Lost but Not Forgotten:
The Significance of Nineteenth-Century American Brigs To a Developing Colonial Australia

Walter Duane Hano
B.A. Southeastern Louisiana University

Maritime Archaeology Program
College of Humanities, Arts and Social Sciences
Flinders University

19 January 2018

STUDENT DECLARATION

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in text.

Walter Hano
Student ID: 2156409
Adelaide, January 2018

ABSTRACT

At the turn of the nineteenth century, wooden brig-rigged sailing vessels were one of the most prevalent types of ship serving in both the naval and merchant sectors. The capabilities of these ships for open–sea sailing, operating in coastal waters and accessing smaller ports are just some of what made these vessels so popular, especially to the maritime-based economy of colonial Australia. Concurrently, the growing shipbuilding industry in the emergent United States quickly was becoming the world leader, and American ships were present the world over. The focus of this thesis is to highlight and investigate the participation of American brigs in Australian maritime commerce and its importance to the maritime-based economies of the Australian colonies. Supplementing this broad-based study is a more detailed and regionally focused examination of the American brig *Ida*, wrecked on the South Australian coast in 1857. *Ida*'s ship biography is developed within the framework of the so-called BULSI system, incorporating the results of archaeological site excavation and historical and archival research. These details provide a specific case example for the broader study context and help advance understanding of the presence of American brigs in Australian waters during the nineteenth century and the contributions that these ships made to the economic development of the colonies and, ultimately, the nation of Australia.

ACKNOWLEDGEMENTS

I am thankful to all of those who assisted me throughout this project.

Firstly, to my supervisors, Dr. Wendy van Duivenvoorde and Mark Polzer, for their guidance and support with this project and throughout my stay at Flinders University. I look forward to what the future holds.

Secondly, to John Naumann for not only aiding with this project, but for all the advice and wisdom he has shared with me.

A special thank you goes out to everyone that assisted with the excavation and surveying of *Ida*. I am extremely grateful for all the hard work everyone put in, without it this project would not have been possible.

To my friends, both the old in the United States and the new in Australia, your support made a world of difference and I am thankful to have each of you in my life.

To my grandmother and grandfather, for always giving as much help as they could and for always being there for me. I will always be grateful for them.

To my wonderful fiancé, Tabitha Young, who followed me to the other side of the world to chase a dream. Without your love, support and patience I would be lost. Thank you for everything you do.

To my amazing sisters, Ashley and Brooklyn, we may have been a world apart but you two were always with me every step of the way.

Finally, to my Mom and Dad, for all the love and support they have given me throughout the years that made all this possible. It has been a long road with ups and downs, but I gave it 110%. I will never be able to repay them for everything they have done for me. I love you both.

--Walter D. Hano

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION

Introduction

In any pre-industrial society, ships were the largest and most complex machine produced and influenced many aspects of social, economic and political life (Muckelroy 1978:3). From the arrival of the First Fleet at Botany Bay in January 1788 until well into the nineteenth century, seafaring, principally by sailed vessels, played a major role in the survival and development of colonial Australia (Hill 2015:9; Playford 2007:60; Sigmond and Zuiderbaan 1979:19). Subsequent to the establishment of its first European settlement, by the British at Sydney Cove in Port Jackson, colonial Australia was reliant solely upon ships to import the goods essential to sustain the colony and export its products to keep it economically viable (McLean 2012:50). Transformation of colonial Australia began in the early nineteenth century, when immigration, exports and whaling became the central focus of economic development. This, in turn, placed an even greater dependency upon shipping. Once these markets were established, sailing vessels from all corners of the earth—brigs, clippers and steam-supplemented vessels—were present throughout the nineteenth century in the ports of Australia.

Shipwrecks, through their location, technological features and shipboard contents, especially their cargo, provide a direct link to these times and new knowledge for interpretation of the socio-economic and cultural features of the past. The discipline of maritime archaeology advances this narrative through survey, excavation, recording and documentation (Green 2008:1601). Unfortunately, and despite an ample number of nineteenth-century wreck sites available for study, few vessels from this time have been investigated thoroughly; even less when considering specific types of vessels. One such example is the American brig *Ida,* which was wrecked on Port Willunga beach, in South

Australia, during a storm on 15 January 1857. Historic and modern photographs of the vessel's occasional exposure on the beach, archival references and preliminary archaeological observations made by students and staff of the Flinders University Maritime Archaeology Program provide a glimpse of *Ida*'s wrecking and post-depositional decomposition, but to date little scholarly research has been undertaken into this particular vessel.

This thesis substantiates the significance of *Ida* and its role in the South Australian economy and inter-colony trade by applying the research framework developed by Wessex Archaeology (UK) and known as the Build, Use, Loss, Survival, and Investigation (or BULSI) system. This framework is designed to produce a comprehensive profile of a shipwreck, from its design and construction methods and material to its utilization, the circumstances surrounding its demise and its historical chronology (Wessex Archaeology 2006:4).

Research Question and Aims:

The main research question that this thesis attempts to answer is: To what extent and in what way did American brigs contribute to the maritime-based economy of nineteenth-century colonial Australia?

In addressing this question, this thesis aims to:

1. establish that the economy of early colonial Australia was overwhelmingly maritime;
2. quantify the participation of brig-rigged vessels in this economy, and more specifically that of American brigs;
3. investigate *Ida* to provide a more fine-grained view of the role of American brigs in the international, inter-state and regional economies of colonial Australia, including such specifics as regional connections, organisation of regional trade, the operations of maritime transport, and the types of commodities traded;

4. advance a greater appreciation of the role of American brigs in colonial Australia; and
5. lay a foundation for further research into this subject.

Research Design and Methods Applied

A thorough investigation of primary and secondary historical sources was conducted in order to establish the maritime nature of the early colonial Australian economy. These sources provide background context for economic development in Australia: what resources were being exported and imported, the reliance on imports from Great Britain, and the use of sailing vessels for global and inter-colonial trading within Australia. Once an understanding of the economy is established, attention is directed to the sailing vessels used to keep the colonies afloat. The data needed to quantify the participation of brig-rigged vessels, primarily American ones, is extracted primarily from archival sources such as shipping logs, newspaper accounts and shipwreck databases. In order to further the understanding of the role of American brigs in Australia, *Ida* will serve as a case study to focus the research and to provide results that can be applied to American brigs in a broader sense. The results of an archaeological investigation of the *Ida* shipwreck and archival research into the ship's working life, it's wrecking and subsequent salvage and abandonment are inputted to the BULSI framework to produce a detailed profile of the ship. This 'ship's biography' will address:

1. details of *Ida*'s hull construction;
2. how *Ida* was utilised;
3. the circumstances of *Ida*'s final voyage and wrecking;
4. the final disposition of *Ida* and its cargo; and
5. previous archaeological investigations or other interventions of *Ida*'s buried remains.

Once a comprehensive profile has been generated for *Ida*, additional sources, such as shipping logs, manifests and other documentary sources for the import/export industry, as well as historical documentation, are consulted to shed light on nineteenth-century colonial Australia's maritime economy. Supplemental historical and archaeological research, based on related research into contemporary ship types, such as clipper ships, whaling vessels and other types of sailing merchantmen, will provide comparative data to augment *Ida*'s ship profile and better-informed interpretations of the role of American brigs in the economies and growth of the Australian colonies.

Following the recording, analysis and interpretation of this data, the question of how it benefits the field of maritime archaeology is addressed. Attention is drawn to the lack of excavations of nineteenth-century sailing vessels, and a discussion of the benefits of a digital database containing the results of similar library reconstructions of historical ships.

Methods

The methods applied in this work are:

- analysis of primary and secondary sources for *Ida* to construct a biography of the ship based on Wessex Archaeology's BULSI system;
- performance of an archaeological investigation of *Ida*;
- analysis of historical and archaeological data on American brigs that visited colonial Australia;
- development of a basic understanding of nineteenth-century Australia's colonial economy; and
- determination of how American brigs were utilised and how this contributed to the colonies' maritime-based economies.

Project Significance

The purpose of this thesis is to underscore the importance of adding new archaeological and historical information to the advancing field of maritime archaeology.

By implementing the BULSI method, a comprehensive profile of the nineteenth-century American brig *Ida*, that can in turn be utilized in a further understanding of the significance associated with the economic development of nineteenth-century colonial Australia, will be developed.

There are approximately 8,000 registered shipwrecks in Australian waters, of which over 6,500 are protected under the *Historic Shipwreck Act 1976*, but only a quarter of which have been located (Smith 2011). Furthermore, few shipwrecks from the nineteenth century have been subjected to systematic archaeological excavation and study, primarily due to the abundance of available historical information; however, the archaeological records obtained from such sites, coupled with historical records, have aided in advancing the historical and archaeological narrative of this dynamic period in Australia's and the world's past (Green 2008:1601). This research gap stems from much of the new fieldwork eventuating from previously studied sites, while new green field projects have come to a virtual halt (Fisher 2013). It is hoped that the research produced from this thesis project, and its modest fieldwork, will demonstrate the value of investigating nineteenth-century vessels and inspire similar works, the sum of which will help advance maritime archaeology in Australia and the world over. With respect to Australia, in particular, shipwrecks, like *Ida*, from the country's colonial period have the unique potential to provide details of international, inter-colonial and regional (local) trade, early industries and consumption patterns that shaped the economic and social development of the colonies and, ultimately, of the Australian nation.

Finally, in the context of ship biographies and the need for good comparanda, this thesis makes a case for the establishment and maintenance of a database of underwater

archaeological sites. Such a database ideally would contain inventories of all known shipwreck sites, reports of new finds, awareness campaigns and published site information that is accessible to everyone (Lane 2012:34).

Thesis Configuration

Chapter 1 provides a concise synopsis of the archaeological, historical and economic research presented and examined in this thesis and its relevance to the development of colonial Australia and more generally to the field of maritime archaeology.

Chapter 2 presents a review of the published archaeological, historical and economic literature examining the colonization of Australia, the development of Port Willunga and the South Australian economy and the role that the American maritime industry played more broadly in the economic development of nineteenth-century Australia.

Chapter 3 discusses the implementation of a two-phase methodology based on the BULSI system that includes historical and archaeological fieldwork. The chapter reviews historical research into the construction, use, wrecking circumstances and archaeological site history of the *Ida* shipwreck, as well as an onsite archaeological investigation of the shipwreck site. The interpretation of the data obtained during the research completes the last step of the BULSI method.

Chapter 4 provides an overview of the survey work, excavation and recording conducted at the *Ida* shipwreck site, including the collection of timber samples and recording of copper-alloy metal fasteners recovered previously by a member of the public.

Chapter 5 discusses the use of brigs in colonial Australia, with a focus on the development of trade and commerce. It also examines *Ida*'s ship profile, developed in Chapter 3, in light of the colonial economy.

Chapter 6 lays out the final conclusion to the thesis and what this research has revealed regarding its research question and aims. It also includes suggestions for future work with respect to the *Ida* shipwreck site and what additional information this might provide, as well as potential parallel lines of research from which the broader inquiry could profit.

CHAPTER 2

LITERATURE REVIEW

> "The ideal sailing ship could not be developed in any one trade; the requirements of a single trade were too narrow and always placed a premium on some one quality to the exclusion of others" (Chapelle 1988:273).

Introduction

Throughout history sailing ships have led to great discoveries of new lands, allowed the development of colonies on the other side of the world, provided nations with exotic goods and been the deciding factor in wars (Paine 2013). As Chapelle (1988) notes, size (carry capacity), speed and manoeuvrability requirements dictated the respective evolution of merchant and naval sailing ships. American shipbuilders similarly were tasked with designing various types of vessels during the nineteenth century. In the latter half of the century, for example, when the lucrative trade in Chinese tea placed ever-greater demands on speed, the clipper ship, with its extreme sharp entry and long, narrow hull, reigned supreme (Chapelle 1988:274).

Relevant to the entire period, though, brigs and schooners met much of the demands and dominated the maritime industry in the nineteenth century. The premise underlying this thesis is that it is possible, through examination of the archaeological and historical records, to determine the contribution of a particular type of vessel to a specified area. Archaeological remains of ships tell us not only how the vessels were built, but also the purpose for which they were built and the means by which shipwrights and builders tried to meet the demands of that purpose. As J. Richard Steffy (2015:5) noted, there is enough information still to be

discovered from unexcavated shipwrecks that can increase our knowledge and understanding of shipbuilding and uses for ships tenfold.

Colony and Economy in Australia

After the unexpected loss of its North American colonies as a result of their war for independence (1775–1783), Great Britain also lost its main outlet for its ever-growing domestic convict population. During the war, convicts that were to be sent to America were temporarily housed in hulks, large decommissioned ships, moored along the River Thames (Fletcher 1976:18). Because this housing situation was only temporary, a more permanent solution to the overcrowding convict problem needed to be found, so Great Britain turned to their other colonies. The African, Canadian, and West Indian colonies were all considered, but were deemed unsuitable, so it was decided to start a permanent penal colony in Botany Bay (Fletcher 1976:19). Australia's isolated location played a prominent role in Britain's decision to establish a convict settlement. In addition to the convict solution, Botany Bay was chosen so that Great Britain could establish itself in eastern Australia to expand their sphere of influence to this region and aid in the protection of their interests in India (Fletcher 1976:21). On 13 May 1787, The First Fleet, comprising 11 ships, officers, marines, their families and convicts set sail for Botany Bay under the command of Captain Arthur Phillip (Ballyn 2011). Upon arrival at Botany Bay on 18 January 1788, the location was deemed unsuitable for a settlement and eight days later the fleet moved to a more promising site in Port Jackson, which Phillip named Sydney Cove (State Library of New South Wales 2014). In the following years penal colonies were established across Australia, north from New South Wales to Queensland and Norfolk Island, south to Van Diemen's Land (Tasmania) and to the far western coast of the continent. Between 1788 and 1868, a total of 160,000 convicts were transported to these colonies, the last convict transport arriving in Western Australia on 10 January 1868 (McLean 2012:44–45). Prisoners supplied the work force needed to build

the colonies, always under the watchful eye of the military. Free settlers were scarce in Australia until the 1820s (Mclean 2012:45). The colonial settlements experienced little growth in comparison to Europe, due to a lack of reproducible capital assets from the Indigenous economy and the inability to impose taxes (McLean 2012:42). For centuries, Europe and Asia concentrated on the development and advancement of their economies and infrastructure, but Australia had no pre-existing foundation and had to begin the enormous task of creating a modern society from scratch (McLean 2012:37–38). The newly established colony was able to meet its basic requirements for food, the need to expand the availability of necessities and grow as a colony through the use of imports, but this was not a sustainable model and the search for a reliable export began (McLean 2012:50; Morgan 1999). Norfolk Island pine (*Araucaria heterophylla*) for construction, shipbuilding and carpentry, New Zealand flax for rope and sails, whale oil and other products, seal furs, slate for roofs and building material, wheat and merino sheep wool became the key products that grew the export industry and the economy as a whole (Ash 2005:34–35; Lee 2003; McLean 2012:50). The first export boom experienced by the colony was linked to international trade, and sustained colonial economic success through the nineteenth century relied on the expanding global maritime transportation industry (Forrest 2002:15; McLean 2012:51). Throughout that century, whaling flourished and established itself as one of Australia's earliest and most profitable industries (Lawrence and Staniforth 1998:7). Shore-based whaling, bay whaling and pelagic, or open sea, whaling all were practiced in Australia and all relied heavily upon boats and ships (McAllister 2013:1; Pearson 1983:40). The most profitable of the three types of whaling was pelagic whaling, although it also required the greatest amount of capital investment (Gibbs 1996:8). The demand for imported goods, corresponding exports and the procurement and transport of whale oil in the nineteenth century resulted in the development of ports across Australia and an ever-greater demand for ships.

South Australia

With the success of the penal colonies in Australia, the idea of convict-free settlement grabbed the interest of British investors, such as the South Australian Company. Empowered by the *South Australian Act 1834* of the Parliament of the United Kingdom and settlers—both seasonal and permanent—on Kangaroo Island and the adjacent mainland, the Company established Australia's first "free" colony in South Australia in December 1836 (McDouall 2017). Although the colony was set up as a settlement for non-convict citizens, and never received transported convicts from Great Britain, convicts were brought in from other Australian colonies to satisfy local labour demands. By the 1850s, the colony had expanded to the fertile land of the Fleurieu Peninsula, where wheat became one of the colony's biggest exports (Khan 2006:65). Sheep's wool also became an important export for the South Australian colony. Another major export from the region was slate, which was used primarily for roofing. At their peak, the Willunga slate quarries exported an estimated 20,000 slabs of slate per week (Ash 2005:34). Due to the time constraints of land transport for these products, a jetty was built at Port Willunga in 1853, extended shortly thereafter and again four years later. Still inadequate, a second larger jetty was constructed and opened in early 1868, by which time Port Willunga had become the second busiest port in the colony (Khan 2006:65). Due to the lack of any good natural harbourages, Port Willunga was chosen because of its close proximity to the wheat fields. Unfortunately, the harbourage lacked natural protection and there was no governmental investment in infrastructure aside from the two jetties, so ships were exposed to the prevalent southern and easterly winds. Vessels simply would hook up to moorings, but due to the number of ships that broke free and wrecked on the foreshore, as happened to *Ida*, it is clear that these moorings were insufficient.

