FLINDERS UNIVERSITY MARITIME ARCHAEOLOGY MONOGRAPHS SERIES

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A Year in Review: 2006 Program in Maritime Archaeology

EDITED BY

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FLINDERS UNIVERSITY

DEPARTMENT OF ARCHAEOLOGY

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Front cover illustration: Total Station data for Area 1 mound concentration, Shackleford Banks, North Carolina (Jateff 2006)

Flinders University Maritime Archaeology Monographs Series

Maritime archaeology has been taught at undergraduate level in the Department of Archaeology at Flinders University since 1996 and the first Bachelor of Arts Honours thesis in maritime archaeology was completed in 1997. The introduction of the Bachelor of Archaeology in 1997 saw undergraduate students specializing in maritime archaeology for the first time and the first Bachelor of Archaeology Honours thesis appeared in 1999. Then in 2002, a new Graduate Program in Maritime Archaeology was introduced resulting in the first Master of Maritime Archaeology thesis in 2003.

Since 1997 a significant number of research theses and reports have been completed by staff and students in underwater and maritime archaeology. The Honours and Master of Maritime Archaeology theses are required to be approximately 15,000 to 18,000 words and therefore are rarely, if ever, published in full. As a result much of this valuable research remains essentially unpublished and difficult to access - a part of the "grey literature". The Department of Archaeology regularly gets requests for copies and this research is becoming widely cited in journals such as the *Bulletin of Australasian Institute for Maritime Archaeology*.

This series aims to publish in full some of the honours and postgraduate theses as well as research reports written by staff and students in the field of maritime archaeology. Hopefully this will help to disseminate the results of research to the professional community in a simple, accessible and timely fashion. It is also hoped that this may encourage students to publish shorter-length journal articles derived from their research.

Associate Professor Mark Staniforth
Convenor of Studies in Maritime Archaeology
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13. Jennifer McKinnon and Jason Raupp (editors) *A Year in Review: 2006 Program in Maritime Archaeology*

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Rick Bullers has had a life-long interest in ships and the sea. Prior to beginning postgraduate studies, he worked for many years in protected area management, including a large portion of the Great Barrier Reef Marine Park. In 2005 he completed a Master of Maritime Archaeology at Flinders University and his thesis investigated the quality of construction in early Australian shipping. He is currently a PhD candidate at Flinders, further developing the subject of early Australian shipbuilding.

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David VanZandt is a US military veteran and holds a BSc in Nuclear Engineering from Purdue University. He has worked for NASA for the past 21 years, and since 1995 has developed a passion for conducting shipwreck research. In 2003 he formed Cleveland Underwater Explorers (CLUE), a non-profit group dedicated to locating, exploring, and documenting the submerged cultural history of the Great Lakes. David is currently enrolled in the Postgraduate Program in Maritime Archaeology and his interests include technical diving, underwater photography, and marine geophysics.

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Brian Williams completed a BA in Anthropology at the University of San Diego (California) with an emphasis in maritime archaeology. In 2004 he worked with Florida State University at the Etruscan site of Poggio de Civitelle. Since graduation Brian has worked with the San Diego Institute of Archaeology and the Barona Museum. Brian is currently enrolled in the Postgraduate

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Preface

The year 2006 was a busy year for the Flinders University Program in Maritime Archaeology Program. Several field projects were conducted by staff and postgraduate students both in Australia and abroad. The Maritime Archaeology Monograph Series publication "A Year in Review: 2006 Program in Maritime Archaeology" is a sampling of this field research. The projects covered include research conducted on historic shipwreck shelter huts, early colonial ship construction sites, whaling sites, geophysical investigations, and two general survey reports.

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Introduction

Jennifer McKinnon and Jason Raupp

The year 2006 was busy for the Flinders University Department of Archaeology's Postgraduate Program in Maritime Archaeology Program. It began with the 2006 Maritime Archaeology Field School at Mt. Dutton Bay and the introduction of new academic staff to the ever-growing program. With new staff came new opportunities for fieldwork, and 2006 was a banner year for just that. This latest publication in the Maritime Archaeology Monographs Series (MAMS), *A Year in Review: 2006 Program in Maritime Archaeology*, is a small sampling of the field work both staff and students have conducted over the past year. Although all of the fieldwork conducted in 2006 could not be reported in this monograph, some of the key projects were chosen for publication.

The Program in Maritime Archaeology provides many opportunities for students to gain valuable experience working in the field. First and foremost is the annual Maritime Archaeology Field School, which was held in February. The 2006 field school was held at Mt. Dutton Bay on South Australia's Eyre Peninsula. During the field school students were encouraged to use the sites they investigated and the data they collected for their Masters Theses research. This year three students conducted research on their theses projects including investigations of the historic oyster industry in South Australia, maritime infrastructure in South Australia and Australian ship construction. Although these research projects were not included in this publication, future MAMS publications will be devoted to them.

Academic staff research is another valuable opportunity for students and staff to conduct fieldwork. In April 2006 a team of researchers and students led by Lecturer Jennifer McKinnon travelled to Kangaroo Island (South Australia) to conduct research on 20th century shipwreck shelter huts which were once located on the western end of the island. These shelter huts were erected for a short period of time to aid shipwrecked sailors with food, water, clothing and shelter in an effort to prevent loss of life. While expectations were low for finding these ephemeral shelter huts, the research hoped to establish these sites as viable maritime archaeological sites and begin to place them within a broader context of understanding 20th century shipping in South Australia. Chapter 2 reports on the results of archaeological and geophysical investigations at these sites.

While some students take the opportunity to utilize field school as a means for collecting thesis data, others are more adventurous and undertake field projects on their own. Chapter 3 outlines

Masters student Emily Jateff's ambitious fieldwork conducted in North Carolina (USA). In April and October 2006 Jateff organized and conducted a field research project at Cape Lookout National Seashore on Shackleford Banks in an attempt to locate shore-based whaling sites associated with the late 19th century settlement of Diamond City. This project combined the efforts of a number of agencies including the National Park Service Southeast Archaeological Centre, Cape Lookout National Seashore, the Program in Maritime Studies at East Carolina University and the North Carolina Maritime Museum. Although no definitive remains of whaling activities were located, Jateff's research illustrated the fact that changes in the environment and coastal erosion significantly affect archaeological sites and therefore should be monitored closely.

The program also supported the field research of two PhD students in 2006. PhD candidate Claire Dappert conducted archaeological research at Kangaroo Island's American River and reports on her findings in Chapter 4. Much like the ephemeral nature of the archaeological sites reported in Chapters 1 and 2, Dappert examines evidence of South Australia's earliest known non-Indigenous shipbuilding at American River. In addition to attempting to locate the construction site of *Independence*, her research investigated the factors which influenced the shipbuilders' decision to construct the vessel where they did and what types of timbers would have been available to them.

Chapters 5 and 6 represent yet another example of the growing opportunities for students to gain field experience. In 2006 the program added a new topic called *Practicum in Maritime Archaeology* to its course offerings. This topic provides students with opportunities to participate in the workplace environment with government agencies, consultancy firms, non-profit groups, or other universities. A practicum provides students with the ability to take part in joint projects and receive personal guidance and instruction with immediate feedback on their performance. It also allows students to put their theoretical learning into practice, develop a sense of the workplace, enhance their employment prospects through additional training, build networks of contacts and develop a range of personal and professional skills.

Over the years the program has developed a strong professional relationship with the Maritime Heritage Unit (MHU) of Heritage Victoria. As a result of this relationship, Flinders University and the MHU have run many joint research projects and field schools in both Victoria and South Australia. Chapter 5 reports on the results of one of two practicums conducted with the MHU in 2006. In October Flinders students and staff travelled to the southeast Gippsland region of Victoria to assist the MHU with site inspections of historic shipwrecks and terrestrial sites with maritime associations. The investigations of three shipwrecks (SS *Blackbird*, PS *Clonmel* and PS *Thistle*), and a riverine landing site at Stockyard Creek were conducted and students produced a preliminary field report for submission to Heritage Victoria. The Gippsland project is an example of the symbiotic relationships on which these practicums are constructed.

Chapter 6 reports on the second practicum conducted with the MHU at Port Phillip Bay in Victoria. As the authors point out, this practicum was "established with the dual purpose of assisting Heritage Victoria with its legislated responsibility of inspecting and managing shipwrecks of heritage significance, as well as providing maritime archaeology students with field experience". The project crew consisted of students and staff from Flinders University, MHU archaeologists, Australian National Maritime Museum archaeologists and members of the Maritime Archaeological Association of Victoria. In all, seven historic shipwrecks were investigated and three more were attempted, ship lines of the lifeboat *Queenscliffe* were lifted and recorded, and an archaeological assessment of the 19th century mineral springs and spa at Clifton Springs was conducted.

The last project to be reported in this MAMS publication presents the results of research conducted by program staff members Jason Raupp (Technical Officer), Ian Moffat (Research Fellow) and Masters student David VanZandt. Flinders University's Department of Archaeology has had a longstanding interest in incorporating geophysics into the archaeological investigation of Indigenous, historic and maritime sites. Chapter 7 reports on one project that combined historical, archaeological and geophysical research to look for the remains of several early ships known to have gone ashore near Port Elliot on the southern Fleurieu Peninsula. These investigations proved fruitful in demonstrating that a combination of historical research and a bi-partite geophysical methodology can substantially reduce the unnecessary use of time, funding and effort in the search for shipwrecks located in beach environments.

A Year in Review: 2006 Program in Maritime Archaeology is a compilation of reports on the fieldwork conducted by students and staff in the Flinders University Program in Maritime Archaeology. By no means does it represent all of the fieldwork conducted in 2006; instead it is a sampling of the various types of projects supported and operated by the program. The year 2007 is shaping up to be another year of great research projects and it is hoped that the efforts of students and staff can be reported on in another Maritime Archaeology Monograph series publication. Enjoy the year in review.

2

A Needle in a Haystack: Archaeological and Geophysical Investigations of Historic Shipwreck Shelter Huts on Kangaroo Island

Jennifer McKinnon, Ian Moffat and Andrea Smith

The Kangaroo Island Shipwreck Shelter Hut Survey Project began as part of a Flinders Faculty Research Maintenance Grant in 2006 and has since evolved into a cross-continental study of lifesaving stations, houses of refuge and shipwreck shelter huts in both Australia and the United States of America. The field work portion of this project was designed to locate and document the archaeological remains of two early shipwreck shelter huts located at Cape du Couedic and West Bay on Kangaroo Island. It was hoped that a pre-disturbance survey of these 20th century huts would provide a better understanding of the severities of life and shipping along the isolated, rocky coastline of Kangaroo Island, particularly the local need for lookouts and lifesaving stations. On a broader scale it was also hoped that this research would add to our general understanding of early shipping and ship losses in this area of South Australia.

The project crew included Jennifer McKinnon (principal investigator), Jason Raupp, Claire Dappert, Ian Moffat, and Andrea Smith and lasted six full days. On 7 April 2006 the crew arrived at Kangaroo Island and set up headquarters at the Flinders-Baudin Research Centre at Rocky River (Flinders Chase National Park). The project goals were to assess the natural and cultural features of the survey areas and possibly identify the locations of the shelter huts. Two and one half days were spent conducting pedestrian surveys, one day conducting magnetometer surveys, and the remainder of the time researching in the local museums. The following chapter is a description of this work and the results of the pedestrian and magnetometer surveys.

Brief History of Kangaroo Island

Kangaroo Island, Australia's second largest island, is located in the southeast of South Australia at the southern tip of the Fleurieu Peninsula (Figure 1). It is separated from the mainland by Backstairs Passage, a historic shipping channel renowned for its strong currents, waves, and weather. The island itself is approximately 150 km long and 55 km wide and as of 2005, the total population is 4,384 persons. Access to the island is available only by ai or sea and there is a ferry that offers service to and from the mainland via Cape Jervis and Penneshaw.

Figure 1. Map of Kangaroo Island (J. McKinnon 2006)

Despite the absence of an Indigenous population upon European arrival there is material evidence that suggests the island was inhabited by Indigenous peoples. Kangaroo Island became known to Europeans in March of 1802 when Matthew Flinders anchored in Nepean Bay (Ruediger, 1980:10). His first impressions of the island were recorded in his diary:

> There was little doubt, that this extensive piece of land was separated from the continent; for the extraordinary tameness of the kangaroos and the presence of seals upon the shore, concurred with the absence of all traces of man to show that it was not inhabited. (Cumpston, 1986:9)

At the same time Nicolas Baudin, a Frenchman, was exploring the waters of South Australia when he happened upon Flinders' expedition. Flinders described Kangaroo Island to Baudin as a place that offered fresh meat and water; however, Baudin did not act on his advice until January 1803 when he returned to Kangaroo Island and charted the southern and western portions of the island unexplored by Flinders (Fornasiero *et al*., 2004:230). Some of the places he charted have retained their French names including Cape Borda, Cape du Couedic, Cape Gantheaume and D'Estrees Bay.

From 1803 to 1830 sealing and whaling operations brought crews of men to Kangaroo Island for seasonal work. These men spent their time procuring oil, meat and kangaroo skins for the international market. A few of the men decided to stay and set up homesteads in the 1820s. It was then that a substantial settlement developed near Three Wells River including 30 men with Indigenous wives and children (Taylor, 2002:25). These Indigenous women utilized their adaptive hunting and gathering skills to help their families survive the difficult environment on Kangaroo Island (Clarke, 1966:51-81).

Sealing, whaling and hunting continued for some time until the arrival of the first planned South Australian settlement at Nepean Bay. This settlement began when the South Australia Company was granted rights to establish a town site and arrived on 27 August 1836 at Kingscote. Initially it was assumed that this area would be satisfactory, however the lack of local water forced plans to settle near present-day Adelaide almost immediately (Parsons, 1986:17). Within months most of the population had relocated and just a few settlers remained. From the late 1830s to the end of the 19th century Kangaroo Island remained stagnant. It was not until 1890 when Kangaroo Island's population, trade and agriculture picked up again. From the early 1900s a considerable amount of development took place and more families moved to Kangaroo Island to settle and make a living. Today there are four main centres of population: Kingscote, Penneshaw, American River and Parndana.

Previous Archaeological Investigations of Kangaroo Island

Until recently, there have only been a small number of archaeological investigations conducted on the island mostly related to Indigenous sites. In 1977 the Society for Underwater Historical Research conducted an archaeological survey on the wreck of *Loch Vennachar* (Society for Underwater Historical Research, 1977; Jeffery 1980). Ronald Lampart (1981) conducted a detailed survey of the island's Indigenous populations as a part of his PhD research. In 1991, Robert McKinnon conducted a survey of the shipwrecks that have occurred along Kangaroo Island's coastline, highlighting their cultural heritage significance. Later the Department of Environment and Planning, South Australia implemented an interpretive Maritime Heritage Trail on the island which focused on identifying and interpreting the location of these wrecks (Department of Environment and Planning, 1991). Also in 1991, Parry Kostoglou and Justin McCarthy conducted an archaeological survey of whaling and sealing sites in South Australia, five of which are located on Kangaroo Island. These settlements were ephemeral in nature and left little material culture behind. An archaeological survey has been conducted on Kangaroo Island's lighthouses as a Masters thesis (Lyons, 2005) and another Masters thesis was completed on several of the historic jetties (Khan, 2006). In 2006, Andrea Smith, co-author of this paper, conducted a maritime cultural landscape study of Kingscote and West Bay as a part of her Honours thesis research. Considering how 'untouched' and 'underdeveloped' the island actually is, there is great potential for archaeological investigations, particularly the maritime heritage.

Shipwreck Helter Huts on Kangaroo Island

During the 19th century maritime trade and traffic was expanding rapidly along South Australia's coastline. These increases in shipping in combination with the rugged and relatively sparsely populated coastline lead to an increase in shipwrecks, cargo loss, and loss of life. As a result, lifesaving stations and shipwreck shelter huts were erected along the coast and on Kangaroo Island in an effort to decrease the effects of these maritime disasters, aid in the recovery of shipwreck survivors and cargo and prevent further deaths from occurring once individuals made it ashore.

Records indicate that as early as 1899 shipwreck shelter huts were erected on the western end of Kangaroo Island (Figure 2). These stations were simply huts built of corrugated metal, wood and stone and no one was stationed at them. They contained enough supplies to sustain shipwreck survivors until further help arrived or until such time as they were well enough to walk for help. Items such as bread, meat, water, blankets, and rockets were stored inside. A notice board was posted outside declaring that the supplies were only to be used by shipwreck survivors, indicating the location of the nearest settlement, and providing instructions for opening the stores and for firing rockets. It is uncertain if any shipwrecked people ever used these shelter huts; however, they remain an interesting and integral part of the maritime history of South Australia and Kangaroo Island.

Shipwreck shelter huts would have been quite unassuming but easily identified from the water as a structure. A review of the historic photographs of the West Bay hut indicates that it was probably constructed of a wood frame with corrugated metal sheeting for walls and a flat roof (perhaps metal as well). Another historic photograph of a different shelter hut indicates the roofs of huts could also be pitched (Figure 3). The hut at West Bay most likely only had one entry, a door which faced south away from the prevailing winds. The structure is approximately 2 m wide by 2-2.5 m high (using individuals in the photograph for scale). The hut may have been painted white or light-coloured, probably so it would stand out among the bush.

Figure 2. West Bay shelter hut, 1906 (Courtesy of State Library of South Australia PGR 280/1/4/129)

Figure 3. Shipwreck shelter hut door, location and date unknown (Courtesy of Flinders Chase National Park Visitor Centre, Photograph: J. McKinnon)

In yet another historic photograph of a different hut (location unknown), the shelter is shown supported by carefully stacked rocks on each corner of the foundation and a path is cleared to the door (Figure 4). Variations such as this suggest that the construction of these huts was carried out in a pragmatic fashion governed by available materials and the specific needs of the particular environments.

Also visible in this photograph is a signpost with a message to shipwrecked sailors and others. One original signpost notice has survived and is on display in the visitor centre of the Flinders

Chase National Park. The notice is written in three languages (English, German and French) and provides instructions for those who made it ashore to the hut. Included in the instructions are a declaration that the supplies were only to be used by shipwreck survivors, directions and distance to the nearest settlement and instructions for opening the stores and firing rockets.

Figure 4. Shipwreck shelter hut with signpost, location and date unknown (Courtesy Hope Cottage National Trust Museum, Photograph: J. McKinnon 2006)

Site Histories

West Bay

West Bay is situated within Flinders Chase National Park on the western coastline of Kangaroo Island. Flinders Chase is approx 32,600 hectares and is comprised of three separate parks including Rocky River in the southwest corner of the island, Cape Borda in the northwest and the Gosse Lands in the northeast. These three park sections surround the Ravine des Casoars Wilderness Protection Area which forms the northern boundary of the West Bay region and totals 41,320 hectares. Together, Flinders Chase and Ravine des Casoars make up 10 percent of Kangaroo Island.

The European history of West Bay is limited as no European settlers inhabited this area and the nearest settlement was at Rocky River approximately 22 km east. In fact, according to the Department for Administrative and Information Services Lands Titles Office, West Bay has never been surveyed or subdivided into pastoral leases but has always been Crown land. When Cape Borda Lighthouse in the north was built in 1858 (Barker and McCaskill, 1999:38) the entire western shoreline including West Bay was named as a part of the Lighthouse Reserve (South Australian Government Gazette, 19 July 1900 and 29 April 1909) which was then transferred to Flinders Chase Park under the *Fauna and Flora Reserve Act* in 1919 (South Australian Government Gazette, 20 September 1923). Thus West Bay has changed very little since Kangaroo Island was settled. In recent years the park has added a remote campground, toilet block, rainwater tank, car park, picnic tables and boardwalk for recreation purposes; however, the bay itself and the terrain have retained their natural landscape.

Historical photographs and records indicate that a small shipwreck shelter hut was constructed at West Bay (Figure 5). It is not known conclusively when the shelter hut was constructed, although it does appear on a 1913 Admiralty Chart as a ‘Relief Station for Shipwreck Mariners’.

According to a display board at the Hope Cottage National Trust Museum in Kingscote (Author unknown) the shelter hut was erected in 1899 and dismantled in 1934. There is no historical evidence to suggest that any shipwrecked sailors found the West Bay hut and used the supplies, but there are stories of locals who raided the supplies (Chapman, 1972:2).

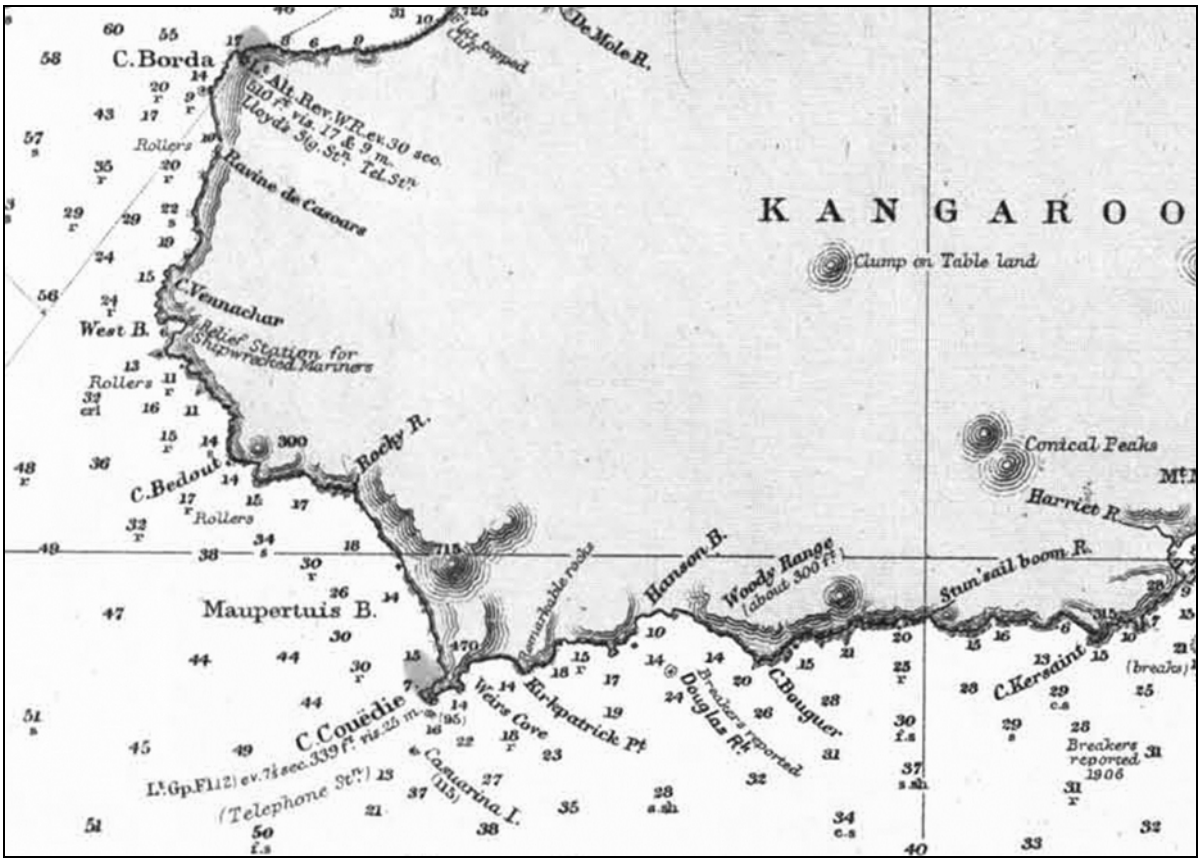

Figure 5. Detail of 1913 Admiralty Chart showing 'Relief Station for Shipwrecked Mariners' at West Bay, Kangaroo Island by Hutchinson, J. and Howard, F. (Courtesy of the State Library of South Australia)

The closest this hut may have come to service occurred in 1905 with the wrecking of *Loch Vennachar*. *Loch Vennachar* was a three-masted fully-rigged iron ship built in Glasgow in 1875 (Chapman, 1972:44). When the ship failed to arrive at port on 6 September suspicions of its sinking were raised. Conclusive evidence of the disaster came when a reel of blue printing paper identified as being on the ship's bills of lading was found floating in the Gulf of St. Vincent. Wreckage washed up all along the western and southern shores of Kangaroo Island for months after the wrecking. Search parties were launched including one aboard the Marine Board ship *Governor Musgrave* (Chapman, 1972:46).

It was not until Trooper R.C. Thorpe and Mr. Charles May, who were inspecting shelter huts on the southern coast of Kangaroo Island and found huge quantities of wreckage in West Bay, that the shipwreck site could be narrowed down to a specific location. On 26 November 1905 Thorpe and May found a badly decomposed body and a beach strewn with wreckage including spars, ship buckets with the name on it, the stern section of a boat, brass fittings, reels and bales of paper, and about 40 hogsheads and half hogsheads of whiskey (Chapman, 1972:48; Loney, 1993:33). Some of the casks of whiskey had been washed over a quarter of a mile up the West Bay Creek. The body was buried in the dunes and a cross was erected from the wreckage. This cross was later removed by vandals but a replacement stands near the spot of the original gravesite today. The body and the wreckage pointed to the fact that the shipwreck must be

somewhere nearby. As mentioned previously, the location of *Loch Vennachar* was discovered at West Bay in 1977 by the Society for Underwater Historical Research [SUHR]. SUHR divers recovered the anchor of the ship which now sits in the car park at West Bay.

Trooper Thorpe was quickly named Keeper of Wrecks and ordered by his superiors to remain in the area and conduct a salvage of the ship's cargo that washed ashore at West Bay (Loney, 1993:32). Thorpe and May made camp up the creek and set out to collect the salvageable cargo. While they waited for the government vessel to return to West Bay and pick up the casks of whiskey, Thorpe wrote a letter to a friend describing the remoteness of the area and complaining about how unpleasant it was to be forced to stay there for an extended period of time. A portion of the letter read,

> Doubtless you have seen in the papers the result of my visit of inspection to the Shipwreck Shelter Hut at this bay, and the sad discovery we made – I had a man named May with me for company, as it is both a rough, scrubby and dangerous place to come to alone. We first visited the Cape du Couedic shelter shed two days previous to this one and found all the stores, etc. intact. (Loney, 1993)

The secretary of the Marine Board received a telegram from Thorpe on 1 December asking when the whiskey would be taken away as it would require two days notice to have the horse bring the casks closer to the waters edge. On 6 December *Governor Musgrave* departed Port Adelaide for West Bay to pick up the whiskey and other salvageable goods. The ship arrived and they loaded the casks and shipped them from West Bay (Chapman, 1972:48).

Cape du Couedic

Cape du Couedic is also located in Flinders Chase National Park at the very south-western tip of the park and island. It is an area of historical, cultural and biological significance for a number of reasons. Located on the Cape are an historic lighthouse and associated buildings, the remains of a jetty and flying fox, Admiral's Arch (a famous geological site attracting thousands of visitors), a colony of New Zealand Fur Seals and the nearby Remarkable Rocks (another famous geological site).

Cape du Couedic's European history involves its designation as one of the early tourist destinations on Kangaroo Island including stops at Remarkable Rocks and Admiral's Arch and the construction of the lighthouse. The circular, masonry lighthouse at Cape du Couedic was built between 1906 and 1909 from locally quarried stone, as were the lighthouse keepers' cottages (Department for Environment, Heritage and Aboriginal Affairs, 1999:39). The location for this lighthouse was chosen because of dangerous ship traps nearby including Lipson Reef which is partially submerged just off the Cape and the Casuarinas (The Brothers), two islands just south of the Cape. Before its construction several vessels including *Mars*, *Emily Smith*, *Loch Sloy*, *Loch Vennachar*, and *Montebello* had wrecked in the vicinity (Chapman, 1972).

Less than a kilometre away at Weirs Cove are the remains of a jetty and the remnants of a flying fox and storehouse where supplies were loaded and unloaded for the lighthouse. The engineering achievements of the incredibly steep flying fox truly represent the remote and harsh nature of the southwest coastline of Kangaroo Island and the lengths to which the inhabitants had to go to in order to supply the lighthouse. Supplies for the lighthouse arrived every three months to this location and were kept in the storehouses adjacent to the jetty. The flying fox was also used to transport the keepers and their families on and off the Cape (Department for Environment, Heritage and Aboriginal Affairs, 1999:39). Mail was delivered by horseback fortnightly to Rocky River about 15 kilometres away, and the first vehicle to visit the lighthouse didn't arrive until 1940. The lighthouse was supplied with a full set of rocket apparatus and rope ladders for

scaling the cliffs in the event that a ship should wreck. In the late 1950s the Cape du Couedic lighthouse was automated. (Department for Environment, Heritage and Aboriginal Affairs, 1999:39). The lighthouse cottages are now used for visitor accommodation.

We know from Trooper Thorpe's letter that a shipwreck shelter hut was located at Cape du Couedic, but no definitive evidence, such as the historical photographs for West Bay, exists. However, when all of the known historic photographs are considered three different shelter huts appear to be represented. One particular photograph may have been taken of a hut located at Cape du Couedic based on the terrain and the object in the background which possibly could be the lighthouse (refer to Figure 4). The shipwreck shelter hut at Cape du Couedic was likely established several years prior to the construction of the lighthouse around the time of the West Bay hut. This photograph of the shelter hut may have been taken during the lighthouse construction process. It is likely that once the lighthouse was constructed, the shelter hut was either dismantled and used for materials or discarded or used as a storage shed or outbuilding of the complex. There would have been little need for a shelter hut once the keeper's cottages were established and could provide housing for shipwrecked sailors. This possible sequence of events raises an interesting idea that the shipwreck shelter hut might have been a precursor to the lighthouse operations.

Survey Project

The project goals were to assess the natural and cultural features of the areas and possibly identify the locations of the shelter huts (although the probability was acknowledged as low due to the ephemeral nature of the buildings). The following is a description of this work and the results of the survey.

West Bay Survey

Landscape

The West Bay environment and vegetation fall within the Gantheaume Environmental Association (Laut *et al*., 1977). The survey area principally consists of Holocene sand thought to be sourced from the adjacent river and then reworked and mounded against a cliff of lithified Pleistocene Aeolian limestone surrounding the survey area.

The survey of West Bay posed more challenges than expected as it is composed of quite steep sand dunes and dense vegetation. The survey began by using the historic photographs and trekking across the sand dunes, lining up the prominent features of the bay with those in the photographs. Because the topography of West Bay is quite dramatic, the crew was unable to maintain systematic survey lines; rather the photographs were used as a guide. It was clear from the photographs that the shelter hut was located in the central area of the bay in the higher set of dunes. These dunes were less susceptible to erosion as was evident by the dense vegetation, and also provided a better view of the surrounding waters due to the elevation. On either side of the bay there are steep rocky cliffs which would be difficult to climb making the dunes a more appealing location for tired, wounded shipwrecked sailors. Just to the south of the central dune area is a seasonal creek. During heavy storms the creek flows but for the majority of the year it is dry. Upon speaking with a park ranger, a fresh water spring was located on the south edge of the beach where the rock cliffs meet the sand.

Selection of survey area

After much climbing and debate a flat area of sand dune near the creek bed was identified as an area for further investigation. There were no signs of material evidence at this location or any

other location during the survey, but the crew operated on the assumption that lining up the prominent features in the historic photographs would put the survey area in the correct location. The area chosen provides a flat platform for a structure, a decent view of the water and vice versa, a nearby creek and is sheltered from winds by larger dunes to the north and east. After conducting a refined pedestrian survey of the area, a small area on the dune (approximately 60 m x 80 m in size) was chosen to conduct a magnetometer survey.

Geophysical survey

A magnetometer was selected as the most appropriate tool for the intended target with reference to the American Society of Testing and Materials standard D6329-99 (American Society of Testing and Materials, 1999:2). The use of magnetometers to detect direct ferrous evidence of cultural material (e.g. Black and Johnston, 1962), evidence of burning (Abbot and Frederick, 1990; Frederick and Abbot 1992), or disturbance in soil stratigraphy (Field *et al*., 2001; Nobes 2006) has a long and established history.

Magnetometer data was collected using a Geometrics G-856 proton precession magnetometer collecting data at five second intervals. During data acquisition the sensor was kept at a constant height of 2 m and orientated towards north at all times. Positioning data was collected with a Garmin 12XL Global Positioning System as a track point at five second intervals.

The survey tracks were placed opportunistically based on breaks in the vegetation and the elevation of the sand dune rather than on a set survey pattern. Survey of this type, although spatially less accurate than gridding (estimated to be +/- 5 m bested on the use of a navigational GPS), allows the rapid collection of reconnaissance data which permits the operator to determine whether the presence of anomalies calls for more detailed and spatially accurate survey (Moffat and Wallis, 2005).

A total of 206 data points were collected with data quality assessed as poor (Figure 6). The data shows a skewed distribution of data points suggesting significant interference from localized variations in the earth's magnetic field, most likely a result of magnetic storms. As a second magnetometer was not used during this survey as a base station, a diurnal correction was unable to be performed (Scollar, 1963). As a result, definitive analysis of the data is problematic; however, no evidence for discrete anomalies of a type and magnitude considered consistent with the generally ephemeral nature of the building were discovered. This suggests that, should the analysis of the likely position of the shelter hut be correct (see above for discussion), no ferrous material culture or other occupational evidence detectable by a magnetometer remains on the site. This is not a surprise as records at the Hope Cottage National Trust Museum indicate that the structure was sold and dismantled in 1934, just 45 years after it was built.

Cape du Couedic Survey

Landscape

Cape du Couedic also falls under the Gantheaume Environmental Association (Laut *et al*., 1977). The survey area contains lithified Pleistocene dune limestone sporadically overlain by a poorly developed soil. Palaeozoic granite outcrops are located around the survey area (including the tourist destination of Remarkable Rocks), and while it does not outcrop in the survey area, it is expected to occur at relatively shallow depths. The terrain posed a bit of a challenge because it is quite vegetated and rocky. This area is swept by high winds which have resulted in exposed limestone bedrock with short, stunted vegetation. In many areas the bedrock is exposed and heavily eroded causing large, deep holes.

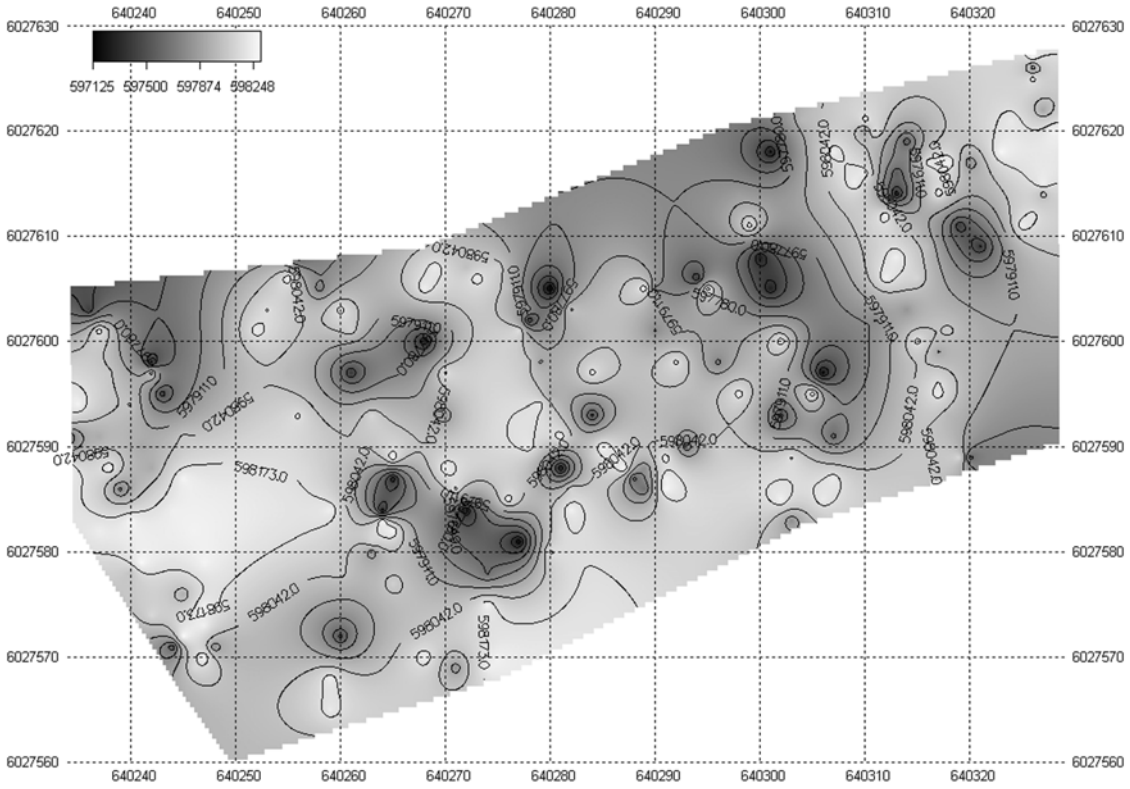

Figure 6. West Bay magnetometer results (I. Moffat 2006)

Selection of survey area

Cape du Couedic also posed more of a challenge due to a lack of definitive historical photographs of the shelter hut and the fact that historical records are somewhat conflicting. Trooper Thorpe's letter indicates there was a shelter hut at Cape du Couedic, but there is also historical mention of the shelter hut being located at Remarkable Rocks (Loney, 1993:33). Early sailors recognized these rocks as a prominent feature on the landscape by which to navigate and this would have been a likely spot to place the hut. Remarkable Rocks are approximately 4 - 4.5 km from the current lighthouse location and between the Cape and Rocks are two bays, neither of which have an accessible coastline. The section of coastline near Remarkable Rocks and Cape du Couedic is incredibly steep making it nearly impossible to climb the rocks if someone was shipwrecked, tired and injured. On Cape du Couedic proper, where the lighthouse is located, the slope to the water is less steep; however, it would still be a challenge to climb to safety. Of the coastline between the Cape and Remarkable Rocks, the area in front of the lighthouse provides the least challenging slope for a shipwrecked sailor. Additionally, this area provides a wider view of the surrounding waters including Lipson Reef and the Casuarinas Islands. Thus it was decided based on the physical characteristics of the shoreline, the viewshed and the probable history of placing structures nearby existing structures (i.e. lighthouse near hut location) that the survey for the shelter hut would involve the immediate area surrounding the lighthouse.

The lighthouse complex involves a series of support structures which were built when the lighthouse was constructed. These include three keepers' cottages, a fuel shed, a stable and work shed, a well, a flagpole and weather station. These structures were identified and photographed, and a general pedestrian survey was conducted to asses the natural and cultural features of the area. A large borrow pit was discovered just southeast of the lighthouse complex where rock and sand was excavated for the construction of the lighthouse (this pit is so large it can be seen on aerial photographs). The borrow pit was subsequently used as a refuse pit by the lighthouse

occupants as evidenced by the exceptionally large sheet midden of glass, ceramic, bone, and metal.

After inspecting the area two systematic pedestrian surveys were conducted in the areas identified as having high probability. These high probability areas were based on possible view sheds of shipwrecked sailors, elevation, shoreline characteristics, and historic photographs. These surveys were conducted south and west of the lighthouse and keepers cottages and south and east of the lighthouse. Using the road and cliff edges as survey boundaries, 10 m line spacing pedestrian surveys were conducted using a compass and GPS to track the lines.

Two promising areas were identified during the north-western survey, the first being a well associated with the construction of the lighthouse in 1899. The well has been excavated and the top edges are reinforced with concrete. Adjacent to the well on either side are two rows of stacked limestone rock radiating out for approximately 5 m. Otherwise the surface area adjacent to the well is cleared of all brush and rock. It is not known whether this was a naturally occurring well that existed prior to the lighthouse construction or if it was purposely dug by the builders. If it was natural, it is likely that a shipwreck shelter would have been constructed nearby in order to provide survivors with fresh water. Nevertheless, there are signs that it was modified and used for a period of time, but there are no visible signs of a nearby shelter hut location.

The second area of probability included a square pit cut into the limestone bedrock (Figure 7). This feature was of interest due to the regularity of the square shape and the cut walls, and was unlike any other natural feature in the bedrock. Additionally, the approximate size of 2 m by 2 m by 35 cm deep is similar to the estimated size of the shelter huts in historic photographs. A small cleared path leads from a maintained park trail up to the square pit and the area at the path/pit interface appears as if it might have been maintained in the past as a doorstep or entrance area to a structure. If the location of the square pit is aligned with the historic photograph of the possible Cape shelter hut, the lighthouse, environment and path or doorway fall in line with the photograph (refer to Figure 4). Additionally, if the photograph is of the Cape shelter hut, the construction techniques also correspond. As mentioned previously, this area is swept by strong winds and any structure built would need to have a substantial foundation and support. The structure could have been set in the ground and rocks stacked around the exterior for further support as shown in the photograph. As the expedition was intended as a reconnaissance only, this project did not include permits to disturb or remove the vegetation within and around the pit to locate postholes or construction techniques. Further investigations could reveal possible construction techniques.

It is entirely possible that this limestone pit could have been a stone borrow pit for the construction of the lighthouse; however, it is considerably smaller than the borrow pits to the southeast and no other borrow pits are located nearby. Another question remains as to how the structure would have remained dry if set into the limestone. Suggestions for it having a raised floor to collect rainwater beneath for drinking may solve this problem. Nevertheless, much remains to be answered as to how these structures were constructed.

The second pedestrian survey was conducted south and east of the lighthouse. Several cultural features associated with the lighthouse were located, including a number of limestone and sand borrow pits and sheet middens. One possible shipwreck shelter location included a deposit of degraded corrugated sheet metal scattered across an area of approximately 6.5 m by 6.5 m. According to historic photographs, corrugated metal sheeting was used in the construction of these shipwreck shelter huts. Although, given this area's proximity to the sheet middens nearby, it is likely that this was the location of another dump site as other bits of metal were located including links of chain and nails.

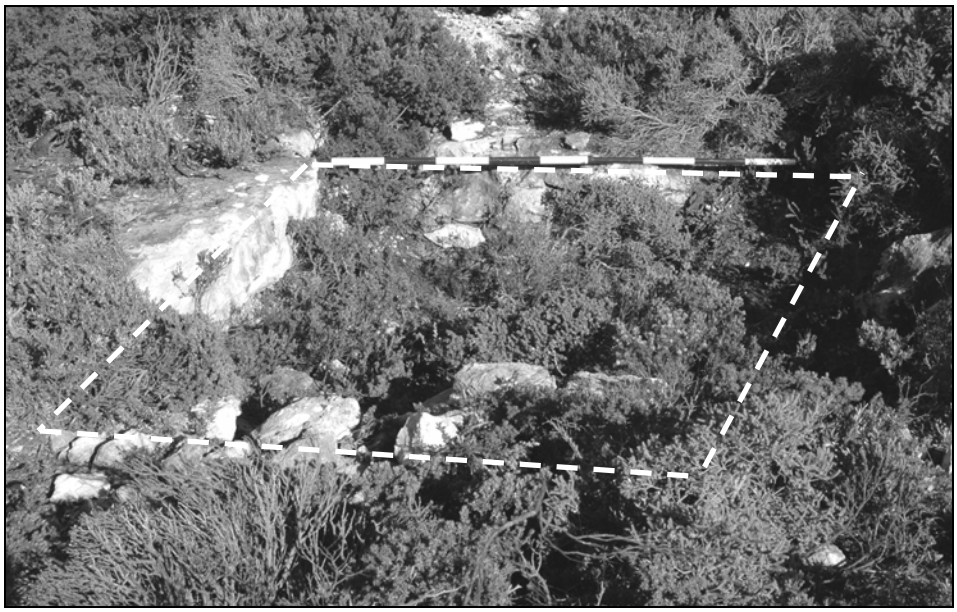

Figure 7. Square pit cut into limestone bedrock, white lines added for emphasis. Photograph taken facing west. (J. McKinnon 2006)

Based on the results of the pedestrian surveys a magnetometer survey was conducted adjacent to the square cut limestone feature. Both the well site and the sheet metal scatter area were excluded from magnetometer surveys due to the obvious presence of cultural material and disturbance.

Geophysical survey

The same magnetometer settings and survey methods were used for the Cape du Couedic area (Figure 8). The survey area was approximately 60 m x 45 m in size and 952 data points were collected. The results of this magnetometer survey identified three significant anomalies at locations near the pit. These anomalies should be tested and further mapping should be conducted at this site to investigate the possibility that this is a location of one of Kangaroo Island's early shipwreck shelter huts.

Conclusion

In conclusion, the project was successful in assessing the potential for locating shipwreck shelter huts. Unfortunately, the potential for locating these early shelter huts is quite low unless historical records, maps or photographs indicate their exact locations. Even then, actual sites are difficult to identify because they were lightly constructed, were not involved in any known shipwrecking events, and were dismantled and removed after a short period of time.

One of the goals of this project was to conduct a pre-disturbance survey of these turn-of-century shipwreck shelter huts in order to establish these sites as viable maritime archaeological sites, and begin to place these sites within a broader context to answer a set of research questions which remain to be answered. This research seeks to provide a better understanding of the severities of life and shipping along the isolated, rocky coastline of Kangaroo Island, particularly the local need for shipwreck shelter huts and lifesaving stations and the political and economic drive behind placing these shelters in these locations. In time and with further research, questions may be answered such as: How were these huts constructed? Who maintained them? Why this particular location(s) for a hut? Why was no one stationed at them? What affected the decisions to place a hut rather than a life station or lighthouse? What was the local involvement with these

huts? Were they ever used or successful? Did it matter if they were used or successful? Were these placed to satisfy a local need or to demonstrate a political effort or presence? When and why were the huts removed? Answers to these questions will begin to add to our broader understanding of early shipping and ship losses in this area of South Australia and Kangaroo Island and how the local community and government were involved in this effort.

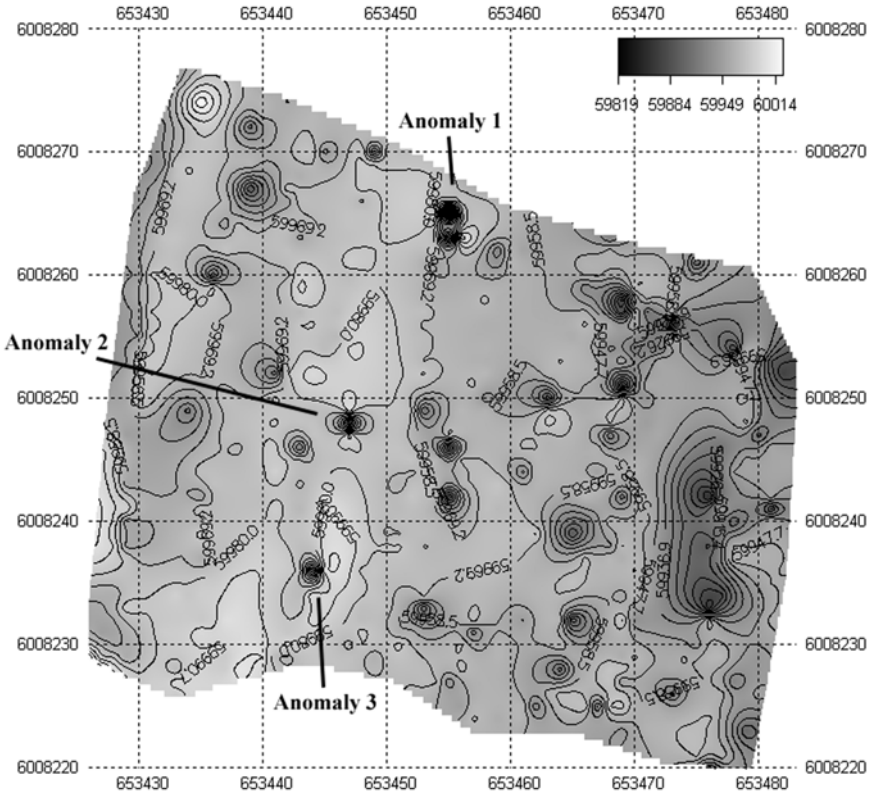

Figure 8. Cape du Couedic magnetometer results (I. Moffat 2006)

Acknowledgments

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3

A Low Impact Survey of Shore-Based Whaling Sites at Shackleford Banks, North Carolina: Diamond City

Emily Jateff

In April and October of 2006, reconnaissance fieldwork was carried out at Cape Lookout National Seashore (CALO) on Shackleford Banks, North Carolina, as a preliminary attempt to locate shore-based whaling sites associated with the late 19th century settlement of Diamond City (Figure 9). Originally named Lookout Woods or simply 'eastern end,' Diamond City was once the largest community on the now uninhabited Shackleford Banks. Destroyed in the San Ciriaco Storm of 17 August 1899, Diamond City remains one of the most often recognized and cited names in North Carolina whaling history and lore.

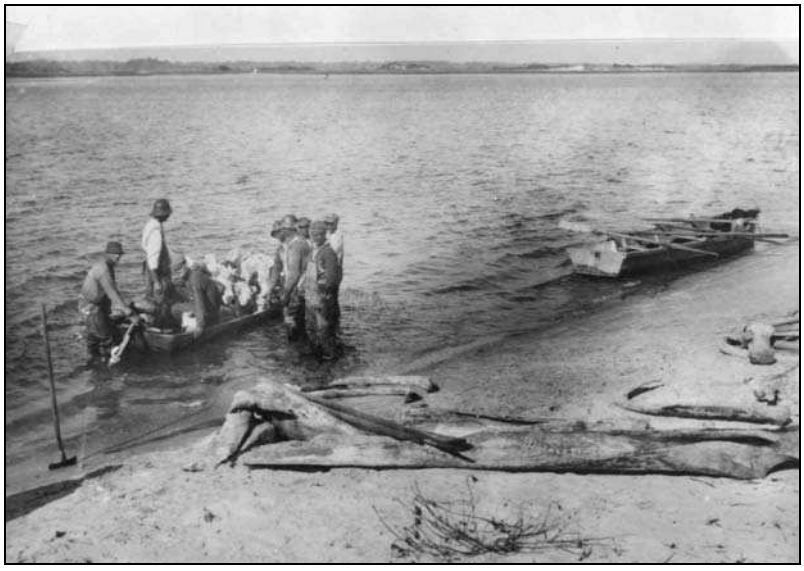

Figure 9. Lighter carrying whale bones prepares to depart banks (Courtesy North Carolina Maritime Museum)

The primary purpose of this reconnaissance survey project was to identify natural or cultural artefacts linked to past shore whaling activities on the eastern end of Shackleford Banks. Because CALO falls within the jurisdiction of the National Park Service (NPS), Diamond City is automatically protected by federal legislation. Although the Archaeological Resources Protection

Act (ARPA) permit granted for this research project did allow excavation for testing purposes, it was decided that the survey methodology should employ only non-destructive techniques. Efforts were made to conduct a surface search, perform remote sensing exercises, and use archival documents to narrow the search area as much as possible prior to fieldwork activities. In addition, Shackleford Banks is home to a large herd of wild 'Banker ponies' and is being considered as a National Wildlife Refuge. Transects of backfilled shovel tests (or similar) could create a dangerous situation for free-roaming animals. Unless absolutely necessary, archaeological research proposals were designed to avoid negatively impacting the current inhabitants and their environment.

As it is always a good idea to have an additional research goal or 'rainy day plan', project aims also included the identification of domestic or other surface features associated with past occupations at Diamond City. It was hoped that in the event that fieldwork was unable to pinpoint evidence of whaling camps, it might at least be possible to identify how and where these whalers once lived, leading to a greater understanding of the physical community structure of Diamond City.

In truth, discussions with both professional archaeologists and CALO employees implied a low expectation of material finds associated with whaling camps at Shackleford Banks due to hurricane impact and coastal erosion. From Hurricane Isabel in 2003 to Tropical Storm Ernesto in 2006, major storm events make landfall near CALO almost annually. The barrier island of Shackleford Banks is an ocean beach habitat characterized by strong wave action, tidal changes and sand scouring. Beach erosion and accretion, as a result of tidal action, have created a dynamic coastline. The beach erosion factor can reach up to nearly 1 m per year and remote sensing data collected in 2004 indicated that the eastern half of Shackleford Banks is "reworked and sediment-starved" (Camann and Wells 2004:ii). These environmental factors led to an assumption that any remaining archaeological evidence of shore-based whaling camps on the eastern ocean side of Shackleford Banks may now be dispersed. In 1938, Barden Inlet was permanently extended to separate Shackleford Banks from Cape Lookout and Core Banks. The production of this dredged waterway likely dispersed any archaeological materials within this area.

Historical Background

Archival research also influenced the supposition that little remains of past shore-based whaling activities on Shackleford Banks. Shore-based whaling was just one of various seasonal fisheries practiced by the men of Diamond City (Brimley 1894; Stick 1958; Simpson and Simpson 1990; Reeves and Mitchell 1988). The men who fished for mullet in September and October were the same men who set out looking for whales in early spring. These individuals would construct the same sort of shelters at their seasonal camps on the beach no matter what the season. For example, the differences between a mullet fishing camp where: "the men lived in cone-shaped huts, quickly built of saplings and thatched with reeds…[with] a lookout posted atop a nearby sand dune" and a whaling camp, where they would: "unite to form a camp, and proceed to build a house out of rushes…near the shore…and a lookout selected…to give the signal if the whales come in sight" were not pronounced (Taylor 1992:19; Earll 1884:490). There does seem to be a preference for quick and easy lodging and a low factor for structural permanence, both for reasons of transient behaviours (seasonal fishery), location (beach) and construction methods (reed huts).

In addition, many of the tools employed for whaling were also useful in other fisheries. Try pots were often just kettles adapted for another use and flensing knives could be as simple as large kitchen knives (Davis 1999:17). Whaling craft were 6-8 m lapstrake pilot boats also utilized for

harbour pilot duties, mullet and shad fisheries, and cross-sound transport (Taylor 1992). It is also likely that many of the tools and watercraft associated with whaling practices were never part of the archaeological record. Iron tools and pots were multiuse items and very hard to come by. Many of these objects were passed down and remain with the descendants of Shackleford whalers (Ira Lewis 2006, pers. comm.). Until the late 20th century, the Alfonso Whaling Museum in Beaufort, North Carolina displayed artefacts from the age of whaling along the North Carolina coast. This museum was housed inside an old sailing craft that was finally declared derelict and the collections (including two try posts, various harpoons and flensing irons) transferred to the North Carolina Maritime Museum (Paul Fontenoy 2006, pers. comm.).

So while it seemed fairly unlikely that much would remain of the actual shelters, tools or craft that could be identified on-surface, what about the flensing stations? It seemed possible that there would be some evidence that up to 50-ton North Atlantic right whales were beached and skinned at this location. Such evidence might include whalebone, brickworks for the try pot fires, and barrels. This turned out to not necessarily be true, as records indicate that flensing took place wherever the whale was beached (Stick 1958:188). If the hunt was a success, the whalers would throw up their oars and give three cheers, signalling the women and children ashore that it was time to prepare for their return (Davis 1999). The women and children would then collect wood to build fires on the beach, sink try pots in temporary brickworks and otherwise set up stations for flensing the captured whale (Stick 1958:190; Pitts 1984:418). Nothing was wasted; Shackleford whalers even transported the whale carcass to the mainland and sold it for fertilizer. (Davis 1999:18)

Historical records indicate that the far eastern end of Shackleford Banks - facing Core Banks and Lookout Bight - was the most likely place to find evidence of shore whaling huts, discarded whalebone, flensing or boat tools, or brickwork (Fries et al. 1922:258; Kell 1975:21). Oral histories gathered from local descendants of the Shackleford whalers suggested that a preference for this location continued well into the 19th century (Stick 1958). Therefore, fieldwork plans included both terrestrial and underwater surface surveys of this segment of the Banks.

So what of Diamond City? Although populated by European transplants from at least the late 17th century, the community of Lookout Woods did not really expand until the mid- to late-19th century. By 1853, the U.S. Coast survey noted buildings and a “sizable community” at the eastern end of Shackleford Banks (Stick 1958:186). By 1880, this number had grown to 500 inhabitants (Gillikin 1999:65). Formally christened “Diamond City” in 1885, this settlement contained stores, schoolhouses, houses, and three on-island processing plants (Stick 1958:187-188, 190; Davis 1999:16) (Figure 10).

The San Ciriaco or “Great” Storm of 1899 thoroughly destroyed the community of Diamond City (Barnes 1999:77). Faced with the obliteration of living spaces, crops, and livestock, the Diamond City settlers chose to relocate to Harkers Island, Bogue Banks, or the mainland. By 1902, no permanent residents remained on the island although local inhabitants of Carteret County continued to use seasonal vacation/fishing camps on Shackleford Banks well into the 20th century. In 1987, Shackleford Banks was acquired by the federal government and incorporated into Cape Lookout National Seashore. At this date, all remaining fishing shacks were burned (Connie Mason 2006, pers. comm.).

In 1952, W. Engels remarked that “nothing remains now but an occasional loose pile of bricks or stone, marking the foundations of a former dwelling place and several large mounds of oyster shells, now covered by sand” (Engels 1952:721). The structures at Diamond City were ramshackle “story-and-a-jump” houses pieced together from shell, brick, shipwreck materials and island timber, or “hodges” - small dwellings carved out of dunes and hills (Willis 1999:91;

Gillikan 1999:68). They were not built for structural permanence. After the Great Storm of 1899, many of these houses were removed from their foundations and floated to the "Promised Land" in Morehead City or to Harkers Island (Stick 1958:193). In addition, no historic plats or Mills Atlas' maps exist to provide a projected layout of Diamond City.

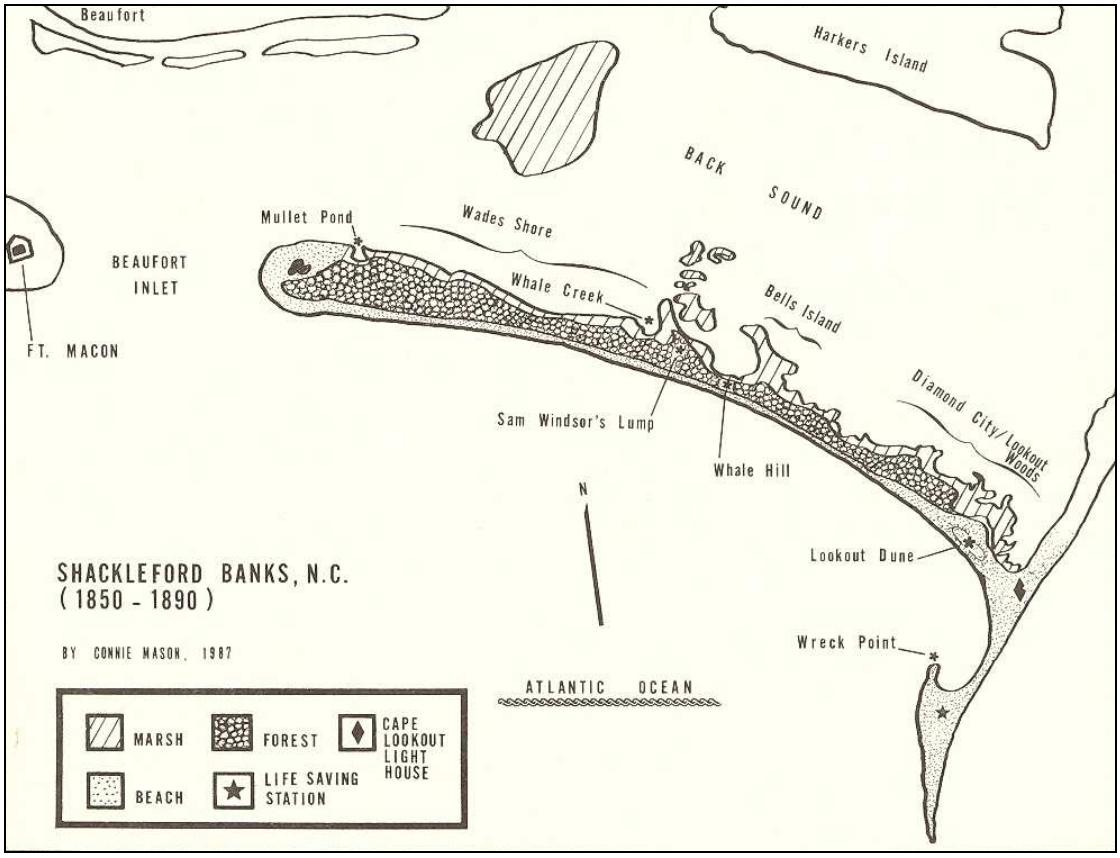

Figure 10. Communities on Shackleford Banks 1850-1890 (Courtesy of Connie Mason, National Park Service)

Previous Investigations

Cultural resource surveys of Cape Lookout National Seashore were previously submitted to the National Park Service by F. Ross Holland (1968) and John Ehrenhard (1976) as a precursor to the purchase of Cape Lookout National Seashore by the National Park Service in 1976 and the subsequent acquisition of Shackleford Banks in 1986. Holland (1968) did not survey for subsurface archaeological sites. Thirty-six sites were recorded within CALO, nine of these on Shackleford Banks, although none were deemed eligible for the National Register.

