Nathan Richards · Sami Kay Seeb *Editors*

# The Archaeology of Watercraft Abandonment

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*This book is dedicated to Dr. Mark Staniforth, whose support, advice, patience, and guidance over the last two decades has shaped this work and the lives of its editors in ways too numerous to count.*

# Acknowledgments

The content for this book emerged from two sources. The first source was a series of papers submitted in two “abandoned ship archaeology” sessions coorganized by Nathan Richards and Mark Staniforth at the joint conference of the Australasian Institute for Maritime Archaeology, Australian Society for Historical Archaeology, Australian Association for Maritime History, and Australian Archaeological Association (Sydney, New South Wales) in 2007, and the Society for Historical Archaeology (SHA) Conference (Albuquerque, New Mexico) in 2008. Presenters included Robyn Ashworth, Lawrence Babits, Cos Coroneos, Michael Dermody, Stephen James Jr., Andrew Lydecker, Michael McCarthy, Calvin Mires, Sami Kay Seeb, Mark Staniforth, Peter Taylor, and Nathan Richards. As will be seen, many of these people have become authors of the chapters in this book, but we want to extend thanks to the entire group of presenters. The conversations emerging from these sessions had an exceedingly positive influence on the continued development of scholarship in this area.

The other source comes from scholars who were unable to present at these conferences but had undertaken studies on ship graveyard sites that had culminated in written reports, theses, or published research in some form. Our heartfelt thanks is extended to Josh Daniel, James Delgado, Brad Duncan, James Hunter III, Daniel LaRoche, Daniel Lenihan, Jacqueline Marcotte, Jonathan Moore, John C. Pollack, Christine Russell, Donald G. Shomette, Lindsay Smith, Caroline Wilby, and Robyn Woodward for making this volume complete. These authors became contributors in a number of ways. In some cases, postconference authorship teams formed. Alternatively, we sought out additional authors or future contributors sought us out. In a number of cases, some studies were completed after the 2008 SHA Conference but could be included.

Mark Staniforth, to whom this volume is dedicated, must be singled out for thanks—his support in mentoring us in the pursuit of this area of study dates back to the very beginning for both editors. In 1996, Dr. Staniforth (then with Flinders University) took his first group of undergraduates to a collection of rusting hulks in the North Arm of the Port Adelaide River and introduced one of the editors (Richards) to maritime archaeology (and his first ship graveyard). This introduction led to collaborations between Staniforth and Richards on the Garden Island Ships’ Graveyard

Project (1996–1997) and the Abandoned Ships' Project (1998–2002). In 2002, Sami Kay Seeb, a visiting undergraduate student assisted with fieldwork. In 2003, Richards joined the Program in Maritime Studies at East Carolina University (ECU) and undertook additional ship graveyard research with graduate students in the United States and Bermuda. Seeb commenced graduate research at ECU and completed her thesis on the Eagles Island Ship Graveyard. This strange trajectory all began when Mark Staniforth decided to draw his bowstring and shoot. We hope this book may serve as a similar arrow for some other bullseye.

Many of our colleagues are also due our thanks for their support. At the UNC-Coastal Studies Institute, Nancy White (Director) and at the Program in Maritime Studies, Bradley Rodgers (Director) and Lawrence Babits (Director, retired) continue to provide critical support, as do other great ECU colleagues (Lynn Harris, Calvin Mires, and David Stewart). This goes double for our respective partners Priscilla Delano and Gabriel Powers.

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# Chapter 1
# Abandoned Ships and Ship Graveyards: Exploring Site Significance and Research Potential

**Nathan Richards**

**Abstract** The remnants of noncatastrophically lost, deliberately discarded watercraft have been a subject of maritime historical and archaeological enquiry for quite some time. Studies of ships reutilized as boat burials and votive offerings, or transformed into foundations, buildings, and other structures, are well known in maritime archaeological literature. Less common are studies of collections of vessels abandoned by their owners at the conclusion of their useful lives. Nevertheless, this research does exist; occurring in the context of the discovery of buried assemblages of watercraft, surveys of huge collections of inundated vessels, and detailed studies of isolated intertidal hulk sites. This chapter will explore themes surrounding the significance and research potential of these abandoned ship resources.

## Introduction

Despite the commonplace occurrence of ship discard behavior, and the ubiquity of deliberately abandoned watercraft across the world, studies of ship graveyards have not been prominent in maritime archaeology. While some archaeological research on the topic and site type has appeared as books, chapters, and articles since the 1970s (see for example McCarthy 1979; Richards 2008; Shomette 1996; Stammers 2004), studies have generally been limited in focus and distribution, and the most common form of dissemination has been in unpublished archaeological reports and graduate theses (see Menzies 2010; Sjordal 2007; Van Tilburg 1999, 2001). Therefore, there also has not been a single source representing the diversity of geographical, historical, and theoretical contexts within which ship graveyard sites and deliberately abandoned vessels exist. This book is an attempt to remedy this deficiency by calling on past and present authors of maritime abandonment studies to contribute to an anthology. In contrast with much of the case-specific or theory-focused literature on the theme of watercraft discard, this book seeks to communicate that ship graveyard sites are representative of their adjacent maritime cultures, and are also emblematic of global

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maritime heritage themes. While the chapters included within *The Archaeology of Watercraft Abandonment* do not include studies from every nation or continent, they are spread across the globe, representing research conducted in Australia, Canada, Great Britain, New Zealand, and the United States (Fig. 1.1). This volume is intended to expose research potential, create discussion, and reinforce the significance of a prevalent cultural resource that is often overlooked.

Significant resources tend to be studied and appreciated, and it is clear that only valued resources are afforded protection. Creating value comes from understanding significance on historical, archaeological, recreational, educational, and aesthetic levels and proving research value through scholarly publication and disseminating information to the public. Researchers, however, need to introspectively evaluate how they ascribe and understand significance. Such an act may allow us to rethink the potential of understudied site types such as ship graveyards. In some ways, the intention of this book is to encourage maritime researchers to think beyond an apparent preoccupation with catastrophically lost shipwrecks (a "shipwreck bias"). This broadening of what we consider significant is in line with trends in research which have seen nonshipwreck studies of maritime landscapes, memorials, submerged aircraft, and coastal infrastructure sites (to name a few) gain recent prominence within maritime archaeology (see Ford 2011; McCarthy 1997, 2002; Stewart 2011). Hence, as a way of introduction, this chapter examines the significance of ship graveyards before outlining the connection between the chapters in this volume and the research potential of discarded watercraft.

## Abandonment and Significance

Why have deliberately discarded watercraft not been featured prominently in maritime historical and archaeological study? The easy answer relates to the act of discard itself, which often happens clandestinely and commonly without fanfare. This is a well-documented occurrence which has left large collections of discarded watercraft littering the shores and bottomlands of every region that has ever utilized waterborne transportation (see Moore 1995, p. 3). Frequently, the act of secret and uncelebrated discard leads to the loss of the identity of a ship and hence the loss of its history and significance—until somehow rediscovered.

However, this may not be the only reason. An examination of the historical record reveals that some of the activities surrounding deliberate acts of discard often elicit emotional responses which illuminate connections between humans and ships. For many nautical cultures, the acts of creating hulks from old ships (known as "hulking"), and the salvaging, scuttling, and beaching of ships are recurrently associated with negative feelings.

In the past, hulks, lighters, barges, and other support vessels played an undeniably important role in the efficient functioning of ports. This was especially true following the introduction and rise of steam propulsion, and before the ascendancy of the

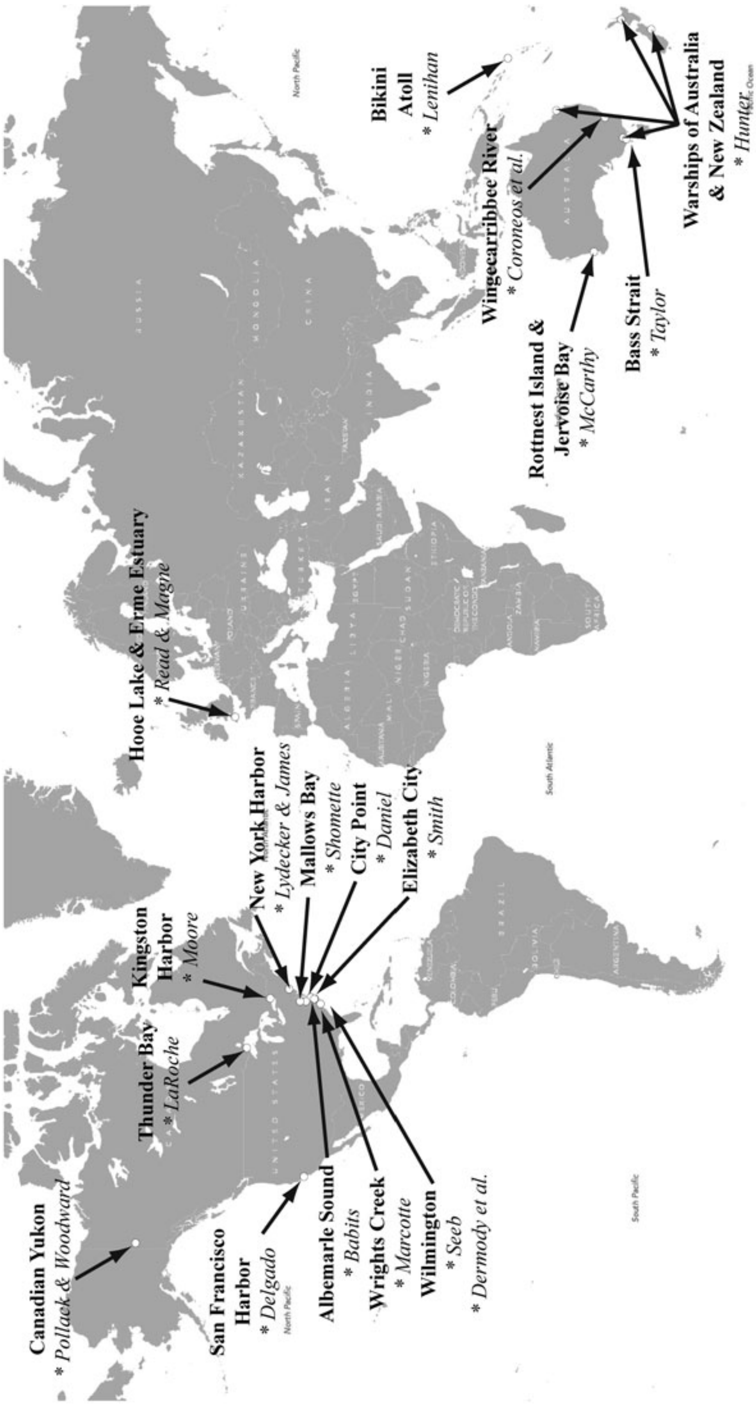


**Fig. 1.1** Map of the global distribution of studies within this volume (Image by Nathan Richards)

diesel engine. This period of time saw a need for coal bunkering that was fulfilled via the conversion of worn-out and unwanted vessels into coal hulks—a phenomena concluding around the 1940s (Glassford 1953, p. 252; Richards 2008, pp. 131–132).

The image of the hulk is a powerful one. In the modern parlance, most relevant to the watercraft described in this volume, a "hulk" is usually a vessel converted to a secondary, nonmercantile function within a port (such as functioning as a storage vessel). While not all vessels served as hulks before their eventual disposal, ships undergoing salvage prior to beaching or deep-water scuttling commonly appeared as (and were referred to as) hulks immediately before their disposal—mainly because of their "forlorn" and "bedraggled" appearance. This process of salvage, alteration, or conversion before discard was symbolic as well as physical (Fig. 1.2). Such watercraft underwent a range of complicated modifications to transition it from one function or form to another. Often the functional transformations came with a change in how the vessel was perceived. New opinions about altered ships provide glimpses into conservative norms within technologically derived maritime cultures. Change rarely sat well with the mariners whose entire life relied on the tried-and-tested technologies embodied in watercraft (see examples of maritime-focused conservatism at Harley 1971, 1973; Mak and Walton 1973; Souza 1998). These perceptions were at times expressed in writing and provide us with an insight into cultural connections to watercraft.

Any feelings regarding the diminished significance of abandoned watercraft may be accorded to our tendency to anthropomorphize and personify watercraft, and the negative connotations associated with hulks. While there have been some studies on the personification of watercraft, they have tended to concentrate on issues related to the bond that mariners feel with their vessel and the way they have viewed their ship as inherently gendered (see Baron 1971, p. 115; Brasch 1969, p. 217; Mellefont 2000, pp. 9–11; Whorf 1956, p. 90). Similar to the human tendency to engender ships, they are also the subjects of aesthetic contemplation; a vessel, for example, can be "more handsome" than another. Ships are likely the most anthropomorphized industrial product ever created.

This tendency to instill human form and meaning onto watercraft may relate to the entirety of a ship, or some aspect of its component parts. In his *Mast and Sail: An Essay in Nautical Comparative Anatomy*, Alan Moore cites his "mental discomfort" with the barkentine rig, considering it ugly and even "degenerate" (Moore 1970, p. 61 (1925)). While history tells us that changes to rig were occurring because sailing ship owners needed to compete with nascent steam technology, Moore's aesthetic consternation regarding this transformative "rigging down" of a well-known symbol manifested itself as anxiety. Indeed, Moore also goes further in his opinion on the greater transition of sail to steam and stated,

> A sailing ship appeals more to her crew than does a steamer to her deck hands. A real sailor will talk at length about the intricacies of his calling, of the behavior of his ship in various states of weather, and of the lead of his buntlines; but a steamer-man never seems to have quite the same personal feeling for his craft (Moore 1970, p. 107 (1925)).

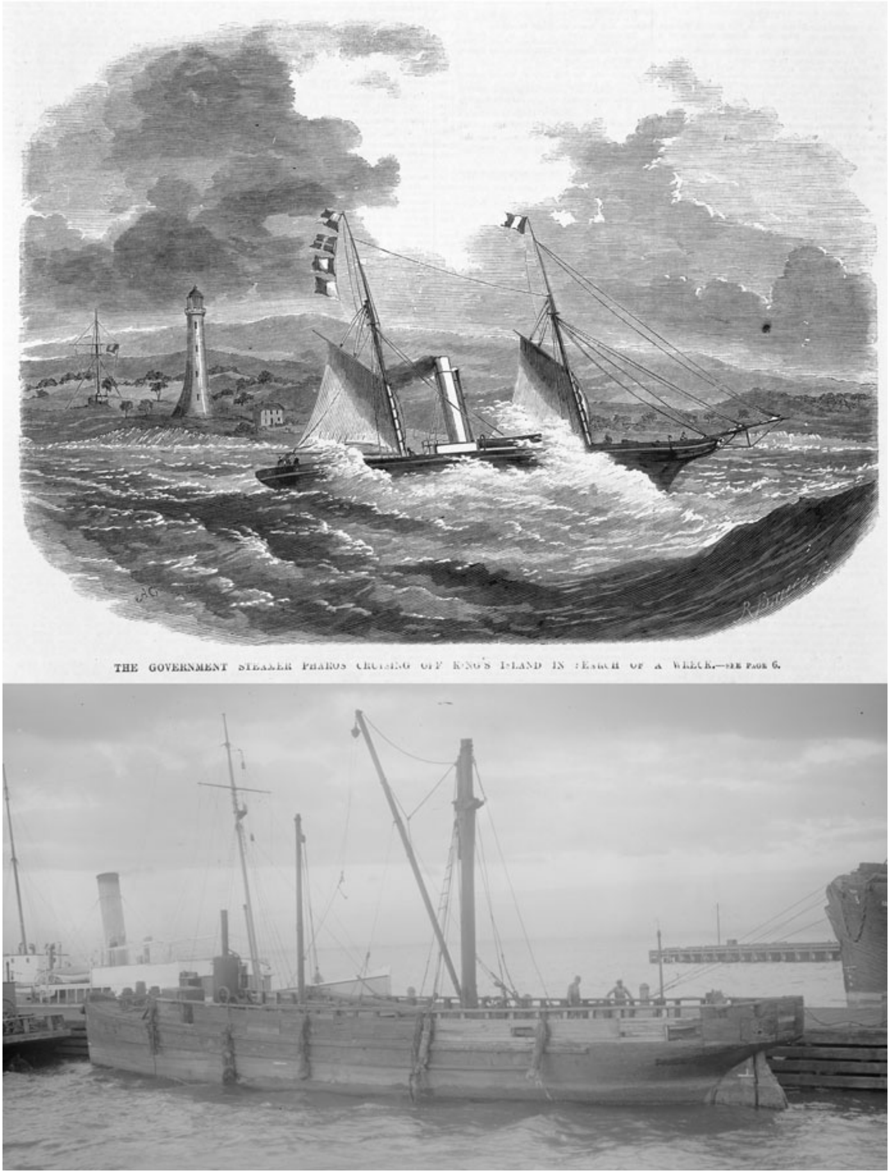


**Fig. 1.2** Contrasting imagery of the government steamer *Pharos* (c. 1864–1928) from its operational life to its use as a hulk (c. 1925–1928, Geelong, Victoria) illustrate the stark material and symbolic transformations hulked watercraft underwent (*top* image is a wood engraving by Robert Bruce originally published in the *Illustrated Australian News*, 1868, courtesy State Library of Victoria, Accession number IAN08/08/68/13; *bottom* photograph by Allan C. Green, date unknown, courtesy of the Allan C. Green Collection, State Library of Victoria, image H91.325/632)

**Fig. 1.3** View of the remains of *Otago*, 2002 (Photograph by Nathan Richards)

Such comments also imply that maritime historians, like the sailors themselves, may be affected by the romantic symbolism of ships and that they may have their own disdain of change. Furthermore, emotional connections often take the form of commentary on the treatment of a vessel, especially in association with its wrecking or deliberate abandonment. History is littered with examples that anthropomorphize wrecking events. The way that the "stranded brig *Edward* has gallantly withstood the seas" (Hobart Mercury 1912, p. 4a; Taylor 1998, p. 86) stands in direct contrast to more "vulgar" or "undignified" acts of vessel discard. Deliberate acts of modification (including hulking) or discard are characteristically associated with negative emotions such as disgust, or the perception that a vessel has had an undeserved "fall from grace." Whether this is because our perception of hulks is arguably tied up with that of the convict hulk, "an overcrowded repository of the unwanted classes (and criminals) of the British Empire" (Clark 1962, p. 64, 97), would be an interesting question for future research.

Likewise, a hulk, often a cut-down, de-masted, and worn-out sea-going masterpiece to a mariner was "half-a-ship"— a veritable blight upon maritime trades, its existence a crime against tradition. Indeed, hulked vessels are often written about as if they are some kind of scourge. One writer, discussing the iron bark *Otago* (1869–1931, Fig. 1.3), even ventured to say, "Like so many once-proud sailing vessels, she ended her days as part of the 'shabby sisterhood' of coal hulks found in every port where steamers called" (Bowes 1995, p. 55). There are many other cases to support this. For instance, the proposed conversion of the ex-South Australian Colonial Navy vessel *Protector* (1884–1944) into a tug rather than a hulk was celebrated, as the "slow decay as a hulk is a lingering miserable end" (William quoted in Parsons

**Fig. 1.4** Photograph of *Wild Wave* before being cut down, date unknown (Image H99.220.949, courtesy Brodie Collection, La Trobe Picture Collection, State Library of Victoria)

1978, p. 1). This negativity is also replicated in Captain J. Maitland Thomson's description of *Wild Wave* (built in 1875, Fig. 1.4). The wooden bark was laid up in the Jervois Basin at Port Adelaide for many years and was eventually bought by the Melbourne Lighterage Company to be stripped for use as a lighter (Thomson 1979, p. 65). This journey to Melbourne was to be its last voyage, and as Thomson communicated, "to be reduced to a lighter after 75 years of glorious sailing and battling eternal waves was a disgrace" (Thomson 1979, p. 66). *Wild Wave* eventually wrecked off Circular Head, east of Stanley, Tasmania on June 4, 1923, after being driven across Bass Strait while on a journey from Port Adelaide to Melbourne with a cargo of barley (Broxam and Nash 2000, p. 118; Loney 1987, p. 113). For Thomson, the wrecking of the vessel was seen as a good thing—it had saved the vessel from a fate worse than death.

> It was almost as if she had known of the disgrace in store for her. Having defied the humans who were to degrade her, she grasped the opportunity to bring herself to this glorious finish (Thomson 1979, p. 72).

Thomson's willingness to apply human-like agency to *Wild Wave* connects to the common implication that hulking is an inherently disgraceful process. In another example, a letter concerning the conversion of the iron sailing ship *Clevedon* (1873–1930) to a hulk cites:

> I was very sorry to learn that she had been turned into a hulk at Fremantle and finally sunk outside. A sailing ship, to me, was always a beautiful, vibrant living thing, perhaps Man's greatest creation, and to end her days as a filthy dead hulk, rusting and rotting in a harbor, is abhorrent to me (Western Australian Maritime Museum. File 194/79/1: Richard McKenna Notes. Fremantle, Western Australia).

It would only be conjecture to say that maritime researchers have been influenced by similar romantic ideas, or that their views of significance have been influenced by the opinions stated above. Nevertheless, there is clear evidence of yesteryear's maritime historians anthropomorphizing their subjects, and perhaps even indulging in the romantic personification of watercraft.

## Maritime Archaeology and the Proven Potential of Abandoned Watercraft

What about maritime archaeological research and researchers? Have the opinions of maritime historians adversely affected our opinions of hulked and discarded watercraft? The literature clearly shows that maritime archaeologists have found abandoned watercraft to be exceedingly useful in research, but it is less clear what role events and processes connected to abandonment play.

Abandoned vessels have an established importance in the archaeology of the ship. The ceremonially dismantled Cheops ship and the deliberately abandoned boats from Dahshur, for example, are amongst the oldest watercraft ever found and have given significant insight into Ancient Egypt's past (Brouwer 1993, pp. 44–45; Jenkins 1980; Johnstone 1974, p. 10, 13). Abandoned watercraft such as the boat finds of Nydam, Hjortspring, Gokstad, and Oseberg have also played a major role in shedding light on the evolution of watercraft in northern Europe (see Crumlin-Pedersen 1991, p. 72). In relation to the characteristics of watercraft in antiquity, deliberately abandoned vessels, such as the Sutton Hoo and Graveney ships, have also been used as a major source in assessing the sailing characteristics of ancient Saxon ships (Gifford and Gifford 1995). The Nydam boat, another reputedly ceremonial abandonment excavated in 1863, has also been cited as the, "first really adequate excavation and restoration of an ancient vessel" (Johnstone 1974, p. 7). Additionally, Sean McGrail (1998, p. xxvii) cites the study of dismantled medieval boats in Bergen and Dublin as leading to the, "compilation of an attribute list for clinker planking and a standardized scheme for describing structural parts of vessels, and fittings for propulsion and steering, by wood science characteristics (and) woodworking features (and) by significant angles, dimensions and ratios." The list could go on (see Richards 2008, pp. 18–37).

