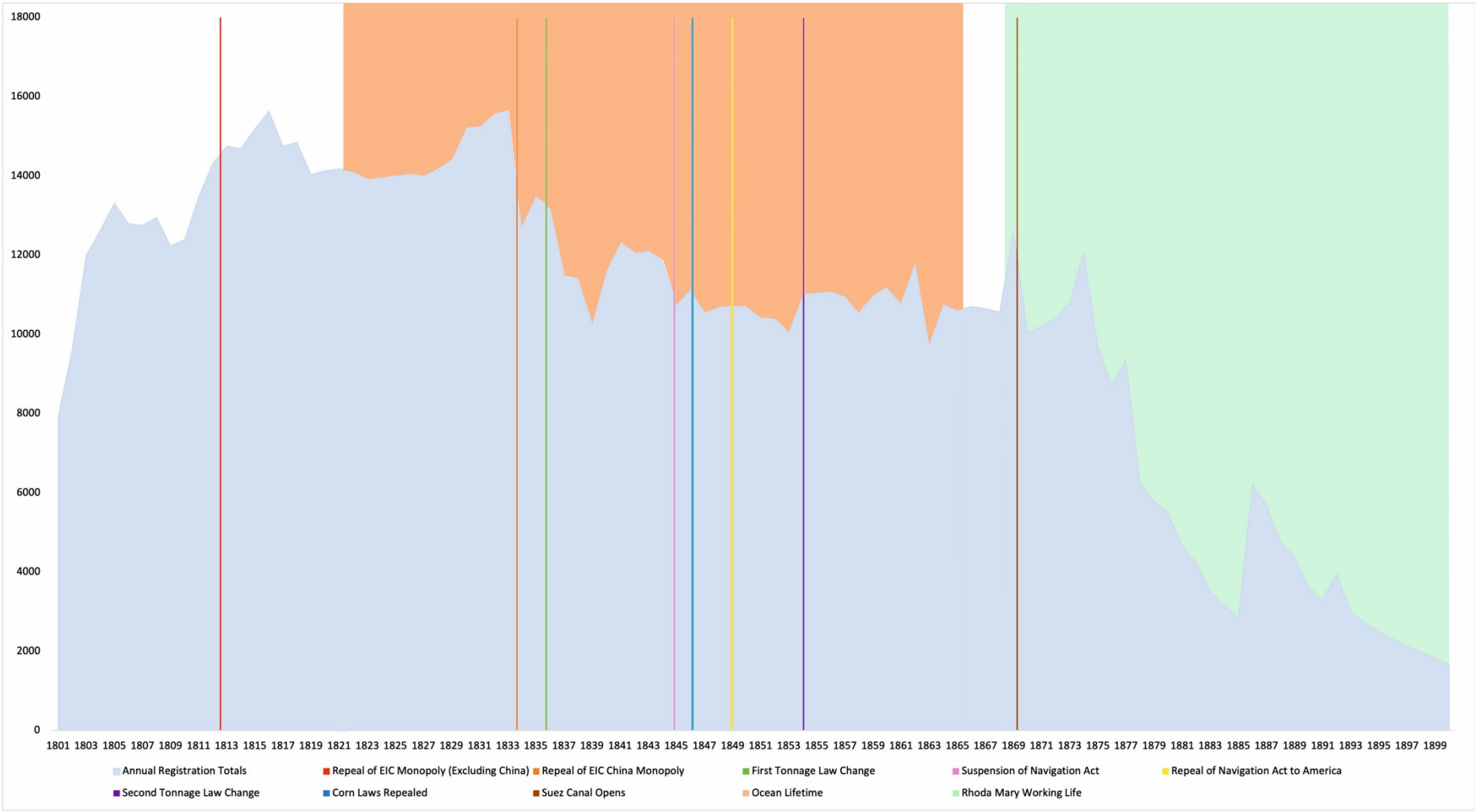


Figure 8.1: Chart of the total number of ships registered by year between 1800 and 1899, overlaid with key dates identified as significant for wooden sailing ship production, set against the working lives of the ships Ocean and Rhoda Mary (Chart produced by the Author with data from the Lloyd's Register of Shipping).

This thesis is the first step in looking at shipbuilding on this scale. Examining the source material concurrently and asking the right questions for each part of the record. The core dataset has now been assembled and the context of the century has been established through the lens of working merchant ships. At this point it seems sensible to return to the two research questions that direct this project:

1. In what ways do schooners, as a medium size ship type, reflect the trends thought to occur in 19th century British shipbuilding?

2. What is the potential for ships in the overall shipwreck record to unlock documentary components of the record thereby revealing relationships and meaning that would otherwise remain obscure in investigations of either source material on its own?

These questions direct the investigation of the various sources available to this thesis. The temporal and spatial scale this project has set out helps to answer these questions. As the general numbers for the period (see Section 3.6) show, it is possible to use the dataset from the HEC to examine broad trends and changes in 19th century shipbuilding. The Record that has been established also conforms to the requirements of Lucas (2018: 62) to be diverse and mobile. That diversity is achieved through the range of source types being investigated from archaeological remains and overall ship numbers, to the individual entries for each ship. Our mobility is governed by the method being used to investigate them. Taking Adams' (2013: 48) concurrent approach requires interpretations to be flexible and mobile. Moving between relevant sources and scales is essential as questions arise and new information comes to light. The type of information available in the HEC archive also means any interpretation must be able to switch between scales—a concept discussed in Section 8.7. Chapter 3 is a good demonstration of this as some overall trends for the entire century have been outlined there and then through the succeeding chapters the perspective has focused onto the lives of two individual ships with a more conventional linear timeline.

The timeline itself is an important character in this story. Figure 8.1 shows a sample of events seen as important to the development of British shipbuilding. Chapter 3 shows how these have been taken from a combination of historical writings and archaeological reports relevant to 19th century shipbuilding. What Figure 8.1 and the discussion in Chapter 3 have begun to demonstrate is the need to test some of the assertions being made that these events are indeed pivotal. This is developed further in this chapter in Section 8.3 by including the Paper Ships. In Chapter 5 technological development was shown as a non-linear system, and particularly towards the end of the 19th century there are multiple technological branches for merchant shipping being implemented at the same time. Therefore, an understanding of the role of sailing ships along the lines of Mendoça's (2013) argument from Chapter 3 is needed. However, we can benefit from the results presented there to show that those branches are not immune to each other. It is also important to be mindful that there are more forces at play here than simply questions of efficiency and transport capacity. There is a broader range of influences in action, not simply innovation following a linear inevitable pathway. In fact, technological innovation doesn't follow such a pathway at all (Pfaffenberger 1992: 513-4). Linear pathways like these are easily constructed by archaeologists when looking back over technological trajectories. However, they are not necessarily indicative of the reality. In this case technological development is a multi-causal relationship and not a cause-and-effect relationship. In this project that relationship has been plotted based upon information from the surviving documentation combined with the archaeological material reality.

The advantage of leveraging a dataset this large is that the investigation can begin to offer quantitative evidence for ideas and interpretations of shipbuilding, such as the reasons for the increase in ship numbers, what the numbers of registered ships actually are, and so on. These are all

important to understanding what the pressures are on shipbuilders throughout the century. For example, increase in population might indicate shipbuilders subject to increased demand. Establishing that evidence also means this discussion can challenge or revise ideas that are not borne out by this dataset. Repeating one of the constant refrains of this thesis, whilst this dataset is substantial it is not all-encompassing. It is almost certain there are gaps, exceptions, anomalies, and inaccuracies in the documentary sources, what we shall call voids. These are discussed in Section 8.5. These voids have been seen in the investigation of both *Ocean* and *Rhoda Mary*. The perceived trends in British shipbuilding that informed the analysis in Section 3.6 must be examined in this way to gain a better understanding of how ideas are moving and what is driving people to make their choices. That examination takes place in Section 8.8. These discussions will address the first research question for this project and build on the interpretation set out in Chapter 3. Then, looking at the record as a whole allows documentary evidence to be tested and establishes how it can be used to inform a wider understanding of the 19th century in Section 8.9.

Assembling the 200 ships as a lens through which to study shipbuilding further adds to the arguments set out by McKee (1983) and Washington (1848) in their examinations of boatbuilding. Their work shows that even boatbuilders relatively close to one another geographically are approaching the construction of watercraft in different ways subject to different pressures. Although information from documentary sources may add some support to that effort without supporting material from the physical remains of ships any regional identification remains weak. It is possible to use the remains of *Rhoda Mary* and *Ocean* to derive some certainty for shipbuilding in the South West but expanding beyond this is challenging with the limits of the current dataset. What this does show is the considerable mobility such a large and diverse dataset has.

8.2. The 19th Century Maritime World

Section 2.3 and Chapter 4 demonstrated that there is a considerable body of literature that deals with the 19th century on the broad scale. There have been very few investigations of ship populations and shipbuilding in the study of maritime archaeology (see Parker 1992a, and 1992b for an example of this approach in the Ancient Mediterranean), and none undertaken for merchant shipping in the 19th century at this scale.

The first stage of the investigation, from the information gathered in Chapter 3, deals with that big picture view. This does not set out to displace the work done elsewhere. This thesis is not attempting to say what has been done before was in any way not enough, or wrong. Merely that our options and resources have changed. Archaeologists have faced many challenges when studying 19th century merchant ships in Britain. The main issue has been how these ships were used and perceived throughout the 19th into the early 20th centuries. Coastal seafaring and the use of sailing ships in this period was ubiquitous. In fact, small ships of less than 150 tons were so common that in coastal trades they were amongst the most numerous ships in merchant service (Greenhill 1980; Jackson 2002: 132). There was a reduction in the use of sailing vessels in the final decade of the 19th century as steam-powered vessels became a viable and then better performing (by tonnage or capacity) alternative (Mendoça 2013: 1728; Cannon 2019: 17). However, sailing ships remain a part of coastal industry at least into the 1920s (Craig 1980: 45; Mendoça 2013: 1729).