Of the nine sites identified by John Ehrenhard on the eastern end of Shackleford Banks, only NPS 14 (Diamond City) is identified as an historic site; all other sites are listed as prehistoric (Ehrenhard 1976). Previously identified sites also include 31CR193 (Diamond City), the site number on-file with the North Carolina Office of Archaeology. However, 31CR193 does not have the same GPS coordinates as NPS 14. As far as could be determined, the location for NPS 14 was determined by surface artefact scatter and boundaries for NPS 14 or 31CR193 had not been defined through subsurface testing or other means. Per the results of previous archaeological investigations, all shell mounds present on Shackleford Banks were believed to be Native American (Ehrenhard 1976; Michael Rikard 2006, pers. comm.).

Site Surveys

The first phase of this project - performed 24 April 2006 - a visual assessment of the beach and sound sides on the eastern end of Shackleford Banks. Previously identified locations for Diamond City (NPS 14 and 31CR193) were relocated and visually surveyed for surface cultural materials. Surface scatter was not identified at either location. Walkover survey inspection began at the Horse Corral and proceeded east along the sound shoreline to the start of the tidal marsh (approximately 3 km in length). Five visual transects were then conducted north/south along the eastern end of the island at approximately 500 m intervals and then west along the ocean side to a point due south of the horse corral (again, approximately 3 km in length). Ten close interval transects (10 m intervals, paced off) were employed at the northern ends of north/south transects 2 and 3 to further delineate surface features present within this area. Survey transects progressed east/west between these points to the shore.

No cultural features were noted on the ocean side of the island within this survey area. Cultural features identified on the sound side of the island included three shell mounds with small scatters of brick, glass and ceramic, and what may once have been a pathway or road oriented east to west (see Figure 11). Personal communications with Connie Mason indicated “nothing is left” of the old roads that connected Diamond City to the other settlements on Shackleford Banks (Connie Mason 2006, pers. comm.). However, it was thought likely that this feature was associated with the Lookout Woods/Diamond City settlement, not only because of shape, size and placement, but also due to the proximity to identified shell mounds.

Figure 11. Pathway/Road, facing Mound 1, to the northwest (Jateff 2006)

Based on the information collected from archival, oral, and field data collected in April 2006, this low impact field project was designed to include terrestrial and underwater visual survey inspections of the ocean side on the far eastern end of Shackleford Banks. It was determined that this area held the highest potential for identification of cultural and natural artefacts associated with past whaling camp occupation and activity areas. However fieldwork does not always turn out as planned.

The original research design was to include a terrestrial and underwater survey of the eastern end of Shackleford Banks (Figure 12). Emphasis for the terrestrial portion of this project was to concentrate on identification of structures or objects associated with fishing or whaling practices in this area. Due to the submerged nature of the area (tidal flat/salt marsh), it was expected that

some areas would not be accessible. Terrestrial fieldwork was to include a two-person team conducting visual transects. It was expected that visual survey, delineation, measurements and documentation would take three days to complete. The survey area started at the presumed location of Diamond City (31CR193) and terminated at Barden Inlet (total length: approximately 2 km). Width of the survey area varied from 290-780 m. This area was divided into 78 transects at a compass heading of 120 degrees to be visually inspected in 10 m intervals by two individuals. The survey area terrain included beach, sand dune, maritime forest, and tidal marsh. Terrestrial inspection transects were to terminate at the tidal marsh.

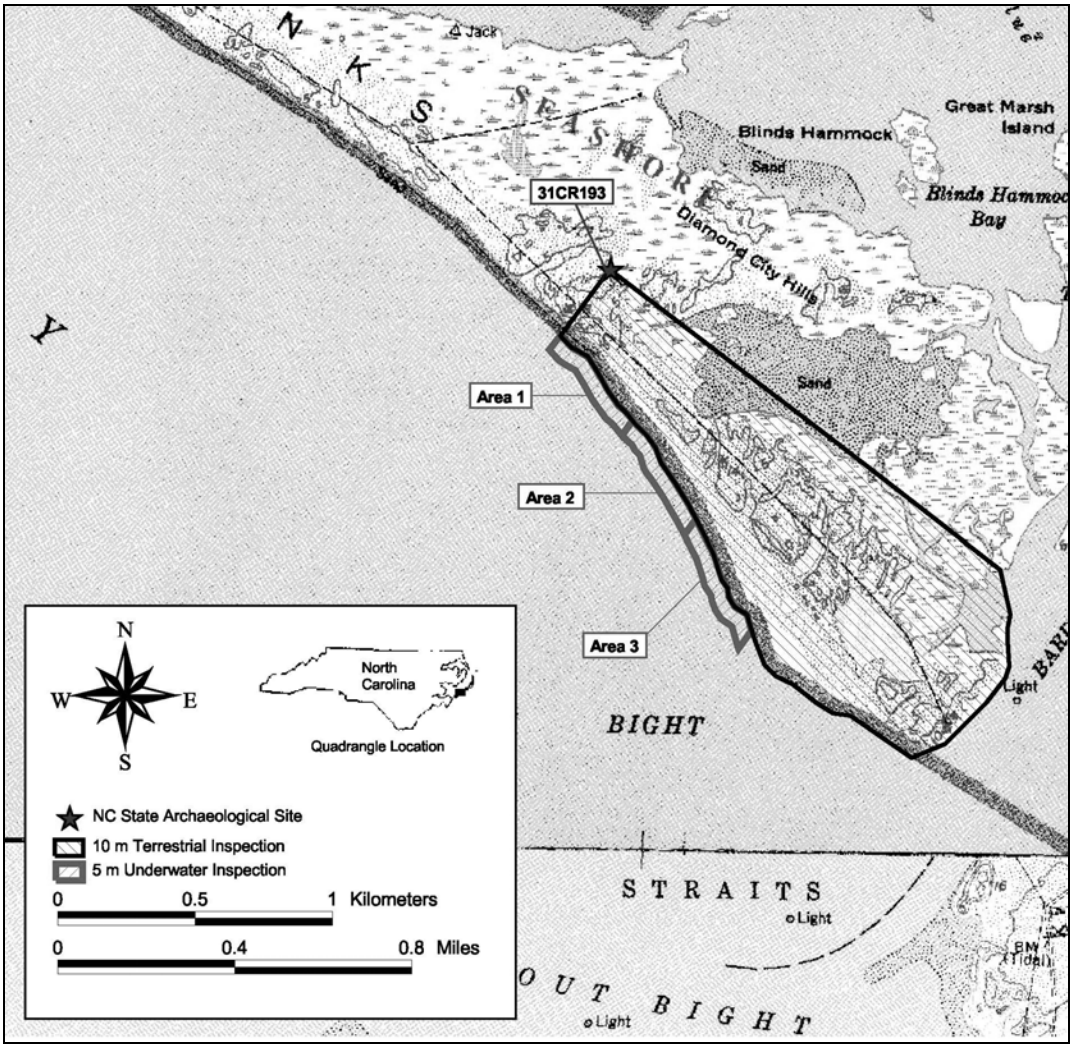

Figure 12. Original survey parameters (Jateff 2006)

The underwater survey was designed to attempt identification of whaling camps once located on land. Consequently, the southern extension of the survey area was determined by the nearly 1 m per year shoreline erosion factor calculated by Eleanor Camann (Camann and Wells 2004). From this estimate, an approximate total shoreline erosion of 65 m is postulated to have occurred since the San Ciriaco hurricane of 1899. Western extension of the survey area started 290 m southwest of the presumed location for Diamond City (31CR193) and the eastern extension was a point due east of the tip of Lookout Bight (1200 m). Time constraints on fieldwork precluded the extension of underwater survey within Cape Lookout Bight.

Time allotted for the underwater component was three days. Fieldwork was to include a snorkel and SCUBA swim line search for surface artefacts within a 1200 m E/W by 65 m N/S survey area adjacent to the terrestrial survey area. Maximum depth in this area is 6 m with an average of

1.5 m. As this was a large survey area to cover in three days of fieldwork, it was divided into three 400 m E/W by 65 m N/S areas. Area 1 (due east of 31CR193) was considered the area with the highest potential for material culture associated with both shore whaling practices and the settlement at Diamond City. Area 2 was the middle survey block and Area 3 the most easterly survey block. Transects were to run N/S from shore at 220 degrees. Each area was to be inspected at 2-5 m intervals, depending on water visibility. Transect totals were 80 transects per block at 5 m intervals or 200 transects per block at 2 m intervals.

The above planned fieldwork was scheduled for 6-8 October 2006 and to be conducted with the assistance of students and faculty from the Maritime Studies Program at East Carolina University (ECU). However, due to fluctuations in weather reports, and unforeseen complications with time constraints, it was impossible to complete fieldwork as originally planned. It was determined that there would not be enough time to complete terrestrial and underwater survey area searches. Therefore previously identified features on the sound side (Area 1) were surveyed in greater detail. In a final attempt to salvage the search for shore-based whaling camps, a visual inspection survey of the far southeastern end of Shackleford Banks (Area 2) was performed on 6 October 2006. The purpose of this survey was to examine the terrain for cultural or natural artefacts located on the surface.

The environment of the north eastern section of Area 2 was tidal marsh/salt flat (located within Barden Inlet); around the bend, the topography changed to steep sand dunes banking a wide beach, and the south-western edge of Area 2 was rolling sand dunes tapering to a flat beach. Dune banks average 1-5 m in height with the greatest height along the southeastern tip of the island. Investigations recorded a 20 cm layer of crushed oyster shell included within the dune bank, approximately 80 cm from the top of the bank (Figure 13). Artefacts identified in Area 2 included one block of granite and three drift pins. It was not possible to conclusively state that these artefacts were associated with historic occupations at Diamond City as they could be associated with modern activities. There was little evidence that future fieldwork will be able to locate archaeological evidence of shore whaling within Area 2. Severe coastline erosion may prevent the identification of *in situ* cultural material that could be linked to past shore-based whaling activities.

Figure 13. Sand dune with shell lens and cultural material, facing north (Jateff 2006)

To get the most from the survey and learn as much as possible about past occupants of Shackle ford Banks, the 'rainy day plan' was enacted. It was decided that the weekend of fieldwork should concentrate on determining information about the location and boundaries of Diamond City. The purpose of this revised fieldwork was to record all identifiable shell mounds, structures, and the pathway/road located within the survey area on the eastern sound side of Shackleford Banks (Area 1). Primary goals included survey and assessment of the previously identified mounds and pathway/road to ascertain if they could be associated with past historic occupation of Diamond City.

Area 1 encompassed two mounds identified during April 2006 fieldwork, five newly located mounds, two structures, and the pathway/road. Five of these mounds were mapped with a TopCon GTS 229 Total Station; and all mounds were recorded with a Global Positioning System set to North American Datum (NAD) 83. Points were taken on and near Mounds 1-5 to determine mound dimensions and distribution of brick and other cultural artefacts. To determine the possible locations of buried cultural materials, a Garrett Infinitum Pulse Induction metal detector was employed in an approximate 100 m swath around Mounds 1 and 2. However, there was insufficient time available to metal detect the areas around Mound 3-7.

Further investigation of the pathway/road found this feature to continue much farther than previously believed. This feature is also believed to include offshoots - that led directly to identified shell mounds. An approximate total length and width of the main road were collected using a combination of GPS and tape measurements.

A total of 71 artefacts and 65 brick fragments were identified at Mounds 1, 3, 4 and 5 and a maximum date range for these artefacts was 1815 to 1925. Mean Ceramic Date (MCD) calculations reported a mean of 1863 (Mound 1) and 1861 (Mounds 3 through 5), although temporal distribution of ceramics indicated a later - rather than an earlier - occupation. The cultural assemblage combined with the spatial distribution implied a connection with Diamond City. Mounds were spaced at intervals located close to the sound shoreline and contained shell, historic ceramics, brick, and roofing nails (Figure 14).

In addition, Diamond City descendants Ellis Yeomans and Dennis Chadwick reported that the twentieth century fishing shacks on Shackleford Banks were set up on top of the old shell mounds. In some cases, existing shell mounds were scraped up and combined to create higher mounds (Yeomans and Chadwick 2006, pers. comm.). If the fishing shacks on Shackleford Banks were burned in 1987, it is interesting that all copper, stone, and iron artefacts noted at Mounds 3, 4 and 5 presented evidence of fire scorching.

It is believed that artefact data support the theory that the mounds in Area 1 were associated with historic occupations on Shackleford Banks. In addition, on-island location suggested that Area 1 mounds were associated specifically with occupations of Diamond City. However, these mounds could not be pinpointed to one temporal period. There is both historical and archaeological evidence of mound utilization from the mid-19th century through the late 20th century. Further surface survey will most likely not be able to tighten these temporal ranges, although if deemed necessary, it may be possible through subsurface testing.

If the Area 1 mound concentration represented a section of Diamond City, then it is possible to presume that similar mounds may also be associated with Diamond City and therefore future research may be able to locate and define boundaries for the entire community (see Area 1 extension in Figure 15). The far northeastern tip of Shackleford Banks is the location of the "largest mound on the island" (Michael Rikard 2006, pers. comm.). Future research at CALO includes plans for visual inspection of similar mound features.

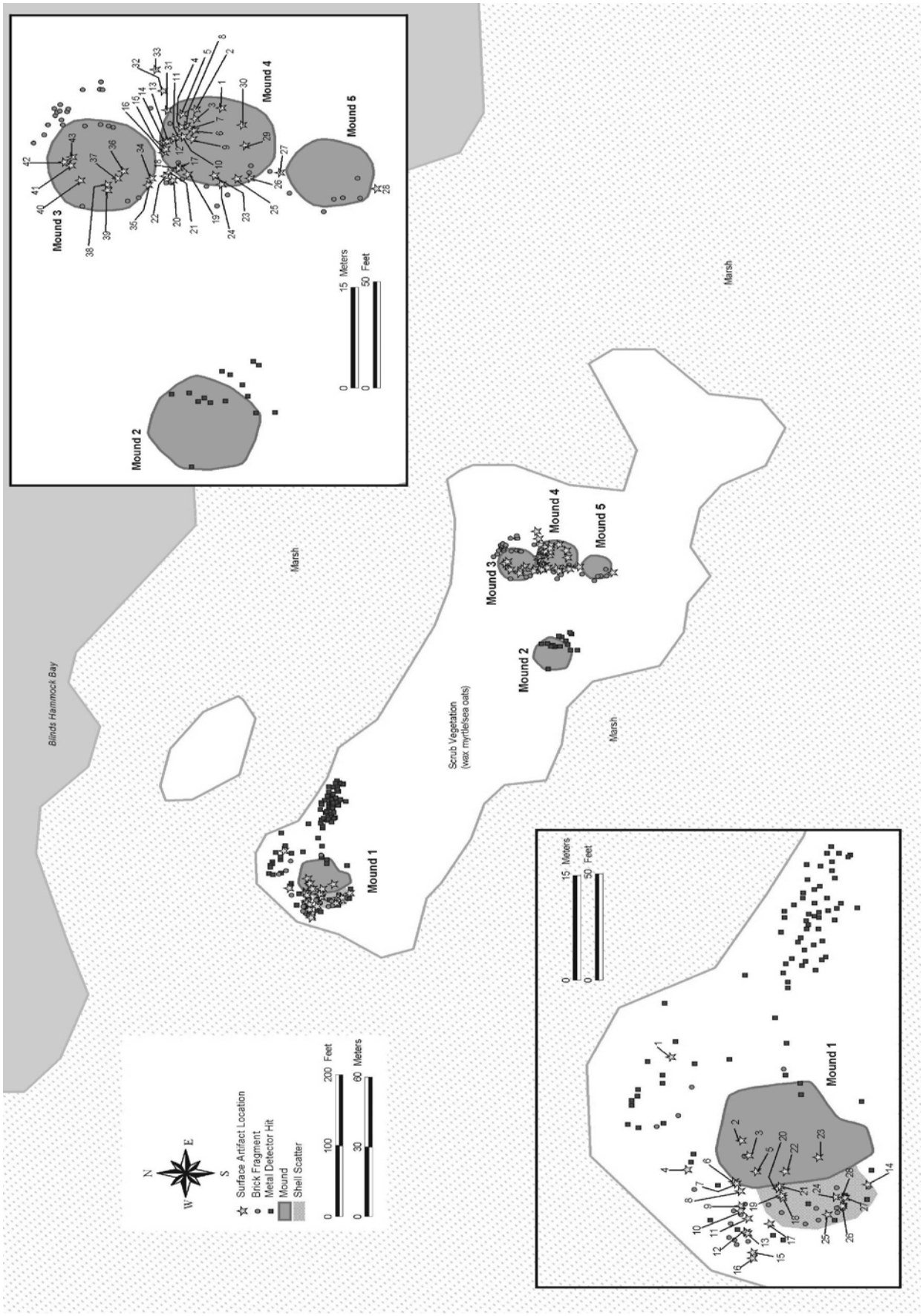

Figure 14. Total Station data for Area 1 mound concentration (Jateff 2006)

Figure 15. A portion of a 2006 aerial photograph showing Area 1 and projected Area 1 extension (Adapted from Europa Technologies, DigitalGlobe)

Conclusion

The question may be asked whether or not this fieldwork project could be deemed a success. Expectations for archaeological evidence of shore-based whaling sites were not optimistic. Therefore, the fact that reconnaissance surveys of the southeastern end of Shackleford Banks proved difficult to identify cultural or natural remains of shore-based whaling activities was not a great surprise. There is the chance that the original fieldwork plan would have proved more successful; however, time constraints necessitated changes to the fieldwork plan. The 'rainy day plan' allowed for a change of focus that still gathered valuable information about historic occupations on the eastern end of Shackleford Banks.

Acknowledgments

Field research was performed under the auspices of an Archaeological Resources Protection Act (ARPA) permit, granted by the National Park Service Southeast Archaeological Centre (SEAC) and supported by the staff at Cape Lookout National Seashore (CALO), including Bennie Keel and Michael Rikard. Project fieldwork would not have been possible without the assistance of Mark Staniforth and Jennifer McKinnon from Flinders University, Nathan Richards, Tricia Dodds, and the Program in Maritime Studies at East Carolina University (ECU), Paul Fontenoy with the North Carolina Maritime Museum and the community of Harkers Island.

4

Search for the *Independence* Construction Site, American River, Kangaroo Island

Claire Dappert and Ian Moffat

During July 2006, students and staff of the Program in Maritime Archaeology at Flinders University conducted an archaeological survey near American River, Kangaroo Island, South Australia, to attempt to locate the US schooner *Independence* construction site. The purpose of this report is to summarize the methodology and findings of these investigations. Based on historical documentation, the construction site was suspected to be located along the present day shore line near American River (Figure 16).

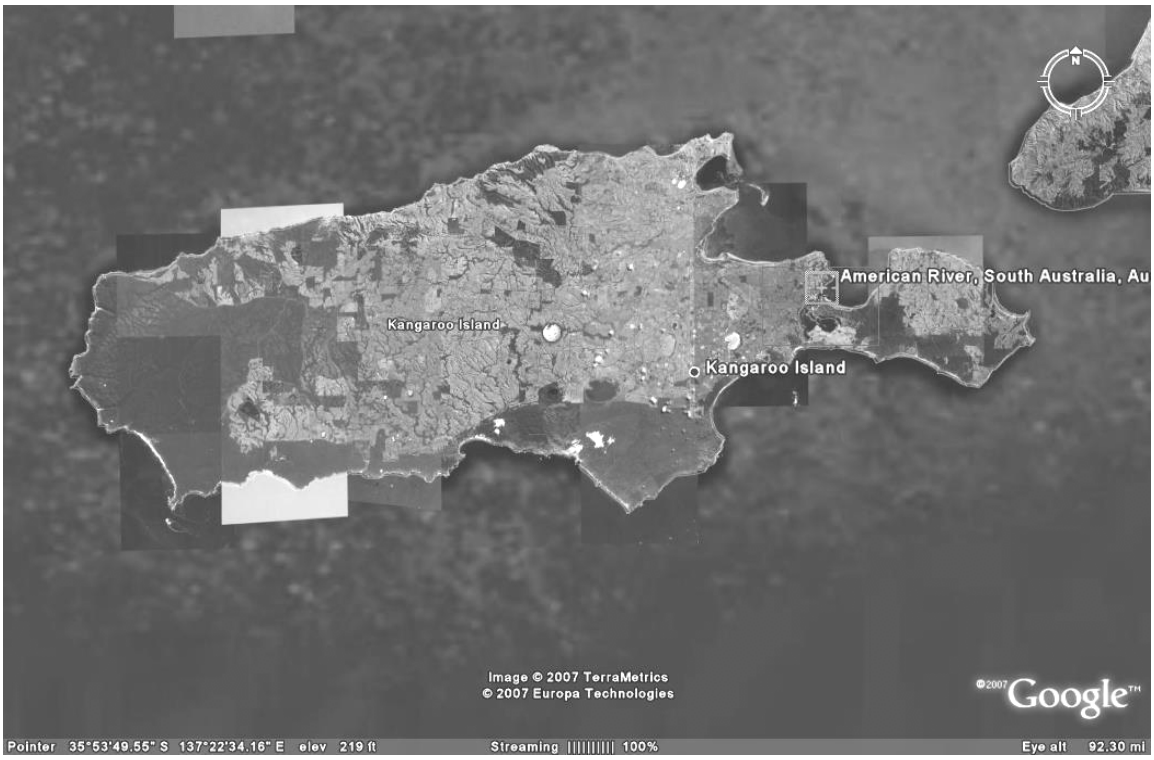

Figure 16. Map of Survey Area (TerraMetrics 2007)

Although the survey did not find the exact location for the *Independence* construction site, it did establish three target areas (Figure 17) that would have been most ideal for this activity in the survey area: the *Independence* Point Site (Site A), the American River Township Site (Site B) and the Fish Cannery Track Site (Site C). These locations were based on several assumptions about characteristics of shipbuilding sites: closeness to channel, relationship to flat or gently sloping land for ease of launching, closeness to fresh water, protection from the elements, and presence of early 19th century cultural material. In addition to attempting to locate the site of construction, this research sought to address two central questions: what factors, such as environmental resources, influenced Captain Pendleton to choose American River as a location to construct *Independence*, and what were the different types of timbers available to the shipbuilders of *Independence*? As part of answering these questions, the field crew initiated a vegetation survey to sample prominent timber specimens.

This archaeological survey provided a valuable source of information on several levels. The survey represented the first archaeological survey conducted in the American River area, and this cultural assessment provides a baseline for future studies and management. This study was also one of the first studies to attempt to locate such an ephemeral shipbuilding site. The knowledge gained from the investigation could provide a foundation for similar studies that target short occupation ship construction sites.

Figure 17. Survey area showing Site A, Site B and Site C (TerraMetrics 2007)

History of US Schooner *Independence*

Independence, which was the first non-indigenous vessel constructed in South Australia, was built in 1803 by the crew of US brig *Union*. *Union* was outfitted by Fanning & Co. of New York in 1802 for a sealing expedition to the southeast coast of New Holland (Fanning 1989:230). Edmund Fanning, who owned a part share in the vessel, stated,

> Never, perhaps, was a voyage entered upon with brighter, and never did a vessel sail with more encouraging prospects than this brig. Her commander (Captain Isaac Pendleton) was …left unrestricted, and at perfect liberty to act on all occasions as his judgment should direct, to make the most profitable voyage he could of it for his owners. (Fanning 1989:230-231)

On February 18, 1803, the vessel arrived at Seal Island in King George III Sound. The crew then went ashore to procure seal skins, but because the chief part of the sealing season had already passed, they only obtained a small amount (Fanning 1989:231-232). Two days later, Pendleton happened upon the French explorer Nicolas Baudin of *Le Géographe* who was surveying the coast of New Holland. Baudin recorded the details of their rendezvous:

> And before seating ourselves he begged me to give him, if possible, a chart of the coast of New Holland, not possessing any information to guide him in the course he desired to take in the search for the places frequented by seals, nor for the direction of the coast nor of the dangers to be met with there. I gave him two charts…as well as the position of King Island. (Cumpston 1970:26)

Baudin and his officers reassured Pendleton that he would find enough seals to complete his cargo at Kangaroo Island, and he proceeded to tell him the best place for anchorage and to procure sealskins. Previous to this encounter, Baudin and his corvette *Le Géographe* had sailed around Kangaroo Island. Baudin had lost a longboat, and his carpenters had combed the island for suitable timber. It was only when they reached the area near what is now called American River that the carpenters were able to procure suitable timber, and then construct a longboat aboard Baudin's vessel. Although not historically documented, it is possible that Baudin shared this information with Pendleton.

Pendleton set sail for Kangaroo Island, and decided to winter at American River, where they constructed the 30-ton schooner *Independence* (*Sydney Gazette* 8 January 1804). Here the crew "found both the hair and fur seals, extensive forests, good water, and much game; fowls and birds of various kinds in abundance; and also excellent fish and oysters in great plenty" (Fanning 1989:231-232). They stayed for almost four months, during which time they "set about and built a small vessel, 30 tons burthen, named the *Independence*" (Fanning 1989:232; *Sydney Gazette* 8 January 1804).

The timbers utilized to construct *Independence* have been debated. Edmund Fanning's (1989) historical narrative and The *Sydney Gazette* reported that the scantlings used to construct *Independence* were hewn and sawn from the local pine tree, which resembled Swedish timber and contains turpentine (Fanning 1989:232; *Sydney Gazette* 1 July1826). Another source states,

> The first officer, D. Wright, a man of mechanical ingenuity, the carpenter and armourer directed preparation of the native pine, eucalypt and casuarina timber. With this and spare sails, rigging and other materials from the Union they were able to launch the *Independence* early in 1804. (Nunn 1989:20)

Upon completing the vessel, Pendleton and the crew of *Union* parted company with the newly appointed crew of *Independence*, while *Union* got underway to Port Jackson. Isaiah Townsend, who was a seaman aboard *Union* wrote to his brother Samuel in New York:

> We have been cruising on the Southwest Coast of New Holland but to little advantage. We have built a fine schooner of about 30 tons. We call her the *Independence* which…our crew is now cruising in Bass's Straits... Captain Pendleton myself and the remainder of the crew is in here with the ship for supplies. (Townsend 1804)

Union left Sydney during April 1804, to rendezvous with *Independence* at Kangaroo Island (HRA 1804:5.122). They both arrived back in Sydney during June 1804 (HRA 1804:5.120). At this time Captain Pendleton sold a part share of *Independence* to the prominent Sydney trader Simeon Lord. The Articles of Agreement listed Isaiah Townsend as master of the vessel (Fowler

1980:72). Pendleton also sold his cargo of seal skins to Simeon Lord for which he was to procure payment from the sale of the sandalwood in China. He was to obtain the sandalwood at a secret location in Fiji.

The presence of American vessels in Port Jackson had the Governor of the Colony, Phillip King, worried. He wrote to the Secretary of the State for the Colonies, asking him how far he would be "justified in preventing the American intrusion and the resultant intercourse with them." (HRA I 1804:5.92-93). King issued a General Order on August 11, 1804 stating:

> … no vessel under foreign colours, or belonging to any foreigner, be cleared from this port for any sealing voyage within the limits of this Territory or its dependencies, and for the purpose of returning hither, but that all such vessels after their necessities are relieved, be cleared out from this Port to any other Port of Discharge. (HRA I 1804:5.92-93)

Pendleton, rather than reveal his true destination, cleared Port Jackson for China. John Boston, sailing as supercargo, was to take *Union* to Fiji to procure sandalwood for the China markets, which was to be the first attempt at trading sandalwood with China. While stopping at Tonga for supplies, Pendleton and six other crewmen were murdered by the local Indigenous population. Daniel Wright, who became acting captain, returned to Sydney to report the news and to procure provisions. Then, he continued the expedition to Fiji. *Union* struck a reef along the coast of Fiji near Sandalwood Bay, and those that were not drowned were massacred by the local Indigenous population.

Independence, on the other hand, did not have to clear Port Jackson for a foreign port because Simeon Lord owned a part share of the vessel. Townsend sailed the vessel to Antipodes Island, which was south of New Zealand and where they procured 59,000 skins. Captain Townsend wrote to his brother in New York:

> I take this opportunity to inform you…that I have been very successful since I left the Union. On a sealing expedition I have at present several vessels and a large number of men under my direction in this business. Besides my little schooner the *Independence* which I command and have now mated with Captain Jonathan Paddock in the ship *Favorite* of Nantucket. (Townsend 1805)

Independence and *Favorite* set sail on another sealing expedition on the 15 June 1805. The two vessels parted company at New Zealand planning to rendezvous again at the Antipodes Islands. The crew of *Favorite* arrived, procured skins, and sailed back to Port Jackson. *Independence* was never heard of again. Captain Paddock stated:

> We are sorry to report the probable loss of the American schooner *Independence*, which…was for some time conjectured to be traveling on discovery of advantageous situations for procuring seal; but has unfortunately never since been seen or heard of. (*Sydney Gazette* 15 May 1806)

"He had not more than six or seven weeks provisions on board of the schooner...I think from every circumstance we have reason but to think he was lost." (Paddock 1807). Simeon Lord had in his hands everything that Townsend had obtained during his sealing expeditions, which amounted to about 18,000 skins. Paddock did not know what share was Townsend's or Lord's (Paddock 1807).

Previous Investigations

No previous archaeological investigations have been conducted near American River. Historical evidence indicates the vessel was constructed in this area. A chart composed by Captain George Sutherland in 1819 depicts a general location for construction; however, the inscription, "Where a schooner was built by shipwrecked Americans," was incorrect in that the Americans were not shipwrecked. Thus, its validity is rather dubious (Sutherland 1831).

A local historian, J. S. Cumpston, visited the American River region in the 1960s (Figure 17 and Figure 18). He claimed to have identified the *Independence* construction site near a small point along the western shore of American River (Figures 18 and 19).

> Some pieces of coal picked up on the point were found to be dissimilar from that mined in Australia. That suggests that a shipwright's forge was in use there. While the vessel was under construction the Union was almost certainly anchored in Eastern Cove, off American Beach, where water is available. (Cumpston 1970:28)

Based on this cartographic and coal evidence, the present day *Independence* Point was chosen as a primary target area.

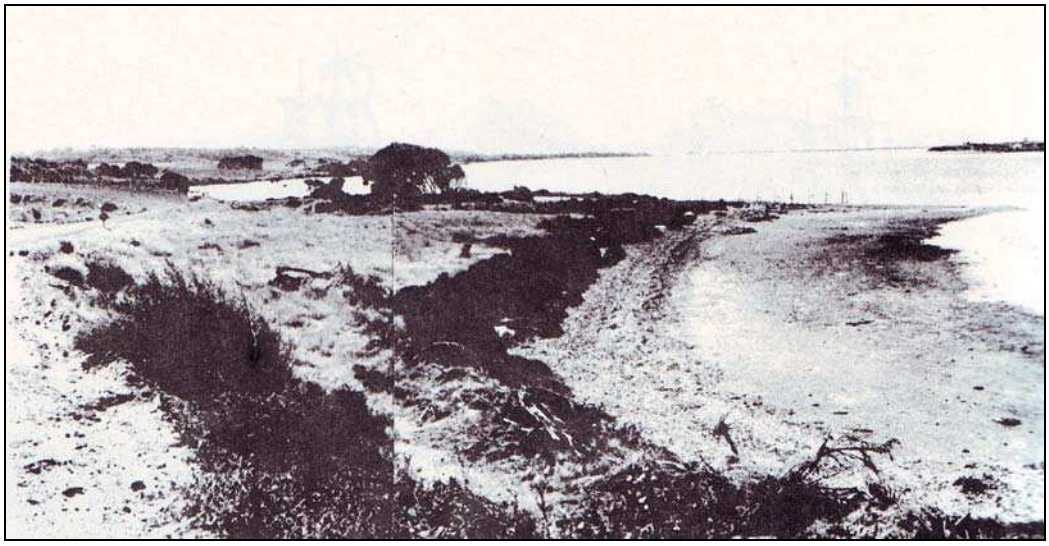

Figure 18. Photo taken by J.S. Cumpston in 1960s showing *Independence* Point (Cumpston 1970)

Environment

Kangaroo Island is the second largest island in Australia. It is located approximately 140 km southwest of Adelaide near the mouth of the Gulf St. Vincent. Separated from Cape Jervis on the mainland by a narrow waterway called Backstairs Passage and from the Yorke Peninsula by Investigator Strait, the island is 50 km wide and has a coastline of 496 km. Most of the island consists of plateau with steep cliffs to the north and low-lying limestone bedrock along the south coast. Much of the soil has gravely limestone inclusions overlaying limestone bedrock, and the predominant overgrowth consists mostly of dense mallee scrub. Rainfall averages 50-60 cm each year. Most streams and lagoons are saline during the spring and dry up during the summer months. Most settlement has centred near these waterways where the soil has more depth before hitting bedrock (Tyler *et al*. 1979:39).

Figure 19. *Independence* Point as it appears today (Karson Winslow 2006)

Methodology

Site investigations included a combination of pedestrian surveys, magnetometer surveys, and a vegetation survey.

Pedestrian survey

The pedestrian survey covered nearly 11 km along the foreshore and identified three target sites based on closeness to a deep water channel, relationship to flat or gently sloping land for ease of launching, closeness to fresh water, protection from the elements, presence of early 19th century cultural material, and availability of timber suitable for ship construction. Target areas were then further investigated by a series of systematic shovel tests (Figure 20). Shovel tests were laid out in a 5 m or 10 m grid, depending on testable terrain, and all soil constituents were recorded with a Munsell soil chart.

Figure 20. Jennifer McKinnon (right) and Karson Winslow investigate a shovel test (Mark Staniforth 2006)

Geophysical survey

A magnetometer was selected as the most appropriate tool for the expected targets with reference to the American Society of Testing and Materials (ASTM) standard D6329-99 (ASTM 1999:2). While other geophysical methods such as ground penetrating radar or electromagnetic induction may have been successful at locating non-ferrous material associated with the site, the complexity of the site history, the expected low level of relict material culture and the closeness of the salt/fresh water interface to the survey areas would make their use problematic given available field resources. The use of magnetometers to detect direct ferrous evidence of cultural material (Black and Johnston 1962) evidence of burning (Abbot and Frederick 1990; Frederick and Abbot 1992) or disturbances in soil stratigraphy (Field et al. 2001; Nobes 2006) has a long and established history within archaeology and so this method was deemed appropriate for use.

Magnetometer data was collected using a Geometrics G-856 proton precession magnetometer automatically collecting data at five second intervals. During data acquisition the sensor was kept at a constant height of 2 m and orientated towards north at all times. The magnetometer was tuned to 60 000 nT prior to data acquisition and the clock was calibrated to the GPS prior to each survey. Positioning data was collected with a Garmin 76 GPS as a track point at five second intervals. Data collection locations were chosen based on ease of access rather than on the basis of a regular grid.

This kind of reconnaissance survey provides an ideal precursor to further investigations as it focuses on covering large areas quickly rather than providing definitive anomaly locations or character (Moffat and Wallis 2005). This is because of the coarse nature (estimated at +/- 5m) of the accuracy of data collected with a navigational GPS and the lack of any diurnal corrections applied to the data set through the used of a second, stationary magnetometer, which does not appear to result in a significant reduction in data quality in surveys of a small duration (Silliman *et al*. 2000). Furthermore, by relying on a single method of geophysical investigation for initial investigations; survey, processing and interpretation time are greatly reduced.

Such a survey philosophy is founded on the premise that the use of inexpensive, widely available instruments without being slowed down by the need to accurately spatially locate the data provides an initial assessment of whether targets exist in the area. If appropriate targets are found, more detailed survey or direct investigation can be used to further define their character and location. Should no anomalies be located during the reconnaissance phase, other more prospective locations can be analysed rather than directing resources towards a probably barren location.

All surveys suffered from a generally low data quality. Plots of data values versus station numbers show a large variation of data points from the mean. This could be the result of noisy diurnal conditions during the survey, heading errors (failing to keep the instrument upright and pointing north at all times during survey) or the large amount of anthropogenic material (one site was a former garbage dump) on site. Despite the large range of points, data for the *Independence* Site magnetometer survey one, the *Independence* Site magnetometer survey two and the Cannery Track magnetometer survey is interpretable.

Vegetation survey

A vegetation survey was also conducted to determine areas that would have been suitable for supporting timber stands large enough for building a 35-40-ton vessel. Vegetation associations, which have been loosely defined as the combination of canopy, understory and ground layer species that form a discreet vegetation community, and species descriptions only included prominent woody species. Herbaceous species would have no bearing on the survey objectives

(Bullers 2006:1). Samples of mature leaves, juvenile leaves, buds, fruit and bark as well as a field guide (Holliday 2003) were utilized to establish timber species. After identification, the vegetation structure, or community, of each area was determined. This allowed for the whole survey area to be compared to other environmental attributes (Bullers 2006:3).

There are several key factors that affect timber growth and its location, and an understanding of this was essential to make informed judgments about timber that may have been available at the time of *Independence*'s construction. These include geology and land surface processes, soils, aspect and slope, fire regime, and disturbance (for a full discussion see Bullers 2006).

Seven woody species were identified during the survey; however, their suitability for shipbuilding purposes (such as maximum dimension of planks and quality) varies greatly. All together, 10 vegetation communities were identified in the survey area and are shown in Figure21. Of these ten vegetation communities, only six were considered as capable of producing timbers suitable for shipbuilding. Accordingly, the 10 potential timber-producing species identified in the American River survey area and their characteristics include:

Sugar Gum, *Eucalyptus cladocalyx* F. Muell.: Strong and durable hardwood timber suitable for many building tasks. Stems are often very straight, and it is considered as one of the best Australian hardwoods. Common uses include poles and fence posts (Bonney 1997:82).

Narrow-leaved Mallee, *Eucalyptus cneorifolia* DC.: Not generally suited for construction timbers. Stems are very thin and crooked, making them unsuitable for construction. Common uses include the distillation of eucalyptus oil (Bonney 1997:83).

Brown Stringybark, *Eucalyptus baxteri* (Benth.) Maiden and Blakely: Often used in construction and for general farm uses including poles and fence posts (Bonney 1997:74).

Black Cypress Pine, *Callitris gracilis* R.T. Baker: Reddish brown with a compact, fine grain and piney odour (Holliday 2002:102). Valued because it is termite resistant. Used for construction of houses, flooring, poles, and fencing (Bonney 1997:54).

Drooping She-oak, *Allocasuarina verticillata* (Lam.) L. Johnson: Not generally used for construction purposes, but it is used for fence posts or other minor structures.

Golden Wattle, *Acacia pycnantha* Benth: This species has many ancillary uses including tanning, wool dye, bush food, firewood, and shelters, but it is not used in the construction industry (Bonney 1997:16).

South Australian Paperbark, *Melaleuca halmaturorum* F. Muell. Ex Miq.: This species has many ancillary uses including fencing, weaving, bush food and firewood, but it is not used in the construction industry (Bonney 1997:149).

SA Coast Mallee, *Eucalyptus diversifolia* Bonpl.: Timber characteristics are unknown, but given that it only occurs as an occasional with other mallee communities, it was not likely easily available for shipbuilding purposes (Bullers 2006:13).

Narrow-leaved Red Mallee, *Eucalyptus foecunda* Schau.: Slender stems of narrow diameter make this species unlikely to provide suitable shipbuilding timbers (Bullers 2006:13).

Moonah, *Melaleuca lanceolata* Otto: Bushy shrub or rough-barked, low-branching tree. Can have substantial stems (Bullers 2006:13).

Although these communities could change over time, particularly as a result of historic clearing activities, fire or other types of cultural or natural disturbance, remnant timber species provide a means to extrapolate what types of timbers were available to the shipbuilders of *Independence*?

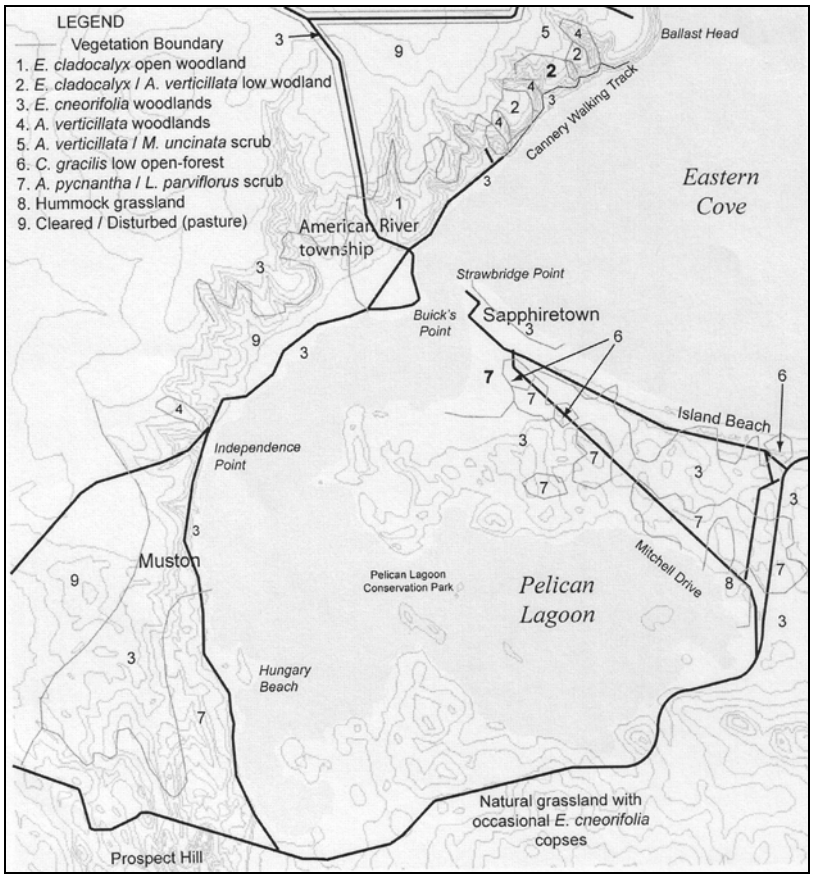

Figure 21. Map of survey area showing vegetation communities (Bullers 2006)

As mentioned previously, three historical sources, Fanning (1989), Townsend (1804), and the *Sydney Gazette* as well as one contemporary source, Cumpston (1970), state that *Independence* was constructed from native pine. The only native pine species observed in the survey area was Black Cypress Pine (*C. gracilis*). Interestingly, Cumpston stated the Latin name of the native pine as *C. propinqua*, which is a former name of *C. gracilis*. This species was observed intermittently within the survey area, but there were no prominent stands of *C. gracilis* observed at *Independence* Point or anywhere along the eastern and southern shores of Pelican Lagoon. The exception to this was a single shrubby individual at the entrance of the car park and a few individuals at Hungry Beach (Bullers 2006:29).

Since Cumpston utilized the scientific binomial for the local species, he probably positively identified the species. It can also be inferred that since he visited this area during the 1960s and since then there has been much development, *C. gracilis* probably grew in this area at least until that time. The present day vegetation pattern, however, does not support this. Only three intensive stands of this species were observed, and all three were on the northern side of Pelican Lagoon. One stand was near Strawbridge Point, which is across the channel from American River Township. Thus, either the vegetation at *Independence* Point has changed drastically, or Cumpston was mistaken in his identification. He could have confused she-oak for native pine (Bullers 2006:29).

In addition to the claims that *Independence* was constructed of native pine, Nunn states that *Allocasuarina* and *Eucalyptus* species were also utilized. The only casuarinas species identified

within the survey area were Drooping She-oak (*A. verticillata*). It occurs commonly throughout the region both as a co-dominant and dominant species. The majority of identified individuals were rather short and slender, but it can grow quite large, as several examples were observed with trunks approximately 30 cm in diameter. These larger individuals could yield excellent shipbuilding timbers (Bullers 2006:29).

Nunn also states that *Independence* was constructed from a *Eucalyptus* species; there were five types of *Eucalyptus*, three with a tree habitat and two with a Mallee habitat, identified during the survey. The most predominant vegetation association was woodland dominated by Narrow-leaved Mallee (*E. cneorifolia*), a species present in nearly all communities except shrublands and grasslands. The other Mallee species, Mallee sp. 1, *Eucalyptus sp*. (no identification) was only observed as a singe individual. Since the Mallee growth form does not allow for anything other than the production of small, slender poles, this species should be discounted (Bullers 2006:29-30). This species, however, can grow in tree form (Costermans 1983:375), and it is possible that some substantial timber stands were available in 1803.

The three *Eucalyptus* tree species observed included two isolated individuals of South Australian Coast Mallee (*E. diversifolia*), near Muston and Tree sp. 1, *Eucalyptus* sp. (no identification) near Strawbridge Point. Despite the ephemeral presence of these two examples, it is possible that more extensive stands were present during the 19th century (Bullers 2006:30).

The *Eucalyptus* most capable of producing timbers suitable for shipbuilding is Sugar Gum (*E. cladocalyx*) (Figure 22), a species common to Kangaroo Island but only occurring in a limited range of the study area. This species occurred along the coast in a limited band from American River Township north to Ballast Head. Its growth form varied from stands of short, twisted communities of little value for construction purposes to tall straight stands ideal for shipbuilding (Bullers 2006:30).

Figure 22. Sugar Gum (*E. cladocalyx*), found near American River Township with a base greater than 1 m. Sugar Gum was one of the few tree species that would have been suitable for the construction of a 40-ton vessel such as *Independence* (Rick Bullers 2006)

This vegetation analysis finds that there are three species that were most likely to have been utilized for the construction of *Independence*:

- Black Cypress Pine (*C. gracilis*)
- Drooping She-oak (*A. verticillata*)
- Sugar Gum (*E. cladocalyx*)

Because of the limited range of two of these species, there are several locations based on vegetation alone that would have been ideal for the construction of *Independence*. Furthermore, because the crew of *Union* was small and had a limited time range to construct the vessel (three months), the crew probably would not have transported large timbers great distances. Thus, the availability of suitable timber within a close range was probably a factor in its construction location (Bullers 2006:30). These ideal locations include: Between *Independence* Point and the American River Township; at, or near, Strawbridge Point on the northern side of Pelican Lagoon, opposite American River; and near one of seven gullies between American River Township and Ballast Head (Bullers 2006:30). All three target sites were located within these boundaries (See Figure 23).

Site Interpretation

Independence Point (Site A)

Independence Point (Site A) was identified as a target area based on the claim made by Cumpston that he had found coal at this location. *Independence* Point is relatively close to the channel. The coastline at low tide is approximately 50 m from the present day channel. Because there is nearly a 2 m tide, the water depth between the coast and the channel at high tide could have been sufficient for launching a small schooner.

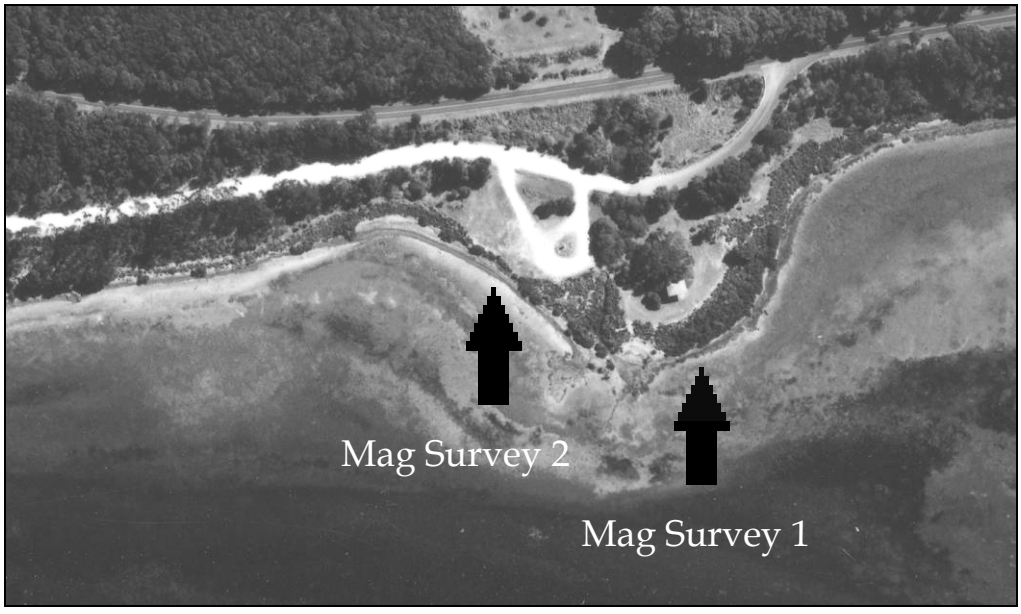

Figure 23. Aerial photograph showing *Independence* Point magnetometer surveys (Adapted from American River Aerial Photographs, South Australia Department of Environment and Heritage 2001)

Because the National Trust has turned *Independence* Point into a park, it was necessary to test the land formation to see if it was natural or culturally deposited. A series of shovel tests and cut-banks determined that most of the formation was natural. As the shovel tests neared the road, the

ground appeared to be disturbed. The natural part of the landform of *Independence* Point appears to have formed as a result of alluvial deposition from a small creek. This geologic process has endowed the area with relatively flat to gently sloping land, which would have been ideal for launching a vessel.

The creek is tidal, having little fresh water except during periods of heavy rain; however, the dynamic nature of the tide entering and exiting the creek mouth has scoured a small channel perpendicular to the shore. This small channel could have provided a natural slipway for a newly launched vessel to reach deeper water.

Independence Point sits on the west side of Pelican lagoon. It is partially protected from the south easterly winds that usually blow during the winter by Hungry Beach and High Barbaree, peninsula like land formations to the south. Additionally, the creek extends into a small valley that could have provided additional protection from the wind (Figure 10).

Pedestrian surveys located three areas in close proximity of *Independence* Point that had cultural material. The first location was adjacent to the creek. Two magnetometer surveys were established on either side of the creek because of the presence of a slag-like deposit on the shore. Magnetometer survey one (Figure 24) was conducted over an area of approximately 60 m x 40 m with survey lines being placed in accessible locations within the site. A zone of anomalous response of approximately 20 m x 10 m was observed in the western extent of the survey area (Anomaly I1-1), and several small magnetic highs were observed in the eastern extent of the survey area including anomalies I1-2, I1-3 and I1-4 (which also exhibits a magnetic low).

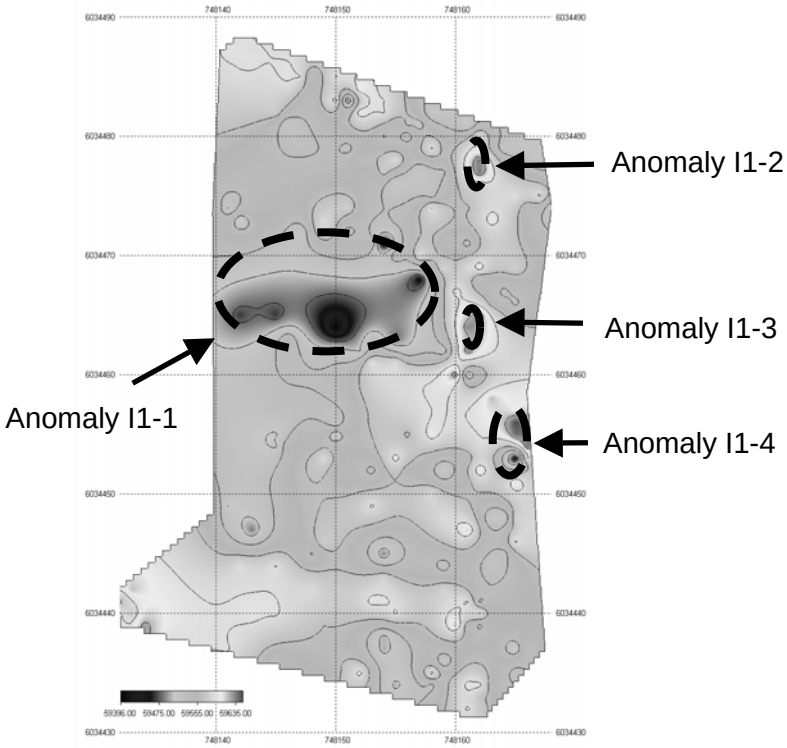

Figure 24. *Independence* Point magnetometer survey one showing anomalies (Ian Moffat 2006)

Magnetometer survey two (Figure 25) was conducted over an area of approximately 40 m x 140 m with survey lines being placed in accessible locations within the site. Two small magnetic lows were identified within the site (contained within areas showing a wider trend of magnetic low) and are designated I2-1 and I2-2. The second location at approximately 100 m south of

Independence Point was defined by a light scatter of coal. The coal was photographed and sampled. A systematic shovel test grid did not reveal any cultural material below the surface. All anomalies were investigated but were found to be relatively modern material, including a fish hook, barbed wire fencing and various sized iron nails.

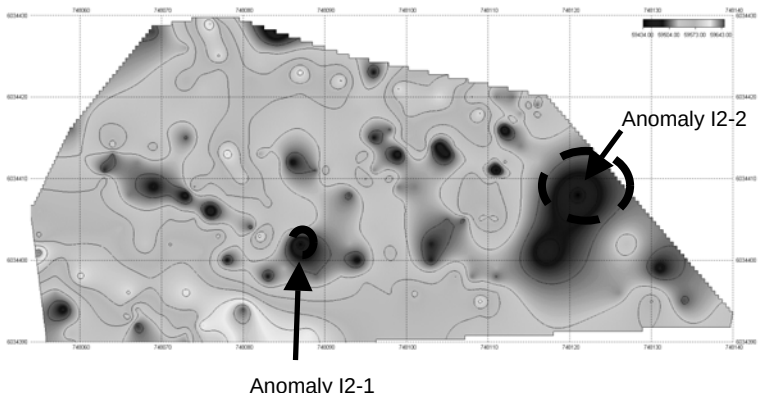

Figure 25. *Independence* Point magnetometer survey two showing anomalies (Ian Moffat 2006)

At approximately 200 m south of *Independence* Point, the surveyors found more coal, very dark green bottle glass associated refined earthenware, as well as another piece of refined earthenware (Figure 26). However, these objects were located amongst a scatter of other cultural material that dated to the later part of the 19th century. This material included amethyst glass and brown transferwares. These materials were photographed and sampled.

Figure 26. Refined shell edge earthenware near *Independence* Point (Karson Winslow 2006)

The coal scatter spread from *Independence* Point to the site of Muston, a small historic village whose inhabitants operated a steam engine in the late 19th and early 20th century salt trade. The coal scatter was very light in density near *Independence* Point and was moderate in density approaching the Muston jetty. There was much cultural material associated with the Muston jetty and the small village; however, most of it dated from the turn of the century to relatively modern, and because of this it was not sampled.

The vegetation survey revealed that substantial stands of *E.cladocalyx* grow near *Independence* Point. Additionally, the land between *Independence* Point and the American River Township is characterized by *E. cneorifolia* woodland along the foreshore, but it is mostly cleared pastureland on the western side of the highway. These pasturelands have remnant *E. cneorifolia* stands, but it

is undetermined whether this would have been the only community during 1803 (Bullers 2006:31-32).

Site A could have been a likely location for the construction of *Independence*, but its distance from the channel and the results of the shovel tests and magnetometer survey refute this.

American River Township (Site B)

The American River Township Site (Site B) probably would have been ideal for a habitation area, as it affords almost complete protection from the south easterly winds. During a pedestrian survey a very dark green glass fragment and an associated refined black transferware ceramic was found. Because of time limitations this area was not shovel tested.

The American River Township Site (Site B) magnetometer survey was conducted over an area of approximately 60 m x 20 m with the survey lines being placed opportunistically on the basis of areas of available access (Figure 27). Two zones of anomalous magnetic intensity response were observed through the survey; one being a magnetic high and another being a diffuse magnetic low. Both of these targets are considered prospective as locations for archaeological material; however due to time limitations the targets were not investigated.

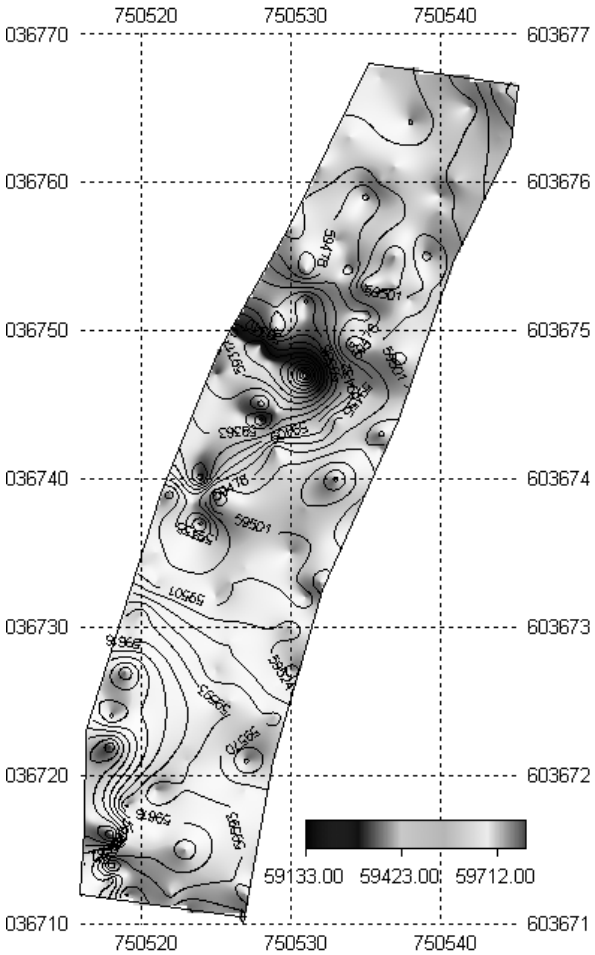

Figure 27. American River Township magnetometer survey two showing anomalies (Ian Moffat 2006)

This immediate area probably could not have served as a ship construction site because it rests adjacent to mud flats that exhibit little water depth even at high tide. Site B, however, is relatively close to the modern wharf area (Buick's Point), which would have been ideal for

launching a vessel (Figure 28). This association is important; however, it could not be assessed as it exhibits much cultural development and disturbance. A paved road runs parallel to the coast, and there is a paved parking lot with a convenience store in this area.

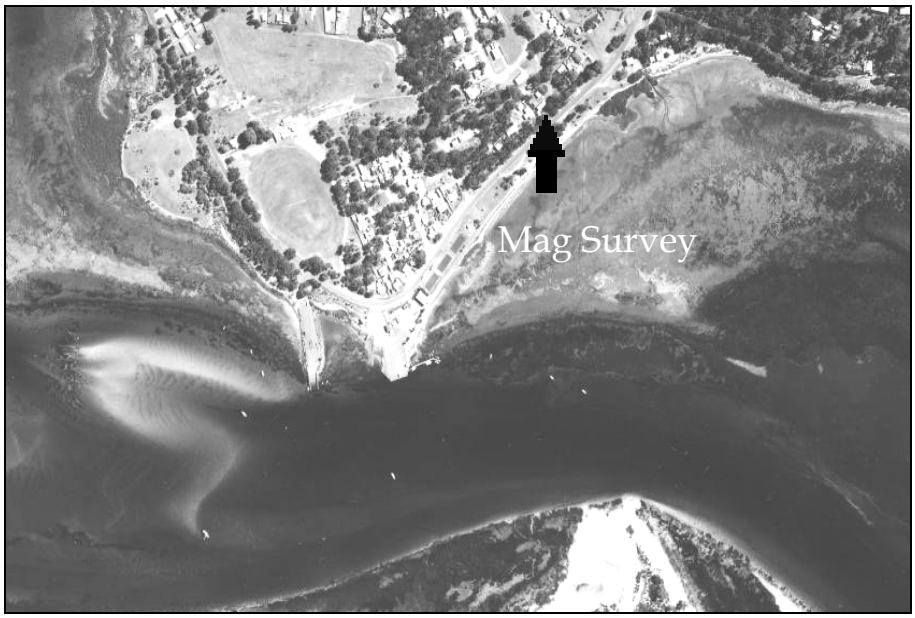

Figure 28. Aerial photograph showing American River Township (Site B) magnetometer survey (Adapted from American River Aerial Photograph, South Australia Department of Environment and Heritage 2001)

Substantial stands of *E.cladocalyx* grow in the American River Township. As mentioned previously, the land between the American River Township and *Independence* Point is characterized by *E. cneorifolia* woodland along the foreshore, but it is mostly cleared pastureland on the western side of the highway. There are remnant *E. cneorifolia* stands in these pastures, but it is undetermined whether they would have been the only community during the time of *Independence*'s construction (Bullers 2006:31-32). Towards the north end of the township, the dominant vegetative community is *A. verticillata*, low open-woodland with occasional *E. cladocalyx* emergents.

It is interesting to note that across the channel at the present day Strawbridge Point there are low-lying dune formations with dense stands of *E. cneorifolia* and *Acacia pycnantha* scrubland. Although these communities are considered unsuitable for shipbuilding, there were three isolated stands of *Callitris gracilis* near this location. These stands would produce a limited quantity of quality shipbuilding timbers. One possibility is that the crew of *Union* cut *Callitris gracilis* at this location and floated it across the narrow channel from Strawbridge Point to Buick's Point (Bullers 2006:31).

Overwhelmingly, Site B appears to be the most ideal as a ship construction site; however, because of modern development it could not be investigated. Buick's Point lies on relatively flat land and is adjacent to the channel. It would have afforded sufficient protection from the elements, and there is a freshwater creek. It is the only site surrounded by all three native timbers identified during the vegetation survey that would have been ideal for constructing a small vessel.