Abandoned watercraft have also been used in many more interdisciplinary projects. Michael Leone (1983, p. 177), for instance, touched upon the use of the location of abandoned watercraft as evidence for the gradual silting up of the Patuxent River on Chesapeake Bay. Additionally, they have also formed the core of corrosion potential analysis and sacrificial anode studies in Australia. Abandoned ships were likely to be more intact than their wrecked counterparts and therefore served as good opportunities for data collection (Kenderdine 1995, pp. 274–276; Kentish 1995; MacLeod 1992, pp. 1–10; McCarthy 1996, p. 347). Michael McCarthy has also touched upon the scientific potential of the abandoned vessel resource in his comparison of the remains of *Redemptora* (1853–1892) and the wreckage of *Gemma* (1868–1893). Both wooden-hulled wrecks are in close proximity, with *Gemma's* structure significantly buried and *Redemptora's* hull protected by a layer of stone. In McCarthy's view, their comparison may shed light on the optimal conditions required for the preservation of wooden vessels (McCarthy 1996, pp. 204–205).

While these studies are good indicators of the potential of certain exceptional cases of abandoned ships, they are also often evidence of the application of particularistic shipwreck significance criteria to discarded ships. On closer examination, *abandonment* and *discard* serve as labels or descriptions, and rarely anything more. For this reason, such research cannot be seen to embody the breadth of the potential of the resources because the factors leading to abandonment, the behaviors associated with ship dumping, and the consequences of discard acts are usually ignored. Researchers must stop looking through a *shipwreck lens* if they hope to assess the deeper significance of noncatastrophically lost maritime archaeological sites.

## Assessing Significance

While researchers are sometimes directly responsible for creating perceptions of importance, trends in scholarship often follow significance concepts codified in site assessment procedures. Such systems, while critical for managing cultural resources and determining funding priorities, however, are often rigid. Though guiding scholars in the process of determining significance, they also have the potential to include or exclude categories of cultural heritage for protection.

Significance measures for assessing maritime heritage sites around the world (and especially among the nations included in this volume), barring some minor classificatory variations, are much the same. Criteria such as integrity, fragility, rarity, representativeness, age, and association with historical events and people, as well as considerations of historic, sociocultural, symbolic/religious, aesthetic, architectural/technical, social, archaeological, interpretive, and scientific significance are useful tools for exploring the research potential of ship graveyards (see Australian Institute for Maritime Archaeology Inc. (AIMA) and the Australian Cultural Development Office (ACDO) 1994; Delgado et al. 1985; Hardesty and Little 2000; Historic Sites and Monuments Board of Canada (HSMBC) 2000; Skeates 2000;

Walton 2002). These factors, however, are limiting because they focus on catastrophic shipwrecks. Abandoned vessels, due to their relative archival obscurity, lack of casualty, and absence of violent wrecking event, often do not meet the highest levels of significance. While these guidelines are a useful system in the assessment of shipwreck material, they do not reflect the notions important for understanding the behaviors associated with ship abandonment.

Nicholas Clark (1988, p. 14), writing about the study of iron and steamship wrecks, asserted that much of the process of assessing site significance is extremely subjective and is influenced by a range of factors disconnected from extant historical or archaeological knowledge. While the significance guidelines and protocols noted above attempt to diminish a site assessor's reliance on subjective notions of significance by formulating a set of guidelines, using such a framework for significance may create borders to funding and hence hurdles for investigating research potential. Clark encapsulates this possible shipwreck bias in a quote,

> For shipwreck sites, there is a greater amount of documentary material available for vessels which sank spectacularly, with a great loss of life or material goods, than for those vessels which had safe successful careers and were finally scuttled when they had aged beyond repair. In the latter case, are these vessels any less a part of history than their disastrous counterparts (Clark 1988, p. 15)?

So is significance then attached to the amount of historical material available on a shipwreck, whether it sank in a spectacular blaze, or caused the loss of many lives? If this were the case, many of the "icons" of maritime archaeology may never have been studied.

In stringently categorizing abandoned vessels according to schemes designed to assess shipwrecks, researchers undermine how these unique maritime heritage resources may be interpreted. To a large degree, the investigation of shipwrecks as representations of catastrophic events replete with emotive and romantic qualities has influenced how deliberately abandoned watercraft are perceived and studied. The customary way of examining shipwrecks may involve charting its history and understanding its trade routes, function, wreck disintegration, and other factors. Invariably this creates a tendency to view a shipwreck as a "time capsule," "snapshot," or "artifact repository"—other names for what Michael Schiffer (1985) called a *Pompeii premise*—an erroneous assumption that all archaeological sites are "frozen in time" (see also Gould 2000, p. 13). By treating individual abandoned vessels as such, we lessen their importance and potential as archaeological resources.

## New Significance for Old Ships

The chapters in this volume may be seen as explorations of the research potential of discarded watercraft. Some adhere to traditional concepts of *individual site significance* and others imply a form of *fleet significance* in which the potential of the resource is only realized comparatively, thematically, or geographically. Nevertheless, all contribute as to how we create *new significance* for old ships. The studies which follow explore the broader potential of ship graveyards by considering the deeper human motivations implicated in deliberate acts of dumping.

The next chapter in this book, similar to this introduction, is concerned with the significance of deliberately discarded watercraft. Michael McCarthy looks at the birth of ship graveyard studies in Australia (intertwined with the beginnings of maritime archaeology there) and how the Western Australian Maritime Museum integrated the study of more modern maritime archaeological sites into its evolving vision of research—in doing so, altering concepts of archaeological significance. Following this, Daniel LaRoche discusses the case study of the Thunder Bay Ship Graveyard (Canada) and how an assemblage of dumped ships was considered for inclusion in the Lake Superior National Marine Conservation Area of Canada. LaRoche's chapter outlines the history of two interconnected shallow- and deep-water dumping sites and how individual ships were assessed using Parks Canada's significance assessment procedures, in accordance with Canadian cultural heritage legislation.

Throughout this volume, the concept of *microcosm* is present. This notion suggests that acts of abandonment leaving behind large collections of discarded watercraft create archaeological sites that are effectively "a world in miniature" of the surrounding culture. Such "worlds" may be seen in economic, social, political, or technological terms. Jonathan Moore's chapter, concerning a number of ship graveyards near Kingston, Ontario, illustrates this. The scores of abandoned watercraft peppering Lake Ontario are a testament to over two centuries of Great Lakes commerce. The microcosm concept is also epitomized by Joshua Daniel's chapter regarding a ship graveyard at City Point, Virginia (on the James River), which similarly reflects hundreds of years of maritime economic development in the area. Inherent in this idea is that while the ships themselves may be relatively modern, they reflect decisions that may stretch back much further about the suitability of landscapes for habitation and use. Moore and Daniel show us how maritime entrepôts invariably accumulate the detritus of their successes and failures, which in turn may manifest as an assemblage of catastrophically wrecked and deliberately disposed of ships. In a direct link, many of City Point's vessels were constructed during the First World War by the Emergency Fleet Corporation, a very large subset of which would eventually be abandoned within Mallows Bay, Virginia. This huge cluster of watercraft is the subject of Donald Shomette's contribution. Therein, Shomette carries out his exhaustive inventory and assessment of the scores of ships now lying on sections of Virginia's muddy bottomlands.

Truly extensive collections of ship graveyards are the subject of a number of other chapters, not surprisingly located in some of the world's largest ports. James Delgado's examination of abandonment centers distributed around San Francisco Bay, California highlights this region's long history of watercraft discard and shipbreaking, from the days of the California Gold Rush through the twentieth century, and how these ships were used, reused, and ultimately recycled within the economy. Similarly, Andrew Lydecker and Stephen James' chapter examines the numerous clusters of ships around New York Harbor. Their chapter is a partial catalog of one of the most extensive areas of ship abandonment in the world and outlines a collection that is representative of a cross-section of maritime trade in the port of New York and the entirety of the United States. The implication of Delgado, Lydecker, and James' approach is that "common" ships may illuminate more about everyday human nautical behaviors than famous shipwrecks.

John Pollack and Robyn Woodward's work on the abandoned watercraft of the Canadian Yukon Territory illustrates the differences that short-lived economic events and isolation create at ship graveyards. Their work, on the largely intact ships abandoned following the 1896 Klondike Gold Rush, shows how ship graveyards on frontiers are not only spatially different than clusters near large ports but also accumulate different types of watercraft. Another contrast to large collections of ships is Lawrence Babits' chapter focusing on the rural contexts of small boat abandonment in a section of the Albemarle-Pamlico Estuarine System (North Carolina). His approach emphasizes the relationships between local knowledge of the landscape (and other environmental variables, such as bathymetry) and ship disposal locations. In this way, boat graveyards are a reflection of the convergence of cultural and natural landscapes.

Lying within Babits' study area and growing from his research is Jacqueline Marcotte's detailed examination of boat graveyards in the area of Wright's Creek (near Belhaven, North Carolina). Marcotte's chapter is the first in the volume to carry explicit theory at its core. Drawing on sociological sources, as well as behavioral archaeology and scholarship examining the "archaeology of memory," her examination also looks at the formation of boat disposal areas by interviewing the people who create them. Marcotte's correspondence with the fishermen, shipbuilders, and ship-breakers (often the same people) highlights their motivations and processes and creates an ethno-archaeological dataset which may be used for studying similar sites.

Sami Seeb's examination of the Eagles Island Ship Graveyard (Wilmington, North Carolina) takes an explicitly behavioral archaeological approach. In addition to considering how the assemblage of ships reflects economic and technological changes in the port of Wilmington, she carries out an in-depth examination of how behaviors are reflected in archaeological signatures present on discarded watercraft. Seeb also investigates how intrasite variability is connected to the utilization of ships for postabandonment functions. Lindsay Smith's research in the Pasquotank River (adjacent to Elizabeth City, North Carolina) combines behavioral archaeology with an Annales School framework. This Annales-Behavioral hybrid approach is compelling due to its ability to surpass particularistic details and behavioral inferences and place isolated sites and abandonment clusters in their intertwined local, regional, and national contexts.

The works of Marcotte, Seeb, and Smith show us that the research potential of ship graveyards is more than the sum of their parts. Their significance is not limited to the intactness, level of preservation, or ability of individual ships to inform us about ship-building techniques. Rather, the archaeological remains at these sites, irrespective of their temporal depth, are imbued with meaning and significance that can shed light upon past human behaviors. Hence, abandonment is not simply a label or historical detail—encased within the acts and processes of discard are transitions in values and intentions, themselves clues to undocumented human interactions.

Representing what is probably the most unique abandoned assemblage of watercraft in the entire anthology is the “fleet” of sunken vessels in the Wingecarribbee River in New South Wales, Australia. Cosmos Coroneos, Brad Duncan, and Caroline Wilby outline the story of a scuttled fleet of odd-looking leisure craft built by German and Austro-Hungarian internees while imprisoned at Berrima during the First World War. Their research reinforces how watercraft are imbued with symbolism, from their construction to their often ritualistic disposal. This idea of the “ceremonial scuttle” is also present in Daniel J. Lenihan’s chapter on the utilization of unwanted naval craft and war prizes in the aftermath of the Second World War. Whether diminutive dugout canoes or colossal battleships, these two chapters illustrate that the symbolic significance of ship abandonment is connected to the context of a ship’s construction and use.

Keeping to this theme of the abandonment of government-owned watercraft, James Hunter’s chapter is a multinational study of the colonial and early national navies of Australia and New Zealand. His study illustrates how warship abandonment differs significantly from disposal processes relating to commercial watercraft. This is partially because military forces, through the backing of their government, have the ability to stockpile watercraft for future potential use, a luxury not generally available to merchant traders.

The final chapters in this book outline novel uses of ship graveyard sites. These chapters focus on educational and recreational concepts of significance. Michael Dermody, Calvin Mires, and Christine Russell utilized the aforementioned Eagles Island Ship Graveyard as the subject of a mobile media (iPod-based) maritime heritage trail. The trail was designed to enhance local knowledge of the ship graveyard and enrich cultural tourism in the area. Their outline of the process and their assessment of their product have relevance for transforming other archaeological sites for similar outreach initiatives. Martin Read and Polly Magne’s chapter outlines the benefits of utilizing abandoned hulk sites for discipline-specific and experiential education. Their description of a series of educational outings demonstrates the processes involved with incorporating ship graveyards into maritime historical and archaeological curricula. The last chapter, by Peter Taylor, looks at the historical and educational significance from a different viewpoint. Following his outline of the history of a deep water ship graveyard off the coast of Port Phillip Bay (Victoria, Australia) and the processes that led to disposal, Taylor examines how these ships became important educational sites for the recreational and technical diving communities.

The apparent “shipwreck bias” within maritime archaeology has been the cause of the continued trend of assessing ship graveyards from a series of benchmarks not suited to the site type. This trend has dictated that the appraisal of discarded vessels should be considered only as individual entities, or according to a litmus test that emphasizes catastrophe. Discarded watercraft hold much more for maritime archaeology than simply those cases where abandonment left a remarkable ship behind. Fitting abandoned vessels exclusively into a tradition of scholarship which tends to value archaeological sites according to their attendance at historical events or their place within technological or anatomical typologies stifles creative scholarship.

Site significance is an amalgam of local, regional, national, and global contexts, each interpreted from historical, archaeological, anthropological, and philosophical perspectives. Determination processes must straddle *art* and *science*; no formula or "paint-by-numbers" approach can set significance in stone without leading to overlooked site potential and inevitably, unrealized research innovation. Arguably, the following chapters, as the efforts of a diverse group of scholars with myriad perspectives, are indicative of strides taken in a different direction.

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# Chapter 2
# Scuttled, But Not Yet Abandoned: The Genesis and Evolution of Antipodean Studies on the Australian West Coast

**Michael McCarthy**

**Abstract** In the late 1970s, with an overarching departmental focus on bullion-carrying East-India ships and former slave traders, it fell to the most inexperienced and unqualified of the maritime archaeologists then present in Western Australia to examine and manage a suite of seemingly mundane abandoned nineteenth and twentieth century vessels in a ship graveyard. The recognition of the abandoned and recently scuttled hulk is now such that it occupies an important place amongst shipwrecks having an attraction, significance, and worth that is now often far beyond its former service value. This work first examines the unlikely genesis of what has since become a mainstream study and concludes with an overview of the present situation.

## Introduction

The confluence of an unidentified wreck being unexpectedly found in 1976 at Careening Bay on Garden Island near Fremantle together with the advent of comprehensive national shipwreck legislation saw the eponymous *Day Dawn* (1851–c. 1887) open a new era that heralded the advent of the scuttled ship as a core element in antipodean maritime archaeology. In 1973, a dredge deepening Careening Bay (Fig. 2.1) encountered a then unknown and still unidentified wreck (code named CB1). Being in state waters, its operators reported the wreck to the Department of Maritime Archaeology at the Western Australian Museum (WAM) as required under the terms of the *Maritime Archaeology Act, 1973*. Though at the time one of the strongest pieces of shipwreck legislation in the world, it had (and still retains) an 'Achilles heel' in having a pre-1900 criterion for protection, leaving all twentieth century wrecks regardless of their worth without any legal protection.

Clearly an abandoned and dismantled hulk, CB1 was thought to have been scuttled after year 1900 and was therefore judged not to be a historic wreck. Standing in the way of what was to become a new Commonwealth Government naval facility (HMAS Stirling), and with only fragments of the original hull remaining, the wreck was hauled out and deposited in the Museum's yard.

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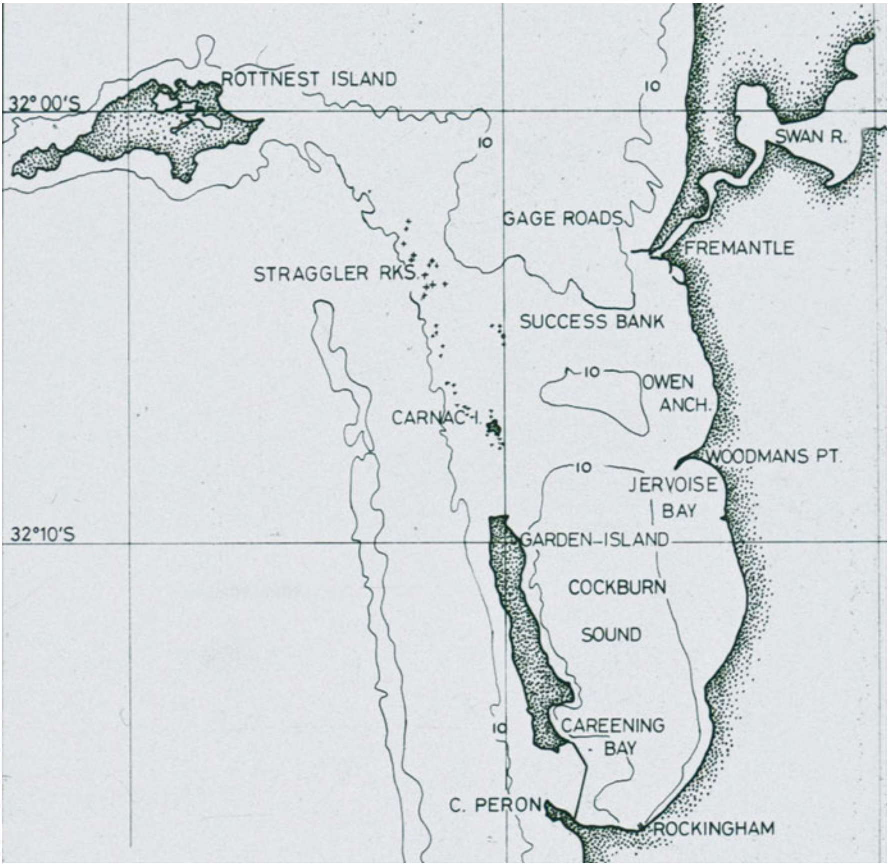


**Fig. 2.1** Map of the study region (Courtesy of WA Museum)

Three years later, another wreck Careening Bay 2 (CB2), as it was then known, was also uncovered by dredging. Around 30 m in length and apparently intact below the waterline, there was great speculation about its identity and as a result its uncovering, inspection, and analysis received considerable press. By then, the waters of HMAS Stirling had been excised from State control and in becoming Commonwealth naval waters all the wrecks in the Bay were thereafter to be covered by Commonwealth legislation, in this instance the new *Commonwealth Historic Shipwrecks Act, 1976*. This legislation allowed for the protection of all wrecks deemed to be historic, regardless of their date of wrecking. Under its terms, the pre-1900 condition had been scrapped in favor of the application of a raft of criteria of significance that served to ensure that even this apparently mundane, abandoned wreck had to be assessed against them. At the time these criteria were:

1. A wreck significant in the discovery, early exploration, settlement or early development of Australia;
2. Relevance of a wreck to the opening up or development of parts of Australia;

3. Relevance of a wreck to a particular person or event of historical importance;
4. The wreck is a possible source of relics of historical or cultural significance;
5. The wreck is representative of a particular maritime design or development;
6. Naval wrecks, other than those deliberately scrapped or sunk and having no particular historical or emotional interest.

Clearly the new wreck might prove eligible for protection when measured against one or all of these criteria, but first it had to be assessed. Time was of the essence and while attempts were made to ascertain the significance of the CB2 remains, a compromise was reached with the Museum allowing the engineers to lower the remains beneath the harbor datum by carefully dredging under its keel. This allowed the contractors to continue their work while the wreck was assessed.

Though the lowering process was closely supervised by the museum's Inspector of Wrecks (Sledge 1979), what followed was unavoidably conducted under the loose supervision of the Museum archaeologists, for they were then extremely busy with the seventeenth and eighteenth century treasure-carrying East India ships, the newly-discovered trading brig *James Matthews*(n.d.–1841), and a demanding wreck inspection program. A rich wreck with many colonial-era artifacts, *James Matthews* was also an ex-slaver, one of the first to be examined across the globe, adding further pressure on the museum's resources. As a result, the task of recording and possibly identifying the Careening Bay wreck was passed to the Museum's "avocational" wing, the Maritime Archaeological Association of Western Australia (MAAWA). Formed in 1974, it comprised an active group of wreck researchers whose shipwreck interests and activities generally preceded the advent of the Department of Maritime Archaeology which was formed under Jeremy Green three years earlier. Before Green, the Department was in effect a team of 'shipwreck police' garnered from former service personnel and oil industry divers with a brief to protect the wrecks of the then recently found British and Dutch East Indiamen. Other wrecks were understandably of secondary importance to them.

To the MAAWA volunteers, however, all wrecks, including the abandoned hulks, had an air of mystery and importance. This rendered even the most mundane of them worthy of being researched and recorded. *James Matthews*, for example, had been accidently found during the search for a wooden hulk, the brig *Ellen* (1857–1890). The search leader, MAAWA member Mike Pollard, was an avid wreck researcher. He was also a member of the Underwater Explorer's Club that had been formed in the 1960s when SCUBA diving first gained popularity. For decades, its members had been scouring the seas and shores for interesting training dives. To them diving on new wrecks, be they cargo vessel, barge, or hulk, in deep or in shallow waters just offshore, was a 'holy grail.'

The then unidentified CB2 was excavated, recorded, and researched by the MAAWA team under its then President, Lindsay Hill. Pollard and many other members, including this author joined in trying to resolve the mystery surrounding its identity. Camped on boats or in the old fishing shacks that lined Careening Bay; diving, sometimes in poor visibility for hours in freezing water, to the MAAWA this was to be their finest hour. Working with Lindsay Hill, we were allowed to excavate, take samples, record and raise artifacts, interview old residents, and generally proceed with minimal supervision. It was a shipwreck enthusiast's wildest dream unexpectedly realized.

Copper alloy sheathing and fastenings, timber analyses, together with a capstan carrying the name 'AD Taylor' and the word 'Boston' served to indicate that the wreck was of nineteenth century American origin. Timbers found low in its bilges carrying the name 'Day Dawn' were initially thought to be linked to a once-famous inland gold mine of that same name. Initially nothing gelled.

Later search of contemporary newspapers found reference to a ship called *Day Dawn* being wrecked at Quindalup. For his part, Pollard had no prior knowledge of it and the wreck had not appeared in any of the museum records. The MAAWA had found details of a wreck that was at the time unknown to museum staff. Again this was an amateur's greatest dream come true, to achieve something that even the experts had not been able to do!

The MAAWA researchers, subsequently aided and supervised by Scott Sledge the Inspector of Wrecks at the Museum, eventually uncovered further detail about the career of *Day Dawn*. These details, since augmented by other studies, show that it was built as the 460 ton American whale-ship *Thomas Nye*. Launched at Fairhaven, Massachusetts, in June 1851, it was sold after three successful whaling voyages under the New Bedford based and very well-known Nye family flag, up until the advent of the American Civil War. *American Lloyds* of 1867 shows that soon after the war ended and there was a downturn in the industry, *Thomas Nye* was sold to interests in Sydney, Australia and renamed *Day Dawn*. Based there, it traveled variously to many ports including Hong Kong, Shanghai, and Manila. By the mid 1870s, *Day Dawn* had been converted to a bark rig and was sold to Adelaide (South Australia) interests. From there, it regularly traversed the Australian south coast and Indian Ocean as a general carrier.

In 1886, whilst loading railway sleepers for Adelaide, *Day Dawn* went aground at the timber port of Quindalup on the West Australian coast. In reporting the vessel as a wreck on distant shores, and in attesting to the longevity and strength of the American whaler type, the Adelaide press stated that *Day Dawn* was at the time of its stranding 'the best wooden vessel in the colonies.' Though its back was broken, hull planks sprung and the bilge full of water, the wreck was purchased for £ 140. At the time a mid-level government servant received in the vicinity of £ 100–150 per annum and most wrecks fetched little over £ 150.