As those sailing vessels were lost or left service, they often became part of coastal life in a different way. Lost or abandoned vessels were so commonplace, ports in the 19th century were not only transition points but also "*places of meditation upon shipwrecks*" (Sivasundaram 2021: 5). Even today on beaches and riverbanks all around Britain's coast there are still many wrecked or hulked ships of various periods. However, the most common end for ships in this period was that they were broken up after their working life. It is possible that wooden hulks arising through abandonment became more common towards the end of the 19th century as the need to recycle their components into

shipbuilding or other uses gradually declined. This is certainly an area that would benefit from further study to understand the changing industries along Britain's coastline. Until recently the hulks and shipwrecks that have survived were simply not seen as vital sites to investigate. An issue that has certainly been worsened by the United Kingdom's system for managing its maritime heritage and archaeological sites in particular (Whitewright 2020: 25). Sites such as these are increasingly being focused on as fewer and fewer survive from year to year (Ransley *et al.* 2013: 171-3). The work undertaken on the Medway (Milne *et al*. 1998) is an excellent example, recording hulked ships immediately before they were broken up, other examples can be found around the coast (Isle of Wight County Archaeology 2000; Paddenberg and Hession 2008; Tolan-Smith 2008; Museum of London Archaeology 2013).

It is important to consider these issues for the preservation of 19th century hulks and shipwrecks in context of archaeology's approach to 19th century shipbuilding (explored in Section 2.3) and the background of maritime archaeology discussed in Section 2.2. These show the study of ships has primarily been approached on a site-by-site basis alongside a broader scale historical narrative of the 19th century that has not incorporated archaeological material (see Section 2.2). The dataset and methodological outcomes of this thesis can support single-site investigations, studies of local or regional shipbuilding, and it can also contribute to the bigger questions around the development of 19th century shipbuilding. Through studying ships, in this case through wooden sailing ship construction, it is also possible to explore the wider world those ships are part of. As the ships in this period have an extensive record provided by the *Lloyd's Register of Shipping*, including dates for key events in their lives such as repairs or changes in ownership, it is possible to use them to explore other components of the Maritime World. These components may not possess any features in The Record that are as detailed as the Paper Ships, or, as in the case of the shipyard in Brixham where Daniel Dewdney built *Ocean,* may not have any other components in The Record at all. The focus of the context presented in Chapter 4 is merchant shipping engaged in coastal trade and the people involved with them. That context has therefore been assembled from the perspective of those entities. This in turn allows us to reframe the discussion of 19th century shipping through coastal trade and shipbuilding and has highlighted that the coasting trade continued past the end of the study period of this thesis into the 20th century.

8.3. Ship Numbers – The Big Picture

The result of the big picture context is a better understanding of exactly what is happening with ships in the 19th century. The Lloyd's Register is not a complete picture or all-encompassing of the ships in service around the coast of Britain. But it is better than any other single resource we have utilised before to get an idea of the number of ships in service at any one time. In fact, this just means that any calculations and figures extracted from their resources are conservative in their scope. The Lloyd's Register provides a large enough dataset to serve as a representative sample of Britain's coastal shipping. Therefore, there is a degree of confidence in any discussion of these overview figures and the interpretations extracted from them. Those figures can also be combined with things that are much more concrete: laws, events, forces, and dates that are known to hold significance and power for the Maritime World of the 19th century.

The result of this phase of investigation is that there is now a better understanding of the overall number of ships in existence throughout the 19th century. It was also possible in Chapter 3 to relate this to studies of steam driven ships. Many of the key pieces of legislation thought to drive merchant ship construction had a smaller impact than previously thought. Principle amongst these is the gradual erosion of the East India Company's (EIC) control of and monopoly over trade with India and China. From the information extracted from the Lloyd's Register following the termination of the EIC's China monopoly in 1834 show a ship population that never fluctuates by more than 10%. Then, in the final quarter of the 19th century, there is a total collapse in wooden shipbuilding with the total

registered population dropping by over 70%. However, of particular interest to this project is the continued presence of schooners in the LRS well after that collapse. In fact, schooners represent a larger proportion of the remaining ships at the end of the 19th century than they did prior to the fall in the mid-1870s. This seems to validate the selection of schooners as the ship-type for investigation in this project.

In the closing decades of the century, these results show an interesting development. There is a resurgence in "British" shipbuilding recorded in the *Lloyds Register of Shipping* and the *World Fleet Statistics* in 1885. Delving into these sources a little further, this resurgence is the result of an increase in colonial wooden shipbuilding, recorded as British because both the register books and fleet statistics record ships built in colonial territories and the UK as "British". Examining earlier register books and statistics shows that colonial shipbuilding prior to this date is a minimal contribution to the total registered population compared to the numbers of ships built in the UK and Ireland. It is perhaps the case that wooden sailing ships were still an essential part of the local colonial systems and the best fit for their infrastructure. This is an area in need of further investigation but outside the scope of this project. Larger metal-hulled and steam driven ships require different shore-side infrastructure for their effective use (Greenhill 1978: 194; Geels 2002:1270). So, it is possible this rise in ships built outside the UK is in response to a demand in colonial systems for ship types that could fulfil their needs when those ships are no longer being produced in the UK. This issue is also relevant to some of the findings in Section 5.4.7 and later in Section 8.4.1 for sailing ships in the UK. Changes in port infrastructure in the UK (Greenhill 1978: 194; Geels 2002:1270) may have caused wooden sailing ships to move to locations where they could still fit into the local maritime systems.

8.3.1. Impacts on Shipbuilding – The Need for a Tighter Focus

What cannot be extracted from the LRS at this scale is any granular information about shipbuilding practices or technologies. However, as can be seen from the example of the survey in Section 7.8 there is granular information to be had—the Lloyd's Surveys do provide technical details that can make any study much more granular. However, working at this large scale with the information from the LRS allows the discussion to chase broad trends and talk in general terms. It Is possible to relate information to specific events and suggest alternate interpretations of major legislative and commercial changes. It is certain that wooden sailing ships are still in operation at the end of the century, those ships appear in reduced numbers at that point but are by no means a negligible population. To uncover this detail, the investigation must get more granular in the investigation of shipbuilding technology. This is easier to do because an overview of the period has been established in Chapter 3 that is directly relevant to schooners involved Britain's coastal trade in the 19th century. The selection of the ships set out in Sections 4.4.2 and 5.2.1 delivers that level of granularity.

8.4. The Paper Fleet – The Middle Ground

The author Patrick O'Brian wrote a scene in the novel *Master and Commander* (1969) with his lead characters Dr. Stephen Maturin and Captain Jack Aubrey in conversation about the ships that could be seen from HMS *Surprise*'s quarterdeck. In that scene Maturin remarks that it is hard to identify one type of ship from another. This is met with incredulity by Captain Aubrey who goes on to explain the difference between the series of ships in their view. In this quite entertaining scene is a lesson for the maritime archaeologist. If today a succession of merchant sailing ships from the 19th century were lined up and passers-by asked to tell the difference between each one, many would focus on sails or size. Most would respond much like Maturin by commenting on the imposing nature of such ships. In fact, even for most maritime archaeologists if a series of schooner-rigged variants were to be lined up in the same fashion there would be very little to tell them apart from a distance.

The issue of ship-type is further complicated by the way ship types are named, as Section 2.3. In the 18th century ships are named for their hull form: Cats, Snows, and so on. In the 19th century that

identification shifts, and names are derived from the sailing rig a ship is carrying: schooner, barquentine, sloop, and many others (for a more detailed breakdown of ships and their rig-types see MacGregor 1980a, 1984a, and 1984b). In reality, the rig of a ship had relatively little bearing on the overall size of the vessel, the largest sailing ship ever built, the *Charles W Lawson* (Figure 8.2) was a schooner rigged vessel. Now this might seem to contradict the point made in Chapter 1 that this thesis is targeting schooners because they represent small sailing ships of limited range. But that point is still true. It applies to the Paper Fleet, all except two of which were coastal or middle-distance merchant ships. The end of the 19th century is a time where there is considerable technological messiness, as was discussed in Sections 3.2 and 5.4. Extracting individual shipbuilding technologies as was done in 5.4.4, and specifically Table 5.4, helps to set out the technological messiness that develops in the 19th century. By the middle of the century there are also a range of different materials and technologies available just for the construction of a wooden sailing ship. Furthermore, by this time there are not only the wooden sailing ships we are concerned with, but also composite vessels (wooden ships with an iron or steel frame instead of timber futtocks and beams), iron hulled sailing ships, wooden hulled steamers, iron hulled steamships, steamers driven by paddles, and steamers driven by a screw propellor. All these vessel types are on the water at the same time.