American Shipbuilding

Almost since the first wooden sailing vessels took to the seas, ships worldwide have been the principal vehicle for long-distance exploration, commerce, and war. Sailing vessels "began as a desire for profit, a hope for victory or a dream of exploration or conquest in the minds of its originators" (Steffy 2012:5), and were the largest and most complex machines developed by pre-industrial societies (Muckelroy 1978:3). This was as true for the American colonies, and later United States, as for anywhere else in the world. Between 1641 and 1650, the American shipbuilding industry was born out of the tremendous growth in shipping brought on by the West Indian Trade (Chapelle 1988:7). But it was not until the introduction of the *English Navigation Act* of 1651 that it enjoyed a notable growth itself (Chapelle 1988:7–8). Wooden sailing ships were classified as transport, utility, naval, or fishing vessels and each category varied in size, shape, and hull design (Steffy 2012:10). By the early 1700s, England had depleted a majority of its large oak resources, and this shortage of trees for timbers paved the way for the shipbuilding industry in America to flourish (Jones 1957:8–9). In early American shipbuilding, methods were crude and assembly predominately was by hand and largely unaffected by industrialization; however, this soon came to distinguish American-built ships from their European counterparts, and gained them a reputation for durability and quality workmanship (Chapelle 1988:9). By 1774, ships built in the American colonies comprised one-third of the tonnage of Britain's merchant fleet (Jones 1957:9). Colonial shipbuilders did not design ships to specific type constraints, but instead built largely to individualistic parameters, leaving only their outward appearance as the distinguishing factor (Chapelle 1988:274). Their vessels primarily were swift and had sizeable cargo holds, and were low-cost to construct. These characteristics served the colonies well during their struggle for independence from Great Britain (which lasted in effect until victory in the War of 1812), as their light and fast ships were capable of penetrating British blockades (Jones 1957:9).

Overall, though, the biggest advantage that American ships had over European vessels was how cost-effective they were to produce (Chapelle 1988:10); American ships were 25–30 percent less costly to construct than their British equivalents (Jones 1957:9). After the American Revolution, and continuing on into the nineteenth century, the American brig became popular for both coastal and long-distance trading (Chapelle 1988:293). Demand for faster ships exploded in the mid-nineteenth century, driven by the Chinese tea trade (1843) and the Australian gold rush (1849). This, in turn led to the development of the American clipper ship (Clark 1910:V), marking the final stage of evolution in wooden sailing ships (Jones 1957:10). The introduction of steamships spelled the end of the clippers, but wooden sailing vessels remained the dominant form of sea transport until 1887, when the reliable triple expansion steam engine was introduced (Delis 2012:349). Due to the cheaper costs and desirable combination of speed, capacity and manoeuvrability of their ships, American shipbuilders dominated the shipbuilding industry until the British started to combine steam engines and irons hull (Jones 1957:10–11). "To attempt to preserve sailing craft for purely sentimental reasons is a hopeless task, but it is yet to be proven that the sailing boat and vessel are no longer of economic value" (Chapelle 1988:303).

In addition to the ships that made the American shipping industry so profitable, the American sailors themselves played a significant role. Alexis de Tocqueville (1805–1859), a French nobleman, stated that:

> "Unlike the English sailor …The American neglects these precautions and braves these dangers…The Americans are often shipwrecked, but no trader crosses the seas so rapidly. And as they perform the same distance in a shorter time, they can perform it at a cheaper rate… I cannot better explain my meaning than by saying that the Americans affect a sort of heroism in their manner of trading" (Smith and NMHS 2009:268).

Brigs

In the late 1600s, The British Navy introduced the brigantine, a two-masted vessel that also was capable of being rowed, based on the Mediterranean brigantine (Vanhorn 2004:30). The term brig is thought to be derived from the brigantine and was used to identify a style of square rigging on a two-masted ship (Vanhorn 2004:30). By the seventeenth century, Great Britain defined a brig as having two square-rigged masts, as opposed to one square-rigged mast like the brigantine (Falconer 1969:50). Neither the brig nor brigantine was similarly rigged as the Mediterranean lateen-rigged counterpart (Vanhorn 2004:30). The American brig was an entirely or partially square rigged two-masted vessel, and comprised three separate classes of brigs: the full-rigged brig, the brigantine and the hermaphrodite brig, also referred to as the schooner-brig (Robinson and Dow 1922:28). The full-rigged brig had two masts both rigged with square sails. The mainmast consisted of a standing gaff, which was rigged with a small fore-and-aft sail (Ansted 1919:33; Robinson and Dow 1922:29). The hermaphrodite brig was a combination of a full-rigged brig and a schooner rig (Ansted 1919:33). The mainmast was made from two parts and carried no yards, having rather a fore-and-aft mainsail and gaff-topsail. The mainmast was constructed and rigged in the same manner as a two-masted schooner, which is why it was also referred to as a schooner-brig (Ansted 1919:33; Robinson and Dow 1922:29). The brigantine was a two-masted vessel in which the foremast was squared-rigged like a brig and the mainmast was rigged like a schooner (Ansted 1919:33). Brigantines had two, sometimes three, yards on the mainmast over the large fore-and-aft mainsail rather than a gaff-topsail (Robinson and Dow 1922:29). Brigs were used as both warships and trading vessels, especially during the early to mid-nineteenth century. Naval brigs carried between 10 and 20 guns. These ships—particularly the brigs *Lawrence* and *Niagara*—proved how effective they were for the United States against larger British warships during the Battle of Lake Erie in the War of 1812 (Paullin and

Perry 1918). With the brig *Lawrence* as the flagship and the brig *Niagara* as the second in command, Oliver H. Perry and his fleet of nine ships— three brigs, two schooners and four gunboats—defeated and captured six British warships (Tucker 2011:300). It was by utilising *Niagara's* fast sailing abilities with the change in the wind that changed the course of the battle and led to the American victory (Tucker 2011:301). During the nineteenth century, brigs were used primarily as cargo ships, due to their coastal and open-water sailing capabilities and smaller size, which allowed them to visit smaller ports (Maritime Heritage 1998). Brigs were used by the British and the United States, but also were used in the Mediterranean Sea, where they made up the bulk of the Greek trade fleet throughout the nineteenth century (Delis 2012:358).

Comparative Vessels and Other Sources

The types of sailing vessels used in trade and other industries were equally as important as the history of the maritime economy and the shipbuilding industry itself (Sucher 2008:141). In this section, multiple sources, representing historical and archaeological perspectives, are accessed to understand the significance of predominant ship types to the maritime economy and industries of the nineteenth century. The first comparative sailing ship type belongs to the whaling industry, which was one of Australia's largest and most profitable industries (Lawrence and Staniforth 1998:7). Several ships transporting convicts to the Australian colony participated in short whaling voyages on their return to Britain (Pearson 1983:40). British, American and French whaling ships averaged between 150 to 500 tons and had the ability to carry a large cargo of oil, whaling gear and supplies for a voyage of up to four years, while Australian whale ships averaged 200 tons and had considerably smaller cargo space (Pearson 1983:42). Shipbuilding techniques, sail usage, hurricane house structures, rowing capabilities and size also differed between American and Australian built ships

(Pearson 1983:42). The best years for the global whaling industries were from 1830 to 1850, and during this period the American whaling fleet accounted for 722 of the 900 whaling ships (80 percent) operating throughout the world (Davis et al 1997:38; Hohman 1928:6). The whaling industry required ships that had proven reliability and dependability, so modifications typically were made to older ships until the construction of actual whaling ships began (McAllister 2013:6). Soon after the American Revolution and the War of 1812, smaller ships, such as schooners and sloops, were converted into larger brigs (Rosbe 2002:41). According to J. Hector St. John de Crevecoeur (1997:118), "the vessels most proper for whale fishing are brigs of about one hundred and fifty tons burden". These converted ships measured between 200 and 500 tons and were outfitted to make longer voyages in search of whales. The results of an archaeological study of three nineteenth-century American whaling ships, *Samuel Wright* (1840), *North America* (1840) and *North America* (1843), provide a basis for comparison of archaeological typologies and shipbuilding traditions (McAllister 2013:3–5). In addition to the comparative ship data, McAllister (2013) provides background information on American involvement in colonial Australia's economy; American ships in particular.

Other vessel types that played a role in the development of nineteenth century colonial Australia can be useful for comparative models. One such type is the clipper. Clipper ships were built primarily for speed and, although their heyday was short-lived, marked the pinnacle of sailing technology (Everist 2009:91). These swift vessels cut the voyage time from Britain to Australia from four months to just over two (Everist 2009:91). But this speed came at a price, and the clipper ships' design diminished their ability to carry large cargoes, which ultimately led to their demise (Clark 1910:340; Howe and Matthews 1927). The schooner is another type of merchant ship that visited or wrecked in Australian waters in the nineteenth century. One example of such is *Grenada*, a vessel engaged in coastal and inter-

colonial trade that frequented Port Willunga and, in 1856, was blown ashore during a gale (Ash 2005:34). A 156-ton wooden schooner that transported grain, flour and other commodities from Port Willunga to Adelaide and Melbourne (Christopher 1990:72; Ash 2005:38; Australian National Shipwreck Database 2009), *Grenada*'s function, location and history make it a prime candidate to compare to *Ida* (Ash 2005; Christopher 1990; Vaudrey 1989). It should be noted that so far attempts to locate the remains of *Grenada* have proven unsuccessful (Ash 2005:44).

Along with the results from the *Ida* shipwreck excavation and recording effort conducted as part of this thesis research, and to help augment the scant hull remains that survive from *Ida*, information on nineteenth-century ships will be gleaned from the preliminary excavation report of a nineteenth-century coasting schooner named *Annabella*, excavated in Cape Neddick, Maine (Claesson 1997). *Annabella* was a small vessel that easily navigated America's eastern seaboard, traveling from port to port transporting commodities such as cordwood, brick, coal and perishables (Claesson 1997:39). Claesson (1997:57) provides a detailed report on the excavation processes and recording of *Annabella*, along with a justification of the need for archaeological investigations of such historical vessels, despite the presence of archival documentation, plans and other information:

> "Ships of the 19th century are well documented in historical sources. Plans, ship lines, and general construction techniques can be researched through historical documents. Ship construction, however, cannot be studied in detail through such sources. Only the archaeological study of hull remains can provide information that is illustrative of the nuances of a particular shipwright's skills, or of how a craft was adapted to a specific economic and physical environment."

The methods used to excavate the shipwreck remains of *Annabella* provide a beneficial comparison to the excavation work conducted on *Ida* due to the site conditions being so similar.

Additionally, American brigs operating in Australian waters are compared to their Australian–built counterparts. Shipbuilding in the Australian colonies, using local materials, began during the nineteenth century. Rebecca O'Reilly (2007:12–16) provides a comprehensive study of the Australian shipbuilding industry during the second half of the century.

Another means of gauging the extent of the presence of American ships in colonial Australia is using the Australian National Shipwreck Database maintained by the Australian Government's Department of the Environment and Energy. This database contains all of the registered shipwrecks in and around Australia and allows for searches based on ship type, rigging, country of origin and date. For example, three American brigs shipwrecked in Australia during the nineteenth century are *James* (1830), *Cosmopolite* (1866), and *Elenora* (1856) (Australian National Shipwreck Database 2009). There are some limitations to the information provided, as many of the registered ships are either unidentified, such as *Cosmopolite,* or their remains, like those of *Grenada*, have not been located (Australian National Shipwreck Database 2009). Historical information contained in the database is limited to shipping manifests and accounts of the wrecking event. Nevertheless, the database is a useful source for evidence of the presence of American ships in Australia and their involvement in the developing economy. An additional valuable resource for South Australia is the compiled listing of all of the ship arrivals and departures in the region from 1627 to 1850 (Sexton 1990). This data log provides numbers for American merchant ships coming into Australia during the first half of the nineteenth century, when brigs were primarily used as merchant vessels (Maritime Heritage 1998 and Sexton 1990).

American Brig *Ida*

Ida was a 175-ton wooden American brig that was registered in San Francisco to Captain Mann, Master (Smith 1981:37). The brig was pushed ashore during a storm while attempting to anchor at Port Willunga on 15 January 1857 (Parsons 1998:31). It was in route from Port Wakefield to Port Sydney with a cargo of 570 bags (30–40 tons) of copper ore No. 2 for the English and Australian Copper Company when it had to stop at Port Willunga due to inclement weather (*South Australian Register* 21 January 1857). The strength of the storm parted *Ida's* anchors, set the vessel adrift and forced it onto the beach (Parsons 1998:31; Smith 1981:37; *South Australian Register* 21 January 1857). When inspected the following day, Marine Surveyors Captains Smith and Simpson determined that the ship's "back" was broken and the vessel was no longer seaworthy (Smith 1981:37). On 16 January 1857, the cargo was removed under the supervision of Deputy Harbour Master Turpin and the police to ensure there was no plundering. A majority of the cargo was salvaged from the wreck site and later auctioned, and other pieces of the wreck were salvaged by locals to construct buildings (Ash 2007:34). In the *South Australian Register* (1857 19 Jan, p.4 column d), the following notice of salvage was posted:

> "On Thursday, January 22, for the benefit of all concerned, wreck of the brig *Ida* 175 tons register. E Solomon and Co have received instructions to sell (for the benefit for all concerned) at the City Auction Mart, on Thursday next, at 10 o'clock punctually – the wreck of the *Ida* as she now lies ashore at Port Willunga - also 570 bags of Copper Ore, No. 2 say about 30 tons of 14 per cent. Of Copper, shipped by the English and Australian Copper Company".

What is left of *Ida* is buried under the sand at Port Willunga. Over the years, there have been a few documented accounts of storms removing sediment and partially exposing the remains (Jeffery and Arnott 1995; Smith 1981; Whiting 2009). Aside from photographs

of the vessel's occasional exposure, historical references and preliminary archaeological observations made by students and staff of the Flinders University Maritime Archaeology Program, little research has been undertaken on this particular vessel. On 23 August 1981, after a storm uncovered some of the remains, two members of the Society for Underwater Historical Research (SUHR) took measurements and drew plan views of the exposed remains (Smith 1981:37). Fourteen years later, on 12 August 1995, Bill Jeffery and Terry Arnott inspected the site after another winter storm and found an exposed timber, which they thought to be part of the bow stem or sternpost that had two iron bolts near its upper end (Jeffery and Arnott 1995). In 2007, Aidan Ash used an Excalibur 1000 metal detector and an air probe to map the site's location within about 10 meters (Ash 2007:14–15). The most recent exposure of the site occurred in July 2016 (Bennett 2016). A small team from Flinders University's Maritime Archaeology Department recorded, photographed, and gathered information from locals on the exposed remains (Bennett 2016). Days later a local resident contacted Wendy van Duivenvoorde, lecturer in Maritime Archaeology at Flinders University, and turned over to her several fragments of copper alloy fasteners from the wreck.

Conclusion

The information in the previous sections provides the background needed for this thesis. Having a better understanding of the Colonial Australian economy, American shipbuilding and a clear definition of an American brig, it is possible now to shift the focus to *Ida* and its role in the South Australian economy, as a case study of the broader significance of nineteenth-century American brigs in the development of colonial Australia. The American shipbuilding industry was the dominant ship manufacturer in the world during the nineteenth century and brigs were the preferred ship type for coastal and overseas trading. Research has

shown that there is a lack of information that focuses on the uses and contributions of American brigs in Australia. As the dominant shipbuilding nation, along with the popularity of brigs in the nineteenth century it is not hard to imagine that more documentation on this subject should be available. By using *Ida* as a case study, developing a ship's biography using the BULSI system, and comparing the archaeological data from other American brigs, a greater understanding of the contributions made by American brigs in Australia can be achieved.

CHAPTER 3
METHODOLOGY

Introduction

This thesis is composed of two major components: the first being the collection of data by means of primary and secondary sources, and the second being archaeological fieldwork. The methods chosen for this project aim to connect the use of American brigs to the maritime based economy of Australia during the nineteenth century. In an effort to accomplish this goal, *Ida* was chosen as a case study. The following sections contain a summary of the historical and archaeological information gathered on American brigs, the Australian economy, and *Ida*. This chapter describes the methods used to obtain the data required for this project and the results will be outlined in Chapter 4.

Primary and secondary source data collection

In-depth research on brig-rigged vessels, the American shipbuilding industry, the use of American brigs in Australia, the *Ida* shipwreck, the BULSI system and the Australian maritime based economy were essential components to this thesis. Through compiling the aforementioned documented information, a greater understanding of the use of American built brigs in the Australian maritime-based economy in the nineteenth century was obtained. Shipping and whaling were two of the earliest commercial interests in Australia and provided the foundation for the colonial economy and facilitated colonial development. They also illustrate the importance and need for foreign built ships during the nineteenth century. Gaining a better understanding of the American shipbuilding industry was also needed to show the availability and dominance of American ships during the nineteenth century. Additional research on *Ida* had to be collected in order to determine that the ship remains in question at Port Willunga, SA, are actually the remnants of the American brig *Ida*. Further

information and comparative examples were compiled to show the benefits of producing a ship's biography using the BULSI system. The following resources were used in gathering information for this thesis:

- Contemporary newspaper accounts
- South Australian Shipwreck data base
- South Australian State Library archives
- Archaeological site investigations

Case Study: Archaeological Investigation of *Ida*

Previous work

At the start of this project there had only been four inspections of the *Ida* shipwreck site, but no thorough excavation (Ash 2005; Bennett 2016; Jeffery and Arnott 1995; Smith 1981). Members of SUHR conducted the first of these investigations in 1981 when, following a mid-winter storm that had exposed the remains of *Ida*, two society members measured and recorded the exposed timbers (Smith 1981:37–49). The next known site inspection, by Bill Jeffery and Terry Arnott, took place in 1995 after storms again displaced a portion of the sand covering *Ida* (Jeffery and Arnott 1995). A large timber with two iron bolts, believed to be a part of the bow or stern, was partially exposed. Jeffery and Arnott (1995) dug out about one meter of the timber, photographed it and took measurements. The timber was sided 23 cm and the iron bolts were 18 cm in diameter (Jeffery and Arnott 1995). In addition, the men recorded the GPS position of the exposed timber as 35º 15.675'S 138º 27.585' E (Jeffery and Arnott 1995). In August 2004, Aidan Ash (2005) conducted a search for *Ida* as part of his MA thesis on the maritime cultural landscape of Port Willunga. The purpose of the search was to confirm the location of the wreck site on the beach. The site was buried completely at the time of the search, and Ash employed a metal detector, magnetometer and air probe to

locate the wreckage (Ash 2005:17–18). At low tide, Ash and his team used plastic pegs to mark out a 2 × 2 m grid over an area measuring 20 × 30 m. Using a Geometrics G-856 magnetometer, Ash's team took a reading every two metres, for a total of 150 readings (Ash 2005:17–18). To investigate anomalies, Ash employed the air probe to determine depth and type of material (Ash 2005:17–18). The most recent site investigation was conducted in July 2016 by staff and students from the Maritime Archaeology Program at Flinders University (Bennett 2016). Storms once again had exposed the ship remains, but by the time the team got to the site, much of the site had been covered over again with sand (Bennett 2016). Nevertheless, the team photographed what timbers remained exposed and recorded the location of the wreck using GPS. Local residents who had come to the beach to see the wreck presented the team with photographs of the remains that were taken earlier during the site's maximum exposure. Port Willunga resident Mark Williams even turned over a collection of metal fasteners (see pp. 46–47, below) that he had recovered from the hull section. These were recorded, certified and handed over to the Department of Environment, Water and Natural Resources for curation (Bennett 2016).