Subsequent newspaper entries showed that *Day Dawn* was sold by the initial salver, who not only recovered his initial costs by selling the boats, anchors, and cables, but then received £ 1,000 for the ship itself. Refloated, it was towed up to Fremantle where the news correspondent noted 'she may have many years of serve as a hulk for general purposes' (Inquirer Newspaper (IN) 1887). Whether the buyer saw a financial return for what was then a very large sum to pay for a wreck is not known.

Whatever transpired in the interim, at an unknown date, *Day Dawn* was taken down from Fremantle a few nautical miles south to the exceptionally calm waters of Careening Bay. It was a place well suited for mooring hulks and for ship-repairs. Another vessel *Dato* (1872–1893) had already been taken there. *Dato* had arrived for conversion to a powder hulk after being stranded at Quindalup. However, because it was in poor condition it began to sink at its moorings. Eventually, it capsized and was abandoned in 20 m of water, a total loss.

In contrast to *Dato*, the evidence shows that both CB1 and *Day Dawn* had been run ashore and scuttled in the shallows. They were then dismantled and burnt down to the waterline to recover their reusable timbers and fastenings. What remained of them then slowly disintegrated and they slipped from view, marked only by a few weed-covered timbers on a sandy bottom. Similar to *Dato* offshore, both soon became lost to living memory, known to a select few squatters occupying shacks erected around the bay after the 1950s only as good fishing spots.

As part of MAAWA's team at *Day Dawn,* the author was eventually coerced into agreeing to write the account of the excavation and the team's archaeological and historical analyses. This initially unwelcome delegation was on the basis that he was the only 'school teacher' amongst a disparate group of artists, housewives, retirees, and artisans and therefore, despite being only a sportsmaster, must be good at writing.

In having become the next president of the MAAWA, in commencing the *Day Dawn* report under the supervision of museum staff, and in also completing a research-based representation (model) of *James Matthews*—which was loaned to the museum for exhibition—the author was deemed suitable for employment and secured a post in the Department when the next curatorial vacancy arose in 1978. It was while employed in that capacity that the account of the MAAWA excavation and research was eventually published (McCarthy 1980).

## Jervoise Bay and the First Graveyard Studies

Within a few months of joining the department in 1978, the author was sent down to Jervoise Bay (south of Fremantle) to examine and report on the endangered hulks littering its shores. The area had been earmarked for a major shipbuilding facility and the Underwater Explorer's Club (UEC), who had their base at Woodman Point on the northern end of the Bay, had noted the presence of a number of wrecks along the shores. These now required 'expert' evaluation and where possible identification, thus becoming the first ship graveyard to be examined by the Museum.

Eight wrecks, all ostensibly post-1900 were studied. Site details, research, plans, and wherever possible photo-mosaics were produced. Reports (with recommendations) appeared in the Museums files (Department of Maritime Archaeology (DMA), Western Australia Maritime Museum, Fremantle (WAMM), Jervoise Bay File, 9/78) and in an internal report (McCarthy 1979a). Because legal opinion at the time had it that the bay was in state waters, with only pre-1900 wrecks able to be protected, management strategies were in effect an exercise in 'management by goodwill' with developers undertaking to avoid impinging on the sites, where possible.

Somewhat surprisingly at the time the *Day Dawn* and Jervoise Bay studies were also accepted by the *International Journal of Nautical Archaeology* for publication (McCarthy 1979b, 1981a), for it was a time when the beliefs of leading maritime archaeologist Keith Muckelroy and maritime historian David Lyon remained very influential, in British circles at least. Lyon, then keeper of the ship's plans collection of the National Maritime Museum at Greenwich, strongly believed that where detailed historical records of a particular ship were extant there was little point in spending large amounts of time and money recording its features on the seabed (Lyon 1974). For his part, Muckelroy, then the doyen of theoretical maritime archaeology in Britain, stated that studies on early steamships and the like, while interesting and sometimes providing useful display materials for museums, were not archaeology. He argued that, "as an academic discipline" archaeology becomes redundant at the point where archives, representations, and oral histories provide more cultural information than can be obtained from the materials themselves. Further, Muckelroy had argued that the onset of "industrialization and modern-style bureaucracies in the early 1800s marked the cut-off point for underwater archaeological studies" (Muckelroy 1980, p. 10).

In another contrarian development in that era, the Jervoise Bay study also attracted such interest among the Museum's hierarchy that it was sought for publication in *Records of the Western Australian Museum*, a thick, and to many, a somewhat esoteric periodical that up to that time was solely reserved for promulgating the results of the museum's natural science unit. There the Jervoise Bay Ship Graveyard entered a broader museum consciousness alongside rare flora and fauna, spiders, snakes, rare insects, and aquatic life (McCarthy 1983a, 1983b).

As a result, it soon became apparent to all that the ostensibly mundane hulk was an important part of the nineteenth- and early twentieth-century maritime economy. The wrecks in the Jervoise Bay Ship Graveyard and *Day Dawn* came to be regularly accessed by students enrolled in the Museum's course in maritime archaeology. As they graduated and then dispersed across Australia, the hulk and ship graveyards became a central part of eastern, northern, and southern Australian maritime archaeological research and field activities.

As interest spread, hulk and graveyard studies evolved from relatively uncomplicated ship and regional studies such as the *Day Dawn* and Jervoise Bay instances to encompass much wider thematic interests and research. These also came to have increasingly mature theoretical underpinnings including in recent years the 'cultural landscape' concept (see for example, Duncan 2006).

Indicating how far the study of the hulk has progressed as *bona fide* maritime archaeological research in Western Australia alone, by 2004 the following entry on the Jervoise Bay wrecks appeared. It was alongside other more traditional maritime archaeological entries such as those in the *Batavia* (1628–1629), *Vergulde Draeck* (1653–1656), *Zuytdorp* (1701–1712), *Zeewijk* (1725–1727), *Rapid* (1807–1811), *James Matthews, Xantho* (1848–1872), William Dampier's *Roebuck* (1690–1701) and other prominent wrecks appearing in a compendium of the Department of Maritime Archaeology's achievements up to that time (Green et al. 2004):

> Lying in the lee of Woodman Point south of Fremantle Jervoise Bay was one of the best-known ships' graveyards in Western Australia, being in use between 1890 and 1910. It also was the scene of three actual shipwrecks, where ageing vessels that were temporarily anchored in its sheltered waters blew ashore in fierce storms. Over the years, MAAWA members, notably the late Mike Pollard, discovered various shipwrecks and undertook archival

research and site studies. In 1978, it was announced that shipbuilding in the area was to expand. The wrecks in Jervoise Bay were considered to be 'at risk' and a grant ($ 2000) was provided by the State Department of Conservation for the Department of Maritime Archaeology to study the sites in the area. As it was considered unlikely that vessels would have been wrecked or scuttled in deep waters, survey methods were confined to swim-line searches and the analysis of aerial photographs. Each of the wrecks was located, photographed, measured and fully assessed. A comprehensive research program was then undertaken and positive identification was made of the following vessels:

1. *KVIII*, the 64 m-long Dutch submarine, an obsolete vessel belonging to the Royal Netherlands Navy, built in 1922 and later based at Surabaya. It was re-commissioned there in 1942 and, after sailing to Fremantle, was decommissioned in the same year; and run aground and sold for scrap;
2. SS *Alacrity*, (1931) a former French tug;
3. *Redemptora*, a 44 m-long, 1,235 ton Brazilian ship, that was condemned, converted into a coal hulk and sunk between 1892–1910;
4. *Abemama,* a 40 m-long, three-masted schooner built in America in 1918 that blew ashore in 1927; and
5. SS *Egmont,* a 61 m-long, ex-Adelaide Steamship Company vessel, that was converted into a coal hulk and abandoned in 1910.

Tentative identification was made of the hulks *Ellen*, *Gemma*, and *Camilla*, all wooden sailing vessels of various sizes and all scuttled after serving as hulks or lighters.

At the time, it was believed that the State *Maritime Archaeology Act 1973* was applicable to the wrecks in the bay. With its cut-off date of year 1900, none of these wrecks could be protected either because of their post-1900 date or a failure to positively identify and/or date them. Again, as indicated earlier, the management strategy relied heavily on goodwill and the final results reflected that. *Abemama* and *Alacrity* remained popular dive and snorkel sites until recently when they were buried under landfill (McCarthy 2004).

Despite the WA Museum's maritime archaeology department being spawned, nurtured, and regularly invigorated by the discovery, inspection, and excavation of a steady stream of British, Dutch, American, and Portuguese East Indiamen, it had become obvious to all that the mundane hulks and abandoned ships each had far more to do with the economy and the society of the State of Western Australia than the passing treasure ships whose crews unsuccessfully sought to safely pass by in abject fear of its shoals and inhabitants.

Partly as a result of the *Day Dawn* and Jervoise Bay studies, what was once seen as somewhat idiosyncratic and esoteric research by one prominent MAAWA member, Richard McKenna (whose abiding joy appeared to reside in listing and describing the careers of all the coal hulks of the ports of Fremantle and Albany), was perceived to have considerable historic and economic importance. Bulky tomes, each entry comprising pages of *Lloyds Register* and other registers, newspaper articles, with photographs of the ships as they sailed the oceans and plied the ports, then as hulks, their bows squared off to fit easier along the wharves became known as "McKenna's notes." These entered the Museum's shipwreck files in 1979 as the hulk and graveyard studies matured. There they ranged alongside cabinets replete with the records associated with East Indiamen and prominent colonial vessels.

**Fig. 2.2** Hulks in Fremantle (McKenna Collection, WA Museum)

McKenna's notes also showed that the hulks at the ports of Fremantle and Albany were mainly used to store nonperishable goods, notably coal for steamers, and that a good many of the world's famous ships ended their days in that capacity. While many wooden ships were used—including the former convict ship *Larkins* (1808–1876)—to house P&O coal at Albany, the best known were the famous iron and steel-hulled *Sierra Colonna* (1878–1952) and *Herschell* (1857–1908) at Albany and *Samuel Plimsoll* (1873–1948), *Kirkudbrightshire* (1884–1934) and *Tamerlane* (1861–1926) at Fremantle (Fig. 2.2). These are found described in their heyday in Basil Lubbock's famous mid to late twentieth century series of works documenting the last age of sail across the globe (e.g., Lubbock 1927). Once an object of great interest, and to those who viewed them from afar, once romantic vessels of great beauty, they were generally stripped off most of their fittings and fixtures, their once-elegant bows cut square, to be essentially dismasted, though lower masts and main yards were often kept to act as cranes, lifting goods to and from the hold. In the case of coal hulks, large baskets were used and in many cases occasionally quite lavish captain's quarters were retained to house the hulk master and his family (DMA, WAMM, Coal Hulks Fremantle file, 194/79, Coal Hulks Albany file, 193/79).

McKenna's notes also show that when they were no longer of any use, the wooden hulks were taken out of the harbor to a distant bay or cove and allowed to run ashore where they were abandoned and anything of value salvaged. As with *Day Dawn*—which incidentally did not appear in McKenna's archive (attesting to an apparent failure to successfully convert it for use as a hulk)—copper and copper alloy fastenings were particularly prized and after any reusable wood was removed, the hull was burnt to allow the fastenings to be recovered once the fire was extinguished. The burning of *Margaret* on Swarbrick's Salmon Beach at Albany is one example (Fig. 2.3). While a photograph of the event remains extant, the wreck itself is yet to be found, apparently (like many others in the Albany region) having disappeared beneath the sand. For their part, the iron and steel hulls were rarely run ashore, being generally scuttled in waters out of the shipping lanes and deep enough to ensure they were not a navigation hazard with explosives.

**Fig. 2.3** Burning the hulk *Margaret* (McKenna Collection, WA Museum)

Eventually harbormasters came to see these ad-hoc dumping methods as untidy and potentially risky practices and later came to prescribe designated graveyards for the iron and steel hulls; at Rottnest Island off Fremantle and around from Bald Head off Albany, for example. In McKenna's notes, there also occasionally appeared 'box camera' images of the ships as they slowly sank into the deep-water graveyard.

Often his was the only record, and to an extent, McKenna's notes on the hulks have come to epitomize the essential and inextricable links between maritime archaeology and maritime history and between professional and avocational researchers and divers as evident in Western Australia and elsewhere. That his records are today a shared resource regularly accessed by the two now separate departments of maritime archaeology and maritime history further epitomizes the fact that in the study of abandoned hulks and ship graveyards, archaeology, history, economics, and society are inextricable rich strands in a multicolored rope (DMA, WAMM, Coal Hulks Fremantle file, 194/79, Coal Hulks Albany file, 193/79).

## Ongoing Studies at the Deepwater Graveyard

A deep-water graveyard was established by the Port of Fremantle at the beginning of the twentieth century as a dumping ground for iron and steel vessels that were of no further commercial use. The gazetted location is off the western end of Rottnest Island in waters between 80 and 120 m deep. As indicated, up until that time, redundant vessels were abandoned along the shores of places like Jervoise Bay in Cockburn Sound, on reefs north of Fremantle, and in Careening Bay on Garden Island. It is now known that some vessels were also dumped (in some cases apparently surreptitiously) just off Stragglers Reef west of Fremantle, well inshore of the designated graveyard.

**Fig. 2.4** Scuttling a redundant hulk in deep water. *Concordia* sinking (McKenna Collection, WA Museum)

As the museum's next Inspector of Wrecks following Scott Sledge's departure, the author was tasked with recording, and if possible, inspecting all reports of wrecks and relics with a view of determining their historic status. The reports received included the wrecks that were occasionally found and (less often) reported in deep water off Rottnest Island, but were impossible to inspect at the time, with remotely operated vehicles (ROVs) in their infancy and only oil–industry divers accessing those depths. When news of their existence and of the prolific sea life they supported spread, fishing on the graveyard wrecks became a popular past-time. As deep-water echo sounders became more common on recreational boats, 'hard evidence' of their existence—above and beyond the reports of prolific sea life and occasional 'hook up' of line, anchor or net—was forthcoming. These echo sounder traces then entered the Museum's records, though at the time the positions provided for the wrecks were approximate at best (DMA, WAMM, Rottnest Island Graveyard file, 355/00).

Initially, the museum's file contained only sparse Harbormaster and Commonwealth government entries of ship names and a rough latitude and longitude for each sinking. As a result, McKenna's coal hulk file became the main source as to the expectations with respect to the hulks of the old iron or steel sailing ships that had been scuttled there (see Fig. 2.4). Knowledge of what was being found by the fishermen was complicated, however, by the understanding that over the years, not only were many redundant coal hulks scuttled there as diesel fuel gradually replaced coal, but at the end of the Second World War, a wide range of military equipment, particularly items belonging to the Lend-Lease Program, Catalina flying boats, vehicles and large quantities of ammunition were also dumped in the graveyard. A redundant Dutch submarine (*KX1*), which had sunk in Fremantle Harbor post-war after fleeing Surabaya, was also disposed off there; as were the Wellman midget submarine fleet from the wartime Naval Base on Garden Island. From the 1950s on, working vessels that were no longer economic to repair were also dumped in the graveyard, as well as lighters, old whalers, barges, and other vessels, including lighthouse tenders. Fluctuating and often poor scrap metal prices were one factor in this.

Other than McKenna's notes and the Harbormaster and Commonwealth government's lists in the graveyard file, the Museum's record of the resource in the graveyard was ad hoc and no identification of any wreck report was able to be made. The situation changed when Jeremy Green saw the possibilities of applying his skills in remote sensing to the graveyard. Here it needs be noted that with very few exceptions, all the historic wrecks in Western Australian waters lie in depths less than 30 m, and in that respect, the graveyard held the only deep water collection of sites.

In an earlier career, Green had been a protégé of Teddy Hall, the inventor of the magnetometer. In keeping well abreast of the advancing technology, he began to acquire remote sensing equipment for the Department and the then nascent National Centre for Excellence in Maritime Archaeology, which he also headed. Green's developing interest in the possibilities for meaningful research in the graveyard was also as a result of the advent of the GPS and the newly emerging practice of combining the geographical, physical, and historical records in GIS data management systems. It was in this context that Green, with his own exceptional computing skills, took graveyard studies in Western Australia to the next level. Clearly it was time for the author, who in computing terms was, and still is, 'steam-powered' to again pass the baton over and to take a supporting role. In that respect, ship graveyard and hulk studies reflect the trends in modern maritime archaeology generally, with the need to apply advanced technology in accessing, recording, and analyzing sites now a given.

Under Green, the wrecks of the Rottnest Island Ship Graveyard also became a 'test-bed' for the development of site-specific (ships and aircraft included) search and survey regimes (Green 2009). The program evolved even further in 2001, when Prospero Productions, headed by Julia Redwood and maritime archaeology course graduate Ed Punchard, became interested in featuring the graveyard as part of their *Shipwreck Detectives* series. First, maritime archaeologist and museum Honorary Associate Dena Garratt was commissioned to complete a desktop study and scour the Museum's files and other archives in making a list of what was to be expected there (see Garratt 1999). At Green and Punchard's behest, UTS Geophysics, a local company, then flew an aerial magnetometer survey over a section of the graveyard and produced eight (relatively) large magnetic anomalies, including HMAS *Derwent* (1964–1994). Knowing the exact dimensions, depth, and being able to calculate the amount of ferromagnetic materials in its hull, *Derwent* proved a very useful test bed under Green. These showed that while this vessel could be detected easily in 200 m of water, in distances greater than that it would prove an elusive target. To many, this came as a great surprise and it has provided an important example in explaining to the general public and others unaware of the limitations of air and seaborne magnetometry of the difficulties to be expected in locating lost vessels. HMAS *Sydney* which was found in 2008 and HMA Submarine *AE1* which is yet to be found are two examples where the lessons learnt in the graveyard have proved valuable elsewhere.

**Fig. 2.5** *KOS VII* hulk (Mike Caplehorne)

Further investigations by the Australian Hydrographic Department, Fugro Survey and the Marine Futures Program (a multidisciplinary project that aims to understand the relationship between marine habitats and biodiversity) have found indications of further sites in the Deepwater Graveyard. Currently, the position of 47 wrecks has been 'fixed,' of which six have since been identified under Green's direction (Fig. 2.5). In this process, he has used Garratt's and McKenna's compilations to analyze data provided by drop cameras, ROVs and a two-person submersible, which was made available to the museum by philanthropist Mike Caplehorne. In a manner reflecting the advent of SCUBA diving in the 1960s, the deep-water wrecks are now also being regularly accessed by the (relatively) new breed of mixed-gas and 'tech divers.' In sharing their information with the WAMM and in assisting Green in recording the remains, they are in effect the latest iteration of avocational researchers linked to the field of maritime archaeology, though there is one crucial difference. In being a 'modern phenomenon,' this 'new breed' of divers are accessing wrecks long after the advent and acceptance of protective legislation and in a climate where the need to protect the cultural and natural heritage is widely accepted. Of additional import, to 'tech divers' across Australia, the abandoned hulks and the other deliberately scuttled ships, planes, and submarines in deep-water graveyards are now one of their most-treasured deep water cultural resources.

## Is the Study of the Hulk Archaeology?

In referencing the dichotomy existing between the processes of wreck site location, inspection, and the gleaning of new information about behaviors through archaeological method, Graeme Henderson, the then curator of colonial wrecks at the Western Australian Maritime Museum, later its Director and subsequently a founding member of the ICOMOS committee on the Underwater Cultural Heritage (ICUCH) once wrote:

> One popular attitude to archaeology is that it is there to plug up gaps in the historical record. Thus prehistoric sites (prior to written records) are more important to these people than historic sites. But are the later sites less relevant to modern society? Some would say that on a scale, the more recent the site the less important it becomes. . . but other archaeologists say that the aim of archaeology is not to plug the gaps in the historical records but to look in a different way at man's behavior in the past and present, and for this purpose it does not matter how old a site is—the important thing is whether it can be used to answer substantial questions about how man behaves (Henderson 1988, p. 10).

As the pioneering theoretician, Keith Muckelroy himself noted a decade earlier that maritime archaeology is "concerned with all aspects of maritime culture; not just technical matters, but also social, economic, political, religious and a host of other aspects" (Muckelroy 1978, p. 4). It is here and within *Shipwreck Anthropology*, an American publication (Gould 1983) and a movement first manifest in Australia during the early 1980s that the study of the scuttled hulk resides. In understanding the ship as an object, the science involved in its creation, and the motives and behaviors of people involved in use, reuse, and eventual discard, hulk and graveyard studies remain a bonafide element in our field (see Richards 2008).

The study of the abandoned hulk remains a worthwhile activity in the context of collecting data of present or future archaeological, economic, or social significance. Thus in circumstances where new information about these elements and/or human behavior is not forthcoming, recording even ostensibly mundane shipwrecks like the abandoned hulk, is nonetheless important in serving, as Henderson notes above, to also help 'plug the gaps' in the historical and economic record.

## The Hulk *Omeo*, Western Australia's Family Wreck

This 605 ton bark-rigged iron screw steamer was built at Newcastle, England in 1858. After many years carrying passengers and cargo, *Omeo* played a major part in the construction of the overland telegraph line from Darwin, carrying telegraph poles and cargo 160 km up the Roper River. *Omeo* also laid the Bass Strait cable from Cape Otway to Launceston. The vessel's engines were removed in 1880 and the funnel replaced with a new mast. As a four-masted "jackass bark," *Omeo* traded for many years in the Pacific and Indian Oceans and ended its useful career as a hulk stationed at Fremantle. Around 1905, *Omeo* went ashore at its present location (Warne 2007). Though little of the vessel now remains visible above the water, it being only 15 m from shore in normally calm waters, it is a stunning dive for beginner divers and snorkelers. In the wake of the wreck trail 'underwater display case' concept developed at Rottnest Island by the author in 1980 and mindful of the successes of the many that have been established since—with Garden Island Ship Graveyard Heritage Trail in South Australia a prime example (see Hartell and Richards 2001; McCarthy 1981b), the Museum is now in the process of presenting the site as the State's premier metropolitan beachside shipwreck dive along the lines of the original concept plan:

> The protection and management of *Omeo* as the only remaining easily-accessible historic iron wreck in the Perth Metropolitan area has been one of the cornerstones of the Department's 'wreck access' program in recent years. This follows our wreck trail initiatives elsewhere, some of which date back to 1980... plans [are] for a marine 'flora, fauna and heritage' reserve centering on the *Omeo* site with protective piles (jetty type) keeping boats out and snorkelers safe, underwater markers, above water markers, pamphlets, a ramp for people with disabilities, two of the ship's anchors on exhibit on the land above the wreck, and with a prohibition on interfering with all aquatic life, it was envisioned *Omeo* would become one of the premier snorkel sites in the state (McCarthy, DMA, WAMM, *Omeo* Wreck File, 19/80).

This concept now has unanimous support amongst developers, tourist agencies, local government, schools, and the public at large. To get to this stage has been a protracted process nonetheless, with considerable tensions emerging between various government departments over the competing aspirations of developers, tourism, and heritage protection agencies. For their part, the developers and their supporters within government were initially incredulous that the museum was prepared to invoke the Commonwealth Historic Shipwrecks Act to preserve the site. The options presented in subsequent exchanges once it was accepted that the wreck was historic because it lay, not in State Waters as many believed, but under Federal jurisdiction—ranged from featuring the wreck as a tourist, educational, and recreational asset within the marina itself (the preferred option and the one initially agreed to by the developers at great expense), to having the marina footprint reduced to avoid the site (but potentially leave it exposed to the seas) to burying it in protective sediments for the future.