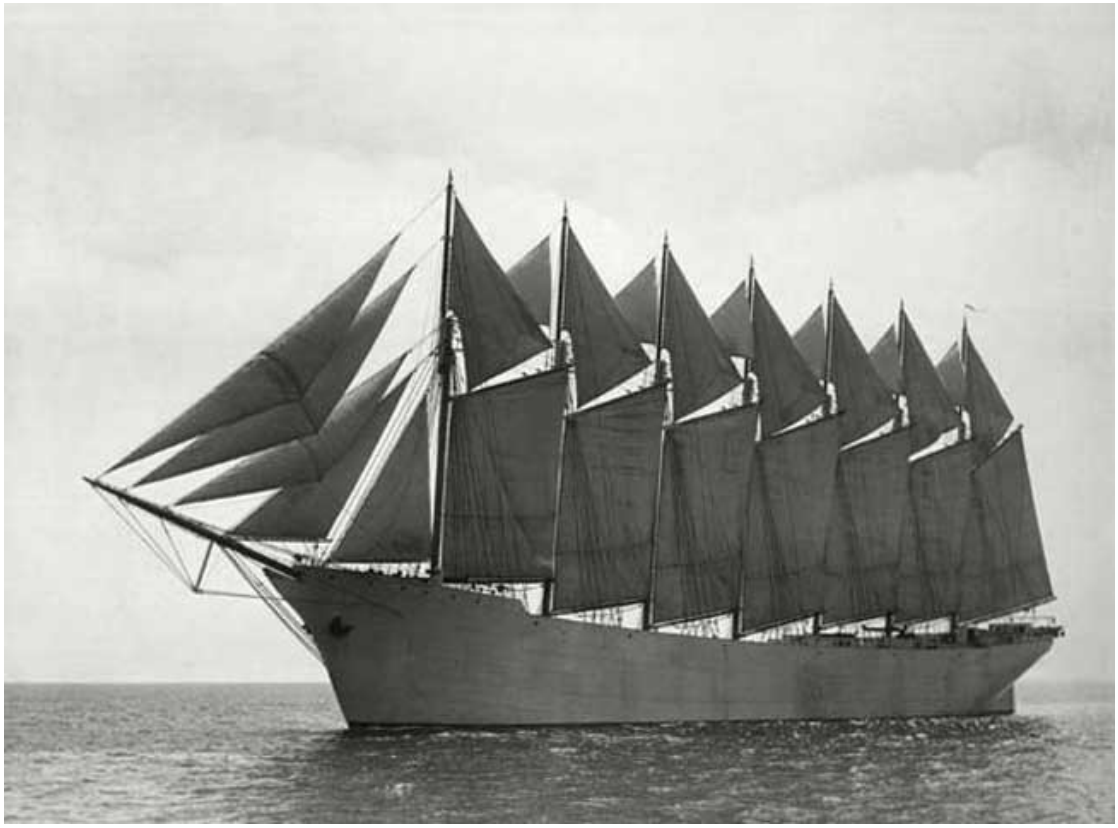


Figure 8.2: The merchant schooner Charles W Lawson (Image from the Mariners Museum, Newport, Virginia)

The part of that messiness of most interest to this thesis is the continued presence of wooden sailing ships. Challenging the current state of understanding (see Chapters 2 and 3) it appears these wooden ships are not that dissimilar to those being built at the start of the century. Taking the lesson from Patrick O'Brian even quite substantial differences in construction and hull form (such as rounded sterns or finer lines below the water) may not translate into a ship that appears all that different. The Paper Fleet is allowing some of that harder to see detail, to be picked out. However, these are design elements, and have already been well examined by Cannon (2019). The focus of this project is on the technologies being used in the construction of these ships. The question being, do we see ships at the end of the 19th century that are built in the same way as those at the start? Or to approach from another direction; that the fundamental approach to wooden sailing ships as a technology endured,

in parallel with—and despite—shipbuilding revolutions and innovations, and the widespread industrialised change that characterises 19th century technology. The adoption of technologies is also of interest. These will be most evident in the use of metal hull-sheathing, yellow-metal and iron bolts, iron framing components, and so on. There is also the question of how ships are treated in their working life. By reviewing the notes about repairs, refits, and alterations it is possible to see how working ships in the 19th century are being used and managed. Finally, this reveals the industries these ships are participating in and the places they are voyaging to. This is interesting as it would be expected that this will change throughout the century and, following the current understanding of 19th century shipping, see wooden sailing ships being displaced by one variant or another of their steam driven counterparts.

As was explained in Chapter 1, and in Section 2.3, schooners were chosen as the focus because of the flexibility those ships possessed. Serving in both home coastal trades and participating in much longer voyages. This is a further area we can explore with this dataset and one that it is almost impossible to extract from archaeological remains alone. The existing discussion of shipping towards the end of the 19th century suggests that sailing vessels are gradually pushed out of high-value low-volume trades, such as fruit, by steamers (see Section 4.6 and Greenhill 1978: 194). This reflects the increasing role steam ships play in the movement of goods. However, we see wooden schooners remain as a part of the Maritime World well into the 20th century. Existing arguments suggest this is because schooners and other sailing ships remain as viable technology to trades moving bulk goods that are not as time or volume sensitive (Greenhill 1988: 156). Fruit is an issue because it must be transported fast to avoid spoilage and cannot sit in port waiting for a fair wind (Greenhill 1988: 134). Similarly low volumes are needed because of both the time taken to load cargoes and the damage the cargo can do to itself. As fruit is loaded the first pieces put onto the ship are subject to bruising by additional loads and as the loading process often takes a considerable time will be at risk of spoilage if the cargo is too large (*ibid.*). Small sailing ships utilising schooner rigs were a key part of this trade as they allowed low volume cargoes and were reasonably fast, until in the middle of the 19th century they were replaced by steam-driven ships that were faster still and not bound by the limits of wind and tide (*ibid.*). These are not issues for commodities such as china clay, coal, aggregates, or timber. It is in these later industries that it appears schooners remain a relevant vessel type into the late 19th and early 20th centuries (Greenhill 1988: 25-6; MacGregor 1982: 82-5).

Finally, it is possible to extract some understanding of the service life of these vessels. The shipwrecks have been suggested erroneously as a record of failure (Blackmore 2002: 50; Cocker 2014). Some parts of the study of shipwrecks make the point that ships that wreck are the failed examples of that technology (Mentz 2015: 12-13). Whilst there is certainly some correlation it is by no means true that the shipwreck record is a record of failures (Adams 2013: 17). Throughout the fleet of Paper Ships are examples that only survived a handful of years from their first registration. Although, this does assume that their absence from the register book indicates a ship was lost. This might be an overly simplistic approach that will be discussed later in Section 8.9. Alongside these shorter-recorded ships are examples of vessels that had much longer careers. Both *Ocean* and *Rhoda Mary* in Chapters 6 and 7 had substantial careers and there are 41 ships (20.5%) in the Paper Fleet with lifespans longer than 30 years.

8.4.1. Moving to the Fringe

Taking the information from the Paper Fleet and combining it with the larger scale understanding that has developed from the study of the period as a whole it is possible to identify some interesting details. In the final three decades of the 19th century wooden sailing ships are moving to the Maritime Fringe of the UK. Their ports of registration—the places they were surveyed by a Lloyd's Register surveyor—are located away from ports traditionally identified as centres of British commerce such as Bristol, or London (Alvarez-Palau and Dunn 2019: 4). This coincides with the dramatic fall in ship

numbers identified in Section 3.6. and discussed in Section 8.2. It is reasonable to suggest that this is a displacement of wooden sailing ships in favour of the rapidly growing population of metal-hulled and steam driven ships. Greenhill's (1978: 187 & 194) point about shore bound infrastructure is relevant to this discussion. As is the rise in colonial shipbuilding seen in Section 3.6, where similar forces seem to be at play. It would be easy to see wooden sailing ships in a romantic light, as a resilient population, and discuss their legacy in establishing British Maritime Power. However, the reasons for this shift are simpler and more pragmatic.

Building ships with metal hulls means they can be larger and accommodate a greater tonnage of cargo in a single journey (Mendoça 2013: 1728). This necessitates harbourside infrastructure that can enable the construction and maintenance of ships of this size and efficiently deal with cargo at this scale (Geels 2002: 1270). Steam driven ships also have distinct infrastructure requirements, such as the supply of coal and the equipment and expertise to maintain their propulsion systems (Geels 2002: 1270). It is likely that the provision of the infrastructure to deal with one or at times both types of vessels' requirements displace the expertise and materials needed to provide the same service to a wooden sailing ship. At the same time, steam driven vessels and very large metal cargo ships are less suitable for smaller harbours and may not function as well in coastal communities that are not plugged in to the necessary terrestrial infrastructure, such as the railway to move coal in bulk or other transhipment systems to move large cargoes onwards. Nevertheless, there is certainly still a role for smaller wooden ships in moving bulk cargoes onward from main shipping centres. The two are not mutually exclusive and this practice of loading smaller wooden ships, particularly lighters and sailing barges, for onward movement of material like coal still occurred well into the second half of the 19th century (Greenhill 1993). This may be further evidence of the 19th century's technological complexity as smaller wooden ships adapt to fill new niches and roles created by the appearance of large cargo ships. Furthermore, those smaller communities also may not require the services or cargoes being dealt with by large merchant ships. In these locations the use of smaller wooden sailing ships remains essential. Wooden ships do not require elaborate infrastructure to service and maintain. We know they can be reliably cleaned and maintained through processes such as careening which only requires a riverbank of the correct pitch and a suitably motivated crew. The smaller harbours and coastal communities that rely on maritime connection can be reliably found in places like the South West (particularly Cornwall and Devon), Wales (especially areas outside the Bristol Channel or away from the Liverpool hinterlands), and Northern Scotland. It is unsurprising that these are places that are entered more commonly into the *Lloyd's Register of Shipping* entries for our Paper Ships at the end of the 19th century and into the 20th (see Section 5.4.6).

As the century progresses ships are increasingly likely to be registered at survey ports in one of those regions. This further informs the investigation of the *Lloyd's Register of Shipping*. Registration ports should be seen as "hubs" not as "home ports". These are the places that local shipping must congregate periodically in to be able to continue to function with an in-date registration. That understanding helps the investigation of the wider record as it shows there is considerably more detail about the ship's life masked by the survey port. This relates to something that developed from the investigation of the wreck of *Ocean* (see Section 6.4.2) that there is far more complexity in a ship's life than is at first apparent in the entries within the register book. The processes of coastal shipping are becoming more centralised even as wooden sailing ships are increasingly moving to the fringe.