Site Investigation

Unlike previous inspections of *Ida*, the purpose of this intervention was to go beyond mere non-disturbance recording of the exposed shipwreck and perform a diagnostic investigation. The primary goals of the 2017 fieldwork were to determine the full extent of the wreck remains lying under the beach sand, expose and fully record those remains and confirm that they are in fact the last remnants of *Ida*.

The site first was surveyed using Electrical Resistivity Topography (ERT) in order to determine if any other pieces of hull or other material from the shipwreck are buried at the beach in addition to the known section of hull timbers, or indeed if this section extends deeper

into the sand and rock substrates. According to Kleanthis Simyrdanis, Geophysicist Researcher and Post-Doc in the Department of Archaeology at Flinders University who led the survey, ERT has not previously been used on a shipwreck site on the foreshore. Thus, this survey also served as a test case to determine the effectiveness of this technique in such conditions, and will be compared to the results of a 2004 magnetometer survey of the site.

In order then to expose the remains for detailed recording, as much of the site as possible was excavated over a two-day period, with much of the removed sand used to fill sandbags to form a primitive coffer dam around the dug remains in order to minimise re-deposition of sediment onto the shipwreck by the rising tide waters. The hull remains then were recorded three-dimensionally using photogrammetry and manually using tape measures and sketches. Given the limited remains, the construction features recorded were used to verify the vessel's build type, or at least to determine if the features are consistent with those of a typical American brig. Finally, because of this scantiness, the best way to confirm the wreck's identity is by sampling the timbers and determining the wood species from which they were fashioned. Since *Ida* is the only known American-built ship to have wrecked at Port Willunga, the wood species of the hull timbers will need to be consistent with North American tree varieties for a positive identification. The survey and excavation and their results are presented and discussed in Chapters 4 and 5, respectively.

Wood Species Identification

Shipbuilders throughout history, like other woodworkers, have developed specific preferences for the types of wood they employ in the hulls of their ships. These preferences are based on the part of the hull in which the wood is to be used and the specific characteristics of that species, such as structural strength, flexibility, resistance to rot, ease of use, accessibility and other parameters (Steffy 2012:256–259). This has made wood species identification a key part

of any shipwreck research. It also provides crucial evidence for identifying the place of origin for the wood used to build a ship, and potentially for locating where the ship itself was built. Of course, wood has been a traded commodity since ancient times, so caution is required when relying solely on such evidence (see, for example, van Duivenvoorde 2015:9–10). As mentioned in the previous section, one of the primary goals of excavating the *Ida* remains was to take wood samples from the preserved hull timbers for wood species identification to determine if the original ship had been built in North America, thus virtually confirming the identity of the wrecked ship as *Ida*. According to the South Australian Shipwrecks Database (Department of Environment, Water and Natural Resources, Government of SA 2017), there are six known shipwrecks in the Port Willunga area. From what is known of these six vessels, *Ida* is the only one that was built in the United States. While the ship remains in question are in a location consistent with the 1857 wrecking of *Ida*, there previously has been no attempt to positively identify the remains. Sampling each type of timber preserved in the remains and having the wood species identified will provide good evidence to support attributing the remains to *Ida*, should the wood types be consistent with North American timber, or eliminating the possibility should the wood turn out to be Australian, European or other species.

BULSI System

One of the primary outcomes of this project is to provide a more in-depth vessel biography of *Ida*. In order to achieve this, the Build, Use, Loss, Survival, and Investigation (BULSI) system was employed. English Heritage commissioned Wessex Archaeology to design a research methodology to assess the importance of physical remains of shipwrecks that are threatened by development, resulting in the creation of the BULSI system (Wessex Archaeology 2006:1). This system is a methodological framework used to collect and represent information about shipwreck sites, from the ship's build to its life as a working

vessel to its wrecking or abandonment and, finally, to its subsequent formation as an archaeological site (Wessex Archaeology 2006a:25). Two projects for which Wessex Archaeology employed the BULSI system are "Early Ships and Boats (Prehistory to 1840)" (2013) and 'HMS *B2* Archaeological Report" (2014). In both cases, the BULSI system was implemented to produce a detailed report based on historical resources and archaeological investigations. In addition to such technical reports by Wessex Archaeology, Colwell-Pasch's master thesis (2014) provides an in-depth example of how this methodology is utilized. Colwell-Pasch produced an in-depth biography for *Leven Lass* using the BULSI method and demonstrated its usefulness in providing an historical record of a vessel. This system was chosen for the investigation of *Ida* because of its simplicity and its ability to provide a detailed analysis of every phase of a vessels life, based on primary and secondary sources and archaeological investigations. The resulting vessel biography of *Ida* produced using the BULSI System is presented in Chapter 5.

CHAPTER 4

EXCAVATION AND SURVEY DISCUSSION

Survey

On 14 August 2017, a four-person team consisting of staff and students from Flinders University Maritime Archaeology Program, led by Kleanthis Simyrdanis, an Archaeology post-doctorate Geophysicist Researcher in Archaeological Science, conducted a pre-excavation geophysical survey on the *Ida* shipwreck site on the foreshore of Port Willunga beach. Only the uppermost tip (about 15 cm) of the presumed endpost was visible above the sand, the rest lying buried beneath up to two metres of mixed sand and rock overburden. ERT was selected as the survey technique due to the available expertise of Dr Simyrdanis, the type of site and environmental conditions and the opportunity to demonstrate the technique in such conditions. The ERT survey equipment consisted of 64 metal electrodes, a current source (12 V, 40 Ah lead-acid automotive battery), a geophysical resistivity meter and a computer to collect and analyse the data. ERT utilises a system of electrical probes, placed in a grid pattern over a test area, then calculates the subsurface distribution of electrical resistivity from several resistance measurements made from electrodes which produces an image when processed by a computer (William et al 2004). The foreshore location of the site means that the site is submerged at high tide, which occurred at 07:43 hours on the day of the survey (Willy Weather). Two hours after high tide, the tidewaters had receded enough for work to commence on the site, giving the team between 5 and 6 hours before the returning tide again would inundate the excavation site. A 12 × 2 meter survey grid was set up over the site, oriented on the exposed timber end (Figure 1). Ten survey lines were recorded during the allotted time. Each survey line consisted of 64 sensors (two cables, each having 32 sensors, joined together) attached to metallic probes spaced every 0.20 m. A line spacing of 0.20 m

was used in order to obtain sufficient resolution. A reference survey line (L10) was recorded to provide a baseline measurement. The grid and survey line locations were recorded and geo-referenced using an RTK (Real Time Kinematic)-GPS system.

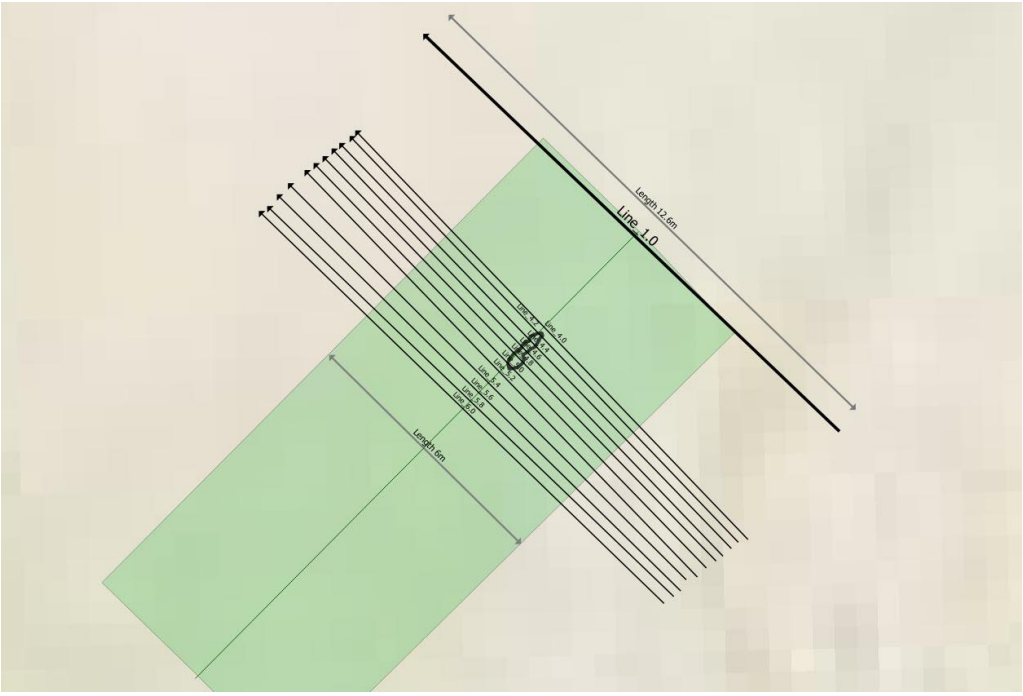


Figure 1. Plot of the ERT survey grid, *Ida* shipwreck site, Port Willunga Beach. The outlined area marks the exposed timber (plot by Kleanthis Simyrdanis).

The data was collected using FlashRES- UNIVERSAL, a 61–channel comprehensive array-oriented resistivity and IP system made by ZZ Resistivity Imaging Pty. Ltd., Adelaide (Figure 2). The voltage was set at 36 V and both Pole-Dipole and Dipole-Dipole protocols were used. The first protocol acquired a combination of forward and reverse data comprising 3,834 measurements (N = 1–20; a = 0.2–1.2 m), while 4,794 measurements (N = 1–8; a = 0.2–1.6 m) were taken using the latter protocol.

The data was processed, filtered and inverted using RES2DINVx32/x64 and RES3DINVx32/x64 geoelectrical imaging software by Geotomo Software Pty Ltd, for 2D and 3D imaging, respectively. The programs use the smoothness-constrained Gauss-Newton

least-squares method inversion technique to produce respective 2D and 3D models of the subsurface from the apparent resistivity data. The raw data were filtered based on apparent resistivity (ρ_a) values greater than zero ($\rho_a > 0$ ohm-m, where ρ_a is an Ohm's-law ratio of measured voltage (V) to applied current (I) multiplied by a geometric constant (k) specific to the electrode array; thus, $\rho_a = k \times V/I$) and resistance gear accuracy levels less than 0.001 V/I (Res.>0.001 V/I), and were trimmed after inversion according to the percent (%) RMS error estimation. For comparison of the inverted images, a common resistivity scale ranging from 0.2 to 150 ohm-m was used (0.2 ohm-m being the resistivity of seawater). The % RMS error varied between 10 and 25% for the Dipole-Dipole array and between 8 and 20% for the Pole-Dipole array. A total of 10 data lines were recorded and the results of the survey are discussed below.

Survey Results

Kleanthis Simyrdanis supervised the ERT survey and analysed and interpreted the collected data. The stratigraphy of the area appears to indicate two layers: an upper layer, up to a depth of 2 m, with resistivity values between 2 and 4 ohm-m; and a lower layer, presumably beach rock, with much higher resistivity values, between 120 and 160 ohm-m. The first 0.2 m of the upper layer had low resistivity values (0.4–1.5 ohm-m) due to the presence of the seawater, which was poured over each probe in the array to provide good conductivity for the current entering the substrate. High resistivity readings (20–40 ohm-m) within the upper layer indicate the likely presence of shipwreck remains. The burial depths of these targets are estimated to be 0.31 m below the surface.

Figure 2. ERT survey equipment and linear probe array, *Ida* shipwreck site, Port Willunga Beach (photo by Kleanthis Simyrdanis).

Interpretation of these results comes primarily from the Dipole-Dipole array, as unfortunately the models produced by the Dipole-Dipole and Pole-Dipole arrays do not show similar variation in resistivity within the upper layer. Simyrdanis determined that this is likely due to the small probe spacing (0.2 m) employed in the array and a defect with the hardware motherboard of the resistivity equipment. Because of this glitch, the resistivity equipment was unable to cope with the close probe spacing. As a result, the data collected during the survey and the models produced from them are inconclusive, and additional surveying work will need to be undertaken.

Excavation

From 29–30 August 2017, the author led an eight-member team of Flinders University Maritime Archaeology staff and students that excavated the *Ida* shipwreck remains on Port Willunga beach (Figures 3 and 4). The dates for the excavation were chosen based on favourable tide times and heights (South Australian Tide Tables, Commonwealth of Australia Bureau of Meteorology, http://www.bom.gov.au/oceanography/projects/ntc/sa_tide_

tables.shtml). The two main purposes of the excavation were to confirm if the hull remains are American in origin and thus most likely those of *Ida*, and to record them in detail.

Being situated on the foreshore, the *Ida* shipwreck falls under state jurisdiction and so is protected under the South Australia *Historic Shipwrecks Act 1981*. A Permit Application for Disturbance of a Historic Shipwreck or Relic Under Section 15 of the South Australian *Historic Shipwrecks Act 1981* was filed and granted on 9 August 2017 (Permit No. 17-59-01, see Appendix 1). Based on the previous survey work, it was determined that the best start time was around 09:30, roughly two hours after high tide when the water would be off the site. Once on site, it was clear that in the two-week period since the survey additional sediment had been deposited naturally over the site, resulting in the complete burial of the remains. Thus, the team had to re-locate the site using the GPS coordinates taken during the ERT survey. Digging commenced to remove the sand overburden, which was used to fill some 200 polypropylene sandbags, which were used to erect a three-bag-high barrier encircling the excavation pit and to support the interior wall of the pit to prevent the tidal waters from backfilling it overnight (Figures 5 and 6). The team successfully completed the defensive barrier and uncovered half of the remains by the end of the first day.

Arriving back on the beach on the morning of the second day, the team was relieved to find that the sandbag barrier had successfully done its job and prevented any backfilling of the excavation pit. Digging resumed until as much of the hull section as possible was exposed down to a depth of 2.5 m. The excavation pit extended below the water table, which prevented the team from uncovering the lowest parts of the hull timbers as the pit continuously filled with water. In order to record the exposed portion of the timbers, the team periodically had to bail seawater from the pit.

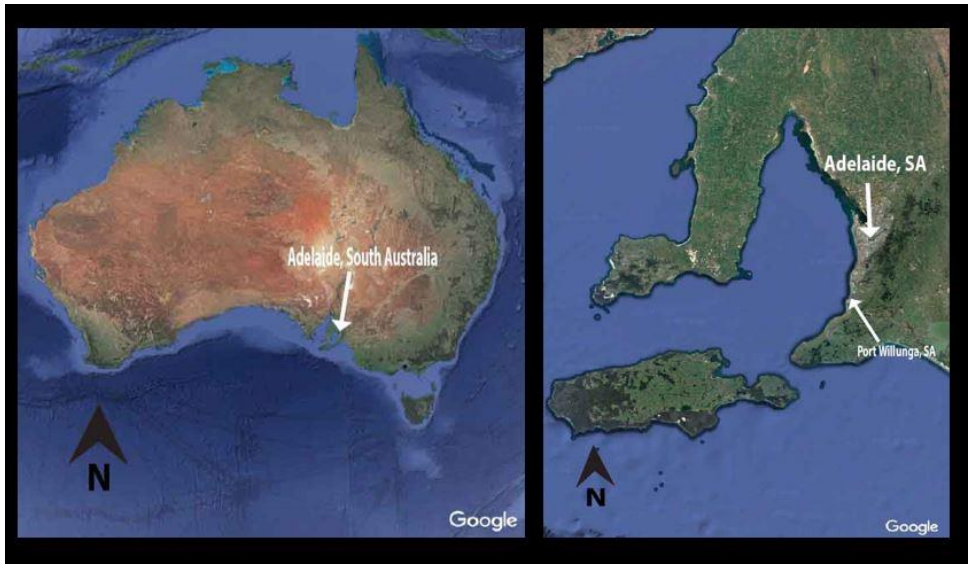


Figure 3. Location of Port Willunga, South Australia (Google Maps)

Figure 4. Location of *Ida* remains, Port Willunga (Google Maps)

Figure 5. The excavation pit and sandbag barrier, *Ida* shipwreck site, Port Willunga Beach (Photo by Tabitha Young).

Figure 6. Excavation pit with completed sandbag barrier and safety netting at the end of the first day of excavation (Photo by Tabitha Young).

The timbers were recorded first with more than 100 overhead photographs taken with the aid of a telescopic extension pole to create a photogrammetric 3D model of the hull section (Figure 7). The photogrammetry photographs were taken with a TG3 Olympus underwater camera attached to a telescopic pole, controlled wirelessly with a Nexus Google tablet, to obtain shots from directly over the remains. A rough sketch of the hull remains (Figure 8) was then made and used to record measurements and observations of the timbers and construction details. In addition, the team used handsaw, hammer and chisel to extract eight matchbox-size wood samples, at least one from each functional type of timber, for wood species identification.

Once the recording and sampling were completed, the team opened all of the sandbags and refilled the excavation pit. A subsequent visit to the beach on 28 September determined that the site had returned to its pre-excavation state.

Excavation and Wood Sample Discussion

Excavation

The excavation of the *Ida* remains proved to be more difficult than anticipated, but the two days of fieldwork were successful in completing the primary excavation objectives. Even with the issue of the high-water table filling in the excavation trench, the wreck site was exposed more than ever previously recorded. This became evident while removing sediment from around the framing timbers when a layer of black sediment was reached (Figure 9). The sediment turns black in anaerobic conditions, which indicates that this portion of the wreck had not been exposed for quite some time. Much like the natural exposure of the site in 1981, 1995 and 2016, the excavation resulted in uncovering a total of 16 framing timbers, a large horizontal section at the north end (believed to be the bow), and some planking (Figure 10). Each exposed hull timber was labelled (Figure 11) and measured, the results of which can be

Figure 7. Recording the *Ida* ship remains using photogrammetry (photo by Tabitha Young).