Ultimately the development was realigned to miss the wreck. Instead of being a feature within the marina itself, with interpretive material, a ramp for people with disabilities and pylons protecting divers from passing boats as envisaged above, it now lies just south of its sea wall in what was first predicted to be an extremely vulnerable position due to scouring under the hull and backwash from the marina wall. Had that been the case and had the wreck shown signs of rapid disintegration, burial in sediments was considered an option. Seabed changes have served instead to produce a slight accretion of sand in the region and to actually shore up the wreck, leaving it on pristine sand bottom only meters from shore. As a result, the wreck features in the Port Coogee Marina promotional material as one of the attractions of the facility and the surrounding area. On a good day with an easterly wind producing a beautiful calm vista, the beach adjacent is frequented by families, and the wreck itself is found teeming with snorkelers, the odd SCUBA diver, and kayakers—all attesting further to the value of hulks as potential educational and recreational assets long after they were abandoned. The Department's plans for interpretive materials, exhibition of the ship's anchors, and enhanced access for families and people with disabilities remain on track.

An example of the value now placed on this site is this recent post from a local diving instructor advising others about the wreck on a popular website for divers:

> Here is an interesting bit of info about this wreck.
> In 2003 Taylor Burrell Barnett Town Planning and Design were asked to prepare a report for Port Catherine Developments Pty Ltd for submission to local government agencies as part of the approval process for Coogee Marina development. As part of their research, they approached the WA maritime museum for their advice on how to deal with the wreck of the OMEO. Keep in mind that the OMEO is protected under the Historic Shipwrecks Act 1976 (gazetted 1977). WA Maritime museum offered them two options... and I quote:
> The Western Australian Maritime Museum has previously indicated that options available to the developer for treating the Omeo in the context of the development, ranged from burial of the site under landfill behind a repositioned seawall, to it being left insitu to become a recreational/snorkeling feature within the proposed Marina itself.
> Personally, I am shocked and amazed that WAMM suggested burying this historic wreck under landfill. These are the people who are supposed to protect our wrecks, yet they offer destructive suggestions such as this... Shame on you WAMM. Fortunately, the developer chose a more realistic option, and chose to work around the wreck and leave it in situ (http://www.wadivers.com.au/forums/viewtopic.php?f=1&t=4865).

## Modern Scuttlings

Scuttled wrecks are this generation's gift to future divers. In 1982, recognizing they would also take pressure off historic wrecks, the museum actively began to encourage and assist those with an interest in sinking ships as dive sites. The program initiated and led by the author commenced with support provided to the South Coast Divers Club in their obtaining, stripping, and then sinking the redundant whaler *Cheynes III* (1947–1982) in Albany. This sinking was effected after months of helping the owner (John Bell, the late founder of the now famous whaling-focused heritage precinct "Whale World") remove the triple expansion engine and its two cylinder steering engine. The former became an exhibit at Whale World and the latter a feature at the Western Australian Maritime Museum. This was followed by the redundant barge *Miwok* (1971–1983) sunk off Rottnest Island by divers from the Australian Army in 1983. This scuttling was designed not for the use of recreational divers, as was *Cheynes III*, but at the Museum's request in order to provide an alternative to commencing demolition practice on a then privately owned, but nonetheless popular shipwreck the RMS *Orizaba* (1886–1907). In another joint venture, the still unidentified "North Mole Barge" was lifted and moved by the Fremantle Port Authority to a new location in 1988. Leading MAAWA member, shipwreck historian, and port authority Public Relations Officer Denis Robinson, one of the original *Day Dawn* team, was able to convince his superiors of the tremendous PR returns for the authority as they expanded the port and needed the wreck out of the way. The SCUBA-diving families and 'new' divers who swarm over this site on weekends attest to his persuasiveness and the Port Authority's largesse. The wreck was also used for maritime archaeology field school in 1990. This was followed 3 years later by the barge *W. H. Gemini* (1978–1993) at Two Rocks. This program was again facilitated by the museum, this time in association with the Royal Australian Navy (RAN) (who used it as a field exercise) and John Clarke, an expert diver and salver who initiated the program in order to develop a dive site for the Perth northern suburbs. A finder of a number of wrecks and avid researcher, Clarke was subsequently appointed as a member of the Museum's Maritime Archaeology Advisory Committee (MAAC), a group of academics, historians, heritage professionals, and divers joined to assist the Museum's CEO in wreck-related deliberations.

With the MAAC lending gravitas to the notion, the museum then entered into discussions with the RAN to ensure that the recently decommissioned guided missile destroyer HMAS *Derwent* was acquired and sunk as a dive site. When news of the possibility spread, many dive groups and associations from across the state began to make submissions to secure the vessel for their region. For a number of reasons, including its prior use as an explosives test-bed, moves to secure *Derwent* failed and it was sunk in the Rottnest Island Ship Graveyard with a torpedo in a 1994 military exercise. It now serves variously as a 'fish attraction' and a 'fish aggregation' device. Agreement is yet to be reached on which is the more appropriate term—does the wreck promote the growth of aquatic life or does it merely (and to an extent dangerously) collect it in one place?

The disappointment in losing *Derwent* was curbed by news that HMAS *Swan* (1970–1997) was to become available. It attracted so many bids and such interest that in September 1995 six mayors and their CEOs are reputed to have gone to Canberra to lobby the minister. In order to help facilitate deliberations, the museum hosted a 'Diver Tourism Seminar' in 1995 and, partly as a result the ship was gifted to the state, thereby allowing an internal decision as to its location to be made. The realization of the import of the museum's 'Scuttling Program,' as it was then called, was such that the MAAC then resolved to support the author's recommendation that the CEO should write to the navy seeking a commitment from the government to never again allow a former serving ship to be sold offshore for scrap, as was the case before *Derwent*. Rather they were to be retained in service to the nation as dive sites, as fish attraction or aggregation sites, or as museum ships. That is now the prevailing philosophy and whenever serving Australian vessels are decommissioned competition for them is very strong.

As two examples, in November 1995, the Geographe Bay Artificial Reef Society proved successful in acquiring *Swan,* and it was sunk in 1997. HMAS *Perth* (1962–2001) followed *Swan,* which (in the face of competing bids from Esperance, Rottnest, Carnarvon, Roebourne and Rockingham) went to Albany and was sunk there in 2001. The success of the program assured the need for its support gradually diminishing, the museum then took a back seat, though for a number of years the author sat on Environment Australia's committee assessing permits to sink vessels across the nation.

The scuttling movement in Western Australia has since become so popular that the Museum no longer needed to take an initiating, supporting, or for that matter any role at all in the process. The former naval ships were followed by the sinking of a wide range of other vessels, for example including some in the north-west of the state. Two confiscated Patagonian Toothfish (also known as Chilean sea bass, *Dissostichus eleginoides*) trawlers have now been added to the list. The result is that the WA Tourism Commission's list of the 'Top 10 Dive Wrecks' not only includes some of the historic wrecks such as *Batavia*, the two naval vessels mentioned above, and *Sanko Harvest* (1985–1991), a massive bulk carrier wrecked off Esperance in 1991, but also the illegal trawlers *Lena* (n.d.–2003), which was scuttled off Bunbury in late 2003, and *South Tomi* (n.d.–2004), which was sunk off of Geraldton in the following year.

What was once an active program for the Department of Maritime Archaeology, MAAC support slowly became passive, albeit maintaining a museological link through Conservation Department staff (Jon Carpenter, Dick Garcia, Ian Macleod, and Vicki Richards and their colleagues). In the wake of their pioneering studies on *Xantho*, which were commenced in 1985, to these specialists, scuttled wrecks have become modern test beds for corrosion studies. They have also been proved important for biologists monitoring the colonization of marine life. In that context, fishing and the taking of marine life is prohibited on these wreck-sites, adding further to their attraction and their importance as wildlife refuges now and in the future. For the Department of Maritime Archaeology, however, the baton has well and truly been handed over and all that we do today is provide a boat and assistance and dive supervision to those specialists and scientists gleaning useful data from scuttled sites.

## *Day Dawn* and the Jervoise Bay Hulks Revisited

Over the last decade or so, the time-honored 'management by goodwill' strategy utilized at Jervoise Bay was stressed by social, political, and economic considerations. Eventually pressure to further develop what was rapidly becoming an internationally renowned shipbuilding hub proved an inexorable force. Though loathe to lose the popular and contrasting dives at the wooden hulled *Abemama* (1918–1927) and the steel-hulled *Alacrity* (1893–1931) at the head of the bay, the museum was eventually forced to yield, and after further site recording and scientific analysis, to allow them to be buried in landfill for the land-backed wharves. By then, their being protected from human (e.g. propeller wash) and natural forces (e.g. accelerated corrosion and teredo worms) by being buried under sand behind a steel barrier to seaward became the management strategy thereby serving to protect the two sites for the future (Garratt and Souter 1997). As indicated above, for a while this same strategy had been mooted at the *Omeo* site in order to prevent its disintegration. *Egmont* and *Ellen* are also buried under landfill, and now surrounded by marina walls the *KVIII* has also disappeared beneath the sand. There they all remain, inaccessible, but protected under the sand for generations to come. This contrasts with the hulk *Redemptora* which, while once encapsulated under its own protective ballast mound, became inexplicably exposed as informal agreements broke down, and would eventually require an extensive remediation program. Once the extent of the damage was ascertained, this program was conducted by Museum staff and students of the post graduate diploma course, with many students filing extensive reports (Luckman 2002). The Museum's remediation program led by Jeremy Green and Matthew Gainsford also involved comprehensive electronic recording followed by an extensive reburial regime (Gainsford 2003).

With the benefit of hindsight, *Abemama* and *Alacrity* might have remained as dive sites and the damage to *Redemptora* may not have occurred had a reappraisal of their legal status (that reversed the reading that they lay in State and not Commonwealth Waters) been received earlier. This legal opinion saw all the Jervoise Bay wrecks, with the exception of submarine *KVIII* fall under the terms of the *1976 Commonwealth Historic Shipwrecks Act*. Around this same time it had evolved, dropping the need to apply the heritage criteria (i.e. proof of worth) listed earlier, in exchange for a 'blanket' rule that served to protect any site lost 75 years or more years ago.

At Jervoise Bay, burial and the application of the 1976 Act serve to provide some protection and thereby allow those buried sites to be preserved in sediment for generations to come. This contrasts with the situation at *Day Dawn* in Careening Bay. Soon after MAAWA completed its work, Scott Sledge led an attempt to cover the wreck in sand, but that proved unsuccessful as the 400 $m^3$ of sand dumped from a hopper barge dispersed in the water column. A number of proposals to shore the wreck up or otherwise stabilize the remains also came to naught.

Given that strategic and other military requirements (*Control of Naval Waters Act 1978*) override the provisions of the *1976 Commonwealth Historic Shipwrecks Act*, in 1988 the Museum found itself faced with an imperative to act as plans to deepen the harbor solidified. In concert with the author (then Inspector of Wrecks) in June 1988, maritime archaeology course graduate Adam Wolfe (who was then an experienced shipwreck and maritime heritage consultant for the RAN) presented four management options to the museum and the navy. These included dredging under the wreck and sinking it further beneath the harbor datum, or moving it (intact or dismantled) outside the harbor to be deposited and reburied near the hulk *Dato* in approximately 20 m of water. Fieldwork was to be in association with the RAN Clearance Diving Team of which Wolfe was a reservist member (Wolfe 1988).

One proposal, based on Parks Canada's benchmark dismantling and reburial of the Red Bay whaler (Grenier et al. 2007), entailed quite some expense and time, and was opposed by others in the Museum hierarchy on the basis that the dismantling would reduce the wreck's archaeological significance to an unacceptable level (DMA, WAMM, *Day Dawn* file, 6/78/1, 2, and 3, 134/76). In that context, a decision was made to raise the wreck intact and transport it across the bay well outside the harbor (Wolfe and Waterman 1990). This was put into effect in May 1991 using wire ropes slung between two barges using a tidal lift method (Kimpton and Henderson 1991). On arrival at the agreed location, the wreck was brought to rest against the slope at the southern end of the bay and the slings removed. In association with Museum staff, MAAWA divers then used tires to shore up the exposed side and commenced back filling the hull using a water dredge. In March 1994 the site was re-inspected by Wolfe and recommendations were made for further remediation. An inspection conducted in 1995 involved Jeremy Green and a team of diving conservators and timber specialists including Ian Godfrey and Vicki Richards. They found an unexpected colonization of the timbers by an introduced species of tubeworms. In recognizing the need for further remediation, Green elected to make the wreck and that of the *Dato* a major field school in 1995–1996. Both wrecks (and others including a barge surreptitiously scuttled by one enterprising dive shop needing a training venue outside their premises) were the subjects of a comprehensive regime of tests, analyses, site recording, archive searches and other studies (Anderson et al. 1995; Erskine et al. 1995). Attempts to further stabilize the *Day Dawn* remains proved ultimately unsuccessful, however.

## Conclusion

Returning full circle, the *Day Dawn* example highlights the fact that in Western Australia after 1978 the accessible hulk, abandoned ship and the ship graveyards, re-entered what has been categorized by archaeological theorists as the 'systemic' or 'living environment.' They are now firmly entrenched there.

The deep-water ship graveyard off Rottnest, for example is now a veritable hive of activity for fishers, 'tech divers' and for those testing and studying remote-sensing equipment and ROVs, including students and apprentices entering the oil industry. The abandoned hulk (with *Omeo* a prime example) attracts divers, schools, families, and tourists to the metropolitan seas and the shores, has joined the famous East Indiamen as public attractions and much sought after dive sites. Even *Day Dawn* in its final sad iteration served as a major field school, influencing and nurturing a group that now numbers amongst its members some of Australia's leading maritime archaeologists and conservators.

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# Chapter 3
# The Thunder Bay Ship Graveyard, Lake Superior: From Abandonment to Deliberate Discard in a Deep Resting Place

**Daniel LaRoche**

**Abstract** The Lake Superior *National Marine Conservation Area of Canada* (NMCAC) was selected to represent one of the 29 natural marine regions in Canada. Parks Canada is responsible for both protecting these ecosystems and managing them for visitors to understand, appreciate, and enjoy in a sustainable manner. Cultural resources found within an NMCAC are protected. This chapter provides details on the evaluation of the significance of "dumping grounds" for derelict vessels considered for an inclusion in the NMCAC.

## Introduction

The interest of Parks Canada archaeologists in the Thunder Bay Ship Graveyard was triggered in 1998 during a feasibility study for the establishment of a National Marine Conservation Area of Canada (NMCAC) in Lake Superior, Canada (Fig. 3.1). Lake Superior is the largest of the five traditionally demarcated Great Lakes of North America. Together they form the largest group of freshwater lakes on earth by total area. Navigation of the lakes has been and is still important to the economy of Canada and United States.

During the public consultation period of the feasibility study, a local historian and diver provided historical and remote sensing archaeological evidence of a ship graveyard located somewhere in the middle of Thunder Bay and close to the anticipated defined area for the NMCAC. The ship graveyard was created in 1936 when a decision was made to undertake the removal of derelict vessels from Port Arthur and Fort William Harbor for disposal elsewhere. The two adjoining municipalities ultimately combined to form the present day city of Thunder Bay. A suitable deep area was identified by the harbormaster where the remaining hulks once stripped of any useful/reusable/recyclable materials would be scuttled.

What was seen in 1936 as a beneficial action for the management of the harbor with the passage of time also became favorable for the preservation of a slice of nineteenth century Great Lakes shipping history and the maritime history of Canada.

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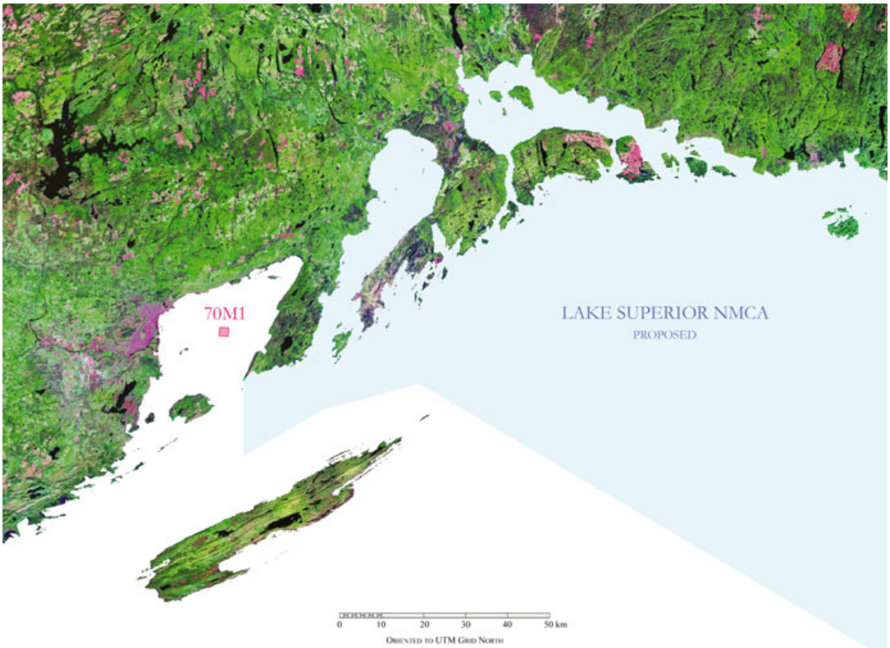


**Fig. 3.1** Map showing the location of the proposed Lake Superior NMCA in relation to 70M1 graveyard spot (Parks Canada)

In fact, the Thunder Bay Ship Graveyard holds an estimated collection of 35 hulks including multiple specimens of passenger/freight steamers, bulk freighters, tugs, barges, scows, and dredges.

As the creation of NMCAC is a very long and complex undertaking and has to fulfill the primary goal of protecting natural marine areas, the request for the extension of proposed boundaries based on cultural values came late in the process. Parks Canada had to strike a balance between the diverse opinions expressed during the public consultations and the delicate process of negotiation with major stakeholders including Aboriginal groups and the province of Ontario who would have to approve the transfer of bottom lands to Parks Canada for the NMCAC.

Nevertheless, Parks Canada took the ship graveyard inclusion proposal seriously and asked the Underwater Archaeology Service of the Ontario Service Centre (OSC) as well as the Archaeological Services Branch of the Heritage Conservation and Commemoration Directorate (HCCD) to evaluate the archaeological and historical value of the abandoned watercraft in support of their ongoing negotiations. This led to archival research that helped to better define the overall historical events and to determine the area to be searched. This was supplemented by a field survey using side scan and sector sonar as well as remotely operated vehicle (ROV) to confirm the presence and evaluate the state of preservation of the remains located in what was called the "dumping grounds" by the local Harbormaster in 1936. Lastly,

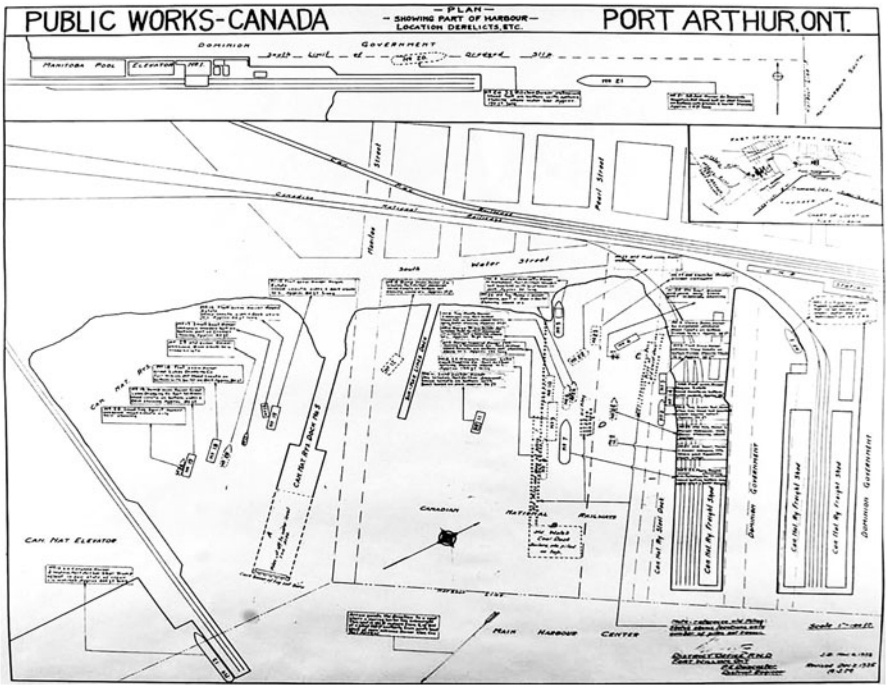


**Fig. 3.2** Plan of the Department of Public Works marking the location of the abandoned vessels (NAC, RG 42 Vol. 377 File 24.2.32)

the significance of the dumping grounds was evaluated based on existing Cultural Resource Management (CRM) tools in use at Parks Canada. This chapter presents Parks Canada's approach to the evaluation of these potential underwater resources, and includes a review of some other CRM tools available in the Canadian context, for evaluating deliberately abandoned watercraft.

## Historical Context around the Creation of the "Dumping Grounds"

A full 15 years prior to the eventual establishment of the "dumping grounds" in 1936, the Federal Government commenced looking into removing the many obstructions and derelicts that had come to congest Port Arthur and Fort William harbors. This is reflected in a 1921 Department of Public Works project file and its enclosed survey plan showing the distribution of various wrecks and abandoned docks that were in need of disposal (National Archives of Canada (NAC), RG 11 Vol. 4307 File 2488-1). An updated harbor clearance plan was produced in 1933, with further revisions added in 1935 accounting for "all items of which complaint has been made at various times" (NAC, RG 42 Vol. 377 File 24.2.32; Fig. 3.2).

A careful look at the Marine Department activities over the 1921–1936 period preceding the identification of an area to be used as the "dumping grounds" indicates that removal of obstructions to navigation was a regular activity monitored or led by this Department for those years (NAC, RG 42-C-1, Obstructions to navigation, Ontario—Port Arthur). However, with the creation of the Department of Transport and the amalgamation of three branches of the former department under the *Aids to Navigation Branch* in November 1936, things have changed. Even though there was not a special program devoted to the removal of wrecks, it appears that the branch took its new mandate as an opportunity to invest in improving Fort William, Port Arthur and also Sarnia in Ontario and Sorel in Québec (Department of Transport 1937, pp. 79–80), all likely declared strategic harbors at the time. The fact that C. D. Howe was a Member of the House of Commons, representing Port Arthur, Ontario, and also served as Minister of Railways and Canals and Minister of Marine (1935–1936) and Minister of Transport (1936–1940), may also have influenced the overall process. The largest amount of money for the 10 year review was spent in year 1936 when $ 38,085 was allocated to Fort William and Port Arthur for the clearance operation.

Table 3.1 presents the list of ships identified on the May 29, 1936 harbor clearance plan. Further research has demonstrated that more wrecks (or wrecks that were not clearly identified on the harbor clearance plan) also were taken to the dumping grounds (NAC, RG. 12, vol. 5200, File 8308-156, Part 1 and 2). The ship graveyard resulting from the operation was not only to be the resting place of derelict vessels but would also be used for other material considered an obstruction to navigation, or a hazard in the harbor. Even though Parks Canada's evaluation of significance has concentrated on abandoned vessels, the clearance plan provides evidence that components of docks, old cabin structures, old boilers, and piles of debris were taken onto scows to be disposed at the dumping grounds. Indeed, side scan sonar surveys have revealed structural elements that may eventually be identified *in situ*.