8.4.2. Questioning Consistency

The other point of interest that has emerged from studies of the Paper Fleet is that whilst there are obvious differences in how ships are being built, there is also remarkable continuity between ships from the beginning of the century and those present at the end. In principle the overall shipbuilding technology is the same but the specific details of the construction—how fastenings are deployed, the

securing of treenails, arrangement of frames, and so on—are different. There are definitely changes to some key technologies being used, especially in the first half of the century. At the beginning of the century, ships are being built that have iron bolts transversally securing their framing timbers (futtocks, top timbers, and so on) or have iron plates and bolts forming the main assembly of their deck beams (see Figure 8.3). There are also ships with Copper Fastenings, presumably the spikes or bolts that secure hull planking as the butt end and hood end bolts (see Figure 8.4). Towards the middle of the century and especially after the 1830s yellow-metal (copper alloy) appears as both a fastening type and a sheathing material entirely replacing copper sheathing in the Paper Fleet. There are also sporadic entries for iron framework, however, as was shown from the analysis of the entries in Chapters 6 and 7 these appear to be recorded less consistently. Both of those examples had iron fastenings but neither shows them in every register book entry.

After the middle of the century the picture seems to be slightly different. It is worth revisiting the fact that different information is recorded in different years. Particularly after 1870 there are books where very little is entered aside from the fields of ship name, owner, build location, build date, and survey port. This makes it slightly harder to be confident that all the information is present for these ships. However, there are sufficient years that contain all the fields to illuminate enough of the picture to discuss them in detail. It would seem that later ships continue to be built utilising at least one of the technologies that emerged at the beginning of the century; copper sheathing, iron framework, or yellow-metal fastenings. It is certainly the case that there are no new material entries for shipbuilding technologies or components used in wooden sailing ships added to the *Paper Fleet* after 1830. The possible exception to this is the detail recorded for *Qua Lee* and *Ta Lee* with "Iron Frame Planked Diagonally" recorded in both ships' entries. This probably means both ships are actually "composite" construction, meaning wooden hulls laid over a fully iron frame, not that the ships were built with conventional wooden shipbuilding techniques reinforced by iron knees and braces. In this case both ships are further distinct from the others in the sample of 200. However, they remain useful in showing the difference between composite vessels and more conventional wooden hulls. They have been included because of their potential to provide a dateable reference to "Double Diagonal" planking. These ships also allow this thesis to comment on the nature of the LRS's recording. Both ships were included alongside other wooden sailing ships, despite the fact they represent a technological tradition that archaeologists and historians view as separate from wooden shipbuilding. In the last two decades of the 19th century composite-built ships like these are separated from wooden ships. This reflects the changing technological landscape of the 19th century, where multiple ways of building a ship are in practice at the same time the methods to record and catalogue those ships must also change.

There are other areas of consistency alongside the technologies being implemented. The ships do not markedly differ in size. The exception being a few ships below 100 tons. It might be better to present this as a ceiling, and ships that exceed the 150-ton mark appear to be trading further afield. The possible anomaly being the 449-ton *Earl of Devon* which is consistently registered in a British port. Although, as this ship is in the register books after 1874 there is no onward destination recorded in any of its entries. It is therefore possible this is a larger schooner-rigged ship involved in international long-distance trade. For the remainder of the Paper Ships there is little change in the size of the ships, once hull dimensions start to be included after 1863 the same trend is visible with only minor differences (meaning less than five feet) in hull size. This is again an interesting development. Although, it is a logical one. The roles these ships played in coastal trade almost certainly placed an upper limit on size. However, Greenhill's (1978: 45 & 47) assertion that it relates to schooners being built to serve in fruit trades is unconvincing given the number of ships and diversity of origins, and that schooners had been replaced in fruit trades by the mid-19th century. Tonnage and size were not part of the selection criteria for the Paper Ships, so it is not a selection bias that has led to this pattern of size. There is something else at play here.

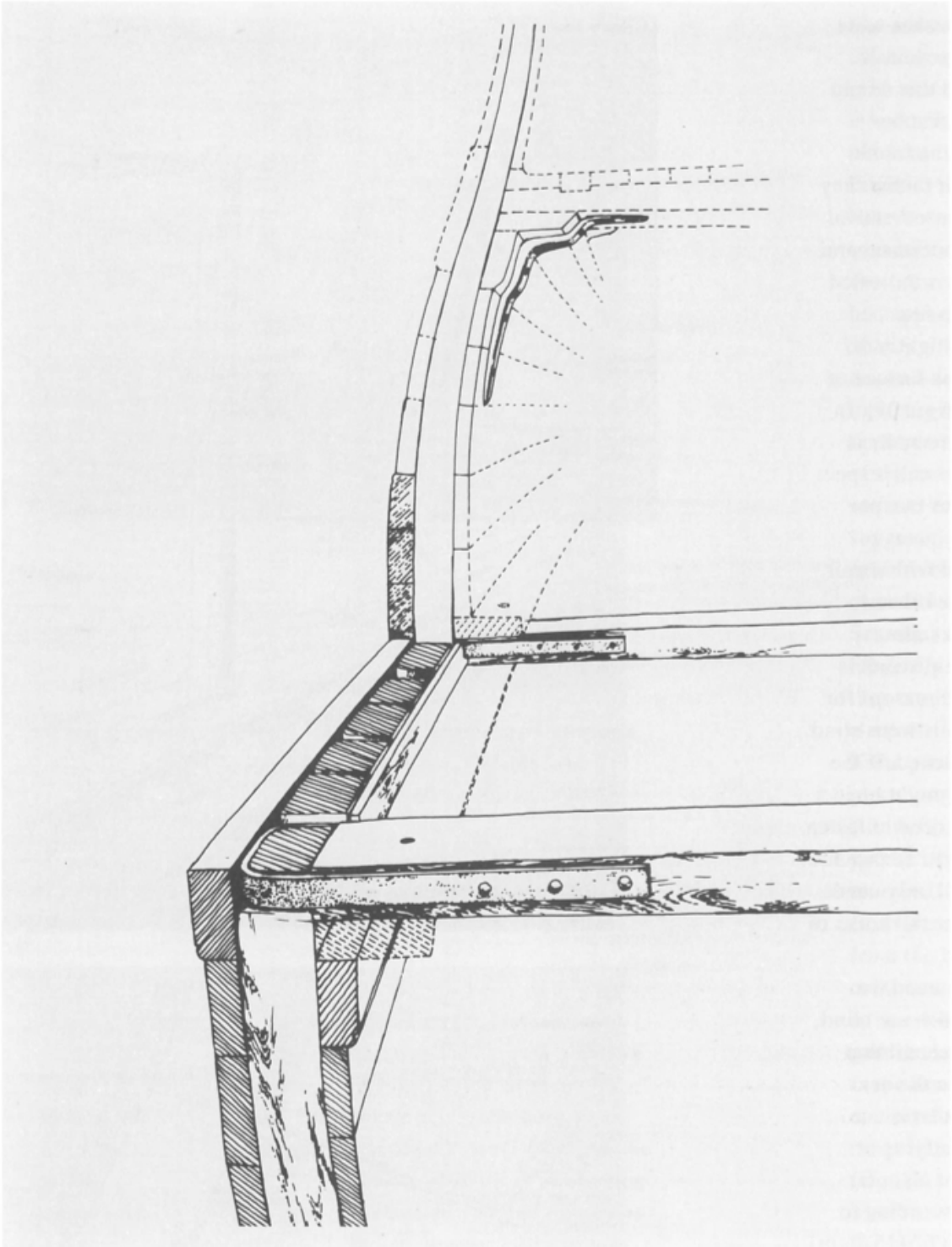


Figure 8.3: A reconstruction of the deck and hold beam structure from SL4 taken from Adams et al., (1990: 87, Fig. 104).