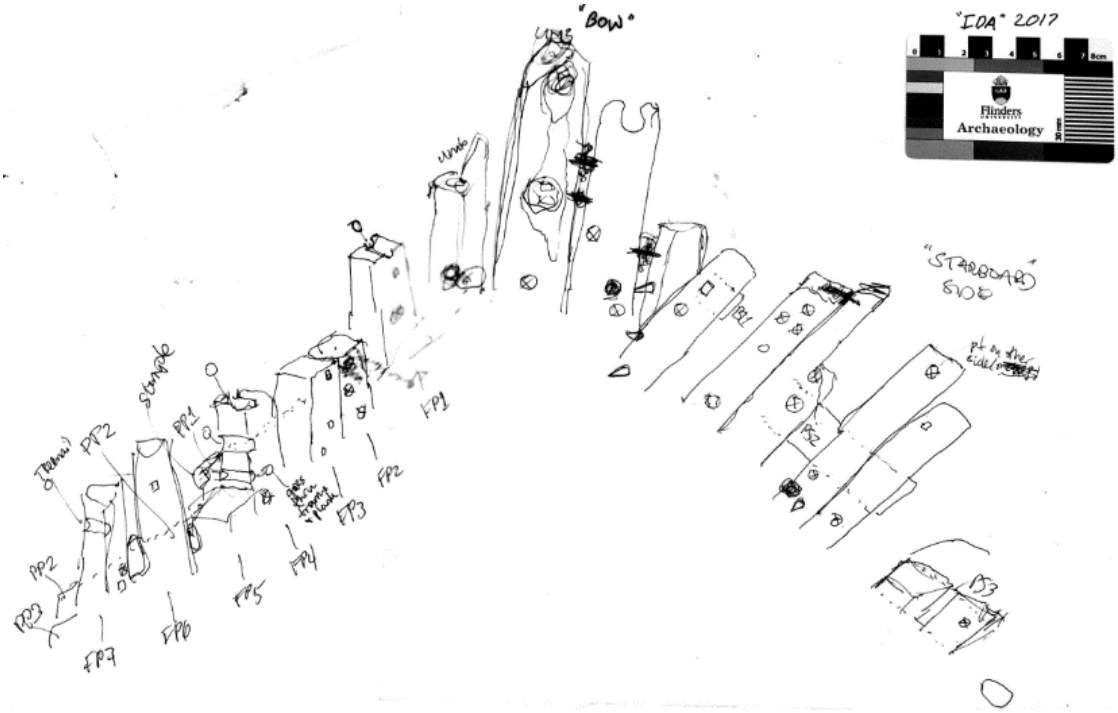


Figure 8. Sketch of the *Ida* hull remains used for recording (drawing by Mark Polzer).

seen in Tables 1, 2 and 3. Timbers FP8, FS8, UM1, and UM6 are missing measurements. FP8 and FS8 were the last and southernmost frame timbers to be exposed, but because the hull section sits at a slight decline towards the water, and also lists slightly to port, again towards the water, these two frames are buried deeper and only their tops could be exposed. UM6 also proved difficult to measure as a result of the rising ground water in the pit. UM1 is the horizontal projection at the supposed bow end. The top section measures 0.94 m long, while the bottom section extended 1.33 m. The two sections combined are molded 0.60 m. The overall length of the excavated remains is 5.32 m. The timbers also were inspected for evidence of fashioning and construction methods: saw, chisel or other marks and nails, staples, treenails or other fasteners, which were sketched (Figure 8) and photographed. Hull planks are attached to frames with treenails, and perhaps also square-sectioned iron nails, although the recorded nail holes are somewhat random. The horizontal 'bow' timbers are fixed with a bolt, most likely iron, judging from the rusty concretion formed over the bolt head. No metal nails were found in the timbers, but a metal staple was recorded on portside frame FP4.

Figure 9. Excavating the *Ida* hull timbers (photo by Tabitha Young).

Figure 10. Exposed *Ida* hull remains (photo by Tabitha Young).

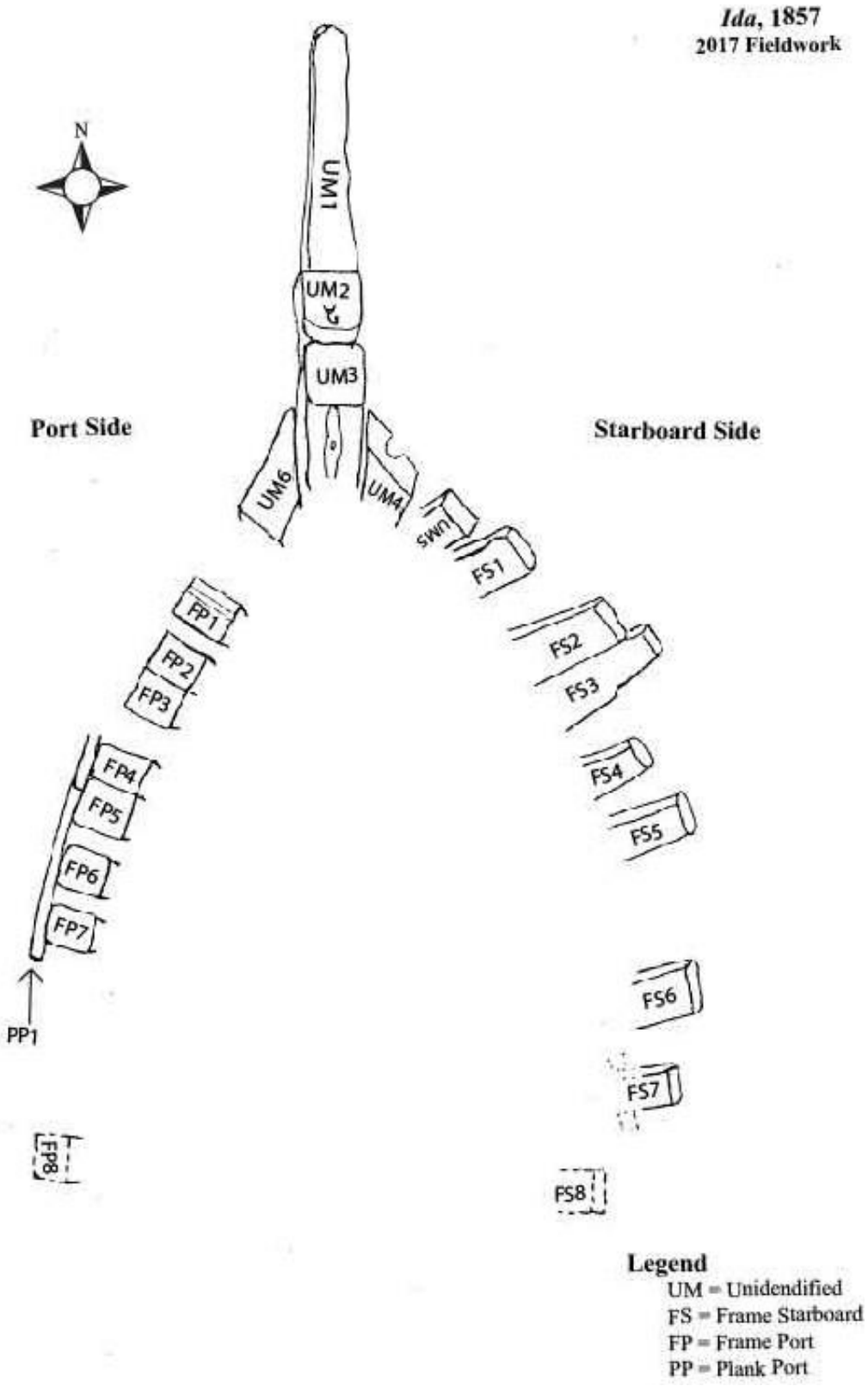


Figure 11. *Ida* site map with timber labels (drawing by author).

Table 1. Portside Frame Dimensions

Timber	Length Exposed (m)	Sided (m)	Molded (m)
FP1	**0.57**	**0.18**	**0.19**
FP2	**0.56**	**0.20**	**0.17**
FP3	**0.65**	**0.19**	**0.19**
FP4	**0.78**	**0.20**	**0.22**
FP5	**0.25**	**0.16**	**0.25**
FP6	**0.78**	**0.17**	**0.23**
FP7	**0.64**	**0.22**	**0.21**
FP8	**N/A**	**0.09**	**N/A**

Table 2. Starboard side Frame Dimensions

Timber ID	Exposed Length (m)	Sided (m)	Molded (m)
FS1	1.05	0.19	0.16
FS2	1.21	0.19	0.16
FS3	1.29	0.19	0.18
FS4	1.80	0.19	0.18
FS5	1.00	0.19	0.19
FS6	0.48	0.16	0.22
FS7	0.57	0.20	0.20
FS8	N/A	0.20	N/A

Table 3. Unidentified Timber Dimensions

Timber ID	Exposed Length (m)	Sided (m)	Molded (m)
UM1	N/A	N/A	N/A
UM2	1.24	0.35	0.40
UM3	1.69	0.35	0.30
UM4	1.43	0.27	0.21
UM5	0.76	0.2	0.21
UM6	N/A	N/A	N/A

Even though the excavation uncovered the hull remains more fully than ever before, the team still was unable to reach the keel, and no additional timbers were found beyond (south of) FS8 and FP8. While the time, personnel and intruding ground water played a role in limiting the maximum depth of the pit, bedrock was the main reason. Excavation encountered a tightly compacted layer of bedrock, or concreted beach rock, which could not be penetrated with hand tools. The team extended the excavation pit some 1.5–2 m beyond the southernmost timbers, but did not locate additional material. Instead, what was encountered were large rocks and debris that may have fallen from the cliffs to the east and been washed down by tidal or storm waters. Comparing these finds with the photograph of the 2016 exposure, which shows similar bed- or beach rock and loose rocks surrounding the remains (Figure 12), it is estimated that scouring and abrasion from shifting sands and especially rock debris eroded from the surrounding cliffs over time have covered or likely destroyed the rest of the wooden hull remains from the ship. With the resources available, the excavation was unable to remove these slabs of rock in order to test the hypothesis.

Photogrammetry Models

Two 3D photogrammetry models of the *Ida* remains were generated based on the photogrammetry photographs taken of the site. A total of 177 photographs were taken with an Olympus TG-3 16MP waterproof digital camera, which was attached to a telescopic pole to get vertical overhead shots. Shadowing in the photographs was adjusted using Adobe® Lightroom software to emphasize the features of each timber. The photographs were then uploaded to Agisoft PhotoScan Pro photogrammetric software for processing and generation of textured 3D models (Figures 13 and 14). These models provide a detailed record and representation of the ship remains for future research.

Figure 12. *Ida* remains, uncovered after a storm in 2016, and what appears to be bedrock (photo by Richard Ferber).

Wood Samples

Once the team had completed the timber recording, eight wood samples were extracted from the remains. The sampled elements include the three timbers comprising the horizontally protruding bow structure (UM1, UM2 and UM3); two frames (FS3 and FS6); two treenails (from FS1 and FS4); and a plank (PP1) (Figure 15). The samples were sent to timber specialist Jugo Ilic for species identification. Ilic examined the material both macroscopically with a hand lens and then by thin (*c.* 0.02 mm) section microscopy (Ilic 2017). Species determination is made by establishing the characteristics of the wood structure and comparing them with authentic material and by applying prior knowledge and experience. The results of the species identification process are found in Table 4.

Figure 13. Photo realistic 3D render of the *Ida* hull remains, model 1 (3D model and render by Adeena Fowke).

Figure 14. Photo realistic 3D render of the *Ida* hull remains, model 2 (3D model and render by Adeena Fowke).

Figure 15. Wood samples from the *Ida* hull remains (photo by author)

Table 4. Wood Species Identification Results

Sample ID	Timber ID	Scientific Name*	Common Name
0001	UM1	*Pinus (taeda)*	yellow pine group
0002	UM2	*Quercus (alba)*	white oak group
0003	UM3	*Quercus (alba)*	white oak group
0004	PP1	*Quercus (alba)*	white oak group
0005	FS1-TR	*Ulmu (rubra)*	red elm
0006	FS4-TR	*Robinia pseudoacacia*	black locust
0007	FS3	*Quercus (alba)*	white oak group
0008	FS6	*Quercus (alba)*	white oak group

*Species names in parentheses indicate that they cannot be differentiated from other similar species on the basis of wood structure.

The two upright timbers of the bow structure (UM2 and UM3) are made from white oak (possibly *Quercus alba*), but, somewhat surprisingly, the horizontally projecting element (UM1) is made from yellow pine (possibly *Pinus taeda*, known as loblolly pine), a softwood (Ilic 2017). The frames (FS3 and FS6) and planking (PP1) are made from white oak, while the two treenails (FS1-TR and FS4-TR) also were fashioned from hardwoods—red elm (possibly *Ulmu rubra*) and black locust (*Robinia pseudoacacia*), respectively (Ilic 2017). The oak, elm and pine timbers could not be specified for certain beyond the genus level, as similar species within each genus cannot be differentiated solely based on the structural characteristics of the wood (Ilic 2017). All are trees native to North America, but similar species also are found in Europe. The most diagnostic species identified is the black locust (*Robinia pseudoacacia*), which is native only to the south-eastern United States (USDA Natural Resources Conservation Service 2017).

All of these types of wood were utilised in the American shipbuilding industry in the nineteenth century, as North America is blessed with an abundance and variety of quality timber. Oaks and other hardwoods were favoured by American shipbuilders for constructing sturdy hulls (Steffy 2012:258), especially framing and fastening elements, while the characteristics and workability of yellow pines made them ideal for ship timbers, masts and spars (Steffy 2012:29). The identification of *Robinia pseudoacacia* is significant, as it is native only to North America; and although the other woods could not be confirmed to the species level, they all also are consistent with a North American provenance. Furthermore, even if there are similar European species within the pine, oak and elm genera identified, none of these trees are native to Australia. Taken together, and in light of the shipbuilding industry in the nineteenth century (see pp. 12–13), it is most likely that the ship was built using North American timber and, therefore, in North America—the United States, specifically. Furthermore, since the location of the hull remains is consistent with accounts of

the shipwrecking event of *Ida*, and *Ida* is the only North America-built vessel to have wrecked on Port Willunga beach, it is reasonable to assert that the shipwreck remains in question are indeed those of the American brig *Ida*. As a final observation, it is interesting that, although the ship *Ida* was built in the San Francisco area, all of the identified woods used in its construction are native to the eastern, and particularly south-eastern, United States (generally from eastern Texas to northern Florida and north to the New England states), which may provide some insight to the timber trade and supply of shipyards across the United States during this time.

Metal Fasteners

In 2016, after the winter storm that almost completely exposed the *Ida* remains, Mark Williams, a local Port Willunga man, found and collected 11 metal artefacts from the wreck site: a keel staple, nails, and nail fragments. Based on the blue-green patina covering each piece, they are made of copper or some copper alloy. Williams notified Wendy van Duivenvoorde at Flinders University of the finds, who then retrieved the artefacts and turned them over to the Heritage Unit of the South Australian Department of Environment, Water and Natural Resources. There the fasteners were measured, weighed, photographed and then accessioned into their collection (Table 5). Each item was issued a unique identifier number and a Registration of Relic Certificate under Section 12 of the South Australian *Historic Shipwrecks Act 1981*, copies of which are provided in Appendix 2. In 2017, the author was granted permission to record the objects, when once again they were photographed, weighed and measured (Table 6). This second set of data was collected a full year after the original recordings, and since the relics have not undergone any type of conservative treatment, the two data sets were compared and the pieces visually inspected to determine their ongoing state of preservation. Conservators Vicki Richards and Jon Carpenter from the Western

Table 5. Metal Fasteners from the *Ida* Shipwreck (DEWNR, 2016).

Historic Shipwreck Relic No.	Weight (g)	Height (mm)	Width (mm)	Length (mm)
11100	507	155	93.24	27.8
11101	122	104.91	19.11	18.9
11102	76	101.1	11.97	11.1
11103	59	86.02	11.46	11.5
11104	61	83.44	11.47	11.1
11105	45	64.43	12.40	10.7
11106	45	54.71	11.63	10.7
11107	37	41.04	11.22	11.2
11108	34	39.19	11.67	12.3
11109	25	32.92	11.06	10.4
11110	27	29.82	11.2	12.0

Table 6. Metal Fasteners from the *Ida* Shipwreck (Walter Hano, 2017).

Historic Shipwreck Relic No.	Weight (g)	Height (mm)	Width (mm)	Length (mm)
11100	508.7	154	93.0	28.0
11101	123.2	186	18.6	19.0
11102	76.5	100	12.0	11.0
11103	59.2	86	11.4	11.6
11104	61.0	82	11.5	11.1
11105	45.4	63	12.0	10.6
11106	45.5	53	11.6	10.7
11107	36.2	40	11.1	11.2
11108	32.5	39	11.5	12.2
11109	24.8	32	11.0	10.4
11110	26.6	28	11.2	12.0

Australian Museum inspected the artefacts and noted that there did not appear to be any sign of continued corrosion or degradation. Additionally, the two sets of weights and dimensions for the pieces are virtually identical, indicating that the artefacts are in a stable condition and are no longer oxidizing beneath their protective patina.