Fish Cannery Track (Site C)

The Fish Cannery Track Site is located to the north of American River Township. It rests on gently sloping land adjacent to a small creek. The Fish Cannery Track Site is protected from the

south easterly winds, as it lies in a large cove. The site, however, was the farthest from the channel compared to the other two sites, and launching a vessel the size of *Independence* would not have been likely as the shoreline is adjacent to a large mudflat.

One piece of very dark green, hand-blown, bottle base fragment was located in this vicinity. Based on this cultural evidence and its relation to environmental attributes, a series of shovel tests were conducted to determine if there was any cultural material *in situ*. All shovel tests were void of cultural material.

The Cannery Track magnetometer survey (Figure 29 and Figure 30) was conducted over an area of approximately 25 m x 25 m with survey lines being placed in accessible locations within the site. A zone of anomalous response of approximately 10 m x 10 m with a number of discrete magnetic lows was observed in the magnetic data (Anomaly C-1). A second smaller zone was observed to the west of this zone, however it was poorly defined due to its presence on the edge of the survey grid (Anomaly C-2).

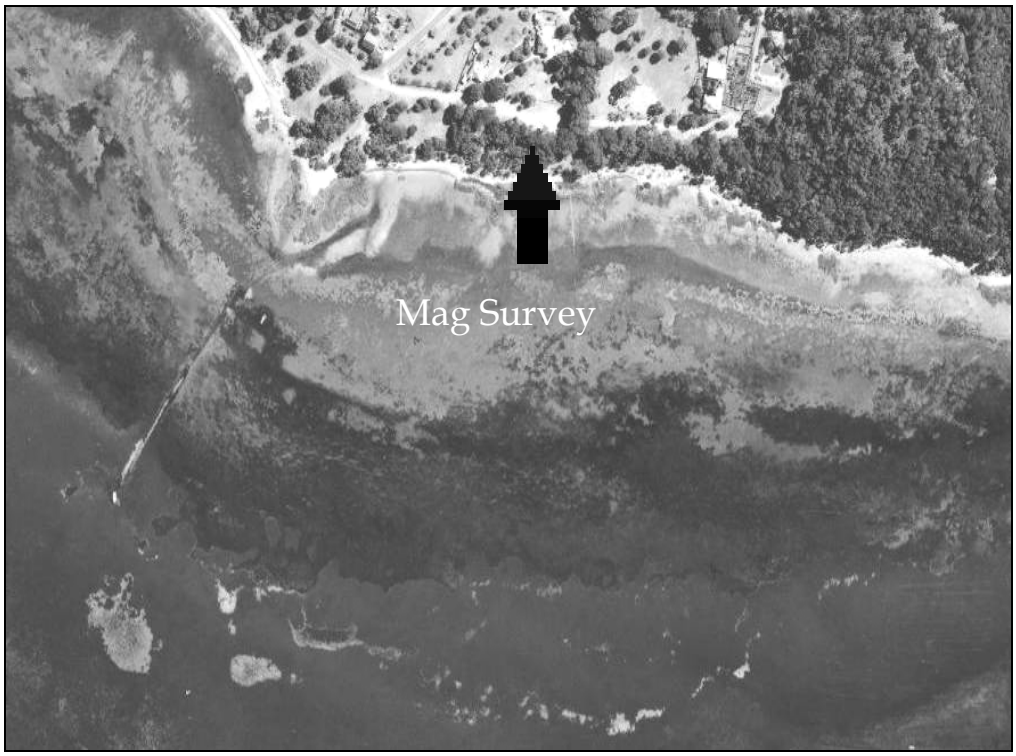

Figure 29. Aerial photograph showing Fish Cannery Track Site (Site C) magnetometer survey (Adapted from American River Aerial Photographs, South Australia Department of Environment and Heritage 2001)

Because the GPS had an inaccuracy level of approximately 10 m, the targets were investigated with a metal detector and trowel. Several pieces of lead sheeting and a lodging knee (Figure 31) were identified. The lead sheathing was collected, while the lodging knee was recorded *in situ*. A timber sample was taken from the lodging knee, and the results are forthcoming. The presence of this lodging knee is rather dubious. It could have been leftover after the construction of *Independence*, but a lodging knee would probably not have been left behind, especially when quality timber was difficult to find. It should also be noted that outer hull planking was observed on the western shore of American River and Pelican Lagoon during the pedestrian survey. Considering this, the knee could have floated to shore from a nearby shipwreck or abandoned vessel. Therefore, it is not indicative of a shipbuilding site location.

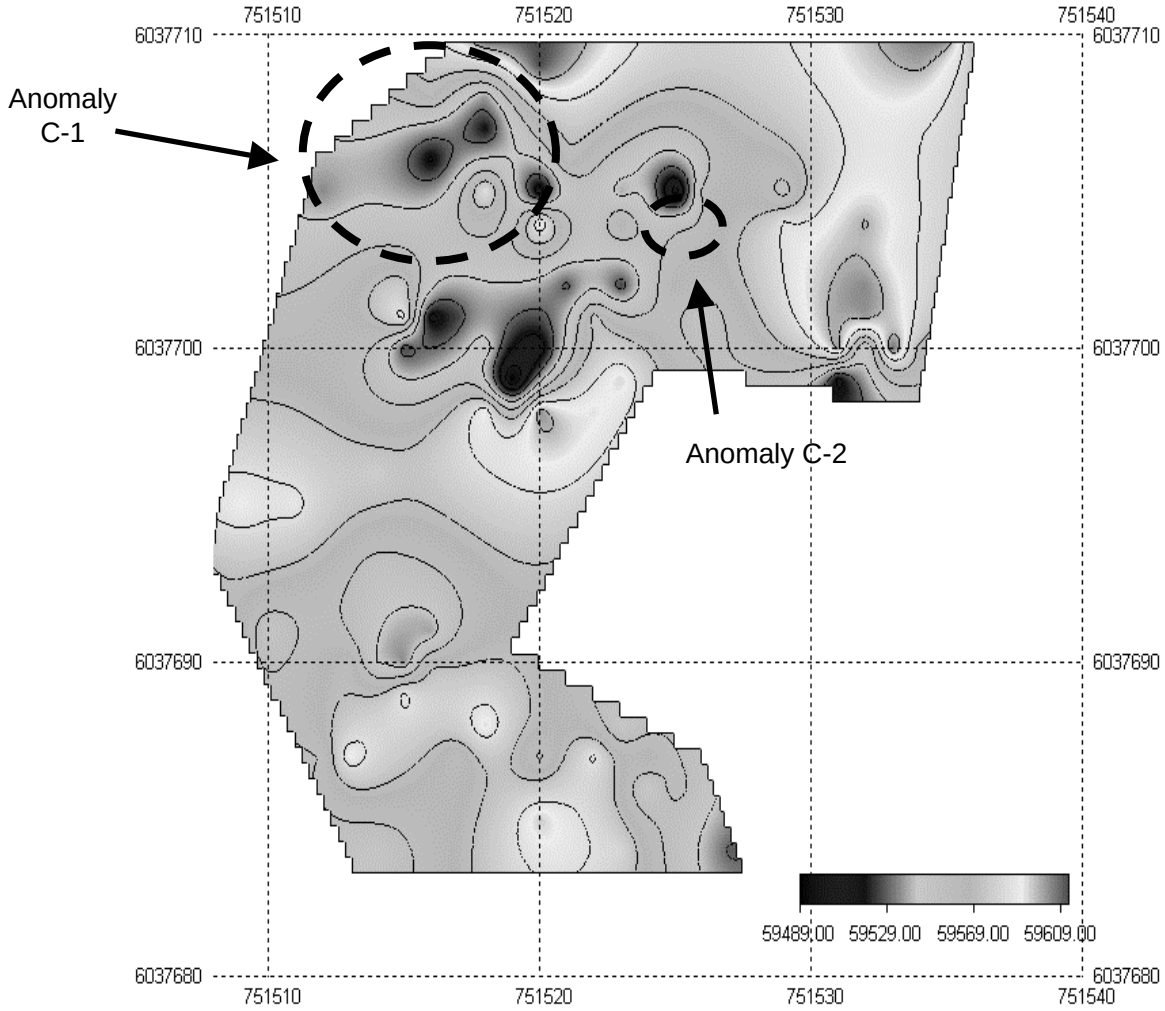

Figure 30. Fish Cannery Track Site magnetometer survey one showing anomalies (Ian Moffat 2006)

The vegetation survey revealed that this area is dominated by *A. verticillata* low open-woodland with occasional *E. cladocalyx* emergents. On the southeast facing slopes the understory was very sparse but became very dense as the track traversed the north east facing slope. The southern sides of the gullies were dominated by she-oak canopies. The first gully north of American River Township had a relatively gently fall and seemed to provide a suitable habitat for tall, straight-stemmed Sugar Gum individuals, but the second gully which had a steep fall supported no Sugar Gums along the creek line. Additionally, the Sugar Gums on the southeast facing slope were much more stunted, likely as a result of shallow, rocky soils on steep slopes. Thus, the potential for good timber along the coastline of this area reduced further north of American River, and this area is considered least likely for the location of ship construction (Bullers 2006:31).

Despite the presence of a lodging knee buried in the foreshore area, this area does not seem suitable for constructing a vessel the size of *Independence*.

Conclusion

Although this survey did not find the exact location of the *Independence* construction site, it did establish a methodology for approaching ephemeral shipbuilding locations. This project also refuted the claim that *Independence* was constructed at the area that is now known as

Independence Point. No cultural material was found that could have been directly associated with shipbuilding activities.

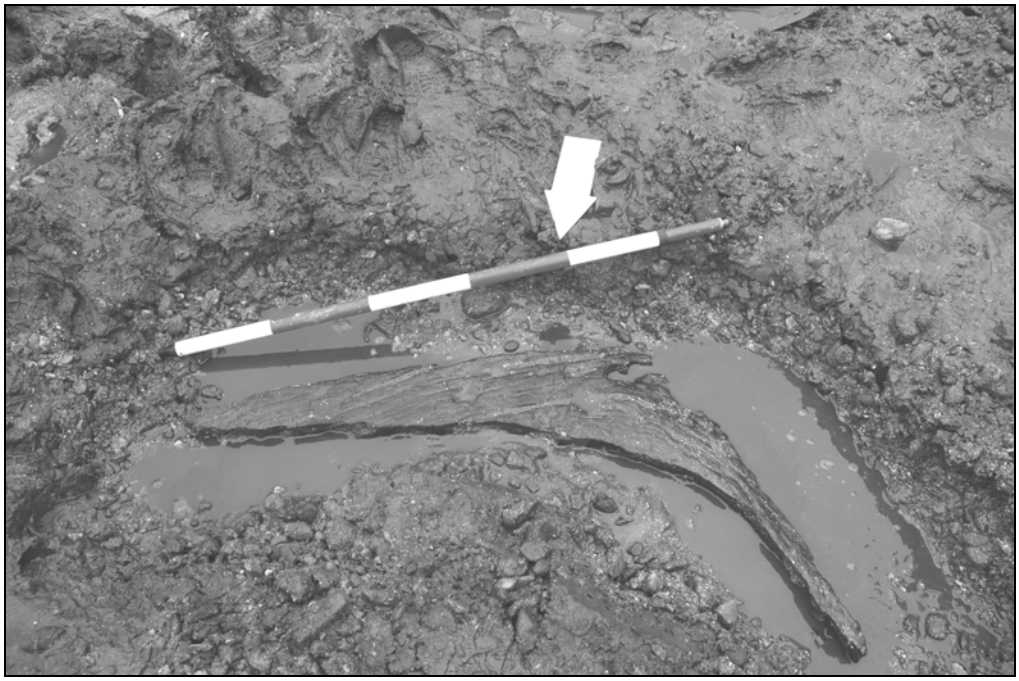

Figure 31. Lodging Knee located at Fish Cannery Track Site (Karson Winslow 2006).

Previous research on ephemeral shipbuilding locations is limited, and, thus, archaeological evidence relating to this sort of activity has not been well documented. It appears that little evidence relating to this activity survives in the archaeological record for a number of reasons. Timber decomposes rather quickly, unless it is in an anaerobic environment. Thus, timber scabs do not survive as archaeologically recognizable surface scatters. Similarly, launching ways and supportive timbers were probably broken down and stowed aboard the vessel as spare timber or firewood, and carpentry tools were probably not left behind, as these items were often considered valuable commodities aboard a working vessel. Forging activities, on the other hand, are probably the most likely to be identified in the archaeological record.

Even though the *Independence* construction site remains unknown, the legend of the vessel being constructed near American River plays a significant role in the maritime heritage of Kangaroo Island and South Australia. As the first non-indigenous vessel constructed in South Australia, *Independence* also represents an important aspect of Australian history. This is exemplified in the construction of a monument dedicated to its construction. It also has international significance, as the era of sealing in the Pacific represented an important component of the globalization of US trade during the 19th century.

None of the anomalies discovered through magnetometer surveying yielded features of archaeological interest. While not all features were systematically tested it is thought that those that were and did not yield a source for the anomaly may be the result of heading errors or anthropogenic noise due to the complex site history. In addition, surveys in other areas have shown that reconnaissance geophysical surveys should be groundtruthed with detailed surveys with multiple methods over the identified anomalies (the bi-partite survey methodology) to ensure that positional accuracy and level of information about each site is high enough to accurately guide intelligent excavation (Moffat *et al*., 2006). Should further investigation of this site be conducted, detailed geophysical survey over the identified anomalies would form part of the investigation strategy.

Acknowledgments

The search for the *Independence* construction site would not have been possible without the assistance of many people and organizations. My gratitude extends to the field crew including Mark Staniforth, Jennifer McKinnon, Jason Raupp, Rick Bullers, Karson Winslow, Toni Massey, and Paul Sjordal, and to Ian Moffat for analysing the geophysical survey data. I would also like to thank several individuals who conversed with me about the historical interpretation of *Independence*, including Mary Thacher and Anne Tate of the Stonington Historical Society, Bill Peterson of Mystic Seaport, Richard Ryan of the Townsend Society of America, Terry Arnott of the South Australia Department of Environment and Heritage, Anthony Brown, Joan Fawcett, and the Klieve Family of American River. I would also like to thank many of the institutions who graciously opened their doors for historical research, particularly the Richard A. Woolworth Library, Mystic Seaport, the Townsend Society of America, the American Geographical Society, the New South Wales State Library, the South Australian State Library, and the South Australia Department of Environment and Heritage. Finally, gratitude is extended to Flinders University for a University Research Budget Postgraduate Grant that provided funding for this project.

5

A View from Above: Archaeological Site Inspections in East Gippsland, Victoria

Jason Raupp, Karson Winslow, Agnes Milowka and Brian Williams

In October of 2006 Flinders University Program in Maritime Archaeology students and staff participated in an archaeological site inspection program in the south eastern Gippsland region of Victoria. The Port Albert Practicum was designed to provide students with an opportunity to assist archaeologists from Heritage Victoria's Maritime Heritage Unit (MHU) in inspecting historic shipwrecks and documenting terrestrial sites with maritime associations. Students also processed field data, conducted archival research and produced a final project report. The project was a great success and proved beneficial to each of the groups involved.

Field crewmembers consisted of Heritage Victoria archaeologists Peter Harvey, Cassandra Philippou and Liz Kilpatrick; Flinders University technical officer Jason Raupp and maritime archaeology graduate students Karson Winslow, Agnes Milowka and Brian Williams; and Maritime Archaeological Association of Victoria members Peter Taylor, John Riley and Jim Anderson. While the project was headquartered in Toora, sites were investigated throughout south-east Gippsland. This region is particularly important due to the number of historically significant colonial shipwrecks as well as terrestrial sites associated with its mining past.

This is not the first project on which Flinders University and the MHU have worked together; Heritage Victoria has been an important partner in educating Flinders students through providing fieldwork opportunities and assisting in teaching annual field schools. This practicum program demonstrates the potential for state and federal agency archaeologists to mentor students through practical experiences.

Brief History of East Gippsland

Victoria's East Gippsland region has a rich history. While the area had been the home of Indigenous people for over 30,000 years, the first European explorations occurred when George Bass sailed into Corner Inlet in 1798 (Fleming 1977). Throughout the early part of the 19th century only sealers and whalers inhabited the Gippsland coastline. A severe draught in 1838-39 forced stockowners from New South Wales to see new pastures for their famished herds led them to Gippsland (McRae 1976:54). By 1840 groups of settlers seeking useable farm lands arrived in the region and established a small settlement known then as the Old Port (Bull 1966).

As a result of the wrecking of P.S. *Clonmel* in 1841, the leader of the rescue party established a settlement on the east bank of the Albert River, just west of the Old Port. Two years later that

settlement was moved to its present site, where streets and allotments were laid out. As the first major port in East Gippsland, Port Albert became a significant export centre where goods produced in the region were carried on iron steamships to Melbourne and Sydney (Love 2003). Today Port Albert provides direct access to a safe harbour for local boating and fishing industries.

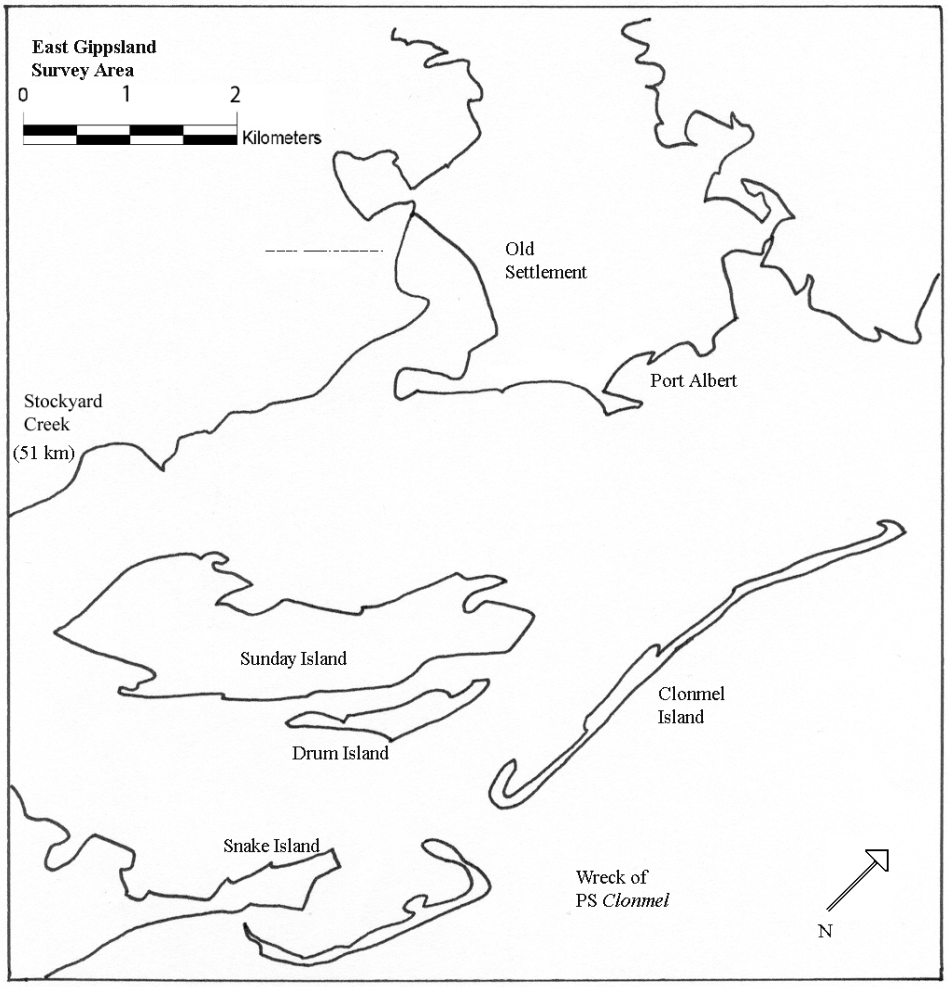

Figure 32. Map of project area (Karson Winslow 2006)

Site Inspections

The Port Albert Practicum was run in conjunction with an ongoing program of wreck inspections that are routinely performed by MHU archaeologists and volunteers (Figure 33). This particular region was chosen based on the need to assess the recent placement of a hazard buoy system on the wreck of P.S. *Clonmel*, and to investigate recent reports of undocumented sites. Though plans initially included seven site inspections and a marine magnetometer survey, rough seas resulting from the survey area's exposed location only allowed for inspections of three shipwrecks (S.S. *Blackbird*, P.S. *Clonmel* and P.S. *Thistle*) and a riverine landing site (Stockyard Creek).

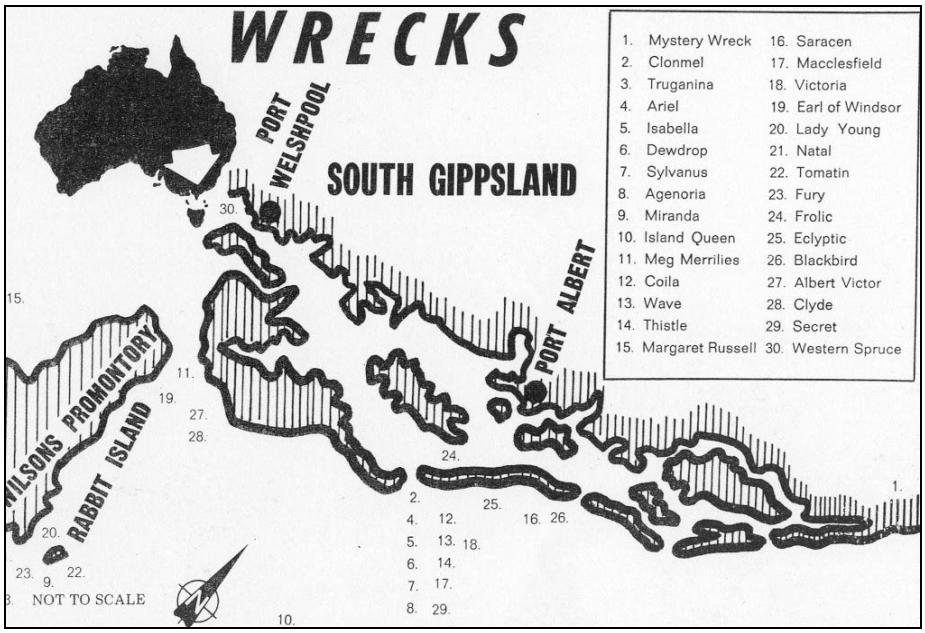

Figure 33. Location of wrecks around Port Albert, Victoria (Loney 1985)

S.S. *Blackbird* (1863-1878)

The iron-hulled screw steamer S.S. *Blackbird* measured 196.4 ft (59.9 m) in length, 28.2 ft (8.6 m) in width and had a 16.7 ft (5.1 m) depth of hold. Built in Newcastle on Tyne in 1863, the 655-ton, three-masted barque was equipped with a two-cylinder, 80 horsepower steam engine. Purposely constructed for the Australian coastal trade, the steamer spent most of its career operating between Newcastle and Melbourne. On the early morning of 2 June 1878, *Blackbird* was loaded with 800 tons of coal bound for Melbourne. Rough conditions caused the captain to make a fatal navigation error and the vessel ran ashore, however no lives were lost in the incident (Love 2003).

The wreck lies in approximately 5 m of water and is located at 90 Mile Beach just off Clonmel Island (Figure 34). The goal of the investigation was to relocate the site and record accurate GPS positions for the separate bow and stern sections, and to complete an overall site inspection. Exceptional visibility and clear skies allowed for both the bow and stern sections of the wreck to be seen from the surface, which easily allowed their positions to be fixed. However, increasing swell and time constraints prevented divers from investigating the site. Though the wreck appears from the surface to be stable, it is recommended that it be re-visited by the MHU staff in the near future for underwater survey and monitoring.

P.S. *Clonmel* (1836-1841)

The wooden vessel P.S. *Clonmel* was built in Birkenhead, England in 1836 and measured 154.8 ft (47.2 m) in length, 21.5 ft (6.6 m) in width and had a 16.6 ft (5.1 m) depth of hold. The 600-ton, schooner-rigged steamer set out for Melbourne from Sydney on its second trip since its arrival in Australia. While navigating the Bass Strait, P.S. *Clonmel* was pushed to shore near Wilson's Promontory by strong winds and currents. At approximately three o'clock on the morning of 2 January 1841, the vessel ran aground near Corner Inlet and was pushed onshore by incoming swells. Using the ship's boats the captain transported the 42 crew and 38 passengers to nearby Snake Island. Realizing help was not coming, a contingent of seven men set out for Port Philip Heads in one of the ship's boats. Nearly three days later they reached the Heads and then returned with the cutters *Sisters* and *Will Watch* to rescue the remaining survivors. While the wreck was seen as a major setback to the development of intra-colonial transport and those

settling in the Australian colonies, it led to the discovery of Port Albert and the subsequent opening up of the East Gippsland region for trade and agriculture (Harvey 1999).

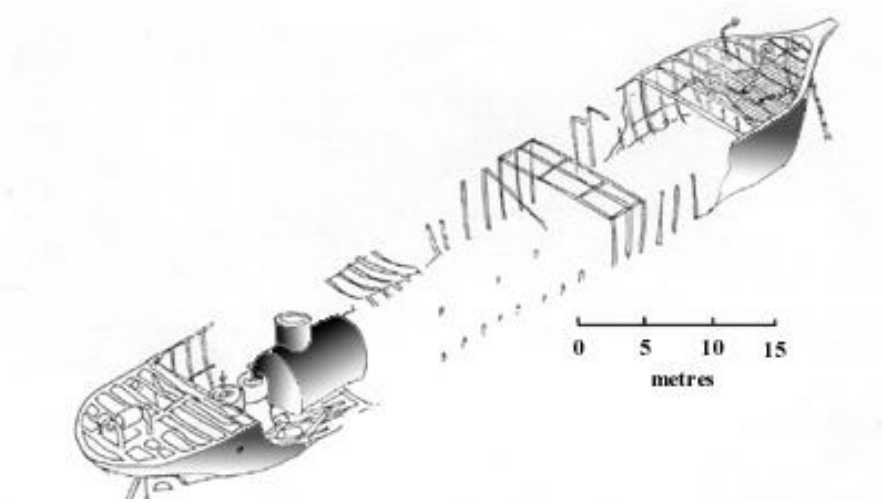

Figure 34. Isometric site plan of the P.S. *Blackbird* site (Goff Hewitt 1997)

The wreck of *P.S. Clonmel* is listed as a Commonwealth Historic Shipwreck site and is protected under Australian federal law as a marine area. Diving and fishing activities on the site are prohibited without a permit. Resting on the eastern side of Port Albert Channel approximately one half of a nautical mile from the easterly tip of Snake Island, the wreck is situated in 8 m of water. At low tide the apex of the boiler structure is exposed. This wreck has been extensively documented over the past 20 years and is considered to be one of Australia's most important steamship wrecks (Figure 35).

The site was surveyed over the course of three days and average conditions generally consisted of a slight swell and an approximate 1.5 knot current. A total of 6 dives were conducted with visibility ranging from 2 to 4 m and water temperatures averaging 15 degrees Celsius.

Since the last site inspection, a large buoy system has been deployed on the site to warn vessels of the hazard to navigation presented by the boiler structure. This system consists of a large, highly-visible, yellow buoy attached to a long section of heavy steel chain. The steel chain is then connected to a 1.5 cubic meter concrete block which is supposed to be located off the wreck site to prevent damage to the structure. Therefore one objective was to map the exact location of the concrete block in relation to the wreck and document any damage caused by its presence. The block was found positioned approximately 1 m from the vessel's keelson remains and the chain was causing damage to the shipwreck. Unfortunately, the system has been deployed far too close to the wreck and needs to be repositioned, removed or replaced with another type of marker (possibly a pylon marker) to prevent further damage.

Some newly exposed artefacts were identified on the site; all artefacts were photographed and remain *in situ*. The first artefact documented is most likely a tallow cup for oiling an engine component. The cup is made of copper or a copper alloy (based on the presence of a green patina) and it is 3 cm in diameter at the top and 1 cm at the base (Figure 36). Other artefacts included a partially exposed glass bottle of unknown manufacture and filled with sediment and several previously undocumented sections of lead and copper piping, which averaged approximately 8 cm in diameter and are probably associated with the steamer's engine and/or boiler.

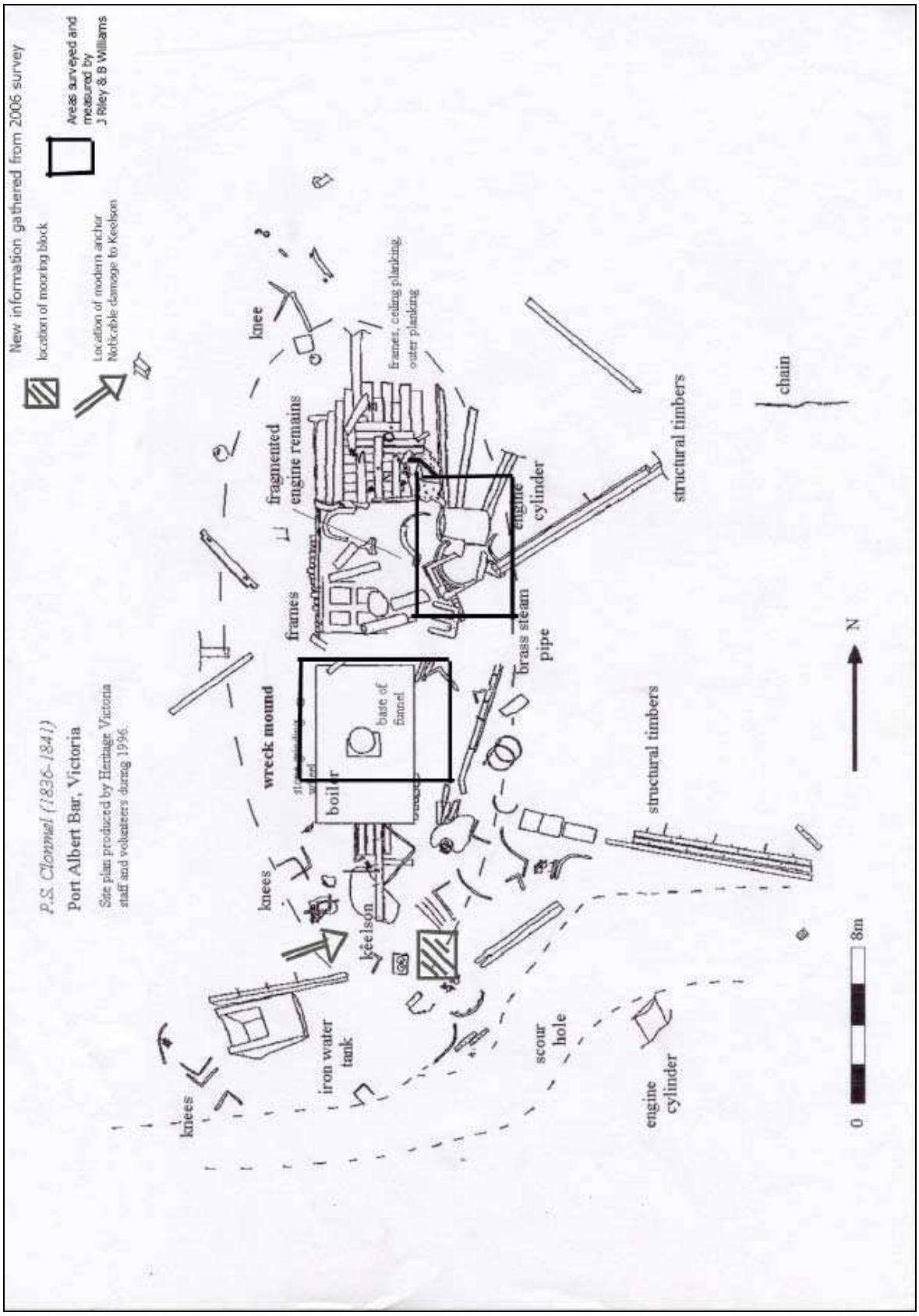

Figure 35. *P.S. Clonmel* site plan showing locations of hazard buoy pad and damage from modern anchor and chain (Maritime Heritage Unit 1996)

A modern anchor and chain was also found wrapped around the keelson. At this location approximately 40 cm of concretion has been stripped away, leaving the underlying iron exposed.

The presence of this anchor is evidence that unauthorized divers or fishermen have visited the site at least once since the last inspection.

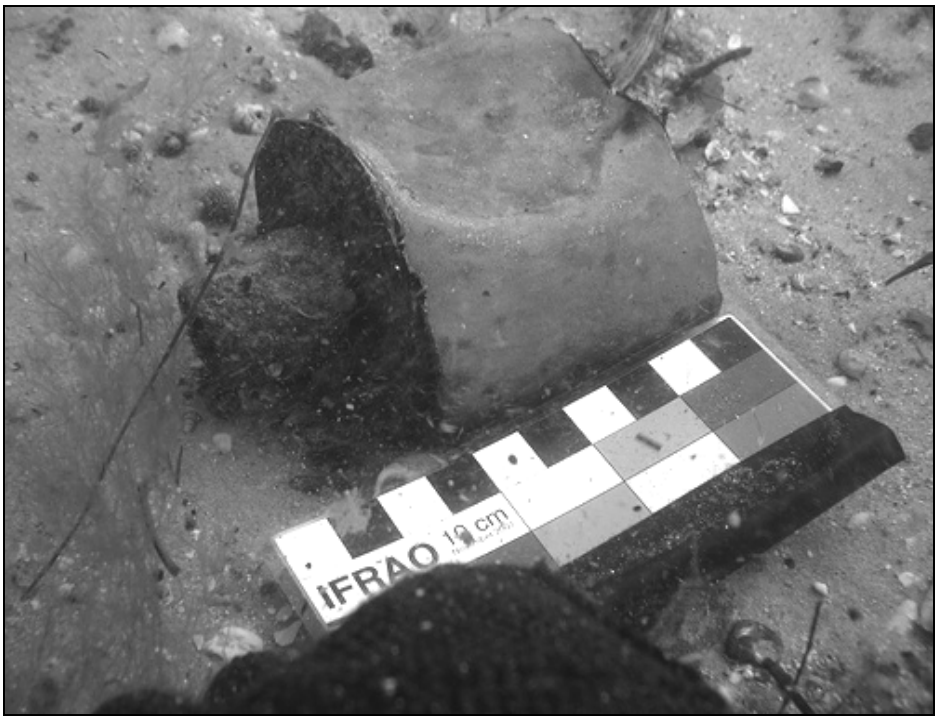

Figure 36. Possible tallow cup from P.S. *Clonmel* site (Agnes Milowka 2006)

P.S. *Thistle* (1845-1859)

The iron steamer P.S. *Thistle* was built in 1845 in Poplar, England for the Hunter River System Navigation Company and measured 148.7 ft (45.3 m) in length, 19.5 ft (5.9 m) in width and had an 11 ft (3.4 m) depth of hold. The 278-ton vessel spent most of its career on the eastern coast of Australia, but in 1859 it was purchased for the Port Albert – Melbourne trade. On 23 December 1859 *Thistle* grounded in a gale while en route from Melbourne to Port Albert. Although all 70 passengers made it to shore safely, numerous businesses in the Gippsland region suffered great losses, as most of the cargo was uninsured (Loney 1971).

The wreck of P.S. *Thistle* is located on the west bank of Port Albert Heads. The site was only inspected once due to increasingly rough conditions in its general area. Conditions on site on the day of inspection consisted of a moderate swell, an approximate 0.5 knot current, an average water temperature of 15 degrees Celsius and a maximum visibility of 1 m.

Objectives included inspecting and photographing the engine and boiler and gathering data necessary to test a theory concerning the structural integrity of the subsurface remains. Unfortunately, due to poor visibility, photo documentation was ineffective and attempts to survey the entire site proved futile. Therefore the dimensions of the crank shaft were recorded, and depths at various areas around the boiler and engine measured to determine the amount of sand accumulation which had occurred on the site since the last visit (Figure 37).

Snake Island Site

The purpose of the visit to Snake Island was to assess the remains of an historic jetty structure and machinery located on the island, and to attempt to locate a recently reported shipwreck. While previous surveys found scatters of both ceramics and glass (Duncan 1998), which indicated some early activity there, no comprehensive survey of the area has been completed. A

local fisherman reported a wreck containing large copper fastenings on the foreshore. Since no such site had been located on the island to date and the wreck was reportedly of copper fasteners (suggesting an early construction date), MHU archaeologists were very interested in locating it and assessing its significance.

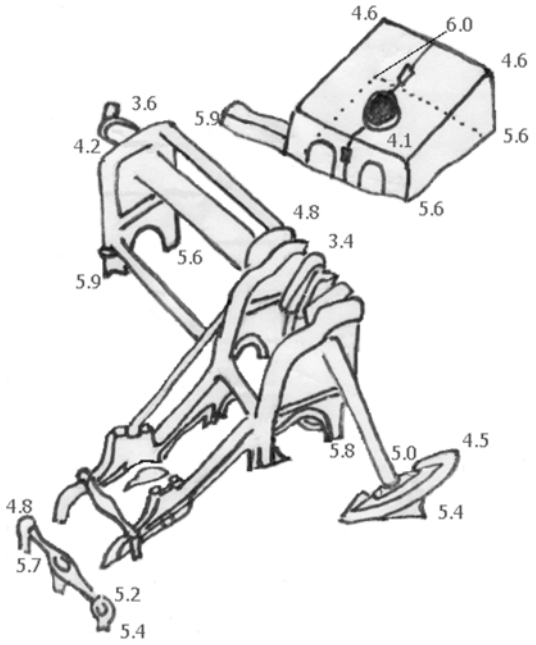

Figure 37. Remains of P.S. *Thistle* engine showing recent sedimentation and depths from surface in meters (Brian Williams 2006, based on Riley 2003 and Hewitt 1997)

Unfortunately environmental conditions prevented the crew from reaching the shore and no survey of the island could be undertaken. Instead, MHU archaeologists used the opportunity to test the potential for a kite-mounted camera to acquire aerial photos. MAAV member Jim Anderson's box kite was flown and aerial images were successfully captured, thus proving this to be an inexpensive and relatively easy tool for obtaining aerial images.

Extremely low tides and rough conditions prohibited site inspections and surveys at Snake Island. Based on the report of the copper-fastened shipwreck located on the island, it is recommended that the site be re-visited by MHU staff to verify the existence of this wreck.

Stockyard Creek Site Complex

In response to reports of a possible landing site near the town of Foster, a team was sent to investigate the area. According to a local informant this site was originally established as a landing for unloading and loading cargoes going to and coming from the goldfields at Walhalla. The site reportedly initially consisted of a wharf and a small rail line that was used to transport shipments, but as activity increased a hotel and two boarding houses were established on an island on the northern side of the creek. Professional fishermen later used the site as a mooring point for their vessels and at one stage as many as five of vessels were based there. Preliminary investigations of this area proved interesting and prompted additional historical research.

History of Stockyard Creek

As drovers moved cattle between Port Albert and the settlement at Westernport, a stock route was established which linked the two. Originally nothing more than a rough trail along the coast that crossed a number of rivers, creeks and watering holes, this route gradually became more defined. One of the creeks that the trail crossed became known as a good watering spot, and over

time stockyards were built on the creek's west bank to facilitate overnight stops. A settlement was established only a half mile downriver from the stockyards and thus became known as Stockyard Creek (Wilson 1950).

The Stockyard Creek area was heavily timbered with large quantities of black-wood ideal for palings. In 1869 a group of entrepreneurial timber splitters illegally set up camp on the banks of the creek. Given the difficulty in accessing the area, their illegal activities received little attention from inspectors. However the suspicion and interest of the local Crown Land Ranger was finally aroused and he decided to personally investigate the matter (Cunningham and Esler 1995).

Luckily for the group John Amey, an ex-convict from Tasmania who had established a farm a few miles east of Stockyard Creek, had an interest in the timber business and not only warned the men but also suggested they pose as prospectors in order to explain their presence in the area. When the five timber workers moved up the creek, they happened upon gold deposits. Together with Amey the group promptly went to register their claim (Fleming 1977).

Due to the mining by-laws which existed in Gippsland at the time the group could only stake a claim measuring 800 yards (731 m) along the creek by 100 yards (91.5 m) across. Luckily for them the mining by-laws also stipulated that any discoverer could increase their holding by an extra five miles (8 km) from a new claim. Upon staking the new claim the claim was called "The Great Uncertainty" and later divided into two parts (Wilson 1950).

News of gold spread through the colony and prospectors rushed to the area. Access was difficult, and while some made the overland journey, the most practical route was by sea. Small steam vessels brought the miners across from Port Albert to Stockyard Creek at high tide and unloaded passengers at the landing two and a half miles (4 km) below the developing settlement. Initially newcomers carried their possessions into town on foot, but soon after the Buln Buln Tramway Company built a wooden, horse drawn tramway from the landing into town. The tram was constructed entirely of blue gum timber, including the spikes and rails, and utilized one luggage and two passenger trucks. (Fleming 1977).

Early settlers lived in tents, but when families began arriving log huts were constructed. By June 1871 the town's population numbered 700 people and included stores, houses and hotels. Two hotels were erected at the landing site of Stockyard Creek. During the major growth in the area Police Magistrate William Henry Foster was sent to officially name the township. Originally he proclaimed the name "Stockyard Creek Diggings" because of the gold fields; however, on that same day the town's people voted to rename the city "Foster" (Cunningham and Esler 1995).

In the 1880s an exodus occurred as gold sources were exhausted. Many of the prospectors left to seek fortunes elsewhere. Some returned in hopes of finding new veins, while others looked to dairy farming and agriculture. The Stockyard Creek landing was later converted into a wharf and maintained by the local community (Figure 38).

Archaeological inspection

Though the entire area is considered to be one archaeological site, for ease of survey it was divided into two separate sections. For the purposes of this preliminary survey, the first section was called the Stockyard Creek Site and is located on the south western side of the creek, and the second was called Stockyard Creek Island Site and is located on a small island in the creek to the north. A mud map of the entire site was drawn which included both sites and all major features associated with the various uses of the sites (Figure 39).

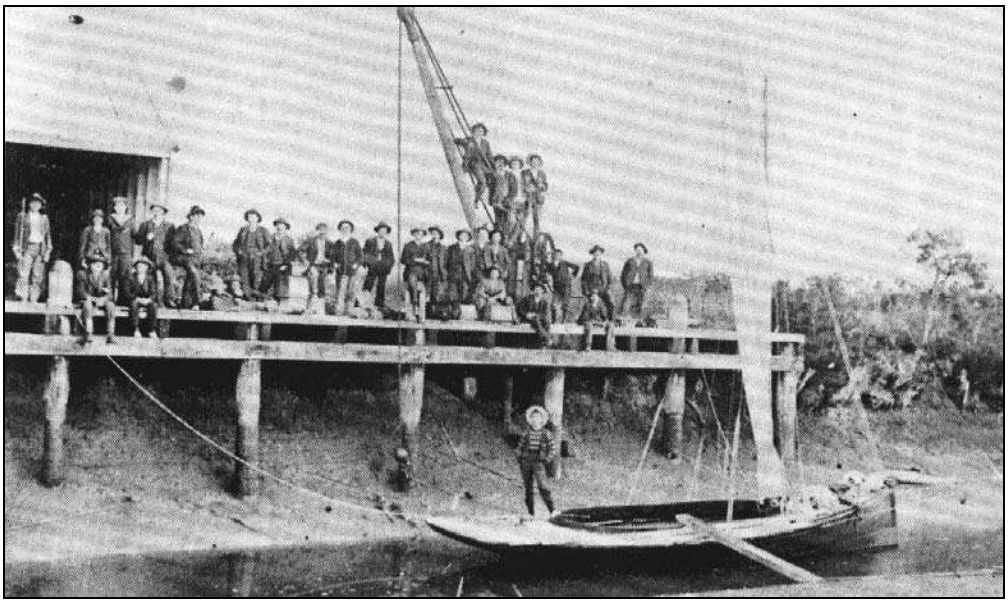

Figure 38. The jetty at Stockyard Creek landing where all goods were landed to supply the gold fields (Victorian State Library)

Stockyard Creek Site

Several major features are associated with the Stockyard Creek Site. The first of these is associated with its current use as a public recreation area. Components include an open, grassy area and a modern, concrete boat ramp used for launching small water craft. Signage relating to fishing regulations and conservation is present; however the poor condition of the ramp suggests that the park has been neglected.

The next feature of the site is the remains of a possible historic slipway. Situated alongside the boat ramp, this site may be associated with some type of shipyard activities. Visible components include 9 railway sleepers (used to support the rails) and approximately 10 m of track (Figure 40). Approximately 20 m onshore of the rails is the remains of a possible winch system which would have been used to haul vessels in and out of the water; depressions where the rails would have lain can be seen across the distance between the two. On the creek bed in the vicinity of this winch bed is the remains of possible cable drum that is likely associated with this system.

Associated with this possible slipway are two small 'trucks' that were likely used on the rails. These are approximately 0.5 m wide and consist of one axle and two wheels connected to a timber frame and held in place by hand carved wooden blocks. One of the two trucks had a large (approximately 2 m), slightly curved timber attached to the top of it. The wheels were six spoked and uniform in manufacture and size. The recorded dimensions of one wheel were 230 mm outer diameter, 30 mm diameter hubs and 70 mm thick. Axle diameters varied from 35 mm to 65 mm and tapered to 30 mm to fit into the hubs; this inconsistency suggests that the axles were not purpose made.

All of these components appear to be associated with the practice of hauling wooden fishing vessels out of the water to complete necessary repairs. The rails do not run in to the water at low tide, suggesting that if used for this purpose the operation had to be undertaken at high tide. No historical information relating shipyard activities at the site has yet been located.

The next major feature is the remains of a possible rail bed. Running parallel to the creek over the entire length of the site, it continues beyond the area surveyed. A local informant stated that this substantial feature is associated with the earliest activities at the site and was built to

transport supplies to the Victorian goldfields. It consists of a low, truncated mound of compacted dirt averaging approximately 40 cm high and 2 m wide. Aerial images captured via the kite-camera show consistent and evenly spaced depressions which are presumed to have been left by rails that have since been removed (Figure 41).

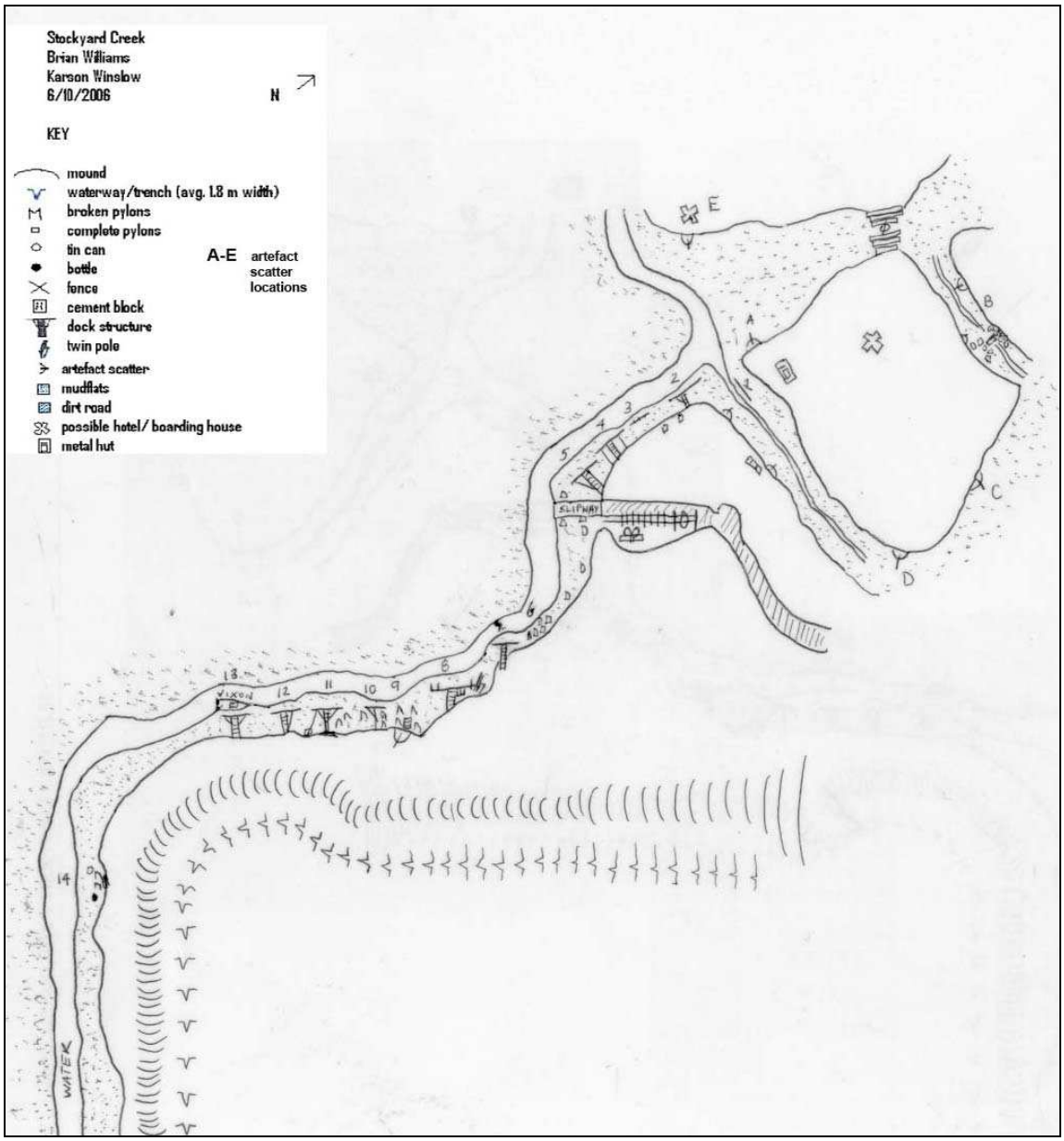

Figure 39. Mud map of Stockyard Creek Site Complex (B. Williams and K. Winslow 2006)

Another major feature of Stockyard Creek is a series of structures associated with mooring vessels. A total of 14 dock structures were identified in varying conditions. Each of these was documented, ascribed an arbitrary number, given GPS coordinates, photographed in their current conditions and provided physical descriptions including approximate size and the number of pylons present (Figure 42). Structurally the docks were similar, mostly consisting of a T shaped superstructure. Their random distribution along the creek suggested no particular order for their construction. Based on the many irregular pylon positions and the presence of timbers of varying ages, it is apparent that they were upgraded or newer docks were built on top of older ones that had fallen into disuse or disrepair.

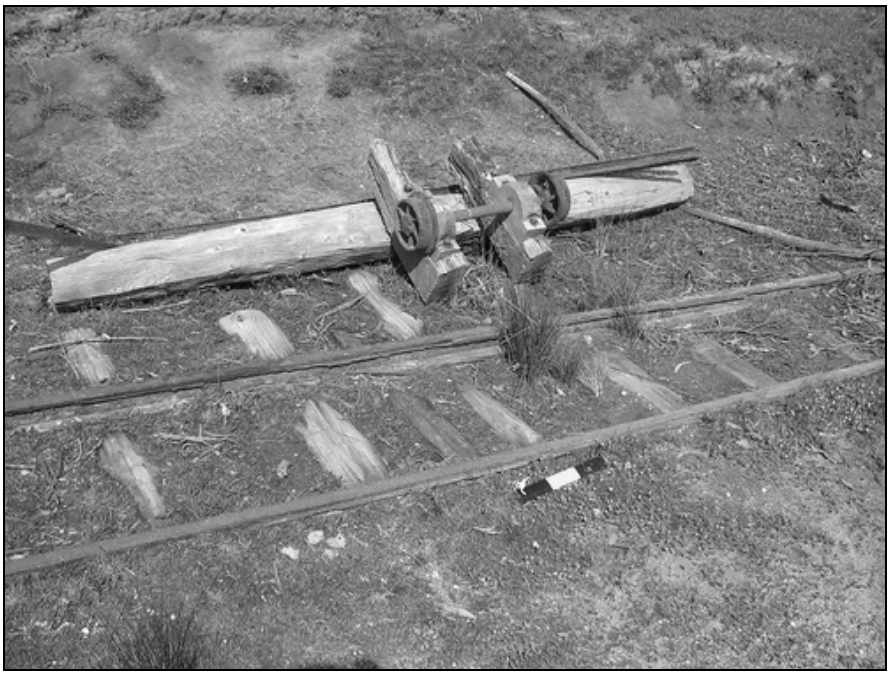

Figure 40. Remains of possible slipway and one "truck" used in its operation (Agnes Milowka 2006)

Figure 41. Aerial view of the rail bed; note the faint outline of depressions made by tracks (Jim Anderson 2006)

While some of these are obviously modern dock structures, two of them are thought to be much older. Designated as Dock One and Dock Nine, their sizes, locations and conditions indicate that they are quite significant. Of these Dock Nine is located among the modern structures on the western bank of the creek and Dock One is located on the northern side of the creek and is likely associated with activities of the island.

The remains of Dock Nine consist of 10 heavily deteriorated pylons (in varying states of decay) in uniform positions in two parallel rows (Figure 42). One row is placed very close to the top of the bank of the creek, while the other row is approximately 3 m out onto the creek bed. Based on the diameter of the best preserved of these (approximately 40 cm) and their placement pattern, it is proposed that these could be the remains of a wharf structure associated with the occupation of the site during the gold rush in the 1870s. On top of the creek bank in front of these were found small bits of brick and charcoal which might indicate a previous structure in the vicinity.

Figure 42. Remains of Dock Nine; note the advanced level of deterioration which suggests an earlier construction date than the others (Agnes Milowka 2006)

The last major feature of interest was located at the northwest side of the site. There a small circular area (approximately 2 m squared) had been dug out of the bank of the creek and several broken bottles and shards dumped in a pile. Initially this area was though to be a midden or historic refuse dump, however closer inspection led to the determination that it was instead evidence of looting activities. Probably created by bottle hunters, it contained broken bottles and shards of many different types, including green wine bottles, champagne bottles and modern beer bottles.

Isolated artefacts were also located in many locations around Stockyard Creek Site. Most of these were bottles and bottle glass shards of varying types (mainly wine and champagne). Other artefacts included ceramics sherds (plain white ware), a section of thin timber (possible planking) with several small copper fasteners attached and small pieces of possible copper sheathing. Based on their location these are thought to be associated with possible shipyard activities. Charcoal was also noticed eroding out of the wall of the boat ramp. All artefacts were left *in situ* and their locations and details were recorded with GPS, photography and mapping.

Stockyard Creek Island Site

Situated in Stockyard Creek is an island which is only accessible by crossing the mud flat. Known by the local informant as the 'Island,' this was reported to have been the site of a hotel and two boarding houses which accommodated settlers to and from the Walhalla Goldfields. Aerial photos (again captured by the innovative kite-camera) reveal a large area in the island's centre that was cleared of timber at some point but is now completely overgrown with scrub trees and blackberry bushes; this vegetation is considered indicative that the area has not been developed since that time.

Several major features of this site were located and recorded. The first of these is the remains of another possible wharf structure (Figure 43). Initially this was considered to be another recreational dock and was included in the dock structure survey, and as previously mentioned, was designated Dock One. However, closer inspection revealed that it was likely the remains of a wharf that ran along the shoreline and was used for loading and unloading passengers and cargo. The approximate length of the structure is 8 m and based on its position and the apparent age of its deteriorated timbers, it is suggested that this structure was likely associated with the hotel or boarding houses reported to have been in operation on this side of the creek.

Figure 43. Remains of Dock One (Agnes Milowka 2006)

The next feature of the site is a log bridge which allows access to the island from the mainland **(**Figure 44). This bridge is composed of approximately 30 felled trees of varying diameters and averaging 3 m in length. This structure spans a section of the creek approximately 10 m wide and creates a semi-dry path across the muddy creek bed (Figure 45). While this may be a modern bridge constructed by land owners to allow cattle to cross, the apparent age and condition of the logs may warrant further inspection.

The remains of another bridge were located between the island's northern shore and the mainland (Figure 45). This is presumed to have been associated with the reported railway and rail bed remains located on the main site. It is composed of several pylons placed at regular intervals which span the creek for a distance of approximately 25 m. There is evidence of two

separate building episodes; the first are several pylons that are obviously very old and deteriorated, and the second are more modern pylons that appear to have been placed to reinforce the originals. Possible building remains (bricks) were noted on the island side of the bridge base. Of particular interest was the presence of a builder's string attached to a screwdriver implanted in the bank on the island. This string stretched across the more recent bridge remains to the opposite bank.

Figure 44. Possible log bridge (Jason Raupp)

Figure 45. Remains of rail bridge (Liz Kilpatrick)

Several artefact scatters were also located at various points around the island. These areas were recorded and each was given an arbitrary number (Figure 40). Artefacts in Scatter 1 included 'hotel' ware and transfer print sherds; those in Scatter 2 consisted of construction materials such as bricks and mortar; Scatter 3 artefacts included wine and champagne bottles and shards, stoneware sherds, white ware sherds, a ginger beer bottle sherd, and a possible Rhine ware transfer print sherd with a partial makers mark; and Scatter 4 artefacts included a cache of wine

and champagne bottles. Several isolated wine and champagne bottles were also found around the site; however their locations were not mapped due to their large number. A case bottle neck, a copper nail, and window pane glass were also located across the creek; though not directly on the island this area was called Scatter 5 and recorded.

Due to time constraints only preliminary investigations of the sites at Stockyard Creek sites were undertaken. Evidence from the sites, including remaining structures and artefacts, support the local knowledge that the site was once a landing and settlement site dating to the Victorian gold rush era. For this reason it is recommended that intensive historical research be conducted to determine as much information as possible regarding the establishment of this site and changes it underwent through time. Additional non-intrusive archaeological investigations should also be undertaken. Such investigations should include a multi-technique geophysical investigation strategy involving ground penetrating radar, electromagnetic induction, and magnetometry to determine targets that might indicate structural remains both on the shore and on the mud flats.

Conclusion

Over the course of the practicum three shipwrecks and an important landing site were inspected. Though not all of the sites that were originally planned to be investigated could be accessed, the practicum was a huge success. MHU archaeologists provided Flinders students the chance to gain practical experience and participate in all aspects of the project, from data collection to final report production. These opportunities help to build skills, knowledge and experience necessary for employment. Practicums such as these also prove beneficial to Heritage Victoria by assisting in the completion of required site inspections.

Acknowledgments

The authors would like to thank to MHU archaeologist Peter Harvey, Cassandra Philippou and Liz Kilpatrick for providing them to opportunity to not only participate in this practicum, but to have a great time as well. Thanks are also extended to the MAAV volunteers for sharing their knowledge and experience, and for exposing them to new methodologies (i.e. Jim Anderson's kite-mounted camera)!

6

Heritage Revisited: Historic Shipwreck Inspections in Port Phillip Bay, Victoria

Rick Bullers, Toni Massey, John Ricci and Dianna Zwart

The Port Phillip Bay Practicum was established with the dual purpose of assisting Heritage Victoria with its legislated responsibility of inspecting and managing shipwrecks of heritage significance, as well as providing maritime archaeology students with field experience. The practicum is one of several similar projects including one conducted at Port Albert described earlier in this volume. The Port Phillip Bay Practicum was designed to relocate and monitor the known wrecks within Port Phillip Bay and to assess erosion and other long term damage associated with underwater wreck sites.

The project crew included five staff and students from Flinders University (Jennifer McKinnon, Rick Bullers, Diana Zwart, John Ricci and Toni Massey) and lasted ten full days between 8 and 17 November 2006. The Flinders crew assisted staff from Heritage Victoria's Maritime Heritage Unit (MHU), and volunteers from Maritime Archaeological Association of Victoria (MAAV) and Australian National Maritime Museum (ANMM). The inspection team established its base in a rented house in St. Leonards for the duration of the practicum.

Port Phillip Heads is widely considered to be the most dangerous entrance in Commonwealth waters due to its deep, narrow entrance to Port Phillip Bay, dangerous reefs and uneven sea floor. The conditions around the Heads and the presence of sand bars inside caused many vessel casualties in the 200 years since the bay was discovered by Europeans. These shipwrecks are culturally significant because they contribute to the history of Port Phillip Bay. Periodic wreck inspections are therefore necessary to assess the condition of these historically significant sites and determine appropriate management strategies for their long-term survival.

Brief History of Port Phillip Bay

Port Phillip Bay, located on Victoria's central coast (Figure 46), covers 1950 km². Port Phillip Bay is one of Australia's most densely populated catchments; more than 3.2 million people live around its shore. The nation's second largest city, Melbourne, is located at its head and the Port of Melbourne is Australia's busiest port (Parks Victoria, 2007).