## The Survey

In 2004, a 5 × 5 km survey was conducted and provided sonar data for several contacts (Fig. 3.3). Side scan sonar was able to capture a surprising amount of diagnostic detail for the contacts (wrecks) revealing their principal dimensions, altitude, relief, and extent of surviving structure and superstructure. This facilitated the correlation of historic data with remote sensing data. Exceptional quality 600 kHz sonar data was obtained for six out of nine wrecks for which different identification qualifiers were used confirmed, suspected, probable. (Table 3.2).

Low frequency sonar detected three other wrecks. Five other sonograms provided lesser quality contacts, or sites representing scatters of nondistinctive vestiges. These, nevertheless, helped to assemble a list of suspected vessels associated with the remains appearing on the sonograms (Table 3.3).

**Table 3.1** Summary of all potential shipwrecks identified to be moved toward the "Dumping Grounds"

| Vessel name | Derelict N° | Type | Year built | Length | Breadth | Net weight (tonnes) | Hull material | Const. city |
|---|---|---|---|---|---|---|---|---|
| *Mary Ann* | 1 | Tug | 1867 | 78 | 15 | 57 | Wood | Stromness, ON |
| *Jessie Hall* | 2 | Tug | 1867 | 84 | 17 | 29.44 | Wood | Buffalo, NY |
| *Unknown* | 3 | Flat scow | n.d. | 63 | 14 | – | Unknown | Unknown |
| *Unknown* | 4 | Dump scow | n.d. | 78 | 14.5 | – | Wood | Unknown |
| *Henrietta* | 5 | Scow or Barge? | 1879 | 112 | 22 | - | Wood | Duluth, MN |
| *W. A. Rooth* | 6 | Tug | 1871 | 85 | 10 | 32 | Wood | Port Robinson, ON |
| *Mary H. Boyce* | 7 | Steamer | 1888 | 196 | 34 | 607 | Wood | Grand Haven, MI |
| *Niagara* | 8 | Steamer | 1856 | 152 | 22 | 166 | Iron | Glasgow, Scotland |
| *Imperial* | 9 | Barge | 1902 | 127 | 34 | 648 | Wood | Fort William, ON |
| *St. Joe* | 10 | Barge | 1902 | 100 | 25 | 70 | Wood | Port Arthur, ON |
| *Unknown* | 11 | Dipper dredge | n.d. | 72 | 28 | – | Wood | Unknown |
| *Unknown* | 12 | Dump scow | n.d. | 75 | 30 | – | Wood | Unknown |
| *Unknown* | 14 | Flat scow | n.d. | 100 | 28 | – | Wood | Unknown |
| *Unknown* | 15 | Flat scow | n.d. | 86 | 33 | – | Wood | Unknown |
| *Unknown* | 16 | Dipper dredge | n.d. | 53.5 | 20 | – | Wood | Unknown |
| *Unknown* | 17 | Tug | n.d. | 40 | – | – | Wood | Unknown |
| *Unknown* | 18 | Derrick scow | n.d. | 98 | 28 | – | Wood | Unknown |
| *Unknown* | 19 | Dump scow | n.d. | 123 | 23 or 28 | – | Wood | Unknown |
| *Ritchie* | 20 | Steamer | 1880 | 179 | 30 | 307 | Wood | Grand Haven, MI |
| *Jed* | 21 | Steamer | 1889 | 240 | 35 | 749 | Wood | Marine City, MI |
| *Unknown* | 22 | Mud scow | n.d. | – | – | – | Wood | Unknown |
| *Unknown* | 23 | Elevator dredge | n.d. | 140 | 33 | – | Wood | Unknown |
| *Unknown* | 24 | Tug | n.d. | | | – | Unknown | Unknown |
| *Unknown-Kaministiquia?* | 25 | Tug | n.d. | 120 | 25 | – | Wood | Unknown |

(*Continued*)

**Table 3.1** (*Continued*)

| Vessel name | Derelict N° | Type | Year built | Length | Breadth | Net weight (tonnes) | Hull material | Const. city |
|---|---|---|---|---|---|---|---|---|
| *J. Storey* | 26 | Tug | n.d. | 65 | 15 | – | Wood | Unknown |
| *Unknown* | 27 | Tug | n.d. | 30 | | – | Wood | Unknown |
| *Spirit* | 28 | Tug | 1871 | 40 | 12 | – | Wood | Bay City, MI |
| *Unknown* | 29 | Dump scow | n.d. | 70 | 18 | – | Wood | Unknown |
| *Unknown* | 31 | Flat scow | n.d. | 73 | 22 | – | Wood | Unknown |
| *Unknown* | 32 | Scow | n.d. | 25 | 18 | – | Wood | Unknown |
| *Unknown* | 33 | Launch | n.d. | 20 | 7 | – | Wood | Unknown |
| *A. B. Conmee* | 34 | Tug | 1881 | 81 | 20 | 71 | Wood | Owen Sound, ON |
| *Gravel King* | 35 | Sand sucker | 1915 | 84 | 25 | 81.59 | Wood | Chatham, ON |
| *Julian V. O'Brien* | - | Tug | 1888 | 70 | 17 | – | Unknown | Buffalo, NY |
| *W.G. Harrow* | - | Tug | 1893 | 95 | 19 | – | Unknown | Port uron, MI |
| *H. F. Bronson* | - | Tug | 1919 | 100 | 21 | – | Unknown | Kingston, ON |
| *Red Fox* | - | Fishing tug | 1903 | 69 | 15 | – | Unknown | Goderich, ON |
| *Peter Pan II* | - | Tug | 1917 | 97 | 24 | – | Wood | Collingwood, ON |

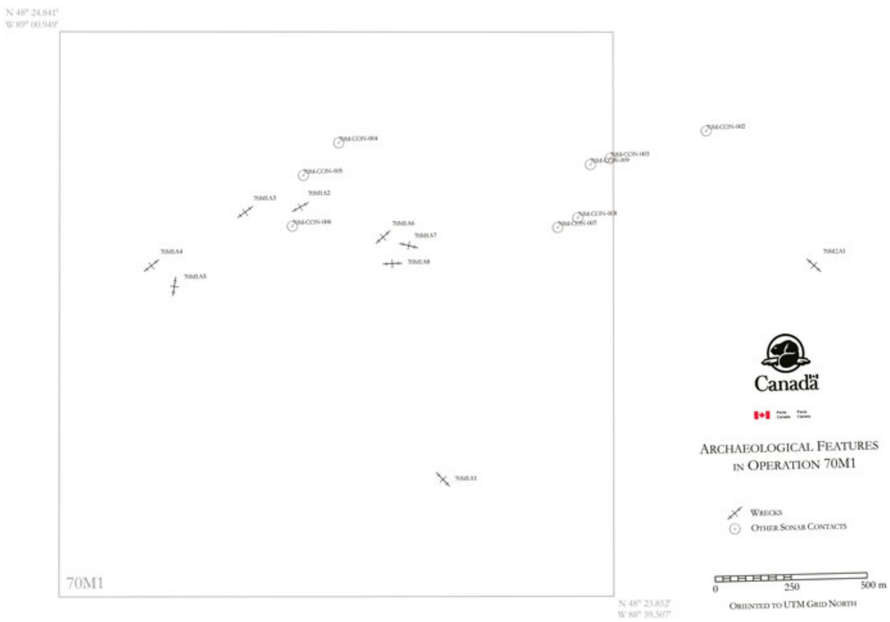


**Fig. 3.3** Archaeological features in operation 70M1 (Plan by Ryan Harris, Parks Canada; 70M-2004-101-2)

**Table 3.2** Summary of the shipwrecks associated with high and low frequency sonar contacts

| Name | Status | ID from archival source | Vessel type |
|---|---|---|---|
| *Mary H. Boyce* | Confirmed | Derelict No 7 | Bulk freighter |
| *A. B. Conmee* | Confirmed | Derelict No 34 | Tug |
| *Jessie Hall* | Suspected | Derelict No 2 | Tug |
| *Unnamed* | Probable | Derelict No 14 | Scow |
| *Unnamed* | Probable | Derelict No 18 | Scow |
| *Julian V. O'Brien* | Suspected | – | Tug |
| *Provincial II* | Suspected | – | Tug |
| *Richard B. or MaryAnn* | Suspected | – | Tug |
| *W. G. Harrow* | Suspected | – | Tug |

Many of the wrecks were ultimately inspected using an ROV in 2007 and a sector-scanning sonar system was instrumental in tracking the ROV's progress in and around the sites. This 2007 inspection survey proved to be useful as it confirmed identifications previously made and ultimately helped classify one of the more interesting vessels, the Confederate blockade runner *Druid* (1856) which was scuttled as *Niagara* in 1936.

The next step was to determine if the assemblage of wrecks met the definition of a cultural resource according to Parks Canada's policy and management tools, the *Parks Canada Cultural Resource Management (CRM) Policy* (1994) and the

**Table 3.3** Summary of other shipwrecks potentially associated with low frequency sonar contacts

| Contact # | Other potential or suspected vessels |
|---|---|
| Contact 004 | Barge *Imperial*; barge *Henrietta* (derelict ID No. 5); an unnamed flat scow (derelict ID No. 31); the steamer *Kaministiquia* |
| Contact 005 | Barge *St. Joe* (derelict ID No 10); dipper dredge (derelict ID No. 11); mud scow (derelict ID No. 12); dump scow (derelict ID No. 19); sand-sucker dredge *Gravel King* (derelict ID No. 35) |
| Contact 006 | Mary H. Boyce (section) or an open deck scow (derelict ID No. 32) |
| Contact 007 | Small tug (derelict ID No. 17) |
| Contact 009 | Small tug probably the *Spirit* (derelict ID No. 28) |

*Parks Canada Guidelines for the Management of Archaeological Resources* (2005). These Agency documents also provide criteria for the assessment of resources. They generally apply to the evaluation of resources within Heritage Areas administered by Parks Canada. However, the team had no doubt that the use of these criteria would lead to the conclusion that many of the resources would have sufficient historic value to be considered cultural resources if included within the Marine Conservation Area. Although some level of historic value for consideration as *cultural resources* was predetermined for the abandoned wrecks, the preliminary assessment ended up being sufficient to determinate that neither the ship graveyard nor individual wreck would qualify for consideration to a level as high as a National Historic Site of Canada (NHSC) or Level 1 resource(s). The following analysis provides the reasons why the resources were not submitted as an NHSC. Nevertheless, the evaluation exercise provided a series of benchmarks that helped define them as Level 2 cultural resources, and further establish values which enhanced their association to a NMCAC. The following sections provide more detail concerning the terminology and approach for the evaluation of cultural resources within the Parks Canada network of Heritage Areas. The author will also demonstrate connections with other CRM tools that support the identification of shipwrecks or ship graveyards as archaeological sites and therefore afford protection, value, and preservation to them. It should be noted that internal correspondence resulting from the 2007 inspection addressed the pros and cons of including the resources within the boundaries of the Lake Superior NMCAC and ended up providing recommendations not to go forward.

## The Evaluation of Significance at Parks Canada

Parks Canada administers large Heritage Areas defined as National Parks of Canada (NPC), National Marine Conservation Areas of Canada (NMCAC), and National Historic Sites of Canada (NHSC). These areas generally provide for the protection of both the natural and cultural heritage. This is accomplished via diverse legislative tools depending on applicable acts and regulations. If the present case under study proved to be valuable, the *Canada National Marine Conservation Areas Act* (2002) could potentially offer protection to natural and cultural heritage within the NMCAC.

The preamble of the act lists among other aims the long-term protection of marine resources in order to "provide opportunities for the people of Canada and of the world to appreciate and enjoy Canada's natural and *cultural marine heritage*." Moreover, to ensure a balance in the management of assets, policy tools are required to determine the value of resources and engage in their active protection, conservation, and monitoring.

The Cultural Resource Management Policy (CRM) provides a definition of what a cultural resource is and the general management rules to be followed. Parks Canada's *CRM Policy* (1994) defines a 'cultural resource' as,

> . . . a human work, or a place that gives evidence of human activity or has spiritual or cultural meaning, and that has been determined to be of *historic value*. This value derives from an association with an aspect or aspects of human history. Parks Canada may apply the term cultural resource to a wide range of resources in its custody, including, but not limited to, cultural landscapes and landscape features, archaeological sites, structures, engineering works, artifacts and associated records [author's emphasis].

## *CRM Level 1 Resources Representing National Historic Significance*

According to the CRM policy, there are two levels of *historic value* that could possibly be attributed to resources: Level 1 and Level 2 resources. To be recognized Level 1, resources have to have a direct association with reasons for designation as a *National Historic Site of Canada.* The reasons for designation are submitted to the Historic Sites and Monument Board of Canada (HSMBC) for its approval. Generally the submissions are made by the public and have to go through a screening process. The following steps toward a potential designation is partly assumed by Parks Canada who provides research and support to the *Historic Sites and Monuments Board of Canada* (HSMBC)—the body which advises the Minister of Environment (the Minister responsible for the Parks Canada Agency and who according to the law must approve the designations promoted by the Board) on national historic significance. The HSMBC is composed of officers from all provinces and territories in order to ensure an adequate representation across Canada. They are selected by the minister responsible for Parks Canada. The board reviews assessment reports and uses criteria in order to make recommendations to the Minister.

Such designation does not automatically provide protection but codifies the significance status of resources. In order to be submitted for designation, a shipwreck or a ship graveyard must first and foremost meet the definition adopted by HSMBC for such cultural resources:

> For designation purposes, shipwreck shall mean an artifact representing a ship, boat, vessel or craft, whatever its type, which is deemed to have sunk, been driven aground, run aground or wrecked, and has been abandoned, thus putting an end to its career.
> The shipwreck will be submerged and possibly embedded in an ocean, lake or waterway floor, be lying or buried in a tidal flat, beach or any other type of shore, including a modified ancient shore.

> The physical condition of the shipwreck may vary. The shipwreck may be in one piece or in the form of remains spread out over a large area. In the latter case, a shipwreck may be nominated as an archaeological site or as archaeological remains, depending on the approach necessary to document it.
> Included in the definition of shipwreck or shipwreck site will be the vestiges associated with the structure, cargo, equipment, human remains and personal effects of occupants, fragmented remains associated with these items and any natural accretions following the shipwreck. By extension, a shipwreck designated as an archaeological site will include the preceding elements and even any natural accretions following the shipwreck, which may help to reconstitute the context of the wreck's evolution and to clarify its specific attributes (HSMBC 2000).

A review of *HSMBC Criteria and Guidelines for Places* (2008) demonstrates that there are multiple criteria on which recommendations are made by the board in order to be selected for designation:

> ... an archaeological site, structure, building, group of buildings, district or cultural landscape of potential national historic significance must:
>
> - illustrate an exceptionally creative achievement in concept and design, technology and/or planning, or a significant stage in the development of Canada; or
> - illustrate or symbolize in whole or in part a cultural tradition, a way of life or ideas important in the development of Canada; or
> - be most explicitly and meaningfully associated or identified with one or more persons who are deemed of national historic significance; or
> - be most explicitly and meaningfully associated or identified with one or several events that are deemed of national historic significance.

Additional guidelines also provide information on what is acceptable or not, but the archaeological guidelines are the most useful in connection with shipwrecks and wreck graveyard analysis:

> The Board recommended that a declaration of national significance be based on one or more of the following (guidelines):
>
> a. substantive evidence that a particular site is unique, or
> b. that it satisfactorily represents a particular culture, or a specific phase in the development of a particular cultural sequence, or
> c. that it is a good typical example, or
> d. that it otherwise conforms to general Board [guidelines] touching the selection of historic sites for national recognition.

In order to help the preparation of a submission to the HSMBC, the *Guidelines for Evaluating Shipwrecks of National Historic Significance in Canada* (HSMBC 2000, pp. 5–10) were developed. The guidelines are viewed as the minimum information required prior to any examination of future candidates for national historic recognition. By doing so, a well documented submission would have a better chance to be considered by the Board. However, in the case of submerged watercraft, it was not deemed necessary to develop specific criteria for the assessment of their national significance. Archaeologists felt that the complex maritime history, representativeness of various types of shipwreck throughout the country (and their unknown number) would make the task of selecting specific criteria of national significance impossible for this site type. In the interval, it was recommended to use the guide to prepare strong submissions that met the general criteria and the archaeological guidelines.

The guidelines outline a series of attributes to associate with shipwreck candidates when applicable:

1. Characterization attributes
   a. Architectural: typological and characteristic
   b. Technical
   c. Scientific
   d. Representative
   e. Artistic
   f. Rare or Unique
   g. Group or association
2. Cultural attributes: historical/archaeological/anthropological/ethnographic
   a. Association to persons, cultural groups, first nations
   b. Event association
   c. Socio cultural (cargo and personal belonging)
   d. Symbolic
3. Presentation attributes
   a. Interpretive
   b. Economic
   c. Cultural Landscape
4. Structural assessment attribute
   a. Integrity

The following examples are provided to better explain the meaning of the attributes and their subgroups. Note that it is possible for a National Historic Site to be located within a National Park or a National Marine Conservation Area. Such a site would be managed according the NHSC scheme with its commemorative integrity measured every five years. Moreover, any shipwreck or group of shipwrecks anywhere in Canada could be submitted to the HSMBC by any citizen as long as they provide a substantive base of historical or archaeological documentation to support the case. However, the sites are located outside Parks Canada administered land it would not be protected, as there is no federal protection for shipwrecks or archaeological sites outside these boundaries. In the case of submerged ship graveyards on other lands, provincial or territorial archaeological legislation may apply and provide protection as long as it has been officially recognized as an archaeological site. There are more than 950 national historic sites in Canada; of these, 167 are administered by Parks Canada. Only Parks Canada properties are protected by federal law.

## *CRM Level 2 Resources*

According to Parks Canada CRM Policy, when a resource is not a NHSC because it does not meet the highest National Historic Sites criteria, it may have historic value and therefore may be identifiable as Level 2 cultural resources. *The Parks Canada Guidelines for the Management of Archaeological Resources* (Parks Canada 2005, pp. 25–26) provide a series of benchmarks for the assessment of the 'historic value' of an archaeological site or feature. The following are suggested value indicators for determining Level 2 archaeological resource significance.

- Physical value
  (i) The physical archaeological evidence such as features, structures, and objects bears witness to past human activities through their manufacture and use.
  (ii) The archaeological context contributes to the value of the resource and its integrity can be measured.
  (iii) The integrity of the resource, related resources or resource environment is not compromised.
  (iv) The resource adds value to the sum of the archaeological resources found at the site or area.
- Associative and symbolic value
  (i) The archaeological resource conveys a spirit of event, person, place, or time.
  (ii) The resource relates to local oral tradition and/or traditional knowledge.
  (iii) The resource is considered sacred.
  (iv) The resource is associated with funerary practices (Aboriginal and non-Aboriginal).
  (v) The resource is associated with a Classified or Recognized Federal Heritage Building.
- Scientific and research value
  (i) The resource evolved through many periods in history.
  (ii) The resource is unique, rare in an international, national, regional, or local context.
  (iii) The resource is representative of a class, a type, a function, a theme of Canadian history.
  (iv) The resource is within or was derived from an archaeological context.
  (v) The resource is the sole source of information on a site or a particular theme.
  (vi) The resource contributes to the understanding of human occupancy and behavior.
  (vii) The resource illustrates the relationship between human beings and their environment.
  (viii) The resource has interpretive and presentation potential.
  (ix) The resource contributes to a collection.
- Public value
  (i) The resource plays a role in the public understanding of heritage.
  (ii) The resource adds value to educational and presentation programs.

While archaeological resources may be evaluated on the strength of any *one* of these suggested value indicators, the evaluation process benefits considerably from a more multifaceted examination. This process may draw upon a variety of archaeological, historical, and other indirect sources of information, as appropriate. The Level 2 heritage value benchmark list just reviewed provides many of the same important keywords that help capture the heritage value of a shipwreck resource in the *Guidelines for Evaluating Shipwrecks of National Significance* (HSMBC 2000). The list is not presented in the same order or with the same architecture (and some of the qualifiers are not applicable to ships). However, most of the ships vestiges or the entire ship graveyard would be labeled Level 2 resources based on at least one of the following benchmarks: Physical (i, ii, iii, iv), Associative (ii), and Scientific (i, iii, iv, vi) value. Nevertheless, it is clear that in order to meet the threshold or criteria for National Historic designation, the benchmarks listed would have to demonstrate national significance and be meaningful to all Canadians.

## Factors Influencing the Levels of Significance of a Shipwreck Graveyard

Based on the CRM Level 2 assessment criteria presented above, we can assume that most of the wrecks in the dumping grounds could be individually and collectively labeled as such resources. However, when examined through the lens of HSMBC *Guidelines for Evaluations of Shipwreck of National Historic Significance* (HSMBC 2000) the collection of sites within the ship graveyard combines many additional qualitative attributes. One fundamental attribute is their *group association* as derelicts from a single harbor location which have been extracted, floated, or loaded and dumped in a known location.

In addition, the number of tugs and scows within the group makes it a *rare* and impressive wreck "type collection." Since they appear to have been locally owned and operated in the area of their disposal, many of the sites could also be said to have a *regional* and *local association* and be *representative* of the commercial shipping activities in Thunder Bay and Lake Superior. However, we do not have a clear picture of the use of most of the ships to make the *local association* a strong attribute unless they were built locally or the extent of their use in the area was determined.

In order to better visualize the significance, Parks Canada tested applicable value attributes to the classes of vessels represented within the list of derelicts. When available, construction dates were associated with archaeological remains so they could provide clues to technological changes. Other meaningful attributes including regional and local association or representation as a type were cross-referenced in Table 3.4. The archival evidence at hand was used to determine which ships had stronger significance characters amidst the 35 different vessels believed to have been taken out to the dumping grounds (Harris and LaRoche 2005). Table 3.4 notes the discrepancy between the ships with significance characters coming out of the archival data and the ships identified during the survey. Only *A.B. Conmee* (1881) and *Mary Boyce* (1888) (Fig. 3.4) show up in both.

In view of the available historic records, very few attributes concerning the ship graveyard sites consistently contribute strong heritage characterizations for the collection of vessels now lying in Thunder Bay. Individually, however, the aforementioned steamer *Druid* (1856) is a site for which historical significance determination was very clear. The information collected in the archives indicates that it had a combination of characters above that of a Level 2 resource and deserves separate National Historic recognition. Evidence of technological innovation, its representation of a particular vessel class and substantial association with important historical events were among elements of note (Harris and LaRoche 2005). Unfortunately, the remains of *Druid* were apparently dissected with a blowtorch during removal and left a disjointedly and dispersed scatter of hull components on the lakebed, compromising its integrity (Ryan Harris, departmental correspondence, Parks Canada 2010).