CHAPTER 5

DISCUSSION

Brigs and Maritime Australia

Whaling was one of the earliest and most successful industries in Australia (Lawrence and Staniforth 1998:7). Pelagic (open sea) whaling, as opposed to bay or shore-based whaling, was the most profitable (Gibbs 1996:8). From 1830 to 1850, the American whalers dominated the global industry, their fleet comprising up 722 (80%) of the 900 whaling ships active throughout the world's oceans (Davis et al 1997:38; Hohman 1928:6). Pelagic whaling required ships that were reliable and manoeuvrable, and that could operate both in coastal waters and open seas. Brigs fulfilled these requirements exceptionally well, as demonstrated especially during the War of 1812 (Tucker 2011:301). It was believed that brigs of around 150 tons were the best ships for whaling (St. John de Crevecoeur 1997:118). With the number of American whaling ships operating worldwide, and the high demand on whale by-products, the presence of American ships in Australian waters was strong. The major whaling port in Nantucket had 72 whaling ships in 1820, most of which were brigs (Ashley 2012:47). Three well-known American whaling ships that wrecked in Australia are *Samuel Wright* (1840), *North America* (1840) and *North America* (1843), and while these ships were not brigs, they represent the strong presence of American whalers in Australia in the nineteenth century. It is safe to assume that American whaling brigs also operated in Australian waters during this time, based on their reputation as the best type of whaling ship and the dominant presence of American whalers. Indeed, one such vessel was the 148-ton brig *Amity*, built at St Johns in New Brunswick, Canada, in 1816 (Australian National Shipwreck Database 2009, Shipwreck ID no. 6871). The vessel was used to transport immigrants to Australia (it famously brought the first Europeans to Western Australia in 1826), it operated as a general

supply and transport vessel, was employed in the whaling and sealing trade and, finally, in the cattle trade transporting livestock between Victoria and Tasmania, where it wrecked in 1845 (Marshall 2001:86). As an indication of the adaptability of brigs, a characteristic largely responsible for their popularity as whaling vessels, when employed in the whaling trade, *Amity* operated both offshore and as a tender and transport for shore-based whaling stations.

In the early- to mid-nineteenth century, when the Australian colonies were in the process of establishing a maritime presence, most of the ports being used—much like Port Willunga—were too small to accommodate the larger merchant ships. It was during this time that the smaller brigs truly flourished, being used as cargo vessels due to their coastal and deep-sea sailing capabilities and their smaller size, which allowed them to visit the smaller ports (Maritime Heritage 1998). While brigs did bring goods and people from around the world to Australia, they also participated in coastal trade between colonies. *Ida*, for example, carried passengers from the United States to Australia, and made stops in Port Wakefield and Port Willunga to collect copper, wheat, and flour to transport to New South Wales. While *Ida* is just one example, the wrecks of *James* (1830), *Cosmopolite* (1866) and *Elenora* (1856), three American-built brigs, along with the previously discussed *Amity*, show that American brigs were active in all aspects of maritime trade and transport in Australia (Australian National Shipwreck Database 2009; Marshall 2001:86).

In addition to shipwrecks, shipping arrival and departure logs show that a large number of brigs were present in Australia, especially towards the middle of the nineteenth century. For the purpose of this research, two such logs covering the middle of the nineteenth century are especially useful: one from Sydney and the other from South Australia. Shipping arrival and departures records for Sydney from 1841 to 1844 show that a total of 148 different brigs came through the port (Broxam and Nicholson 1988). Similarly, according to arrival and departure logs for South Australia, 197 different brigs came through the colony

between 1827 and 1850. These logs also show that a majority of these vessels were present in either Sydney or South Australia multiple times during the recorded years.

Although the logs provide important data for the presence of brigs in Australian ports, they are limited in the information they contain; they only show the point of origin and port of arrival, but provide no information on where the ship was built or registered. Fortunately, other sources, such as artistic representations, can be used to augment such evidence. A painting of Sydney Harbour by Jacob Janssen from 1845, now located at the Art Gallery of South Australia in Adelaide, shows a brig flying the American flag (Figure 16 and Figure 17). This section discusses the evidence for establishing a connection between maritime Australia and brigs, and specifically American brigs, but also demonstrates that additional targeted research is needed on this subject to better understand this connection.

Figure 16. 'Panorama of Sydney Harbour with Government House and Fort Macquarie from Mrs Macquarie's Chair' by Jacob Janssen, 1845 (M.J.M. Carter AO Collection, Art Gallery of South Australia).

Figure 17. Detail from Janssen's painting (Figure 16) showing an American brig.

Trade and Commerce

The new colonies founded along the coasts of New South Wales, South Australia and Western Australia initially were almost totally reliant upon imported commodities for sustenance and saleable exports to support the establishments financially. Any island is dependent on trade to supply its material needs and the development of a material culture resulting in the necessity to establish seaborne trade networks (Staniforth 2003:1,42). While the colonies were able to maintain the basic requirements for food and other necessities through supply shipments from Great Britain, an exploitable resource was needed to ensure the longevity of the colonies (McLean 2012:50; Morgan 1999). This need for a material culture allowed the colonists to distinguish themselves from the Indigenous people; reassure themselves about their place in the world; and help establish their own network of social relations (Staniforth 2003:2) Reciprocally, the colonies were reliant upon Great Britain as the primary destination for their exports until after the Second World War (McLean 2012:51).

Merino sheep wool, which was in high demand in England at the turn of the century, was the first major export from the colonies, but Norfolk Island Pine, New Zealand flax for rope and sails, whale and seal products, slate and wheat all were key components to the growth of the export industry (Ash 2005:34–35; Lee 2003; McLean 2012:50).

The whaling industry brought an increase in shipping to Australia, first in the vessels engaged in procuring the animals, and second in the ships used to export its products. While there was whaling in Australia prior to the establishment of penal colonies, it was the presence of these colonies that enabled the great expansion of the Australian whaling industry. The years between 1830 and 1850 witnessed the height of the whaling industry, and the British, French and especially Americans all had a presence in Australian waters to take advantage of the large whale populations (Davis et al 1997:38; Hohman 1928:6). The huge global demand for whale oil and other products and the participation of so many foreign vessels allowed whaling to flourish in Australia and become one of the colonies' earliest and most profitable industries (Lawrence and Staniforth 1998:7).

In addition to such international maritime commerce, a large portion of the trade and shipping in Australia was between the colonies themselves. For example, South Australia became successful in the production of wheat and flour with the discovery of the fertile Fleurieu Peninsula (Khan 2006:65). Gold rushes in NSW and Victoria resulted in large influxes of prospectors and entrepreneurs and a corresponding increase in demand for wheat, which was satisfied largely by imports from South Australia (Ash 2007:30). The size of the Australian continent, the great distances between colonies and the majority coastal location of settlements meant that overland transport of goods was too difficult, took too long and was too costly, making coastal shipping the preferred means of moving products. Even though much of the goods comprising Australia's primary exports, aside from whale products, were not marine resources, it was this dependence on riverine, coastal and oceanic water transport

to move goods from field, forest or mine to port, between colonies and on to the global market that made colonial Australia a maritime-based economy. Success of the early industries led to greater wealth and economic opportunities in the colonies, increased immigration and population growth, discovery of new resources for exploitation and export and a growing demand for imported goods—both basics and cultural material that reflected the rising economic and social status of the colonists. All of this required the development of more ports and the need for more ships in the nineteenth century, increasing the colonial economy's already immense reliance upon maritime transport.

Ida and the South Australian Economy

Build

Ida was a 175-ton brig-rigged vessel built in San Francisco in the first half of the nineteenth century. Aside from this information, not much else in known about the construction of *Ida* and there are no known depictions of the ship, so information will have to come from other contemporary American-built brigs. As mentioned previously, American shipbuilders did not follow a set standard when constructing their vessels (Chapelle 1988:274), so the information that follows should be considered representative at best. The well-documented American naval brig USS *Niagara*, constructed at the beginning of the nineteenth century for service on Lake Erie during the War of 1812, serves as a good comparative vessel for *Ida*, despite their size difference (Figure 18). *Niagara* is a 305-ton vessel measuring 110 feet (33 m) in length (Chapelle 1949:270). As *Ida* was just over half of this tonnage, its length probably was between 50 and 85 feet (15 and 26 m). The hull plans for USS *Niagara* (Figure 19) provide a possible representation of how *Ida*'s hull was constructed, seeing as how little of the ship's actual hull is preserved.

Use

Although *Ida* was a merchant vessel built in the United States, it is clear from the ship's logs of 1845 and 1855 (Tables 7 and 8; see also Appendices 3 and 4) that *Ida* participated in both long distance and inter-state trade along the Australian coasts. The first log (Table 7) shows that in 1854, three years before it wrecked, *Ida* sailed from Melbourne to New South Wales. According to the second log (Table 8), the following year *Ida* travelled from San Francisco to Sydney. As for the cargoes the ship was transporting, little is known other than *Ida* did carry some passengers. The notice of salvage posted in the *South Australian Register* (19 Jan 1857, p.4 column d) after the ship's wrecking indicate that at the time *Ida* was transporting approximately 30 tons (570 bags) of copper ore no. 2 for the English and Australian Copper Company from Port Wakefield to Sydney, and was stopping in Port Willunga in route to pick up a load of wheat and flour when it was blown ashore (Parsons 1998:31). While further research is needed, it can be surmised from the information gathered thus far that *Ida* not only was used to transport specified consignments point to point, but likely participated in opportunistic trade as well and transported a wide variety of cargos, including commodities, produce and people.

Figure 18. USS *Niagara*, 1913 (US Library of Congress Prints and Photographs Division, Reproduction # LC-USZ62-127683).

Loss

In addition to the background information on *Ida* provided in Chapter 2, following are additional details of the ship's wrecking based on Parsons (1998). *Ida* was driven ashore at Port Willunga on 15 January 1857. It was transporting approximately 30 tons of copper ore from Port Wakefield to Sydney and pulled into Port Willunga to fill up with wheat and flour. When the vessel arrived, Mr Turpin, Port Willunga's Harbour Master, went aboard and offered his services. At the time, the weather was fine, although there were indications that a storm was approaching. *Ida* had its anchor out ahead of the government moorings, but the Harbour Master was in the process of moving *Ida* to the moorings when a heavy sea set in from the west-north-west.

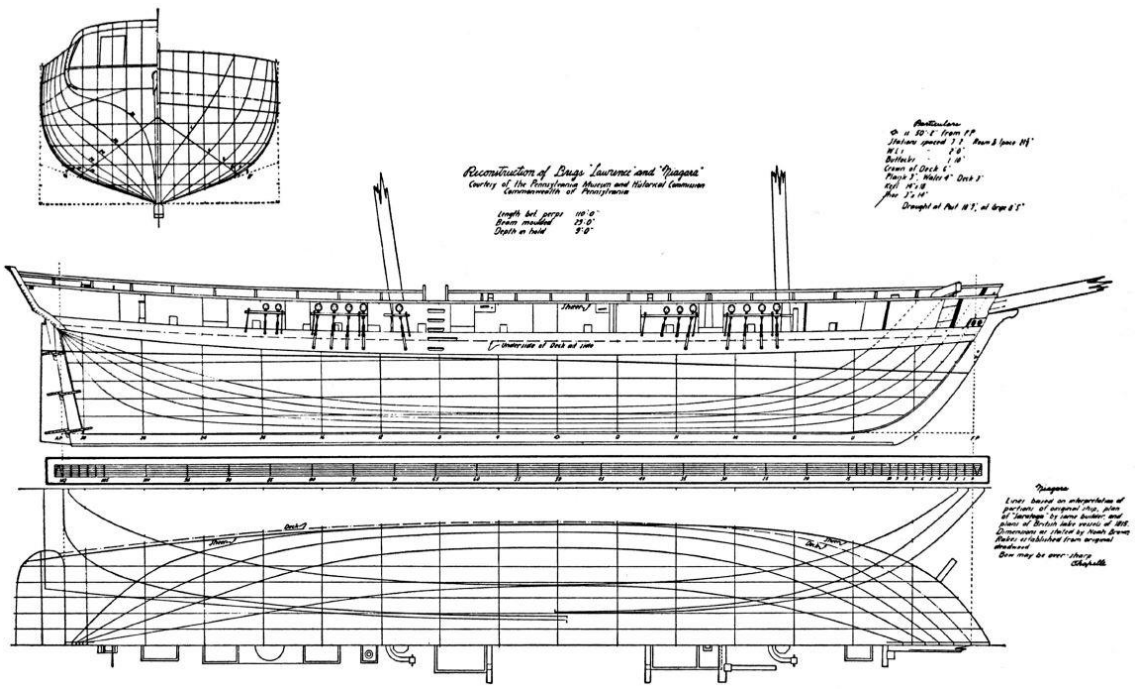


Figure 19. Reconstructed hull lines of American brigs *Lawrence* and *Niagara* (Chapelle 1949: 271).

Table 7. 1854 *Ida* Shipping log

IDA of San Francisco, Samuel C Woodruff, Master, Burthen 175 Tons From the Port of Melbourne Via Newcastle to, New South Wales, 4th February, 1854					
Surname	**Given Name**	**Station**	**Age**	**Of what Nation**	**Status**
Woodruff	Samuel	Master			Crew
McDonald	?	Mate	26	American	Crew
Wilson	S	2nd Mate	39	American	Crew
Perry ?	J	Seaman	36	American	Crew
?	C.S.	Seaman	25	American	Crew
Tonckles	? C.	Seaman	19	American	Crew
Hollock	C	Seaman	27	American	Crew
Marshall	?	Seaman	25	American	Crew
Johnson	J	Seaman	30	American	Crew
Walsh	?	Seaman	30	American	Crew
Frank	?	Seaman	25	American	Crew
Casey	? W.	Seaman	24	American	Crew

Table 8. 1855 *Ida* Shipping log

IDA **Brig of San Francisco, WM. Mann Master, Burthen 176 Tons From the Port of San Francisco to Sydney New South Wales, 3rd December 1855**						
Surname	**Given Name**	**Station**	**Age**	**Of what Nation**	**Status**	**Comments**
Mann	WM.	Captain			Crew	
Brown	J.	Super ?	30	America	Crew	
Hansell	J.	Mate	27	America	Crew	
Hoods	T.	2nd Mate	25	America	Crew	
Hopkins	C.	Cook	30	America	Crew	
Francisco	I.	Steward	26	America	Crew	
Forster	F.	Seaman	31	America	Crew	
Mirst	T.	Seaman	20	America	Crew	
Mormon	J.	Seaman	22	America	Crew	
Stevens	M.	Seaman	30	America	Crew	
Flinn	T.	Seaman	23	America	Crew	
Hadwick	J.				Passenger	Cabin
Sholluche		Mr			Passenger	Cabin
Sholluche		Mrs			Passenger	Cabin
Rooche	M.				Passenger	Steerage
Fitzpatrick	T.				Passenger	Steerage
Dyers	T.				Passenger	Steerage
Dolton	A.				Passenger	Steerage
Atherton	P.				Passenger	Steerage
Odorsell	C.				Passenger	Steerage
Ryan	T.				Passenger	Steerage
Collins	C.				Passenger	Steerage
Calligan	W.				Passenger	Steerage
Odonnel	T.				Passenger	Steerage

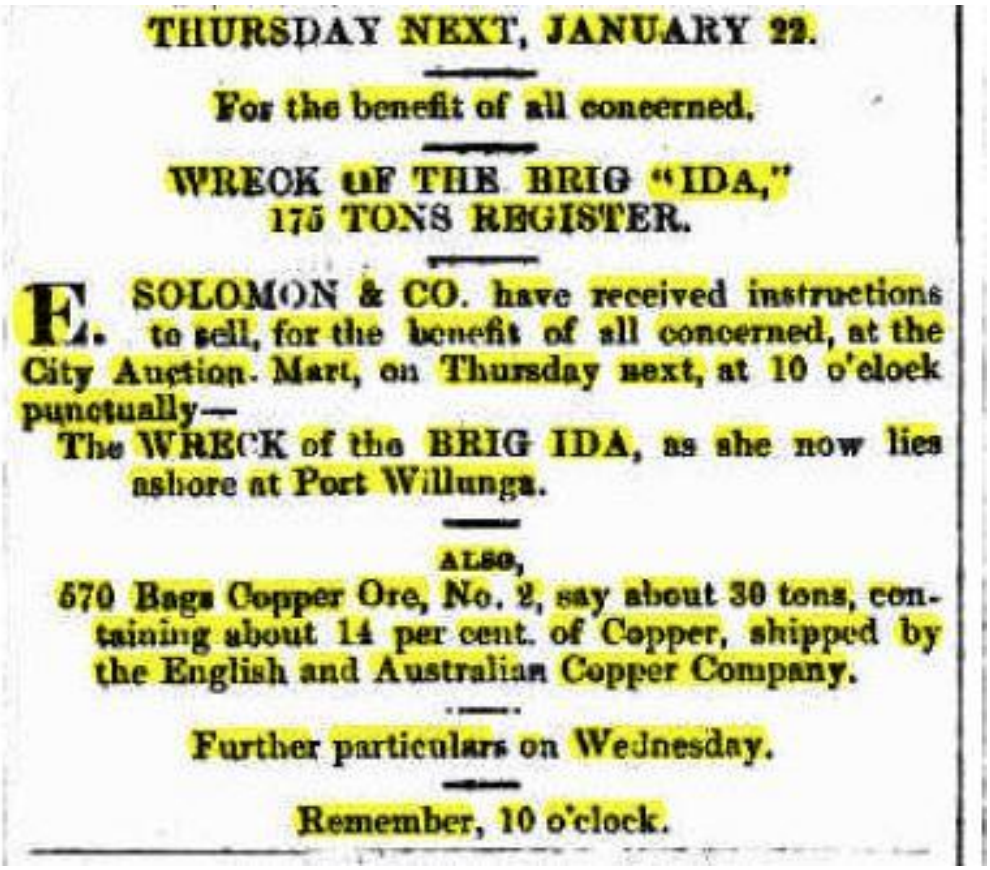
With the seas rising, the Harbour Master felt it best to use the ship's gear to moor and the crew were in the process of shackling the best bower anchor when the cable holding the brig snapped. The ship drifted for a while so the best bower and smaller bower were put down on another cable. By this time, the sea was raging, making a clean breach over the jetty. At about 3:00 AM, the best bower anchor parted from the cable and, in an effort to take some of the strain off of the remaining anchor, a spring was put on the chain, but this too parted. The ship was brought up by using the stream anchor, but the heavy seas soon caused that to part as well and the vessel was driven ashore about 100 yards south of the (original) jetty. Upon examination that next day, it was found that the ship's back had been broken.