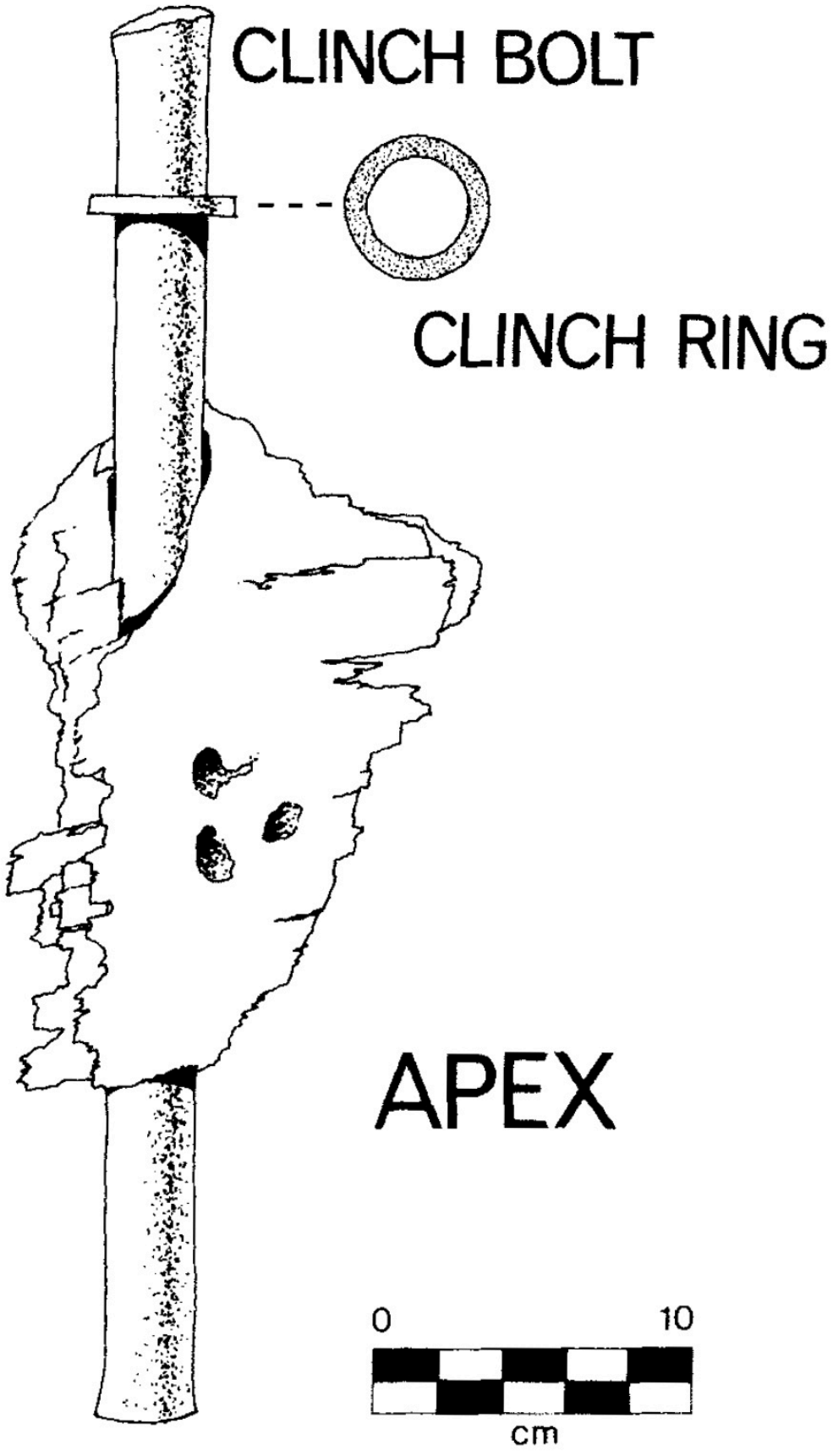


Figure 8.4:A clinch bolt commonly used in the late-19th century as a through fastening in iron, copper, or copper-alloy for butt or hood ends of planking (taken from McCarthy 1996: 193 Figure 14)

It is possible that the similarity in size and capacity for the schooners in the sample represents a preferred vessel size for Britain's coastal trade. There are suggestions in the literature that pressures of efficiency played a major role in private merchant shipping (Davis 1972: 73-4; Reid 2020: 220). It has been argued that a fore-and-aft rig means ships can be run with a smaller crew (Greenhill 1988: 131; Reid 2020: 202-203) and increasing the size of such a ship does not mean a complementary increase in the size of the crew. However, it is possible that there is a limit on the size of ship that can be effectively serviced by harbour and coastal infrastructure. The record represented by the Paper Fleet shows that larger ships are being built. Composite and metal hulls allow for ships of several hundred tons capacity to be constructed but these are then restricted to certain harbours and ports, and possibly also too large for the Maritime Fringe. What may have started as a technological limit—a size that could not be easily passed because of the limits of wooden hull construction—then became an infrastructure limit. This limit took effect in two ways. Firstly, because the shift to iron shipbuilding and steam ships reduced the amount of infrastructure in harbours and ports that could support wooden shipbuilding. Secondly, as wooden sailing ships were pushed to the margins by larger ships that commanded the services of larger harbours closer to railheads, canals, or other transhipment services. There was a maximum size these ships could be and still work out of the smaller harbours in places like Cornwall or Northern Scotland. It is also likely an element of technological adaptation takes place, where wooden ships are adapting to the changed Maritime World and wooden sailing ships—like *Rhoda Mary*—are built to serve in the trades available in the Maritime Fringe. As the century progresses wooden ships are seeing the coast of Britain change and focus on a different means of interacting with the sea—one driven first by steam, and then by kerosene and diesel motors—meaning they fill different roles to those a similar vessel would occupy in an earlier decade of the century.

8.4.3. Lifespans:

Those wooden ships are often seeing considerable changes because their lifetimes are extending as the century progresses. This can be seen in the averages across the 200 Paper Ships. Those built in the second half of the century are living 6.8 years longer, an increase of 36.5%, not an insignificant amount. This was an unexpected change that arose from the investigation of the Paper Ships. However, it fits with the suggestion, in 8.4.2, that the way wooden ships are approached is changing toward the end of the century. This change could be considered in the same discussion as the fact that ships do not increase in size beyond a certain point because of constraints on infrastructure and materials. Perhaps what is taking place is an effort to keep ships working for longer. This is reflected in an increased use of rebuilding and Special Surveys. Potentially, as the century progresses it is becoming unviable to construct a new wooden sailing ship, of a size useful to the coastal trades, from scratch (Geels 2001: 1269-1270). Therefore, existing ships must be maintained, repaired, and rebuilt to ensure they continue to function. The crash in wooden ship registrations after 1874, possibly precedes a loss of the people possessing the knowledge and skill to continue building them. What was once easy to do on every riverbank or coastal settlement in Britain, building a wooden merchant ship, becomes lost to all but a handful of people and places. The skills to build and maintain smaller working boats remain (McKee 1983). However, these are a different construction tradition to working ships as represented by the schooners in the Paper Fleet. Centralisation of shipbuilding for metal-hulled and steam driven ships to places that have the infrastructure to support their construction can only exacerbate this.

Such a gap in lifespan also raises the question of whether the reason for this increase is due to some influence in the first half of the century leading to shorter lives. One of the stated objectives of Lloyd's Register as an organisation was to enhance safety at sea (Lloyd's Register Foundation Heritage and Education Centre 2022d). The process of recording and characterising vessels was created to

ensure the ships that set out were seaworthy and safe. Looking at the lifetimes of the Paper Ships there are notably more ships with very short lifespans in the early part of the century. However, what this is really showing is ships with very short periods of recording in the *Lloyd's Register of Shipping*. Looking at those ships in more detail shows that many were built several years, or even decades, before their first appearance in a Lloyd's Register Book. It might be that they were entered into other registers, as *Ocean* was, or that they were simply unregistered. Several were built prior to the year 1800 and this may indicate that their owners and masters were not used to participating in the developing system of Registration which only started in the mid 1780s.

There is no doubt there is an increase in the use of "rebuilding" and of Special Surveys in the second half of the 19th century (see Sections 2.3 and 5.4.1). So, it is clear more time and effort are being invested into keeping ships on the water. What is unclear based on a closer look at our dataset is whether this translated into ships with vastly longer lives. That increase in rebuilding and survey also coincides with an increase in ships being hulked and abandoned in the final decade of the 19th century. This has come from the process of extracting the Paper Ships from the register books, noticing increased numbers of stamps for "Abandoned", "Missing", and "Hulked" including amongst ships that were not part of the selection of 200 used for this thesis. However, within the 200 ships examined for this project there is an increase in lifespan towards the end of the century. It therefore seems reasonable to suggest that whilst ships are living longer, they are also being abandoned more regularly. Just as it becomes unviable to construct a new sailing ship at the end of the century, it appears it is also becoming unviable for many ship owners to keep their vessels working. In a Maritime World increasingly dominated by steam-driven and motorised shipping the value of working sailing ships decreases to the extent that the best option is to simply moor on a riverbank and leave the vessel to decay. Those shipowners and masters that can keep their craft viable try to stretch their ship's lifespan beyond what was seen for similar vessels in the first half of the century.

8.5. Fragments and Voids:

This discussion around establishing the lifetimes of ships has highlighted an issue that should be addressed before engaging with the results presented in Chapters 6 and 7. The Record, even with the addition of the documents from the Lloyd's Register Heritage and Education Centre, is a fragmentary one. The register books, and the information contained within them, are incomplete. They are less fragmentary than many types of site archaeologists are used to working on, but they are by no means the single solution to understanding shipping in the 19th century. What the issue of establishing how long ships are alive and functioning for shows is that studies such as this one must ensure they are not solely relying on the documentary or archival record for our study of this topic. This is not a problem. The deployment of an archaeological methodology was necessary precisely because of this challenge. Voids in the dataset should not be a concern. Put simply, those voids have always been there, they are just growing bigger with time as more and more of the context surrounding them is lost. In most cases it will not be possible to recover the information that has become part of the void in our dataset, but we can get a better idea of how much is missing. By combining the information held within the register books and other documents with information gathered from the archaeological investigation of shipwreck sites we can create knowledge about an individual ship that we did not hold before.

8.6. Shipwrecks and Stories – *Ocean* and *Rhoda Mary*

Two of the ships within the Paper Fleet have accessible remains that were investigated for this project. Including the investigations of these sites has allowed an examination of the documentary material in light of physical, measurable evidence from the ships it concerns. These investigations have also allowed a review of to what extent the ships in question reflect the trends and themes we have identified in the overall study of the period as well as the existing literature. These two sites serve as anchor points in the Paper Fleet and are the point at which the intangible collection of

vessels that exist only on paper cross into the real world and become corporeal. They also serve to be parts of the dataset that can be examined in even finer detail and integrate wider sources than the *Lloyd's Register of Shipping* to include their survey reports, and previous archaeological investigations. Through these sources and the investigations conducted for this project it has been possible to relate the stories of these ships. In the case of *Ocean* this has included the final moments of the ship as it was chased aground by a storm. For *Rhoda Mary* a more common end has been described as it progressed through different owners before passing out of working life entirely to become a houseboat, eventually abandoned on a muddy riverbank in Kent many miles from its birthplace in the leafy creeks of Cornwall.

8.6.1. *Ocean*

In the investigation of *Ocean* in Chapter 6 the importance of integrating multiple sources has been demonstrated, perhaps better than at any other point in this thesis. The contextual information that was gathered from the register books and the survey information from the Plymouth Ship Register made significant contributions to understanding the site. Without that information it would have been impossible to suggest an identity for the shipwreck emerging from Hayling Island's East Winner Bank. It would be possible to get close to an identification with the evidence recovered from the site and analysis of metallurgical finds giving dates and diagnostic information. However, these results realise their true value when combined with the contextual information held within the *Lloyd's Register of Shipping*.