Archival records were particularly silent regarding the potential attributes associated with the unknown "scows" in the ship graveyard (listed in Table 3.1) although two

**Table 3.4** Characters of Significance based on archival material

| Type/name/year built | Symbolic association to Canadian history | Evolving technology through many periods | Representative of a type | National association | Regional association | Local association |
|---|---|---|---|---|---|---|
| Passenger/Freight Steamer *Niagara/Druid* (1856) | X | X | | X | | |
| Passenger/Freight Steamer *Kaministiquia* (1886) | | | | | | X |
| Bulk Freighter *Mary Boyce* (1888) | | | X | | | X |
| Bulk freighter *Jed* (1889) | | | | | X | |
| Tug *A. B Conmee* (1881) | | | X | | | X |
| Dredge *Gravel King* (1915) | | | X | X | | |
| Dredge *Elevator Dredge (#23)* (n.d.) | | | X | | | |
| Barge *St. Joe* (1899) | | | | | | X |

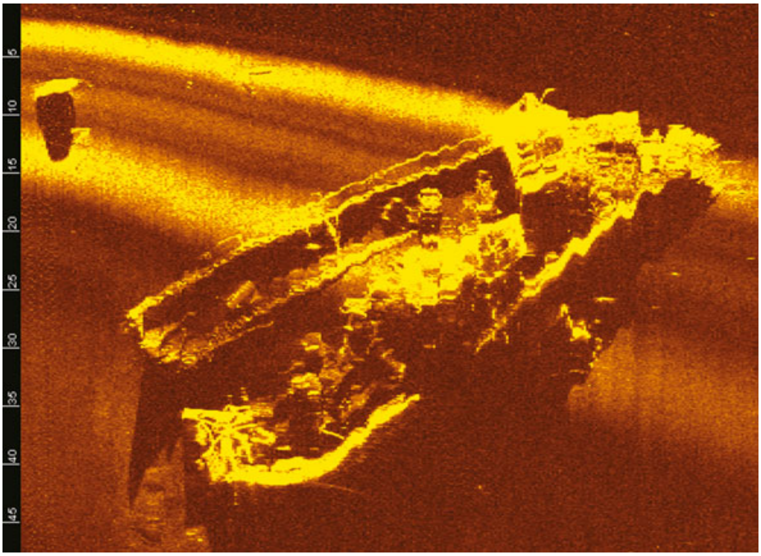

**Fig. 3.4** Sonar contact of *Mary Boyce*, Wreck 70M1A2—the bow appears on the lower left-hand side and the stern on the upper right. (600 kHz sonogram; Courtesy Parks Canada)

of them were located with the sonar and nine of them are known to have been scuttled in the "Dumping Ground" (Harris and LaRoche 2005, pp. 57–59). It would probably be most logical to associate them to local or regional shipbuilding and entrepreneurship. As a group the scows could provide an excellent source of comparative material regarding shipbuilding practices.

The analysis of the integrity of the shipwrecks may provide additional insight influencing the significance of cultural resources. The historic records show that many of the larger ships had multiple careers and were probably refitted several times (Harris and LaRoche 2005, pp. 50–57). In terms of significance, this could be interpreted in two ways: a ship could demonstrate adaptation to new technology and engineering to overcome obsolescence or it could have lost what was originally giving it value and significance; for example, its technological features, its architecture or facilities. Since primary and secondary source research for construction plans, shipbuilders and fleet-owners was not undertaken in the context of this preliminary inventory, it was impossible at the inventory stage to make any further statement.

The removal and discard of abandoned hulks from a harbor reflects a process of secondary deposition. This process in Thunder Bay took several forms. Many hulks were refloated and towed to their new resting place with scrap material on deck to be scuttled or burnt. Others were stripped for their reusable material, dismantled, cut in sections and dumped on scows (NAC, RG 12 Vol. 5,200, File 8308-P5). Processes like these can harm the integrity of the resources. The evaluation of integrity as a characteristic attribute was taken into consideration before formulating any recommendations.

The 2007 survey season, devoted to visual inspection using a remotely operated vehicle, contributed to assess site intactness and revealed that a number of lower hull structures survived relatively undamaged. However, for many vessels the salvage operation prior to its disposal left almost nothing of original machinery, deck structure, and hull fittings. The evidence of thorough salvage operations could be observed by noting the absence of portholes and other fittings (extracted before disposal) and also in the large openings torn in the upper decks used to extract machinery. Other remains only survive in a highly fragmented state on the lake bed. *Druid* is one that suffered the most salvage prior to being disposed in the dumping grounds (Ryan Harris, departmental correspondence, Parks Canada 2010).

## The Concept of Significance in Ontario and in a Larger Canadian Context

Beside the HSMBC and NMCAC inclusion, there are other instruments recognizing historic or heritage significance that are used in Ontario and Canada. These could eventually be applied to ship graveyards in order to raise awareness and promote research.

### *Ontario's Marine Archaeology Sites Significance*

As the Thunder Bay Ship Graveyard was at the time of the survey located on provincial lands in Ontario, any underwater research surveys and evaluation has to be done under an archaeological provincial license. In 2012 the surveyed area is still provincial land and Parks Canada has not considered the ship graveyard to be within the NMCA boundaries. Maritime archaeological sites are protected as such by the *Ontario Heritage Act* and *Regulations*. The Act also allows for some marine archaeological sites to be prescribed by regulation. This is a measure designed to protect sites by prohibiting diving activities and the operation of any type of submersible vehicle. The prescription contains clear indication prohibiting divers and underwater vehicles to approach the remains to prescribed distances.

There are only two shipwreck sites listed in the provincial regulation. One is a site already proclaimed a National Historic Site of Canada and is composed of two very well preserved warships, *Hamilton* and *Scourge* that sunk during the Anglo-American War of 1812. The wrecks were designated in 1976 of National Historic Significance because they are rare examples of vessels of the War of 1812, are in remarkable condition, and contain a vast quantity of shipboard articles (Parks Canada 2012). The provincial authorities listed them for the same reasons and because they contain human remains. The second shipwreck, *Edmund Fitzgerald* (1958) sank in

1975, was listed in order to protect it from intrusion as it was considered a gravesite. The prescription in regulation was considered a sound measure to protect highly prized wrecks (Ontario Heritage Act, O. Reg. 11/06)

## *The Canadian Register of Historic Places*

Most of the National Historic Sites of Canada are automatically entered in the Canadian Register of Historic Places (CRHP). The register also provides a single source of information about all historic places officially recognized for their heritage value at the local, provincial, territorial, and national levels throughout Canada. The CRHP is a vehicle for Federal/Provincial and Territorial governments, heritage conservationists, and other interested parties to enable Canadians to help recognize and celebrate historic places today and for future generations. To be included on the CRHP a historic place must first be formally designated as historic by one or more levels of government in Canada then submitted by the appropriate authority to the Canadian Registrar with the proper documentation. It is up to a provincial or municipal government like the Ontario government to decide if a particular site merits registration as a Historic Place.

The *Canadian Register of Historic Places* (CRHP) is more than an online inventory. It provides concise records of historic places in the form of basic information such as construction dates, location, function, images, as well as a *Statement of Significance* (SOS). A SOS is an explanation of what a site is and why it is of historic or heritage value. The SOS consists of different elements including the basic documentary information; name, address, geospatial coordinates, dates, cultural period, boundaries, coding, a description of the place, a heritage value statement and a list of character defining elements.

There are special instructions available for writing the Heritage Value Section for Archaeological Sites. The core of the heritage value section of the SOS is a brief explanation to describe two related issues:

- How evidence led to the identification of an archaeological site of significance; and,
- The reasons why the evidence has led to the selection of the site as a recognized historic place [Canadian Register of Historic Places 2006].

The heritage value for archaeological sites can be grouped into the following types of heritage value:

- Scientific value
- Historical or cultural value
- Aesthetic value
- Social value; and,
- Spiritual value

In determining which elements are "character-defining" for archaeological sites, special consideration should be given to:

- Scientific information as contained in on- or off-site collections that are directly associated with a site;
- Information, including documentation and collections that result from full or partial excavations of the site;
- Connections between past and present-day communities and cultures associated with the site, including oral traditions and oral history;
- The environmental context of the site, even if the context is under threat of destruction or change;
- The layout and setting of the site.

Outside of Ontario a total of 11 designated sites incorporating 13 shipwrecks have been entered in the Register. The register can easily be consulted on the web by researching individual wrecks. Five of them are National Historic Sites, with the rationale for designation determined by the Historic Site and Monument Board of Canada. Such entries use a Statement of Significance (SOS) based upon the HSMBC Board Minutes. No entry in the CRHP currently originates from a ship graveyard.

The Canadian Register bears many similarities with the United States National Register of Historic Places. In contrast with the US system, the submission process for the Register in Canada is not as stringent and only few criteria are used for evaluating the eligibility to appear on the Canadian Register. The requirements according to the Historic Places Program Branch (2006) are:

A historic place must meet three basic criteria to be listed on the Canadian Register:

- it must meet the definition of historic place;
- the required documentation must be supplied; and
- with some exceptions, its specific location must be publicly identifiable.

When the process of selecting shipwrecks to be listed in the American Register is closely examined we realize that it requires the determination of the significance of the vessels by examining the characteristics of a shipwreck against established criteria. In that regard the listing in the US register is to a certain extent a complex exercise that bears some similarities to the National Historic Sites of Canada designation process but includes more local and regional significance criteria.

## *The Difference between Dumping Grounds and Ship Graveyards*

In the Thunder Bay example, the "dumping grounds" should not be considered a primary abandonment site similar to most archaeological sites, but as a secondary abandonment site. In fact, the 13 wrecks located were affected by salvage activities during their years of abandonment in the harbor. They also endured additional salvage and damage during a final deposition process that involved different extraction processes (such as being re-floating using pumps or raised in slings, torn apart with clamshell dredges, demolished with dynamite, or removed in pieces) from their original resting places. Here lies the difference between this dumping ground and many other ship graveyards. Indeed, it is interesting to note according to traditional significance assessment processes, it could be said that because of these processes the heavily compromised archaeological integrity of the assemblage leaves a resource with impaired research and public presentation potential. However, the archaeological evidence of these activities comprises much of their research potential. In fact, it has been found that the concentration of numerous example of certain type of vessels provide an excellent base for comparison on construction techniques.

## Conclusion

The Thunder Bay dumping ground is the first example of a shipwreck assemblage that has been tested for evaluation of significance by Parks Canada archaeologists. The survey and evaluation was done to validate a recommendation made during public consultation for the NMCAC territory to include the ship graveyard area. The primary goal for such a Heritage Area is to protect natural resources, but other resources including underwater cultural resources (Level 2) are protected when they are located within NMCAC boundaries.

The survey results demonstrate that only around 13 of 37 discarded hulks have been discovered. One explanation could be that some of the listed vessels were broken up and moved to an onshore disposal site as recommended by the departmental salvage diver in 1936 (NAC, RG 12 Vol. 5,200, File 8308-P5). In terms of significance, the ship graveyard was evaluated not only as a collection of individual wrecks but also as an archaeological assemblage representing a cross-section of Lake Superior shipping at the turn of the nineteenth century.

As a group, such a number of wrecks discarded over approximately a year period and within a dumping ground represents an important event in terms of local maritime history. Many of the wrecks were locally owned and used. Several were even operated in the context of harbor maintenance (tugs, dredges, and scows). The type of ships represented could be valued for their role in the industrial and marine transportation history by local historians and nearby mariners, and local communities.

The location and depth of the dumping grounds influenced the recommendation not to include the ship graveyard into the NMCAC territory. Physically the area would have been outside the contemplated NMCAC boundaries and its management would have required complex measures such as remote monitoring. However, these underwater archaeological resources will not be left unprotected, as the *Ontario Heritage Act* applies. Moreover, the resources are not threatened by natural forces or by human use. In the end the decision not to include the Thunder Bay assemblage within the NMCAC was based on the opinion that it would not necessarily significantly advance the mandate of Parks Canada for preserving and protecting nationally significant examples of Canada's cultural heritage as established in the preamble of the *Parks Canada Agency Act*, 1998.

Finally, this brief analysis demonstrates that the protection and preservation and presentation of underwater cultural resources could be a complex and expensive undertaking and the results cannot always be predicted. It also demonstrates that the resources could be protected somehow but the tools to ensure recognition, documentation and protection could differ considerably depending on which level of designation is sought.

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# Chapter 4
# Resting Places of the Pioneer Craft: Ship Abandonment at Kingston, Canada

**Jonathan Moore**

**Abstract** A remarkable number and variety of abandoned ships and ship graveyards are found in Lake Ontario at Kingston, Canada, encompassing 90 vessels that span 200 years of deposition. Collectively, these important sites have attracted historical and archaeological interest for over 100 years. This paper summarizes previous vessel abandonment studies at Kingston and examines ship abandonment on a local scale from a sizeable and fascinating Great Lakes shipwreck assemblage.

## Introduction

Strategically situated at the foot of the Great Lakes at the eastern end of Lake Ontario where it drains into the St. Lawrence River, Kingston was an important port and naval base during successive French, British, and ultimately post Confederation Canadian periods. It was also the site of a British naval base and dockyard from 1789–1835 and 1838–1853. From the mid twentieth century forward, transshipment and shipbuilding as well as ship chandlery, repair, wintering, and salvage were important elements of Kingston's economy. Not surprisingly, these activities led to vessel abandonment and the formation of ship graveyards on its doorstep (Fig. 4.1), described below in chronological order and summarized in the concluding section.

## Kingston's Abandoned Warships

During the War of 1812, Kingston played a key role in British efforts to control Lake Ontario because its naval dockyard fronting Navy Bay was the site of a massive shipbuilding effort between 1813 and 1815. In 1814, the frigates HMS *Prince Regent* (56 guns) and HMS *Princess Charlotte* (42 guns) were launched, followed by the three-decker HMS *St. Lawrence* (102 guns), the largest wooden sailing warship ever

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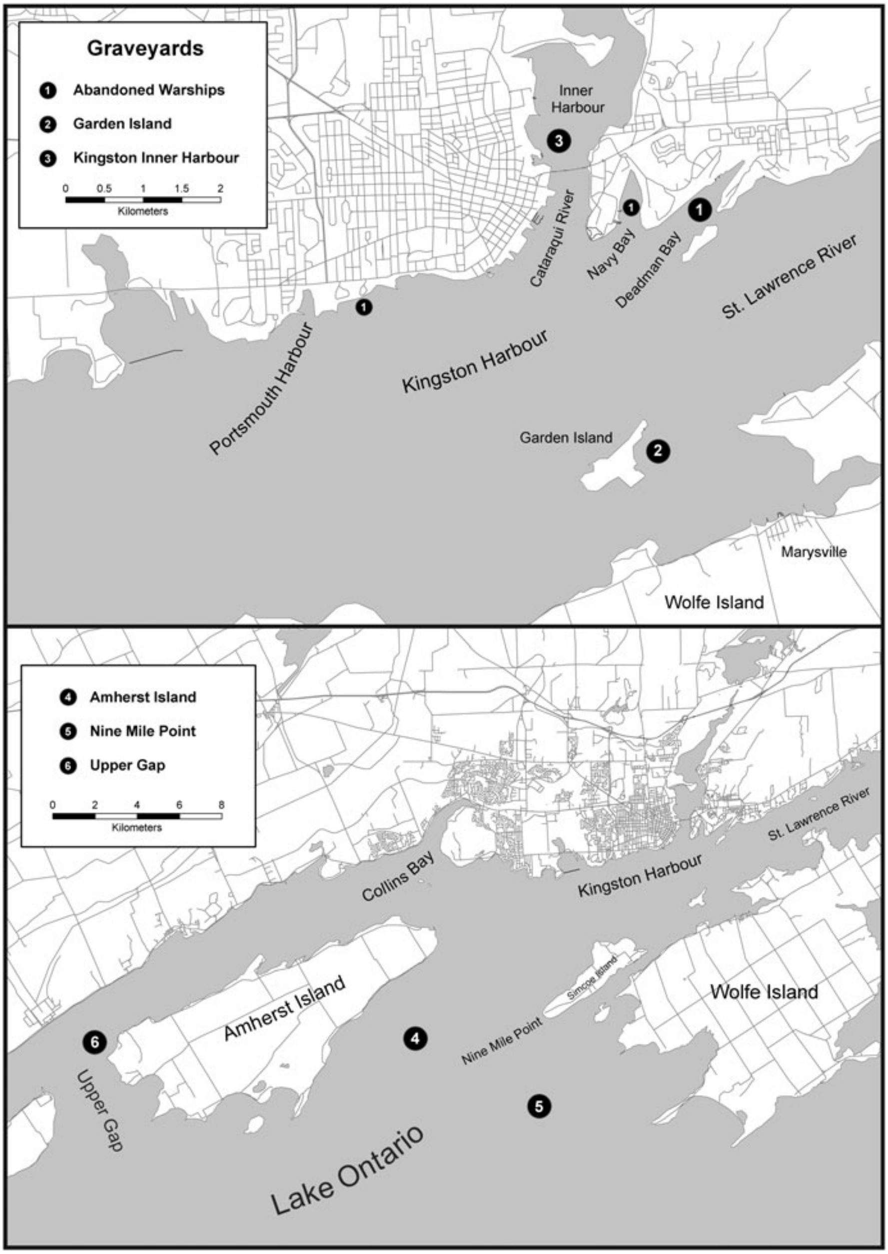


**Fig. 4.1** Kingston Harbor and approaches showing selected place names and ship graveyard locations. Individual abandoned ship locations are not shown. (Map by Jonathan Moore)

launched on the Great Lakes. Peace in early 1815 brought to an end warship construction when the British squadron on Lake Ontario numbered nine warships. Soon, their rigging and armaments were put into storage on shore and the hulls were housed-over and placed in ordinary, some variously serving as hospital, powder, and headquarters ships (Moore 2006, pp. 5–28). The Rush–Bagot Treaty of 1817 formalized demilitarization of the Great Lakes and soon most of the hastily built warships, not surprisingly, were in poor condition. By the late 1820s, many of the larger hulks were moved from the dockyard's wharves and slips farther into marginal areas of Navy Bay at a time when they were considered health and fire hazards. Some were left to fall to pieces along the shore while others were permanently hauled out of Navy Bay and abandoned on slips. Most of the old warships were put up for auction as a practical means of clearing them out when the dockyard was slated to close in the early 1830s. In 1832, *St. Lawrence*, by then "a remnant of her former majesty," was sold for £ 25 to a Kingston businessman and pumped out early the next year and towed to serve as a wharf, a brewery, and a distillery on the town's western outskirts (Moore 2006, p. 28, pp. 72–74; Neilson 1992, p. 35).

The other hulks remained in place in Navy Bay even though some were sold at a second auction. They were still there in 1838, when the dockyard was reopened for a short period under the command of Captain Williams Sandom, who upon his arrival found a ship graveyard on shore and in the Navy Bay shallows. He considered the hulks a nuisance and harmful to the anchorage. He learned that they had been sold by a clerk following the departure of naval officers "without a clause obliging the buyers to take them away, the consequence was, that these persons took out the most valuable metal, & such parts of their top sides as were easily come at, leaving the hull of these ships to sink & ruin the harbor" (Williams Sandom to Charles Abbot, 1st Baron Colchester, letter, 13 February 1846, The National Archives of the United Kingdom, PRO 30/9, London; Moore 2006, pp. 29–30). Evidently, by about 1841, *Prince Regent* and *Princess Charlotte* were pumped out by Sandom's men and taken to an adjacent cove called Deadman Bay, and a smaller warship was discarded in deeper water off the mouth of Navy Bay. Several smaller partially submerged hulks remained in Navy Bay. The old warship hulls in the two bays continued to decay and disappeared below the water's surface, and their identities were soon forgotten. At least one of the Deadman Bay wrecks was blown up by the military, and they were considered hazards to navigation (*Daily Standard* [DS] 1911b, p. 5; *Kingston News* 1889, p. 5; Moore 2006, pp. 30–33).

At the turn of the twentieth century, however, the wrecks' historic value began to be recognized. The shallow-water wrecks were the subject of field investigation and insightful comment by newspaperman and author Charles Henry Jeremiah Snider between 1909 and about 1950. In 1937–1938, a hard-hat diver was employed to search the waters around the old dockyard where 11 wrecks were found. Later, the old frigates in Deadman Bay were salvaged to recover artifacts for a military museum. Nearly 15 years later in 1951–1952, Professor Richard A. Preston who taught at the Royal Military College, which was built on the site of the dockyard, teamed-up with a navy "frogman" to identify the abandoned warships. Modern underwater archaeological study of the wrecks first took place in the late 1980s, partly to confirm their identities (Moore 2006, p. 33, pp. 71–80, 95–102, 107–131).

There are six abandoned naval vessels at Kingston. Three can be identified by name as HMS *St. Lawrence*, HMS *Prince Regent,* and HMS *Princess Charlotte*. Three others in and around Navy Bay remain unidentified (Moore 2003, 2006, 2008a, 2008b). An invaluable 30-m long portion of *St. Lawrence*'s lower hull survives in water which is 2.5 m deep and the lower hulls of *Prince Regent* and *Princess Charlotte* survive from stempost to sternpost in 3–4 m of water. Archaeological survey has shown how naval shipwrights used clever methods to assemble the hulls under pressing wartime conditions (Moore 2006, pp. 45–70, p. 81; Walker 2006). Construction features both agree and disagree with Royal Navy ship plans prepared in 1815, underscoring the value of comparison and contrast of historical and archaeological evidence. Indeed, *Prince Regent* was successfully identified in part given that three prominent mast steps were preserved in its hull; their spacing closely matched the mast spacing as shown on the ship's 1815 lines plan. One of the most interesting aspects of *Princess Charlotte* is the collection of artifacts raised from the wreck in 1938. These include fixtures and items left in the hull before it was abandoned, including a copper magazine lantern, a gunpowder mixing table, shot, hand weapons, and interestingly, old French guns used as ballast (Moore 2006, p. 53, pp. 121–135). Of note here is that the peacetime removal of ordnance and shipboard equipment, a long period in ordinary, and its final abandonment had not resulted in the wholesale stripping of its contents.

The three other suspected abandoned naval vessels at Kingston lie close to the former dockyard and have yet to be identified by name. "Wreck Charlie" in Navy Bay, named in true military fashion by Preston's diver, was accessible to diving as late as the 1980s but is now under landfill, providing yet another example of the vulnerability of abandoned vessels to development (Moore 2006, pp. 101–102, 109–119). The "Navy Bay Wreck" was abandoned parallel to the western shore of Navy Bay, and having narrowly dodged being similarly buried, has been the subject of preliminary study by Parks Canada (Moore 2008b, pp. 37–38) and a survey by Nadine Kopp (2012). Lastly, "Guenter's Wreck" off the mouth of the bay in 15 m of water has been known for some time but only recently has it been identified by Parks Canada as a possible War of 1812 wreck, based on comparison with *Prince Regent's* and *Princess Charlotte's* construction features (Moore 2008b, p. 35). Given the historical evidence and the wreck's dimensions, it could be HMS *Wolfe* (21 guns) among other possibilities (Moore 2008a, p. 24). Infilling of the lower hull with sediment has obscured identification-aiding features such as mast steps. In summary, Kingston's War of 1812 abandoned ship assemblage encompasses a unique range of warship types and sizes, rests in close association with on-shore sites from an intact nineteenth century naval and military cultural landscape, has demonstrable historical and archaeological significance, and is readily accessible for recreational diving (Moore 2009).