Survival

In the days following *Ida*'s wrecking, the ship's cargo of copper was recovered from the grounded vessel and sold at auction (Figure 20). Richard Martin bought the salvage rights to the wreck, and purchased ship timbers were used as building material for a number of structures in the Willunga area (Hancock and Liebelt 1986:290). In the following years, the *Ida* remains became buried naturally under beach sand and rock. Periodically, storms remove enough sediment to expose portions of the remaining hull structure, with the greatest level of exposure recorded in July 2016 following a winter storm.

Investigation

Terry Smith conducted the first investigation of the ship remains on Port Willunga beach in 1981 for the Society for Underwater Historical Research (SUHR), when he and another society member measured and recorded the exposed timbers (Smith 1981:37–49). In 1995, storm waters left the upper end of bow timber UM2, with its two iron bolts, protruding from the beach sand.



THURSDAY NEXT, JANUARY 22.

For the benefit of all concerned,

WRECK OF THE BRIG "IDA,"
175 TONS REGISTER.

E. SOLOMON & CO. have received instructions to sell, for the benefit of all concerned, at the City Auction Mart, on Thursday next, at 10 o'clock punctually—

The WRECK of the BRIG IDA, as she now lies ashore at Port Willunga.

ALSO,

570 Bags Copper Ore, No. 2, say about 30 tons, containing about 14 per cent. of Copper, shipped by the English and Australian Copper Company.

Further particulars on Wednesday.

Remember, 10 o'clock.

Figure 20. *Adelaide Times* 20 January 1857 auction announcement for the *Ida* shipwreck.

Bill Jeffery and Terry Arnott went to examine and record the timber. They dug down another 30 cm or so to expose at least a meter of the timber, photographed and measured it and recorded its position with GPS (Jeffery and Arnott 1995). In 2004, as part of a broader study of the so-called maritime precinct of Port Willunga, Flinders University student Aidan Ash conducted a search for the buried ship remains using a magnetometer, air probe and metal detector (Ash 2007). In July 2016, the hull section was again laid bare after a storm. Members of the public photographed the exposed timbers and reported them to the Flinders University Maritime Archaeology Program. Unfortunately, by the time a team of program staff and students arrived at the beach, a majority of the remains had been re-covered with sand (Bennett 2016). Nevertheless, they recorded what remained visible and took GPS

coordinates for the site. They also were notified by local resident Mark Williams of an assortment of metal artefacts that he had found on the site (see pp. 46–47, above). The 2017 survey and excavation of the site conducted as part of this thesis research (see Chapter 4) represents the only thorough archaeological investigation of the remains, as all previous work was simply non-intrusive recording of chance exposures. The recent excavation resulted in the creation of a 3D photogrammetry model, detailed recording of all of the remaining timbers and fastenings, and identification of the types of wood used in the vessel's construction.

Ida and the South Australian Economy

In 1842, copper was discovered in Kapunda, and three years later, in 1845, even richer deposits were discovered in Burra (Auhl 1986:1). When the mines first opened, the only way to transport ore out and supplies in was overland by drays to and from Port Adelaide, a three-week return trip (Port Wakefield SA 2017). In 1849, though, the discovery of the mouth of Wakefield River led to the establishment of a suitable port at the northern end of Gulf St Vincent; originally named Port Henry, it was later changed to Port Wakefield (Port Wakefield SA 2017). The English and Australian Copper Co. (formerly Patent Copper Co.) maintained wharves at Port Wakefield and Port Adelaide for the transport of copper ore mined at Burra.

By 1850, the South Australian colony had expanded to the Fleurieu Peninsula, where wheat became one of the colony's biggest exports (Khan 2006:65). In addition to wheat, sheep wool and slate also were major exports from the region, the Willunga slate quarries exported an estimated 20,000 slabs of slate a week at their peak (Ash 2005:34). Nevertheless, wheat remained the primary export, and it was demands from local farmers that led to the development of an export jetty at Port Willunga. The time required and difficulties in

transporting wheat by land to Adelaide prompted calls for a local port facility, and the lack of good natural harbourages along this section of coastline led to the decision to build of a jetty at Port Willunga, the location chosen because of its proximity to the wheat fields. It quickly became the second busiest port in the colony (Khan 2006:65). The gold rushes in New South Wales and Victoria created even greater demand for wheat, and as a result shipping activity increased to transport the produce (Ash 2007:30).

While the South Australian economy was not based on copper and wheat alone, these two commodities are what links *Ida* to the colonial economy. Destined for New South Wales, *Ida* was transporting copper ore from Port Wakefield and was set to take on wheat and flour at Port Willunga when it wrecked (Parsons 1998:31). This small part of *Ida*'s story demonstrates how interwoven American brigs were in Australian commerce of the nineteenth century, both in regional and inter-colony trade.

CHAPTER 6

CONCLUSION

Throughout the nineteenth century, colonial Australia participated in an economy that was primarily maritime based. From the much needed imports from Great Britain, which supplied the colonists with sustaining provisions and the familiar comforts of home, to the exploitation of whale populations in Australian waters, to the exportation and inter-colonial trading of the continent's riches, such as timber, copper, slate, and agricultural and pastoral produce, virtually every aspect of the Australian colonial economy was dependent upon maritime transport—ships. One of the most prevalent ship types of this period was the brig. Their reliability, manoeuvrability, adaptability and capacity to operate close to shore and to access smaller ports made brigs the perfect vessel for the developing colonies and their coastal settlements. At the same time that Australia's demand for ships was increasing, American shipbuilders were dominating the global shipbuilding industry. Beginning in the mid-1600s as small-scale colonial shipbuilding operations under British control, American shipyards were flourishing by the turn of the eighteenth century; by 1774, American-built ships comprised one third of the tonnage in Britain's fleet. It was not until after the American Revolution and War of 1812 that the American brig became popular, for both coastal and long-distance trading. Wooden sailing vessels continued as the primary form of maritime transportation throughout the nineteenth century, until the introduction of the triple expansion steam engine in 1887. Considering the popularity of the brig, as whalers, transport vessels and general merchantmen, American dominance in the shipbuilding industry, and the high demand for sailing vessels in Australia, it is not unreasonable to assume that American-built brigs played a significant role (or roles) in the Australia economy.

The American brig *Ida*, which wrecked onshore at Port Willunga in 1857, was chosen as a case study to examine how American brigs were utilised in regional and inter-colonial trade. Through the use of the BULSI (build, use, loss, survival and investigation) system developed by Wessex Archaeology, a ship's biography was developed for *Ida*. In doing so, it was revealed that *Ida* was an American built and registered brig that was utilised for transporting people and goods at least in and between South Australia and New South Wales.

The shipwreck buried at Port Willunga beach was presumed to be *Ida*, but the remains had never been properly investigated or positively identified. Over the course of two days, a complete excavation of the site took place and wood samples from the hull timbers were collected. The surviving hull section comprises timbers made from white oak, southern yellow pine, red elm, and black locust species, all of which are native to the south-eastern United States, and which collectively could only have been found in North America. These results, supported by agreement between the location of the remains and reports of the wrecking event, mean that the identity of the wreck in question is almost certainly the American brig *Ida*. With the evidence of multiple American brigs wrecking in Australia, shipping logs documenting the comings and goings of American brigs in colonial ports, and the ship's biography of *Ida*, it is clear to see that American brigs did play a significant role in the maritime-based economy of nineteenth-century colonial Australia.

Questions and Future Work

While the work done for this project has provided a foundation for the research into American brigs and maritime aspects of the early Australian economy, much additional research is required. Some questions that still need to be addressed are: How many ships of the American whaling fleet were brigs, and how many operated in Australian waters? How many American-built brigs operated in Australia and what percentage of the total shipping

did this represent? How many brigs registered to the colonies or other nations were built in America? While arrival and departure logs were helpful in proving that brigs were operating in Australia, and specific ports, further investigation is needed to determine how many of them were actually built in America. Finally, the best means of understanding the different ways the American brig contributed to the Australian economy and colonial development is by compiling more ship biographies. Towards this end, more historical research and archaeological investigations are needed to locate, identify and study American brig shipwrecks, and to reveal where and how they were utilised in colonial industries and trade, and to better understand the characteristics that made brigs such desirable vessels for these purposes.

In addition to such work, there is additional fieldwork scheduled for the *Ida* shipwreck and related sites. Since the results of the ERT survey were corrupted, another survey is scheduled for the near future. The planned work includes surveys of the site using ERT, ground penetrating radar (GPR) and magnetometer. This combined approach should provide a diagnostic image of the hull section and surrounding area to determine if any additional material is present beneath the beach sands, and better geophysical definition of the sub-surface stratigraphy at the beach. The results also will be compared to determine the best geophysical surveying method for shipwrecks on the foreshore.

Another project being planned is a marine magnetometer survey of the waters off the beach to locate the old government moorings used at Port Willunga and *Ida*'s two anchors that were lost in the vain attempts to keep the ship from being blown ashore. A map of the general location of the moorings is provided in Appendix 5 (Ash 2007).

The lack of documented and uncorroborated information encountered during the research for this thesis has strengthened the notion for a centralized international maritime database that is accessible to everyone. It would be beneficial to have a database maintained

by the United Nations Educational, Scientific and Cultural organization (UNESCO). UNESCO, established in 1946, is the largest international partnership with 195 member states and 10 associate member states with the sole purpose of contributing to peace and security by promoting collaboration among nations through education, science and culture. The implementation of the 2001 Convention solidified their commitment to the protection of underwater cultural heritage. The UNESCO website currently has twelve member states that have contributed a total of twenty-eight databases and maps of underwater cultural heritage sites. There is, however, a disclaimer stating the accuracy of the databases have not been controlled and is not guaranteed by UNESCO. Each member state would work with maritime archaeologists and cultural preservation organizations within their jurisdiction to compile and maintain an accurate database of all known shipwrecks within their territory. The UNESCO database should be organized like the Australian National Shipwrecks Database (ANSDB). It would be user friendly and would contain extra fields of information including images of the shipwreck, relics recovered, site environment information for divers and site managers, ship building techniques, list of passengers and crew, a list of cargo and any proposed site work. An integrated management system to facilitate online permit applications and notifications would also be beneficial so that at any given time a government or educational institution would be able to monitor all registered and protected sites.

As a final note, there is a historical marker at Port Willunga that provides information on *Star of Greece* and the tragedy involved in its wrecking in 1888. It is hoped that, with the consolidation of historical research on the brig *Ida* and the positive identification of *Ida*'s remains on Port Willunga beach, a new historical marker or informational board can be erected on the cliff top overlooking the *Ida* wreck site to inform local residents and visitors about the archaeological remains and the events leading to the ship's wrecking on the beach below, the vessel's role in the early economy of the South Australian colony, and the

importance of shipping and American brigs to the development of colonial Australia and its maritime dependent economy.

REFERENCES

Ansted, A. 1919 *A Dictionary of Sea Terms*. Glasgow: Brown & Son Nautical Publishers.

Ash, A. 2005 A nice place for a harbour or is it? Investigating a maritime cultural landscape: Port Willunga, South Australia, Department of Archaeology, Flinders University of South Australia, Bedford Park.

Ash, A. 2007 The maritime cultural landscape of Port Willunga, South Australia, Department of Archaeology, Flinders University of South Australia, Bedford Park.

Auhl, I. 1986 *The Story of the Monster Mine: the Burra Burra Mine and its Townships, 1845-1877*. Burra: District Council of Burra Burra.

Australian Government Department of the Environment and Energy 2009 *Australian National Shipwreck Database*. Retrieved 5 March 2017 from <www.environment.gov.au/heritage/historic-shipwrecks/australian-national-shipwreck-database>.

Ballyn, S. 2011 An Introduction to Lives in Migration: Rapture and Continuity. In M. Renes (ed.), *Lives in Migration: Rupture and Continuity*, pp.16–29. Barcelona: University of Barcelona.

Bennett, K. 2016 *Storm Exposes a Shipwreck and Port Willunga, South Australia*. Bedford Park: Flinders University of South Australia. 2016.

Broxam, G. and I. Nicholson 1988 *Shipping Arrivals and Departures: Sydney 1841–1844*. Canberra: Roebuck Books.

Chapelle, H. 1949 *The History of the American Saling Navy: the ships and their development*. New York: W.W. Norton & Co., Inc.

Chapelle, H. 1988 *The History of American Sailing Ships*. New York: Bonanza Books.

Christopher, P. 1990 *South Australian Shipwrecks: A Database 1802–1989*. Adelaide: Societ for Underwater Historical Research.

Claesson, S. 1997 A preliminary report on the excavation of a 19th century derelict vessel in Cape Neddick, Maine: The Southern New Jersey Coasting Schooner Annabella. *Northeast Historical Archaeology* 26(1):39–62.

Clark, A. 1910 *The Clipper Ship Era: an Epitome of Famous American and British Clipper Ships, their Owners, Builders, Commanders and Crews 1843–1869*. New York: G.P. Putnam's Sons.

Clifford, A. 2012 *The Yankee Whaler*. Mineola: Dover Publications.

Cobar, C. 2010 A digital approach to the reconstruction of ancient sunken ships, Department of Philosophy, Texas A&M University, College Station.

Colwell-Pasch, C. 2014 From shipyard to seabed: A multiphasic vessel biography of Leven Lass, 1839–1854, Department of Archaeology, Flinders University of South Australia, Bedford Park.

Davis, L., R. Gallman and K. Gleiter 1997 *In Pursuit of Leviathan: Technology, Institutions, Productivity and Profits in American Whaling 1816–1906*. Chicago: University of Chicago Press.

Delis, A. 2012 *Mediterranean Wooden Shipbuilding: Production, Productivity, and Ship Types in Comparative Perspective*. Leiden: Brill.

Department of Environment, Water and Natural Resources, Government of South Australia 2017 *Data.SA: South Australian Government Data Directory: Shipwrecks*. Retrieved 25 October 2017 from <https://data.sa.gov.au/data/dataset/shipwrecks>.

Everist, R. 2009 *The Complete Guide to the Great Ocean Road: Walks, Beaches, Heritage, Ecology, Towns and Sustainable Tourism Through Southwest Victoria*. Torquay: Best Shot Publications Pty Ltd and Hindhead: Trailblazer Publications.

Falconer, W. 1769 *An Universal Dictionary of the Marine: Or a Copius Explanation of the Technical Terms and Phrases Employed in the Construction, Equipment, Furniture, Machinery, Movements and Military Operations of a Ship*. London: T. Cadell.

Fischer, L. 2013 Are we in danger of being left with our journals and not much else: the future of maritime history? *The Mariner's Mirror* 97(1):366–381.

Fletcher, B. 1976 *Colonial Australia Before 1850*. Melbourne: Nelson Australia.

Forrest, J. 2002 The invisibility of crews of nineteenth century Australian shipping in catalogued collections of artefacts from provenance sites, Department of Archaeology, Flinders University of South Australia, Bedford Park.

Gibbs, M. 1996 The historical archaeology of shore-based whaling in WA 1836–1879, Center of Archaeology, University of Washington, Seattle.

Green, J. 2008 Maritime Archaeology. In D. Pearsall (ed.), *Encyclopedia of Archaeology*, pp.1599-1605. Waltham: Academic Press.

Hancock, M. and F. Liebelt 1986. Unpublished report prepared for the Hancock and Martin Family Reunion Committee, Adelaide.

Hill, D. 2015 *The Making of Australia*. North Sydney: Random House Australia.

Hohman, E. 1928 *The American Whaleman: A study of Life and Labor in the Whaling Industry*. New York: Longmans, Green and Co.

Howe, O. and F. Matthews 1927 *American Clipper Ships 1833–1858*. Brattleboro: E.L. Hildreth & Co.

Ilic, J. 2017 Wood identification results: Assessment of eight wood specimens from the supposed remains of the brig *Ida*, buried under Port Willunga beach, South Australia, in the inter-tidal zone. Unpublished report prepared for Flinders University Maritime Archaeology Program.

Jeffery, B. and T. Arnott 1995 Ida *Site Inspection Report*, Department of Environment, Water and Natural Resources, South Australia.

Jones, L. 1957 *Shipbuilding in Britain: Mainly Between the Two World Wars*. Cardiff: University of Wales Press.

Khan, A. 2006 Pier Reviewed: A Study of Port-related Structures in South Australia, Department of Archaeology, Flinders University South Australia, Bedford Park.

Lane, P. 2012 Maritime and shipwreck archaeology in the Western Indian Ocean and Southern Red Sea: an overview of past and current research. *Journal of Maritime Archaeology* 7:9–41.

Lawrence, S. and M. Staniforth 1998 *The Archaeology of Whaling in Southern Australia and New Zealand*. Gundaroo: Brolga Press for the Australian Society of Historical Archaeology and the Australian Institute for Maritime Archaeology.

Library of Congress 1913 *The Niagra on the Scene of her Battle 1813*. Retrieved 23 February 2017 from <www.loc.gov/pictures/item/2001695540>.

McAllister, M. 2013 Stout, Sturdy and Strong: A Typology for Early Nineteenth-Century American Whalers, Department of Archaeology, School of Humanities, Flinders University of South Australia, Bedford Park.

McDouall, J. 2017 *Australia Explorers: Adelaide to Darwin*. Retrieved from <http://www.exploringaustralia.com.au/history.php?s=adel>.

McLean, I. 2012 *The Princeton Economic History of the Western World: Why Australia Prospered: The Shifting Sources of Economic Growth*. Princeton: Princeton University Press.

Marshall, G. 2001 Maritime Albany Remembered: Les Douglas et al. Kalamunda: Tangee Pty Ltd.

Morgan, P. 1999 Encounters Between British and Indigenous Peoples, c. 1500–c. 1800. In M. Dauntan and R. Halpern (eds), *Empire and Others: British Encounters with Indigenous Peoples, 1600–1850*, pp.42–78. Philadelphia: University of Pennsylvania Press.

Muckelroy, K. 1978 *Maritime Archaeology*. Cambridge: Cambridge University Press.

Natural Resources Conservation Service, U.S. Department of Agriculture 2017 Plant profile: *Robinia pseudoacacia* L. black locust. Retrieved 20 November 2017 from <https://plants.usda.gov/core/profile?symbol=ROPS>.

O'Reilly, R. 2007 Australian Built Wooden Sailing Vessels of the South Australian Intrastate Trade, Department of Archaeology, Flinders University of South Australia, Bedford Park.