The remains of *Ocean* demonstrate three of the major developments in shipbuilding technologies in the early 19th century. The first being the presence of iron knees on the site. Second the presence of iron bolts securing the framing timbers, and third yellow-metal fastenings in the hull planking and keel. By identifying these materials, it was possible to secure an earliest possible date for the ship's construction. From the extent and location of the yellow-metal fastenings in the ship it was possible to determine they were a later addition, likely a repair. The results of the metallurgical analysis further refined this by providing the earliest dates the alloys they comprise were available from. This allowed the site to be related to specific incidents of repair.

By far the most significant result of the investigation of *Ocean's* wreck site and the wider assemblage of documentary sources was the story that emerged of the ship's final night. Through this site it is possible to witness the heroic rescue of part of *Ocean*'s crew and the lasting impact on the immediate area through the provision of a lifeboat station. The investigation shows how this ship voyaged around the coast of Britain as an essential component of its local coastal trade. This also reveals the complex world of 19th century ship owners, reflected in the Stevens family's shifting ownership and division of shares. That last area also highlights a further advantage of consulting multiple sources, they provide a more granular view of the ship's life. In the LRS the changing ownership structure is masked by one family name "Stevens", and by including information from the Plymouth Shipping Register we can witness the more complex dynamics at play.

8.6.2. *Rhoda Mary*

As a different type of site created by different processes *Rhoda Mary's* hulk contributes more information to the overall discussion. This site also includes a survey report, compiled by a Lloyd's Register surveyor, as part of its assemblage. *Rhoda Mary*'s hulk on the Medway is also an excellent example of how ships from the 19th century can lead complex and multi-layered lives. From discussions with a heritage group (The Rhoda Mary Project) established to recover and restore the hulk it is understood that the ship survived well beyond its last registration identified for this project in 1909. There is also information relating to the ship in Greenhill's 1988 book *The Merchant Schooners*, so there is already a secure identification and some detail of the ship's story. Despite this existing work there had not been any archaeological investigation of the site prior to the involvement

of this project. As with *Ocean* in Chapter 6 we have been able to construct a site plan and identify key diagnostic components on the site.

Rhoda Mary is another ship that lives through the change to the *Lloyd's Register of Shipping* that means the onward voyages of ships are no longer recorded. However, many of the themes identified for other ships in service during the second half of the 19th century are present in its record, specifically the use of Special Surveys and repairs. The ship receives a new deck in 1892 and is then subject to a series of Special Surveys in 1889, 1896, and 1901. These maintain *Rhoda Mary*'s classification at "A1", the highest possible. So, it is likely this is an example of the system of maintaining a ship to keep it in service. More information related to this can be found in the initial survey report conducted for the ship's registration. The shipbuilder, another Stephens, is in correspondence with the Lloyd's Register committee throughout the building process. It appears the aim of this correspondence is to ensure the ship exceeds the criteria set out by the Lloyd's Register's rules for wooden sailing ships. He is successful in this aim as the survey report shows the timbers and fastenings exceed all the required dimensions. This is a wooden sailing ship being built during the transition that leads to the crash in Britain's sailing ship population identified in Chapter 4. *Rhoda Mary* is launched in 1868, just six years before the registered population of wooden sailing ships collapses by more than 70%.

The technologies incorporated in the building process for *Rhoda Mary* closely follow those identified in the Paper Ships. The evidence from the survey report shows a ship built with iron bolts to secure the framing timbers and iron knees. On the site it was also possible to identify several diagnostic components. The arrangement of frames, positioned with reduced room and space, is also recorded in the survey report. These timbers were also consistently sized, reflecting the findings of the Lloyd's Surveyor. Information from the report also helps to fill in the gaps present on the site. Incorporating different source types like this is a way to address the expanding void discussed in Section 8.5. The survey report states the ship was built with iron knees, and therefore confirms the disarticulated iron knees found near the site are associated with the hulk. This site also demonstrates where the surveys and register books have their own gaps, the most obvious being a series of iron braces positioned vertically on the inside of the hull secured with iron spikes that are not referenced in any of the documents. The final technology we find is yellow-metal fastening. There are two incidents of yellow-metal bolts or spikes through the butt ends of planking into the frames. These are not recorded in the register books. There is no entry for yellow-metal fastenings anywhere in *Rhoda Mary*'s entries. However, they are present in the survey report and are recorded for the lower portion of the hull. Metallurgical analysis of these fastenings confirms they are of 19th century date. With voids and fragments in all the different sources individually the best possible understanding of the site is achieved by bringing them all together.

8.7. Stories at Scale

Taking two of the Paper Ships and investigating them at this level of detail has allowed their specific stories to be drawn out. This is a level of detail that it is impossible to attain with just one of these sources. An overview of a ship's life from the Lloyd's Register is and a list of a ship's voyages can be created, but this is still missing a lot of the story. Ships do not cease to impact the world when they drop out of the register books. Their influence on the world is long lasting and at times quite discreet. Viewing the remains of the ship in their final context adds to their study, being able to record and investigate their remains allows form to be put to the words in the register books. Through incorporating the resources of the Lloyd's Register, an account of the 19th century can be presented that does not try to follow an existing perspective, but instead places working ships, and specifically Britain's coastal trade, at the heart of the story. This is still imperfect, that account needs to be strengthened by further study of coastal shipping. Several areas have been suggested in this thesis that need further study, but all of them require archaeological involvement. That part of the record is

essential to framing our discussion of 19th century coastal shipping. The granularity that is available through an archaeological investigation makes this possible. The intersection between different source types provokes new areas of study, much as Adams (2014: 38) demonstrated.

At this point the main outcomes from each set of results in this project are clear. There is an account of the 19th century and the shipbuilding industry that centres on British merchant shipping. Some of the key influences and driving factors on coastal seafaring and the shipbuilding choices made in the production of those ships have been explored. Those results also contain the single largest collection of 19th century merchant ships that has even been investigated. The 200 ships that make up this sample cover the entire period and show the changes, and continuances that are taking place. Some of what has been uncovered is expected, such as the decline in shipbuilding at the end of the century. Some runs counter to current thoughts on the period, there is no spike in ship numbers following the EIC's monopoly ending, and there is continued use of wooden shipbuilding technology in the 1890s and 1900s reminiscent of the earliest part of the 19th century. This allows the research questions established at the outset of this project to be answered.

8.8. Existing Narratives Confirmed and Disrupted – Question 1

The first question asked: *In what ways do schooners, as a medium size ship type, reflect the trends thought to occur in 19th century British shipbuilding?* Chapters 2 and 4 set out what those trends are, through both the current state of the archaeology of ships and then the existing knowledge and accepted wisdoms that exist around the construction of 19th century ships. Answering this question is made simpler by recent scholarship (Mendoça 2013; Olaberria 2018; Cannon 2019; Reid 2020; Tanner 2021) that have already started to break open this topic and demonstrate new lines of enquiry for the study of ships and the way the development of shipbuilding is approached. Olaberria's (2018) work exploring the use of mental templates and rules of thumb is most directly relevant here, showing the process of shipbuilding is exactly that, a process and not a formula to be followed.

From the investigation we can also outline issues with existing arguments beyond construction of individual ships, looking at the period as a whole. The population of merchant ships in the LRS and then the *World Fleet Statistics* do not follow the assumed trends, this was explored in Section 3.6. The influence of certain legislative and corporate changes does not drive the spikes and falls in shipbuilding that have been suggested elsewhere (MacGregor 1984b: 10-11). Furthermore, events like the opening of the Suez Canal do herald the collapse of the sailing ship industry but perhaps it is more accurate to say this indicates the beginning of the end and what follows is a significant reduction in ship numbers followed by a more gradual decline. This is supported by the results from Mendoça's (2013) paper where the tonnage represented by steam-driven ships climbs dramatically at the same time as the tonnage for sailing ships falls. Looking at both the results from this project and those Mendoça presents, shows the effectiveness of studies of this kind in enhancing our understanding of the 19th century Maritime World. However, the Suez Canal is the exception, there is no other single event that reflects a marked change in the technologies being deployed in merchant shipping in this century. Even the development of the steam engine, or the use of iron hull construction, do not result in an immediate shift but are instead a gradual transition in shipping from wood and sail to iron and steam. Even this is not so straightforward with wooden steam vessels and iron sailing ships also regularly in use at in the same period. The reality where influences on shipbuilding are concerned is probably a vastly more complicated and nuanced combination of all these different events. The population of sailing vessels falls in the first half of the century, as MacGregor (1984b: 10-11) indicates, but this is immediately prior to the end of the EIC's China monopoly not in the years following. So, it can be assumed that this fall is unlikely to be caused by an oversupply in ships built to enter the China trade. There is a rise in ship numbers at the time of the initial repeal of the EIC monopoly to India, but this takes place in the first decade of the 19th century,

and as we have seen the registering of ships was by no means established in the early part of the century. It is therefore difficult to attribute that rise solely to the monopoly's repeal.