## Garden Island Ship Graveyard

Situated 3 km southeast of Kingston between the Ontario mainland and Wolfe Island, Garden Island was the home of one of Kingston's most important and diversified marine businesses between 1830 and 1914. The Calvin family and its partners operated timber forwarding, shipbuilding, and later towing and wrecking operations on the island. Between 1839 and 1903, 62 vessels were built on the island. Its harbor, in Back Bay on the protected southeast flank of the island, was crammed with piers and cribs. Not unexpectedly, a sizeable ship graveyard grew in Back Bay and around launching ways on the northeast side of the island. An 1881 newspaper article eloquently reported that it contained "... the sunken, abandoned hulls of several old steamboats and vessels, whose exposed parts, weather beaten and fearfully dilapidated, serve as so many monuments marking the resting places of the pioneer craft" (*Daily British Whig* [DBW] 1881, p. 3). In this poignant article, veteran Calvin employee Captain Donnelly was interviewed and he identified some of the wrecks by name, outlined their construction histories and former routes, and explained what engines, boilers, and machinery were swapped and redeployed as modes of marine transport evolved (DBW 1881, p. 3):

> I have assisted in burying most of the old boats. The machinery was taken out of those which it was not the intention to again repair or divert to other purposes. Some of them are older than I am, and all have been good and satisfactory investments.

He described how some vessels were stockpiled in the graveyard for years and later raised to be refitted as barges while others were "permanently retired" their "usefulness being gone." Others were removed from the ship graveyard for other purposes. For example, the hull of the former Calvin and Company steamer *Sir John A. Macdonald* was fetched for use on a salvage job in a St. Lawrence River rapid. Ballasted with tons of stone, it was deliberately sunk upstream to shelter salvage vessels from the current (DBW 1897, p. 1).

Two episodes of underwater archaeological survey at the ship graveyard have taken place. The first was a 1983–1984 preliminary survey of the steamer *D.D. Calvin* by the local marine heritage group Preserve Our Wrecks (POW) (Neilson 1988). The second was a 1996 inventory survey of the entire graveyard carried out by the author as part of a POW project to record Kingston-area wrecks prior to their colonization by invasive zebra and quagga mussels. A total of 23 wrecks within the shallow waters of Garden Island were surveyed using air photos, plane survey, and snorkeling or diving examination. Correlating archaeological attributes with historical sources, most notably a ship graveyard map, confirmed the identities of seven vessels in addition to *D.D. Calvin*, including: the side-wheel steamers *Parthia*, *Chieftain*, *Hercules*, *Highlander*, *William IV*, screw-steamer *Rideau King*, and schooner *Denmark* (Moore 1998, pp. 48–63). Fifteen other wrecks remain unidentified.

All wrecks lie upright in shallow water 1.8–3.0 m deep with two on the north side of the island in 10 m. Most survive from stem to stern and out to the turn of the bilge, invariably with their lower hulls opened up. They show telltale archaeological signatures of abandonment: empty engine mounts; absent boilers but *in situ* fire

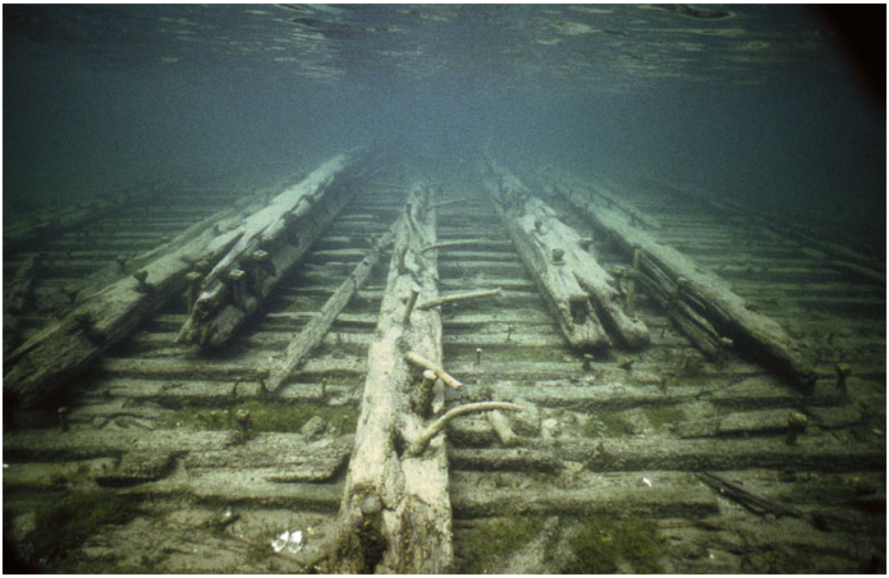

**Fig. 4.2** The lower hull of *Highlander* showing its floors, keelson, and engine-bearing timbers. Built in 1850, *Highlander* burned at Garden Island in 1871 where it was stripped and put in the graveyard. (Photo by Jonathan Moore, Marine Museum of the Great Lakes at Kingston, POW fonds, accession 1998.012, slide BbGc-58-008)

brick beds (Fig. 4.2); cut propeller shafts with missing propellers yet *in situ* shaft adjusters; evidence of placement assurance in the form of large boulders in one hull; preserved mast steps and centerboard trunks; and easily distinguishable steam-versus sailing-vessel rudders strewn about. Archaeological study showed that eight graveyard wrecks were definitely steam ships, two definitely sailing vessels, and the propulsion type of 13 remain unknown (Moore 1998, pp. 51–62).

Wreck distribution within the graveyard exhibits some classic abandonment patterns (Moore 1998, p. 63). About ten grouped vessels are aligned in a northeast to southwest orientation at Pea Point that bounds the southwest side of Back Bay; most of these vessels are paired side by side, ostensibly to form a long breakwater. They are often superimposed, difficult to distinguish, and comingled with crib remains (Moore 1998, pp. 56–57). Elsewhere others are aligned side by side and notably *William IV* was placed on the windward side of a marine railway "to serve as a breakwater" (DBW 1900, p. 1).

Garden Island's ship graveyard holds a remarkable collection of at least 23 ships from the nineteenth and early twentieth centuries within a 1 $km^2$ area. It is both, the most populous and dense Kingston ship graveyard. It grew out of the pioneering shipping and shipbuilding activities of a sizeable family business active for almost 100 years. Notably, it was a private graveyard not open to all comers, but rather ships placed in reserve or that had been damaged, destroyed by fire, or salvaged; in many cases they were carefully arranged to form breakwaters. When the Calvin's business folded in 1914, the privately owned island was not further developed, and a once thriving commercial community became a ghost town. Consequently, its associated ship graveyard ceased to accumulate new burials. This fascinating collection of wrecks sees relatively little sport diving, chiefly because the wrecks are shallow and broken-up and partly because the graveyard's waters are perceived as private.

## Kingston Inner Harbor Ship Graveyard

Kingston's earliest commercial harbor was situated at what is now its northern flank where it was tucked inside the mouth of the Cataraqui River. As Kingston grew during the nineteenth century, so did its harbor which expanded southwards and westwards out into deeper frontage to accommodate increasingly large vessels. The harbor was bisected by the construction of a bridge across the river mouth in 1828 that was later superseded by a causeway; this formed an "Inner Harbor" north of the crossing. Increasingly marginalized over time, parts of the Inner Harbor became the site of a sizeable marine graveyard. This was the subject of a 1994–1995 study by the Marine Museum of the Great Lakes at Kingston led by the author (Moore 1995, 1996).

The earliest documented use as what was referred to as the "boneyard below the bridge" dates to the 1860s when old barges, scows, and Durham boats were cast as unhealthy vectors of disease and "unsightly nuisances." The city's poor were encouraged to scavenge them for firewood but conversely they were considered useful for land-filling (Moore 1996, pp. 3–4). Marine activity was focused in a small corner of the Inner Harbor ringed by rail, coal, and wood yards, a dry dock, and shipyard with factories to the north. During the construction of the dry dock in 1882, the abandoned barge *Linnet* was raised and placed end-to-end with the barge *Odessa* to form one of its sides. Others were less carefully deposited: the schooner *Helen* was "towed into the bay, and a hole being punched in her bottom allowed to drift towards Bell Island near which she sank" (DBW 1882, p. 3).

During the late nineteenth and early twentieth centuries, the unsanctioned dumping ground of convenience attracted more and more "superannuated" ships; some burned deliberately or accidentally, others were cut up for firewood, some the subject of court proceedings to determine responsibility for their removal and all were unwelcome by city authorities. In 1902, the harbormaster encouraged the creation of an official ship graveyard:

> For years old, worn-out vessels have been towed to various parts of the harbor and there left. In all such cases they are a menace to navigation ... Mr. Calvin, at Garden Island, has a graveyard for such old vessels, and the city should have one, too. Or if the derelicts were taken out into deep water and sank, it would not be so bad ... In my opinion it would be a wise move on the part of the city to choose a place as a graveyard for old vessels, and then made it compulsory for every derelict to be buried there (DBW 1902, p. 2).

City authorities met with limited success to these ends and sought federal government-sponsored harbor improvements with spin-off derelict removal. Early air photographs and a 1921 government plan of the ship graveyard show abandoned

**Fig. 4.3** Kingston Harbor showing floating and sunken derelict vessels in the Inner Harbor graveyard (*top right*), September 25, 1924. Some of these vessels were removed during clearances in 1925 and 1937. (National Air Photo Library, Ottawa, HA.22.31)

vessels cheek by jowl with functional or soon to be abandoned craft, some of which were put to use as breakwaters, and many clustered around derelict coal docks (Fig. 4.3). These included the barges *Chicago* and *Glengarry*, a derelict schooner *Abbie L. Andrews*, schooner-barge *Rickarton*, and most notably, the aged wooden bulk freighters *Mapleglen*, *Maplegreen*, *Maplegorge*, *A. McVittie*, *Nicaragua*, *Stormount*, and *Sarnor*, most of which were recently acquired by Canada Steamship Lines (CSL) (Moore 1996, pp. 10–11). The city had taken the unfortunate owner of *Abbie L. Andrews* to court in 1920 to have the aged and sunken schooner moved from a coal wharf. The Pyke Towing and Salvage Company dumped it in the Inner Harbor, punctuating the end of the schooner's 47-year working life in the dying days of commercial sail on Lake Ontario (Fig. 4.3). City council more diplomatically explored options to remove the freighters "without causing any ill-will of certain companies that wintered a large number of their vessels in Kingston harbor" and the potential loss of allied ship repair, chandlery, and wintering revenue (Moore 1996, pp. 12–13).

In 1925, four of the CSL steamers were removed by the Donnelly Salvage and Wrecking Company and sunk in deep water off Amherst Island (discussed further in the chapter); this clean-up was probably paid for by CSL following city complaints. Others that remained were scavenged for firewood or burned by vandals. In the latter case, the fire department made no attempt to “save the old relics” since they posed no hazard to other shipping, and though graveyard critics noted the improved harbor appearance, the fires would only serve to complicate their complete removal in the future (DS 1926, p. 12; Moore 1996, p. 15). During a final government clean-up in 1937, the CSL steamers *Sarnor* and *Stormount*, barkentine *St. Louis*, and schooner *Hattie Hutt* were raised and sunk in deep water off Nine Mile Point by Sincennes-McNaughton Tugs Ltd. (discussed further in the chapter). By the late 1930s, the wooden vessels of the graveyard were either removed or had rotted below the water’s surface, when a new collection of dredges, dump scows, tugs, and other miscellaneous floating stock occupied marginal spaces until cleaned out in the late 1970s. By this time, Kingston’s Inner Harbor was gentrified and Kingston’s role as a commercial port virtually ceased. A notable archaeological discovery came in 1953 when five vessels were unearthed from under landfill, probably from the 1860s wreck deposition phase (Anonymous 1991, 1992; Moore 1996, pp. 3–4, 16–21).

A diving and snorkeling inventory survey of the ships that ultimately remained in the Inner Harbor was carried out in parallel with the historical research outlined earlier in this chapter. In all, 13 wrecks were relocated and inspected, all of them deposited in an east to west alignment perpendicular to the western shore of the Inner Harbor. Six of them are positioned in side-by-side pairs, one pair of which formed a pier extension at a cotton mill. All of the vessels are wooden-hulled except for one that has a riveted iron hull with external protective wooden sheathing, a telltale sign of a steamship that ran the rapids of the Upper St. Lawrence River (Moore 1995, pp. 65–70, 1996, pp. 21–22). The hulls of all vessels are only partially preserved, given the shallow water. Typically, they survive from stem to stern out to the turn of the bilge; like all of the shallow-water wrecks at Kingston, winter ice no doubt hastened their decay and rendered the vessels more readily accessible to scavenging. Archaeological remains yielded limited and at times ambiguous clues to propulsion; *Chicago*, *Glengarry*, and *Abbie L. Andrews* alone could be identified.

Available evidence points to the ship graveyard as the resting place of vessels abandoned in the late nineteenth to early twentieth centuries. Local mariners, shipping firms big and small, and salvers saw parts of the Inner Harbor both, as marginal and a convenient dumping ground. Some hulls were used for wharf extensions, marine structures, and landfill, while others were scavenged for firewood or torched by vandals. They were consistently referred to as “... eyesore nuisances and hazards to both health and navigation” by city officials (Moore 1996, pp. 22–23). Today, given their shallow depths and silty and weedy surroundings, these wrecks receive no sport-diver visitation and few city residents are even aware of their existence.

## Amherst Island Ship Graveyard

The Amherst Island Ship Graveyard is a cluster of ten abandoned vessels located approximately 16 km southwest of Kingston off Amherst Island. It was first used during the June and July 1925 clean-up of Kingston’s Inner Harbor when the bulk freighters *Mapleglen*, *Maplegorge*, *Maplegreen*, and *A. McVittie* were sunk there in water approximately 18–23 m deep (Lewis and Neilson 2008, p. 11; Moore 1996, p. 15; Neilson 1991, p. 32; Neilson and Shales 1985). In June 1925, the *Daily Standard* (1925, p. 5) reported sentimentally on the removal of *Mapleglen*, the first of four vessels to go from Kingston Inner Harbor:

> The boats have been there now a long time and perhaps not a beautiful landmark, they had a sort of picturesque beauty. With a groan the ancient and stalwart steamer broke away from its position seeming to beg to remain. But the irresistible pull of the gnats at her side was too much and she started her final voyage. She was slowly towed to a quiet and lonely spot near Amherst Island where the last rituals over the aged and creaking vessel were "said." There is a depth of over seventy-five feet where she was buried.

In addition to the CSL ships, at least five other vessels were later added to the graveyard. Of particular note is the iron-hulled side-wheel steamer *Cornwall*, the subject of a remarkable "biography" entitled *The River Palace* by Walter Lewis and Rick Neilson (2008). Walter Lewis is a marine historian and diver and Rick Neilson a Kingston diver, shipwreck researcher, and marine historian. Their biography of this vessel embodies countless event types and processes associated with ship salvage and deliberate abandonment. Built in 1854 as a palace steamer, *Kingston* experienced catastrophic fire on two occasions, numerous groundings, collisions, rebuilds, reincarnations, and name changes to *Bavarian*, *Algerian*, and ultimately *Cornwall*, spending the twilight of its career as a wrecker. On a snowy day in late 1931, the redundant wrecker was towed from Portsmouth Harbor (now a part of Kingston Harbor) to the graveyard by its last owner Sin-Mac Lines Ltd. and dispatched to the bottom with the aid of dynamite (Lewis and Neilson 2008, pp. 24–40, 47–58, 143–144, 173–201; Neilson 1991, pp. 32–33; Neilson and Lewis 1999, p. 17).

In 1976, Kingston diver Ed Donnelly started to relocate the graveyard wrecks, a search continued in 1980 by Rick Neilson. The wrecks soon became popular recreational dive sites. Later in 1989, Neilson found the wreck of *Cornwall* after a protracted search and it also was soon opened for visitation (Neilson 1991). Divers have recorded all of the wrecks with photographs and video but they have received only cursory archaeological examination that includes hull dimension recording by Neilson (Moore 1998, pp. 32–36; Neilson 1980–2011). Unlike *Cornwall*, the nine other graveyard wrecks remain unidentified, including the four large freighters from 1925 and three other hulls, including at least one tug. Neilson gave the biggest wrecks the tongue-in-cheek yet handy names "Titanic," "Queen Mary," "Lusitania," and "Empress of Ireland" for ease of reference. Their level of preservation is typically limited to an opened-up lower hull intact from bow to stern but in varying states of collapse and without any superstructure. As a collection, they exhibit classic abandonment signatures such as large in situ boilers and engine beds devoid of engines but with drive trains and propellers. Unlike their former Inner Harbor neighbors, these wrecks attract divers and POW maintains moorings at them (Dekina 2009; Northern Tech Diver 2007; Preserve Our Wrecks, Kingston 2011; Wilson 2009). The large steamers constitute an accessible archaeological collection of 1887–1890 American-built screw-propelled package freighters launched as far afield as Great Lakes ports Milwaukee, Grand Haven, Buffalo, and

Detroit that were later converted to bulk freighters and sold across the border to Canada between 1912 and 1919 (Moore 1996, pp. 27–28; Neilson 1991, p. 32). Although local and visiting divers alike appreciate the scale of these wrecks, individual wreck identification would improve diver understanding of each vessel's history and its place in Great Lakes shipping; this will only be accomplished through additional historical and archaeological study to pinpoint identification clues.

*Cornwall* has received the greatest attention of all the wrecks. Lewis and Neilson (2008, pp. 11–18) give an archaeological tour of the wreck and point to repair and abandonment signatures: a "concrete patch" on the starboard side could be from an 1889 repair (Lewis and Neilson 2008, p. 15, 176); a tear in the port-side hull plating could be damage from explosives and a forward bulkhead door was kept open "so as not to interfere with her sinking" (Lewis and Neilson 2008, p. 14). Furthermore, the boilers, paddle wheel shaft supports, and paddle wheels themselves are in place but not the engines; the bulkheads could have been removed preabandonment to facilitate sinking. The presence of artifacts around the wreck such as "wooden barrels, tools, steam pipes, a bed, a ladder," windlass and a small engine all described by Neilson (1991, p. 33), attest to the fact that the wreck was not comprehensively stripped prior to its scuttling. Lewis and Neilson also underscore *Cornwall's* historical and archaeological significance as "only the fourth commercial iron vessel on the Great Lakes" and "one of the oldest riveted hulls in North America." They also point out that, "In no other place on the lakes can you explore the wreck of a mid-nineteenth century iron-hulled paddle-wheeled steamboat" (Lewis and Neilson 2008, p. 9; Neilson 1991, p. 33). What is more, a wooden-hulled side-wheel steamer *Comet* wrecked in 1861 following a collision lies 3 km from *Cornwall*, providing an archaeological counterpoint. *Comet* exhibits a strikingly similar level of preservation to *Cornwall* but embodies earlier-generation marine technologies and a different suite of presinking formation processes (Lewis 1985; Neilson 1991, p. 33; Walter Lewis, personal communication 2011).

## Nine Mile Point Ship Graveyard

This official ship graveyard is located approximately 15 km south–southwest of Kingston, off Nine Mile Point, Simcoe Island. This deep-water graveyard was used for a 4-month period in late 1937 during a government-sponsored clean-up of Kingston's Inner Harbor and Portsmouth Harbor (Moore 1996, pp. 15–19). This work mirrored other similar clean-ups of derelict vessels in other Great Lakes ports during the Great Depression such as at Port Arthur and Fort William, Lake Superior.

The village of Portsmouth situated just west of Kingston was the site of a shipyard and protected harbor, and like Kingston's Inner Harbor, had accumulated a number of derelict and abandoned vessels by the 1920s; it was also home to the Donnelly Salvage and Wrecking Company fleet. This firm inconsiderately crowded most of the available pier space and owned nuisance and eyesore derelicts in the harbor, to the

**Fig. 4.4** The crew of *Cobourg* (*left*) sets off a dynamite charge in the stern of *Stormount* at the Nine Mile Point Ship Graveyard, September 30, 1937. The thin wooden cross amidst the spray suspends the detonator wire. (LAC, Department of Transport fonds, file no. 8308-128, e010963487)

exasperation of Portsmouth village council (Rick Neilson, personal communication 2011). The federal Department of Transport contracted the 1937 clearance work to Sincennes-McNaughton Tugs Ltd., and it closely monitored the work by employing a resident inspector (Library and Archives Canada, Ottawa [LAC], RG 12, vol. 5199, file 8308-126, 1936–1966). Between September and December 1937, eight derelicts were raised then scuttled, including *Hattie Hutt*, *Saint Louis*, *Sarnor*, and *Stormount* from the Kingston Inner Harbor graveyard (Moore 1996, p. 19) and the steambarges *Palmbay*, *Simla* and *Simon Langell* as well as the barge *Augustus* from Portsmouth. Detailed contract specifications, correspondence, progress photographs, and weekly reports minutely record the planning and execution of this government clean-up operation. They show that most of the hulls survived only to the waterline, so makeshift wood and canvas coffer-dams as well as temporary bulkheads were attached to the derelicts' topsides for refloating, among other clever salvage tactics to reinforce and pump out the hulls and salvage scrap metal. Explosive charges were used to sink the hulls near a prepositioned spar buoy that marked the "sinking ground" (Fig. 4.4). Although *Augustus* was destined for the Nine Mile Point, it sank en route during sudden foul weather, despite the best efforts of Sincennes-McNaughton's crew to keep it afloat and get it to the designated sinking ground; government officials were "satisfied upon inspection that the derelict was well disposed of although not in accordance with specification" (Memorandum for Acting Director of Marine Services, 6 December 1937, LAC, RG 12, vol. 5199, file 8308-126, part 2).

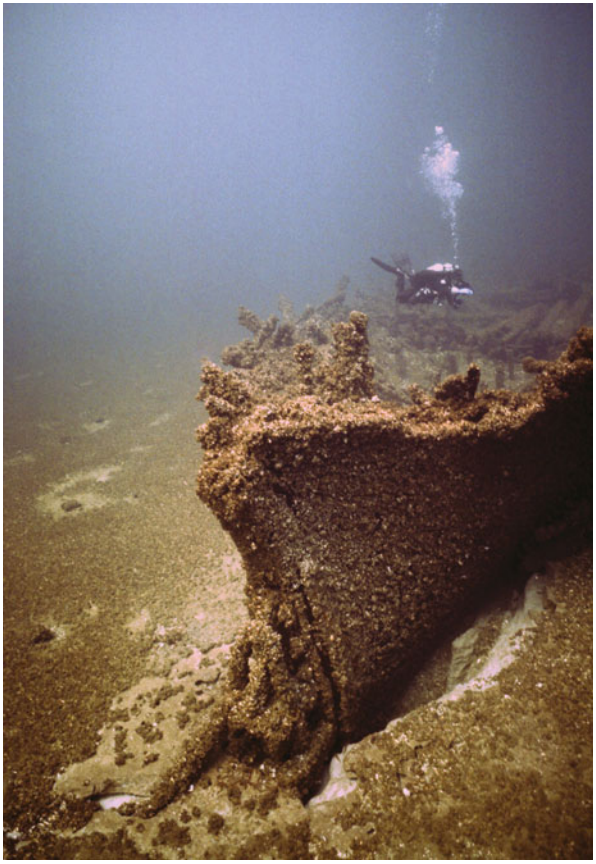

**Fig. 4.5** Stern of an unidentified steamer in the Nine Mile Point graveyard showing that its shaft and propeller were removed prior to its scuttling. (Photo by Vlada Dekina)

There are a total of nine wrecks in this graveyard in depths between 27 and 29 m, including the seven listed earlier plus two other hulls. All were measured and described (and some first found) by Neilson beginning in the early 1980s (Neilson 1980–2011), but identification of the partial hulls has not yet been completed. Divers occasionally visit and photograph them but without a clear picture of individual wreck identities (Dekina 2009; Northern Tech Diver 2007; Wilson 2009; Fig. 4.5). The two sailing vessels *Saint Louis* and *Hattie Hutt* are discernible by their smaller dimensions and the presence of centerboard trunks; only two of the steamers have in situ four-bladed iron propellers and none of them have engines. Indeed, one wreck has a rudder lying amidships and the feet of its engine mounts cut off at the ankle so to speak. It would be interesting to examine carefully the wrecks for archaeological traces of the 1937 salvage activities such as the temporary bulkheads and coffer-dams.