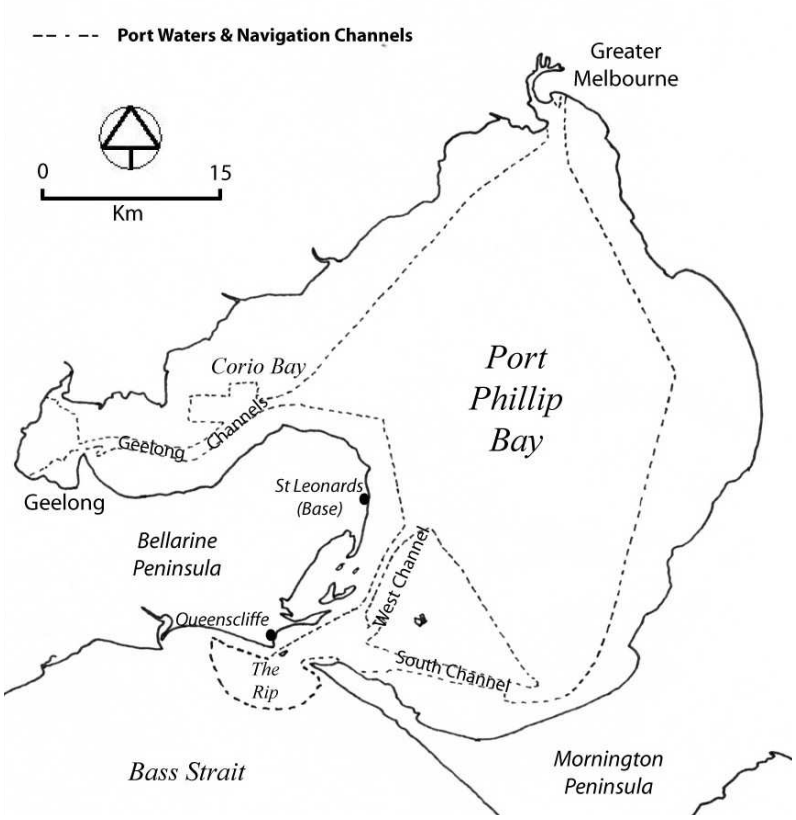

Figure 46. Map of Port Phillip Bay, Victoria (R. Bullers 2006)

Port Phillip Bay has a rich history of both Aboriginal and European occupation. European settlement of the Port Phillip Bay region commenced with its discovery by Lieutenant John Murray in *Lady Nelson* in 1801. Murray reported to Governor King that the area would be very good for cattle and, more particularly, sheep farming. However, it was not until about 1830 before settlement commenced in earnest. Tasmanian graziers John Batman and John Pascoe Fawkner were instrumental in starting the fledgling settlement of Melbourne in 1835 after Batman made a treaty for most of the land around the bay with the local Aboriginal peoples. Melbourne started to grow rapidly, rivalling Sydney as the commercial centre of Australia by 1841 (Elliget and Briedahl 1991).

Shipping was an integral component of life in the fledgling colony, bringing supplies and a steady stream of settlers. This was a very good time for ship owners; their ships brought immigrants to the new settlement from Britain, and returned with cargoes of local wool and fishery products. With the discovery of gold in Victoria, an influx of people arriving from all over the world increased the volume of shipping enormously. The Victorian gold rush of the 1850s sparked a massive immigration increase and huge numbers of ships began arriving in Port Phillip Bay; in 1841 alone there were more than 250 arrivals (Elliget and Briedahl 1991).

A trap for shipping

Port Phillip Heads was considered to be the most dangerous entrance in Australian waters. This is not surprising considering the bay covers an area of 1950 km² and has a volume of 25 km³. Four percent of this volume (1 km³) is exchanged with Bass Strait on every tide (Anderson 2006:7). With only 3 km between the two Heads, and with such an enormous volume of water exchange, the tidal flow can be around 7-8 knots, forming a very dangerous area called The Rip. This is an area of eddies and whirlpools. Only a 1 km wide channel between the Heads is navigable by large vessels; and the channel is surrounded by reefs and sandbars. To get into the

main shipping channel to Melbourne a sharp turn to starboard must be made to avoid the Queenscliff peninsula after passing through the Heads. From the 1850s an increasing number of ships visited Melbourne and had to pass through this dangerous area. Little wonder then, a considerable number of vessel casualties occurred in this area. There are more than 40 wrecks in the immediate vicinity of the Heads (Anderson, 2006: 72). The southern half of Port Phillip Bay (inside the Heads) is characterised by many individual channels separated by large, shifting sandbars. More than half of Port Phillip Bay has a water depth of less than 8 m.

Much of the material culture associated with the early history of Port Phillip Bay can still be seen today. A multitude of wrecks are available for divers to visit, as well as other evidence of the Bay's maritime history such as the forts and lighthouses.

Project Objectives

The Port Phillip Bay Wreck Inspection Project forms a component of a broader MHU program of historic wreck inspections throughout Victoria. This project followed a similar program of historic wreck inspections in the Port Albert area in October 2006. The principal objectives of the project were to:

1. Relocate selected historic wrecks in the southern portion of Port Phillip Bay and obtain accurate GPS coordinates.
2. Inspect selected significant historic wrecks and describe their current physical condition, determine threats and make management recommendations.
3. Determine the feasibility of engaging Flinders University students in future practicums.
4. Perform specific tasks on selected wrecks including:
    a. Contribute to corrosion analysis on HMAS *Goorangai* by deploying sash weights for future measurement;
    b. Determine the identity of objects found previously in the vicinity of the paddle steamer *Ozone*;
    c. Survey and draw the bow section of *Ozone* for incorporation into interpretive signage;
    d. Measure and obtain lines plans for the lifeboat *Queenscliffe* housed at the Queenscliff Maritime Museum.

The Inspection Program

Wrecks were selected for inspection by MHU staff based on significance, ease of relocation, and diving suitability based on weather/water conditions. Where possible, sites were relocated using either GPS coordinates or visual transits. Once a site was relocated a more accurate GPS position was recorded. Heritage Victoria provided two vessels for the surveys: *Trim*, a 9 m catamaran with twin 225hp motors which was used as the primary vessel, and *MAU002*, a 6 m aluminium vessel.

Weather conditions were ideal for boating and diving during the first five days of fieldwork. However, weather conditions deteriorated half-way through the practicum and boating operations were curtailed. Other activities were performed such as diving from shore (*Ozone*) or land-based work (*Queenscliffe* and Clifton Springs Spa).

Sites were inspected by groups of divers at appropriate times; many of the sites are located in strong current areas, and diving could only be conducted at slack tide. Dive buddies were selected based on experience – an experienced diver was generally paired with one with less experience. Each dive pair had a slate upon which to record the general condition of the wreck and any other observable phenomena such as threats, deterioration and marine growth. Dives

were usually limited to 20 minute bottom time on deeper wrecks, but up to 80 minutes was allowed for shallow wrecks.

Vessel crews were rotated daily to ensure that crews were not working on the same boat and with the same crew all the time. The exception was the two vessel skippers, who remained with their respective vessels for the duration. While divers were below, a dive supervisor remained on board the vessels, and a standby diver, in full kit, was available to provide immediate assistance in case of a diving emergency. An oxygen kit was also set up in case of decompression illness (DCI) incidents.

On-site, *Trim* usually anchored first and *MAU002* was rafted alongside. The exceptions to this were the *Hurricane* site, where weather conditions were too rough, and *Goorangai*, which was located in the main shipping channel. At these sites the vessels remained live – that is, untethered and ready to move. Shot lines were first deployed, then divers were dropped near the surface buoys allowing the vessels to move away. At the conclusion of the dive, the divers ascended the shot lines and each vessel then moved in to pick up its dive crew.

Inspections

Clarence (1841 – 1850)

On 9 November the team inspected the wreck of *Clarence*, an Australian-built wooden schooner built in 1841 and wrecked on the east bank of Coles Channel in 1850 (Harvey 1989:1). A general wreck inspection and assessment of the size of exposed scantlings was undertaken by three dive teams. The site was found to be in a relatively stable condition, with the majority covered by sediment and marine growth. Any exposed features remained less than a meter above the surrounding sediment and no evidence of scouring was found. In addition, no individual artefacts were exposed on the seabed, although the remains of fishing tackle and a hand line were located. No visual record of the site was possible, due to technical difficulties with both the underwater video and still cameras.

Several small fishing vessels were anchored nearby when the team arrived. At least one vessel motored towards the survey crew then veered away when they saw the MHU vessels. This site is probably used for fishing, despite the protection zone.

SS *City of Launceston* (1863 – 1865)

The next day, 10 November, the team completed an inspection of SS *City of Launceston*, an iron steamship built in Glasgow in 1863. *City of Launceston* sank in the middle of Port Phillip Bay in 1865 after being struck by the SS *Penola*. The remains of the vessel were relocated in October 1980, and the first official wreck inspection was conducted in May 1984. Several surveys have been occurred in subsequent years, and the information derived has made the wreck one of the most significant in Victorian waters (Strachan, 2000).

The vessel lies in 24 m of water and, like *Clarence*, is enclosed by a gazetted protection zone. Entry to the zone is prohibited, as is any fishing. The two dives consisted of a general inspection of the wreck and an update on a MAAV corrosion experiment. The deck was covered with sediment and shell grit with the remainder of the wreck densely covered in algae. This growth almost completely obscured the survey tags used during a previous excavation, although tarps used to cover the trenches were partly visible. Only 24 sash weights deployed on the site for the MAAV corrosion study were relocated. The divers also found a piece of wood with what are believed to be Celtic symbols on it that had not been seen during previous work, and a rope purposely covered with a piece of iron had become uncovered.

Several fishing vessels were observed in the vicinity of the protected zone. The presence of such vessels illustrates the continued effort that must be employed to appropriately regulate the site.

Monarch (1836 – 1867)

After the *City of Launceston* inspections, the team diverted to conduct an inspection of *Monarch*, a 269 ton wooden barque that ran aground on the bank between West Channel and Coles Channel in 1867 (DEWR 2007).

The approximate position was found using visual transits and on the afternoon of 10 November the wreck site was confirmed by snorkellers. Two dive teams attempted a mud map for the site and also exposed sections of the wreck by hand fanning for the purposes of scaled drawings and photographs. The site was predominately covered in sediment and seagrass, although the six water tanks mentioned in the historical records were discovered. There was evidence of scouring on the site and many of the exposed timbers were badly deteriorated. The tanks were covered in algae and some were missing their top sections.

UNID 'Lightship'

On 11 November the team inspected the remains of an object that had been known colloquially as the 'Lightship,' although the true identity of this site is not known. Two dive teams conducted an inspection and recovered two pieces of glass prism (Figure 47).

The teams also performed an overall inspection of the site. The size and features call into question the site's identification as a lightship, and may indicate that it was a fixed piece of harbour infrastructure. A search of the area surrounding the site confirmed the absence of additional material located beyond the known remains. Further work should be conducted and recovered artefacts and historical sources used to identify this site with more certainty.

Figure 47. Two prisms recovered from the "lightship"

The site had previously been blown up as a navigation hazard, and the wreck was found in a near unrecognisable condition, although many sections stand up to 1.5 m above the seabed and are heavily encrusted in marine growth.

HMAS *Goorangai*

After completing the 'Lightship' inspections, the team proceed to the South Channel to inspect the remains of HMAS *Goorangai*. *Goorangai* was an iron trawler that had been appropriated by the military during World War II and converted to a minesweeper. It sank in the South Channel in 1940 after being run-down at night by the troopship *Duntroon*. The vessel sank in less than a minute and all hands lost (Foster 1987).

On the afternoon of 11 November a team of divers were dropped on site to perform a general survey and deploy 24 sash weights as part of another MAAV corrosion study. The inspection was very brief due to the depth (25 m) and the short periods available for diving between passing ships. The South Channel is the main channel to Port Phillip Heads and is subject to heavy vessel traffic.

Joanna (1856 – 1857)

On 12 November the team performed an inspection of *Joanna*, an Australian-built wooden schooner built at Mount Eliza, Port Phillip Bay in 1856. *Joanna* worked in the bay trade but was lost on the West Bank in 1857 after it was caught in heavy gales; it sank quickly and an attempt to salvage the vessel failed (DEWR 2007).

A circular search for the site, centred on *Joanna's* historic marker, was conducted but material remains were not located. A mound completely covered by sand in 4 m of water was found directly up-current from the historic marker. Slight hand fanning over the mound revealed seagrass growing just below the surface. The mound may have been the shipwreck although no structure was located. Some scouring was noticed around the mound. The site in its current state appears stable, although the dynamic conditions in this area of Port Phillip Bay may cause it to become exposed again.

Ozone (1886 – 1925)

On 14 and 15 November, weather conditions precluded boat diving. Shore dives were conducted on *Ozone* and adjacent *Dominion* wrecks. *Ozone* was a 572 ton iron paddle steamer built in Glasgow in 1886. *Dominion* was a wooden barque built in Quebec, Canada. In 1925 both vessels were dismantled and sunk to form a breakwater (DEWR 2007).

One dive team attempted to relocate several timber barges that were identified during a previous Flinders University Maritime Archaeology Field School at Port Arlington (2004). The previous identification was found to be erroneous, and the barges were identified as part of *Dominion*. Another team photographed the majority of Ozone's remains which is heavily covered in marine growth (Figure 49).

The bow section of *Ozone* was mapped between the boilers and the capstan using a baseline-offset method. This mapping exercise continued the following day with one team mapping the port bow and the second team mapping the starboard bow (Figure 50).

This site remains relatively stable although visits to further document the corrosion of the structure would be helpful; future visits should also note the condition of the interpretative signage in the caravan park.

Other vessels

Attempts were also made to relocate *Foig-a-Ballagh*, a wooden barque built in Belfast in 1845. In 1852, during a heavy squall, the vessel parted from its anchors and went aground. It was transporting a cargo of coal and it was impossible to refloat. On 12 November, following the

Joanna inspection, a dive team attempted a 30m radius circular search from the GPS mark for the *Foig-a-Ballagh*. Unfortunately, the search was inconclusive and marred by problems of the tape bending and shot-line moving due to strong current. This site needs to be revisited in conditions more conducive to effective searching.

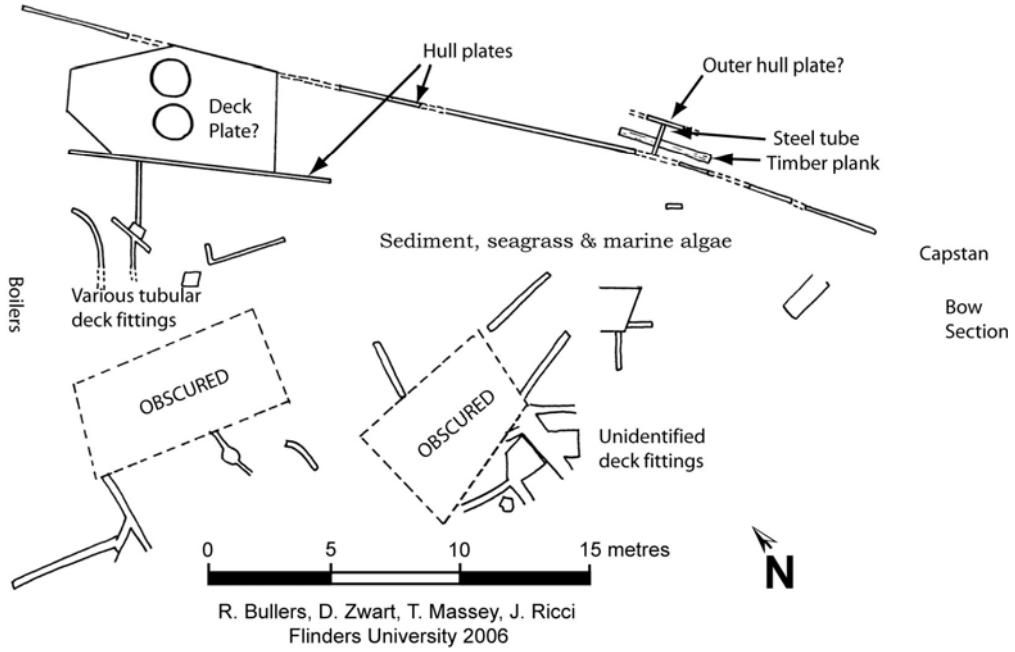

Figure 48. Mud map of *Ozone's* bow section (Bullers, Ricci and Zwart 2006)

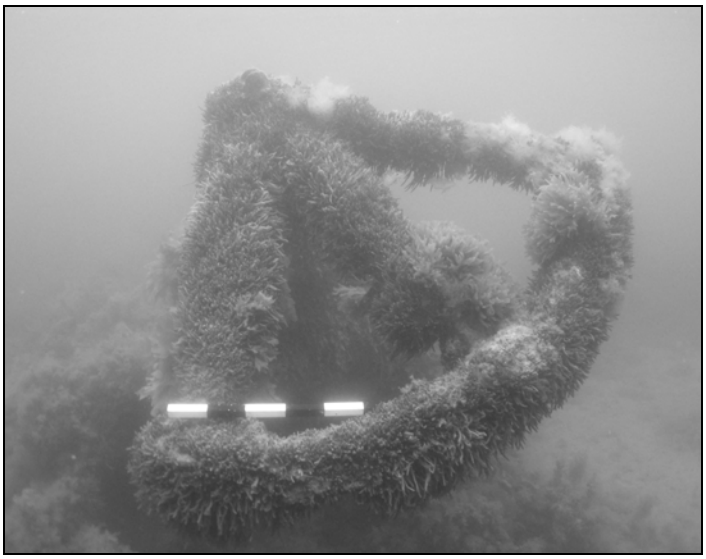

Figure 49. Steering quadrant on *Ozone*

An attempt was also made to relocate the Australian-built vessel *Mountain Maid* from visual transits, but it was unsuccessful.

On 16 November, an attempt was made to inspect the 1198 ton ship *Hurricane*, built in 1853 on the Clyde River in Scotland. *Hurricane* hit the Lonsdale Reef slightly when entering the Heads. First it was thought there was no damage, but after a while the ship started to sink and foundered. The vessel and cargo were sold but the vessel was never raised (Williams and Serle 1963). Shot lines were dropped on the site, and two teams entered the water. No remains were visible, and a circular search of approximately 25m was conducted without result. After the dive teams

surfaced an attempt was made to replace the shots using visual transits and the depth sounder, but worsening weather conditions prevented success.

Figure 50. Divers surveying the bow section of *Ozone*

Lines Plan: Lifeboat *Queenscliffe*

Beginning in 1838 a pilot service was established in Queenscliff to guide ships entering through Port Phillip Heads into the shipping channel. From 1856 until 1976 a lifeboat service operated from Queenscliff. During this period the volunteers of the lifeboat service rescued many stranded sailors (Anderson 2006).

On 13 November, with diving operations postponed due to adverse weather, the team visited the Queenscliff Maritime Museum to inspect and take lines of the lifeboat *Queenscliffe*. This vessel, a Watson Class lifeboat, was built in 1926 in Port Adelaide; it was the fourth lifeboat used at Queenscliff. It was taken out of service in 1976 and is now displayed at the Queenscliff Maritime Museum.

Lines were taken using available tools (Figure 51). A baseline was laid on the ground parallel to the portside of the vessel (the starboard side was obstructed). The baseline was laid 2.5 m from its centre line). Stations were established along the baseline at 0.5 m, 1 m, 2 m, 3 m, 4 m, 6 m, 8 m, 10 m, 11 m, 12 m and 13 m and 13.5 m. A makeshift vertical pole was fashioned from a bedpost. On the vertical pole waterlines were marked at 0.5 m intervals. The vertical pole was placed at a station and then a horizontal distance was measured from each waterline mark on the pole to the hull. Line levels were used to ensure the measurements were level.

An extension was added to the pole to measure the sheer line, however only the height was taken. Measurements were taken at the bow and stern to make sure the curved shape could be drawn (Figure 52).

Clifton Springs

Situated on the Bellarine Peninsula on the shores of Corio Bay is a 19th century mineral springs and spa complex which operated from around 1875-1920. According to Heritage Victoria (2005) at least seven springs existed along the foreshore between the remains of two jetties and along a 50 m stretch of beach. In 1875 the first commercial bottling of spring water began on the site.

The Clifton Springs Mineral Company was established in the 1880s and it is estimated that over 5,000 bottles were sold annually.

Figure 51. Students taking lines off the bow of *Queenscliffe* (Courtesy Program in Maritime Archaeology, Flinders University)

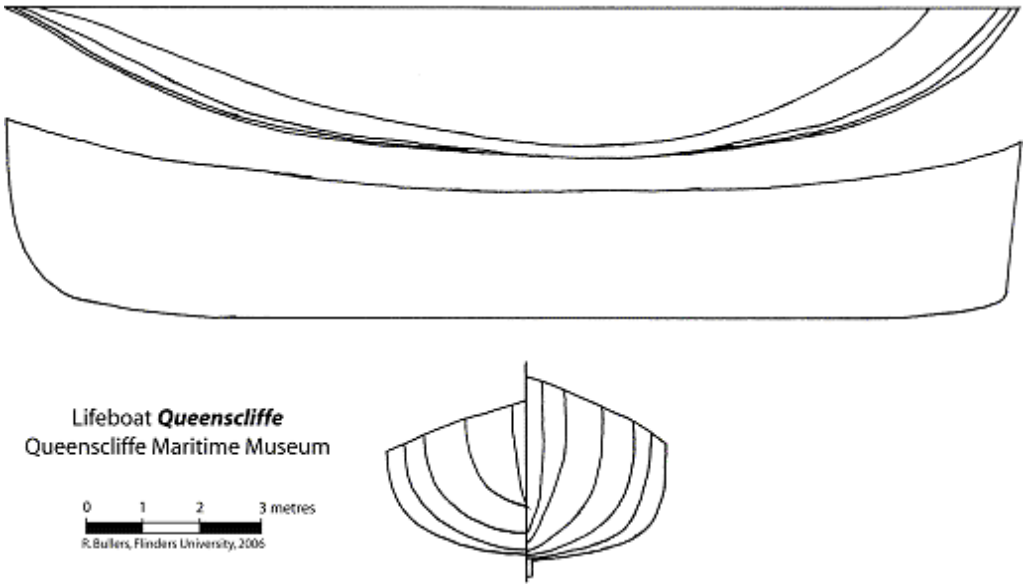

Figure 52. Field draft of *Queenscliffe* lines (Bullers 2006)

In recent years, bulldozers were used for erosion control at Clifton Springs to help minimize the long term effects of erosion of the beach and cliffs. On 14 November, while adverse weather conditions continued to hamper boating operations, the team conducted a small survey of the area which included photography, mud maps and site investigations. Archaeological remains found at Clifton Springs included brick and timber foundations, ceramic tiles, an array of different glass and metal pipes, and the remains of two jetties. Clifton Springs is historically significant as a site of 19th century health tourism in Victoria. Archaeological features at Clifton Springs include:

- Circular brick structures that could mark the location of the springs situated along the beach in the 19th century.

- Jetty remains (including timber pylons) can be seen from the beach and include a number of other structures evident in the water which may also relate to the mineral spas.
- Structural remains which could likely be from the late 19th century kiosk and bottling factory include brick and timber foundations eroding near the cliff adjacent to the springs (Figure 53).
- Other artefact remains include glass, ceramic tiles, bottles and tall metal pipes which also had evidence of erosion.
- Several bottle dumps (Figure 54) were located containing many broken torpedo bottles among others. It is believed that the bottles may have been collected by locals and placed at these different locations. Many different types of bottles were represented including modern ginger beer and beer bottles.
- A small wooden vessel, probably a dinghy, was found lying on the embankment covered in scrub and bushes. Not much could be determined from this vessel due to its poor condition and extent of deterioration.

Figure 53. Erosion-control works have unearthed an extensive bottle scatter (Courtesy Program in Maritime Archaeology, Flinders University)

The long term effects of erosion can be clearly seen at Clifton Springs and include the barricading of adjacent steps leading down to the beach, which is deteriorating due to dangerous land slides and other environmental impacts. Further, other forms of erosion can be seen at Clifton Springs including an area at the western end of the site where erosion and/or remediation earthworks have exposed an artefact deposit at the rear to the beach. Action to stop the erosion has taken place in the form of land filling which will hopefully help slow the natural erosion process.

Only a preliminary investigation of Clifton Springs was carried out due to time constraints. However it is recognised that this site has archaeological significance as it represents a site of

19th century health tourism in Victoria. As such, every effort should be made to stop further erosion, and to document and preserve this important site.

Figure 54. Bottle fragments, Clifton Springs (Courtesy Program in Maritime Archaeology, Flinders University)

Conclusion

During the 10 day practicum, the team inspected a total of seven shipwrecks, and attempted to locate a further three. In addition, inspections of the lifeboat *Queenscliffe* and the mineral springs at Clifton Springs were undertaken. This was achieved in spite of adverse weather hampering much of the original inspection plan.

This program showed that a practicum involving students and archaeology professionals is not only achievable but practical. The benefits include giving students hands-on practical experience, while heritage agencies such as Heritage Victoria, gain valuable assistance in achieving their mandated and legislative responsibilities. It is hoped that such practicums will continue to be a part of The Flinders University's Graduate Program in Maritime Archaeology.

Acknowledgements

Special thanks go to Peter Harvey and Cassandra Phillipou of Heritage Victoria for extending a welcome to the Flinders University team and for providing the funding, equipment and opportunity for this program to succeed.

7

Attention to Detail: Geophysical and Historical Investigations around Port Elliot, South Australia

Ian Moffat, Jason Raupp and David VanZandt

Located on the southeastern coast of South Australia's Fleurieu Peninsula, Port Elliot has a lengthy and interesting maritime history (Figure 55). The unusually high concentration of shipwrecks at Port Elliot is the result of its choice as the first sea port for the Murray River trade. This ill-considered choice led to the wrecking of seven vessels in eleven years before the port was abandoned in favour of the more sheltered Victor Harbour.

In an effort to locate the remains of vessels known to have come ashore in the area, reconnaissance geophysical surveys were conducted along sections of Horseshoe Bay and Middleton beaches. The results of two initial surveys provided anomalies that correspond to the historically recorded positions of two early vessels. Detailed geophysical investigation was used to resolve the spatial distribution and intensity of these targets in greater detail. This paper provides a brief overview of the region's history, reviews previously conducted archaeological research and presents the results of the geophysical investigations.

Historical Background

The development of the Murray River trade allowed goods from Australia's interior to be shipped around the world. Unfortunately the mouth of the Murray was dangerous and was therefore not a viable outlet for this trade. It was soon realized that the alternative to a port at the mouth was to establish one port on the river and one port on the sea, and connect the two installations overland via a railway (Stempel and Tolley 1965:24). South Australian Governor Henry Fox and Captain Thomas Lipson chose Port Elliot as a suitable location for the sea port in 1849.

The decision to locate the trade's outlet to the sea at Port Elliot was strongly opposed by the Legislative Council at Port Adelaide, who feared that the establishment of a southern port would disrupt the trade monopoly that they (Port Adelaide) enjoyed (Bull 1884:317-318). Many experienced seafarers in the region also criticized the decision to locate the port at Port Elliot harbour on the basis that it was too small in size, too exposed and far too shallow. Instead they suggested a safer location at Victor Harbor (Lin 2001:66). In the end, officials felt that the cost of adding the extra 16 km to the railway construction was too costly and unnecessary, and therefore stuck to their original decision to use Port Elliot.

Figure 55. Location of Port Elliot on the Flerieu Peninsula, South Australia (Anon 2006)

In 1851 construction began on a rail line to connect the newly established river port of Goolwa to Port Elliot. The horse-drawn tramway opened for traffic in December 1853 and was acclaimed as the first railway in South Australia and the first public railway on iron rails in Australia (Yelland 1983:49). In conjunction with the railroad's construction in 1853, the first steamers began plying the waters of the Murray, and by 1857 the river trade was booming.

Construction of a jetty for Port Elliot began in 1852 and was completed in 1853. This 100 ft (30 m) long structure was seen as a folly since the water depth at its end was only 6 ft (2 m), and it soon became apparent that large ships could not moor to the jetty. Therefore cargos had to be lightered to ships waiting in deeper water, which added to shipping costs. Though plans to lengthen the structure an additional 100 ft (30 m) were drafted, they were never implemented (Pomery 1997).

Ships calling at Port Elliot consisted principally of sailing vessels including barques, brigs, cutters, and schooners from 40 to 150 tons and periodically steamers, usually about 500 tons. Outbound cargoes were principally wheat, barley, and flour from both local production and that transported down the Murray River by paddle steamers to Goolwa and overland to Pt. Elliot. Inbound merchandise included stores and building materials. While some of these cargoes were for use in the South Coast region, most were intended to be forwarded by steamers from Goolwa to interior settlements (Tolley 1965:22).

In a further attempt to improve shipping conditions at Port Elliot, a breakwater was proposed to enhance the shelter provided by Pullen Island. Unfortunately funds allocated for the project were insufficient and only half of the required distance was constructed. The government also attempted to improve anchorage by installing a series of fixed moorings between 1852 and 1854. These did not fulfil their desired function since they were improperly placed, inadequately maintained and underrated (Perkins 1988:31-33). The deficiencies of these moorings directly resulted in the loss of several vessels during the port's short working life.

Use at Port Elliot peaked in 1855 but declined after 1857 when steam-driven vessels increasingly risked passage through the treacherous Murray Mouth to avoid using Port Elliot. It was not long, however, before the shifting channels and sand bars claimed PS *Melbourne* in the mouth in 1859 and the Murray Mouth was rendered off limits. Although this wreck led to increased activity for Port Elliot throughout the early 1860s, the loss of two more vessels in the port and the lack of room for expansion once again brought to light its inadequacies (Parsons 1967:8). In 1864 an extension of the rail line to a jetty built at Port Victor (later renamed Victor Harbor) was completed (Sexton 1975:38). Though Port Elliot did compete with Victor Harbor for a few years it quietly ceased operation as a port in1866 (Page 1987:64).

Port Elliot's failure as a port was entirely based on its small size, shallow depth and exposed nature, which prevented it from handling the volume of trade that it was expected to carry (Coroneos 1997:24). Had the port been made relatively secure, with a slightly longer breakwater, stronger moorings and improved jetty, it might have adequately carried a limited coastal trade (Sibly 1972:102).

Previous Research

Over the course of 11 years seven ships were lost around Port Elliot's Horseshoe Bay. These include: the schooner *Emu* in 1853; the schooner *Commodore*, the brig *Josephine Loizeau*, the cutter *Lapwing*, and the brig *Harry* in 1856; the schooner *Flying Fish* in 1860; and the brigantine *Atholl* in 1864.

Port Elliot has been the subject of several investigations by both local history enthusiasts and archaeologists. In the 1960s local historians located and recovered several anchors from the Horseshoe Bay. These are now on display near the original jetty and form part of an interpretative trail which provides information about Port Elliot's wrecks (Figure 56).

Figure 56. Anchors recovered from Horseshoe Bay now on permanent display near the original jetty (Jennifer McKinnon 2006)

Australia's earliest volunteer archaeology group, the Society for Underwater Historic Research (SUHR), worked with the Fleurieu Dive Club to carry out the first extensive investigations of the shipwrecks in the bay and surrounding waters. The results of their historical research and

attempts to locate and identify wrecks were documented and published by John Perkins (1988) as *The Shipwrecks of Port Elliot 1853-1864*.

Professional archaeological investigation was conducted in 1997, when Cosmos Coroneos undertook a survey of the shipwrecks of Horseshoe Bay while conducting a study of all known shipwrecks in the region. The results of that survey were published in 1997 as a Special Publication of the Australian Institute for Maritime Archaeology (AIMA) entitled *Shipwrecks of Encounter Bay and the Backstairs Passage*.

Of the seven wrecks that are known to have occurred in this area, only three have been located. The brig *Harry* is the best preserved and represents the only wreck to be identified through historical sources, archaeological remains and wood sample analysis. Two other shipwreck sites have been inspected, but the data obtained did not produce definitive identifications. The lack of archaeological investigation in this area is in part due to the same rough and unpredictable conditions that initially caused these wrecks and make investigations of their remains extremely difficult.

Survey Design

Of the seven vessels wrecked in and around Horseshoe Bay, the schooner *Emu* and cutter *Lapwing* were of particular interest for this survey. Both of these vessels wrecked during violent storms and their remains were eventually washed ashore, making them excellent targets for terrestrial geophysical investigations.

The 21-ton wooden schooner *Emu* measured 39 ft (11.9 m) in length, 11.5 ft (3.5 m) in beam and had a draught of 5.9 ft (1.8 m). Built at Leschenault (Bunbury), Western Australia in 1847, the tiny two-masted schooner was wrecked in 1853 during a heavy gale (Perkins 1988:8 and Coroneos 1997:55). A search of the surrounding region discovered the hull, broken in two and driven on shore, with articles of various kinds scattered along the shore all the way to Middleton Beach (Parsons 1981:27). Some experienced seafarers agreed that *Emu* was "nothing more than a flat barge, laden to the waters edge and that it appears she was unable to fetch in under shelter," and that it appeared "she was driven onto Frenchman's Rock where she was split in two and carried broadside by the breakers onto the beach" (*Adelaide Observer* 1853 and Perkins 1988:6). The disaster resulted in the death of the captain and three crew members. The loss of *Emu* eventually was attributed to the ferocity of the storm and not to the deficiencies in the protection afforded at Port Elliot (Sibly 1972:76).

Lapwing was another vessel of interest for this survey due to its early construction, long working life and the existence of records stating that it also became a total loss ashore (Perkins 1988:17). Built in Mevagessey, Cornwall (United Kingdom) in 1808 for use as a revenue cutter, the 63-ton oak-built and copper-fastened cutter measured approximately 60 ft (18.3 m) long, with nearly 10 ft (3 m) of beam and a depth of nearly 10 ft (3 m) (*SAPP* 1856:1-5 and Perkins 1988:19). After a long career in the revenue service, *Lapwing* was brought to Australia for use in the inter-colonial trade. *Lapwing* was loading timber for the Gawler Town Railway at the time of its loss, which was the result of an attempt to save another vessel that had been attached to its mooring during the storm (*Adelaide Times* 1856a:3d). Due to the violence of the storm, *Lapwing* completely broke up and in the words of its captain, "There is scarcely a portion of her left large enough to make a handspike of. The beach was strewed (*sic*) with various parts of the wreck for a long distance and presented a wretched appearance" (*Adelaide Times* 1856b:2d).

Survey areas were chosen based on historic accounts of the loss of each of these vessels. The first area chosen was the eastern third of Horseshoe Bay Beach, where a Harbour Master's 1856

map of the anchorage shows a projected point onto which *Lapwing* came ashore (Figure 57). The other area was Middleton Beach, where an historic photograph displays remains of what is thought to be *Emu* eroding from the dunes.

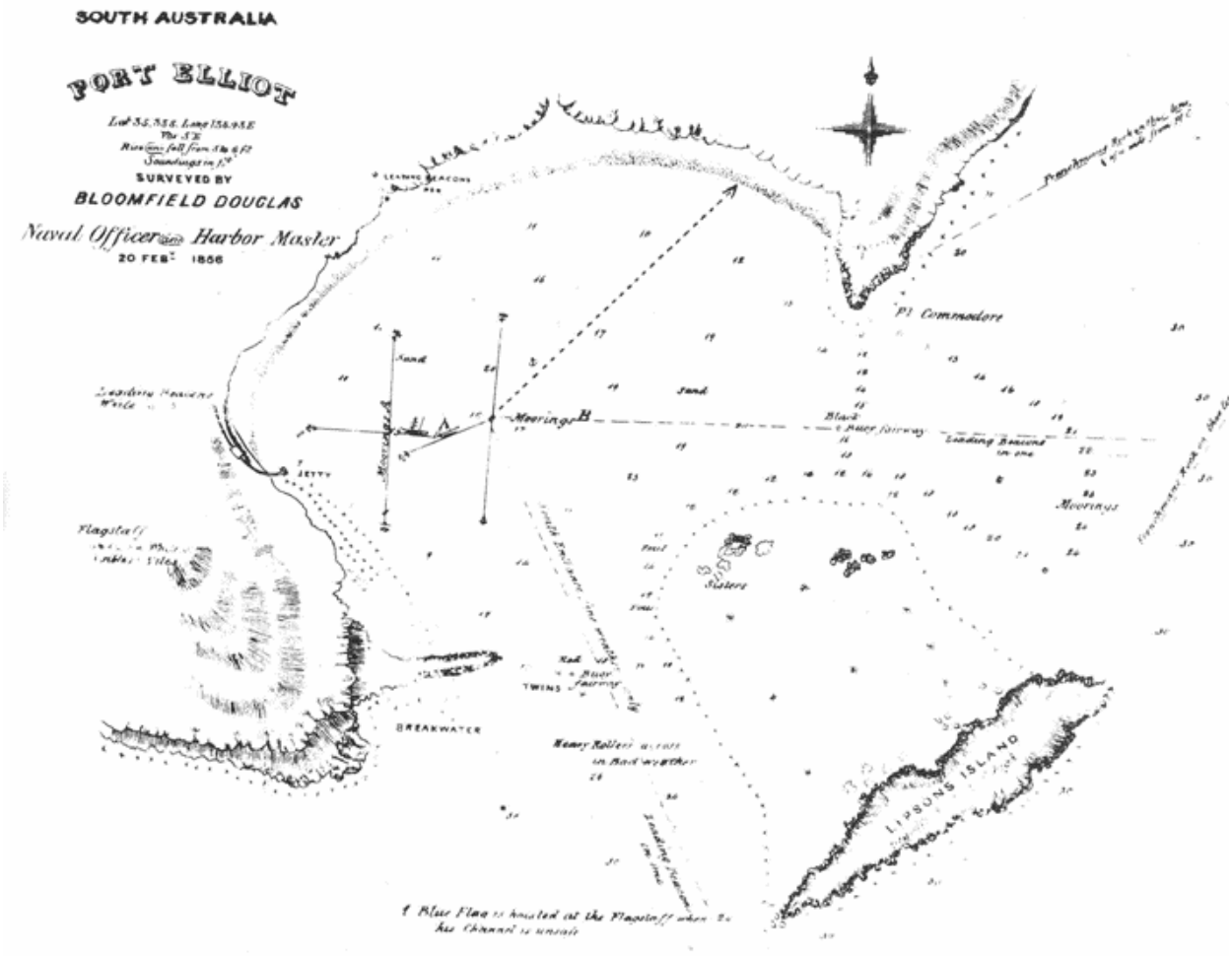

Figure 57. 1856 Harbour Master's map showing *Lapwing*'s projected path and approximate grounding location (Perkins 1988)

Reconnaissance Geophysical Investigations and Results

Horseshoe Bay

The Horseshoe Bay reconnaissance investigations were conducted with a Geometrics G-856AX proton precession magnetometer for collecting magnetic data at five second intervals and a Garmin 12XL navigational global positioning systems (GPS) unit for providing positional data. Survey data was collected at a line spacing of approximately 2 m with lines extending for approximately 500 m. The data collected was then processed using Magpick software to produce a map of magnetic intensity. This map was then overlain onto an aerial photograph using Mapinfo software (Figure 58).

The survey produced one significant anomaly. The location of this anomaly corresponded with the position depicted on an historic map drawn by the harbour master relating to the loss of *Lapwing*. At approximately 4000 nanoteslas (nT) above background, the size of the anomaly was surprisingly large given the expected preservation potential of the wreck and its known construction details. Any anomaly should have yielded a much smaller magnetic disturbance. On

the basis of this result and the significance of the shipwreck, excavation of the anomaly was preliminarily planned. Prior to excavation, a decision was made to undertake further detailed geophysical investigations to refine the nature and location of the anomaly. It was hoped that by refining the target, limited time and resources might be saved.

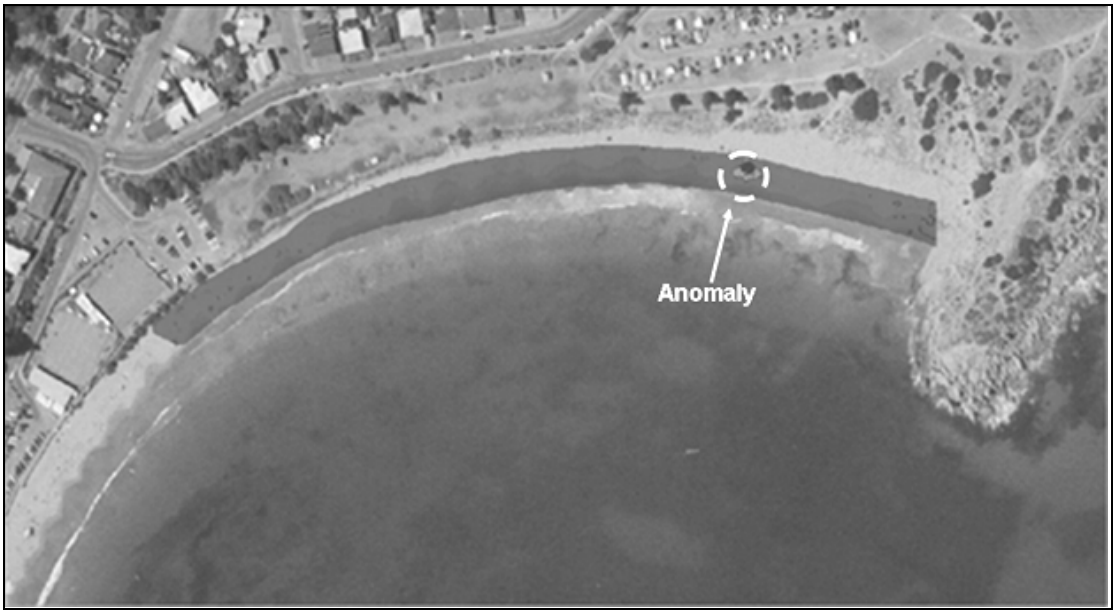

Figure 58. Horseshoe Bay reconnaissance magnetometer map overlain on an aerial photograph. The anomaly is highlighted (Ian Moffat 2006)

Middleton Beach

The Middleton Beach reconnaissance investigation survey area was chosen based on historical documentation which indicated that the broken hull of the schooner *Emu* had been washed onto the beach near the sand dunes in this area (Figure 59).

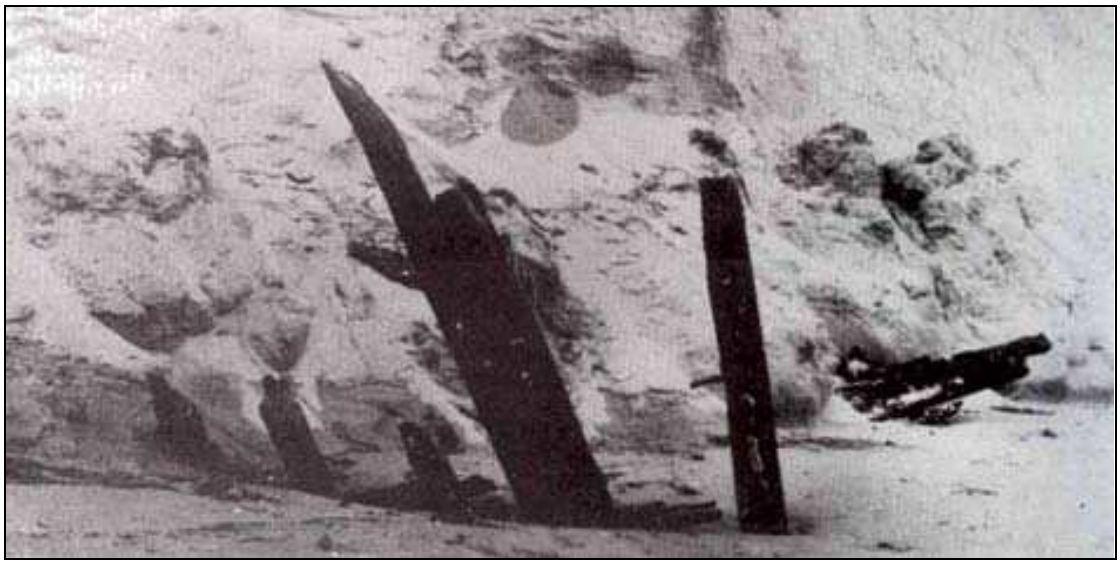

Figure 59. Historic photograph of Emu remains eroding out of dunes (Perkins 1988:8)

The survey was conducted using the same geophysical equipment as that used for the Horseshoe Bay survey. The survey data was collected at a line spacing of approximately 3 m and the area surveyed covered approximately 1800 m by 80 m of the beach. The data collected was then gridded using *Magpick* software to produce a map of magnetic intensity (Figure 60). Though this

map produced many magnetic anomalies which could possibly represent the scattered remains of the schooner, only the most prospective was selected for detailed investigation.

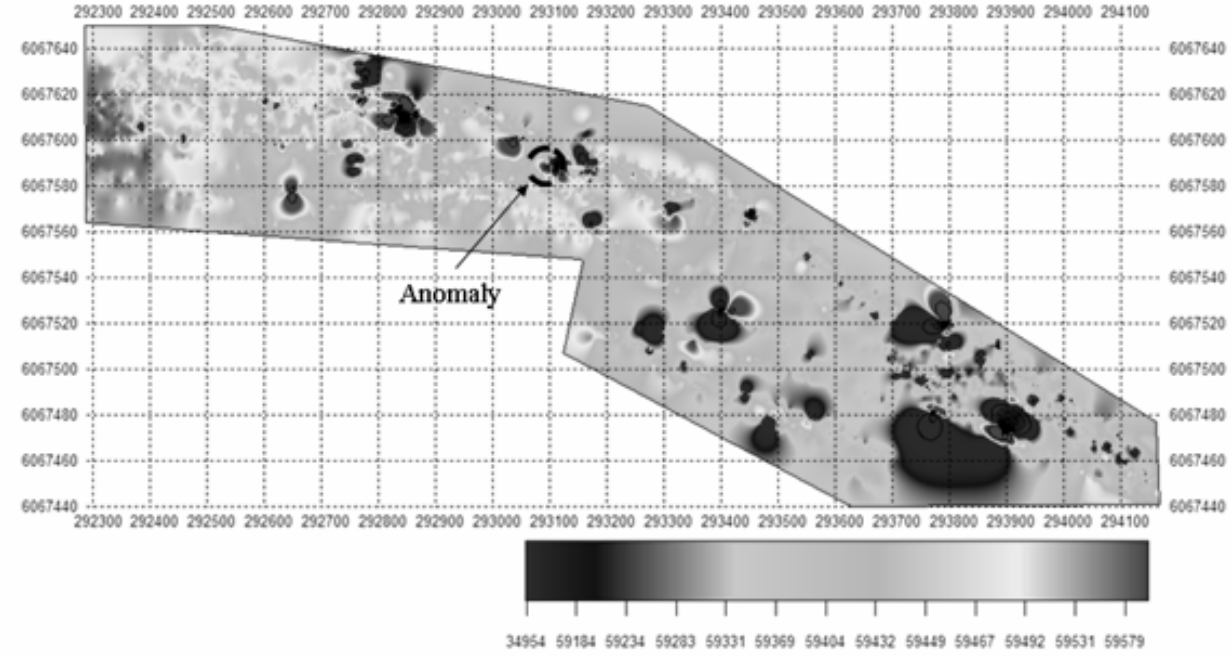

Figure 60. Middleton Beach reconnaissance magnetometer investigation map with anomaly highlighted (David VanZandt 2007)

Detailed Geophysical Investigations

Horseshoe Bay

The detailed geophysical investigation of the Horseshoe Bay anomaly was conducted by establishing a 20 m x 20 m grid over the location of the anomaly discovered through the reconnaissance surveys. The centre of this survey grid was located by using a GPS unit to determine its approximate location and then using a dumpy level and survey tapes to lay out a grid in a north-south and east-west orientation encompassing the feature. Electromagnetic induction and magnetic intensity surveys were conducted using a GEM-2 electromagnetic induction instrument and a Geometrics G-856AX proton precession magnetometer. Data points were collected manually at 1 m intervals by standing on the appropriate survey position, after checking for sensor stability and orientation. Thus each metre of the grid represented a survey station. The data was then combined and gridded using *MagPick* software to produce a map of magnetic intensity.

The detailed magnetometer survey confirmed the existence of an anomaly within the survey grid, but one much smaller in size (-60 nT from background levels) than that recorded during the reconnaissance survey. The significant difference is anomaly size might be attributed to the nature of the survey or possibly a heading error from an incorrect sensor orientation. Also, confirming the earlier statement about the positioning accuracy of handheld GPS units, the identified anomaly was approximately 9 m north of the grid reference indicated during reconnaissance surveys (Figure 61). This magnetic anomaly showed no response from the electromagnetic induction survey suggesting that the volume of the target is quite small and ferrous in nature with no significant wood or other material present.

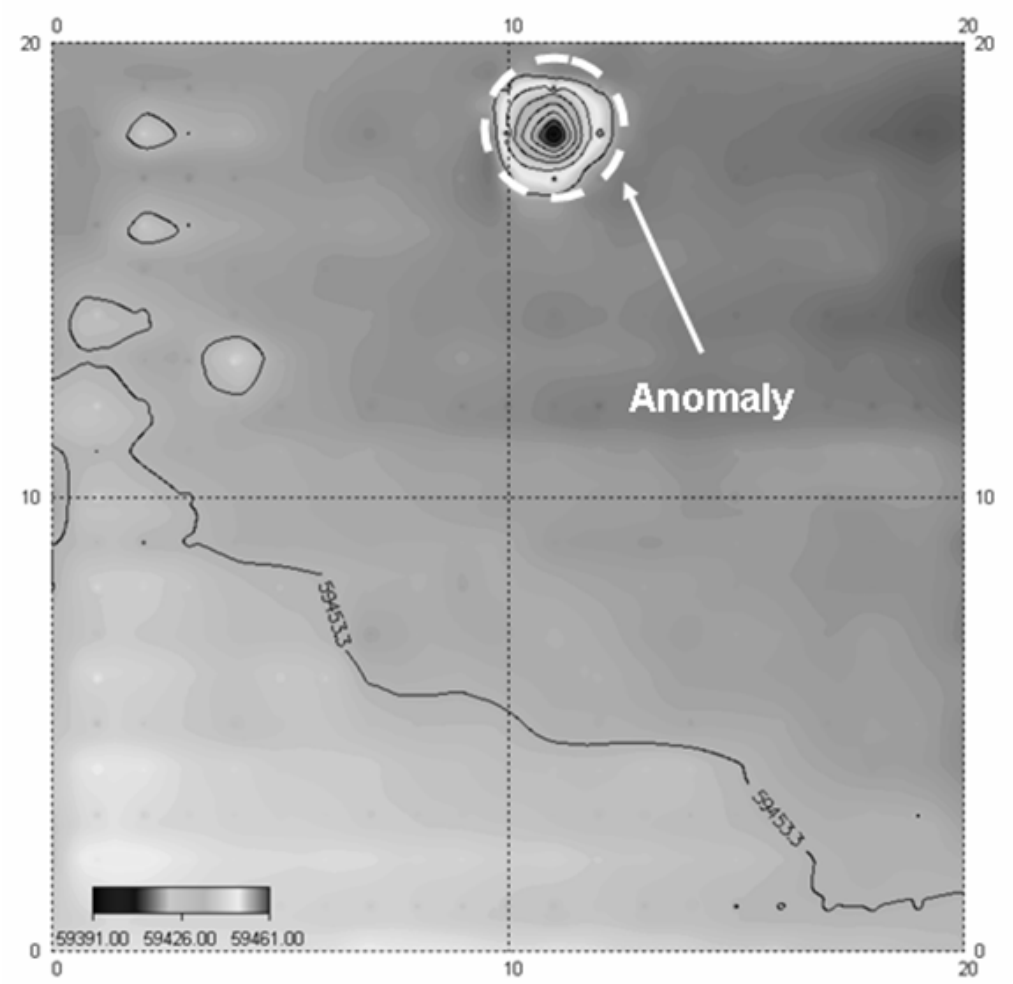

Figure 61. Horseshoe Bay detailed magnetometer investigation map with anomaly highlighted (Ian Moffat 2006)

Middleton Beach

The detailed investigation of the Middleton Beach survey was conducted on a 20 m by 20 m grid which centered on the location of the large anomaly discovered through the reconnaissance investigations. The center of this survey grid was located using a Garmin 12XL navigational GPS. A dumpy level and survey tapes were used to lay out a grid in a north-south, east-west orientation encompassing this feature. Magnetic intensity surveys were conducted using a Geometrics G-856 proton precession magnetometer, respectively. Data was collected using 1 m spaced lines in a north-south direction with survey stations established at 1 m intervals along those lines. Data points were manually collected whilst standing on the appropriate survey position, after checking for sensor stability and orientation. A diurnal correction was applied by returning the magnetometer to the first survey station of the day at the end of each two survey lines and removing this trend from the final data set. The diurnally corrected data was combined with positioning information and gridded using MagPick software to produce a map of magnetic intensity (Figure 62). No anomalies were encountered in this survey suggesting that the anomaly delineated by the reconnaissance investigation may have been erroneous in magnetic response or location.

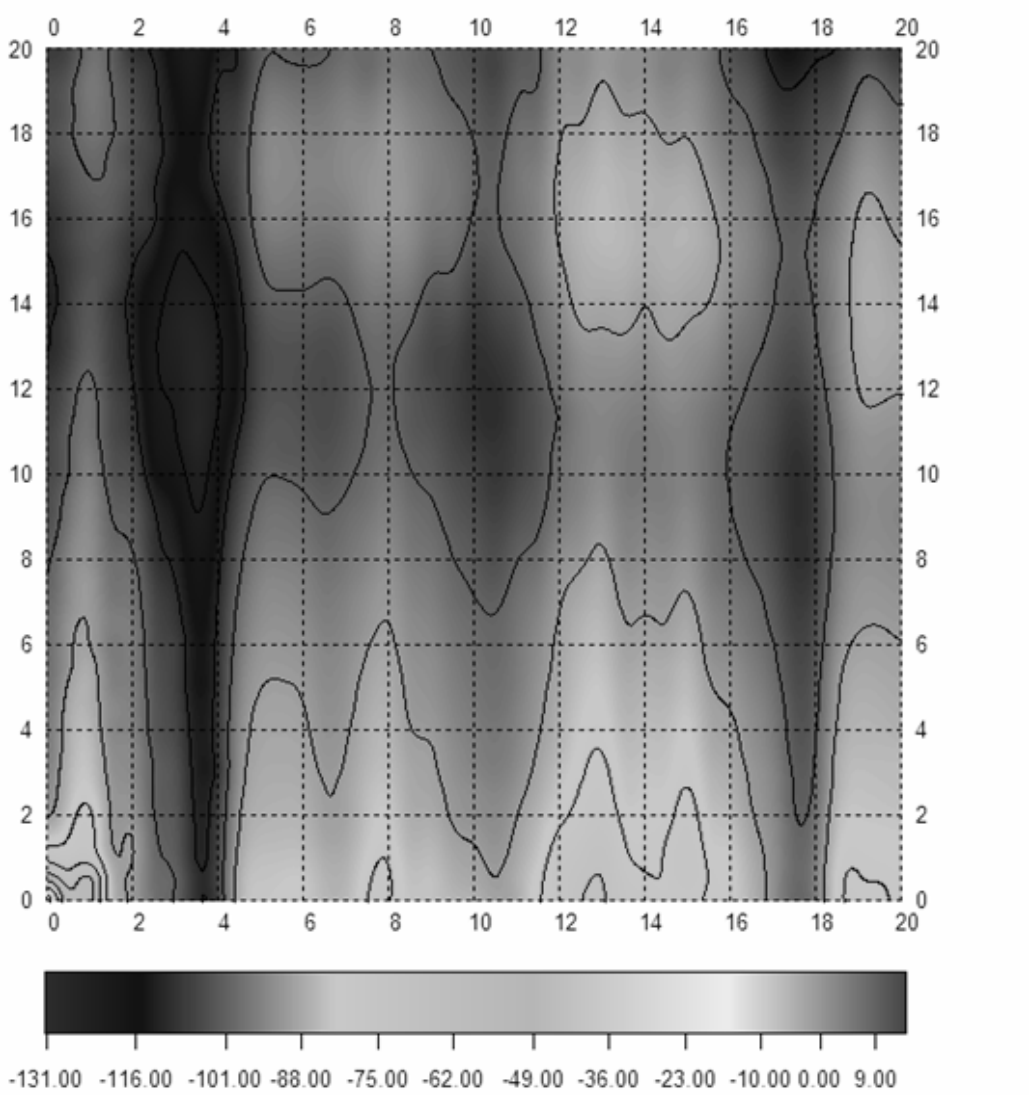

Figure 62. Middleton Beach detailed magnetometer investigation map (David VanZandt 2007)

Geophysical Survey Discussion

The detailed survey data from Horseshoe Bay showed that the magnetic anomaly located in the reconnaissance survey was smaller than initially indicated and also located approximately 9 m north of the location indicated during the initial reconnaissance survey. While this inconsistency in location is small, it is significant enough that should an excavation have been planned on the basis of the original survey it would likely have missed the target altogether. This demonstrates the value of a second phase of detailed geophysical investigations.

Furthermore, the electromagnetic induction data shows no significant anomalies, suggesting that the target is probably a small piece of iron without a large volume of associated material such as wood. The anomaly indicated by the magnetometer from the detailed investigation is also considerably smaller than that shown in the reconnaissance phase. This suggests a significant increase in instrument accuracy when the sensor is stable and stationary during acquisition. On the basis of these results it was decided not to conduct an excavation on the located anomaly as the amount of material available at a suitable depth may not have been sufficient to justify this process.

The detailed survey from Middleton Beach did not reveal an anomaly. This suggests an erroneous magnetic intensity value or positioning data from the reconnaissance survey and also demonstrates further the importance of conducting pre-excavation detailed geophysical investigations.

Conclusion

Through historical and archival research the approximate locations of two previously undiscovered shipwreck sites were identified. Based on records pertaining to their dispositions at the time of loss, it was hoped that they might be located through geophysical investigation. Although general locations about where the vessels might have come ashore were provided, it was obvious that large areas of beach would need to be surveyed to successfully locate the remains. In the case of Port Elliot both limited funding and time constraints led to the development of a bi-partite geophysical methodology as a means to acquire useful data from these large areas.

Due to the high potential area for direct investigation of anomalies, the bi-partite survey methodology was employed to cover the areas in the most effective manner. While the reconnaissance phase of the investigation revealed a significant anomaly located in an area which correlates to the historically mapped location of the colonial cutter *Lapwing*, detailed multi-technique investigations of this anomaly suggest that it is a small ferrous object without a large volume of associated material culture, rather than the remains of *Lapwing*.

Reconnaissance investigations of the sections of Middleton Beach produced several small anomalies which it was thought might represent the broken up remains of the schooner *Emu*. Due to the fact that each of these anomalies was located very close to the surf zone, the multi-technique investigation strategy was abandoned based on the knowledge that electromagnetic induction data would be corrupted by the presence of salt water. The results of the detailed magnetometer survey produced no anomalies suggesting that the anomalies delineated by the reconnaissance investigation may have been erroneous in magnetic response or location.

These results vindicate the decision to incorporate the bi-partite survey methodology into this research. By performing both reconnaissance and detailed surveys prior to excavation it was found that the positioning and physical property data on the targets was inaccurate and saved both time and resources. Thus the utility of this methodology was proven and it is therefore recommended that it be incorporated into research designs where geophysical investigations of beach environments are planned.

Acknowledgments

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FLINDERS UNIVERSITY MARITIME ARCHAEOLOGY MONOGRAPHS SERIES

Number 13

A Year in Review: 2006 Program in Maritime Archaeology

EDITED BY

JENNIFER MCKINNON AND JASON RAUPP

FLINDERS UNIVERSITY

DEPARTMENT OF ARCHAEOLOGY

2007

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Front cover illustration: Total Station data for Area 1 mound concentration, Shackleford Banks, North Carolina (Jateff 2006)

Flinders University Maritime Archaeology Monographs Series

Maritime archaeology has been taught at undergraduate level in the Department of Archaeology at Flinders University since 1996 and the first Bachelor of Arts Honours thesis in maritime archaeology was completed in 1997. The introduction of the Bachelor of Archaeology in 1997 saw undergraduate students specializing in maritime archaeology for the first time and the first Bachelor of Archaeology Honours thesis appeared in 1999. Then in 2002, a new Graduate Program in Maritime Archaeology was introduced resulting in the first Master of Maritime Archaeology thesis in 2003.

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Convenor of Studies in Maritime Archaeology
Department of Archaeology

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13. Jennifer McKinnon and Jason Raupp (editors) *A Year in Review: 2006 Program in Maritime Archaeology*

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Rick Bullers has had a life-long interest in ships and the sea. Prior to beginning postgraduate studies, he worked for many years in protected area management, including a large portion of the Great Barrier Reef Marine Park. In 2005 he completed a Master of Maritime Archaeology at Flinders University and his thesis investigated the quality of construction in early Australian shipping. He is currently a PhD candidate at Flinders, further developing the subject of early Australian shipbuilding.

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Claire Dappert received a BA (with Honours) from the University of Illinois, and an MA in History from the Program in Maritime Studies at East Carolina University (North Carolina), and was employed as a staff archaeologist for the Illinois Transportation Archaeological Research Program for several years. Currently, Claire holds a Flinders University Endeavour International Postgraduate Research Scholarship recipient as a PhD student, is part-time lecturer at Flinders University, and the Series Editor of the Flinders University Maritime Archaeology Monograph Series (MAMS).