Paine, L. 2013 *The Sea and Civilization: A Maritime History of the World*. New York: Knopf Publishing.

Parsons, R. 1998 *Shipwrecks in South Australia 1836–1899*. Lobethal: Ronald Parsons.

Paullin, C. and O. Perry 1918 *The Battle of Lake Erie: A Collection of Documents*. Cleveland: The Rowfant Club.

Pearson, M. 1983 The technology of whaling in Australian waters in the 19th century. *Australian Journal of Historical Archaeology* 1:40–54.

Playford, P. 2007 Aboriginal and European discoveries of Australia. *Early Days: Journal of the Royal Western Australian Historical Society* 13(1):52–65.

Port Walkefield South Australia 2017 *History of Port Wakefield*. Retrieved 28 October 2017 from <http://www.portwakefield.sa.au/history/story-port-wakefield/>.

Robinson, J. and G. Dow 1922 *The Sailing Ships of New England 1607–1907*. Topfield: The Perkins Press.

Rosbe, J. 2002 *The Making of America Series: Maritime Marion Massachusetts*. Charleston: Arcadia Publishing.

Sexton, R. 1990a *Shipping Arrivals and Departures: South Australia 1627–1850: A Guide for Geneologists and Maritime Historians*. Ridgehaven: Gould Books.

Sexton, R.T. 1990b *Shipping Arrival and Departures: South Australia 1627–1850: a guide to genealogists and maritime historians*. Ridgehaven: Gould Books.

Sigmond, J. and L. Zuiderbann 1979 *Dutch Discoveries of Australia: Shipwrecks, Treasures and Early Voyages Off the West Coast*. Adelaide: Rigby.

Smith, A. 2011 *Historic Shipwrecks Around Australia*. Retrieved 10 October 2016 from <www.australiangeographic.com.au/topics/history-culture/2011/03/historic-shipwrecks-around-australia>.

Smith, J. and N.M.H. Society 2009 *Voyages the Age of Sail: Documents in Maritime History Volume 1 1492–1865*. Gainesville: University Press of Florida.

Smith, T. 1981 *Ida*, Society for Underwater Historical Research, Adelaide.

St. John de Crevecoeur, J. 1997 *Letters from an American Farmer*. Oxford: Oxford University Press.

Staniforth, M. 2003 *Material Culture and Consumer Society: Dependent Colonies in Colonial Australia*. New York: Springer.

State Library of New South Wales 2014 *The First Fleet*. Retrieved 22 January 2017 from <http://www2.sl.nsw.gov.au/archive/discover_collections/history_nation/terra_australis/firstfleet.html>.

Steffy, J. 2012 *Wooden Ship Building and the Interpretation of Shipwrecks*. College Station: Texas A&M University Press.

Sucher, S. 2008 *The Moral Leader: Challenges, Tools and Insights*. New York: Routledge.

Tucker, S. 2011 *Battles that Changed History: An Encyclopedia of World Conflict.* Santa Barbara: ABC-CLIO, LLC.

U.S. Department of the Interior 2017 *USGS Global Positioning Application and Practice*. Retrieved 27 August 2017 from <http://water.usgs.gov/osw/gps/index.html>.

van Duivenvoorde, W. 2015 *Dutch East India Company Shipbuilding: The Archaeological Study of Batavia and Other Seventeenth Century VOC Ships*. Ed Rachal Foundation Nautical Archaeology Series. College Station: Texas A&M University Press.

Vanhorn, K. 2004 Eighteenth Century Colonial American Mercant Ship Construction, Department of Anthropology, Texas A&M University, College Station.

Vaudrey, G. 1989 *Samuel White of White's Valley 1840–1868,* City of Onkaparinga Library, South Australia.

Wessex Archaeology 2006 *Aggregate Levy Sustainability Fund Marine Aggregates and the Historic Environment: On the Importance of Shipwrecks Final Report Volume 1*, Wessex Archaeology, Ltd., Salisbury.

Whiting, J. 2009 Long-lost Shipwreck Resurfaces: Port Willunga Shipwrecks. *Southern Times Messenger*.

William, D., R. Abelardo, A. Binley and D. LeBrecque 2004 Electrical Resistance Tomography. *Society of Exploration Geophysicists* 23(5):438–442.

Newspapers

South Australian Register, 19 January 1857; 21 January 1857.

APPENDICES

Appendix 1

South Australia Shipwreck Distrubance Permit

Government of South Australia

Department of Environment, Water and Natural Resources

Historic Shipwrecks Act 1981

PERMIT No. 17-59-01

For Disturbance of a Historic Shipwreck or Relic

I, Beverley Voigt, Delegate of the Minister for Sustainability, Environment and Conservation, hereby grant to Mark Polzer at HUM 277, Sturt Road, Bedford Park, SA 5042 a permit under Section 15 of the South Australia *Historic Shipwrecks Act 1981* authorising in relation to the historic shipwreck or relic listed in schedule 1 the actions specified in schedule 2 which are otherwise prohibited by section 13(1) of the *Historic Shipwrecks Act 1981*, subject to the conditions specified in schedule 3.

Schedule 1 – Historic shipwreck or relics to which permit applies
Name of historic shipwreck or relic: Ida
SA Register of Historic Shipwrecks identification number: 59
Shipwreck coordinates: Latitude 35.2597 South Longitude 138.4611 East
Location description: Approximately 80m South of the beach access path from the Port Willunga car park.

Schedule 2 – Permitted actions
The action in vicinity of the historic shipwreck listed in schedule 1 is permitted for the purposes of: ▪ Archaeological investigations ▪ Excavation and timber sampling

Schedule 3 – Conditions
(a) That the historic shipwreck or relic listed in schedule 1 is only disturbed in accordance with this permit and the requirements of the *Historic Shipwrecks Act 1981*.
(b) Actions must be undertaken in accordance with the methodology outlined within the permit application submitted by the permit holder and the conditions outlined in this Schedule.
(c) The permit holder is responsible for the conduct of all persons participating in the permitted actions and the permit holder or a suitably qualified person designated by and responsible to the permit holder must supervise them.
(d) The permit holder or representative must insure that all persons participating in the permitted actions have been properly briefed on the conditions of the permit, the techniques used to conform to these conditions and their general responsibilities under the *Historic Shipwrecks Act 1981*.
(e) A copy of this permit must be carried by the permit holder or representative and available for immediate inspection by authorised officers, should inspection be required.
(f) The permit holder is aware that shipwreck relics encountered in the course of undertaking the permitted actions must be recorded and reburied on site. If removal of relics becomes a consideration, an amendment to the permit and a relic management plan will be required. The plan must describe the reasons for recovery of the relics, a

Continued overleaf.....

conservation methodology, and a plan for ongoing curation. A statement of commitment to implement an approved relic management plan will be required before a permit amendment can be approved.

(g) The permit holder will be responsible for site rehabilitation. This will include backfilling of all excavation trenches and returning the site to its pre-disturbance state.

(h) The permit holder must provide a full report on the permitted actions, to be submitted within 6 months of the expiration of the permit. The report must provide a review of the methodologies and results of the project investigations and include copies of notes, site plans, survey and sampling data, and photographs.

(i) The report and accompanying material must be submitted electronically. A hard copy submission is optional.

(j) If after two years of receipt of the final report the project investigations resulting from the permitted actions have not been published or shared in public or professional forums, the State Heritage Unit reserves the right to publish or share the findings (suitably attributed).

(k) A request for an extension of the permit will be required in writing. Approval for an extension of the permit is contingent upon the submission of a satisfactory progress report, and is at the discretion of the Minister or Minister's Delegate.

Duration of permit
This permit remains in force for 6 months commencing on the day that the permit is granted, unless earlier varied or revoked.

Dated this 9th day of August 2017

Beverley Voigt
Manager, Heritage and Major Reforms,
Department of Environment, Water and Natural Resources
Delegate of the Minister for Sustainability, Environment and Conservation

Appendix 2.

Metal Relic Government Certifications

Government of South Australia

Department of Environment, Water and Natural Resources

REGISTRATION OF RELIC CERTIFICATE

Under Section 12 of the South Australian *Historic Shipwrecks Act 1981*

For Historic Shipwreck Relic No. 11100

This certificate signifies that the historic shipwreck relic or article described in schedule 1, which is associated with the historic shipwreck or ship described in schedule 2, has been registered under Section 12 of the South Australian *Historic Shipwrecks Act 1981*.

It is an offence under the *Historic Shipwrecks Act 1981* for a person to damage, destroy, dispose of or remove from Australia the relic or article described in schedule 1 without first being issued a permit under Section 15 of the *Historic Shipwrecks Act 1981*, which authorises such action.

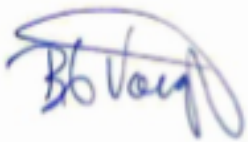
Any person coming into possession, custody or control of this or any other historic shipwreck relic must provide notice in writing within 30 days to the Minister administering the *Historic Shipwrecks Act 1981* or the Ministers Delegate. Notice should be given using the form titled "Notification of Possession, Custody or Control of a Historic Shipwreck Relic".

This certificate does not confirm ownership by any person or confer ownership on any person in relation to the shipwreck relic or article described in schedule 1.

Schedule 1 – Description of relic	
Functional description	Keel Staple
Material	Copper
Year of manufacture	Unknown
Markings or inscriptions	Nil
Length (mm)	27.79
Width (mm)	93.24
Height (mm)	155
Weight (grams)	507

Schedule 2 – Historic shipwreck or ship which this relic is associated with
Name of historic shipwreck or ship: Ida Register of Historic Shipwrecks identification number: 59

Issued this 15th day of August 2016



Beverly Voigt
Manager, Heritage and Boards Secretariat
Department of Environment, Water and Natural Resources
Delegate of the Minister for Sustainability, Environment and Conservation

Continued overleaf.....

Images of historic shipwreck relic or article described in schedule 1.

Government of South Australia

Department of Environment, Water and Natural Resources

REGISTRATION OF RELIC CERTIFICATE

Under Section 12 of the South Australian *Historic Shipwrecks Act 1981*

For Historic Shipwreck Relic No. 11101

This certificate signifies that the historic shipwreck relic or article described in schedule 1, which is associated with the historic shipwreck or ship described in schedule 2, has been registered under Section 12 of the South Australian *Historic Shipwrecks Act 1981*.

It is an offence under the *Historic Shipwrecks Act 1981* for a person to damage, destroy, dispose of or remove from Australia the relic or article described in schedule 1 without first being issued a permit under Section 15 of the *Historic Shipwrecks Act 1981*, which authorises such action.

Any person coming into possession, custody or control of this or any other historic shipwreck relic must provide notice in writing within 30 days to the Minister administering the *Historic Shipwrecks Act 1981* or the Ministers Delegate. Notice should be given using the form titled "Notification of Possession, Custody or Control of a Historic Shipwreck Relic".

This certificate does not confirm ownership by any person or confer ownership on any person in relation to the shipwreck relic or article described in schedule 1.

Schedule 1 – Description of relic	
Functional description	Keel Staple
Material	Copper
Year of manufacture	Unknown
Markings or inscriptions	Nil
Length (mm)	18.93
Width (mm)	19.11
Height (mm)	104.91
Weight (grams)	122

Schedule 2 – Historic shipwreck or ship which this relic is associated with
Name of historic shipwreck or ship: Ida Register of Historic Shipwrecks identification number: 59

Issued this 15th day of August 2016

Beverly Voigt
Manager, Heritage and Boards Secretariat
Department of Environment, Water and Natural Resources

Delegate of the Minister for Sustainability, Environment and Conservation

Continued overleaf.....

Images of historic shipwreck relic or article described in schedule 1.

Government of South Australia

Department of Environment, Water and Natural Resources

REGISTRATION OF RELIC CERTIFICATE

Under Section 12 of the South Australian *Historic Shipwrecks Act 1981*

For Historic Shipwreck Relic No. 11102

This certificate signifies that the historic shipwreck relic or article described in schedule 1, which is associated with the historic shipwreck or ship described in schedule 2, has been registered under Section 12 of the South Australian *Historic Shipwrecks Act 1981*.

It is an offence under the *Historic Shipwrecks Act 1981* for a person to damage, destroy, dispose of or remove from Australia the relic or article described in schedule 1 without first being issued a permit under Section 15 of the *Historic Shipwrecks Act 1981*, which authorises such action.

Any person coming into possession, custody or control of this or any other historic shipwreck relic must provide notice in writing within 30 days to the Minister administering the *Historic Shipwrecks Act 1981* or the Ministers Delegate. Notice should be given using the form titled "Notification of Possession, Custody or Control of a Historic Shipwreck Relic".

This certificate does not confirm ownership by any person or confer ownership on any person in relation to the shipwreck relic or article described in schedule 1.

Schedule 1 – Description of relic	
Functional description	Keel Staple
Material	Copper
Year of manufacture	Unknown
Markings or inscriptions	Nil
Length (mm)	11.10
Width (mm)	11.97
Height (mm)	101.10
Weight (grams)	76

Schedule 2 – Historic shipwreck or ship which this relic is associated with
Name of historic shipwreck or ship: Ida Register of Historic Shipwrecks identification number: 59

Issued this 15th day of August 2016

Beverly Voigt
Manager, Heritage and Boards Secretariat
Department of Environment, Water and Natural Resources

Delegate of the Minister for Sustainability, Environment and Conservation

Continued overleaf.....

Images of historic shipwreck relic or article described in schedule 1.

Government of South Australia

Department of Environment, Water and Natural Resources

REGISTRATION OF RELIC CERTIFICATE

Under Section 12 of the South Australian *Historic Shipwrecks Act 1981*

For Historic Shipwreck Relic No. 11103

This certificate signifies that the historic shipwreck relic or article described in schedule 1, which is associated with the historic shipwreck or ship described in schedule 2, has been registered under Section 12 of the South Australian *Historic Shipwrecks Act 1981*.

It is an offence under the *Historic Shipwrecks Act 1981* for a person to damage, destroy, dispose of or remove from Australia the relic or article described in schedule 1 without first being issued a permit under Section 15 of the *Historic Shipwrecks Act 1981*, which authorises such action.

Any person coming into possession, custody or control of this or any other historic shipwreck relic must provide notice in writing within 30 days to the Minister administering the *Historic Shipwrecks Act 1981* or the Ministers Delegate. Notice should be given using the form titled "Notification of Possession, Custody or Control of a Historic Shipwreck Relic".

This certificate does not confirm ownership by any person or confer ownership on any person in relation to the shipwreck relic or article described in schedule 1.

Schedule 1 – Description of relic	
Functional description	Keel Staple
Material	Copper
Year of manufacture	Unknown
Markings or inscriptions	Nil
Length (mm)	11.50
Width (mm)	11.46
Height (mm)	86.02
Weight (grams)	59

Schedule 2 – Historic shipwreck or ship which this relic is associated with
Name of historic shipwreck or ship: Ida Register of Historic Shipwrecks identification number: 59

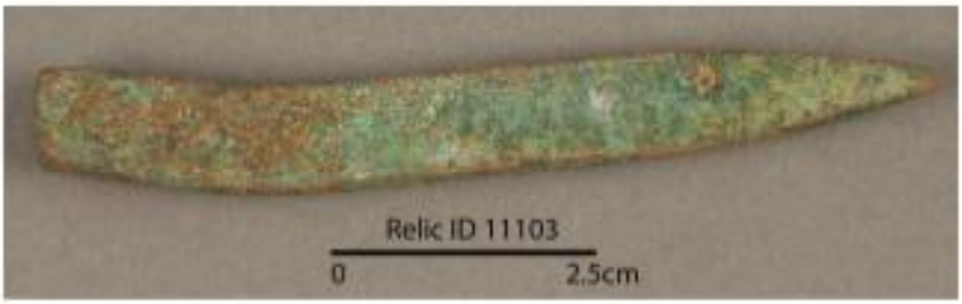
Issued this 15th day of August 2016

Beverly Voigt
Manager, Heritage and Boards Secretariat
Department of Environment, Water and Natural Resources

Delegate of the Minister for Sustainability, Environment and Conservation

Continued overleaf.....

Images of historic shipwreck relic or article described in schedule 1.



Government of South Australia

Department of Environment, Water and Natural Resources

REGISTRATION OF RELIC CERTIFICATE

Under Section 12 of the South Australian *Historic Shipwrecks Act 1981*

For Historic Shipwreck Relic No. 11104

This certificate signifies that the historic shipwreck relic or article described in schedule 1, which is associated with the historic shipwreck or ship described in schedule 2, has been registered under Section 12 of the South Australian *Historic Shipwrecks Act 1981*.

It is an offence under the *Historic Shipwrecks Act 1981* for a person to damage, destroy, dispose of or remove from Australia the relic or article described in schedule 1 without first being issued a permit under Section 15 of the *Historic Shipwrecks Act 1981*, which authorises such action.

Any person coming into possession, custody or control of this or any other historic shipwreck relic must provide notice in writing within 30 days to the Minister administering the *Historic Shipwrecks Act 1981* or the Ministers Delegate. Notice should be given using the form titled "Notification of Possession, Custody or Control of a Historic Shipwreck Relic".

This certificate does not confirm ownership by any person or confer ownership on any person in relation to the shipwreck relic or article described in schedule 1.

Schedule 1 – Description of relic	
Functional description	Keel Staple
Material	Copper
Year of manufacture	Unknown
Markings or inscriptions	Nil
Length (mm)	11.06
Width (mm)	11.47
Height (mm)	83.44
Weight (grams)	61

Schedule 2 – Historic shipwreck or ship which this relic is associated with
Name of historic shipwreck or ship: Ida Register of Historic Shipwrecks identification number: 59

Issued this 15th day of August 2016

Beverly Voigt
Manager, Heritage and Boards Secretariat
Department of Environment, Water and Natural Resources

Delegate of the Minister for Sustainability, Environment and Conservation

Continued overleaf.....

Images of historic shipwreck relic or article described in schedule 1.