The shift to steam that eventually does take place also heralds a change for the use of sail-driven ships around the coast of Britain. From the records of the LRS it is possible to gain a rough idea of where ships are voyaging and how these voyages change across the century. That includes a record of where ships are starting their voyages from, even if they are simply coasting around Britain. The records show that towards the end of the century wooden sailing ships become less and less common in the traditional maritime centres of commerce. Places such as Liverpool, Plymouth, and so on. Instead, schooners are found more and more regularly on Britain's Maritime Fringe, maritime-facing communities with small hard-standing maritime structures, or even none present at all, such as Cornwall, or West Wales. That shift also informs on the complex series of influences at play in this century. Whilst it is certain that wooden sailing ships are displaced in favour of larger iron-hulled vessels, the reasons for this preference are numerous. That shift is combined with an increase in lifespan towards the end of the century, with ships in the Paper Fleet living an average of 36.5% longer in the second half of the 19th century. Increased lifespans also illustrate the effectiveness of the growing use of rebuilding and "Special Surveys" to maintain ships at the highest grades available. It is worth noting here that the lifespan being discussed refers only to the working life recorded in the entries of the LRS, as the example of *Rhoda Mary* in Chapter 7 shows ships can live considerably longer than this and still form a major part of the Maritime World well into the 20th century. Even after their eventual deposition as wreck or hulk their influence remains, as illustrated by the story of *Ocean* in Chapter 6 with the establishment of Hayling Island's lifeboat station and the periodic re-emergence of Daniel Dewdney's ship from the East Winner Bank

It is still important to consider shipbuilding as a single industry. Whilst ships might be being built for specific trades, such as for coasting around Britain, this does not mean those ships are an entirely separate technology from those built for a "blue water" international trade such as China or South America. The individual Paper Ships also show that there is considerable technological consistency. This is surprising considering historical narratives of this century so often focus on progress, technological advancement, and increasing efficiency (Davis 1972; Hobsbawn 1999). However, the record suggests that shipbuilding reaches a point in this period that the energy and effort to develop ship construction and new ways to resolve challenges is put into different technological branches. Those branches are iron-hulled, and steam driven ships. In each of these areas there is a well-documented process of innovation and failure. Designs and technological solutions are trialed, some succeed, and others do not. However, amongst this phase of dramatic technological change wooden sailing ships continue to be built and used that would be easily recognizable to a shipbuilder or sailor at the beginning of the century. In part this is because there is a clear suite of shipbuilding technologies for wooden sailing ships established in the earliest decades of the 19th century. These are: iron framing, metal hull sheathing, and copper or yellow-metal fastenings. There are also rarer examples of specific shipbuilding technologies that may not be so recognisable such as the use of diagonal planking. For the most part the use of these technologies is recorded in the documentary sources used for this thesis. From these recordings it is possible to suggest dates that each individual technological solution becomes "mainstream" or at least is being used regularly enough to warrant its own discrete entry in the LRS, these are shown in Table 5.4. Even for the use of iron framing which is hardly recorded in the Paper Fleet, it is possible to establish this date from the wider information held in the LRS. Whilst these dates are not a definitive record of the first time any individual technology is present, they are still useful in understanding how the shipbuilding industry is changing. It is also possible to identify some interesting trends within the 200 ships. From the 1830s yellow-metal sheathing replaces copper sheathing as the most regular entry for type of hull sheathing. Likewise, the use of yellow-metal fastenings becomes much more common from this point, although it is by no

means present in every ship in the sample of 200 studied here. These dates go some way to aid in the identification of ships, as shown in the investigation of the wreck of *Ocean* in Chapter 6. In that example, by establishing the presence of a repair using yellow-metal fastenings alongside a much earlier construction deploying iron bolts and treenails, it was possible to identify a strong shortlist of suitable candidates for the identity of a hitherto unknown shipwreck on Hayling Island. One of the key findings of this thesis is that at the end of the 19th century there are still ships in service that would be broadly recognisable to a sailor or shipowner from the beginning. Over a span of a century shipbuilding remains the same but specific details of an individual ship's construction can be different. This is perhaps the most interesting outcome of this whole project. There does not appear to be any radical development in the technologies available to wooden shipbuilders after the introduction of yellow-metal in the 1820s and 1830s. Perhaps there has been a slightly oversimplistic way of understanding the relationship between a ship technology and its underlying influences. It is not a case of simple cause and effect leading to linear developments in technology, the reality is far more nuanced and subject to different forces and influences throughout the century. Wooden Schooners powered exclusively through wind power, which have been argued to be a ship type popularized in the latter part of the century, not only exist but are a regular part of the Maritime World even before the year 1800.

Therefore, a clear answer is available to this question. Schooners do not reflect all the trends thought to occur. The reality is a much more complicated picture. However, schooners do follow the technological trends identified in other types of wooden shipbuilding in this century (MacGregor 1984a; 1984b). The same technologies are present in their construction, and the same wider pressures of new branches of ship technology displacing wooden ships are at play. Where they differ from other types of ships, and particularly larger wooden sailing vessels, is their adaptability and resilience. Where large wooden merchant ships are not-so-gradually replaced entirely by iron or composite vessels with increasingly efficient mechanical propulsion systems, the small schooners involved in the coastal trades instead move to the Maritime Fringe. The numbers of ships dwindle, as these places do not need thousands of ships, but their existence coalesces away from the country's large mercantile centers. In the investigation of the wreck of *Ocean* and hulk of *Rhoda Mary* it is possible to see the tremendous impact ships of this kind have on the coastline. In both cases those ships have been impacting and influencing the world around them long after they were forgotten by people. In *Ocean*'s case this is a direct intervention, the establishment of a lifeboat station and a new regard for the dangers on that stretch of coastline. For *Rhoda Mary* the story is gentler, a ship that worked well into the 20th century before being reshaped into a vessel of a different kind, a houseboat on a distant river. Ultimately abandoned and forgotten until its story provoked the interest of a historical group. That interest has since reshaped Cornwall's current Maritime World, with the establishment of the Rhoda Mary Shipyard in Truro and the construction of the Falmouth Pilot Cutter *Pellew.*

8.9. Has the Record Been Unlocked? – Question 2

Alongside the impact of the ships and the way they have encouraged this project to reframe the study of the 19th century Maritime World, runs the question of The Record itself. The second research question asks: *What is the potential for ships in the overall shipwreck record to unlock documentary components of the record thereby revealing relationships and meaning that would otherwise remain obscure in investigations of either source material on its own?* In essence this is looking at the ships discussed in Chapters 6 and 7, as these are the only two of the 200 ships sampled for this project that appear in the shipwreck record. However, what has also emerged from the results of this thesis is that by using the shipwreck record as an anchor point, the documentary record can be opened in such a way as to enable a much larger pool of candidates to be used in the investigation. Due to the variety of sources being included in this thesis the approach chosen had to be able to accommodate multiple scales, from the very broad annual ship numbers and legislative situation of the 19th century as a

whole, right down to the granular exploration of individual shipwrecks and their construction elements. Integrating the two main source types, the LRS as a documentary source and the ship-remains as archaeological material, has allowed this project to re-evaluate the story of 19th century British merchant shipping. Including both types of sources as part of a single archaeological assemblage is one of the main ways this was achieved. Recognising the role of the LRS and the Registration Surveys as an essential part of the working life of these ships means the information held within those sources can be considered in a concurrent manner. Although this description presents this as a top-down process, starting with a re-contextualization of the 19th century and working at ever tighter focus toward an understanding of the construction of individual vessels, for the two shipwreck sites the process to achieve this was the other way around starting from the archaeological remains and working outwards from there.

The individual shipwrecks of *Ocean* and *Rhoda Mary* were a means to break open the documentary record of the 19th century. Starting with the physical remains of the ships. The account of the investigation of *Ocean* is the best way to explain this. Once the site had been investigated and recorded it was possible to interrogate the *Shipwreck Index of the British Isles* (Larn and Larn 1995, 1997a, 1997b, 1998, 2000, 2002) and identify the ships likely to be the wreck on the sandbank. Once an identity was established the records of the Lloyd's Register could be used to draw out more information about the candidate. In the case of the *Ocean* this allowed the investigation to test the two sources, shipwreck material and documentary evidence, against each other. By testing the sources in this way, evidence on the site or in the documents could be used to solidify the identification. It cannot be guaranteed, as there is no single diagnostic find such as a bell or a timber with the ship's name carved into it. However, the identification is as secure as it is possible to get with the information currently available. This approach allows the two source types to challenge each other and unlock new questions and perspectives that might otherwise not become apparent when examining just one of the two sources in isolation. The two shipwreck sites have presented particularly interesting results, this has allowed them to inform not only the questions for this project but also represent two of the only examples of British working merchant schooners that have been explored archaeologically.

Building from this process it is then possible to collate similar information for other coastal merchant schooners in the 19th century. The two shipwrecks serve as the model subsequent ships can be presented through, assembling their lifeway from the *Lloyd's Register of Shipping,* and looking at the key components of each entry that were found to be diagnostic and descriptive in the investigation of the shipwreck sites. The 200 ships were selected following the criteria explained in Chapters 3 and 5. By testing the information gathered from this process against that gathered for the investigations of *Ocean* and *Rhoda Mary, the* extent to which the documentary evidence can be used to discuss shipbuilding and the implementation of different technologies becomes apparent. In the case of both ships with extant remains there were clear voids and inconsistencies in the information held in the LRS for each of them. As was already discussed, in Section 8.5, this does not pose an insurmountable problem but highlights the need to engage these sources alongside the archaeological record. Thinking critically having two archaeological ship-finds is only the starting point for a detailed investigation of this period when combined with the documentary sources and Paper Ships. The inclusion of more shipwreck sites can only make this process better. As it stands this investigation offers two points at which the world of the Paper Ships can be reached into to engage with specific detail of what is happening. The exploration of those 200 Paper Ships did deploy a new approach by assembling a single dataset of ships in a way that has not been done before for the 19th century. Exploring that assemblage of vessels to extract information about shipbuilding and seafaring in the 19th century required a clear understanding of the temporal and spatial context those ships are operating within. This context is necessary to show the role of coastal seafaring amongst the wider system of Empire, as well as to demonstrate how change is taking place not only in technology,

science, and industries like shipbuilding but throughout the everyday world of the 19th century. For 198 of the 200 ships their story can currently only be explored through some of the last remaining components of their assemblages, the register books, and their associated surveys.