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Emily Jateff completed a BA in Anthropology at the University of West Florida. She has been employed for several years as an archaeologist and laboratory supervisor for the cultural resource management firm Brockington and Associates in Charleston, South Carolina. In 2006 she completed a Master of Maritime Archaeology from Flinders University and her thesis examined the history and archaeology of whaling activities in North Carolina. She serves on the Board of Governors for Saving Antiquities for Everyone (SAFE).

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Toni Massey received a Bachelor of Archaeology in 2006 from Flinders University and is currently pursuing an Honours Degree in Archaeology. Her thesis research focuses on the convict built maritime infrastructure of Sarah Island, Tasmania. She has worked on projects with Heritage Victoria, Tasmanian Parks and Wildlife and several Indigenous groups around Australia. Her interests include submerged cultural sites, Indigenous Australian archaeology, shipwrecks and maritime landscapes.

Agnes Milowka

Agnes Milowka completed a BA in History and Australian Studies at the University of Melbourne before embarking on a Bachelor of Business in Marketing and Events Management at Victoria University. After completing AIMA/NAS Part I and II training, she volunteered with Heritage Victoria's Maritime Heritage Unit before finally pursuing her passions and enrolling in the Postgraduate Program in Maritime Archaeology. She's a keen diver, wreck enthusiast and underwater photographer.

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Ian Moffat holds a BA in English and a BSc (with honours) in Earth Sciences from the University of Queensland. Formerly the Communications and Business Manager for geophysical consulting firm Ecophyte Technologies Pty Ltd., he is interested in all applications of earth science techniques to archaeology, especially archaeological geophysics, geoarchaeolgy, sedimentology, geochronology and isotope geochemistry. Ian is currently an Adjunct Associate Lecturer in the Department of Archaeology at Flinders and a PhD candidate in The Australian National University's Research School of Earth Sciences.

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Jason Raupp received a BA in Anthropology and History from Northwestern State University in Natchitoches, Louisiana and an MA in History and Historical Archaeology from the University of West Florida in Pensacola, Florida. Jason has worked as an archaeologist on terrestrial and maritime projects in the US, Africa and Australia. Some previous employers include the Florida Bureau of Archaeological Research, the University of West Florida and South Australia's Department of Environment and Heritage and he is currently employed as Technical Officer in the Department of Archaeology at Flinders University.

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John Ricci attended the University of Memphis (Tennessee) and received a BA in Anthropology and Political Science. He recently submitted his thesis on theoretical approaches to artefact studies to complete the Postgraduate Program in Maritime Archaeology in 2007. John is currently working in cultural heritage management in Western Australia.

Andrea Smith

Andrea Smith attended Flinders University and received a Bachelor of Archaeology in 2005. In 2006 she completed an Honours Degree in Archaeology, and her thesis focused on the maritime cultural landscape of Kangaroo Island (South Australia). Andrea currently works full time for a publishing company in Adelaide.

David VanZandt

David VanZandt is a US military veteran and holds a BSc in Nuclear Engineering from Purdue University. He has worked for NASA for the past 21 years, and since 1995 has developed a passion for conducting shipwreck research. In 2003 he formed Cleveland Underwater Explorers (CLUE), a non-profit group dedicated to locating, exploring, and documenting the submerged cultural history of the Great Lakes. David is currently enrolled in the Postgraduate Program in Maritime Archaeology and his interests include technical diving, underwater photography, and marine geophysics.

Brian Williams

Brian Williams completed a BA in Anthropology at the University of San Diego (California) with an emphasis in maritime archaeology. In 2004 he worked with Florida State University at the Etruscan site of Poggio de Civitelle. Since graduation Brian has worked with the San Diego Institute of Archaeology and the Barona Museum. Brian is currently enrolled in the Postgraduate

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Karson Winslow

Karson Winslow attended the University of California, Santa Cruz, and received a BA in Anthropology. Since graduation she has worked for California State Parks, Alaska State Parks and in cultural resource management. Her interests include submerged cultural sites, Native American archaeology, ceramic production and photography. Karson is currently enrolled in the Postgraduate Program in Maritime Archaeology and conducting research on an abandoned schooner in the Garden Island Ship Graveyard in Port Adelaide.

Dianna Zwart

Dianna Zwart completed a Bachelor of Maritime Operations in Navigation and Marine Engineering in 2000 and a Bachelor of Science in Industrial Engineering and Management in 2001. After graduation she worked as a maritime advisor at a consultancy company and as an Assistant Safety, Health, Environment and Quality Manager in the Netherlands. In 2006 Dianna completed a Master of Maritime Archaeology at Flinders University and her thesis examined the relationship between human behaviour and how it affects shipwrecking events.

Preface

The year 2006 was a busy year for the Flinders University Program in Maritime Archaeology Program. Several field projects were conducted by staff and postgraduate students both in Australia and abroad. The Maritime Archaeology Monograph Series publication "A Year in Review: 2006 Program in Maritime Archaeology" is a sampling of this field research. The projects covered include research conducted on historic shipwreck shelter huts, early colonial ship construction sites, whaling sites, geophysical investigations, and two general survey reports.

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Introduction

Jennifer McKinnon and Jason Raupp

The year 2006 was busy for the Flinders University Department of Archaeology's Postgraduate Program in Maritime Archaeology Program. It began with the 2006 Maritime Archaeology Field School at Mt. Dutton Bay and the introduction of new academic staff to the ever-growing program. With new staff came new opportunities for fieldwork, and 2006 was a banner year for just that. This latest publication in the Maritime Archaeology Monographs Series (MAMS), *A Year in Review: 2006 Program in Maritime Archaeology*, is a small sampling of the field work both staff and students have conducted over the past year. Although all of the fieldwork conducted in 2006 could not be reported in this monograph, some of the key projects were chosen for publication.

The Program in Maritime Archaeology provides many opportunities for students to gain valuable experience working in the field. First and foremost is the annual Maritime Archaeology Field School, which was held in February. The 2006 field school was held at Mt. Dutton Bay on South Australia's Eyre Peninsula. During the field school students were encouraged to use the sites they investigated and the data they collected for their Masters Theses research. This year three students conducted research on their theses projects including investigations of the historic oyster industry in South Australia, maritime infrastructure in South Australia and Australian ship construction. Although these research projects were not included in this publication, future MAMS publications will be devoted to them.

Academic staff research is another valuable opportunity for students and staff to conduct fieldwork. In April 2006 a team of researchers and students led by Lecturer Jennifer McKinnon travelled to Kangaroo Island (South Australia) to conduct research on 20th century shipwreck shelter huts which were once located on the western end of the island. These shelter huts were erected for a short period of time to aid shipwrecked sailors with food, water, clothing and shelter in an effort to prevent loss of life. While expectations were low for finding these ephemeral shelter huts, the research hoped to establish these sites as viable maritime archaeological sites and begin to place them within a broader context of understanding 20th century shipping in South Australia. Chapter 2 reports on the results of archaeological and geophysical investigations at these sites.

While some students take the opportunity to utilize field school as a means for collecting thesis data, others are more adventurous and undertake field projects on their own. Chapter 3 outlines

Masters student Emily Jateff's ambitious fieldwork conducted in North Carolina (USA). In April and October 2006 Jateff organized and conducted a field research project at Cape Lookout National Seashore on Shackleford Banks in an attempt to locate shore-based whaling sites associated with the late 19th century settlement of Diamond City. This project combined the efforts of a number of agencies including the National Park Service Southeast Archaeological Centre, Cape Lookout National Seashore, the Program in Maritime Studies at East Carolina University and the North Carolina Maritime Museum. Although no definitive remains of whaling activities were located, Jateff's research illustrated the fact that changes in the environment and coastal erosion significantly affect archaeological sites and therefore should be monitored closely.

The program also supported the field research of two PhD students in 2006. PhD candidate Claire Dappert conducted archaeological research at Kangaroo Island's American River and reports on her findings in Chapter 4. Much like the ephemeral nature of the archaeological sites reported in Chapters 1 and 2, Dappert examines evidence of South Australia's earliest known non-Indigenous shipbuilding at American River. In addition to attempting to locate the construction site of *Independence*, her research investigated the factors which influenced the shipbuilders' decision to construct the vessel where they did and what types of timbers would have been available to them.

Chapters 5 and 6 represent yet another example of the growing opportunities for students to gain field experience. In 2006 the program added a new topic called *Practicum in Maritime Archaeology* to its course offerings. This topic provides students with opportunities to participate in the workplace environment with government agencies, consultancy firms, non-profit groups, or other universities. A practicum provides students with the ability to take part in joint projects and receive personal guidance and instruction with immediate feedback on their performance. It also allows students to put their theoretical learning into practice, develop a sense of the workplace, enhance their employment prospects through additional training, build networks of contacts and develop a range of personal and professional skills.

Over the years the program has developed a strong professional relationship with the Maritime Heritage Unit (MHU) of Heritage Victoria. As a result of this relationship, Flinders University and the MHU have run many joint research projects and field schools in both Victoria and South Australia. Chapter 5 reports on the results of one of two practicums conducted with the MHU in 2006. In October Flinders students and staff travelled to the southeast Gippsland region of Victoria to assist the MHU with site inspections of historic shipwrecks and terrestrial sites with maritime associations. The investigations of three shipwrecks (SS *Blackbird*, PS *Clonmel* and PS *Thistle*), and a riverine landing site at Stockyard Creek were conducted and students produced a preliminary field report for submission to Heritage Victoria. The Gippsland project is an example of the symbiotic relationships on which these practicums are constructed.

Chapter 6 reports on the second practicum conducted with the MHU at Port Phillip Bay in Victoria. As the authors point out, this practicum was "established with the dual purpose of assisting Heritage Victoria with its legislated responsibility of inspecting and managing shipwrecks of heritage significance, as well as providing maritime archaeology students with field experience". The project crew consisted of students and staff from Flinders University, MHU archaeologists, Australian National Maritime Museum archaeologists and members of the Maritime Archaeological Association of Victoria. In all, seven historic shipwrecks were investigated and three more were attempted, ship lines of the lifeboat *Queenscliffe* were lifted and recorded, and an archaeological assessment of the 19th century mineral springs and spa at Clifton Springs was conducted.

The last project to be reported in this MAMS publication presents the results of research conducted by program staff members Jason Raupp (Technical Officer), Ian Moffat (Research Fellow) and Masters student David VanZandt. Flinders University's Department of Archaeology has had a longstanding interest in incorporating geophysics into the archaeological investigation of Indigenous, historic and maritime sites. Chapter 7 reports on one project that combined historical, archaeological and geophysical research to look for the remains of several early ships known to have gone ashore near Port Elliot on the southern Fleurieu Peninsula. These investigations proved fruitful in demonstrating that a combination of historical research and a bi-partite geophysical methodology can substantially reduce the unnecessary use of time, funding and effort in the search for shipwrecks located in beach environments.

A Year in Review: 2006 Program in Maritime Archaeology is a compilation of reports on the fieldwork conducted by students and staff in the Flinders University Program in Maritime Archaeology. By no means does it represent all of the fieldwork conducted in 2006; instead it is a sampling of the various types of projects supported and operated by the program. The year 2007 is shaping up to be another year of great research projects and it is hoped that the efforts of students and staff can be reported on in another Maritime Archaeology Monograph series publication. Enjoy the year in review.

2

A Needle in a Haystack: Archaeological and Geophysical Investigations of Historic Shipwreck Shelter Huts on Kangaroo Island

Jennifer McKinnon, Ian Moffat and Andrea Smith

The Kangaroo Island Shipwreck Shelter Hut Survey Project began as part of a Flinders Faculty Research Maintenance Grant in 2006 and has since evolved into a cross-continental study of lifesaving stations, houses of refuge and shipwreck shelter huts in both Australia and the United States of America. The field work portion of this project was designed to locate and document the archaeological remains of two early shipwreck shelter huts located at Cape du Couedic and West Bay on Kangaroo Island. It was hoped that a pre-disturbance survey of these 20th century huts would provide a better understanding of the severities of life and shipping along the isolated, rocky coastline of Kangaroo Island, particularly the local need for lookouts and lifesaving stations. On a broader scale it was also hoped that this research would add to our general understanding of early shipping and ship losses in this area of South Australia.

The project crew included Jennifer McKinnon (principal investigator), Jason Raupp, Claire Dappert, Ian Moffat, and Andrea Smith and lasted six full days. On 7 April 2006 the crew arrived at Kangaroo Island and set up headquarters at the Flinders-Baudin Research Centre at Rocky River (Flinders Chase National Park). The project goals were to assess the natural and cultural features of the survey areas and possibly identify the locations of the shelter huts. Two and one half days were spent conducting pedestrian surveys, one day conducting magnetometer surveys, and the remainder of the time researching in the local museums. The following chapter is a description of this work and the results of the pedestrian and magnetometer surveys.

Brief History of Kangaroo Island

Kangaroo Island, Australia's second largest island, is located in the southeast of South Australia at the southern tip of the Fleurieu Peninsula (Figure 1). It is separated from the mainland by Backstairs Passage, a historic shipping channel renowned for its strong currents, waves, and weather. The island itself is approximately 150 km long and 55 km wide and as of 2005, the total population is 4,384 persons. Access to the island is available only by ai or sea and there is a ferry that offers service to and from the mainland via Cape Jervis and Penneshaw.

Figure 1. Map of Kangaroo Island (J. McKinnon 2006)

Despite the absence of an Indigenous population upon European arrival there is material evidence that suggests the island was inhabited by Indigenous peoples. Kangaroo Island became known to Europeans in March of 1802 when Matthew Flinders anchored in Nepean Bay (Ruediger, 1980:10). His first impressions of the island were recorded in his diary:

> There was little doubt, that this extensive piece of land was separated from the continent; for the extraordinary tameness of the kangaroos and the presence of seals upon the shore, concurred with the absence of all traces of man to show that it was not inhabited. (Cumpston, 1986:9)

At the same time Nicolas Baudin, a Frenchman, was exploring the waters of South Australia when he happened upon Flinders' expedition. Flinders described Kangaroo Island to Baudin as a place that offered fresh meat and water; however, Baudin did not act on his advice until January 1803 when he returned to Kangaroo Island and charted the southern and western portions of the island unexplored by Flinders (Fornasiero *et al*., 2004:230). Some of the places he charted have retained their French names including Cape Borda, Cape du Couedic, Cape Gantheaume and D'Estrees Bay.

From 1803 to 1830 sealing and whaling operations brought crews of men to Kangaroo Island for seasonal work. These men spent their time procuring oil, meat and kangaroo skins for the international market. A few of the men decided to stay and set up homesteads in the 1820s. It was then that a substantial settlement developed near Three Wells River including 30 men with Indigenous wives and children (Taylor, 2002:25). These Indigenous women utilized their adaptive hunting and gathering skills to help their families survive the difficult environment on Kangaroo Island (Clarke, 1966:51-81).

Sealing, whaling and hunting continued for some time until the arrival of the first planned South Australian settlement at Nepean Bay. This settlement began when the South Australia Company was granted rights to establish a town site and arrived on 27 August 1836 at Kingscote. Initially it was assumed that this area would be satisfactory, however the lack of local water forced plans to settle near present-day Adelaide almost immediately (Parsons, 1986:17). Within months most of the population had relocated and just a few settlers remained. From the late 1830s to the end of the 19th century Kangaroo Island remained stagnant. It was not until 1890 when Kangaroo Island's population, trade and agriculture picked up again. From the early 1900s a considerable amount of development took place and more families moved to Kangaroo Island to settle and make a living. Today there are four main centres of population: Kingscote, Penneshaw, American River and Parndana.

Previous Archaeological Investigations of Kangaroo Island

Until recently, there have only been a small number of archaeological investigations conducted on the island mostly related to Indigenous sites. In 1977 the Society for Underwater Historical Research conducted an archaeological survey on the wreck of *Loch Vennachar* (Society for Underwater Historical Research, 1977; Jeffery 1980). Ronald Lampart (1981) conducted a detailed survey of the island's Indigenous populations as a part of his PhD research. In 1991, Robert McKinnon conducted a survey of the shipwrecks that have occurred along Kangaroo Island's coastline, highlighting their cultural heritage significance. Later the Department of Environment and Planning, South Australia implemented an interpretive Maritime Heritage Trail on the island which focused on identifying and interpreting the location of these wrecks (Department of Environment and Planning, 1991). Also in 1991, Parry Kostoglou and Justin McCarthy conducted an archaeological survey of whaling and sealing sites in South Australia, five of which are located on Kangaroo Island. These settlements were ephemeral in nature and left little material culture behind. An archaeological survey has been conducted on Kangaroo Island's lighthouses as a Masters thesis (Lyons, 2005) and another Masters thesis was completed on several of the historic jetties (Khan, 2006). In 2006, Andrea Smith, co-author of this paper, conducted a maritime cultural landscape study of Kingscote and West Bay as a part of her Honours thesis research. Considering how 'untouched' and 'underdeveloped' the island actually is, there is great potential for archaeological investigations, particularly the maritime heritage.

Shipwreck Helter Huts on Kangaroo Island

During the 19th century maritime trade and traffic was expanding rapidly along South Australia's coastline. These increases in shipping in combination with the rugged and relatively sparsely populated coastline lead to an increase in shipwrecks, cargo loss, and loss of life. As a result, lifesaving stations and shipwreck shelter huts were erected along the coast and on Kangaroo Island in an effort to decrease the effects of these maritime disasters, aid in the recovery of shipwreck survivors and cargo and prevent further deaths from occurring once individuals made it ashore.

Records indicate that as early as 1899 shipwreck shelter huts were erected on the western end of Kangaroo Island (Figure 2). These stations were simply huts built of corrugated metal, wood and stone and no one was stationed at them. They contained enough supplies to sustain shipwreck survivors until further help arrived or until such time as they were well enough to walk for help. Items such as bread, meat, water, blankets, and rockets were stored inside. A notice board was posted outside declaring that the supplies were only to be used by shipwreck survivors, indicating the location of the nearest settlement, and providing instructions for opening the stores and for firing rockets. It is uncertain if any shipwrecked people ever used these shelter huts; however, they remain an interesting and integral part of the maritime history of South Australia and Kangaroo Island.

Shipwreck shelter huts would have been quite unassuming but easily identified from the water as a structure. A review of the historic photographs of the West Bay hut indicates that it was probably constructed of a wood frame with corrugated metal sheeting for walls and a flat roof (perhaps metal as well). Another historic photograph of a different shelter hut indicates the roofs of huts could also be pitched (Figure 3). The hut at West Bay most likely only had one entry, a door which faced south away from the prevailing winds. The structure is approximately 2 m wide by 2-2.5 m high (using individuals in the photograph for scale). The hut may have been painted white or light-coloured, probably so it would stand out among the bush.

Figure 2. West Bay shelter hut, 1906 (Courtesy of State Library of South Australia PGR 280/1/4/129)

Figure 3. Shipwreck shelter hut door, location and date unknown (Courtesy of Flinders Chase National Park Visitor Centre, Photograph: J. McKinnon)

In yet another historic photograph of a different hut (location unknown), the shelter is shown supported by carefully stacked rocks on each corner of the foundation and a path is cleared to the door (Figure 4). Variations such as this suggest that the construction of these huts was carried out in a pragmatic fashion governed by available materials and the specific needs of the particular environments.

Also visible in this photograph is a signpost with a message to shipwrecked sailors and others. One original signpost notice has survived and is on display in the visitor centre of the Flinders

Chase National Park. The notice is written in three languages (English, German and French) and provides instructions for those who made it ashore to the hut. Included in the instructions are a declaration that the supplies were only to be used by shipwreck survivors, directions and distance to the nearest settlement and instructions for opening the stores and firing rockets.

Figure 4. Shipwreck shelter hut with signpost, location and date unknown (Courtesy Hope Cottage National Trust Museum, Photograph: J. McKinnon 2006)

Site Histories

West Bay

West Bay is situated within Flinders Chase National Park on the western coastline of Kangaroo Island. Flinders Chase is approx 32,600 hectares and is comprised of three separate parks including Rocky River in the southwest corner of the island, Cape Borda in the northwest and the Gosse Lands in the northeast. These three park sections surround the Ravine des Casoars Wilderness Protection Area which forms the northern boundary of the West Bay region and totals 41,320 hectares. Together, Flinders Chase and Ravine des Casoars make up 10 percent of Kangaroo Island.

The European history of West Bay is limited as no European settlers inhabited this area and the nearest settlement was at Rocky River approximately 22 km east. In fact, according to the Department for Administrative and Information Services Lands Titles Office, West Bay has never been surveyed or subdivided into pastoral leases but has always been Crown land. When Cape Borda Lighthouse in the north was built in 1858 (Barker and McCaskill, 1999:38) the entire western shoreline including West Bay was named as a part of the Lighthouse Reserve (South Australian Government Gazette, 19 July 1900 and 29 April 1909) which was then transferred to Flinders Chase Park under the *Fauna and Flora Reserve Act* in 1919 (South Australian Government Gazette, 20 September 1923). Thus West Bay has changed very little since Kangaroo Island was settled. In recent years the park has added a remote campground, toilet block, rainwater tank, car park, picnic tables and boardwalk for recreation purposes; however, the bay itself and the terrain have retained their natural landscape.

Historical photographs and records indicate that a small shipwreck shelter hut was constructed at West Bay (Figure 5). It is not known conclusively when the shelter hut was constructed, although it does appear on a 1913 Admiralty Chart as a ‘Relief Station for Shipwreck Mariners’.

According to a display board at the Hope Cottage National Trust Museum in Kingscote (Author unknown) the shelter hut was erected in 1899 and dismantled in 1934. There is no historical evidence to suggest that any shipwrecked sailors found the West Bay hut and used the supplies, but there are stories of locals who raided the supplies (Chapman, 1972:2).

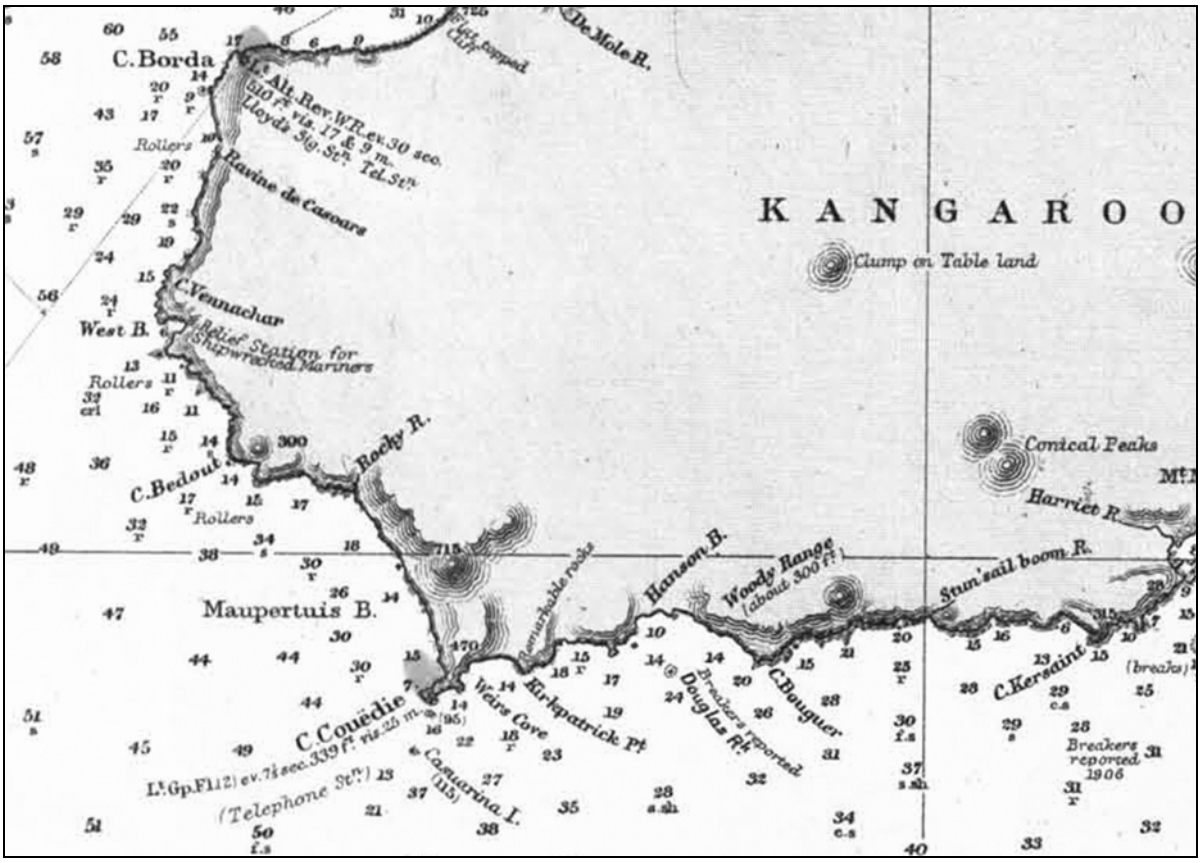

Figure 5. Detail of 1913 Admiralty Chart showing 'Relief Station for Shipwrecked Mariners' at West Bay, Kangaroo Island by Hutchinson, J. and Howard, F. (Courtesy of the State Library of South Australia)

The closest this hut may have come to service occurred in 1905 with the wrecking of *Loch Vennachar*. *Loch Vennachar* was a three-masted fully-rigged iron ship built in Glasgow in 1875 (Chapman, 1972:44). When the ship failed to arrive at port on 6 September suspicions of its sinking were raised. Conclusive evidence of the disaster came when a reel of blue printing paper identified as being on the ship's bills of lading was found floating in the Gulf of St. Vincent. Wreckage washed up all along the western and southern shores of Kangaroo Island for months after the wrecking. Search parties were launched including one aboard the Marine Board ship *Governor Musgrave* (Chapman, 1972:46).

It was not until Trooper R.C. Thorpe and Mr. Charles May, who were inspecting shelter huts on the southern coast of Kangaroo Island and found huge quantities of wreckage in West Bay, that the shipwreck site could be narrowed down to a specific location. On 26 November 1905 Thorpe and May found a badly decomposed body and a beach strewn with wreckage including spars, ship buckets with the name on it, the stern section of a boat, brass fittings, reels and bales of paper, and about 40 hogsheads and half hogsheads of whiskey (Chapman, 1972:48; Loney, 1993:33). Some of the casks of whiskey had been washed over a quarter of a mile up the West Bay Creek. The body was buried in the dunes and a cross was erected from the wreckage. This cross was later removed by vandals but a replacement stands near the spot of the original gravesite today. The body and the wreckage pointed to the fact that the shipwreck must be

somewhere nearby. As mentioned previously, the location of *Loch Vennachar* was discovered at West Bay in 1977 by the Society for Underwater Historical Research [SUHR]. SUHR divers recovered the anchor of the ship which now sits in the car park at West Bay.

Trooper Thorpe was quickly named Keeper of Wrecks and ordered by his superiors to remain in the area and conduct a salvage of the ship's cargo that washed ashore at West Bay (Loney, 1993:32). Thorpe and May made camp up the creek and set out to collect the salvageable cargo. While they waited for the government vessel to return to West Bay and pick up the casks of whiskey, Thorpe wrote a letter to a friend describing the remoteness of the area and complaining about how unpleasant it was to be forced to stay there for an extended period of time. A portion of the letter read,

> Doubtless you have seen in the papers the result of my visit of inspection to the Shipwreck Shelter Hut at this bay, and the sad discovery we made – I had a man named May with me for company, as it is both a rough, scrubby and dangerous place to come to alone. We first visited the Cape du Couedic shelter shed two days previous to this one and found all the stores, etc. intact. (Loney, 1993)

The secretary of the Marine Board received a telegram from Thorpe on 1 December asking when the whiskey would be taken away as it would require two days notice to have the horse bring the casks closer to the waters edge. On 6 December *Governor Musgrave* departed Port Adelaide for West Bay to pick up the whiskey and other salvageable goods. The ship arrived and they loaded the casks and shipped them from West Bay (Chapman, 1972:48).

Cape du Couedic

Cape du Couedic is also located in Flinders Chase National Park at the very south-western tip of the park and island. It is an area of historical, cultural and biological significance for a number of reasons. Located on the Cape are an historic lighthouse and associated buildings, the remains of a jetty and flying fox, Admiral's Arch (a famous geological site attracting thousands of visitors), a colony of New Zealand Fur Seals and the nearby Remarkable Rocks (another famous geological site).

Cape du Couedic's European history involves its designation as one of the early tourist destinations on Kangaroo Island including stops at Remarkable Rocks and Admiral's Arch and the construction of the lighthouse. The circular, masonry lighthouse at Cape du Couedic was built between 1906 and 1909 from locally quarried stone, as were the lighthouse keepers' cottages (Department for Environment, Heritage and Aboriginal Affairs, 1999:39). The location for this lighthouse was chosen because of dangerous ship traps nearby including Lipson Reef which is partially submerged just off the Cape and the Casuarinas (The Brothers), two islands just south of the Cape. Before its construction several vessels including *Mars*, *Emily Smith*, *Loch Sloy*, *Loch Vennachar*, and *Montebello* had wrecked in the vicinity (Chapman, 1972).

Less than a kilometre away at Weirs Cove are the remains of a jetty and the remnants of a flying fox and storehouse where supplies were loaded and unloaded for the lighthouse. The engineering achievements of the incredibly steep flying fox truly represent the remote and harsh nature of the southwest coastline of Kangaroo Island and the lengths to which the inhabitants had to go to in order to supply the lighthouse. Supplies for the lighthouse arrived every three months to this location and were kept in the storehouses adjacent to the jetty. The flying fox was also used to transport the keepers and their families on and off the Cape (Department for Environment, Heritage and Aboriginal Affairs, 1999:39). Mail was delivered by horseback fortnightly to Rocky River about 15 kilometres away, and the first vehicle to visit the lighthouse didn't arrive until 1940. The lighthouse was supplied with a full set of rocket apparatus and rope ladders for

scaling the cliffs in the event that a ship should wreck. In the late 1950s the Cape du Couedic lighthouse was automated. (Department for Environment, Heritage and Aboriginal Affairs, 1999:39). The lighthouse cottages are now used for visitor accommodation.

We know from Trooper Thorpe's letter that a shipwreck shelter hut was located at Cape du Couedic, but no definitive evidence, such as the historical photographs for West Bay, exists. However, when all of the known historic photographs are considered three different shelter huts appear to be represented. One particular photograph may have been taken of a hut located at Cape du Couedic based on the terrain and the object in the background which possibly could be the lighthouse (refer to Figure 4). The shipwreck shelter hut at Cape du Couedic was likely established several years prior to the construction of the lighthouse around the time of the West Bay hut. This photograph of the shelter hut may have been taken during the lighthouse construction process. It is likely that once the lighthouse was constructed, the shelter hut was either dismantled and used for materials or discarded or used as a storage shed or outbuilding of the complex. There would have been little need for a shelter hut once the keeper's cottages were established and could provide housing for shipwrecked sailors. This possible sequence of events raises an interesting idea that the shipwreck shelter hut might have been a precursor to the lighthouse operations.

Survey Project

The project goals were to assess the natural and cultural features of the areas and possibly identify the locations of the shelter huts (although the probability was acknowledged as low due to the ephemeral nature of the buildings). The following is a description of this work and the results of the survey.

West Bay Survey

Landscape

The West Bay environment and vegetation fall within the Gantheaume Environmental Association (Laut *et al*., 1977). The survey area principally consists of Holocene sand thought to be sourced from the adjacent river and then reworked and mounded against a cliff of lithified Pleistocene Aeolian limestone surrounding the survey area.

The survey of West Bay posed more challenges than expected as it is composed of quite steep sand dunes and dense vegetation. The survey began by using the historic photographs and trekking across the sand dunes, lining up the prominent features of the bay with those in the photographs. Because the topography of West Bay is quite dramatic, the crew was unable to maintain systematic survey lines; rather the photographs were used as a guide. It was clear from the photographs that the shelter hut was located in the central area of the bay in the higher set of dunes. These dunes were less susceptible to erosion as was evident by the dense vegetation, and also provided a better view of the surrounding waters due to the elevation. On either side of the bay there are steep rocky cliffs which would be difficult to climb making the dunes a more appealing location for tired, wounded shipwrecked sailors. Just to the south of the central dune area is a seasonal creek. During heavy storms the creek flows but for the majority of the year it is dry. Upon speaking with a park ranger, a fresh water spring was located on the south edge of the beach where the rock cliffs meet the sand.

Selection of survey area

After much climbing and debate a flat area of sand dune near the creek bed was identified as an area for further investigation. There were no signs of material evidence at this location or any

other location during the survey, but the crew operated on the assumption that lining up the prominent features in the historic photographs would put the survey area in the correct location. The area chosen provides a flat platform for a structure, a decent view of the water and vice versa, a nearby creek and is sheltered from winds by larger dunes to the north and east. After conducting a refined pedestrian survey of the area, a small area on the dune (approximately 60 m x 80 m in size) was chosen to conduct a magnetometer survey.

Geophysical survey

A magnetometer was selected as the most appropriate tool for the intended target with reference to the American Society of Testing and Materials standard D6329-99 (American Society of Testing and Materials, 1999:2). The use of magnetometers to detect direct ferrous evidence of cultural material (e.g. Black and Johnston, 1962), evidence of burning (Abbot and Frederick, 1990; Frederick and Abbot 1992), or disturbance in soil stratigraphy (Field *et al*., 2001; Nobes 2006) has a long and established history.

Magnetometer data was collected using a Geometrics G-856 proton precession magnetometer collecting data at five second intervals. During data acquisition the sensor was kept at a constant height of 2 m and orientated towards north at all times. Positioning data was collected with a Garmin 12XL Global Positioning System as a track point at five second intervals.

The survey tracks were placed opportunistically based on breaks in the vegetation and the elevation of the sand dune rather than on a set survey pattern. Survey of this type, although spatially less accurate than gridding (estimated to be +/- 5 m bested on the use of a navigational GPS), allows the rapid collection of reconnaissance data which permits the operator to determine whether the presence of anomalies calls for more detailed and spatially accurate survey (Moffat and Wallis, 2005).

A total of 206 data points were collected with data quality assessed as poor (Figure 6). The data shows a skewed distribution of data points suggesting significant interference from localized variations in the earth's magnetic field, most likely a result of magnetic storms. As a second magnetometer was not used during this survey as a base station, a diurnal correction was unable to be performed (Scollar, 1963). As a result, definitive analysis of the data is problematic; however, no evidence for discrete anomalies of a type and magnitude considered consistent with the generally ephemeral nature of the building were discovered. This suggests that, should the analysis of the likely position of the shelter hut be correct (see above for discussion), no ferrous material culture or other occupational evidence detectable by a magnetometer remains on the site. This is not a surprise as records at the Hope Cottage National Trust Museum indicate that the structure was sold and dismantled in 1934, just 45 years after it was built.

Cape du Couedic Survey

Landscape

Cape du Couedic also falls under the Gantheaume Environmental Association (Laut *et al*., 1977). The survey area contains lithified Pleistocene dune limestone sporadically overlain by a poorly developed soil. Palaeozoic granite outcrops are located around the survey area (including the tourist destination of Remarkable Rocks), and while it does not outcrop in the survey area, it is expected to occur at relatively shallow depths. The terrain posed a bit of a challenge because it is quite vegetated and rocky. This area is swept by high winds which have resulted in exposed limestone bedrock with short, stunted vegetation. In many areas the bedrock is exposed and heavily eroded causing large, deep holes.

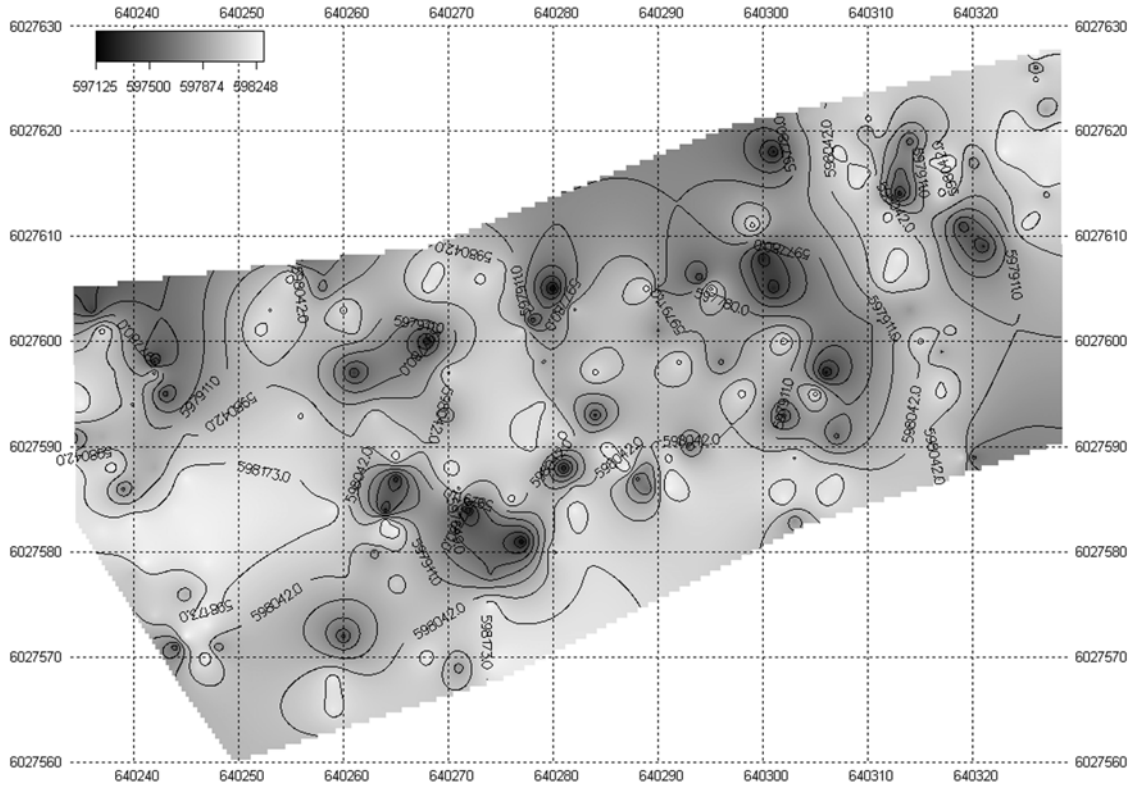

Figure 6. West Bay magnetometer results (I. Moffat 2006)

Selection of survey area

Cape du Couedic also posed more of a challenge due to a lack of definitive historical photographs of the shelter hut and the fact that historical records are somewhat conflicting. Trooper Thorpe's letter indicates there was a shelter hut at Cape du Couedic, but there is also historical mention of the shelter hut being located at Remarkable Rocks (Loney, 1993:33). Early sailors recognized these rocks as a prominent feature on the landscape by which to navigate and this would have been a likely spot to place the hut. Remarkable Rocks are approximately 4 - 4.5 km from the current lighthouse location and between the Cape and Rocks are two bays, neither of which have an accessible coastline. The section of coastline near Remarkable Rocks and Cape du Couedic is incredibly steep making it nearly impossible to climb the rocks if someone was shipwrecked, tired and injured. On Cape du Couedic proper, where the lighthouse is located, the slope to the water is less steep; however, it would still be a challenge to climb to safety. Of the coastline between the Cape and Remarkable Rocks, the area in front of the lighthouse provides the least challenging slope for a shipwrecked sailor. Additionally, this area provides a wider view of the surrounding waters including Lipson Reef and the Casuarinas Islands. Thus it was decided based on the physical characteristics of the shoreline, the viewshed and the probable history of placing structures nearby existing structures (i.e. lighthouse near hut location) that the survey for the shelter hut would involve the immediate area surrounding the lighthouse.

The lighthouse complex involves a series of support structures which were built when the lighthouse was constructed. These include three keepers' cottages, a fuel shed, a stable and work shed, a well, a flagpole and weather station. These structures were identified and photographed, and a general pedestrian survey was conducted to asses the natural and cultural features of the area. A large borrow pit was discovered just southeast of the lighthouse complex where rock and sand was excavated for the construction of the lighthouse (this pit is so large it can be seen on aerial photographs). The borrow pit was subsequently used as a refuse pit by the lighthouse

occupants as evidenced by the exceptionally large sheet midden of glass, ceramic, bone, and metal.

After inspecting the area two systematic pedestrian surveys were conducted in the areas identified as having high probability. These high probability areas were based on possible view sheds of shipwrecked sailors, elevation, shoreline characteristics, and historic photographs. These surveys were conducted south and west of the lighthouse and keepers cottages and south and east of the lighthouse. Using the road and cliff edges as survey boundaries, 10 m line spacing pedestrian surveys were conducted using a compass and GPS to track the lines.

Two promising areas were identified during the north-western survey, the first being a well associated with the construction of the lighthouse in 1899. The well has been excavated and the top edges are reinforced with concrete. Adjacent to the well on either side are two rows of stacked limestone rock radiating out for approximately 5 m. Otherwise the surface area adjacent to the well is cleared of all brush and rock. It is not known whether this was a naturally occurring well that existed prior to the lighthouse construction or if it was purposely dug by the builders. If it was natural, it is likely that a shipwreck shelter would have been constructed nearby in order to provide survivors with fresh water. Nevertheless, there are signs that it was modified and used for a period of time, but there are no visible signs of a nearby shelter hut location.

The second area of probability included a square pit cut into the limestone bedrock (Figure 7). This feature was of interest due to the regularity of the square shape and the cut walls, and was unlike any other natural feature in the bedrock. Additionally, the approximate size of 2 m by 2 m by 35 cm deep is similar to the estimated size of the shelter huts in historic photographs. A small cleared path leads from a maintained park trail up to the square pit and the area at the path/pit interface appears as if it might have been maintained in the past as a doorstep or entrance area to a structure. If the location of the square pit is aligned with the historic photograph of the possible Cape shelter hut, the lighthouse, environment and path or doorway fall in line with the photograph (refer to Figure 4). Additionally, if the photograph is of the Cape shelter hut, the construction techniques also correspond. As mentioned previously, this area is swept by strong winds and any structure built would need to have a substantial foundation and support. The structure could have been set in the ground and rocks stacked around the exterior for further support as shown in the photograph. As the expedition was intended as a reconnaissance only, this project did not include permits to disturb or remove the vegetation within and around the pit to locate postholes or construction techniques. Further investigations could reveal possible construction techniques.

It is entirely possible that this limestone pit could have been a stone borrow pit for the construction of the lighthouse; however, it is considerably smaller than the borrow pits to the southeast and no other borrow pits are located nearby. Another question remains as to how the structure would have remained dry if set into the limestone. Suggestions for it having a raised floor to collect rainwater beneath for drinking may solve this problem. Nevertheless, much remains to be answered as to how these structures were constructed.

The second pedestrian survey was conducted south and east of the lighthouse. Several cultural features associated with the lighthouse were located, including a number of limestone and sand borrow pits and sheet middens. One possible shipwreck shelter location included a deposit of degraded corrugated sheet metal scattered across an area of approximately 6.5 m by 6.5 m. According to historic photographs, corrugated metal sheeting was used in the construction of these shipwreck shelter huts. Although, given this area's proximity to the sheet middens nearby, it is likely that this was the location of another dump site as other bits of metal were located including links of chain and nails.

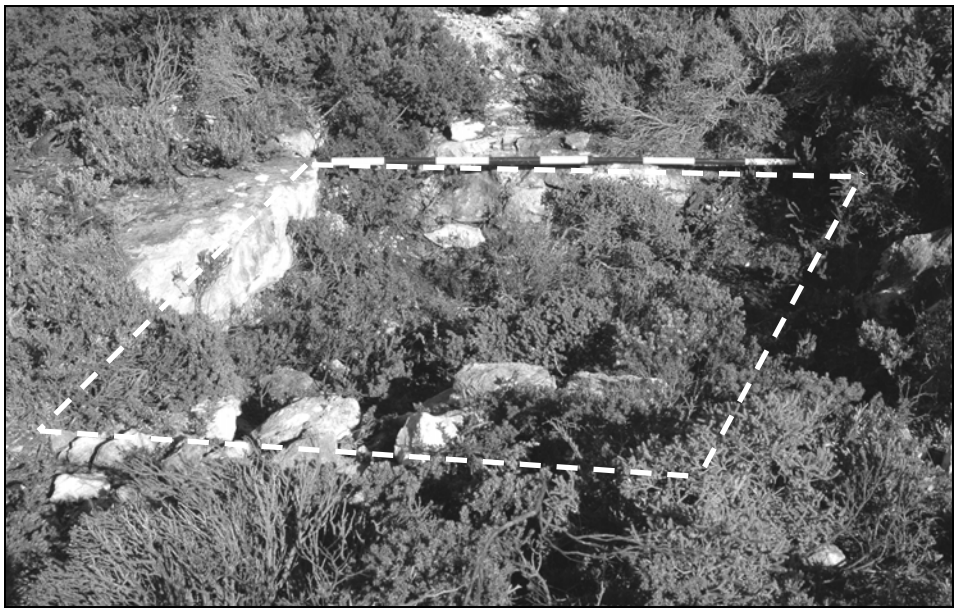

Figure 7. Square pit cut into limestone bedrock, white lines added for emphasis. Photograph taken facing west. (J. McKinnon 2006)

Based on the results of the pedestrian surveys a magnetometer survey was conducted adjacent to the square cut limestone feature. Both the well site and the sheet metal scatter area were excluded from magnetometer surveys due to the obvious presence of cultural material and disturbance.

Geophysical survey

The same magnetometer settings and survey methods were used for the Cape du Couedic area (Figure 8). The survey area was approximately 60 m x 45 m in size and 952 data points were collected. The results of this magnetometer survey identified three significant anomalies at locations near the pit. These anomalies should be tested and further mapping should be conducted at this site to investigate the possibility that this is a location of one of Kangaroo Island's early shipwreck shelter huts.

Conclusion

In conclusion, the project was successful in assessing the potential for locating shipwreck shelter huts. Unfortunately, the potential for locating these early shelter huts is quite low unless historical records, maps or photographs indicate their exact locations. Even then, actual sites are difficult to identify because they were lightly constructed, were not involved in any known shipwrecking events, and were dismantled and removed after a short period of time.

One of the goals of this project was to conduct a pre-disturbance survey of these turn-of-century shipwreck shelter huts in order to establish these sites as viable maritime archaeological sites, and begin to place these sites within a broader context to answer a set of research questions which remain to be answered. This research seeks to provide a better understanding of the severities of life and shipping along the isolated, rocky coastline of Kangaroo Island, particularly the local need for shipwreck shelter huts and lifesaving stations and the political and economic drive behind placing these shelters in these locations. In time and with further research, questions may be answered such as: How were these huts constructed? Who maintained them? Why this particular location(s) for a hut? Why was no one stationed at them? What affected the decisions to place a hut rather than a life station or lighthouse? What was the local involvement with these

huts? Were they ever used or successful? Did it matter if they were used or successful? Were these placed to satisfy a local need or to demonstrate a political effort or presence? When and why were the huts removed? Answers to these questions will begin to add to our broader understanding of early shipping and ship losses in this area of South Australia and Kangaroo Island and how the local community and government were involved in this effort.

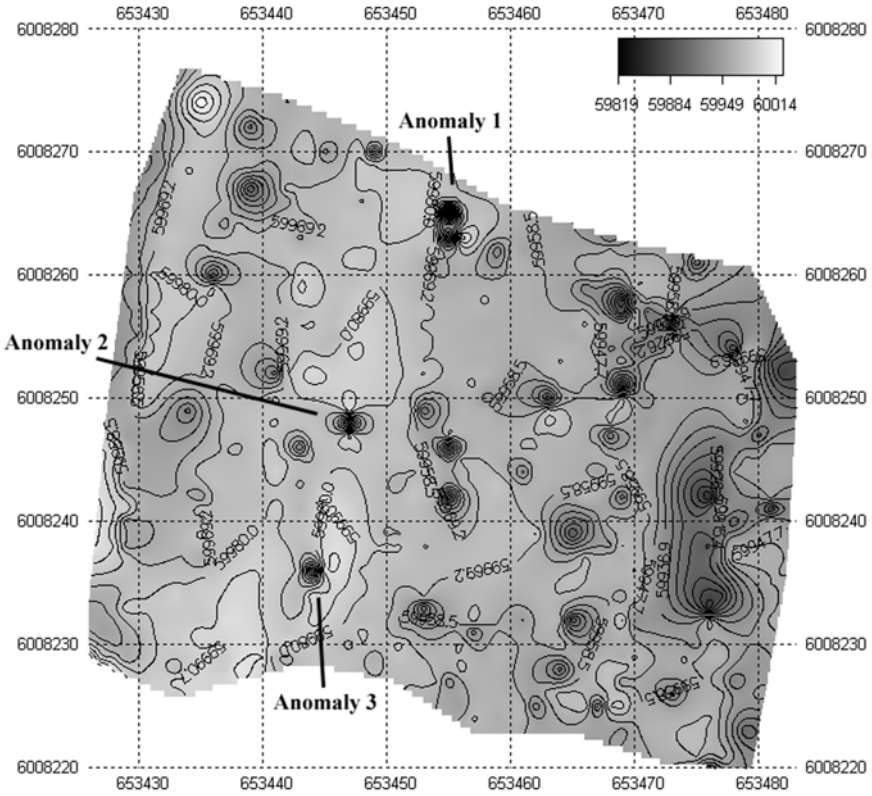

Figure 8. Cape du Couedic magnetometer results (I. Moffat 2006)

Acknowledgments

This research was funded in part by a 2006 Flinders Faculty Research Maintenance Grant. Thanks for support and assistance to the staff of Flinders Chase National Park, South Australia Department of Environment and Heritage, Hope Cottage National Trust Museum, Penneshaw Maritime and Folk Museum, and the State Library of South Australia. Special thanks should be given to a number of individuals who made this project possible including: Jason Raupp, Associate Professor Mark Staniforth, Claire Dappert, Simon Geering and Andrew Geering.

3

A Low Impact Survey of Shore-Based Whaling Sites at Shackleford Banks, North Carolina: Diamond City

Emily Jateff

In April and October of 2006, reconnaissance fieldwork was carried out at Cape Lookout National Seashore (CALO) on Shackleford Banks, North Carolina, as a preliminary attempt to locate shore-based whaling sites associated with the late 19th century settlement of Diamond City (Figure 9). Originally named Lookout Woods or simply 'eastern end,' Diamond City was once the largest community on the now uninhabited Shackleford Banks. Destroyed in the San Ciriaco Storm of 17 August 1899, Diamond City remains one of the most often recognized and cited names in North Carolina whaling history and lore.

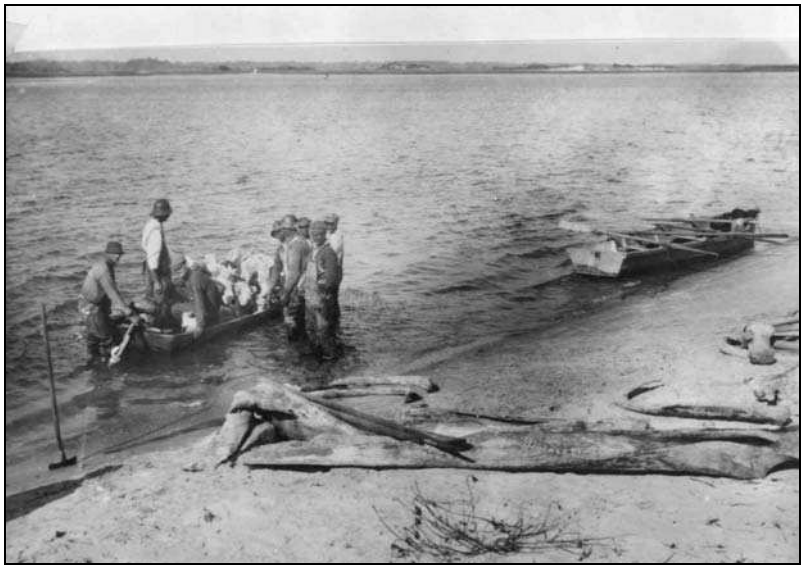

Figure 9. Lighter carrying whale bones prepares to depart banks (Courtesy North Carolina Maritime Museum)

The primary purpose of this reconnaissance survey project was to identify natural or cultural artefacts linked to past shore whaling activities on the eastern end of Shackleford Banks. Because CALO falls within the jurisdiction of the National Park Service (NPS), Diamond City is automatically protected by federal legislation. Although the Archaeological Resources Protection

Act (ARPA) permit granted for this research project did allow excavation for testing purposes, it was decided that the survey methodology should employ only non-destructive techniques. Efforts were made to conduct a surface search, perform remote sensing exercises, and use archival documents to narrow the search area as much as possible prior to fieldwork activities. In addition, Shackleford Banks is home to a large herd of wild 'Banker ponies' and is being considered as a National Wildlife Refuge. Transects of backfilled shovel tests (or similar) could create a dangerous situation for free-roaming animals. Unless absolutely necessary, archaeological research proposals were designed to avoid negatively impacting the current inhabitants and their environment.

As it is always a good idea to have an additional research goal or 'rainy day plan', project aims also included the identification of domestic or other surface features associated with past occupations at Diamond City. It was hoped that in the event that fieldwork was unable to pinpoint evidence of whaling camps, it might at least be possible to identify how and where these whalers once lived, leading to a greater understanding of the physical community structure of Diamond City.

In truth, discussions with both professional archaeologists and CALO employees implied a low expectation of material finds associated with whaling camps at Shackleford Banks due to hurricane impact and coastal erosion. From Hurricane Isabel in 2003 to Tropical Storm Ernesto in 2006, major storm events make landfall near CALO almost annually. The barrier island of Shackleford Banks is an ocean beach habitat characterized by strong wave action, tidal changes and sand scouring. Beach erosion and accretion, as a result of tidal action, have created a dynamic coastline. The beach erosion factor can reach up to nearly 1 m per year and remote sensing data collected in 2004 indicated that the eastern half of Shackleford Banks is "reworked and sediment-starved" (Camann and Wells 2004:ii). These environmental factors led to an assumption that any remaining archaeological evidence of shore-based whaling camps on the eastern ocean side of Shackleford Banks may now be dispersed. In 1938, Barden Inlet was permanently extended to separate Shackleford Banks from Cape Lookout and Core Banks. The production of this dredged waterway likely dispersed any archaeological materials within this area.

Historical Background

Archival research also influenced the supposition that little remains of past shore-based whaling activities on Shackleford Banks. Shore-based whaling was just one of various seasonal fisheries practiced by the men of Diamond City (Brimley 1894; Stick 1958; Simpson and Simpson 1990; Reeves and Mitchell 1988). The men who fished for mullet in September and October were the same men who set out looking for whales in early spring. These individuals would construct the same sort of shelters at their seasonal camps on the beach no matter what the season. For example, the differences between a mullet fishing camp where: "the men lived in cone-shaped huts, quickly built of saplings and thatched with reeds…[with] a lookout posted atop a nearby sand dune" and a whaling camp, where they would: "unite to form a camp, and proceed to build a house out of rushes…near the shore…and a lookout selected…to give the signal if the whales come in sight" were not pronounced (Taylor 1992:19; Earll 1884:490). There does seem to be a preference for quick and easy lodging and a low factor for structural permanence, both for reasons of transient behaviours (seasonal fishery), location (beach) and construction methods (reed huts).

In addition, many of the tools employed for whaling were also useful in other fisheries. Try pots were often just kettles adapted for another use and flensing knives could be as simple as large kitchen knives (Davis 1999:17). Whaling craft were 6-8 m lapstrake pilot boats also utilized for

harbour pilot duties, mullet and shad fisheries, and cross-sound transport (Taylor 1992). It is also likely that many of the tools and watercraft associated with whaling practices were never part of the archaeological record. Iron tools and pots were multiuse items and very hard to come by. Many of these objects were passed down and remain with the descendants of Shackleford whalers (Ira Lewis 2006, pers. comm.). Until the late 20th century, the Alfonso Whaling Museum in Beaufort, North Carolina displayed artefacts from the age of whaling along the North Carolina coast. This museum was housed inside an old sailing craft that was finally declared derelict and the collections (including two try posts, various harpoons and flensing irons) transferred to the North Carolina Maritime Museum (Paul Fontenoy 2006, pers. comm.).

So while it seemed fairly unlikely that much would remain of the actual shelters, tools or craft that could be identified on-surface, what about the flensing stations? It seemed possible that there would be some evidence that up to 50-ton North Atlantic right whales were beached and skinned at this location. Such evidence might include whalebone, brickworks for the try pot fires, and barrels. This turned out to not necessarily be true, as records indicate that flensing took place wherever the whale was beached (Stick 1958:188). If the hunt was a success, the whalers would throw up their oars and give three cheers, signalling the women and children ashore that it was time to prepare for their return (Davis 1999). The women and children would then collect wood to build fires on the beach, sink try pots in temporary brickworks and otherwise set up stations for flensing the captured whale (Stick 1958:190; Pitts 1984:418). Nothing was wasted; Shackleford whalers even transported the whale carcass to the mainland and sold it for fertilizer. (Davis 1999:18)

Historical records indicate that the far eastern end of Shackleford Banks - facing Core Banks and Lookout Bight - was the most likely place to find evidence of shore whaling huts, discarded whalebone, flensing or boat tools, or brickwork (Fries et al. 1922:258; Kell 1975:21). Oral histories gathered from local descendants of the Shackleford whalers suggested that a preference for this location continued well into the 19th century (Stick 1958). Therefore, fieldwork plans included both terrestrial and underwater surface surveys of this segment of the Banks.

So what of Diamond City? Although populated by European transplants from at least the late 17th century, the community of Lookout Woods did not really expand until the mid- to late-19th century. By 1853, the U.S. Coast survey noted buildings and a “sizable community” at the eastern end of Shackleford Banks (Stick 1958:186). By 1880, this number had grown to 500 inhabitants (Gillikin 1999:65). Formally christened “Diamond City” in 1885, this settlement contained stores, schoolhouses, houses, and three on-island processing plants (Stick 1958:187-188, 190; Davis 1999:16) (Figure 10).

The San Ciriaco or “Great” Storm of 1899 thoroughly destroyed the community of Diamond City (Barnes 1999:77). Faced with the obliteration of living spaces, crops, and livestock, the Diamond City settlers chose to relocate to Harkers Island, Bogue Banks, or the mainland. By 1902, no permanent residents remained on the island although local inhabitants of Carteret County continued to use seasonal vacation/fishing camps on Shackleford Banks well into the 20th century. In 1987, Shackleford Banks was acquired by the federal government and incorporated into Cape Lookout National Seashore. At this date, all remaining fishing shacks were burned (Connie Mason 2006, pers. comm.).

In 1952, W. Engels remarked that “nothing remains now but an occasional loose pile of bricks or stone, marking the foundations of a former dwelling place and several large mounds of oyster shells, now covered by sand” (Engels 1952:721). The structures at Diamond City were ramshackle “story-and-a-jump” houses pieced together from shell, brick, shipwreck materials and island timber, or “hodges” - small dwellings carved out of dunes and hills (Willis 1999:91;

Gillikan 1999:68). They were not built for structural permanence. After the Great Storm of 1899, many of these houses were removed from their foundations and floated to the "Promised Land" in Morehead City or to Harkers Island (Stick 1958:193). In addition, no historic plats or Mills Atlas' maps exist to provide a projected layout of Diamond City.