Government of South Australia

Department of Environment, Water and Natural Resources

REGISTRATION OF RELIC CERTIFICATE

Under Section 12 of the South Australian *Historic Shipwrecks Act 1981*

For Historic Shipwreck Relic No. 11105

This certificate signifies that the historic shipwreck relic or article described in schedule 1, which is associated with the historic shipwreck or ship described in schedule 2, has been registered under Section 12 of the South Australian *Historic Shipwrecks Act 1981*.

It is an offence under the *Historic Shipwrecks Act 1981* for a person to damage, destroy, dispose of or remove from Australia the relic or article described in schedule 1 without first being issued a permit under Section 15 of the *Historic Shipwrecks Act 1981*, which authorises such action.

Any person coming into possession, custody or control of this or any other historic shipwreck relic must provide notice in writing within 30 days to the Minister administering the *Historic Shipwrecks Act 1981* or the Ministers Delegate. Notice should be given using the form titled "Notification of Possession, Custody or Control of a Historic Shipwreck Relic".

This certificate does not confirm ownership by any person or confer ownership on any person in relation to the shipwreck relic or article described in schedule 1.

Schedule 1 – Description of relic	
Functional description	Keel Staple
Material	Copper
Year of manufacture	Unknown
Markings or inscriptions	Nil
Length (mm)	10.66
Width (mm)	12.40
Height (mm)	64.43
Weight (grams)	45

Schedule 2 – Historic shipwreck or ship which this relic is associated with
Name of historic shipwreck or ship: Ida Register of Historic Shipwrecks identification number: 59

Issued this 15th day of August 2016

Beverly Voigt
Manager, Heritage and Boards Secretariat
Department of Environment, Water and Natural Resources

Delegate of the Minister for Sustainability, Environment and Conservation

Continued overleaf.....

Images of historic shipwreck relic or article described in schedule 1.

Government of South Australia

Department of Environment, Water and Natural Resources

REGISTRATION OF RELIC CERTIFICATE

Under Section 12 of the South Australian *Historic Shipwrecks Act 1981*

For Historic Shipwreck Relic No. 11106

This certificate signifies that the historic shipwreck relic or article described in schedule 1, which is associated with the historic shipwreck or ship described in schedule 2, has been registered under Section 12 of the South Australian *Historic Shipwrecks Act 1981*.

It is an offence under the *Historic Shipwrecks Act 1981* for a person to damage, destroy, dispose of or remove from Australia the relic or article described in schedule 1 without first being issued a permit under Section 15 of the *Historic Shipwrecks Act 1981*, which authorises such action.

Any person coming into possession, custody or control of this or any other historic shipwreck relic must provide notice in writing within 30 days to the Minister administering the *Historic Shipwrecks Act 1981* or the Ministers Delegate. Notice should be given using the form titled "Notification of Possession, Custody or Control of a Historic Shipwreck Relic".

This certificate does not confirm ownership by any person or confer ownership on any person in relation to the shipwreck relic or article described in schedule 1.

Schedule 1 – Description of relic	
Functional description	Keel Staple
Material	Copper
Year of manufacture	Unknown
Markings or inscriptions	Nil
Length (mm)	10.70
Width (mm)	11.63
Height (mm)	54.71
Weight (grams)	45

Schedule 2 – Historic shipwreck or ship which this relic is associated with
Name of historic shipwreck or ship: Ida Register of Historic Shipwrecks identification number: 59

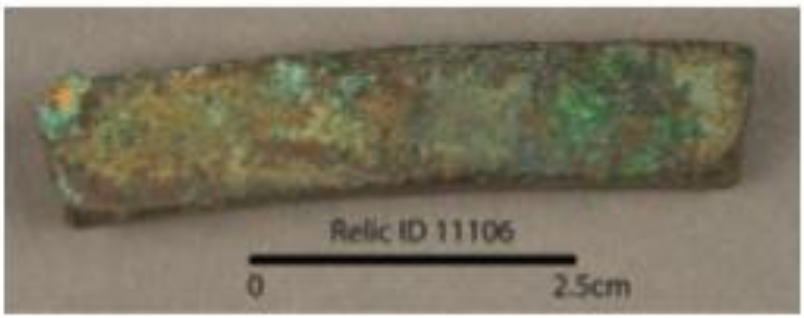
Issued this 15th day of August 2016

Beverly Voigt
Manager, Heritage and Boards Secretariat
Department of Environment, Water and Natural Resources

Delegate of the Minister for Sustainability, Environment and Conservation

Continued overleaf.....

Images of historic shipwreck relic or article described in schedule 1.



Government of South Australia

Department of Environment, Water and Natural Resources

REGISTRATION OF RELIC CERTIFICATE

Under Section 12 of the South Australian *Historic Shipwrecks Act 1981*

For Historic Shipwreck Relic No. 11107

This certificate signifies that the historic shipwreck relic or article described in schedule 1, which is associated with the historic shipwreck or ship described in schedule 2, has been registered under Section 12 of the South Australian *Historic Shipwrecks Act 1981*.

It is an offence under the *Historic Shipwrecks Act 1981* for a person to damage, destroy, dispose of or remove from Australia the relic or article described in schedule 1 without first being issued a permit under Section 15 of the *Historic Shipwrecks Act 1981*, which authorises such action.

Any person coming into possession, custody or control of this or any other historic shipwreck relic must provide notice in writing within 30 days to the Minister administering the *Historic Shipwrecks Act 1981* or the Ministers Delegate. Notice should be given using the form titled "Notification of Possession, Custody or Control of a Historic Shipwreck Relic".

This certificate does not confirm ownership by any person or confer ownership on any person in relation to the shipwreck relic or article described in schedule 1.

Schedule 1 – Description of relic	
Functional description	Keel Staple
Material	Copper
Year of manufacture	Unknown
Markings or inscriptions	Nil
Length (mm)	11.24
Width (mm)	11.22
Height (mm)	41.04
Weight (grams)	37

Schedule 2 – Historic shipwreck or ship which this relic is associated with
Name of historic shipwreck or ship: Ida Register of Historic Shipwrecks identification number: 59

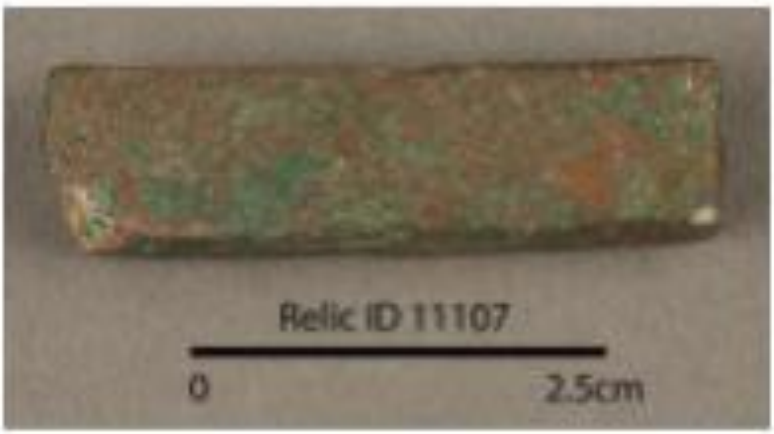
Issued this 15th day of August 2016

Beverly Voigt
Manager, Heritage and Boards Secretariat
Department of Environment, Water and Natural Resources

Delegate of the Minister for Sustainability, Environment and Conservation

Continued overleaf.....

Images of historic shipwreck relic or article described in schedule 1.



Government of South Australia

Department of Environment, Water and Natural Resources

REGISTRATION OF RELIC CERTIFICATE

Under Section 12 of the South Australian *Historic Shipwrecks Act 1981*

For Historic Shipwreck Relic No. 11108

This certificate signifies that the historic shipwreck relic or article described in schedule 1, which is associated with the historic shipwreck or ship described in schedule 2, has been registered under Section 12 of the South Australian *Historic Shipwrecks Act 1981*.

It is an offence under the *Historic Shipwrecks Act 1981* for a person to damage, destroy, dispose of or remove from Australia the relic or article described in schedule 1 without first being issued a permit under Section 15 of the *Historic Shipwrecks Act 1981*, which authorises such action.

Any person coming into possession, custody or control of this or any other historic shipwreck relic must provide notice in writing within 30 days to the Minister administering the *Historic Shipwrecks Act 1981* or the Ministers Delegate. Notice should be given using the form titled "Notification of Possession, Custody or Control of a Historic Shipwreck Relic".

This certificate does not confirm ownership by any person or confer ownership on any person in relation to the shipwreck relic or article described in schedule 1.

Schedule 1 – Description of relic	
Functional description	Keel Staple
Material	Copper
Year of manufacture	Unknown
Markings or inscriptions	Nil
Length (mm)	12.30
Width (mm)	11.67
Height (mm)	39.19
Weight (grams)	34

Schedule 2 – Historic shipwreck or ship which this relic is associated with
Name of historic shipwreck or ship: Ida Register of Historic Shipwrecks identification number: 59

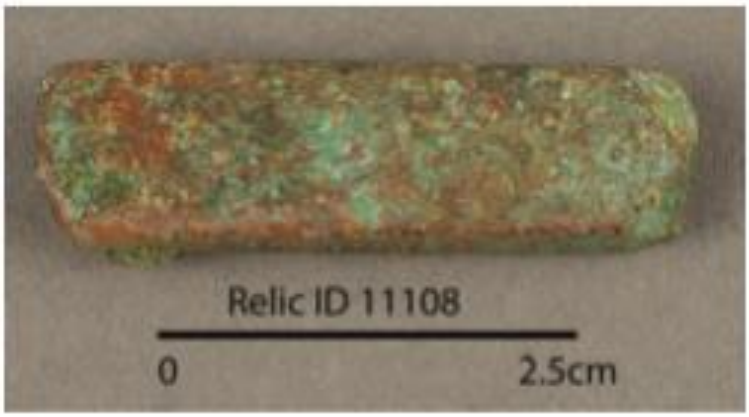
Issued this 15th day of August 2016

Beverly Voigt
Manager, Heritage and Boards Secretariat
Department of Environment, Water and Natural Resources

Delegate of the Minister for Sustainability, Environment and Conservation

Continued overleaf.....

Images of historic shipwreck relic or article described in schedule 1.



Government of South Australia

Department of Environment, Water and Natural Resources

REGISTRATION OF RELIC CERTIFICATE

Under Section 12 of the South Australian *Historic Shipwrecks Act 1981*

For Historic Shipwreck Relic No. 11109

This certificate signifies that the historic shipwreck relic or article described in schedule 1, which is associated with the historic shipwreck or ship described in schedule 2, has been registered under Section 12 of the South Australian *Historic Shipwrecks Act 1981*.

It is an offence under the *Historic Shipwrecks Act 1981* for a person to damage, destroy, dispose of or remove from Australia the relic or article described in schedule 1 without first being issued a permit under Section 15 of the *Historic Shipwrecks Act 1981*, which authorises such action.

Any person coming into possession, custody or control of this or any other historic shipwreck relic must provide notice in writing within 30 days to the Minister administering the *Historic Shipwrecks Act 1981* or the Ministers Delegate. Notice should be given using the form titled "Notification of Possession, Custody or Control of a Historic Shipwreck Relic".

This certificate does not confirm ownership by any person or confer ownership on any person in relation to the shipwreck relic or article described in schedule 1.

Schedule 1 – Description of relic	
Functional description	Keel Staple
Material	Copper
Year of manufacture	Unknown
Markings or inscriptions	Nil
Length (mm)	10.38
Width (mm)	11.06
Height (mm)	32.92
Weight (grams)	25

Schedule 2 – Historic shipwreck or ship which this relic is associated with
Name of historic shipwreck or ship: Ida Register of Historic Shipwrecks identification number: 59

Issued this 15th day of August 2016

Beverly Voigt
Manager, Heritage and Boards Secretariat
Department of Environment, Water and Natural Resources

Delegate of the Minister for Sustainability, Environment and Conservation

Continued overleaf.....

Images of historic shipwreck relic or article described in schedule 1.

Government of South Australia

Department of Environment, Water and Natural Resources

REGISTRATION OF RELIC CERTIFICATE

Under Section 12 of the South Australian *Historic Shipwrecks Act 1981*

For Historic Shipwreck Relic No. 11110

This certificate signifies that the historic shipwreck relic or article described in schedule 1, which is associated with the historic shipwreck or ship described in schedule 2, has been registered under Section 12 of the South Australian *Historic Shipwrecks Act 1981*.

It is an offence under the *Historic Shipwrecks Act 1981* for a person to damage, destroy, dispose of or remove from Australia the relic or article described in schedule 1 without first being issued a permit under Section 15 of the *Historic Shipwrecks Act 1981*, which authorises such action.

Any person coming into possession, custody or control of this or any other historic shipwreck relic must provide notice in writing within 30 days to the Minister administering the *Historic Shipwrecks Act 1981* or the Ministers Delegate. Notice should be given using the form titled "Notification of Possession, Custody or Control of a Historic Shipwreck Relic".

This certificate does not confirm ownership by any person or confer ownership on any person in relation to the shipwreck relic or article described in schedule 1.

Schedule 1 – Description of relic	
Functional description	Keel Staple
Material	Copper
Year of manufacture	Unknown
Markings or inscriptions	Nil
Length (mm)	12.03
Width (mm)	11.20
Height (mm)	29.82
Weight (grams)	27

Schedule 2 – Historic shipwreck or ship which this relic is associated with
Name of historic shipwreck or ship: Ida Register of Historic Shipwrecks identification number: 59

Issued this 15th day of August 2016

Beverly Voigt
Manager, Heritage and Boards Secretariat
Department of Environment, Water and Natural Resources

Delegate of the Minister for Sustainability, Environment and Conservation

Continued overleaf.....

Images of historic shipwreck relic or article described in schedule 1.

Appendix 3.

1854 *Ida* Shipping log

Mariners and ships in Australian Waters

IDA

OF SAN FRANCISCO, SAMUEL C WOODRUFF, MASTER, BURTHEN 175 TONS
FROM THE PORT OF MELBOURNE VIA NEWCASTLE TO , NEW SOUTH WALES, 4TH FEBRUARY, 1854

Surname	Given name	Station	Age	Of what Nation	Status	Comment
WOODRUFF	SAMUEL	MASTER			CREW	
McDONALD	?	MATE	26	AMERICAN	CREW	
WILSON	S	2ND MATE	39	AMERICAN	CREW	
PERRY ?	J	SEAMAN	36	AMERICAN	CREW	
?	C. S.	SEAMAN	25	AMERICAN	CREW	
TONCKLES	? C.	SEAMAN	19	AMERICAN	CREW	
HOLLOCK	C	SEAMAN	27	AMERICAN	CREW	
MARSHALL	?	SEAMAN	25	AMERICAN	CREW	
JOHNSON	J	SEAMAN	30	AMERICAN	CREW	
WALSH	?	SEAMAN	30	AMERICAN	CREW	
FRANK	?	SEAMAN	25	AMERICAN	CREW	
CASEY	? W.	SEAMAN	24	AMERICAN	CREW	

Source: *State Records Authority of New South Wales: Shipping Master's Office; Passengers Arriving 1855 - 1922; CGS 13278, [X90], reel 399.* Transcribed by *Jan Crawford, 2004.*

You may view/print a scan of the original list SCAN - a monitor set to high resolution is recommended for clarity. Use your back button to return.

Modifications made to scans: In some instances, text was enhanced - there was still an occasional name or list which defied this effort to read it; the Master's signature is usually found at the bottom right corner of the page; some pages have been shortened; excessive black markings have been removed. The last two mods. were to enable the fastest possible display in your browser.

Email
Mary-Anne Warner
2004

Mariner's Home | This month's list | Search

Appendix 4.

1855 *Ida* Shipping log

Mariners and ships in Australian Waters

IDA

BRIG OF SAN FRANCISCO, WM. MANN MASTER, BURTHEN 176 TONS
FROM THE PORT OF SAN FRANCISCO TO SYDNEY NEW SOUTH WALES, 3RD DECEMBER 1855

Surname	Given name	Station	Age	Of what Nation	Status	Comments
MANN	WM.	CAPTAIN			CREW	
BROWN	J.	SUPER ?	30	AMERICA	CREW	
HANSELL	J.	MATE	27	AMERICA	CREW	
HOODS	T.	2ND MATE	25	AMERICA	CREW	
HOPKINS	C.	COOK	30	AMERICA	CREW	
FRANCISCO	I.	STEWARD	26	AMERICA	CREW	
FORSTER	F.	SEAMAN	31	AMERICA	CREW	
MIRST	T.	SEAMAN	20	AMERICA	CREW	
MORMON	J.	SEAMAN	22	AMERICA	CREW	
STEVENS	M.	SEAMAN	30	AMERICA	CREW	
FLINN	T.	SEAMAN	23	AMERICA	CREW	
HADWICK	J.				PASSENGER	CABIN
SHOLLUCHE		MR			PASSENGER	CABIN
SHOLLUCHE		MRS			PASSENGER	CABIN
ROOCHE	M.				PASSENGER	STEERAGE
FITZSPATRICK	T.				PASSENGER	STEERAGE
DYERS	T.				PASSENGER	STEERAGE
DOLTON	A.				PASSENGER	STEERAGE
ATHERTON	P.				PASSENGER	STEERAGE
ODORSELL	C.				PASSENGER	STEERAGE
RYAN	T.				PASSENGER	STEERAGE
COLLINS	C.				PASSENGER	STEERAGE
CALLIGAN	W.				PASSENGER	STEERAGE
ODONNEL	T.				PASSENGER	STEERAGE

Source: *State Records Authority of New South Wales: Shipping Master's Office; Passengers Arriving 1855 - 1922; NRS13278, [X93] Reel 402.* Transcribed by *Tricia Miller, 2003.*

You may view/print a scan of the original list SCAN - a monitor set to high resolution is recommended for clarity. Use your back button to return.

Modifications made to scans: In some instances, text was enhanced - there was still an occasional name or list which defied this effort to read it; the Master's signature is usually found at the bottom right corner of the page; some pages have been shortened; excessive black markings have been removed. The last two mods. were to enable the fastest possible display in your browser.

Email
Mary-Anne Warner
2004

Mariner's Home | This month's list | Search

Appendix 5.

Cultural heritage map of Port Willunga showing the location of historical jetties, shipwrecks and government moorings (Aidan Ash 2007)