The final stage of the process was to take the register books and other sources that deal with the overall shipping industry from the Lloyd's Register. In this case adding in the *World Fleet Statistics* published annually by Lloyd's Register. This allowed the investigation to unlock the highest-level view of Britain's merchant shipping. As the investigation continued it was apparent that to best understand the processes, forces, and other influences acting on merchant shipping a re-contextualization of the 19th century would need to take place that put those ships and the world they operated in at the heart of the story. That recontextualization was made possible by the figures extracted from the *Lloyd's Register of Shipping* and *World Fleet Statistics*. It is at this point the discussion is probably farthest from the shipwreck record as the figures are so high level that the individual roles of *Ocean* and *Rhoda Mary* are difficult to distinguish. However, what can be seen is the impact of some of the events discussed in this contextualization on those two individual ships. In *Ocean's* case the impact of tonnage law changes is visible, demonstrated by the myriad of tonnage figures given for the ship amidst the changes in calculations. The impact of new technologies such as yellow-metal in the repairs that were made to the ship that differ so markedly from its original construction are also visible. These findings resulted from an investigation that represents the full extent of the archaeological method available to us today, taking an unidentified wreck and creating a detailed baseline of information that can ultimately offer a secure identity for the shipwreck. For *Rhoda Mary* the impact is more subtle, changes taking place in the type of voyages the ship undergoes, ultimately working in the Maritime Fringe well into the 20th century. The replacement of a deck and the use of Special Surveys maintaining the ship's characterization and ensuring it can continue working. *Rhoda Mary* represents the fullest extent of the documentary methodology as it was possible to include the full first Registration Survey as part of its investigation. The use of that Registration Survey then unlocked more of the archaeological record because of the detail it contained. That detail then allowed for the targeted investigation of key components and presented a record of the ship's construction components and dimensions that is not at all dissimilar from the results of a high-quality archaeological survey.

In effect this thesis can be thought of as four interlocking stories, and they have been presented to follow a gradual focus into the detail of 19th century shipbuilding. First, the overall events of the 19th century portrayed through a collation of ship numbers to evaluate the impact of certain key events on the shipbuilding industry. A backdrop that has been assembled from the documentary components of the record. Second, the collective story of the 200 ships, only visible in the documentary component of the record. Each ship with their own unique lifeway and set of circumstances, all of which combine to give a better understanding of the world of merchant schooners. Finally, the two individual accounts of *Rhoda Mary* and *Ocean* which provide a means to demonstrate the findings of the previous two scales. Those last two stories are made better by the inclusion of documentary evidence concurrently with their shipwrecks. Seeing the impact of new technologies in *Ocean* or the movement to the fringe in *Rhoda Mary,* serves to enable the investigation of the wider documentary record.

It is possible from this series of stories to answer the second question. The shipwreck record does unlock documentary components. The use of the two records together unlocks far more knowledge than one or the other used in isolation. The impact of combining the two and using archaeological thought to view their world from their perspective, makes our investigation more effective. We have been able to identify key issues and events, as well as to get at ships that are increasingly operating in the margins, behind global events, or around the edges of a large trade system dominated by ships that are much better studied or more widely researched. This level of focus on small merchant ships has not been achieved before, and continued research in this area and continued examination of the

material remains of ships of this kind can only improve the wider discussion of 19th century shipping. Adding larger studies of ships from the documentary record can only do the same, although the true strength of this is where the two records can be brought together in the assemblages of individual ships.

8.10. Summary

At the end of all this discussion of ships, fastenings, register books, and surveys, the research questions have been answered. Perhaps the biggest outcome of this project is the use of documentary records to establish the lifeway of a ship that is supported by the findings from an archaeological investigation. Those documents are as much a part of an archaeological assemblage as any of the bits of timber or metal discussed in Chapters 6 and 7. Their investigation requires that role is recognised and that these sources are used in combination with the other assemblage components to generate a picture of the ships being discussed. By doing this and connecting the documentary sources back to the ships they relate to, the documentary record is opened, and an investigation of larger scale influences and trends is enabled. At times in the process of creating this thesis, it was hoped that there would be some great seismic overturning of the current state of understanding, that using the resources in this way would lead to some hitherto unknown or overlooked feature of the 19th century Maritime World. Instead, what it has shown is the messy and complex connections between the different parts of that world. This thesis revels in that complexity, as it is only by engaging with it that the true benefit of the combination of sources that make up The Record becomes apparent. Looking at all this material together allows a challenge to some arguments and support of others. The contribution the archaeological study of future ship-finds from this period can still make then becomes apparent.

Part of the task has been to focus onto a relatively understudied component of Britain's maritime past—merchant coasters. This was relatively easy, as the significance of their role is obvious once we shift perspective to look at the processes and industries underlying and facilitating 19th century European Maritime Power. Seafaring activity is as much a part of the imperial process as colonisation or any other part of the picture—and seafaring around the coast of Britain is no exception, it is part of Britain's global commercial system. The role of shipbuilding can be hard to see, not least because shipbuilding for vessels of the size and type this thesis is interested in, is not a centralised process and does not rely on any formal system, or dedicated infrastructure to take place. Instead, it is a world of mental tools and hard graft, taking place on riverbanks, beaches, and in coastal communities all around Britain. As the period progresses shipbuilding itself changes, new branches spring up and further influence the Maritime World. Whilst the schooners at the end of the century may be recognisable to a sailor from the beginning, the coastline they are navigating along is not. Ports that were once the hub of a merchant fleet driven by the wind have transformed. Sailing ships increasingly move to the margins, working amongst larger vessels of iron and steel, responsible for fewer cargoes and with reduced access to the resources of those ports. That is not to say those ports are now closed to wooden sailing vessels. Instead, their focus has shifted, and whilst wooden sailing vessels still access these places and have a role to play, they are no longer the core users. Their role has been supplanted by steamers and iron-hulled vessels.

This thesis has made considerable progress in enhancing the wider understanding of the 19th century Maritime World. In places that contribution has been as simple and subtle as highlighting areas of oversimplification within the current narrative of 19th century ship construction. Alongside this there are several individual outcomes that are useful for the investigation of ship-finds from this period. These outcomes include the extraction of key dates for individual technologies from the LRS, or the use of the LRS's records to establish shortlists and refine the identification of a shipwreck site. There has also been significant impact on the wider narrative of 19th century shipbuilding, because of the overall analysis of the LRS presented here. A timeline of the number of registered ships by year has

been established (presented as Figure 3.2 and Figure 8.1). That timeline allowed this thesis to test suggestions of major impacts on Britain's shipping population and for some idea of the total population of shipping to be established, with the caveat that whilst the Lloyd's Register is the largest shipping record it is not the only one in operation in this century.

The information gathered at each stage of this project a detailed picture of the 19th century Maritime World has been built. However, that picture is not complete, and nor should it be expected to be. What the investigation of the Lloyd's Register has shown is that The Record has always contained voids. There have always been places where information is missing, be it a master's name or the onward location of a ship. When time is added to any of these resources those voids grow, they are alive, and they feed on the parts of the record that is lost as shipwreck sites degrade, documents are lost, and the living history and oral traditions of the shipping industry fade. However, to archaeologists this threat should hold no power. Our world is one of fragments and voids, the job being to reconstruct what we can from the remnant. It does demonstrate the limits of the Lloyd's Register, and other register systems and organisations, as components of the record. These resources should not be investigated or considered strong enough to form an interpretation on their own; but instead, must be approached in concurrence with the material from shipwrecks, other archives or records, and coastal archaeological sites such as shipyards or harbours.

The stories of *Ocean* and *Rhoda Mary* show the wide range of factors and influences at play. These also show the key role merchant shipping had in the everyday function of the Maritime World. Those ships are remarkably similar in their construction and appearance. Both were built in South West England, with no figurehead, and iron framing components in their hull. However, the two ships would have sailed along vastly different coastlines. As *Ocean* progressed through its working life the repairs made to the ship introduced new materials, such as yellow-metal bolts. *Ocean* would have been working in a rapidly changing industry as more and more trades turned to iron-hulled and even steam-driven ships for larger cargoes or faster passages. The launch of *Rhoda Mary* two years after the loss of *Ocean* would have been into an even more different world. *Rhoda Mary* would have seen an even faster changing coastline and reflects the trend of ships working on the edges of Britain's coastal trade. By the end of the century *Rhoda Mary* would no longer be a representative of Britain's most common maritime technology. Instead, the ship would have shared harbours and trade routes with a much greater number of mechanised watercraft, first steam-driven and eventually kerosene engines. Despite their similarity, *Ocean* and *Rhoda Mary* are clear indicators of the pace of change and the wide and varied influences on the Maritime World. Their stories serve to anchor the individual findings of this thesis and illustrate how shipbuilding developed in this century. Tracing those stories was only possible through the integration of documentary records from the Lloyd's Register alongside the archaeological material. Therefore, allowing a wider investigation of this complex period to be performed.

This project has not set out to challenge the current understanding of shipbuilding and narratives around 19th century seafaring for the sake of challenge. Instead, the aim has been to demonstrate that the information within these archives can be used to expand the investigation of individual shipwreck sites. They also allow the lifeway and narrative of a ship to be pieced together and provide a means to reach the people involved. The results of this project also come in the wake of several important pieces of research that have demonstrated the effectiveness of archaeological approaches, such as Olaberria's (2018) study of shipbuilding process, or the use of archival resources in Cannon's (2019) investigation of ship design and hull-form. The wider understanding of the 19th century Maritime World is changing as are the perspectives from which it is being examined. The 200 ships selected for this investigation represent a fraction of those present in the record. However, that sample represents a group of people that are often forgotten amongst narratives and studies of the period's great Joint Stock Companies and Naval Powerhouses. This project also demonstrates what

can be achieved by applying archaeological techniques to archival resources. What components should be included in the investigation of an archaeological site of this period can be expanded by including documents that were essential to a ship's function but physically separated from it.

Chapter 9. References

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