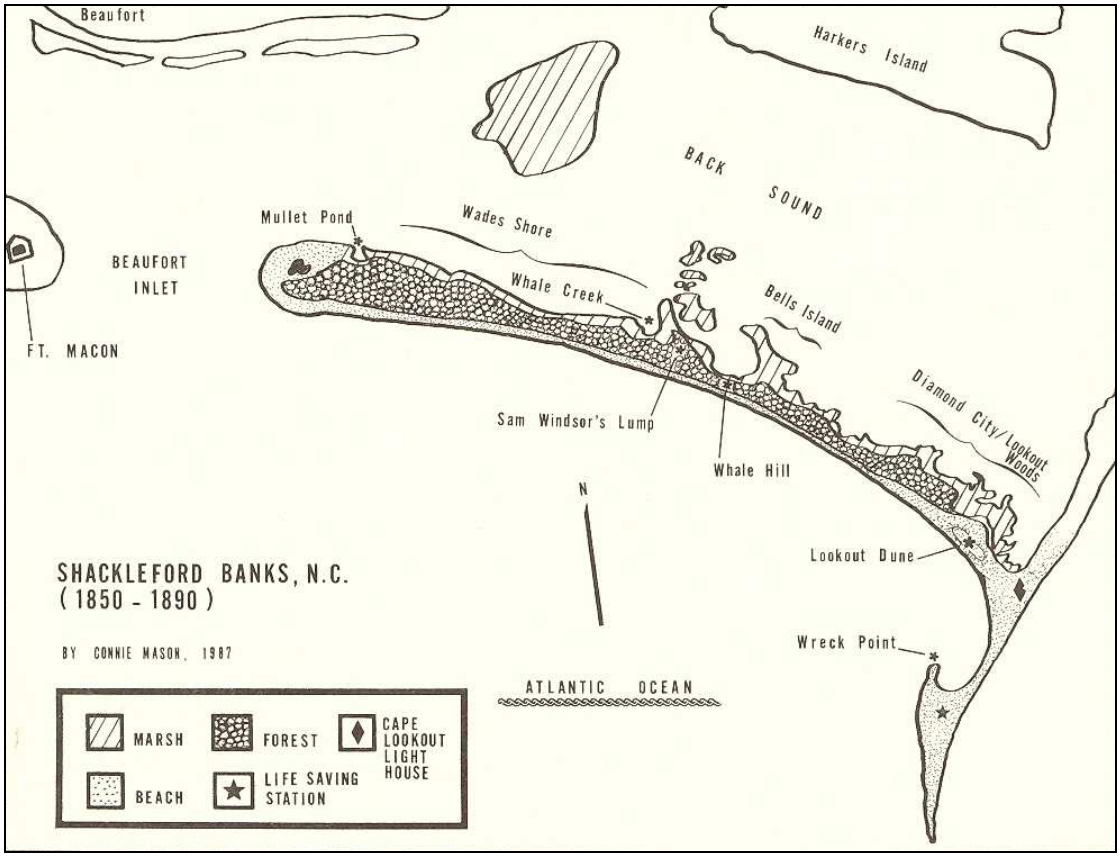

Figure 10. Communities on Shackleford Banks 1850-1890 (Courtesy of Connie Mason, National Park Service)

Previous Investigations

Cultural resource surveys of Cape Lookout National Seashore were previously submitted to the National Park Service by F. Ross Holland (1968) and John Ehrenhard (1976) as a precursor to the purchase of Cape Lookout National Seashore by the National Park Service in 1976 and the subsequent acquisition of Shackleford Banks in 1986. Holland (1968) did not survey for subsurface archaeological sites. Thirty-six sites were recorded within CALO, nine of these on Shackleford Banks, although none were deemed eligible for the National Register.

Of the nine sites identified by John Ehrenhard on the eastern end of Shackleford Banks, only NPS 14 (Diamond City) is identified as an historic site; all other sites are listed as prehistoric (Ehrenhard 1976). Previously identified sites also include 31CR193 (Diamond City), the site number on-file with the North Carolina Office of Archaeology. However, 31CR193 does not have the same GPS coordinates as NPS 14. As far as could be determined, the location for NPS 14 was determined by surface artefact scatter and boundaries for NPS 14 or 31CR193 had not been defined through subsurface testing or other means. Per the results of previous archaeological investigations, all shell mounds present on Shackleford Banks were believed to be Native American (Ehrenhard 1976; Michael Rikard 2006, pers. comm.).

Site Surveys

The first phase of this project - performed 24 April 2006 - a visual assessment of the beach and sound sides on the eastern end of Shackleford Banks. Previously identified locations for Diamond City (NPS 14 and 31CR193) were relocated and visually surveyed for surface cultural materials. Surface scatter was not identified at either location. Walkover survey inspection began at the Horse Corral and proceeded east along the sound shoreline to the start of the tidal marsh (approximately 3 km in length). Five visual transects were then conducted north/south along the eastern end of the island at approximately 500 m intervals and then west along the ocean side to a point due south of the horse corral (again, approximately 3 km in length). Ten close interval transects (10 m intervals, paced off) were employed at the northern ends of north/south transects 2 and 3 to further delineate surface features present within this area. Survey transects progressed east/west between these points to the shore.

No cultural features were noted on the ocean side of the island within this survey area. Cultural features identified on the sound side of the island included three shell mounds with small scatters of brick, glass and ceramic, and what may once have been a pathway or road oriented east to west (see Figure 11). Personal communications with Connie Mason indicated “nothing is left” of the old roads that connected Diamond City to the other settlements on Shackleford Banks (Connie Mason 2006, pers. comm.). However, it was thought likely that this feature was associated with the Lookout Woods/Diamond City settlement, not only because of shape, size and placement, but also due to the proximity to identified shell mounds.

Figure 11. Pathway/Road, facing Mound 1, to the northwest (Jateff 2006)

Based on the information collected from archival, oral, and field data collected in April 2006, this low impact field project was designed to include terrestrial and underwater visual survey inspections of the ocean side on the far eastern end of Shackleford Banks. It was determined that this area held the highest potential for identification of cultural and natural artefacts associated with past whaling camp occupation and activity areas. However fieldwork does not always turn out as planned.

The original research design was to include a terrestrial and underwater survey of the eastern end of Shackleford Banks (Figure 12). Emphasis for the terrestrial portion of this project was to concentrate on identification of structures or objects associated with fishing or whaling practices in this area. Due to the submerged nature of the area (tidal flat/salt marsh), it was expected that

some areas would not be accessible. Terrestrial fieldwork was to include a two-person team conducting visual transects. It was expected that visual survey, delineation, measurements and documentation would take three days to complete. The survey area started at the presumed location of Diamond City (31CR193) and terminated at Barden Inlet (total length: approximately 2 km). Width of the survey area varied from 290-780 m. This area was divided into 78 transects at a compass heading of 120 degrees to be visually inspected in 10 m intervals by two individuals. The survey area terrain included beach, sand dune, maritime forest, and tidal marsh. Terrestrial inspection transects were to terminate at the tidal marsh.

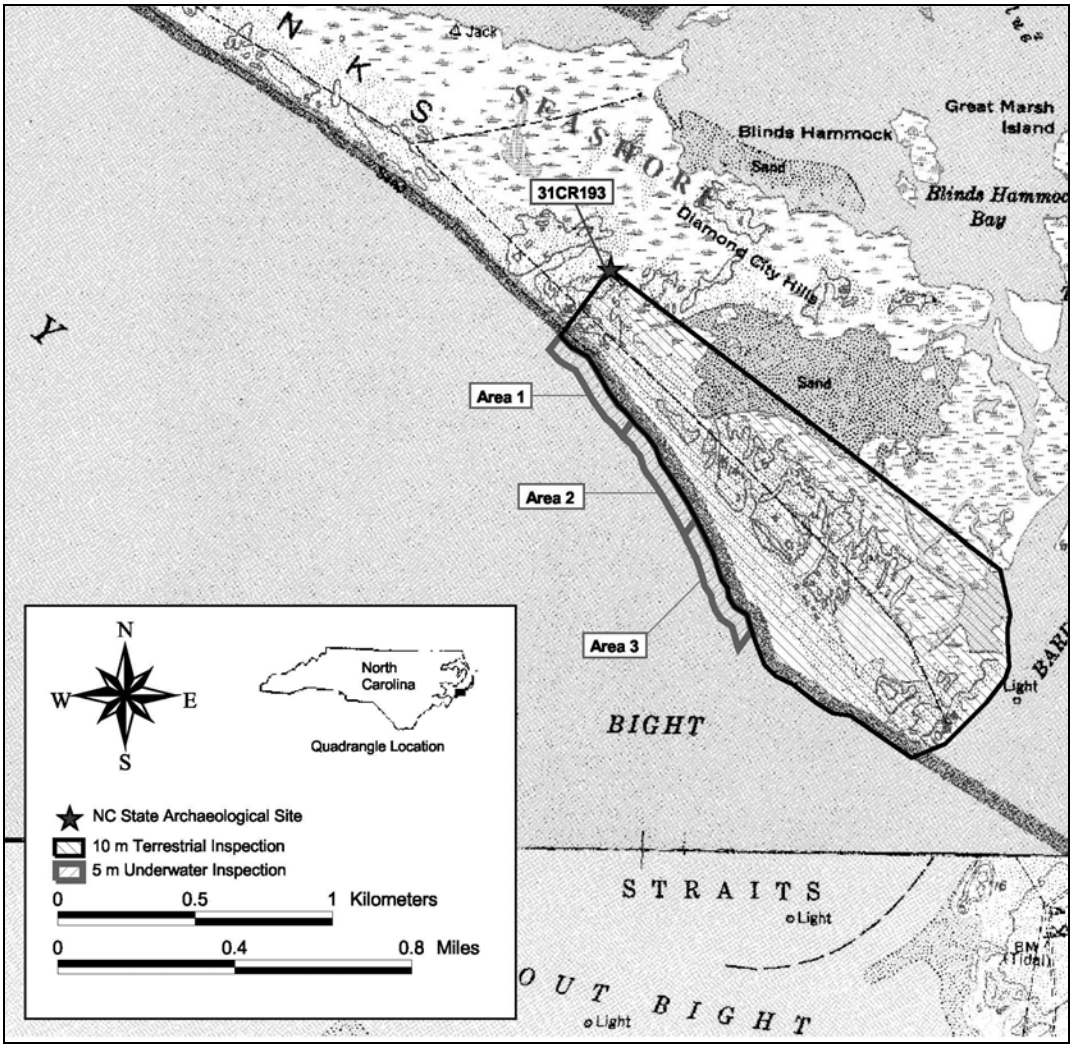

Figure 12. Original survey parameters (Jateff 2006)

The underwater survey was designed to attempt identification of whaling camps once located on land. Consequently, the southern extension of the survey area was determined by the nearly 1 m per year shoreline erosion factor calculated by Eleanor Camann (Camann and Wells 2004). From this estimate, an approximate total shoreline erosion of 65 m is postulated to have occurred since the San Ciriaco hurricane of 1899. Western extension of the survey area started 290 m southwest of the presumed location for Diamond City (31CR193) and the eastern extension was a point due east of the tip of Lookout Bight (1200 m). Time constraints on fieldwork precluded the extension of underwater survey within Cape Lookout Bight.

Time allotted for the underwater component was three days. Fieldwork was to include a snorkel and SCUBA swim line search for surface artefacts within a 1200 m E/W by 65 m N/S survey area adjacent to the terrestrial survey area. Maximum depth in this area is 6 m with an average of

1.5 m. As this was a large survey area to cover in three days of fieldwork, it was divided into three 400 m E/W by 65 m N/S areas. Area 1 (due east of 31CR193) was considered the area with the highest potential for material culture associated with both shore whaling practices and the settlement at Diamond City. Area 2 was the middle survey block and Area 3 the most easterly survey block. Transects were to run N/S from shore at 220 degrees. Each area was to be inspected at 2-5 m intervals, depending on water visibility. Transect totals were 80 transects per block at 5 m intervals or 200 transects per block at 2 m intervals.

The above planned fieldwork was scheduled for 6-8 October 2006 and to be conducted with the assistance of students and faculty from the Maritime Studies Program at East Carolina University (ECU). However, due to fluctuations in weather reports, and unforeseen complications with time constraints, it was impossible to complete fieldwork as originally planned. It was determined that there would not be enough time to complete terrestrial and underwater survey area searches. Therefore previously identified features on the sound side (Area 1) were surveyed in greater detail. In a final attempt to salvage the search for shore-based whaling camps, a visual inspection survey of the far southeastern end of Shackleford Banks (Area 2) was performed on 6 October 2006. The purpose of this survey was to examine the terrain for cultural or natural artefacts located on the surface.

The environment of the north eastern section of Area 2 was tidal marsh/salt flat (located within Barden Inlet); around the bend, the topography changed to steep sand dunes banking a wide beach, and the south-western edge of Area 2 was rolling sand dunes tapering to a flat beach. Dune banks average 1-5 m in height with the greatest height along the southeastern tip of the island. Investigations recorded a 20 cm layer of crushed oyster shell included within the dune bank, approximately 80 cm from the top of the bank (Figure 13). Artefacts identified in Area 2 included one block of granite and three drift pins. It was not possible to conclusively state that these artefacts were associated with historic occupations at Diamond City as they could be associated with modern activities. There was little evidence that future fieldwork will be able to locate archaeological evidence of shore whaling within Area 2. Severe coastline erosion may prevent the identification of *in situ* cultural material that could be linked to past shore-based whaling activities.

Figure 13. Sand dune with shell lens and cultural material, facing north (Jateff 2006)

To get the most from the survey and learn as much as possible about past occupants of Shackle ford Banks, the 'rainy day plan' was enacted. It was decided that the weekend of fieldwork should concentrate on determining information about the location and boundaries of Diamond City. The purpose of this revised fieldwork was to record all identifiable shell mounds, structures, and the pathway/road located within the survey area on the eastern sound side of Shackleford Banks (Area 1). Primary goals included survey and assessment of the previously identified mounds and pathway/road to ascertain if they could be associated with past historic occupation of Diamond City.

Area 1 encompassed two mounds identified during April 2006 fieldwork, five newly located mounds, two structures, and the pathway/road. Five of these mounds were mapped with a TopCon GTS 229 Total Station; and all mounds were recorded with a Global Positioning System set to North American Datum (NAD) 83. Points were taken on and near Mounds 1-5 to determine mound dimensions and distribution of brick and other cultural artefacts. To determine the possible locations of buried cultural materials, a Garrett Infinitum Pulse Induction metal detector was employed in an approximate 100 m swath around Mounds 1 and 2. However, there was insufficient time available to metal detect the areas around Mound 3-7.

Further investigation of the pathway/road found this feature to continue much farther than previously believed. This feature is also believed to include offshoots - that led directly to identified shell mounds. An approximate total length and width of the main road were collected using a combination of GPS and tape measurements.

A total of 71 artefacts and 65 brick fragments were identified at Mounds 1, 3, 4 and 5 and a maximum date range for these artefacts was 1815 to 1925. Mean Ceramic Date (MCD) calculations reported a mean of 1863 (Mound 1) and 1861 (Mounds 3 through 5), although temporal distribution of ceramics indicated a later - rather than an earlier - occupation. The cultural assemblage combined with the spatial distribution implied a connection with Diamond City. Mounds were spaced at intervals located close to the sound shoreline and contained shell, historic ceramics, brick, and roofing nails (Figure 14).

In addition, Diamond City descendants Ellis Yeomans and Dennis Chadwick reported that the twentieth century fishing shacks on Shackleford Banks were set up on top of the old shell mounds. In some cases, existing shell mounds were scraped up and combined to create higher mounds (Yeomans and Chadwick 2006, pers. comm.). If the fishing shacks on Shackleford Banks were burned in 1987, it is interesting that all copper, stone, and iron artefacts noted at Mounds 3, 4 and 5 presented evidence of fire scorching.

It is believed that artefact data support the theory that the mounds in Area 1 were associated with historic occupations on Shackleford Banks. In addition, on-island location suggested that Area 1 mounds were associated specifically with occupations of Diamond City. However, these mounds could not be pinpointed to one temporal period. There is both historical and archaeological evidence of mound utilization from the mid-19th century through the late 20th century. Further surface survey will most likely not be able to tighten these temporal ranges, although if deemed necessary, it may be possible through subsurface testing.

If the Area 1 mound concentration represented a section of Diamond City, then it is possible to presume that similar mounds may also be associated with Diamond City and therefore future research may be able to locate and define boundaries for the entire community (see Area 1 extension in Figure 15). The far northeastern tip of Shackleford Banks is the location of the "largest mound on the island" (Michael Rikard 2006, pers. comm.). Future research at CALO includes plans for visual inspection of similar mound features.

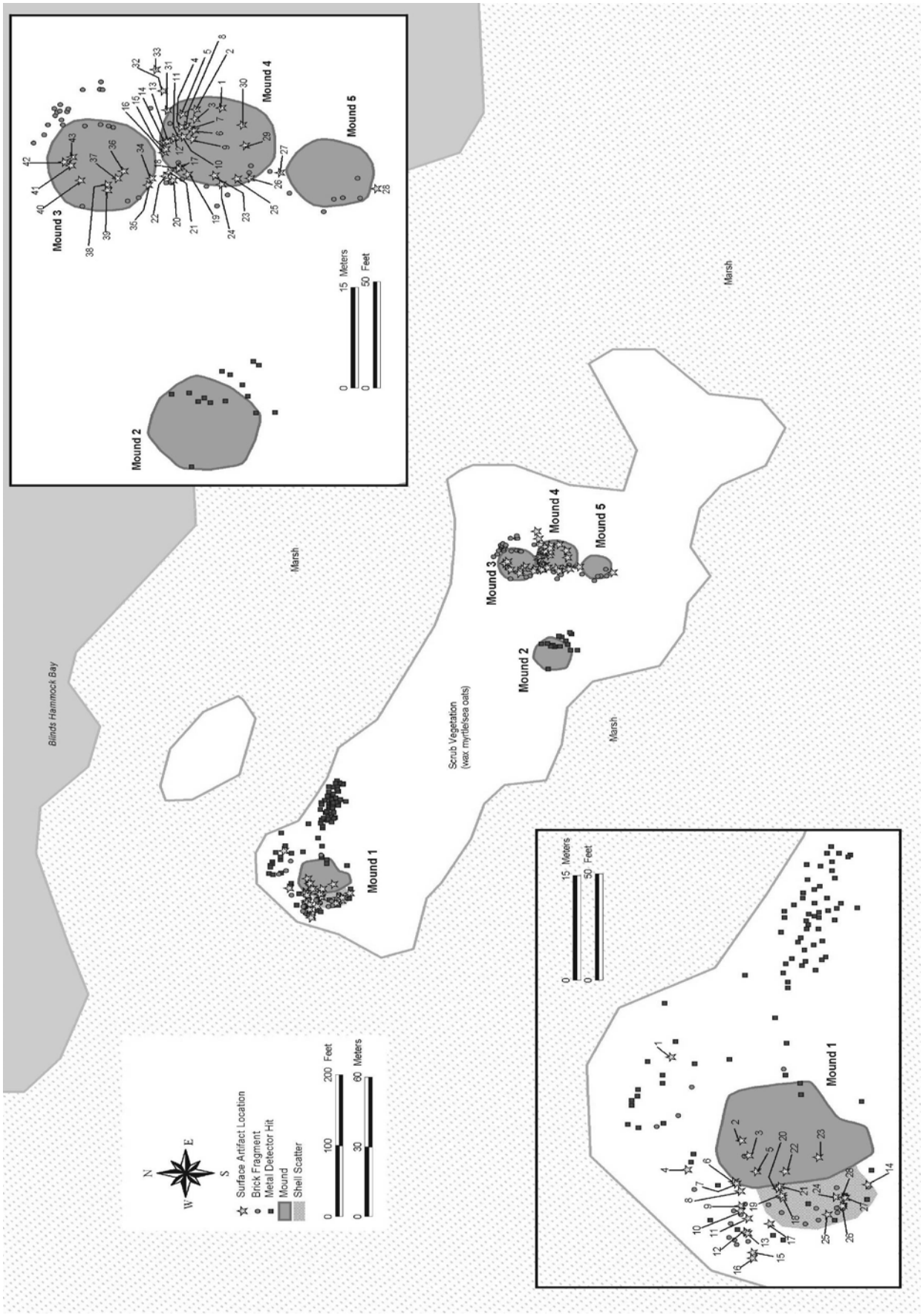

Figure 14. Total Station data for Area 1 mound concentration (Jateff 2006)

Figure 15. A portion of a 2006 aerial photograph showing Area 1 and projected Area 1 extension (Adapted from Europa Technologies, DigitalGlobe)

Conclusion

The question may be asked whether or not this fieldwork project could be deemed a success. Expectations for archaeological evidence of shore-based whaling sites were not optimistic. Therefore, the fact that reconnaissance surveys of the southeastern end of Shackleford Banks proved difficult to identify cultural or natural remains of shore-based whaling activities was not a great surprise. There is the chance that the original fieldwork plan would have proved more successful; however, time constraints necessitated changes to the fieldwork plan. The 'rainy day plan' allowed for a change of focus that still gathered valuable information about historic occupations on the eastern end of Shackleford Banks.

Acknowledgments

Field research was performed under the auspices of an Archaeological Resources Protection Act (ARPA) permit, granted by the National Park Service Southeast Archaeological Centre (SEAC) and supported by the staff at Cape Lookout National Seashore (CALO), including Bennie Keel and Michael Rikard. Project fieldwork would not have been possible without the assistance of Mark Staniforth and Jennifer McKinnon from Flinders University, Nathan Richards, Tricia Dodds, and the Program in Maritime Studies at East Carolina University (ECU), Paul Fontenoy with the North Carolina Maritime Museum and the community of Harkers Island.

4

Search for the *Independence* Construction Site, American River, Kangaroo Island

Claire Dappert and Ian Moffat

During July 2006, students and staff of the Program in Maritime Archaeology at Flinders University conducted an archaeological survey near American River, Kangaroo Island, South Australia, to attempt to locate the US schooner *Independence* construction site. The purpose of this report is to summarize the methodology and findings of these investigations. Based on historical documentation, the construction site was suspected to be located along the present day shore line near American River (Figure 16).

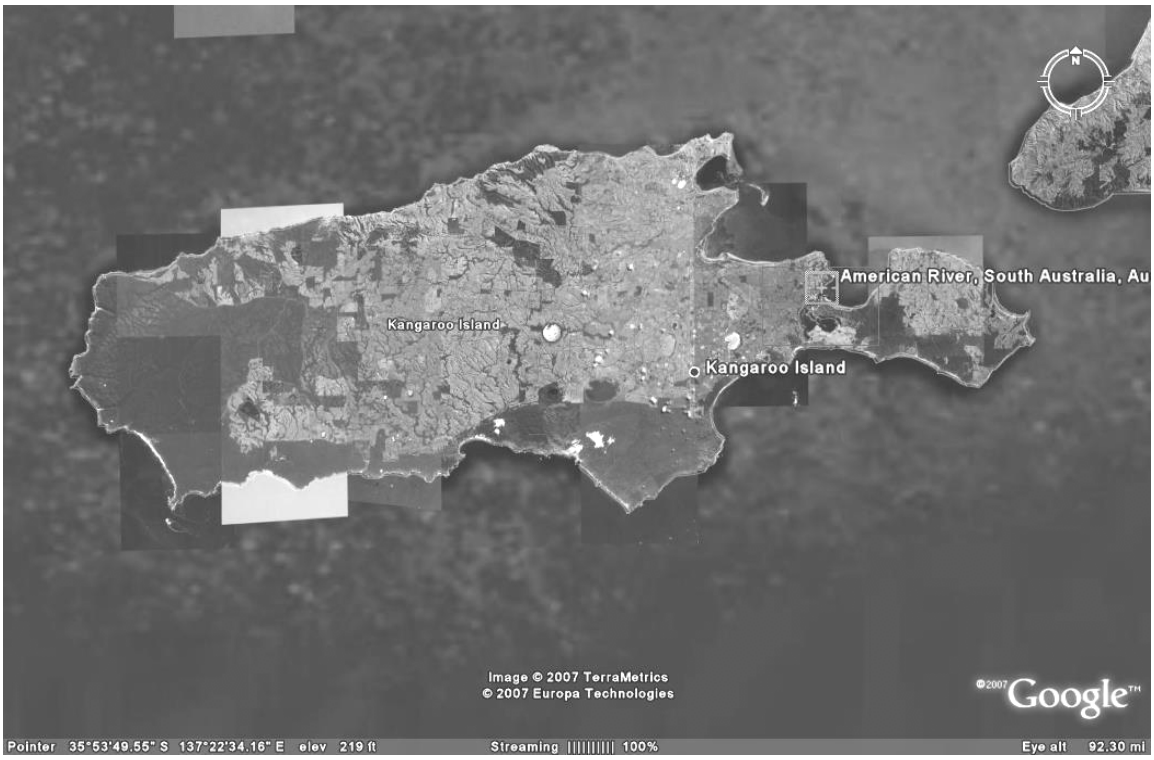

Figure 16. Map of Survey Area (TerraMetrics 2007)

Although the survey did not find the exact location for the *Independence* construction site, it did establish three target areas (Figure 17) that would have been most ideal for this activity in the survey area: the *Independence* Point Site (Site A), the American River Township Site (Site B) and the Fish Cannery Track Site (Site C). These locations were based on several assumptions about characteristics of shipbuilding sites: closeness to channel, relationship to flat or gently sloping land for ease of launching, closeness to fresh water, protection from the elements, and presence of early 19th century cultural material. In addition to attempting to locate the site of construction, this research sought to address two central questions: what factors, such as environmental resources, influenced Captain Pendleton to choose American River as a location to construct *Independence*, and what were the different types of timbers available to the shipbuilders of *Independence*? As part of answering these questions, the field crew initiated a vegetation survey to sample prominent timber specimens.

This archaeological survey provided a valuable source of information on several levels. The survey represented the first archaeological survey conducted in the American River area, and this cultural assessment provides a baseline for future studies and management. This study was also one of the first studies to attempt to locate such an ephemeral shipbuilding site. The knowledge gained from the investigation could provide a foundation for similar studies that target short occupation ship construction sites.

Figure 17. Survey area showing Site A, Site B and Site C (TerraMetrics 2007)

History of US Schooner *Independence*

Independence, which was the first non-indigenous vessel constructed in South Australia, was built in 1803 by the crew of US brig *Union*. *Union* was outfitted by Fanning & Co. of New York in 1802 for a sealing expedition to the southeast coast of New Holland (Fanning 1989:230). Edmund Fanning, who owned a part share in the vessel, stated,

> Never, perhaps, was a voyage entered upon with brighter, and never did a vessel sail with more encouraging prospects than this brig. Her commander (Captain Isaac Pendleton) was …left unrestricted, and at perfect liberty to act on all occasions as his judgment should direct, to make the most profitable voyage he could of it for his owners. (Fanning 1989:230-231)

On February 18, 1803, the vessel arrived at Seal Island in King George III Sound. The crew then went ashore to procure seal skins, but because the chief part of the sealing season had already passed, they only obtained a small amount (Fanning 1989:231-232). Two days later, Pendleton happened upon the French explorer Nicolas Baudin of *Le Géographe* who was surveying the coast of New Holland. Baudin recorded the details of their rendezvous:

> And before seating ourselves he begged me to give him, if possible, a chart of the coast of New Holland, not possessing any information to guide him in the course he desired to take in the search for the places frequented by seals, nor for the direction of the coast nor of the dangers to be met with there. I gave him two charts…as well as the position of King Island. (Cumpston 1970:26)

Baudin and his officers reassured Pendleton that he would find enough seals to complete his cargo at Kangaroo Island, and he proceeded to tell him the best place for anchorage and to procure sealskins. Previous to this encounter, Baudin and his corvette *Le Géographe* had sailed around Kangaroo Island. Baudin had lost a longboat, and his carpenters had combed the island for suitable timber. It was only when they reached the area near what is now called American River that the carpenters were able to procure suitable timber, and then construct a longboat aboard Baudin's vessel. Although not historically documented, it is possible that Baudin shared this information with Pendleton.

Pendleton set sail for Kangaroo Island, and decided to winter at American River, where they constructed the 30-ton schooner *Independence* (*Sydney Gazette* 8 January 1804). Here the crew "found both the hair and fur seals, extensive forests, good water, and much game; fowls and birds of various kinds in abundance; and also excellent fish and oysters in great plenty" (Fanning 1989:231-232). They stayed for almost four months, during which time they "set about and built a small vessel, 30 tons burthen, named the *Independence*" (Fanning 1989:232; *Sydney Gazette* 8 January 1804).

The timbers utilized to construct *Independence* have been debated. Edmund Fanning's (1989) historical narrative and The *Sydney Gazette* reported that the scantlings used to construct *Independence* were hewn and sawn from the local pine tree, which resembled Swedish timber and contains turpentine (Fanning 1989:232; *Sydney Gazette* 1 July1826). Another source states,

> The first officer, D. Wright, a man of mechanical ingenuity, the carpenter and armourer directed preparation of the native pine, eucalypt and casuarina timber. With this and spare sails, rigging and other materials from the Union they were able to launch the *Independence* early in 1804. (Nunn 1989:20)

Upon completing the vessel, Pendleton and the crew of *Union* parted company with the newly appointed crew of *Independence*, while *Union* got underway to Port Jackson. Isaiah Townsend, who was a seaman aboard *Union* wrote to his brother Samuel in New York:

> We have been cruising on the Southwest Coast of New Holland but to little advantage. We have built a fine schooner of about 30 tons. We call her the *Independence* which…our crew is now cruising in Bass's Straits... Captain Pendleton myself and the remainder of the crew is in here with the ship for supplies. (Townsend 1804)

Union left Sydney during April 1804, to rendezvous with *Independence* at Kangaroo Island (HRA 1804:5.122). They both arrived back in Sydney during June 1804 (HRA 1804:5.120). At this time Captain Pendleton sold a part share of *Independence* to the prominent Sydney trader Simeon Lord. The Articles of Agreement listed Isaiah Townsend as master of the vessel (Fowler

1980:72). Pendleton also sold his cargo of seal skins to Simeon Lord for which he was to procure payment from the sale of the sandalwood in China. He was to obtain the sandalwood at a secret location in Fiji.

The presence of American vessels in Port Jackson had the Governor of the Colony, Phillip King, worried. He wrote to the Secretary of the State for the Colonies, asking him how far he would be "justified in preventing the American intrusion and the resultant intercourse with them." (HRA I 1804:5.92-93). King issued a General Order on August 11, 1804 stating:

> … no vessel under foreign colours, or belonging to any foreigner, be cleared from this port for any sealing voyage within the limits of this Territory or its dependencies, and for the purpose of returning hither, but that all such vessels after their necessities are relieved, be cleared out from this Port to any other Port of Discharge. (HRA I 1804:5.92-93)

Pendleton, rather than reveal his true destination, cleared Port Jackson for China. John Boston, sailing as supercargo, was to take *Union* to Fiji to procure sandalwood for the China markets, which was to be the first attempt at trading sandalwood with China. While stopping at Tonga for supplies, Pendleton and six other crewmen were murdered by the local Indigenous population. Daniel Wright, who became acting captain, returned to Sydney to report the news and to procure provisions. Then, he continued the expedition to Fiji. *Union* struck a reef along the coast of Fiji near Sandalwood Bay, and those that were not drowned were massacred by the local Indigenous population.

Independence, on the other hand, did not have to clear Port Jackson for a foreign port because Simeon Lord owned a part share of the vessel. Townsend sailed the vessel to Antipodes Island, which was south of New Zealand and where they procured 59,000 skins. Captain Townsend wrote to his brother in New York:

> I take this opportunity to inform you…that I have been very successful since I left the Union. On a sealing expedition I have at present several vessels and a large number of men under my direction in this business. Besides my little schooner the *Independence* which I command and have now mated with Captain Jonathan Paddock in the ship *Favorite* of Nantucket. (Townsend 1805)

Independence and *Favorite* set sail on another sealing expedition on the 15 June 1805. The two vessels parted company at New Zealand planning to rendezvous again at the Antipodes Islands. The crew of *Favorite* arrived, procured skins, and sailed back to Port Jackson. *Independence* was never heard of again. Captain Paddock stated:

> We are sorry to report the probable loss of the American schooner *Independence*, which…was for some time conjectured to be traveling on discovery of advantageous situations for procuring seal; but has unfortunately never since been seen or heard of. (*Sydney Gazette* 15 May 1806)

"He had not more than six or seven weeks provisions on board of the schooner...I think from every circumstance we have reason but to think he was lost." (Paddock 1807). Simeon Lord had in his hands everything that Townsend had obtained during his sealing expeditions, which amounted to about 18,000 skins. Paddock did not know what share was Townsend's or Lord's (Paddock 1807).

Previous Investigations

No previous archaeological investigations have been conducted near American River. Historical evidence indicates the vessel was constructed in this area. A chart composed by Captain George Sutherland in 1819 depicts a general location for construction; however, the inscription, "Where a schooner was built by shipwrecked Americans," was incorrect in that the Americans were not shipwrecked. Thus, its validity is rather dubious (Sutherland 1831).

A local historian, J. S. Cumpston, visited the American River region in the 1960s (Figure 17 and Figure 18). He claimed to have identified the *Independence* construction site near a small point along the western shore of American River (Figures 18 and 19).

> Some pieces of coal picked up on the point were found to be dissimilar from that mined in Australia. That suggests that a shipwright's forge was in use there. While the vessel was under construction the Union was almost certainly anchored in Eastern Cove, off American Beach, where water is available. (Cumpston 1970:28)

Based on this cartographic and coal evidence, the present day *Independence* Point was chosen as a primary target area.

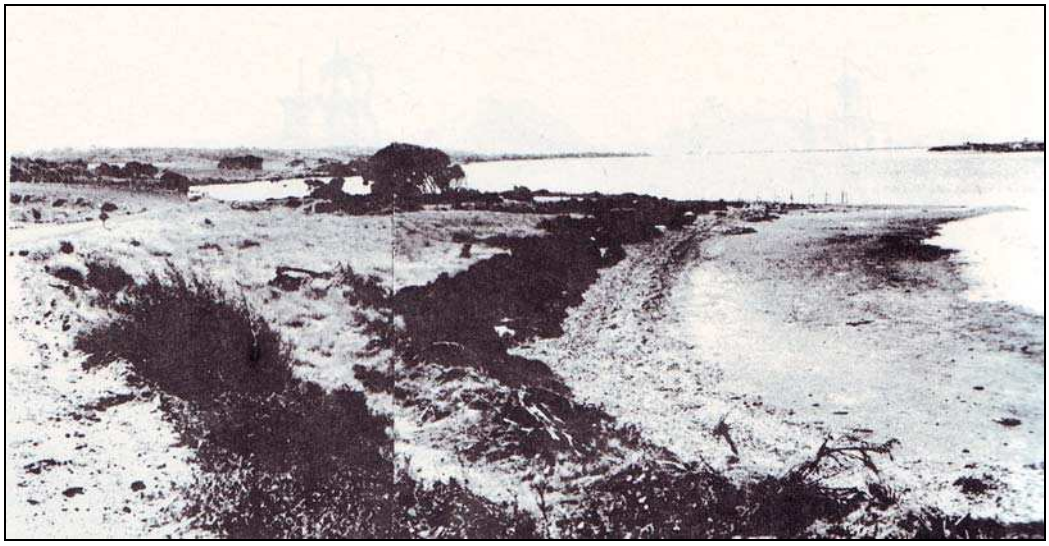

Figure 18. Photo taken by J.S. Cumpston in 1960s showing *Independence* Point (Cumpston 1970)

Environment

Kangaroo Island is the second largest island in Australia. It is located approximately 140 km southwest of Adelaide near the mouth of the Gulf St. Vincent. Separated from Cape Jervis on the mainland by a narrow waterway called Backstairs Passage and from the Yorke Peninsula by Investigator Strait, the island is 50 km wide and has a coastline of 496 km. Most of the island consists of plateau with steep cliffs to the north and low-lying limestone bedrock along the south coast. Much of the soil has gravely limestone inclusions overlaying limestone bedrock, and the predominant overgrowth consists mostly of dense mallee scrub. Rainfall averages 50-60 cm each year. Most streams and lagoons are saline during the spring and dry up during the summer months. Most settlement has centred near these waterways where the soil has more depth before hitting bedrock (Tyler *et al*. 1979:39).

Figure 19. *Independence* Point as it appears today (Karson Winslow 2006)

Methodology

Site investigations included a combination of pedestrian surveys, magnetometer surveys, and a vegetation survey.

Pedestrian survey

The pedestrian survey covered nearly 11 km along the foreshore and identified three target sites based on closeness to a deep water channel, relationship to flat or gently sloping land for ease of launching, closeness to fresh water, protection from the elements, presence of early 19th century cultural material, and availability of timber suitable for ship construction. Target areas were then further investigated by a series of systematic shovel tests (Figure 20). Shovel tests were laid out in a 5 m or 10 m grid, depending on testable terrain, and all soil constituents were recorded with a Munsell soil chart.

Figure 20. Jennifer McKinnon (right) and Karson Winslow investigate a shovel test (Mark Staniforth 2006)

Geophysical survey

A magnetometer was selected as the most appropriate tool for the expected targets with reference to the American Society of Testing and Materials (ASTM) standard D6329-99 (ASTM 1999:2). While other geophysical methods such as ground penetrating radar or electromagnetic induction may have been successful at locating non-ferrous material associated with the site, the complexity of the site history, the expected low level of relict material culture and the closeness of the salt/fresh water interface to the survey areas would make their use problematic given available field resources. The use of magnetometers to detect direct ferrous evidence of cultural material (Black and Johnston 1962) evidence of burning (Abbot and Frederick 1990; Frederick and Abbot 1992) or disturbances in soil stratigraphy (Field et al. 2001; Nobes 2006) has a long and established history within archaeology and so this method was deemed appropriate for use.

Magnetometer data was collected using a Geometrics G-856 proton precession magnetometer automatically collecting data at five second intervals. During data acquisition the sensor was kept at a constant height of 2 m and orientated towards north at all times. The magnetometer was tuned to 60 000 nT prior to data acquisition and the clock was calibrated to the GPS prior to each survey. Positioning data was collected with a Garmin 76 GPS as a track point at five second intervals. Data collection locations were chosen based on ease of access rather than on the basis of a regular grid.

This kind of reconnaissance survey provides an ideal precursor to further investigations as it focuses on covering large areas quickly rather than providing definitive anomaly locations or character (Moffat and Wallis 2005). This is because of the coarse nature (estimated at +/- 5m) of the accuracy of data collected with a navigational GPS and the lack of any diurnal corrections applied to the data set through the used of a second, stationary magnetometer, which does not appear to result in a significant reduction in data quality in surveys of a small duration (Silliman *et al*. 2000). Furthermore, by relying on a single method of geophysical investigation for initial investigations; survey, processing and interpretation time are greatly reduced.

Such a survey philosophy is founded on the premise that the use of inexpensive, widely available instruments without being slowed down by the need to accurately spatially locate the data provides an initial assessment of whether targets exist in the area. If appropriate targets are found, more detailed survey or direct investigation can be used to further define their character and location. Should no anomalies be located during the reconnaissance phase, other more prospective locations can be analysed rather than directing resources towards a probably barren location.

All surveys suffered from a generally low data quality. Plots of data values versus station numbers show a large variation of data points from the mean. This could be the result of noisy diurnal conditions during the survey, heading errors (failing to keep the instrument upright and pointing north at all times during survey) or the large amount of anthropogenic material (one site was a former garbage dump) on site. Despite the large range of points, data for the *Independence* Site magnetometer survey one, the *Independence* Site magnetometer survey two and the Cannery Track magnetometer survey is interpretable.

Vegetation survey

A vegetation survey was also conducted to determine areas that would have been suitable for supporting timber stands large enough for building a 35-40-ton vessel. Vegetation associations, which have been loosely defined as the combination of canopy, understory and ground layer species that form a discreet vegetation community, and species descriptions only included prominent woody species. Herbaceous species would have no bearing on the survey objectives

(Bullers 2006:1). Samples of mature leaves, juvenile leaves, buds, fruit and bark as well as a field guide (Holliday 2003) were utilized to establish timber species. After identification, the vegetation structure, or community, of each area was determined. This allowed for the whole survey area to be compared to other environmental attributes (Bullers 2006:3).

There are several key factors that affect timber growth and its location, and an understanding of this was essential to make informed judgments about timber that may have been available at the time of *Independence*'s construction. These include geology and land surface processes, soils, aspect and slope, fire regime, and disturbance (for a full discussion see Bullers 2006).

Seven woody species were identified during the survey; however, their suitability for shipbuilding purposes (such as maximum dimension of planks and quality) varies greatly. All together, 10 vegetation communities were identified in the survey area and are shown in Figure21. Of these ten vegetation communities, only six were considered as capable of producing timbers suitable for shipbuilding. Accordingly, the 10 potential timber-producing species identified in the American River survey area and their characteristics include:

Sugar Gum, *Eucalyptus cladocalyx* F. Muell.: Strong and durable hardwood timber suitable for many building tasks. Stems are often very straight, and it is considered as one of the best Australian hardwoods. Common uses include poles and fence posts (Bonney 1997:82).

Narrow-leaved Mallee, *Eucalyptus cneorifolia* DC.: Not generally suited for construction timbers. Stems are very thin and crooked, making them unsuitable for construction. Common uses include the distillation of eucalyptus oil (Bonney 1997:83).

Brown Stringybark, *Eucalyptus baxteri* (Benth.) Maiden and Blakely: Often used in construction and for general farm uses including poles and fence posts (Bonney 1997:74).

Black Cypress Pine, *Callitris gracilis* R.T. Baker: Reddish brown with a compact, fine grain and piney odour (Holliday 2002:102). Valued because it is termite resistant. Used for construction of houses, flooring, poles, and fencing (Bonney 1997:54).

Drooping She-oak, *Allocasuarina verticillata* (Lam.) L. Johnson: Not generally used for construction purposes, but it is used for fence posts or other minor structures.

Golden Wattle, *Acacia pycnantha* Benth: This species has many ancillary uses including tanning, wool dye, bush food, firewood, and shelters, but it is not used in the construction industry (Bonney 1997:16).

South Australian Paperbark, *Melaleuca halmaturorum* F. Muell. Ex Miq.: This species has many ancillary uses including fencing, weaving, bush food and firewood, but it is not used in the construction industry (Bonney 1997:149).

SA Coast Mallee, *Eucalyptus diversifolia* Bonpl.: Timber characteristics are unknown, but given that it only occurs as an occasional with other mallee communities, it was not likely easily available for shipbuilding purposes (Bullers 2006:13).

Narrow-leaved Red Mallee, *Eucalyptus foecunda* Schau.: Slender stems of narrow diameter make this species unlikely to provide suitable shipbuilding timbers (Bullers 2006:13).

Moonah, *Melaleuca lanceolata* Otto: Bushy shrub or rough-barked, low-branching tree. Can have substantial stems (Bullers 2006:13).

Although these communities could change over time, particularly as a result of historic clearing activities, fire or other types of cultural or natural disturbance, remnant timber species provide a means to extrapolate what types of timbers were available to the shipbuilders of *Independence*?

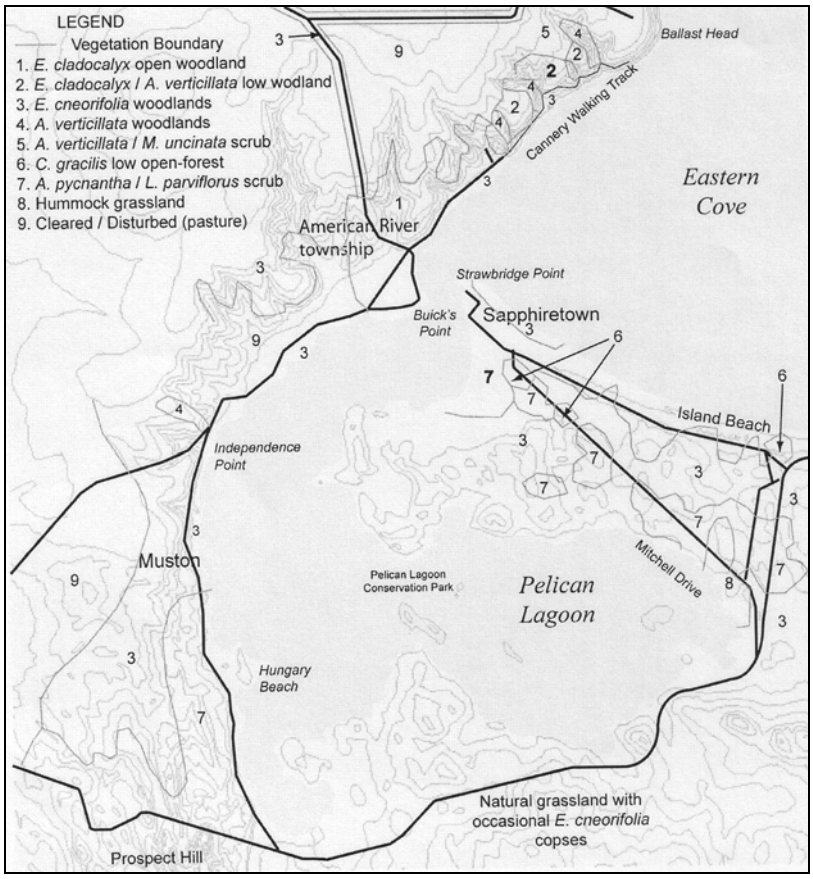

Figure 21. Map of survey area showing vegetation communities (Bullers 2006)

As mentioned previously, three historical sources, Fanning (1989), Townsend (1804), and the *Sydney Gazette* as well as one contemporary source, Cumpston (1970), state that *Independence* was constructed from native pine. The only native pine species observed in the survey area was Black Cypress Pine (*C. gracilis*). Interestingly, Cumpston stated the Latin name of the native pine as *C. propinqua*, which is a former name of *C. gracilis*. This species was observed intermittently within the survey area, but there were no prominent stands of *C. gracilis* observed at *Independence* Point or anywhere along the eastern and southern shores of Pelican Lagoon. The exception to this was a single shrubby individual at the entrance of the car park and a few individuals at Hungry Beach (Bullers 2006:29).

Since Cumpston utilized the scientific binomial for the local species, he probably positively identified the species. It can also be inferred that since he visited this area during the 1960s and since then there has been much development, *C. gracilis* probably grew in this area at least until that time. The present day vegetation pattern, however, does not support this. Only three intensive stands of this species were observed, and all three were on the northern side of Pelican Lagoon. One stand was near Strawbridge Point, which is across the channel from American River Township. Thus, either the vegetation at *Independence* Point has changed drastically, or Cumpston was mistaken in his identification. He could have confused she-oak for native pine (Bullers 2006:29).

In addition to the claims that *Independence* was constructed of native pine, Nunn states that *Allocasuarina* and *Eucalyptus* species were also utilized. The only casuarinas species identified

within the survey area were Drooping She-oak (*A. verticillata*). It occurs commonly throughout the region both as a co-dominant and dominant species. The majority of identified individuals were rather short and slender, but it can grow quite large, as several examples were observed with trunks approximately 30 cm in diameter. These larger individuals could yield excellent shipbuilding timbers (Bullers 2006:29).

Nunn also states that *Independence* was constructed from a *Eucalyptus* species; there were five types of *Eucalyptus*, three with a tree habitat and two with a Mallee habitat, identified during the survey. The most predominant vegetation association was woodland dominated by Narrow-leaved Mallee (*E. cneorifolia*), a species present in nearly all communities except shrublands and grasslands. The other Mallee species, Mallee sp. 1, *Eucalyptus sp.* (no identification) was only observed as a singe individual. Since the Mallee growth form does not allow for anything other than the production of small, slender poles, this species should be discounted (Bullers 2006:29-30). This species, however, can grow in tree form (Costermans 1983:375), and it is possible that some substantial timber stands were available in 1803.

The three *Eucalyptus* tree species observed included two isolated individuals of South Australian Coast Mallee (*E. diversifolia*), near Muston and Tree sp. 1, *Eucalyptus* sp. (no identification) near Strawbridge Point. Despite the ephemeral presence of these two examples, it is possible that more extensive stands were present during the 19th century (Bullers 2006:30).

The *Eucalyptus* most capable of producing timbers suitable for shipbuilding is Sugar Gum (*E. cladocalyx*) (Figure 22), a species common to Kangaroo Island but only occurring in a limited range of the study area. This species occurred along the coast in a limited band from American River Township north to Ballast Head. Its growth form varied from stands of short, twisted communities of little value for construction purposes to tall straight stands ideal for shipbuilding (Bullers 2006:30).

Figure 22. Sugar Gum (*E. cladocalyx*), found near American River Township with a base greater than 1 m. Sugar Gum was one of the few tree species that would have been suitable for the construction of a 40-ton vessel such as *Independence* (Rick Bullers 2006)

This vegetation analysis finds that there are three species that were most likely to have been utilized for the construction of *Independence*:

- Black Cypress Pine (*C. gracilis*)
- Drooping She-oak (*A. verticillata*)
- Sugar Gum (*E. cladocalyx*)

Because of the limited range of two of these species, there are several locations based on vegetation alone that would have been ideal for the construction of *Independence*. Furthermore, because the crew of *Union* was small and had a limited time range to construct the vessel (three months), the crew probably would not have transported large timbers great distances. Thus, the availability of suitable timber within a close range was probably a factor in its construction location (Bullers 2006:30). These ideal locations include: Between *Independence* Point and the American River Township; at, or near, Strawbridge Point on the northern side of Pelican Lagoon, opposite American River; and near one of seven gullies between American River Township and Ballast Head (Bullers 2006:30). All three target sites were located within these boundaries (See Figure 23).

Site Interpretation

Independence Point (Site A)

Independence Point (Site A) was identified as a target area based on the claim made by Cumpston that he had found coal at this location. *Independence* Point is relatively close to the channel. The coastline at low tide is approximately 50 m from the present day channel. Because there is nearly a 2 m tide, the water depth between the coast and the channel at high tide could have been sufficient for launching a small schooner.

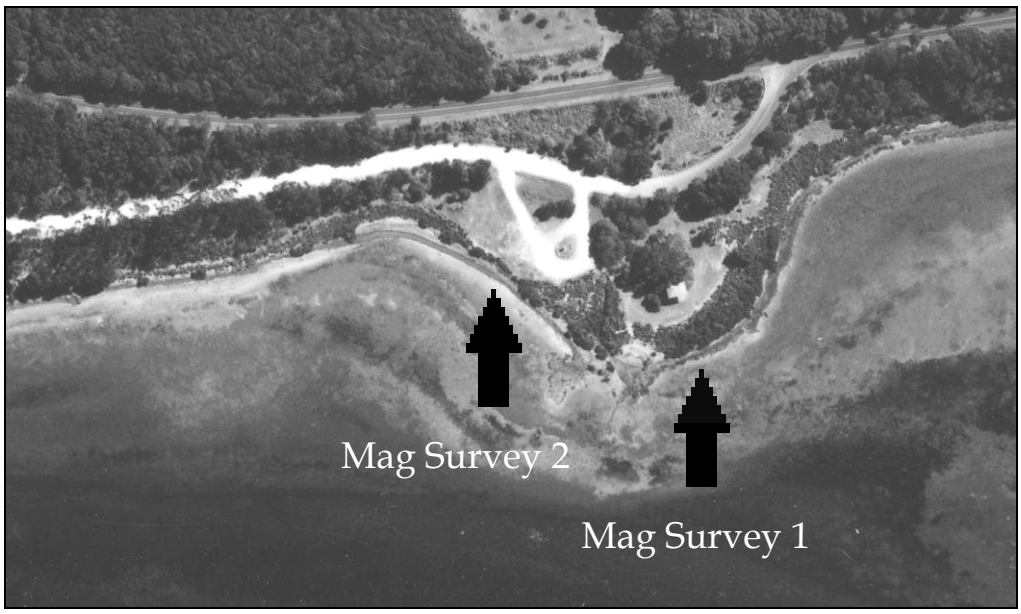

Figure 23. Aerial photograph showing *Independence* Point magnetometer surveys (Adapted from American River Aerial Photographs, South Australia Department of Environment and Heritage 2001)

Because the National Trust has turned *Independence* Point into a park, it was necessary to test the land formation to see if it was natural or culturally deposited. A series of shovel tests and cut-banks determined that most of the formation was natural. As the shovel tests neared the road, the

ground appeared to be disturbed. The natural part of the landform of *Independence* Point appears to have formed as a result of alluvial deposition from a small creek. This geologic process has endowed the area with relatively flat to gently sloping land, which would have been ideal for launching a vessel.

The creek is tidal, having little fresh water except during periods of heavy rain; however, the dynamic nature of the tide entering and exiting the creek mouth has scoured a small channel perpendicular to the shore. This small channel could have provided a natural slipway for a newly launched vessel to reach deeper water.

Independence Point sits on the west side of Pelican lagoon. It is partially protected from the south easterly winds that usually blow during the winter by Hungry Beach and High Barbaree, peninsula like land formations to the south. Additionally, the creek extends into a small valley that could have provided additional protection from the wind (Figure 10).

Pedestrian surveys located three areas in close proximity of *Independence* Point that had cultural material. The first location was adjacent to the creek. Two magnetometer surveys were established on either side of the creek because of the presence of a slag-like deposit on the shore. Magnetometer survey one (Figure 24) was conducted over an area of approximately 60 m x 40 m with survey lines being placed in accessible locations within the site. A zone of anomalous response of approximately 20 m x 10 m was observed in the western extent of the survey area (Anomaly I1-1), and several small magnetic highs were observed in the eastern extent of the survey area including anomalies I1-2, I1-3 and I1-4 (which also exhibits a magnetic low).

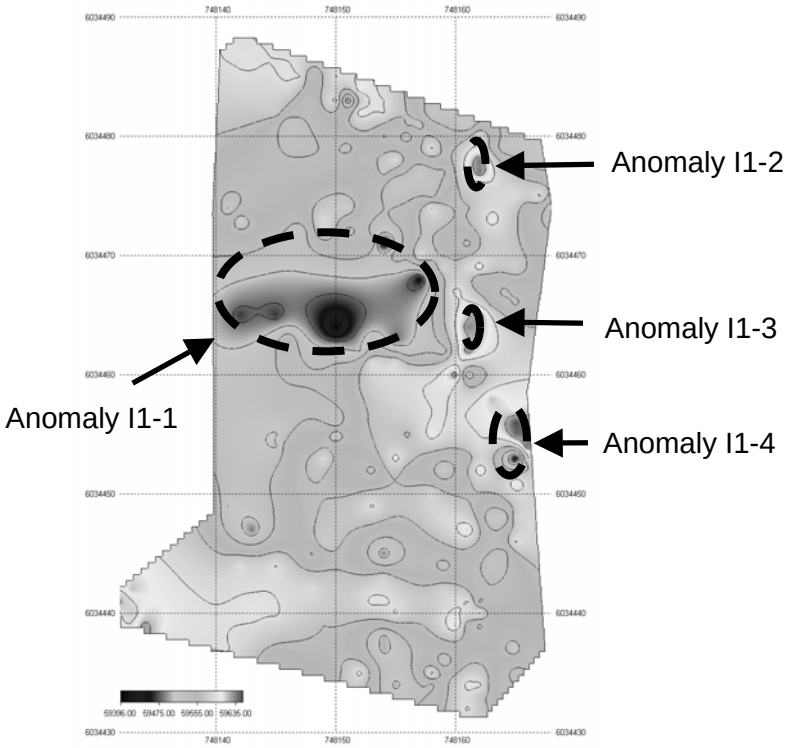

Figure 24. *Independence* Point magnetometer survey one showing anomalies (Ian Moffat 2006)

Magnetometer survey two (Figure 25) was conducted over an area of approximately 40 m x 140 m with survey lines being placed in accessible locations within the site. Two small magnetic lows were identified within the site (contained within areas showing a wider trend of magnetic low) and are designated I2-1 and I2-2. The second location at approximately 100 m south of

Independence Point was defined by a light scatter of coal. The coal was photographed and sampled. A systematic shovel test grid did not reveal any cultural material below the surface. All anomalies were investigated but were found to be relatively modern material, including a fish hook, barbed wire fencing and various sized iron nails.

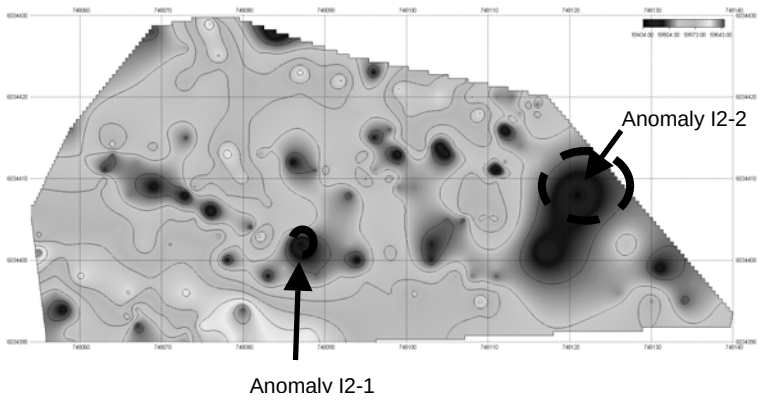

Figure 25. *Independence* Point magnetometer survey two showing anomalies (Ian Moffat 2006)

At approximately 200 m south of *Independence* Point, the surveyors found more coal, very dark green bottle glass associated refined earthenware, as well as another piece of refined earthenware (Figure 26). However, these objects were located amongst a scatter of other cultural material that dated to the later part of the 19th century. This material included amethyst glass and brown transferwares. These materials were photographed and sampled.

Figure 26. Refined shell edge earthenware near *Independence* Point (Karson Winslow 2006)

The coal scatter spread from *Independence* Point to the site of Muston, a small historic village whose inhabitants operated a steam engine in the late 19th and early 20th century salt trade. The coal scatter was very light in density near *Independence* Point and was moderate in density approaching the Muston jetty. There was much cultural material associated with the Muston jetty and the small village; however, most of it dated from the turn of the century to relatively modern, and because of this it was not sampled.

The vegetation survey revealed that substantial stands of *E.cladocalyx* grow near *Independence* Point. Additionally, the land between *Independence* Point and the American River Township is characterized by *E. cneorifolia* woodland along the foreshore, but it is mostly cleared pastureland on the western side of the highway. These pasturelands have remnant *E. cneorifolia* stands, but it

is undetermined whether this would have been the only community during 1803 (Bullers 2006:31-32).

Site A could have been a likely location for the construction of *Independence*, but its distance from the channel and the results of the shovel tests and magnetometer survey refute this.

American River Township (Site B)

The American River Township Site (Site B) probably would have been ideal for a habitation area, as it affords almost complete protection from the south easterly winds. During a pedestrian survey a very dark green glass fragment and an associated refined black transferware ceramic was found. Because of time limitations this area was not shovel tested.

The American River Township Site (Site B) magnetometer survey was conducted over an area of approximately 60 m x 20 m with the survey lines being placed opportunistically on the basis of areas of available access (Figure 27). Two zones of anomalous magnetic intensity response were observed through the survey; one being a magnetic high and another being a diffuse magnetic low. Both of these targets are considered prospective as locations for archaeological material; however due to time limitations the targets were not investigated.

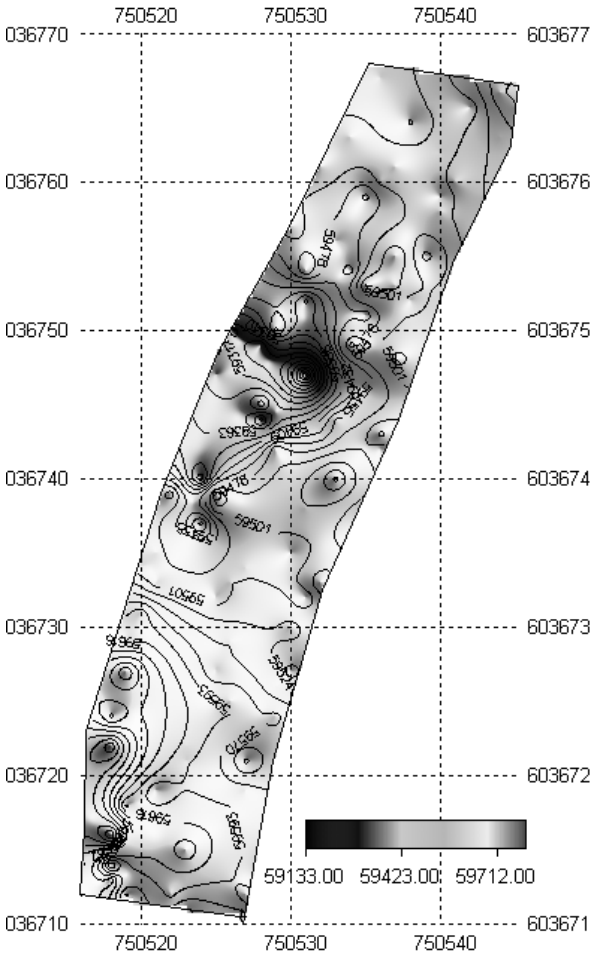

Figure 27. American River Township magnetometer survey two showing anomalies (Ian Moffat 2006)

This immediate area probably could not have served as a ship construction site because it rests adjacent to mud flats that exhibit little water depth even at high tide. Site B, however, is relatively close to the modern wharf area (Buick's Point), which would have been ideal for

launching a vessel (Figure 28). This association is important; however, it could not be assessed as it exhibits much cultural development and disturbance. A paved road runs parallel to the coast, and there is a paved parking lot with a convenience store in this area.

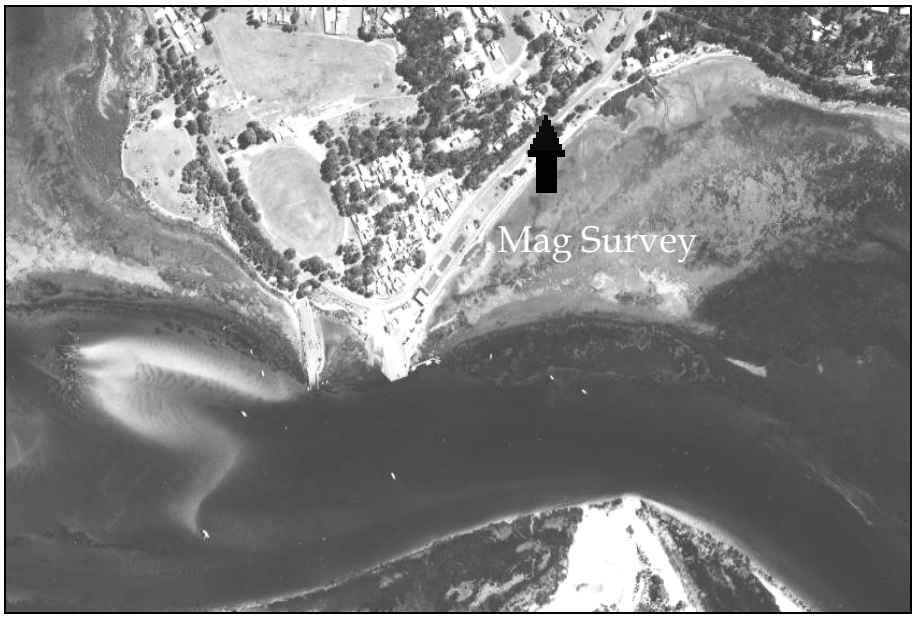

Figure 28. Aerial photograph showing American River Township (Site B) magnetometer survey (Adapted from American River Aerial Photograph, South Australia Department of Environment and Heritage 2001)

Substantial stands of *E.cladocalyx* grow in the American River Township. As mentioned previously, the land between the American River Township and *Independence* Point is characterized by *E. cneorifolia* woodland along the foreshore, but it is mostly cleared pastureland on the western side of the highway. There are remnant *E. cneorifolia* stands in these pastures, but it is undetermined whether they would have been the only community during the time of *Independence*'s construction (Bullers 2006:31-32). Towards the north end of the township, the dominant vegetative community is *A. verticillata*, low open-woodland with occasional *E. cladocalyx* emergents.

It is interesting to note that across the channel at the present day Strawbridge Point there are low-lying dune formations with dense stands of *E. cneorifolia* and *Acacia pycnantha* scrubland. Although these communities are considered unsuitable for shipbuilding, there were three isolated stands of *Callitris gracilis* near this location. These stands would produce a limited quantity of quality shipbuilding timbers. One possibility is that the crew of *Union* cut *Callitris gracilis* at this location and floated it across the narrow channel from Strawbridge Point to Buick's Point (Bullers 2006:31).

Overwhelmingly, Site B appears to be the most ideal as a ship construction site; however, because of modern development it could not be investigated. Buick's Point lies on relatively flat land and is adjacent to the channel. It would have afforded sufficient protection from the elements, and there is a freshwater creek. It is the only site surrounded by all three native timbers identified during the vegetation survey that would have been ideal for constructing a small vessel.

Fish Cannery Track (Site C)

The Fish Cannery Track Site is located to the north of American River Township. It rests on gently sloping land adjacent to a small creek. The Fish Cannery Track Site is protected from the

south easterly winds, as it lies in a large cove. The site, however, was the farthest from the channel compared to the other two sites, and launching a vessel the size of *Independence* would not have been likely as the shoreline is adjacent to a large mudflat.

One piece of very dark green, hand-blown, bottle base fragment was located in this vicinity. Based on this cultural evidence and its relation to environmental attributes, a series of shovel tests were conducted to determine if there was any cultural material *in situ*. All shovel tests were void of cultural material.

The Cannery Track magnetometer survey (Figure 29 and Figure 30) was conducted over an area of approximately 25 m x 25 m with survey lines being placed in accessible locations within the site. A zone of anomalous response of approximately 10 m x 10 m with a number of discrete magnetic lows was observed in the magnetic data (Anomaly C-1). A second smaller zone was observed to the west of this zone, however it was poorly defined due to its presence on the edge of the survey grid (Anomaly C-2).

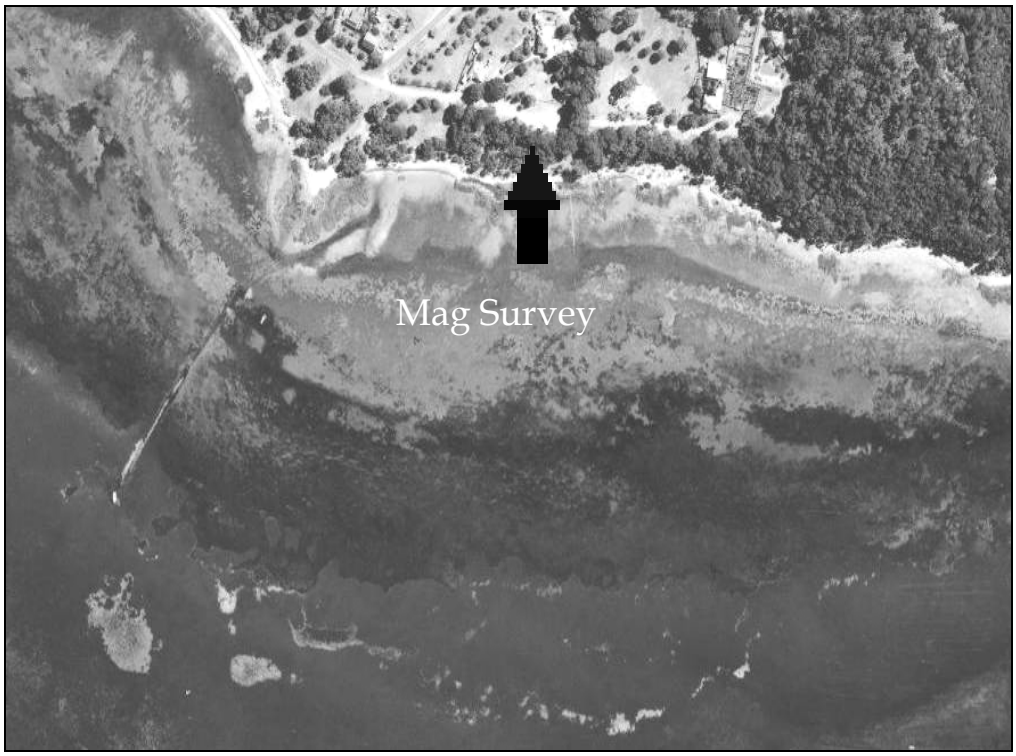

Figure 29. Aerial photograph showing Fish Cannery Track Site (Site C) magnetometer survey (Adapted from American River Aerial Photographs, South Australia Department of Environment and Heritage 2001)

Because the GPS had an inaccuracy level of approximately 10 m, the targets were investigated with a metal detector and trowel. Several pieces of lead sheeting and a lodging knee (Figure 31) were identified. The lead sheathing was collected, while the lodging knee was recorded *in situ*. A timber sample was taken from the lodging knee, and the results are forthcoming. The presence of this lodging knee is rather dubious. It could have been leftover after the construction of *Independence*, but a lodging knee would probably not have been left behind, especially when quality timber was difficult to find. It should also be noted that outer hull planking was observed on the western shore of American River and Pelican Lagoon during the pedestrian survey. Considering this, the knee could have floated to shore from a nearby shipwreck or abandoned vessel. Therefore, it is not indicative of a shipbuilding site location.

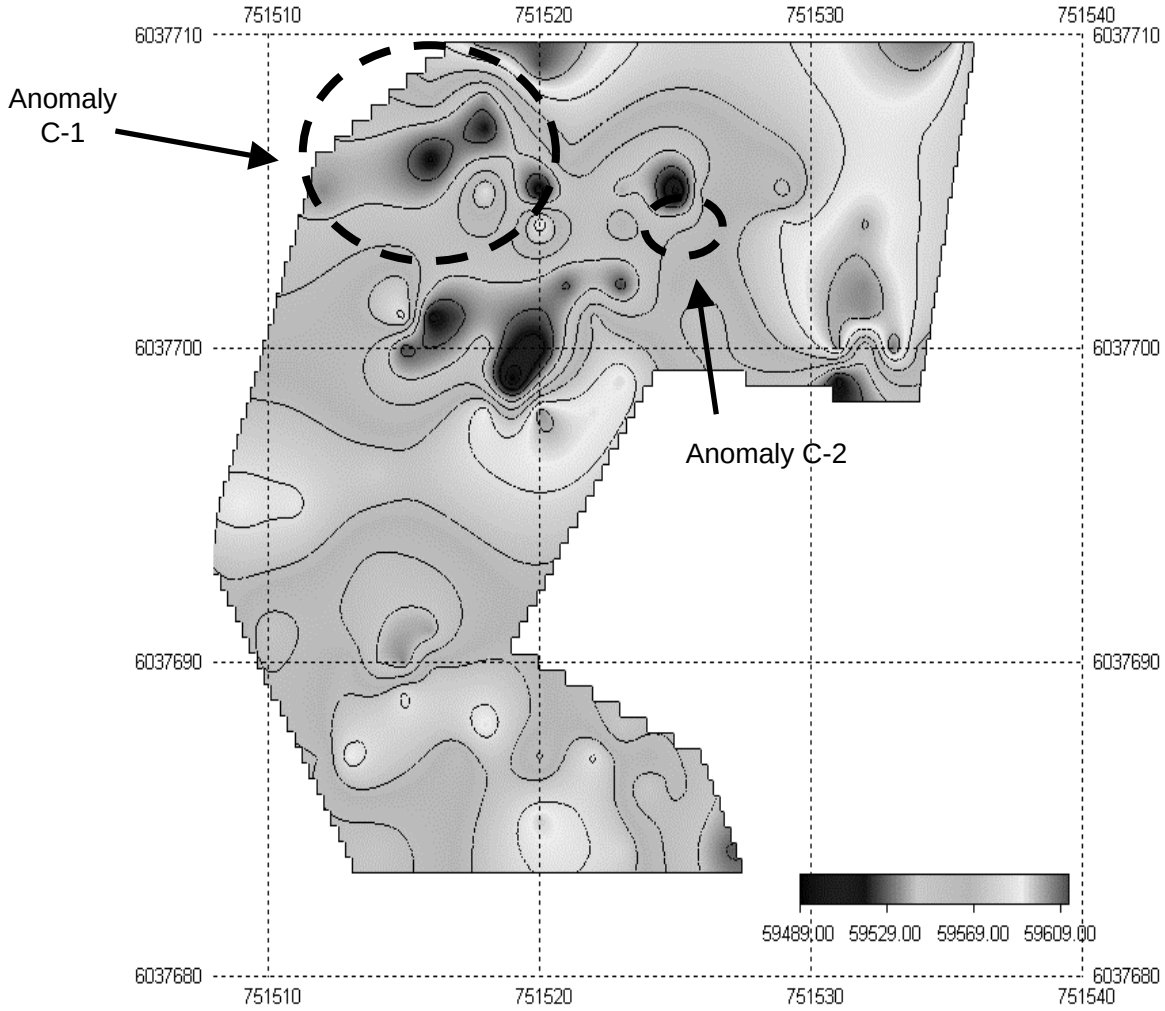

Figure 30. Fish Cannery Track Site magnetometer survey one showing anomalies (Ian Moffat 2006)

The vegetation survey revealed that this area is dominated by *A. verticillata* low open-woodland with occasional *E. cladocalyx* emergents. On the southeast facing slopes the understory was very sparse but became very dense as the track traversed the north east facing slope. The southern sides of the gullies were dominated by she-oak canopies. The first gully north of American River Township had a relatively gently fall and seemed to provide a suitable habitat for tall, straight-stemmed Sugar Gum individuals, but the second gully which had a steep fall supported no Sugar Gums along the creek line. Additionally, the Sugar Gums on the southeast facing slope were much more stunted, likely as a result of shallow, rocky soils on steep slopes. Thus, the potential for good timber along the coastline of this area reduced further north of American River, and this area is considered least likely for the location of ship construction (Bullers 2006:31).

Despite the presence of a lodging knee buried in the foreshore area, this area does not seem suitable for constructing a vessel the size of *Independence*.

Conclusion

Although this survey did not find the exact location of the *Independence* construction site, it did establish a methodology for approaching ephemeral shipbuilding locations. This project also refuted the claim that *Independence* was constructed at the area that is now known as

Independence Point. No cultural material was found that could have been directly associated with shipbuilding activities.

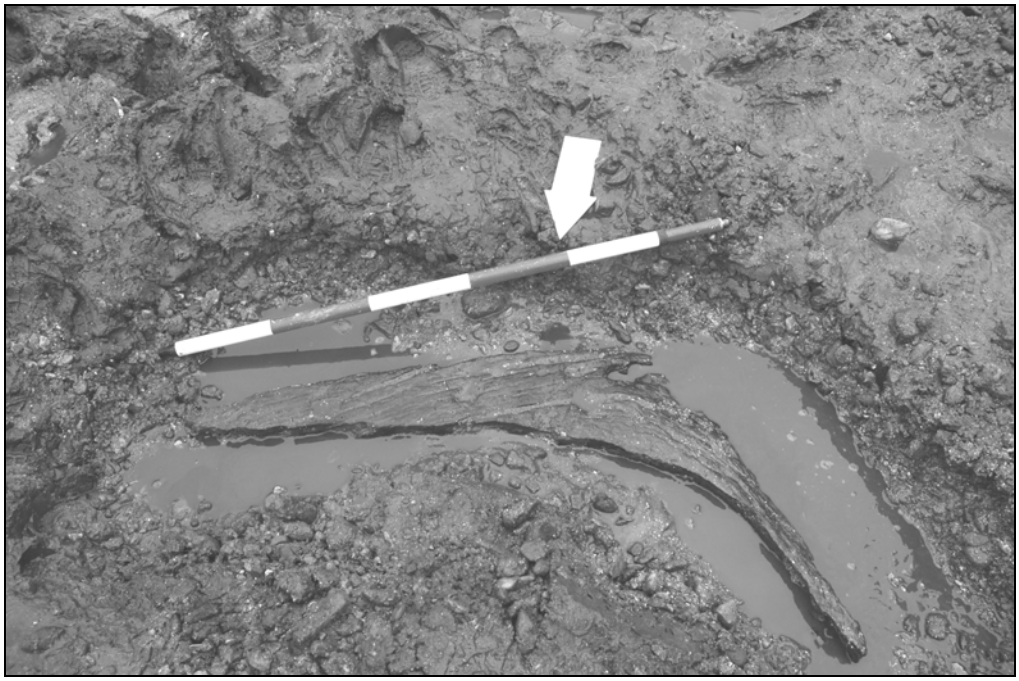

Figure 31. Lodging Knee located at Fish Cannery Track Site (Karson Winslow 2006).

Previous research on ephemeral shipbuilding locations is limited, and, thus, archaeological evidence relating to this sort of activity has not been well documented. It appears that little evidence relating to this activity survives in the archaeological record for a number of reasons. Timber decomposes rather quickly, unless it is in an anaerobic environment. Thus, timber scabs do not survive as archaeologically recognizable surface scatters. Similarly, launching ways and supportive timbers were probably broken down and stowed aboard the vessel as spare timber or firewood, and carpentry tools were probably not left behind, as these items were often considered valuable commodities aboard a working vessel. Forging activities, on the other hand, are probably the most likely to be identified in the archaeological record.

Even though the *Independence* construction site remains unknown, the legend of the vessel being constructed near American River plays a significant role in the maritime heritage of Kangaroo Island and South Australia. As the first non-indigenous vessel constructed in South Australia, *Independence* also represents an important aspect of Australian history. This is exemplified in the construction of a monument dedicated to its construction. It also has international significance, as the era of sealing in the Pacific represented an important component of the globalization of US trade during the 19th century.

None of the anomalies discovered through magnetometer surveying yielded features of archaeological interest. While not all features were systematically tested it is thought that those that were and did not yield a source for the anomaly may be the result of heading errors or anthropogenic noise due to the complex site history. In addition, surveys in other areas have shown that reconnaissance geophysical surveys should be groundtruthed with detailed surveys with multiple methods over the identified anomalies (the bi-partite survey methodology) to ensure that positional accuracy and level of information about each site is high enough to accurately guide intelligent excavation (Moffat *et al*., 2006). Should further investigation of this site be conducted, detailed geophysical survey over the identified anomalies would form part of the investigation strategy.

Acknowledgments

The search for the *Independence* construction site would not have been possible without the assistance of many people and organizations. My gratitude extends to the field crew including Mark Staniforth, Jennifer McKinnon, Jason Raupp, Rick Bullers, Karson Winslow, Toni Massey, and Paul Sjordal, and to Ian Moffat for analysing the geophysical survey data. I would also like to thank several individuals who conversed with me about the historical interpretation of *Independence*, including Mary Thacher and Anne Tate of the Stonington Historical Society, Bill Peterson of Mystic Seaport, Richard Ryan of the Townsend Society of America, Terry Arnott of the South Australia Department of Environment and Heritage, Anthony Brown, Joan Fawcett, and the Klieve Family of American River. I would also like to thank many of the institutions who graciously opened their doors for historical research, particularly the Richard A. Woolworth Library, Mystic Seaport, the Townsend Society of America, the American Geographical Society, the New South Wales State Library, the South Australian State Library, and the South Australia Department of Environment and Heritage. Finally, gratitude is extended to Flinders University for a University Research Budget Postgraduate Grant that provided funding for this project.

5

A View from Above: Archaeological Site Inspections in East Gippsland, Victoria

Jason Raupp, Karson Winslow, Agnes Milowka and Brian Williams

In October of 2006 Flinders University Program in Maritime Archaeology students and staff participated in an archaeological site inspection program in the south eastern Gippsland region of Victoria. The Port Albert Practicum was designed to provide students with an opportunity to assist archaeologists from Heritage Victoria's Maritime Heritage Unit (MHU) in inspecting historic shipwrecks and documenting terrestrial sites with maritime associations. Students also processed field data, conducted archival research and produced a final project report. The project was a great success and proved beneficial to each of the groups involved.

Field crewmembers consisted of Heritage Victoria archaeologists Peter Harvey, Cassandra Philippou and Liz Kilpatrick; Flinders University technical officer Jason Raupp and maritime archaeology graduate students Karson Winslow, Agnes Milowka and Brian Williams; and Maritime Archaeological Association of Victoria members Peter Taylor, John Riley and Jim Anderson. While the project was headquartered in Toora, sites were investigated throughout south-east Gippsland. This region is particularly important due to the number of historically significant colonial shipwrecks as well as terrestrial sites associated with its mining past.

This is not the first project on which Flinders University and the MHU have worked together; Heritage Victoria has been an important partner in educating Flinders students through providing fieldwork opportunities and assisting in teaching annual field schools. This practicum program demonstrates the potential for state and federal agency archaeologists to mentor students through practical experiences.

Brief History of East Gippsland

Victoria's East Gippsland region has a rich history. While the area had been the home of Indigenous people for over 30,000 years, the first European explorations occurred when George Bass sailed into Corner Inlet in 1798 (Fleming 1977). Throughout the early part of the 19th century only sealers and whalers inhabited the Gippsland coastline. A severe draught in 1838-39 forced stockowners from New South Wales to see new pastures for their famished herds led them to Gippsland (McRae 1976:54). By 1840 groups of settlers seeking useable farm lands arrived in the region and established a small settlement known then as the Old Port (Bull 1966).

As a result of the wrecking of P.S. *Clonmel* in 1841, the leader of the rescue party established a settlement on the east bank of the Albert River, just west of the Old Port. Two years later that

settlement was moved to its present site, where streets and allotments were laid out. As the first major port in East Gippsland, Port Albert became a significant export centre where goods produced in the region were carried on iron steamships to Melbourne and Sydney (Love 2003). Today Port Albert provides direct access to a safe harbour for local boating and fishing industries.

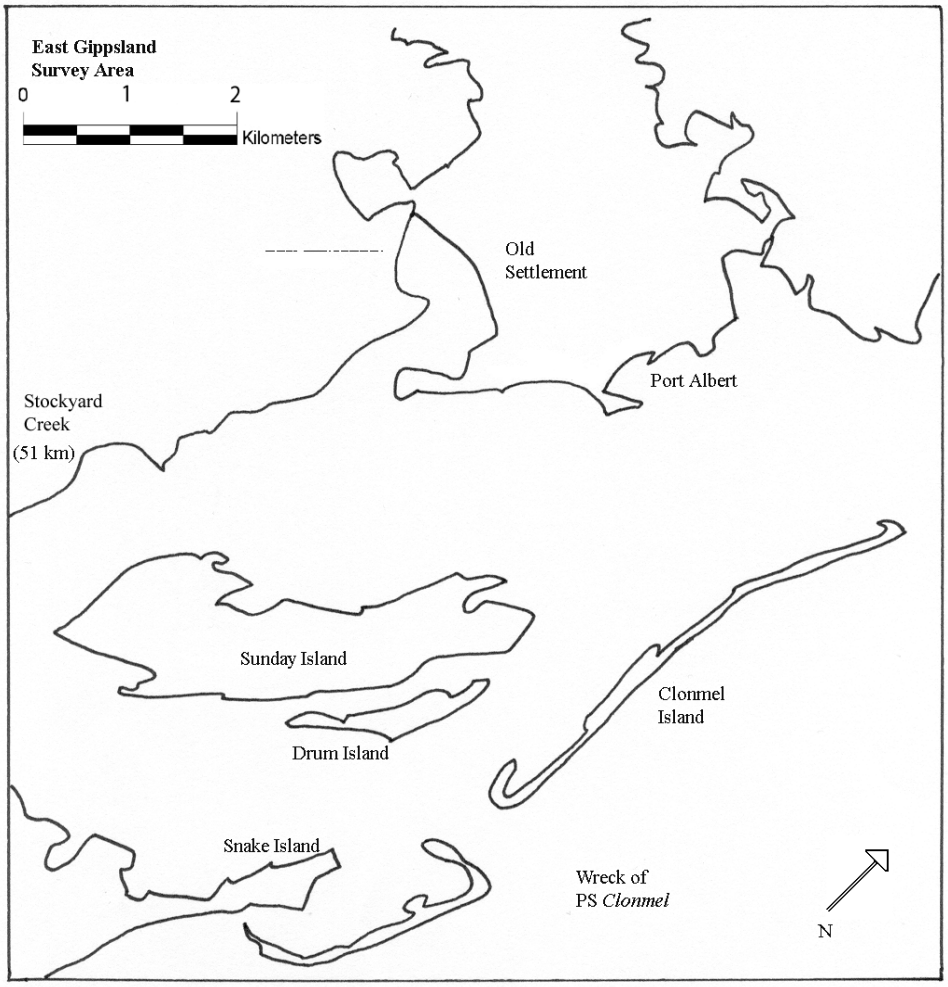

Figure 32. Map of project area (Karson Winslow 2006)

Site Inspections

The Port Albert Practicum was run in conjunction with an ongoing program of wreck inspections that are routinely performed by MHU archaeologists and volunteers (Figure 33). This particular region was chosen based on the need to assess the recent placement of a hazard buoy system on the wreck of P.S. *Clonmel*, and to investigate recent reports of undocumented sites. Though plans initially included seven site inspections and a marine magnetometer survey, rough seas resulting from the survey area's exposed location only allowed for inspections of three shipwrecks (S.S. *Blackbird*, P.S. *Clonmel* and P.S. *Thistle*) and a riverine landing site (Stockyard Creek).

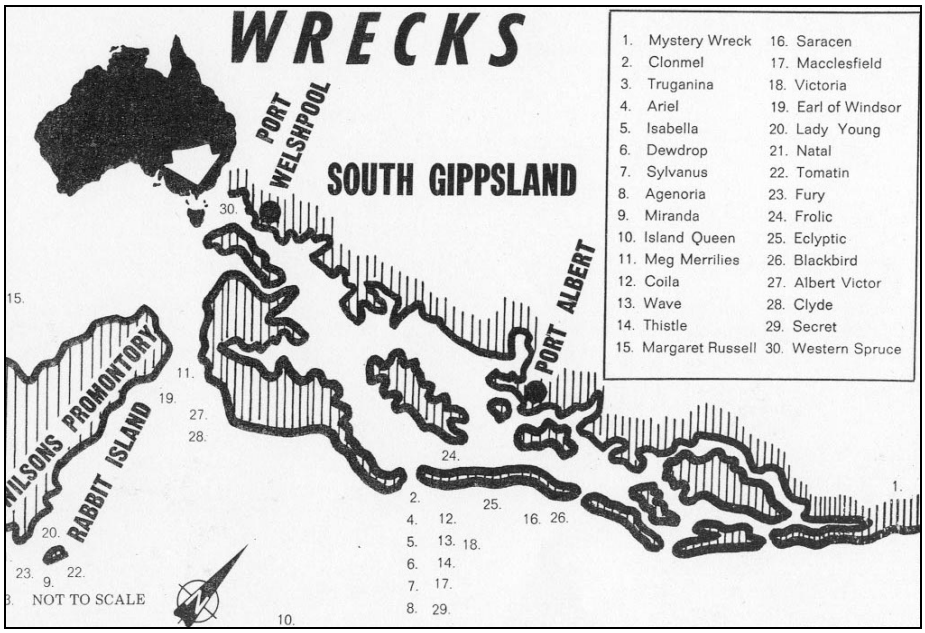

Figure 33. Location of wrecks around Port Albert, Victoria (Loney 1985)

S.S. *Blackbird* (1863-1878)

The iron-hulled screw steamer S.S. *Blackbird* measured 196.4 ft (59.9 m) in length, 28.2 ft (8.6 m) in width and had a 16.7 ft (5.1 m) depth of hold. Built in Newcastle on Tyne in 1863, the 655-ton, three-masted barque was equipped with a two-cylinder, 80 horsepower steam engine. Purposely constructed for the Australian coastal trade, the steamer spent most of its career operating between Newcastle and Melbourne. On the early morning of 2 June 1878, *Blackbird* was loaded with 800 tons of coal bound for Melbourne. Rough conditions caused the captain to make a fatal navigation error and the vessel ran ashore, however no lives were lost in the incident (Love 2003).

The wreck lies in approximately 5 m of water and is located at 90 Mile Beach just off Clonmel Island (Figure 34). The goal of the investigation was to relocate the site and record accurate GPS positions for the separate bow and stern sections, and to complete an overall site inspection. Exceptional visibility and clear skies allowed for both the bow and stern sections of the wreck to be seen from the surface, which easily allowed their positions to be fixed. However, increasing swell and time constraints prevented divers from investigating the site. Though the wreck appears from the surface to be stable, it is recommended that it be re-visited by the MHU staff in the near future for underwater survey and monitoring.

P.S. *Clonmel* (1836-1841)

The wooden vessel P.S. *Clonmel* was built in Birkenhead, England in 1836 and measured 154.8 ft (47.2 m) in length, 21.5 ft (6.6 m) in width and had a 16.6 ft (5.1 m) depth of hold. The 600-ton, schooner-rigged steamer set out for Melbourne from Sydney on its second trip since its arrival in Australia. While navigating the Bass Strait, P.S. *Clonmel* was pushed to shore near Wilson's Promontory by strong winds and currents. At approximately three o'clock on the morning of 2 January 1841, the vessel ran aground near Corner Inlet and was pushed onshore by incoming swells. Using the ship's boats the captain transported the 42 crew and 38 passengers to nearby Snake Island. Realizing help was not coming, a contingent of seven men set out for Port Philip Heads in one of the ship's boats. Nearly three days later they reached the Heads and then returned with the cutters *Sisters* and *Will Watch* to rescue the remaining survivors. While the wreck was seen as a major setback to the development of intra-colonial transport and those

settling in the Australian colonies, it led to the discovery of Port Albert and the subsequent opening up of the East Gippsland region for trade and agriculture (Harvey 1999).

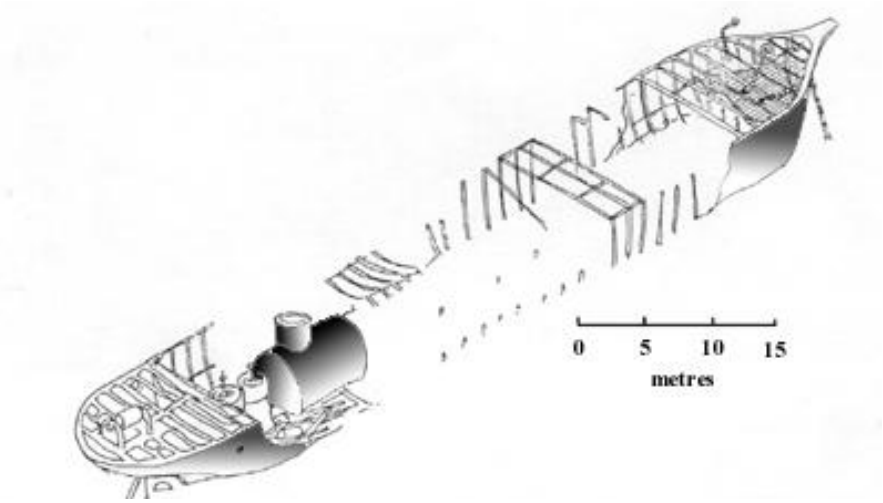

Figure 34. Isometric site plan of the P.S. *Blackbird* site (Goff Hewitt 1997)

The wreck of *P.S. Clonmel* is listed as a Commonwealth Historic Shipwreck site and is protected under Australian federal law as a marine area. Diving and fishing activities on the site are prohibited without a permit. Resting on the eastern side of Port Albert Channel approximately one half of a nautical mile from the easterly tip of Snake Island, the wreck is situated in 8 m of water. At low tide the apex of the boiler structure is exposed. This wreck has been extensively documented over the past 20 years and is considered to be one of Australia's most important steamship wrecks (Figure 35).

The site was surveyed over the course of three days and average conditions generally consisted of a slight swell and an approximate 1.5 knot current. A total of 6 dives were conducted with visibility ranging from 2 to 4 m and water temperatures averaging 15 degrees Celsius.

Since the last site inspection, a large buoy system has been deployed on the site to warn vessels of the hazard to navigation presented by the boiler structure. This system consists of a large, highly-visible, yellow buoy attached to a long section of heavy steel chain. The steel chain is then connected to a 1.5 cubic meter concrete block which is supposed to be located off the wreck site to prevent damage to the structure. Therefore one objective was to map the exact location of the concrete block in relation to the wreck and document any damage caused by its presence. The block was found positioned approximately 1 m from the vessel's keelson remains and the chain was causing damage to the shipwreck. Unfortunately, the system has been deployed far too close to the wreck and needs to be repositioned, removed or replaced with another type of marker (possibly a pylon marker) to prevent further damage.

Some newly exposed artefacts were identified on the site; all artefacts were photographed and remain *in situ*. The first artefact documented is most likely a tallow cup for oiling an engine component. The cup is made of copper or a copper alloy (based on the presence of a green patina) and it is 3 cm in diameter at the top and 1 cm at the base (Figure 36). Other artefacts included a partially exposed glass bottle of unknown manufacture and filled with sediment and several previously undocumented sections of lead and copper piping, which averaged approximately 8 cm in diameter and are probably associated with the steamer's engine and/or boiler.

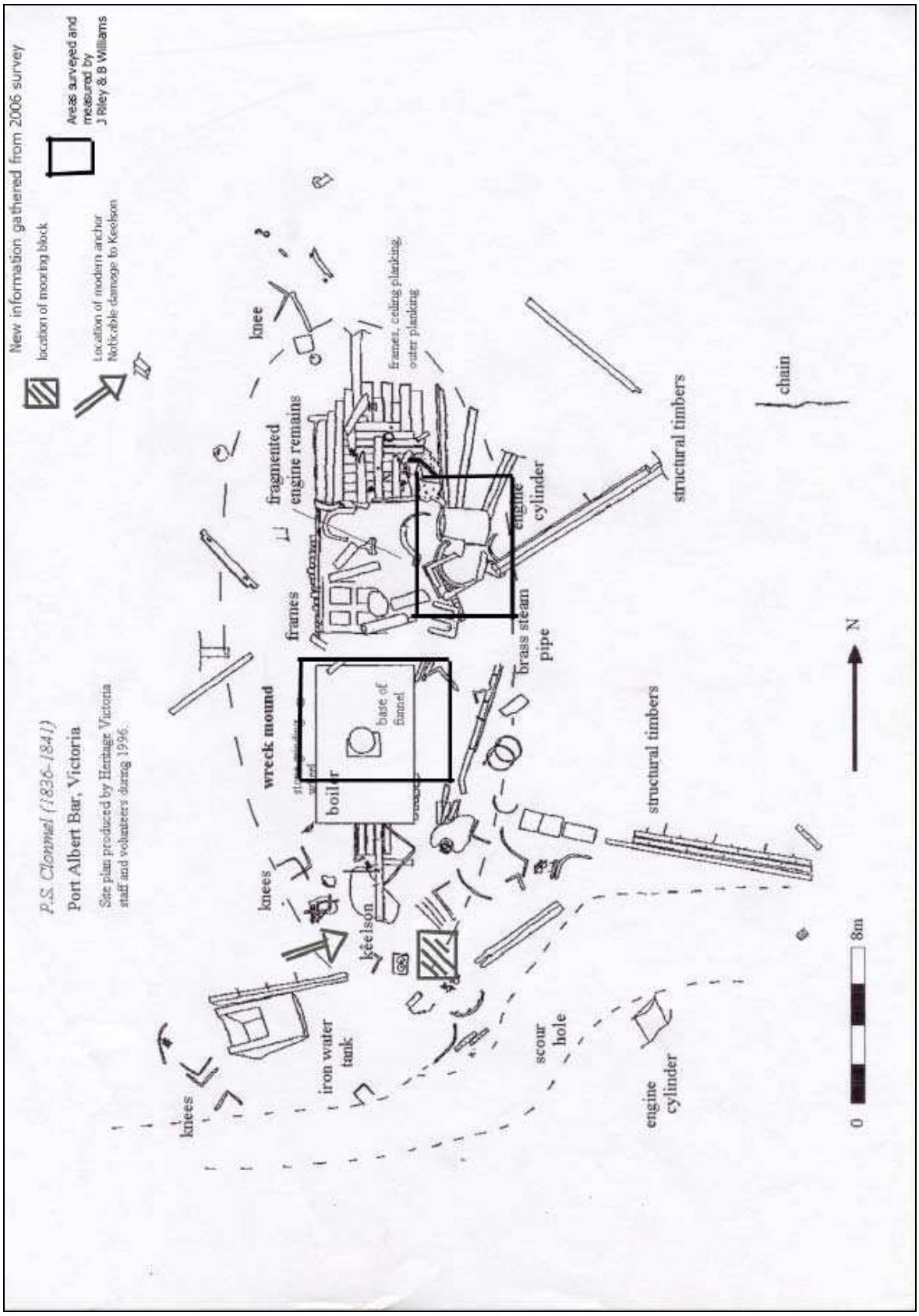

Figure 35. *P.S. Clonmel* site plan showing locations of hazard buoy pad and damage from modern anchor and chain (Maritime Heritage Unit 1996)

A modern anchor and chain was also found wrapped around the keelson. At this location approximately 40 cm of concretion has been stripped away, leaving the underlying iron exposed.

The presence of this anchor is evidence that unauthorized divers or fishermen have visited the site at least once since the last inspection.

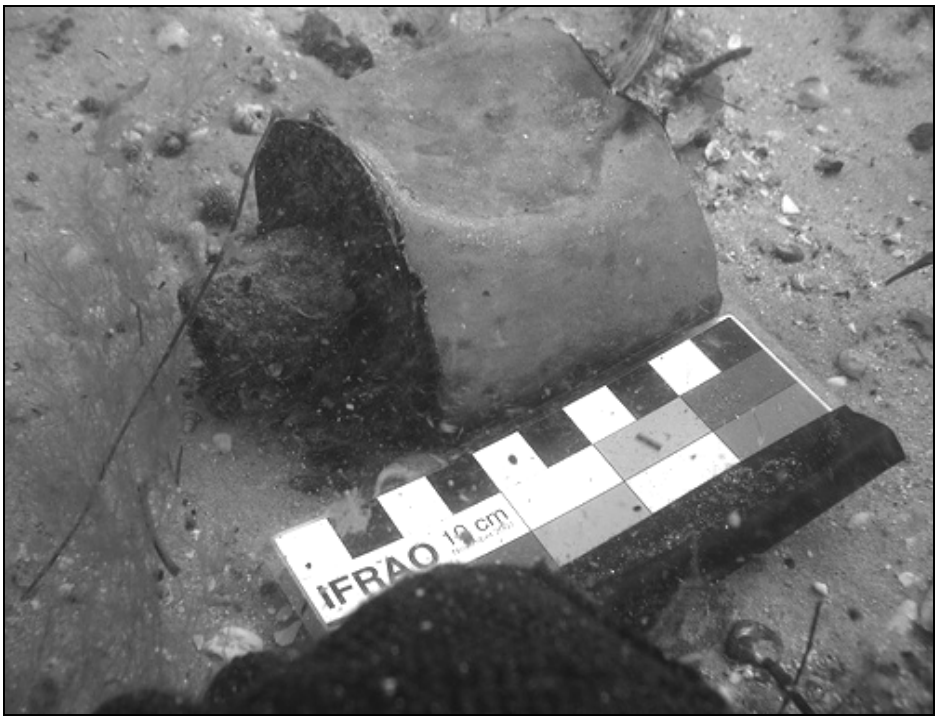

Figure 36. Possible tallow cup from P.S. *Clonmel* site (Agnes Milowka 2006)

P.S. *Thistle* (1845-1859)

The iron steamer P.S. *Thistle* was built in 1845 in Poplar, England for the Hunter River System Navigation Company and measured 148.7 ft (45.3 m) in length, 19.5 ft (5.9 m) in width and had an 11 ft (3.4 m) depth of hold. The 278-ton vessel spent most of its career on the eastern coast of Australia, but in 1859 it was purchased for the Port Albert – Melbourne trade. On 23 December 1859 *Thistle* grounded in a gale while en route from Melbourne to Port Albert. Although all 70 passengers made it to shore safely, numerous businesses in the Gippsland region suffered great losses, as most of the cargo was uninsured (Loney 1971).

The wreck of P.S. *Thistle* is located on the west bank of Port Albert Heads. The site was only inspected once due to increasingly rough conditions in its general area. Conditions on site on the day of inspection consisted of a moderate swell, an approximate 0.5 knot current, an average water temperature of 15 degrees Celsius and a maximum visibility of 1 m.

Objectives included inspecting and photographing the engine and boiler and gathering data necessary to test a theory concerning the structural integrity of the subsurface remains. Unfortunately, due to poor visibility, photo documentation was ineffective and attempts to survey the entire site proved futile. Therefore the dimensions of the crank shaft were recorded, and depths at various areas around the boiler and engine measured to determine the amount of sand accumulation which had occurred on the site since the last visit (Figure 37).

Snake Island Site

The purpose of the visit to Snake Island was to assess the remains of an historic jetty structure and machinery located on the island, and to attempt to locate a recently reported shipwreck. While previous surveys found scatters of both ceramics and glass (Duncan 1998), which indicated some early activity there, no comprehensive survey of the area has been completed. A

local fisherman reported a wreck containing large copper fastenings on the foreshore. Since no such site had been located on the island to date and the wreck was reportedly of copper fasteners (suggesting an early construction date), MHU archaeologists were very interested in locating it and assessing its significance.

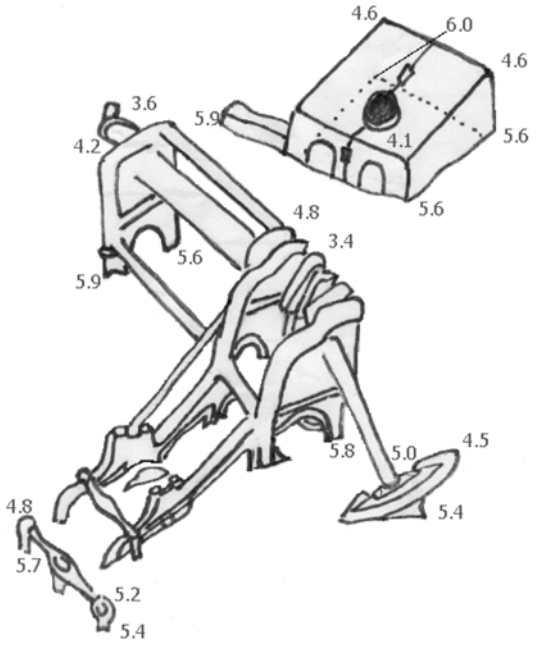

Figure 37. Remains of P.S. *Thistle* engine showing recent sedimentation and depths from surface in meters (Brian Williams 2006, based on Riley 2003 and Hewitt 1997)

Unfortunately environmental conditions prevented the crew from reaching the shore and no survey of the island could be undertaken. Instead, MHU archaeologists used the opportunity to test the potential for a kite-mounted camera to acquire aerial photos. MAAV member Jim Anderson's box kite was flown and aerial images were successfully captured, thus proving this to be an inexpensive and relatively easy tool for obtaining aerial images.

Extremely low tides and rough conditions prohibited site inspections and surveys at Snake Island. Based on the report of the copper-fastened shipwreck located on the island, it is recommended that the site be re-visited by MHU staff to verify the existence of this wreck.

Stockyard Creek Site Complex

In response to reports of a possible landing site near the town of Foster, a team was sent to investigate the area. According to a local informant this site was originally established as a landing for unloading and loading cargoes going to and coming from the goldfields at Walhalla. The site reportedly initially consisted of a wharf and a small rail line that was used to transport shipments, but as activity increased a hotel and two boarding houses were established on an island on the northern side of the creek. Professional fishermen later used the site as a mooring point for their vessels and at one stage as many as five of vessels were based there. Preliminary investigations of this area proved interesting and prompted additional historical research.

History of Stockyard Creek

As drovers moved cattle between Port Albert and the settlement at Westernport, a stock route was established which linked the two. Originally nothing more than a rough trail along the coast that crossed a number of rivers, creeks and watering holes, this route gradually became more defined. One of the creeks that the trail crossed became known as a good watering spot, and over

time stockyards were built on the creek's west bank to facilitate overnight stops. A settlement was established only a half mile downriver from the stockyards and thus became known as Stockyard Creek (Wilson 1950).

The Stockyard Creek area was heavily timbered with large quantities of black-wood ideal for palings. In 1869 a group of entrepreneurial timber splitters illegally set up camp on the banks of the creek. Given the difficulty in accessing the area, their illegal activities received little attention from inspectors. However the suspicion and interest of the local Crown Land Ranger was finally aroused and he decided to personally investigate the matter (Cunningham and Esler 1995).

Luckily for the group John Amey, an ex-convict from Tasmania who had established a farm a few miles east of Stockyard Creek, had an interest in the timber business and not only warned the men but also suggested they pose as prospectors in order to explain their presence in the area. When the five timber workers moved up the creek, they happened upon gold deposits. Together with Amey the group promptly went to register their claim (Fleming 1977).

Due to the mining by-laws which existed in Gippsland at the time the group could only stake a claim measuring 800 yards (731 m) along the creek by 100 yards (91.5 m) across. Luckily for them the mining by-laws also stipulated that any discoverer could increase their holding by an extra five miles (8 km) from a new claim. Upon staking the new claim the claim was called "The Great Uncertainty" and later divided into two parts (Wilson 1950).

News of gold spread through the colony and prospectors rushed to the area. Access was difficult, and while some made the overland journey, the most practical route was by sea. Small steam vessels brought the miners across from Port Albert to Stockyard Creek at high tide and unloaded passengers at the landing two and a half miles (4 km) below the developing settlement. Initially newcomers carried their possessions into town on foot, but soon after the Buln Buln Tramway Company built a wooden, horse drawn tramway from the landing into town. The tram was constructed entirely of blue gum timber, including the spikes and rails, and utilized one luggage and two passenger trucks. (Fleming 1977).

Early settlers lived in tents, but when families began arriving log huts were constructed. By June 1871 the town's population numbered 700 people and included stores, houses and hotels. Two hotels were erected at the landing site of Stockyard Creek. During the major growth in the area Police Magistrate William Henry Foster was sent to officially name the township. Originally he proclaimed the name "Stockyard Creek Diggings" because of the gold fields; however, on that same day the town's people voted to rename the city "Foster" (Cunningham and Esler 1995).

In the 1880s an exodus occurred as gold sources were exhausted. Many of the prospectors left to seek fortunes elsewhere. Some returned in hopes of finding new veins, while others looked to dairy farming and agriculture. The Stockyard Creek landing was later converted into a wharf and maintained by the local community (Figure 38).

Archaeological inspection

Though the entire area is considered to be one archaeological site, for ease of survey it was divided into two separate sections. For the purposes of this preliminary survey, the first section was called the Stockyard Creek Site and is located on the south western side of the creek, and the second was called Stockyard Creek Island Site and is located on a small island in the creek to the north. A mud map of the entire site was drawn which included both sites and all major features associated with the various uses of the sites (Figure 39).

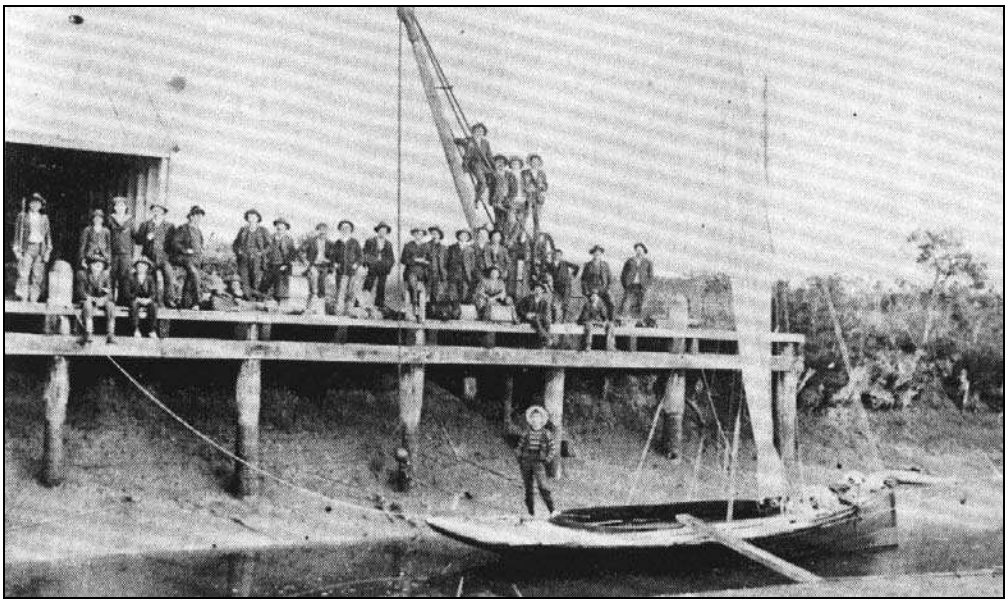

Figure 38. The jetty at Stockyard Creek landing where all goods were landed to supply the gold fields (Victorian State Library)

Stockyard Creek Site

Several major features are associated with the Stockyard Creek Site. The first of these is associated with its current use as a public recreation area. Components include an open, grassy area and a modern, concrete boat ramp used for launching small water craft. Signage relating to fishing regulations and conservation is present; however the poor condition of the ramp suggests that the park has been neglected.

The next feature of the site is the remains of a possible historic slipway. Situated alongside the boat ramp, this site may be associated with some type of shipyard activities. Visible components include 9 railway sleepers (used to support the rails) and approximately 10 m of track (Figure 40). Approximately 20 m onshore of the rails is the remains of a possible winch system which would have been used to haul vessels in and out of the water; depressions where the rails would have lain can be seen across the distance between the two. On the creek bed in the vicinity of this winch bed is the remains of possible cable drum that is likely associated with this system.

Associated with this possible slipway are two small 'trucks' that were likely used on the rails. These are approximately 0.5 m wide and consist of one axle and two wheels connected to a timber frame and held in place by hand carved wooden blocks. One of the two trucks had a large (approximately 2 m), slightly curved timber attached to the top of it. The wheels were six spoked and uniform in manufacture and size. The recorded dimensions of one wheel were 230 mm outer diameter, 30 mm diameter hubs and 70 mm thick. Axle diameters varied from 35 mm to 65 mm and tapered to 30 mm to fit into the hubs; this inconsistency suggests that the axles were not purpose made.

All of these components appear to be associated with the practice of hauling wooden fishing vessels out of the water to complete necessary repairs. The rails do not run in to the water at low tide, suggesting that if used for this purpose the operation had to be undertaken at high tide. No historical information relating shipyard activities at the site has yet been located.

The next major feature is the remains of a possible rail bed. Running parallel to the creek over the entire length of the site, it continues beyond the area surveyed. A local informant stated that this substantial feature is associated with the earliest activities at the site and was built to

transport supplies to the Victorian goldfields. It consists of a low, truncated mound of compacted dirt averaging approximately 40 cm high and 2 m wide. Aerial images captured via the kite-camera show consistent and evenly spaced depressions which are presumed to have been left by rails that have since been removed (Figure 41).

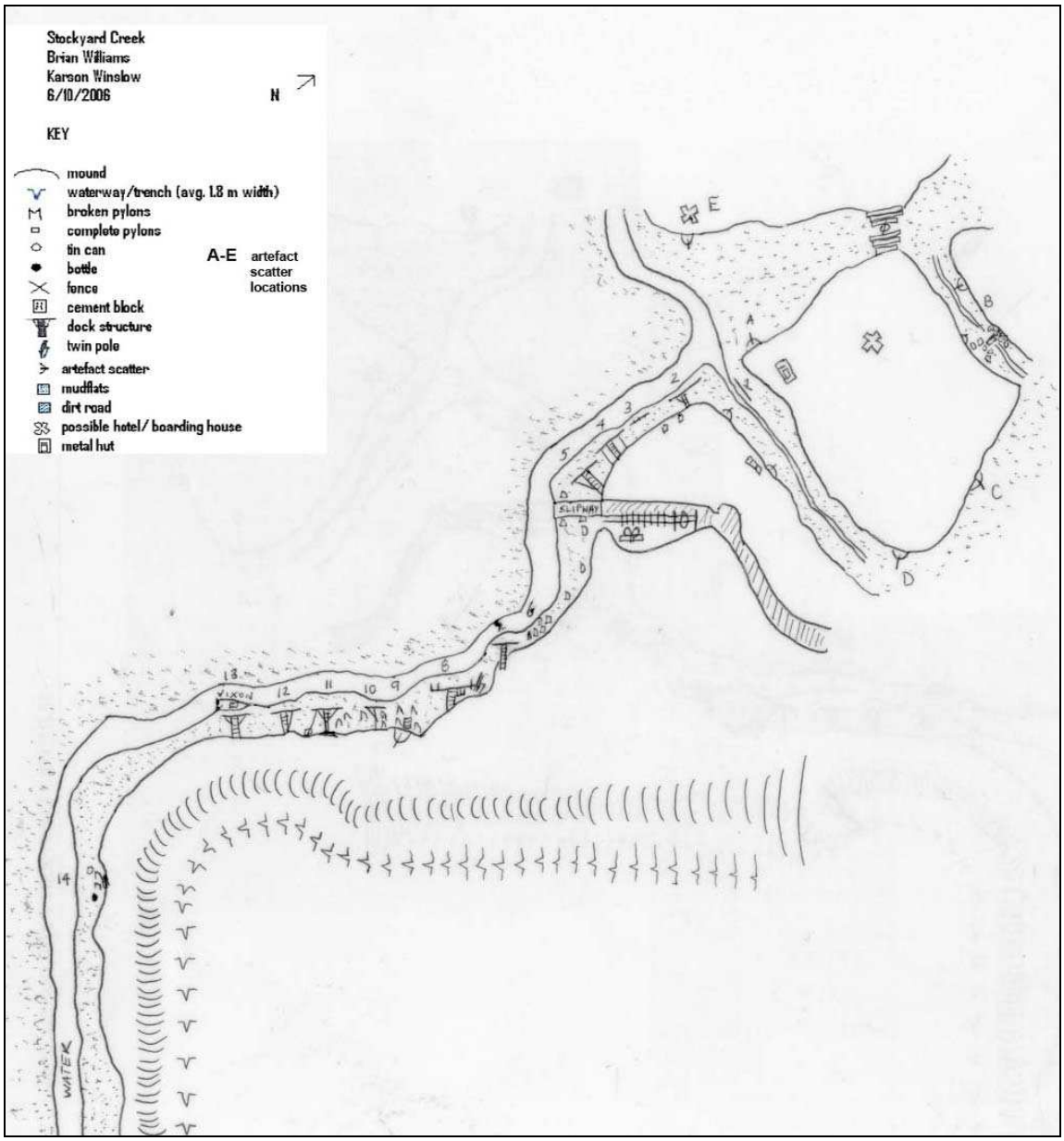

Figure 39. Mud map of Stockyard Creek Site Complex (B. Williams and K. Winslow 2006)

Another major feature of Stockyard Creek is a series of structures associated with mooring vessels. A total of 14 dock structures were identified in varying conditions. Each of these was documented, ascribed an arbitrary number, given GPS coordinates, photographed in their current conditions and provided physical descriptions including approximate size and the number of pylons present (Figure 42). Structurally the docks were similar, mostly consisting of a T shaped superstructure. Their random distribution along the creek suggested no particular order for their construction. Based on the many irregular pylon positions and the presence of timbers of varying ages, it is apparent that they were upgraded or newer docks were built on top of older ones that had fallen into disuse or disrepair.

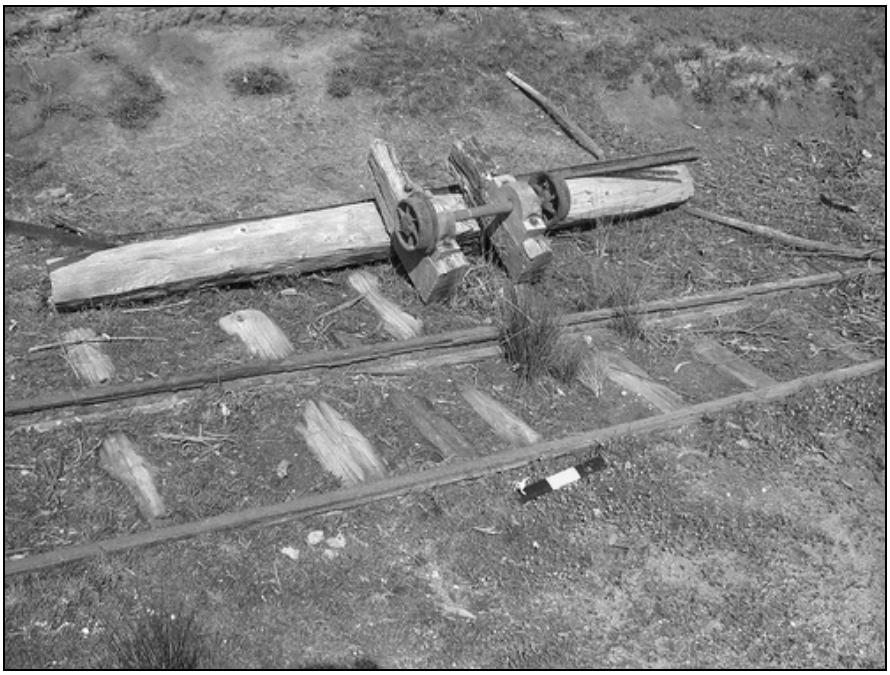

Figure 40. Remains of possible slipway and one "truck" used in its operation (Agnes Milowka 2006)

Figure 41. Aerial view of the rail bed; note the faint outline of depressions made by tracks (Jim Anderson 2006)

While some of these are obviously modern dock structures, two of them are thought to be much older. Designated as Dock One and Dock Nine, their sizes, locations and conditions indicate that they are quite significant. Of these Dock Nine is located among the modern structures on the western bank of the creek and Dock One is located on the northern side of the creek and is likely associated with activities of the island.

The remains of Dock Nine consist of 10 heavily deteriorated pylons (in varying states of decay) in uniform positions in two parallel rows (Figure 42). One row is placed very close to the top of the bank of the creek, while the other row is approximately 3 m out onto the creek bed. Based on the diameter of the best preserved of these (approximately 40 cm) and their placement pattern, it is proposed that these could be the remains of a wharf structure associated with the occupation of the site during the gold rush in the 1870s. On top of the creek bank in front of these were found small bits of brick and charcoal which might indicate a previous structure in the vicinity.

Figure 42. Remains of Dock Nine; note the advanced level of deterioration which suggests an earlier construction date than the others (Agnes Milowka 2006)

The last major feature of interest was located at the northwest side of the site. There a small circular area (approximately 2 m squared) had been dug out of the bank of the creek and several broken bottles and shards dumped in a pile. Initially this area was though to be a midden or historic refuse dump, however closer inspection led to the determination that it was instead evidence of looting activities. Probably created by bottle hunters, it contained broken bottles and shards of many different types, including green wine bottles, champagne bottles and modern beer bottles.

Isolated artefacts were also located in many locations around Stockyard Creek Site. Most of these were bottles and bottle glass shards of varying types (mainly wine and champagne). Other artefacts included ceramics sherds (plain white ware), a section of thin timber (possible planking) with several small copper fasteners attached and small pieces of possible copper sheathing. Based on their location these are thought to be associated with possible shipyard activities. Charcoal was also noticed eroding out of the wall of the boat ramp. All artefacts were left *in situ* and their locations and details were recorded with GPS, photography and mapping.

Stockyard Creek Island Site

Situated in Stockyard Creek is an island which is only accessible by crossing the mud flat. Known by the local informant as the 'Island,' this was reported to have been the site of a hotel and two boarding houses which accommodated settlers to and from the Walhalla Goldfields. Aerial photos (again captured by the innovative kite-camera) reveal a large area in the island's centre that was cleared of timber at some point but is now completely overgrown with scrub trees and blackberry bushes; this vegetation is considered indicative that the area has not been developed since that time.

Several major features of this site were located and recorded. The first of these is the remains of another possible wharf structure (Figure 43). Initially this was considered to be another recreational dock and was included in the dock structure survey, and as previously mentioned, was designated Dock One. However, closer inspection revealed that it was likely the remains of a wharf that ran along the shoreline and was used for loading and unloading passengers and cargo. The approximate length of the structure is 8 m and based on its position and the apparent age of its deteriorated timbers, it is suggested that this structure was likely associated with the hotel or boarding houses reported to have been in operation on this side of the creek.

Figure 43. Remains of Dock One (Agnes Milowka 2006)

The next feature of the site is a log bridge which allows access to the island from the mainland **(**Figure 44). This bridge is composed of approximately 30 felled trees of varying diameters and averaging 3 m in length. This structure spans a section of the creek approximately 10 m wide and creates a semi-dry path across the muddy creek bed (Figure 45). While this may be a modern bridge constructed by land owners to allow cattle to cross, the apparent age and condition of the logs may warrant further inspection.

The remains of another bridge were located between the island's northern shore and the mainland (Figure 45). This is presumed to have been associated with the reported railway and rail bed remains located on the main site. It is composed of several pylons placed at regular intervals which span the creek for a distance of approximately 25 m. There is evidence of two

separate building episodes; the first are several pylons that are obviously very old and deteriorated, and the second are more modern pylons that appear to have been placed to reinforce the originals. Possible building remains (bricks) were noted on the island side of the bridge base. Of particular interest was the presence of a builder's string attached to a screwdriver implanted in the bank on the island. This string stretched across the more recent bridge remains to the opposite bank.

Figure 44. Possible log bridge (Jason Raupp)

Figure 45. Remains of rail bridge (Liz Kilpatrick)

Several artefact scatters were also located at various points around the island. These areas were recorded and each was given an arbitrary number (Figure 40). Artefacts in Scatter 1 included 'hotel' ware and transfer print sherds; those in Scatter 2 consisted of construction materials such as bricks and mortar; Scatter 3 artefacts included wine and champagne bottles and shards, stoneware sherds, white ware sherds, a ginger beer bottle sherd, and a possible Rhine ware transfer print sherd with a partial makers mark; and Scatter 4 artefacts included a cache of wine

and champagne bottles. Several isolated wine and champagne bottles were also found around the site; however their locations were not mapped due to their large number. A case bottle neck, a copper nail, and window pane glass were also located across the creek; though not directly on the island this area was called Scatter 5 and recorded.

Due to time constraints only preliminary investigations of the sites at Stockyard Creek sites were undertaken. Evidence from the sites, including remaining structures and artefacts, support the local knowledge that the site was once a landing and settlement site dating to the Victorian gold rush era. For this reason it is recommended that intensive historical research be conducted to determine as much information as possible regarding the establishment of this site and changes it underwent through time. Additional non-intrusive archaeological investigations should also be undertaken. Such investigations should include a multi-technique geophysical investigation strategy involving ground penetrating radar, electromagnetic induction, and magnetometry to determine targets that might indicate structural remains both on the shore and on the mud flats.

Conclusion

Over the course of the practicum three shipwrecks and an important landing site were inspected. Though not all of the sites that were originally planned to be investigated could be accessed, the practicum was a huge success. MHU archaeologists provided Flinders students the chance to gain practical experience and participate in all aspects of the project, from data collection to final report production. These opportunities help to build skills, knowledge and experience necessary for employment. Practicums such as these also prove beneficial to Heritage Victoria by assisting in the completion of required site inspections.

Acknowledgments

The authors would like to thank to MHU archaeologist Peter Harvey, Cassandra Philippou and Liz Kilpatrick for providing them to opportunity to not only participate in this practicum, but to have a great time as well. Thanks are also extended to the MAAV volunteers for sharing their knowledge and experience, and for exposing them to new methodologies (i.e. Jim Anderson's kite-mounted camera)!

6

Heritage Revisited: Historic Shipwreck Inspections in Port Phillip Bay, Victoria

Rick Bullers, Toni Massey, John Ricci and Dianna Zwart

The Port Phillip Bay Practicum was established with the dual purpose of assisting Heritage Victoria with its legislated responsibility of inspecting and managing shipwrecks of heritage significance, as well as providing maritime archaeology students with field experience. The practicum is one of several similar projects including one conducted at Port Albert described earlier in this volume. The Port Phillip Bay Practicum was designed to relocate and monitor the known wrecks within Port Phillip Bay and to assess erosion and other long term damage associated with underwater wreck sites.

The project crew included five staff and students from Flinders University (Jennifer McKinnon, Rick Bullers, Diana Zwart, John Ricci and Toni Massey) and lasted ten full days between 8 and 17 November 2006. The Flinders crew assisted staff from Heritage Victoria's Maritime Heritage Unit (MHU), and volunteers from Maritime Archaeological Association of Victoria (MAAV) and Australian National Maritime Museum (ANMM). The inspection team established its base in a rented house in St. Leonards for the duration of the practicum.

Port Phillip Heads is widely considered to be the most dangerous entrance in Commonwealth waters due to its deep, narrow entrance to Port Phillip Bay, dangerous reefs and uneven sea floor. The conditions around the Heads and the presence of sand bars inside caused many vessel casualties in the 200 years since the bay was discovered by Europeans. These shipwrecks are culturally significant because they contribute to the history of Port Phillip Bay. Periodic wreck inspections are therefore necessary to assess the condition of these historically significant sites and determine appropriate management strategies for their long-term survival.

Brief History of Port Phillip Bay

Port Phillip Bay, located on Victoria's central coast (Figure 46), covers 1950 km². Port Phillip Bay is one of Australia's most densely populated catchments; more than 3.2 million people live around its shore. The nation's second largest city, Melbourne, is located at its head and the Port of Melbourne is Australia's busiest port (Parks Victoria, 2007).

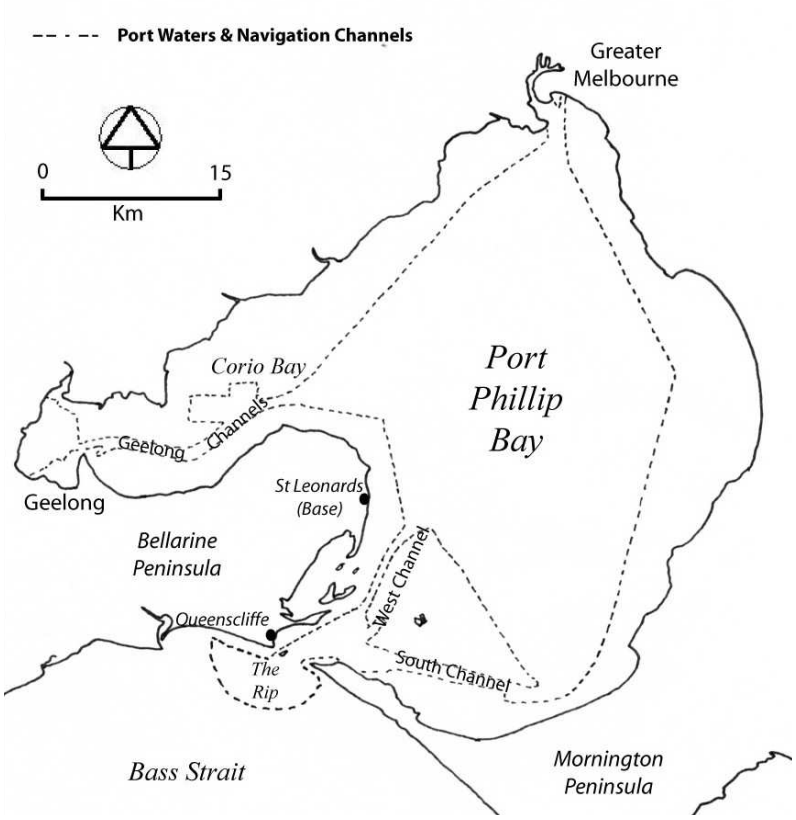

Figure 46. Map of Port Phillip Bay, Victoria (R. Bullers 2006)

Port Phillip Bay has a rich history of both Aboriginal and European occupation. European settlement of the Port Phillip Bay region commenced with its discovery by Lieutenant John Murray in *Lady Nelson* in 1801. Murray reported to Governor King that the area would be very good for cattle and, more particularly, sheep farming. However, it was not until about 1830 before settlement commenced in earnest. Tasmanian graziers John Batman and John Pascoe Fawkner were instrumental in starting the fledgling settlement of Melbourne in 1835 after Batman made a treaty for most of the land around the bay with the local Aboriginal peoples. Melbourne started to grow rapidly, rivalling Sydney as the commercial centre of Australia by 1841 (Elliget and Briedahl 1991).

Shipping was an integral component of life in the fledgling colony, bringing supplies and a steady stream of settlers. This was a very good time for ship owners; their ships brought immigrants to the new settlement from Britain, and returned with cargoes of local wool and fishery products. With the discovery of gold in Victoria, an influx of people arriving from all over the world increased the volume of shipping enormously. The Victorian gold rush of the 1850s sparked a massive immigration increase and huge numbers of ships began arriving in Port Phillip Bay; in 1841 alone there were more than 250 arrivals (Elliget and Briedahl 1991).

A trap for shipping

Port Phillip Heads was considered to be the most dangerous entrance in Australian waters. This is not surprising considering the bay covers an area of 1950 km² and has a volume of 25 km³. Four percent of this volume (1 km³) is exchanged with Bass Strait on every tide (Anderson 2006:7). With only 3 km between the two Heads, and with such an enormous volume of water exchange, the tidal flow can be around 7-8 knots, forming a very dangerous area called The Rip. This is an area of eddies and whirlpools. Only a 1 km wide channel between the Heads is navigable by large vessels; and the channel is surrounded by reefs and sandbars. To get into the

main shipping channel to Melbourne a sharp turn to starboard must be made to avoid the Queenscliff peninsula after passing through the Heads. From the 1850s an increasing number of ships visited Melbourne and had to pass through this dangerous area. Little wonder then, a considerable number of vessel casualties occurred in this area. There are more than 40 wrecks in the immediate vicinity of the Heads (Anderson, 2006: 72). The southern half of Port Phillip Bay (inside the Heads) is characterised by many individual channels separated by large, shifting sandbars. More than half of Port Phillip Bay has a water depth of less than 8 m.

Much of the material culture associated with the early history of Port Phillip Bay can still be seen today. A multitude of wrecks are available for divers to visit, as well as other evidence of the Bay's maritime history such as the forts and lighthouses.

Project Objectives

The Port Phillip Bay Wreck Inspection Project forms a component of a broader MHU program of historic wreck inspections throughout Victoria. This project followed a similar program of historic wreck inspections in the Port Albert area in October 2006. The principal objectives of the project were to:

1. Relocate selected historic wrecks in the southern portion of Port Phillip Bay and obtain accurate GPS coordinates.
2. Inspect selected significant historic wrecks and describe their current physical condition, determine threats and make management recommendations.
3. Determine the feasibility of engaging Flinders University students in future practicums.
4. Perform specific tasks on selected wrecks including:
    a. Contribute to corrosion analysis on HMAS *Goorangai* by deploying sash weights for future measurement;
    b. Determine the identity of objects found previously in the vicinity of the paddle steamer *Ozone*;
    c. Survey and draw the bow section of *Ozone* for incorporation into interpretive signage;
    d. Measure and obtain lines plans for the lifeboat *Queenscliffe* housed at the Queenscliff Maritime Museum.

The Inspection Program

Wrecks were selected for inspection by MHU staff based on significance, ease of relocation, and diving suitability based on weather/water conditions. Where possible, sites were relocated using either GPS coordinates or visual transits. Once a site was relocated a more accurate GPS position was recorded. Heritage Victoria provided two vessels for the surveys: *Trim*, a 9 m catamaran with twin 225hp motors which was used as the primary vessel, and *MAU002*, a 6 m aluminium vessel.

Weather conditions were ideal for boating and diving during the first five days of fieldwork. However, weather conditions deteriorated half-way through the practicum and boating operations were curtailed. Other activities were performed such as diving from shore (*Ozone*) or land-based work (*Queenscliffe* and Clifton Springs Spa).

Sites were inspected by groups of divers at appropriate times; many of the sites are located in strong current areas, and diving could only be conducted at slack tide. Dive buddies were selected based on experience – an experienced diver was generally paired with one with less experience. Each dive pair had a slate upon which to record the general condition of the wreck and any other observable phenomena such as threats, deterioration and marine growth. Dives

were usually limited to 20 minute bottom time on deeper wrecks, but up to 80 minutes was allowed for shallow wrecks.

Vessel crews were rotated daily to ensure that crews were not working on the same boat and with the same crew all the time. The exception was the two vessel skippers, who remained with their respective vessels for the duration. While divers were below, a dive supervisor remained on board the vessels, and a standby diver, in full kit, was available to provide immediate assistance in case of a diving emergency. An oxygen kit was also set up in case of decompression illness (DCI) incidents.

On-site, *Trim* usually anchored first and *MAU002* was rafted alongside. The exceptions to this were the *Hurricane* site, where weather conditions were too rough, and *Goorangai*, which was located in the main shipping channel. At these sites the vessels remained live – that is, untethered and ready to move. Shot lines were first deployed, then divers were dropped near the surface buoys allowing the vessels to move away. At the conclusion of the dive, the divers ascended the shot lines and each vessel then moved in to pick up its dive crew.

Inspections

Clarence (1841 – 1850)

On 9 November the team inspected the wreck of *Clarence*, an Australian-built wooden schooner built in 1841 and wrecked on the east bank of Coles Channel in 1850 (Harvey 1989:1). A general wreck inspection and assessment of the size of exposed scantlings was undertaken by three dive teams. The site was found to be in a relatively stable condition, with the majority covered by sediment and marine growth. Any exposed features remained less than a meter above the surrounding sediment and no evidence of scouring was found. In addition, no individual artefacts were exposed on the seabed, although the remains of fishing tackle and a hand line were located. No visual record of the site was possible, due to technical difficulties with both the underwater video and still cameras.

Several small fishing vessels were anchored nearby when the team arrived. At least one vessel motored towards the survey crew then veered away when they saw the MHU vessels. This site is probably used for fishing, despite the protection zone.

SS *City of Launceston* (1863 – 1865)

The next day, 10 November, the team completed an inspection of SS *City of Launceston*, an iron steamship built in Glasgow in 1863. *City of Launceston* sank in the middle of Port Phillip Bay in 1865 after being struck by the SS *Penola*. The remains of the vessel were relocated in October 1980, and the first official wreck inspection was conducted in May 1984. Several surveys have been occurred in subsequent years, and the information derived has made the wreck one of the most significant in Victorian waters (Strachan, 2000).

The vessel lies in 24 m of water and, like *Clarence*, is enclosed by a gazetted protection zone. Entry to the zone is prohibited, as is any fishing. The two dives consisted of a general inspection of the wreck and an update on a MAAV corrosion experiment. The deck was covered with sediment and shell grit with the remainder of the wreck densely covered in algae. This growth almost completely obscured the survey tags used during a previous excavation, although tarps used to cover the trenches were partly visible. Only 24 sash weights deployed on the site for the MAAV corrosion study were relocated. The divers also found a piece of wood with what are believed to be Celtic symbols on it that had not been seen during previous work, and a rope purposely covered with a piece of iron had become uncovered.

Several fishing vessels were observed in the vicinity of the protected zone. The presence of such vessels illustrates the continued effort that must be employed to appropriately regulate the site.

Monarch (1836 – 1867)

After the *City of Launceston* inspections, the team diverted to conduct an inspection of *Monarch*, a 269 ton wooden barque that ran aground on the bank between West Channel and Coles Channel in 1867 (DEWR 2007).

The approximate position was found using visual transits and on the afternoon of 10 November the wreck site was confirmed by snorkellers. Two dive teams attempted a mud map for the site and also exposed sections of the wreck by hand fanning for the purposes of scaled drawings and photographs. The site was predominately covered in sediment and seagrass, although the six water tanks mentioned in the historical records were discovered. There was evidence of scouring on the site and many of the exposed timbers were badly deteriorated. The tanks were covered in algae and some were missing their top sections.

UNID 'Lightship'

On 11 November the team inspected the remains of an object that had been known colloquially as the 'Lightship,' although the true identity of this site is not known. Two dive teams conducted an inspection and recovered two pieces of glass prism (Figure 47).

The teams also performed an overall inspection of the site. The size and features call into question the site's identification as a lightship, and may indicate that it was a fixed piece of harbour infrastructure. A search of the area surrounding the site confirmed the absence of additional material located beyond the known remains. Further work should be conducted and recovered artefacts and historical sources used to identify this site with more certainty.

Figure 47. Two prisms recovered from the "lightship"

The site had previously been blown up as a navigation hazard, and the wreck was found in a near unrecognisable condition, although many sections stand up to 1.5 m above the seabed and are heavily encrusted in marine growth.

HMAS *Goorangai*

After completing the 'Lightship' inspections, the team proceed to the South Channel to inspect the remains of HMAS *Goorangai*. *Goorangai* was an iron trawler that had been appropriated by the military during World War II and converted to a minesweeper. It sank in the South Channel in 1940 after being run-down at night by the troopship *Duntroon*. The vessel sank in less than a minute and all hands lost (Foster 1987).

On the afternoon of 11 November a team of divers were dropped on site to perform a general survey and deploy 24 sash weights as part of another MAAV corrosion study. The inspection was very brief due to the depth (25 m) and the short periods available for diving between passing ships. The South Channel is the main channel to Port Phillip Heads and is subject to heavy vessel traffic.

Joanna (1856 – 1857)

On 12 November the team performed an inspection of *Joanna*, an Australian-built wooden schooner built at Mount Eliza, Port Phillip Bay in 1856. *Joanna* worked in the bay trade but was lost on the West Bank in 1857 after it was caught in heavy gales; it sank quickly and an attempt to salvage the vessel failed (DEWR 2007).

A circular search for the site, centred on *Joanna's* historic marker, was conducted but material remains were not located. A mound completely covered by sand in 4 m of water was found directly up-current from the historic marker. Slight hand fanning over the mound revealed seagrass growing just below the surface. The mound may have been the shipwreck although no structure was located. Some scouring was noticed around the mound. The site in its current state appears stable, although the dynamic conditions in this area of Port Phillip Bay may cause it to become exposed again.

Ozone (1886 – 1925)

On 14 and 15 November, weather conditions precluded boat diving. Shore dives were conducted on *Ozone* and adjacent *Dominion* wrecks. *Ozone* was a 572 ton iron paddle steamer built in Glasgow in 1886. *Dominion* was a wooden barque built in Quebec, Canada. In 1925 both vessels were dismantled and sunk to form a breakwater (DEWR 2007).

One dive team attempted to relocate several timber barges that were identified during a previous Flinders University Maritime Archaeology Field School at Port Arlington (2004). The previous identification was found to be erroneous, and the barges were identified as part of *Dominion*. Another team photographed the majority of Ozone's remains which is heavily covered in marine growth (Figure 49).

The bow section of *Ozone* was mapped between the boilers and the capstan using a baseline-offset method. This mapping exercise continued the following day with one team mapping the port bow and the second team mapping the starboard bow (Figure 50).

This site remains relatively stable although visits to further document the corrosion of the structure would be helpful; future visits should also note the condition of the interpretative signage in the caravan park.

Other vessels

Attempts were also made to relocate *Foig-a-Ballagh*, a wooden barque built in Belfast in 1845. In 1852, during a heavy squall, the vessel parted from its anchors and went aground. It was transporting a cargo of coal and it was impossible to refloat. On 12 November, following the

Joanna inspection, a dive team attempted a 30m radius circular search from the GPS mark for the *Foig-a-Ballagh*. Unfortunately, the search was inconclusive and marred by problems of the tape bending and shot-line moving due to strong current. This site needs to be revisited in conditions more conducive to effective searching.

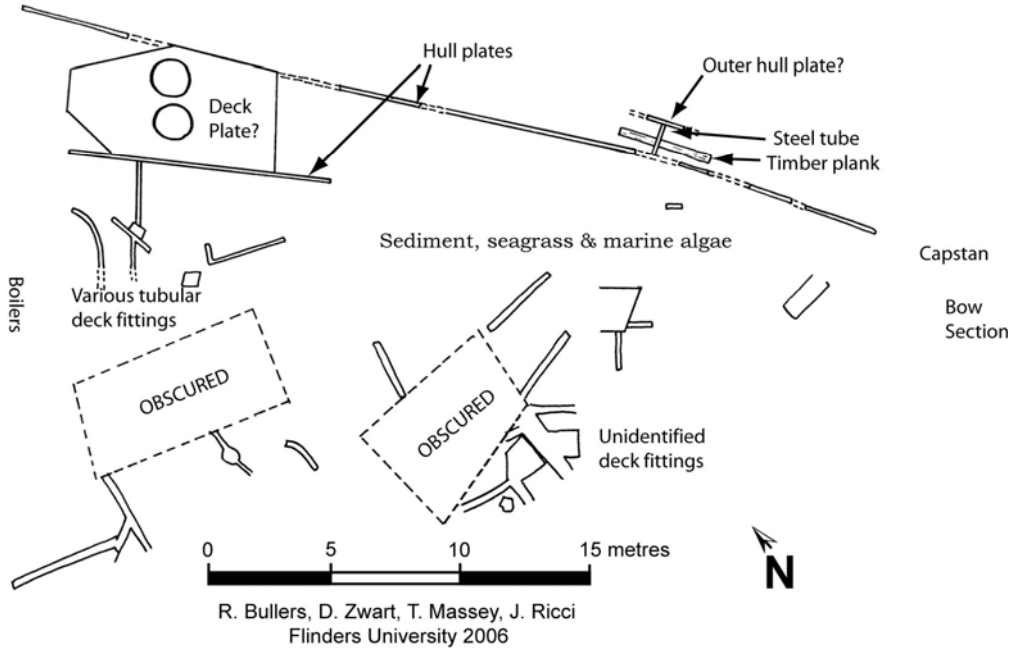

Figure 48. Mud map of *Ozone's* bow section (Bullers, Ricci and Zwart 2006)

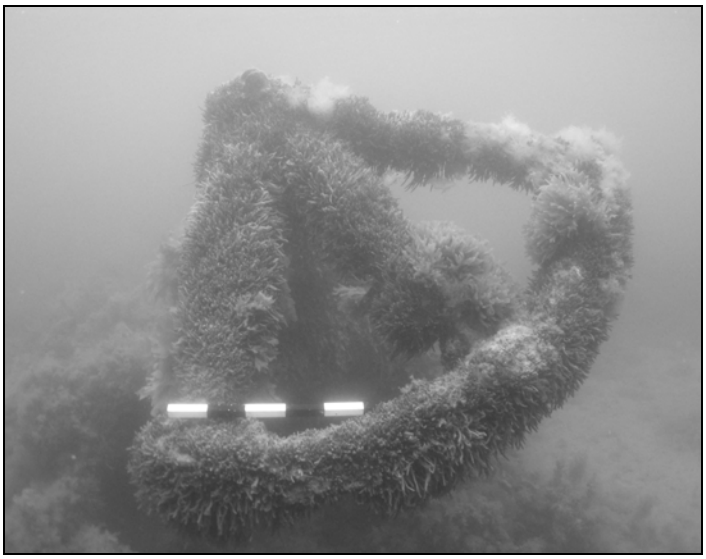

Figure 49. Steering quadrant on *Ozone*

An attempt was also made to relocate the Australian-built vessel *Mountain Maid* from visual transits, but it was unsuccessful.

On 16 November, an attempt was made to inspect the 1198 ton ship *Hurricane*, built in 1853 on the Clyde River in Scotland. *Hurricane* hit the Lonsdale Reef slightly when entering the Heads. First it was thought there was no damage, but after a while the ship started to sink and foundered. The vessel and cargo were sold but the vessel was never raised (Williams and Serle 1963). Shot lines were dropped on the site, and two teams entered the water. No remains were visible, and a circular search of approximately 25m was conducted without result. After the dive teams

surfaced an attempt was made to replace the shots using visual transits and the depth sounder, but worsening weather conditions prevented success.

Figure 50. Divers surveying the bow section of *Ozone*

Lines Plan: Lifeboat *Queenscliffe*

Beginning in 1838 a pilot service was established in Queenscliff to guide ships entering through Port Phillip Heads into the shipping channel. From 1856 until 1976 a lifeboat service operated from Queenscliff. During this period the volunteers of the lifeboat service rescued many stranded sailors (Anderson 2006).

On 13 November, with diving operations postponed due to adverse weather, the team visited the Queenscliff Maritime Museum to inspect and take lines of the lifeboat *Queenscliffe*. This vessel, a Watson Class lifeboat, was built in 1926 in Port Adelaide; it was the fourth lifeboat used at Queenscliff. It was taken out of service in 1976 and is now displayed at the Queenscliff Maritime Museum.

Lines were taken using available tools (Figure 51). A baseline was laid on the ground parallel to the portside of the vessel (the starboard side was obstructed). The baseline was laid 2.5 m from its centre line). Stations were established along the baseline at 0.5 m, 1 m, 2 m, 3 m, 4 m, 6 m, 8 m, 10 m, 11 m, 12 m and 13 m and 13.5 m. A makeshift vertical pole was fashioned from a bedpost. On the vertical pole waterlines were marked at 0.5 m intervals. The vertical pole was placed at a station and then a horizontal distance was measured from each waterline mark on the pole to the hull. Line levels were used to ensure the measurements were level.

An extension was added to the pole to measure the sheer line, however only the height was taken. Measurements were taken at the bow and stern to make sure the curved shape could be drawn (Figure 52).

Clifton Springs

Situated on the Bellarine Peninsula on the shores of Corio Bay is a 19th century mineral springs and spa complex which operated from around 1875-1920. According to Heritage Victoria (2005) at least seven springs existed along the foreshore between the remains of two jetties and along a 50 m stretch of beach. In 1875 the first commercial bottling of spring water began on the site.

The Clifton Springs Mineral Company was established in the 1880s and it is estimated that over 5,000 bottles were sold annually.

Figure 51. Students taking lines off the bow of *Queenscliffe* (Courtesy Program in Maritime Archaeology, Flinders University)

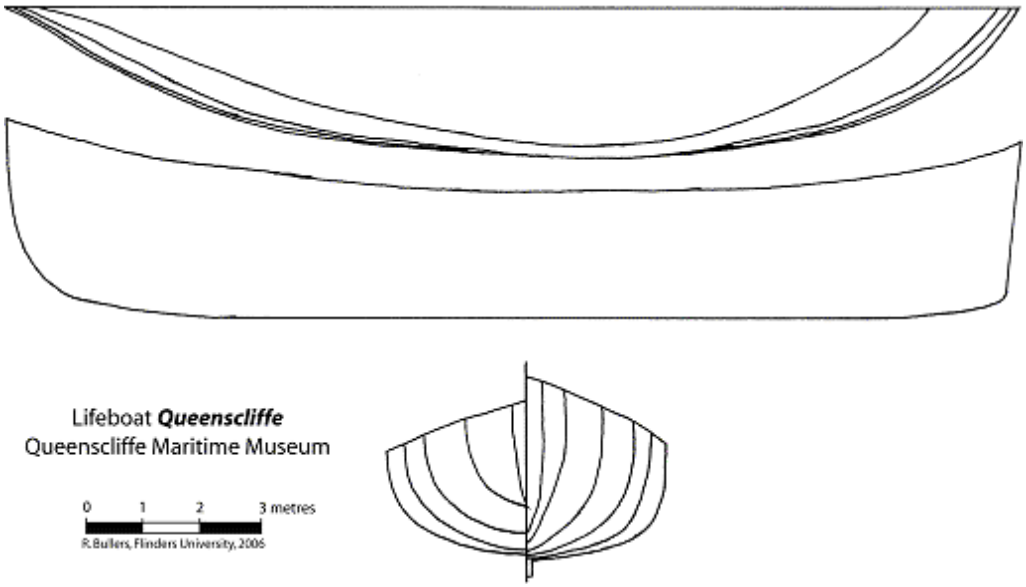

Figure 52. Field draft of *Queenscliffe* lines (Bullers 2006)

In recent years, bulldozers were used for erosion control at Clifton Springs to help minimize the long term effects of erosion of the beach and cliffs. On 14 November, while adverse weather conditions continued to hamper boating operations, the team conducted a small survey of the area which included photography, mud maps and site investigations. Archaeological remains found at Clifton Springs included brick and timber foundations, ceramic tiles, an array of different glass and metal pipes, and the remains of two jetties. Clifton Springs is historically significant as a site of 19th century health tourism in Victoria. Archaeological features at Clifton Springs include:

- Circular brick structures that could mark the location of the springs situated along the beach in the 19th century.

- Jetty remains (including timber pylons) can be seen from the beach and include a number of other structures evident in the water which may also relate to the mineral spas.
- Structural remains which could likely be from the late 19th century kiosk and bottling factory include brick and timber foundations eroding near the cliff adjacent to the springs (Figure 53).
- Other artefact remains include glass, ceramic tiles, bottles and tall metal pipes which also had evidence of erosion.
- Several bottle dumps (Figure 54) were located containing many broken torpedo bottles among others. It is believed that the bottles may have been collected by locals and placed at these different locations. Many different types of bottles were represented including modern ginger beer and beer bottles.
- A small wooden vessel, probably a dinghy, was found lying on the embankment covered in scrub and bushes. Not much could be determined from this vessel due to its poor condition and extent of deterioration.

Figure 53. Erosion-control works have unearthed an extensive bottle scatter (Courtesy Program in Maritime Archaeology, Flinders University)

The long term effects of erosion can be clearly seen at Clifton Springs and include the barricading of adjacent steps leading down to the beach, which is deteriorating due to dangerous land slides and other environmental impacts. Further, other forms of erosion can be seen at Clifton Springs including an area at the western end of the site where erosion and/or remediation earthworks have exposed an artefact deposit at the rear to the beach. Action to stop the erosion has taken place in the form of land filling which will hopefully help slow the natural erosion process.

Only a preliminary investigation of Clifton Springs was carried out due to time constraints. However it is recognised that this site has archaeological significance as it represents a site of

19th century health tourism in Victoria. As such, every effort should be made to stop further erosion, and to document and preserve this important site.

Figure 54. Bottle fragments, Clifton Springs (Courtesy Program in Maritime Archaeology, Flinders University)

Conclusion

During the 10 day practicum, the team inspected a total of seven shipwrecks, and attempted to locate a further three. In addition, inspections of the lifeboat *Queenscliffe* and the mineral springs at Clifton Springs were undertaken. This was achieved in spite of adverse weather hampering much of the original inspection plan.

This program showed that a practicum involving students and archaeology professionals is not only achievable but practical. The benefits include giving students hands-on practical experience, while heritage agencies such as Heritage Victoria, gain valuable assistance in achieving their mandated and legislative responsibilities. It is hoped that such practicums will continue to be a part of The Flinders University's Graduate Program in Maritime Archaeology.

Acknowledgements

Special thanks go to Peter Harvey and Cassandra Phillipou of Heritage Victoria for extending a welcome to the Flinders University team and for providing the funding, equipment and opportunity for this program to succeed.

7

Attention to Detail: Geophysical and Historical Investigations around Port Elliot, South Australia

Ian Moffat, Jason Raupp and David VanZandt

Located on the southeastern coast of South Australia's Fleurieu Peninsula, Port Elliot has a lengthy and interesting maritime history (Figure 55). The unusually high concentration of shipwrecks at Port Elliot is the result of its choice as the first sea port for the Murray River trade. This ill-considered choice led to the wrecking of seven vessels in eleven years before the port was abandoned in favour of the more sheltered Victor Harbour.

In an effort to locate the remains of vessels known to have come ashore in the area, reconnaissance geophysical surveys were conducted along sections of Horseshoe Bay and Middleton beaches. The results of two initial surveys provided anomalies that correspond to the historically recorded positions of two early vessels. Detailed geophysical investigation was used to resolve the spatial distribution and intensity of these targets in greater detail. This paper provides a brief overview of the region's history, reviews previously conducted archaeological research and presents the results of the geophysical investigations.

Historical Background

The development of the Murray River trade allowed goods from Australia's interior to be shipped around the world. Unfortunately the mouth of the Murray was dangerous and was therefore not a viable outlet for this trade. It was soon realized that the alternative to a port at the mouth was to establish one port on the river and one port on the sea, and connect the two installations overland via a railway (Stempel and Tolley 1965:24). South Australian Governor Henry Fox and Captain Thomas Lipson chose Port Elliot as a suitable location for the sea port in 1849.

The decision to locate the trade's outlet to the sea at Port Elliot was strongly opposed by the Legislative Council at Port Adelaide, who feared that the establishment of a southern port would disrupt the trade monopoly that they (Port Adelaide) enjoyed (Bull 1884:317-318). Many experienced seafarers in the region also criticized the decision to locate the port at Port Elliot harbour on the basis that it was too small in size, too exposed and far too shallow. Instead they suggested a safer location at Victor Harbor (Lin 2001:66). In the end, officials felt that the cost of adding the extra 16 km to the railway construction was too costly and unnecessary, and therefore stuck to their original decision to use Port Elliot.

Figure 55. Location of Port Elliot on the Flerieu Peninsula, South Australia (Anon 2006)

In 1851 construction began on a rail line to connect the newly established river port of Goolwa to Port Elliot. The horse-drawn tramway opened for traffic in December 1853 and was acclaimed as the first railway in South Australia and the first public railway on iron rails in Australia (Yelland 1983:49). In conjunction with the railroad's construction in 1853, the first steamers began plying the waters of the Murray, and by 1857 the river trade was booming.

Construction of a jetty for Port Elliot began in 1852 and was completed in 1853. This 100 ft (30 m) long structure was seen as a folly since the water depth at its end was only 6 ft (2 m), and it soon became apparent that large ships could not moor to the jetty. Therefore cargos had to be lightered to ships waiting in deeper water, which added to shipping costs. Though plans to lengthen the structure an additional 100 ft (30 m) were drafted, they were never implemented (Pomery 1997).

Ships calling at Port Elliot consisted principally of sailing vessels including barques, brigs, cutters, and schooners from 40 to 150 tons and periodically steamers, usually about 500 tons. Outbound cargoes were principally wheat, barley, and flour from both local production and that transported down the Murray River by paddle steamers to Goolwa and overland to Pt. Elliot. Inbound merchandise included stores and building materials. While some of these cargoes were for use in the South Coast region, most were intended to be forwarded by steamers from Goolwa to interior settlements (Tolley 1965:22).

In a further attempt to improve shipping conditions at Port Elliot, a breakwater was proposed to enhance the shelter provided by Pullen Island. Unfortunately funds allocated for the project were insufficient and only half of the required distance was constructed. The government also attempted to improve anchorage by installing a series of fixed moorings between 1852 and 1854. These did not fulfil their desired function since they were improperly placed, inadequately maintained and underrated (Perkins 1988:31-33). The deficiencies of these moorings directly resulted in the loss of several vessels during the port's short working life.

Use at Port Elliot peaked in 1855 but declined after 1857 when steam-driven vessels increasingly risked passage through the treacherous Murray Mouth to avoid using Port Elliot. It was not long, however, before the shifting channels and sand bars claimed PS *Melbourne* in the mouth in 1859 and the Murray Mouth was rendered off limits. Although this wreck led to increased activity for Port Elliot throughout the early 1860s, the loss of two more vessels in the port and the lack of room for expansion once again brought to light its inadequacies (Parsons 1967:8). In 1864 an extension of the rail line to a jetty built at Port Victor (later renamed Victor Harbor) was completed (Sexton 1975:38). Though Port Elliot did compete with Victor Harbor for a few years it quietly ceased operation as a port in1866 (Page 1987:64).

Port Elliot's failure as a port was entirely based on its small size, shallow depth and exposed nature, which prevented it from handling the volume of trade that it was expected to carry (Coroneos 1997:24). Had the port been made relatively secure, with a slightly longer breakwater, stronger moorings and improved jetty, it might have adequately carried a limited coastal trade (Sibly 1972:102).

Previous Research

Over the course of 11 years seven ships were lost around Port Elliot's Horseshoe Bay. These include: the schooner *Emu* in 1853; the schooner *Commodore*, the brig *Josephine Loizeau*, the cutter *Lapwing*, and the brig *Harry* in 1856; the schooner *Flying Fish* in 1860; and the brigantine *Atholl* in 1864.

Port Elliot has been the subject of several investigations by both local history enthusiasts and archaeologists. In the 1960s local historians located and recovered several anchors from the Horseshoe Bay. These are now on display near the original jetty and form part of an interpretative trail which provides information about Port Elliot's wrecks (Figure 56).

Figure 56. Anchors recovered from Horseshoe Bay now on permanent display near the original jetty (Jennifer McKinnon 2006)

Australia's earliest volunteer archaeology group, the Society for Underwater Historic Research (SUHR), worked with the Fleurieu Dive Club to carry out the first extensive investigations of the shipwrecks in the bay and surrounding waters. The results of their historical research and

attempts to locate and identify wrecks were documented and published by John Perkins (1988) as *The Shipwrecks of Port Elliot 1853-1864*.

Professional archaeological investigation was conducted in 1997, when Cosmos Coroneos undertook a survey of the shipwrecks of Horseshoe Bay while conducting a study of all known shipwrecks in the region. The results of that survey were published in 1997 as a Special Publication of the Australian Institute for Maritime Archaeology (AIMA) entitled *Shipwrecks of Encounter Bay and the Backstairs Passage*.

Of the seven wrecks that are known to have occurred in this area, only three have been located. The brig *Harry* is the best preserved and represents the only wreck to be identified through historical sources, archaeological remains and wood sample analysis. Two other shipwreck sites have been inspected, but the data obtained did not produce definitive identifications. The lack of archaeological investigation in this area is in part due to the same rough and unpredictable conditions that initially caused these wrecks and make investigations of their remains extremely difficult.

Survey Design

Of the seven vessels wrecked in and around Horseshoe Bay, the schooner *Emu* and cutter *Lapwing* were of particular interest for this survey. Both of these vessels wrecked during violent storms and their remains were eventually washed ashore, making them excellent targets for terrestrial geophysical investigations.

The 21-ton wooden schooner *Emu* measured 39 ft (11.9 m) in length, 11.5 ft (3.5 m) in beam and had a draught of 5.9 ft (1.8 m). Built at Leschenault (Bunbury), Western Australia in 1847, the tiny two-masted schooner was wrecked in 1853 during a heavy gale (Perkins 1988:8 and Coroneos 1997:55). A search of the surrounding region discovered the hull, broken in two and driven on shore, with articles of various kinds scattered along the shore all the way to Middleton Beach (Parsons 1981:27). Some experienced seafarers agreed that *Emu* was "nothing more than a flat barge, laden to the waters edge and that it appears she was unable to fetch in under shelter," and that it appeared "she was driven onto Frenchman's Rock where she was split in two and carried broadside by the breakers onto the beach" (*Adelaide Observer* 1853 and Perkins 1988:6). The disaster resulted in the death of the captain and three crew members. The loss of *Emu* eventually was attributed to the ferocity of the storm and not to the deficiencies in the protection afforded at Port Elliot (Sibly 1972:76).

Lapwing was another vessel of interest for this survey due to its early construction, long working life and the existence of records stating that it also became a total loss ashore (Perkins 1988:17). Built in Mevagessey, Cornwall (United Kingdom) in 1808 for use as a revenue cutter, the 63-ton oak-built and copper-fastened cutter measured approximately 60 ft (18.3 m) long, with nearly 10 ft (3 m) of beam and a depth of nearly 10 ft (3 m) (*SAPP* 1856:1-5 and Perkins 1988:19). After a long career in the revenue service, *Lapwing* was brought to Australia for use in the inter-colonial trade. *Lapwing* was loading timber for the Gawler Town Railway at the time of its loss, which was the result of an attempt to save another vessel that had been attached to its mooring during the storm (*Adelaide Times* 1856a:3d). Due to the violence of the storm, *Lapwing* completely broke up and in the words of its captain, "There is scarcely a portion of her left large enough to make a handspike of. The beach was strewed (*sic*) with various parts of the wreck for a long distance and presented a wretched appearance" (*Adelaide Times* 1856b:2d).

Survey areas were chosen based on historic accounts of the loss of each of these vessels. The first area chosen was the eastern third of Horseshoe Bay Beach, where a Harbour Master's 1856

map of the anchorage shows a projected point onto which *Lapwing* came ashore (Figure 57). The other area was Middleton Beach, where an historic photograph displays remains of what is thought to be *Emu* eroding from the dunes.

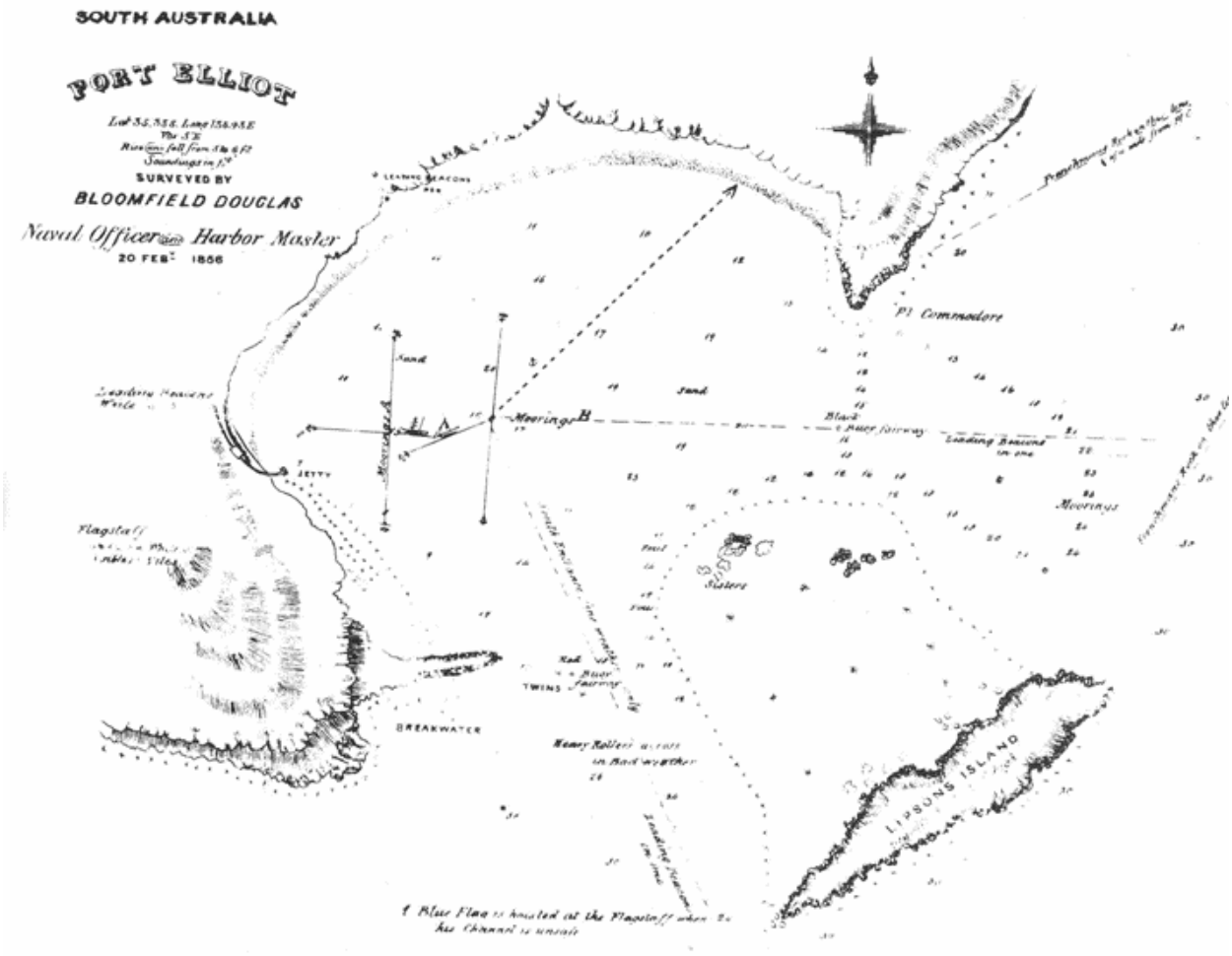

Figure 57. 1856 Harbour Master's map showing *Lapwing*'s projected path and approximate grounding location (Perkins 1988)

Reconnaissance Geophysical Investigations and Results

Horseshoe Bay

The Horseshoe Bay reconnaissance investigations were conducted with a Geometrics G-856AX proton precession magnetometer for collecting magnetic data at five second intervals and a Garmin 12XL navigational global positioning systems (GPS) unit for providing positional data. Survey data was collected at a line spacing of approximately 2 m with lines extending for approximately 500 m. The data collected was then processed using Magpick software to produce a map of magnetic intensity. This map was then overlain onto an aerial photograph using Mapinfo software (Figure 58).

The survey produced one significant anomaly. The location of this anomaly corresponded with the position depicted on an historic map drawn by the harbour master relating to the loss of *Lapwing*. At approximately 4000 nanoteslas (nT) above background, the size of the anomaly was surprisingly large given the expected preservation potential of the wreck and its known construction details. Any anomaly should have yielded a much smaller magnetic disturbance. On

the basis of this result and the significance of the shipwreck, excavation of the anomaly was preliminarily planned. Prior to excavation, a decision was made to undertake further detailed geophysical investigations to refine the nature and location of the anomaly. It was hoped that by refining the target, limited time and resources might be saved.

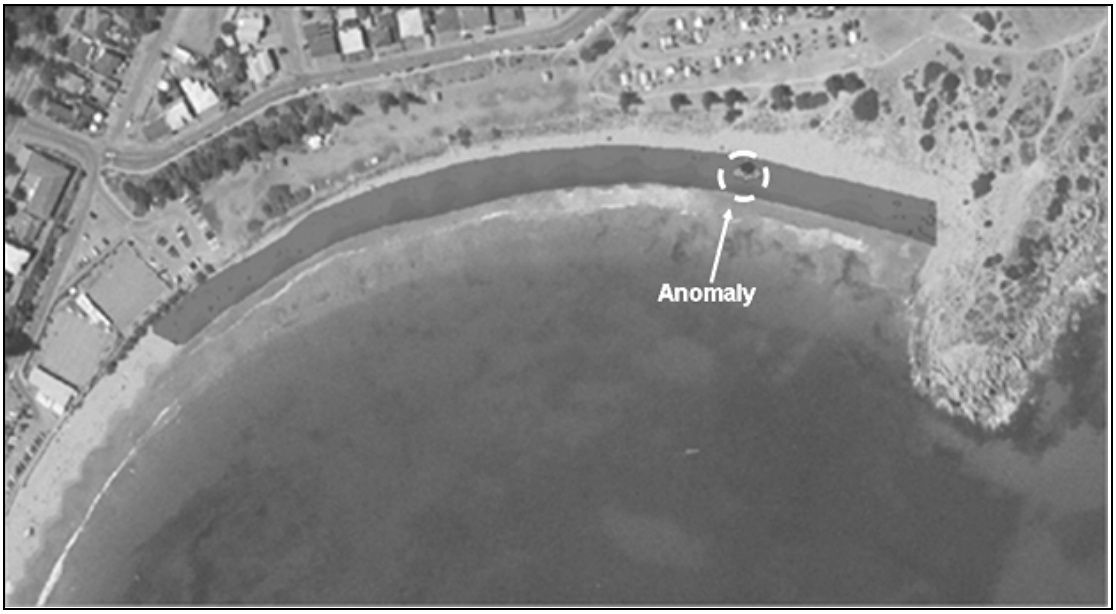

Figure 58. Horseshoe Bay reconnaissance magnetometer map overlain on an aerial photograph. The anomaly is highlighted (Ian Moffat 2006)

Middleton Beach

The Middleton Beach reconnaissance investigation survey area was chosen based on historical documentation which indicated that the broken hull of the schooner *Emu* had been washed onto the beach near the sand dunes in this area (Figure 59).

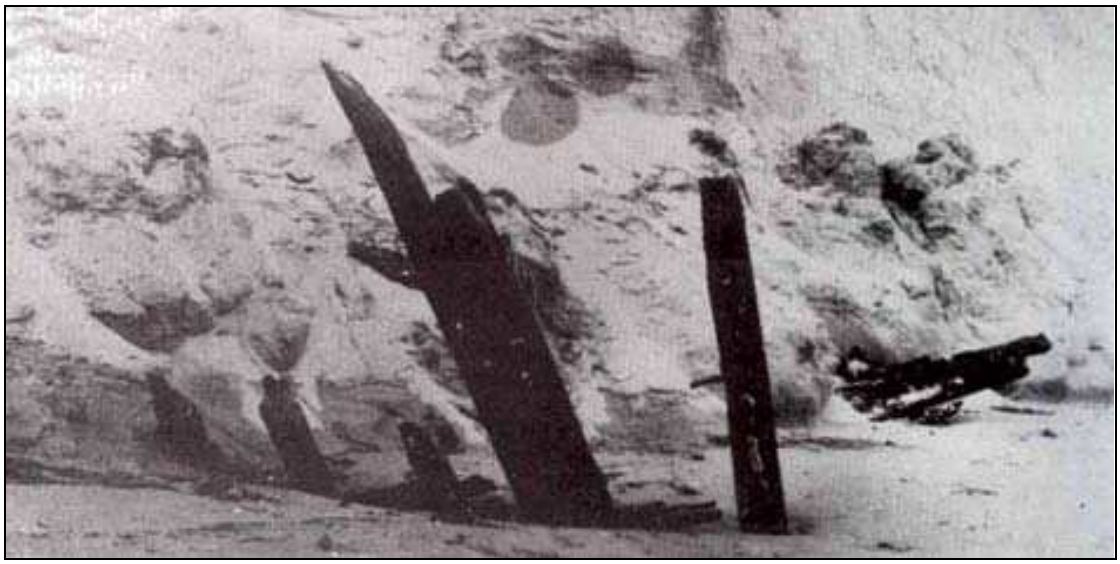

Figure 59. Historic photograph of Emu remains eroding out of dunes (Perkins 1988:8)

The survey was conducted using the same geophysical equipment as that used for the Horseshoe Bay survey. The survey data was collected at a line spacing of approximately 3 m and the area surveyed covered approximately 1800 m by 80 m of the beach. The data collected was then gridded using *Magpick* software to produce a map of magnetic intensity (Figure 60). Though this

map produced many magnetic anomalies which could possibly represent the scattered remains of the schooner, only the most prospective was selected for detailed investigation.

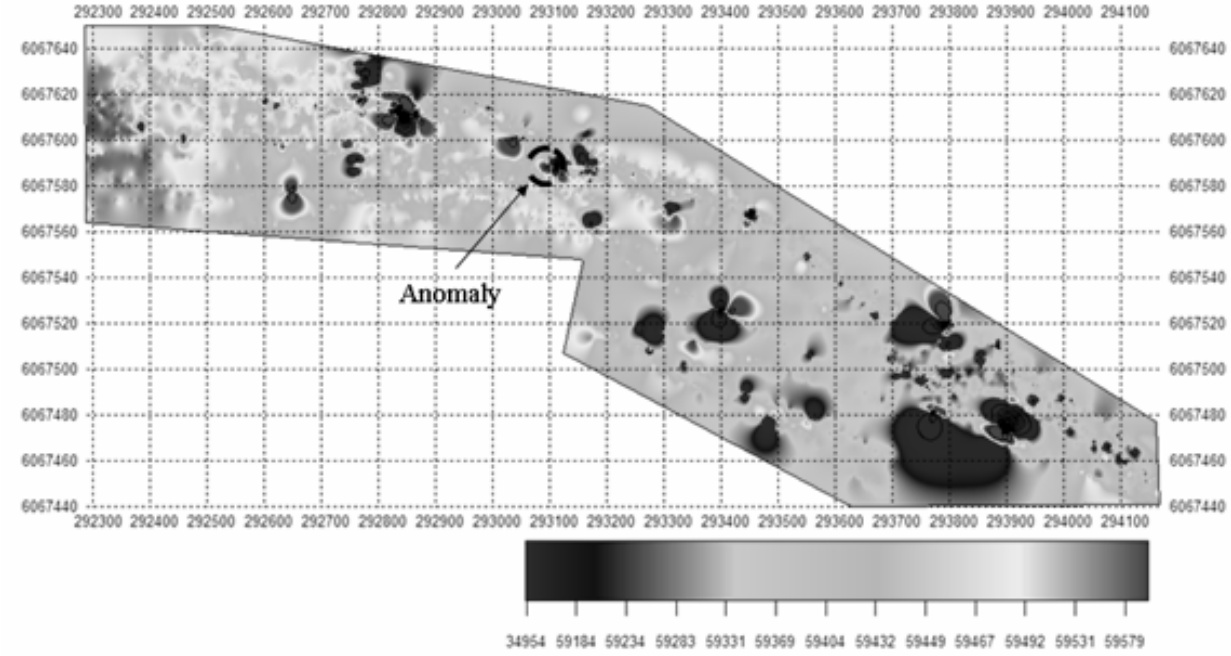

Figure 60. Middleton Beach reconnaissance magnetometer investigation map with anomaly highlighted (David VanZandt 2007)

Detailed Geophysical Investigations

Horseshoe Bay

The detailed geophysical investigation of the Horseshoe Bay anomaly was conducted by establishing a 20 m x 20 m grid over the location of the anomaly discovered through the reconnaissance surveys. The centre of this survey grid was located by using a GPS unit to determine its approximate location and then using a dumpy level and survey tapes to lay out a grid in a north-south and east-west orientation encompassing the feature. Electromagnetic induction and magnetic intensity surveys were conducted using a GEM-2 electromagnetic induction instrument and a Geometrics G-856AX proton precession magnetometer. Data points were collected manually at 1 m intervals by standing on the appropriate survey position, after checking for sensor stability and orientation. Thus each metre of the grid represented a survey station. The data was then combined and gridded using *MagPick* software to produce a map of magnetic intensity.

The detailed magnetometer survey confirmed the existence of an anomaly within the survey grid, but one much smaller in size (-60 nT from background levels) than that recorded during the reconnaissance survey. The significant difference is anomaly size might be attributed to the nature of the survey or possibly a heading error from an incorrect sensor orientation. Also, confirming the earlier statement about the positioning accuracy of handheld GPS units, the identified anomaly was approximately 9 m north of the grid reference indicated during reconnaissance surveys (Figure 61). This magnetic anomaly showed no response from the electromagnetic induction survey suggesting that the volume of the target is quite small and ferrous in nature with no significant wood or other material present.

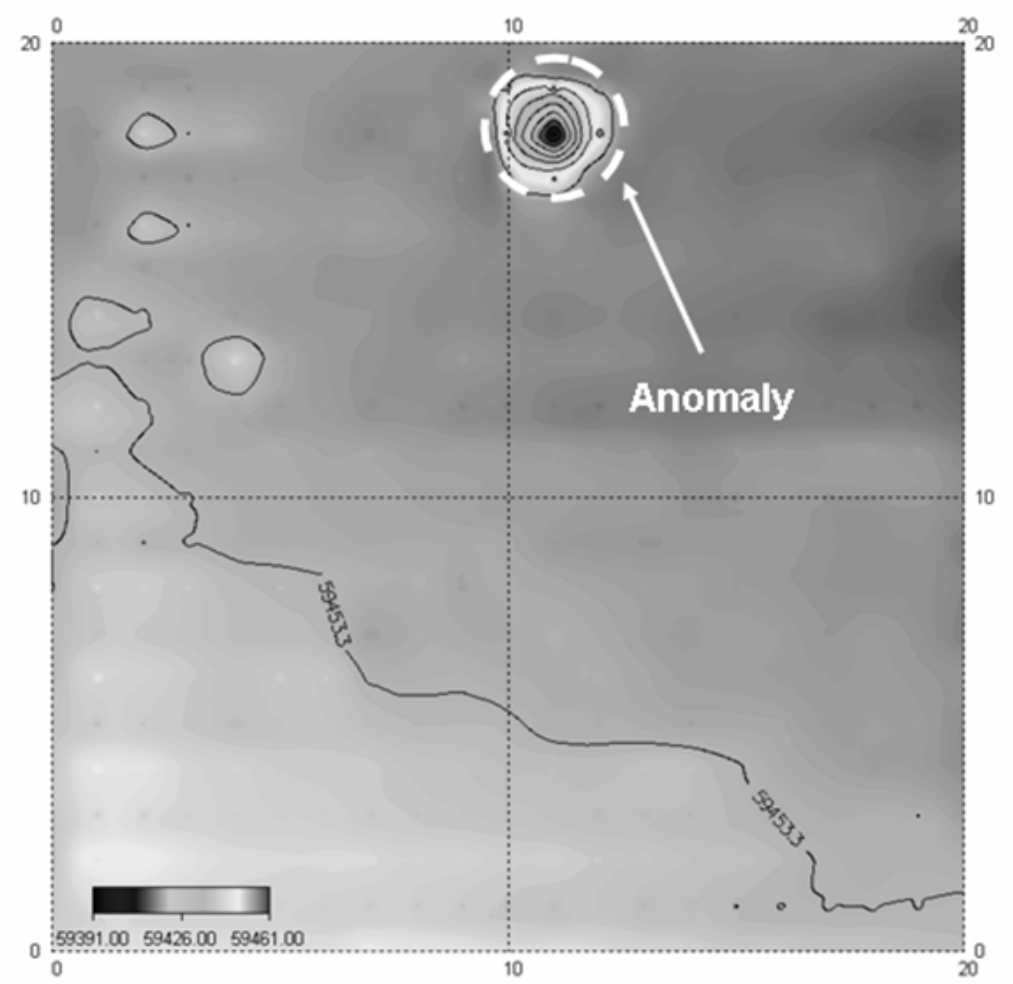

Figure 61. Horseshoe Bay detailed magnetometer investigation map with anomaly highlighted (Ian Moffat 2006)

Middleton Beach

The detailed investigation of the Middleton Beach survey was conducted on a 20 m by 20 m grid which centered on the location of the large anomaly discovered through the reconnaissance investigations. The center of this survey grid was located using a Garmin 12XL navigational GPS. A dumpy level and survey tapes were used to lay out a grid in a north-south, east-west orientation encompassing this feature. Magnetic intensity surveys were conducted using a Geometrics G-856 proton precession magnetometer, respectively. Data was collected using 1 m spaced lines in a north-south direction with survey stations established at 1 m intervals along those lines. Data points were manually collected whilst standing on the appropriate survey position, after checking for sensor stability and orientation. A diurnal correction was applied by returning the magnetometer to the first survey station of the day at the end of each two survey lines and removing this trend from the final data set. The diurnally corrected data was combined with positioning information and gridded using MagPick software to produce a map of magnetic intensity (Figure 62). No anomalies were encountered in this survey suggesting that the anomaly delineated by the reconnaissance investigation may have been erroneous in magnetic response or location.

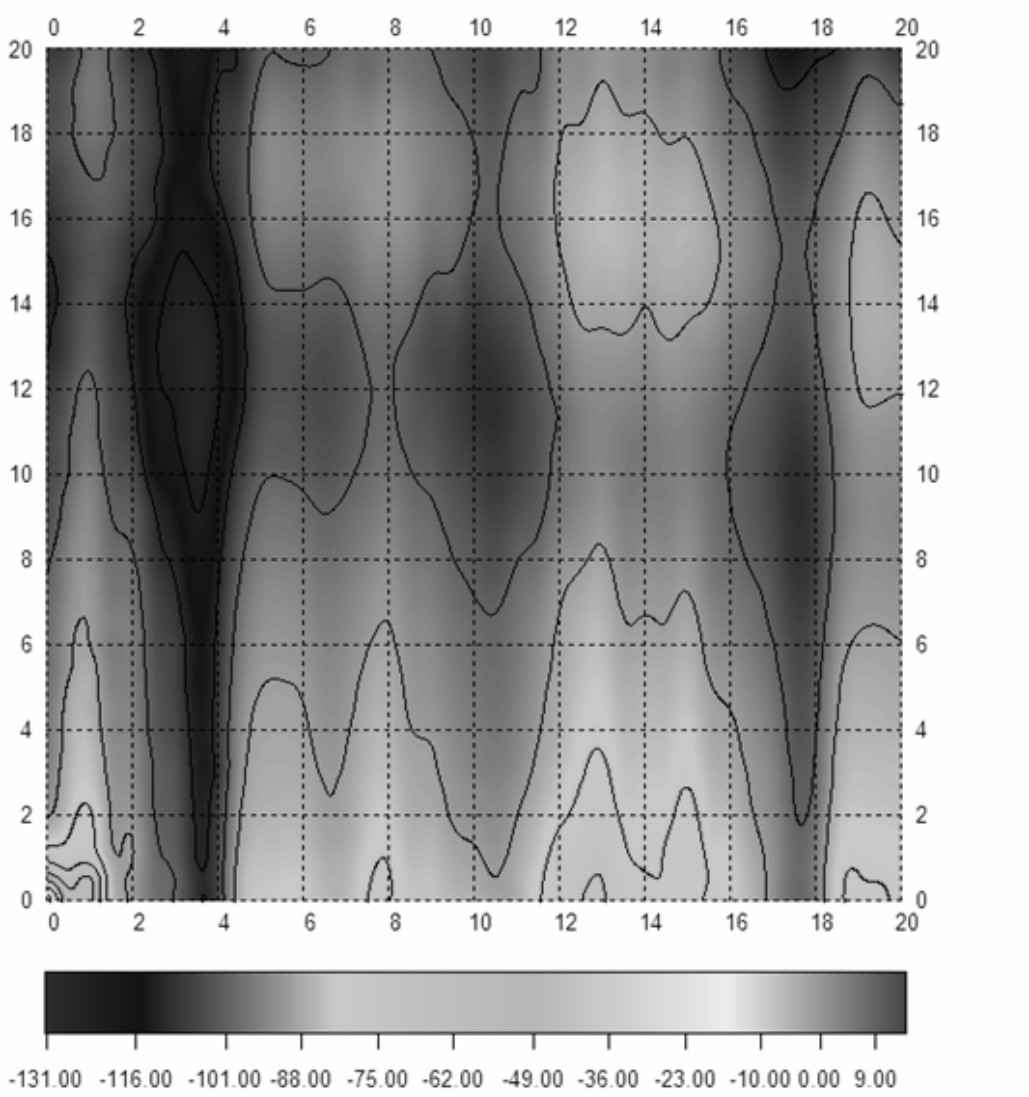

Figure 62. Middleton Beach detailed magnetometer investigation map (David VanZandt 2007)

Geophysical Survey Discussion

The detailed survey data from Horseshoe Bay showed that the magnetic anomaly located in the reconnaissance survey was smaller than initially indicated and also located approximately 9 m north of the location indicated during the initial reconnaissance survey. While this inconsistency in location is small, it is significant enough that should an excavation have been planned on the basis of the original survey it would likely have missed the target altogether. This demonstrates the value of a second phase of detailed geophysical investigations.

Furthermore, the electromagnetic induction data shows no significant anomalies, suggesting that the target is probably a small piece of iron without a large volume of associated material such as wood. The anomaly indicated by the magnetometer from the detailed investigation is also considerably smaller than that shown in the reconnaissance phase. This suggests a significant increase in instrument accuracy when the sensor is stable and stationary during acquisition. On the basis of these results it was decided not to conduct an excavation on the located anomaly as the amount of material available at a suitable depth may not have been sufficient to justify this process.

The detailed survey from Middleton Beach did not reveal an anomaly. This suggests an erroneous magnetic intensity value or positioning data from the reconnaissance survey and also demonstrates further the importance of conducting pre-excavation detailed geophysical investigations.

Conclusion

Through historical and archival research the approximate locations of two previously undiscovered shipwreck sites were identified. Based on records pertaining to their dispositions at the time of loss, it was hoped that they might be located through geophysical investigation. Although general locations about where the vessels might have come ashore were provided, it was obvious that large areas of beach would need to be surveyed to successfully locate the remains. In the case of Port Elliot both limited funding and time constraints led to the development of a bi-partite geophysical methodology as a means to acquire useful data from these large areas.

Due to the high potential area for direct investigation of anomalies, the bi-partite survey methodology was employed to cover the areas in the most effective manner. While the reconnaissance phase of the investigation revealed a significant anomaly located in an area which correlates to the historically mapped location of the colonial cutter *Lapwing*, detailed multi-technique investigations of this anomaly suggest that it is a small ferrous object without a large volume of associated material culture, rather than the remains of *Lapwing*.

Reconnaissance investigations of the sections of Middleton Beach produced several small anomalies which it was thought might represent the broken up remains of the schooner *Emu*. Due to the fact that each of these anomalies was located very close to the surf zone, the multi-technique investigation strategy was abandoned based on the knowledge that electromagnetic induction data would be corrupted by the presence of salt water. The results of the detailed magnetometer survey produced no anomalies suggesting that the anomalies delineated by the reconnaissance investigation may have been erroneous in magnetic response or location.

These results vindicate the decision to incorporate the bi-partite survey methodology into this research. By performing both reconnaissance and detailed surveys prior to excavation it was found that the positioning and physical property data on the targets was inaccurate and saved both time and resources. Thus the utility of this methodology was proven and it is therefore recommended that it be incorporated into research designs where geophysical investigations of beach environments are planned.

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