The ninth wreck is a short distance from the main 1937 wreck cluster. It was first found and identified by Rick Neilson as *William Johnston*, a tug that took part in the 1937 clearances and was itself abandoned in the graveyard in 1941 by its last owner Sincennes-McNaughton Tugs Ltd. Built in 1839–1840 at Garden Island, the vessel had an eventful and varied 100-year working life that ended as a wrecking tug (Kohl 1997, p. 210; Lewis and Neilson 2008, pp. 133–134; Moore 1998, p. 91). The wreck itself survives from stem to stern to the level of the top timbers throughout and shows clear signs of preabandonment salvage. A rectangular aperture was neatly cut into its port side to remove the engine and boiler, and equipment and fittings were stripped throughout, although the rudder, tiller, propeller shaft adjuster, and propeller are in situ. In its salvage days, *William Johnston* operated with the tug *Frontenac*, built by Calvin and Company at Garden Island in 1901. *Frontenac* was wrecked in 1929 near which *William Johnston* was later abandoned. Like the *Cornwall* and *Comet* examples, this tug serves as an archaeological contrast to its scuttled sister ship on account of its collapsed wheelhouse, mast and derrick, in situ equipment and fittings, and comprehensive artifact assemblage (Moore 1998, pp. 46–47, p. 91).

## Other Burying Grounds and Individual Graves

In addition to the clearly defined ship graveyards described so far, there are other individually abandoned craft in the harbor and less populous concentrations that yield a grand total of 29 wrecks. These appear to represent individual abandonment events carried out over a wide chronological span by disparate owners. Two wreck location charts produced by Rick Neilson (1987) show 13 vessels with telltale signs of deliberate abandonment that are fairly evenly spread out along the southern flank of Kingston Harbor and are all less than 1.6 km from shore. Seven more recent discoveries bring this total to 20. To date, these hulls have received minimal archaeological recording (apart from hull dimensions recorded by Rick Neilson and others), photographic and video documentation, creation of selected dive guides, and some attempts to identify them by name and type (Dekina 2009; Neilson 1980–2011; Northern Tech Diver 2007; Preserve Our Wrecks, Kingston 2011; Wilson 2009). A high proportion of wrecks in this group appear to be salvage related, and include the derrick scow *Islander* (used by Sincennes-McNaughton in the 1937 harbor clearances and scuttled in 1940), a dump scow, flat scow, at least two tugs, two possible wreckers, and the salvage barge *Augustus* removed from Portsmouth in 1937. Interestingly, there is a noticeable concentration of abandoned vessels trailing from and to southwest of Portsmouth Harbor. Here, a popular 17-m deep site called the “Stacked Hulls” is a 44-m long hull resting directly atop a 70-m long hull, a sure sign of deliberate abandonment but with few identity clues.

The abandonment of the steambarge *Norseman* at the western end of Kingston Harbor played out in contemporary newspapers; its story reveals some curious abandonment behaviors. In June 1911, *Norseman*, built in 1864 and almost 50 years old, was on its last legs at Kingston when a steamboat inspector refused it a permit “to ply on these waters.” It was seized by a sheriff for failure to pay the crew’s wages, sold at public auction, purchased by the Donnelly Salvage and Wrecking Company, stripped of its engine and machinery and converted to a barge, sunk and raised on two occasions, deliberately run aground by the Donnelly’s in a small inlet called

Collins Bay in 1912 where it was later struck by lightning and burnt to the waterline (despite efforts by the Donnellys to extinguish the fire). Finally in 1914, the Donnellys returned to the wreck given that "The boat is an obstruction and not worth raising, so it is intended now to blow it to pieces and clear it away" (DBW 1911a, p. 2, 1911b, p. 2, 1911c, p. 8, 1911d, p. 3, 1911e, p. 3, 1911f, p. 2, 1912, p. 5, 1914, p. 2; DS 1911a, p. 1, 1911b, p. 5, 1911c, p. 7). Based on available evidence, the salvage firm's decision to run it ashore rather than sink it in deeper water is curious, given that their initial abandonment incurred subsequent expense and effort. The stripped wreck is still in Collins Bay where the Donnelly's put it, lying at a right angle to the south shore. At periods of low lake levels, it is still a navigation hazard (Rick Neilson, personal communication 2011).

The case of the Keyes Wreck at an abandoned dock at Marysville, Wolfe Island, 5 km southeast of Kingston presents an interesting example of vessel reuse. The wreck has been the subject of detailed archaeological study by Benjamin Ford (2009, pp. 251–260, 509–510) who sought to identify the wreck. Local oral histories informed him that it was a coal barge that burned and sank at the dock in the 1920s or 1930s. Newspaper extracts later compiled by Rick Neilson reveal a different story, yet corroborate archaeological inferences made by Ford. The wreck is the steam-barge *Scotia* converted into the base of a coal dock in 1896 (DBW 1895, p. 4, 1896, p. 3). The hull later experienced a wrecking of sorts, breaking apart and spilling its store of coal in 1905 (DBW 1905, p. 2):

> Tuesday night at Wolfe Island dock, the old propeller Scotia used by William Allinson, as a coal shed, collapsed, and dumped between four and five hundred tons of coal into the river. This will mean a loss of close to $1,000. Some years ago the propellor [sic] Scotia was condemned as unfit for navigation. She was towed across the river, sunk on her bottom at the dock and for over ten years has been used for coal. The collapse was due to the hull of the boat "spreading."

Soon after, the hull remains above the waterline were removed to improve the appearance of the harbor (DBW 1907, p. 5).

Deliberate abandonment of old vessels continued at Kingston after the Second World War. The iron-hulled *Cobourg* and steel-hulled *Hilda* and *Londonderry* built in 1897, 1898, and 1901 respectively were salvage vessels that had been laid-up in Portsmouth Harbor; indeed both the *Cobourg* and *Londonderry* were used by Sincennes-McNaughton during the 1937 Kingston and Portsmouth derelict clearances. All three in turn were scuttled closely together in a deep 70–78 m "hole" in the Upper Gap (a channel west of Kingston) over a 3-year period between 1966 and 1969 (LAC, RG 12, vol. 5199, file 8308-126; LAC, RG 42, Shipping Registers, vol. 1686, f. 19, 119, 193; Rick Neilson, personal communication 2011). They were scuttled at a time when recreational diving and dive tourism at Kingston were in their infancy—given that they are beyond the normal recreational depth limits, Neilson has lamented: "It sure would have been nice to have them dumped in 100 ft. of water somewhere" (Rick Neilson, personal communication 2011). Compare this with the case of the retired *Wolfe Islander II*. This 1946 car ferry was carefully sunk in 1985 just east of Kingston to serve as an all-weather recreational dive site in 26 m of water. About the same time, the retired sandsucker *S.M. Douglas* built in 1897 but being used as a breakwater was scuttled in deep water near the Main Duck Island lighthouse in 1986 under windy conditions (Kohl 1997, pp. 211–216). The vessel drifted some 8–10 km while sinking and was only found by chance in 1997 far from its intended sinking position (Rick Neilson, personal communication 2011).

## Discussion: Kingston's Abandoned Ship Assemblage

Examining the overflowing filing cabinet that is Kingston's shipwreck archive reveals that deliberately abandoned vessels represent over three-quarters of the files, all of them stuffed with information about the maritime past of Kingston and the Great Lakes. Out of a total of 110 wrecks at Kingston and its western approaches, 90 were deliberately abandoned. This chapter has explored local ship abandonment based on evidence collected chiefly by divers and more recently underwater archaeologists and students, and is an endorsement of the value of coordinated historical and archaeological research to bring out the best in these two categories of evidence, ideally to write authentic ship biographies in books, research papers, websites, and dive guides. This retrospective shows that writing these biographies is constrained perhaps only by our ability and willingness to fully exploit what contemporary record keepers, abandonment behaviors, and site formation processes have left preserved in the abandonment files.

The character of the assembled Kingston files is duly influenced by the nature of both, historical and archaeological research. There are rich, but at times elusive, veins of abandonment information to be mined from local, provincial, and national archives. Newspapers have been printed at Kingston from 1810 to the present, and for 25 years, Rick Neilson has meticulously searched of them decade upon decade; to date he has transcribed a staggering 30,000 marine extracts, many of them chronicling ship abandonment. Contemporary ship graveyard maps (from all chronological periods) and photographs have also proven to be particularly valuable historical sources. Archaeological studies of abandoned watercraft have varied considerably in both, geographical coverage and intensity yet all known examples have received at least some level of recording. There has not been, however, a comprehensive archaeological inventory or all-encompassing remote sensing survey of the harbor and its approaches and for this reason, other abandoned vessels certainly remain undetected.

Kingston's abandoned ships have launch dates from circa 1814 to 1946 although some vessels could predate this period; most were launched in the last quarter of the nineteenth century. They are found individually or in clusters, the latter ranging in population from 3 to 23 ships. They rest in a range of depths ($<$ 3–78 m) and distances from shore, and their accessibility varies. Typically, they are wooden-hulled and iron-fastened consisting of the hull bottom usually intact from stem to stern; only five vessels of 90 are iron or steel hulled. Deposition in shallow water (both preabandonment and postabandonment) and attendant water movement and ice action have often excavated for us down into the hulls, exposing useful anatomical and diagnostic information. An impressive range of vessel types has been outlined earlier.

Other patterns are revealed in the collected Kingston evidence, many of which have been understood locally for years but not always expressed. The Kingston examples reflect the multiplicity of preabandonment and postabandonment regimes, discard behaviors, vessel reuse tactics and formation processes, most of which are classified in Nathan Richards' book *Ships' Graveyards* (2008). Vessels were often shuffled from place to place prior to final abandonment, sometimes leaving a traceable historical trail. Harbor clean-ups resulted in chronologically focused final abandonment episodes that were motivated by a range of factors, from vessels being "eyesores, nuisances, and hazards to navigation" or health hazards as well as harbor redevelopment, construction work, and dredging (Moore 1996, p. 3). The historical record reveals a wide range of placement assurance behaviors from none at all by casting vessels adrift, to tucking vessels behind derelict wharves and using explosives. Archaeological evidence for placement assurance is both conspicuous and subtle: boulder ballast in a Garden Island wreck and a carefully opened hatch on *Cornwall*. Some postabandonment behaviors such as scavenging were influenced by seasonal accessibility of shallow-water ships by winter ice formation.

Spatial deposition patterns are recognizable within the assemblage. Owners and salvers deposited vessels singly or collectively in unofficial ship graveyards. Harbor clearances resulted in the creation of an official dumping ground in the 1840s near the naval dockyard and one in 1937 at Nine Mile Point. The Calvin Company maintained a private ship graveyard at Garden Island. A trademark pattern seen elsewhere is that of selected abandoned vessels being expelled from feeder sites out into deeper water. Indeed, every protected harbor inlet at one time had derelict vessels and most of these were home to shipyards and/or salvage and wrecking firms. Some vessels were left behind during clearances and some of these were later covered by landfill or subsequently removed. Vessels abandoned in shallow water are found with common axial orientations, often in pairs and groups, sometimes arranged to form elongated reuse structures. The deep-water graveyard wrecks do not share a common alignment.

There are numerous relational links among Kingston's abandoned ships, and informative comparisons have been made with local wrecked ships, collectively offering, for example, opportunities to find diagnostic and identifying features. Overwhelmingly, research effort at Kingston has focused on finding archaeological and archival epitaphs to identify abandoned vessels by name, a genealogical exercise of sorts among a veritable family tree's worth of shipwrecks. Indeed, since a ship's abandonment can be a long, drawn out affair and not always attract public attention, ship identities can fade from memory and identifying records can be more difficult to trace without a target date often associated with nineteenth and twentieth century shipwreck events (Moore 1996, p. 3). Without exception, the 20 or so "shipwrecks" in both the harbor and the ship trap west of Kingston are identified by name versus much less than half of the 90 vessels encompassed by this chapter. Apart from posing a difficulty in fully understanding a site and creating complete ship biographies like the *Cornwall* example, this anonymity through abandonment gets in the way of demonstrating both, historical and archaeological significance. Furthermore, there are repeated examples in Kingston of unidentified and temporarily named abandoned wrecks being “rediscovered” years after having first been found and dived, cases often associated with the presentation of inadequately researched, unsubstantiated, or misleading identification information. The Kingston example underscores how successful identification augments understanding and appreciation on the part of both, sport divers and the public.

Kingston’s 200 year’s worth collection of 90 abandoned ships, whether identified or not, offers unique histories, archaeological stories, and visitor experiences. Viewed through different lenses, some are more attractive dive sites, some more archaeologically informative, and some more historically significant. Equally, however, they represent links to the wider story of maritime activity, and embody the evolution of ship technology, changes in modes of navigation, and shifting patterns of trade. In describing *Cornwall*, Lewis and Neilson (2008, p. 145) have elegantly expressed this abandoned ship’s value :

> The *Cornwall* is a museum, an artifact of an age when princes travelled by steamboat, and coal-laden schooners went down in storms. She is a museum open to the public 24 hours a day during the season of navigation. She has no security guards to protect her, for she carries no wealth … She carried to the bottom only what the salvagers could not be bothered to remove. What remains can still tell us much of the life on the Lakes in the late-nineteenth century and the early twentieth century. We just have to observe and learn. And if her last owners left little of interest to collectors aboard the ship they abandoned, she remains one of the most historically significant vessels to lie beneath the waters of the Great Lakes.

Considering the *Cornwall* model and the several other cases of more complete biographies described in this chapter such as the War of 1812 shipwrecks, the scope and value of Kingston’s abandoned ship assemblage are brought into focus when we consider what could be learned from a full archaeological and historical exploration of them all.

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# Chapter 5
# A Ship Graveyard at City Point, Virginia

**Joshua A. Daniel**

**Abstract** The James River region of Virginia has one of the longest recorded histories in the United States. The area near City Point was colonized in 1613 and is still used as an industrial center. This rich history, coupled with the number of exposed wrecks, led to a side scan sonar and photographic survey that was conducted east of City Point. The goal of the City Point Shipwreck Survey was limited in scope: determine the number of wrecks within the survey area and identify vessel types and dates, if possible. The results of the survey identified 42 wrecks that have been divided into five classifications: rectangular barges or ferries, a tugboat, combination barges, ocean-going vessels, and vessels of unknown type. Historical research indicates that some of these wrecks were likely abandoned after two specific events: the Civil War and the First World War. The number and diversity of wrecks and their methods of abandonment provide a unique resource for archaeologists, while the survey provides a starting point for future archival and archaeological research. These ships represent important elements of trade and transportation from a variety of periods in the history of City Point, Virginia, and the United States.

## Introduction

As a waterway with one of the richest histories in North America, the James River has long been considered an area of high archaeological and historical importance. The project area was inhabited by Europeans as early as 1613 and is still used as an industrial center. Centuries of human habitation have left an abundant archaeological record, both above and below the water. While this project is in its initial stages, ongoing historical research provides a context for the types of archaeological resources present in the area and is used to interpret the modest fieldwork that has been conducted thus far. Environmental, political, and economic events in the history of the United States have contributed to the levels and patterns of ship abandonment in the James River. Those historical incidents have a direct impact on the trends

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of commercial activity in the river, which, in turn, have placed their mark in the archaeological record in the form of higher proportions of vessel abandonments and shipwrecks. Natural disasters sank ships in this region while the Civil War and First World War both had direct impacts on City Point and its maritime commerce. This research has identified a number of specific vessels wrecked or abandoned in the project area, and an increase in maritime activity over the course of four centuries increases the likelihood of vessels from certain time periods being deposited in the vicinity of City Point. The historical record provides a solid foundation for the continuing archaeological field activities at City Point and provides the primary avenue for vessel identification.

Submerged archaeological sites in the vicinity continue to be jeopardized by human activities. Both looting and regular dredging of the ship channel present dangers to the preservation of the shipwrecks in the river (Foster 1992, p. 58). Among a list of threatened James River sites, Kevin Foster includes the sites of the CSS *Florida* and USS *Cumberland* at Hampton Roads; the Civil War-era shipwrecks, obstructions, and fortifications at Drewry's Bluff; and the City Point docks and anchorage. Aerial photographs show a variety of shipwrecks exposed at low tide. Foster describes "[s]idewheel ferries, three-mast schooners, and at least one large wooden ship or bark" in the area (Foster 1992, p. 66). He also identified pilings surrounding one group of wrecks, a type of placement assurance strategy used to keep the vessels from drifting (see Richards 2002, pp. 366, 367; 2008 p. 23, pp. 170–172).

Due to the extensive history of the area and the number of wrecks visible above the water surface, a remote-sensing and photographic survey was conducted on the tidal flats east of City Point. The goal of this survey was limited in scope: determine the number of wrecks in the survey area and identify vessel types and dates in conjunction with the historical record. The number and diversity of wrecks and their methods of abandonment provide a unique resource for archaeologists and the Commonwealth of Virginia, and this survey provides a starting point for future archival and archaeological research. This chapter will present both a history of City Point and the results of a two day remote-sensing survey which lay the groundwork for future research activities.

## Historical Background

Following the establishment of Jamestown in 1606, the area at the confluence of the James and Appomattox Rivers was colonized by the English in 1613 when Sir Thomas Dale established the settlement of Bermuda Hundred (Hagemann 1988, p. 21; Horning 2004, pp. 34–35; Tyler 1900, pp. 130–131). The settlement, located on the James River immediately north of the Appomattox River, was named as a testament to the time Dale spent on the Bermuda Islands after being shipwrecked while on the English ship *Sea Venture* (Tyler 1900, pp. 130, 131).

Colonists began to settle in the area to the south of the Appomattox River shortly after the establishment of Bermuda Hundred. This settlement was called Bermuda City (Tyler 1900, p. 130). Bermuda City was soon renamed Charles City in honor of Prince Charles (later Charles I) and was designated as one of four principal cities when the colony was divided into four corporations. The location was selected for several key reasons including a defensible promontory, fertile soil, and a deep anchorage in the James River—a quality which made City Point an important entrepôt throughout its history. The initial settlers experienced numerous difficulties. They received little food and clothing from the Virginia Company, leading to such a sad state of affairs that by 1619 the settlement was reduced to only six decaying houses (Horning 2004, p. 36). Both settlements were destroyed in the 1622 Powhatan Uprising.

In 1635, the lands at City Point were granted to Captain Francis Eppes. Although no primary documentation exists, tradition suggests he arrived with his brother, Peter, in 1622 in the ship *Hopewell*. Francis Eppes acquired 34 headrights by financing passage for himself, his three sons, and thirty servants to Virginia, in return receiving a patent incorporating 1,700 acres. In 1653, he claimed an additional 280 acres and by his death in 1674, owned 1,980 acres on the south side of the James River and 572 acres on what is still known as Eppes Island (Horning 2004, pp. 44, 45).

In 1691, an act was passed "appointing certain limited ports, Wharfes, keys, and places for laying on shoar and loading on board all goods, tobacco and other merchandises, to be exported out of, and imported into, this their majesties dominion of Virginia" (Hening 1823, p. 54). The official port for Charles Citty [sic] County was Flower de Hundred (Flowerdew Hundred), downstream from City Point. This Act for Ports, &c. was suspended in 1693, but reinstated in 1705, again naming Flower de Hundred an official port on the James River, suggesting that City Point had not reached the prominence it would attain in the mid-nineteenth century (Hening 1823, p. 415).

## The Eighteenth Century

In 1702, Charles City County was split with those lands south of the James River becoming Prince George County. That same year, three ferries were established in Prince George County: one upstream from City Point on the Appomattox River and two downstream from City Point on the James River. In 1731, Bermuda Hundred was established as an official tobacco inspection station (Watts 1998, p. 21). The following year, another ferry was established from "City Point to Shirley Hundred at the Ship Landing." The act establishing the ferry was repealed in 1770 when Richard Eppes, the owner of a large plantation at City Point, complained that the ferry was not convenient to the public and was long disused (Kennedy 1906, p. 6). These abandoned ferries could be in the collection of shipwrecks in the tidal flats in the survey area. City Point continued to serve as a port and important landmark, and in 1755 "An Act for establishing Pilots, and regulating their fees" established a pilot rate of 7 shillings per feet of water drawn by a vessel's hull (Hening 1819, p. 492).

Commerce through this area eventually came from further up the river. As the population of Virginia increased in the eighteenth century, planters began to move westward above the fall line of the James River. Part of this movement was the establishment of the town of Stockoe, later Richmond (Watts 1998, pp. 21, 22). The General Assembly provided for a tobacco inspection warehouse at the falls of the James River as part of the Tobacco Inspection Act of 1730. William Byrd, who owned the property on which the warehouse was established, laid the foundations for Richmond on the east side of the river in 1733. Richmond quickly grew as a transshipment site for both tobacco and flour. These goods were shipped on shallow draft vessels designed to navigate the river, eventually leading to the development of a vernacular watercraft style known as the *bateau*. Once the goods arrived at Richmond, they were transferred to ocean-going vessels for shipment both downstream and overseas.

Maritime commerce at City Point in the latter half of the eighteenth century is documented by several newspaper articles and advertisements. An August 21, 1756 announcement stated that a servant man by the name of Michael Discoll "[ran] away from on Board the *Carlisle*, lying at City-Point, on James-River" (Virginia Gazette [VG] 1756). A newspaper from May 30, 1771 detailed a great flood that swept the James River, reporting that at Richmond the river rose at a rate of two inches an hour (VG 1771). Large trees were carried down the river in the swift current, endangering ships. Vessels at Shirley Plantation were swept over to City Point, and those at City Point were driven down to Jordan Point. At least one vessel went ashore at City Point, another lost three anchors, and a third "was driven so far on Shore that it is feared she will not be got off again" (VG 1771). Another advertisement from the April 2, 1772 issue of the *Virginia Gazette* states that the ship *Industry*, bound for London, was lying at City Point and was taking tobacco on consignment and provided accommodations for passengers (Lowes 1772). A year later, the ship *Jenny* arrived at City Point from Limerick, Ireland, with 70 indentured servants who would be redeemed upon the payment of their passage (VG 1773).

The Revolutionary War touched City Point only briefly. During the Virginia Campaign of 1781, British forces under the command of Brigadier General Benedict Arnold twice sailed up the James River in an effort to control strategic locations in Virginia. In January, when Arnold led a mission from Westover to Richmond, militia led by Colonel John Banister forced British ships following the expedition to retreat from the Appomattox River (Horning 2004, p. 85). When the British passed City Point, American forces fired on the vessels. Accounts from an ordnance officer indicate that 60 pieces of shot were fired in the engagement (Watts et al. 2010, p. 16).

On April 24, 1781, British forces used City Point as a landing for both supplies and men (Arnold 1932, p. 187). After destroying thousands of hogsheads of tobacco, a ship, and a number of vessels on the stocks at Petersburg, General William Phillips and General Arnold divided forces. Phillips raided Chesterfield Courthouse and Arnold marched to Osborn's landing, up the Appomattox River from City Point. There, Arnold engaged a fleet of ships. British forces captured two ships, three brigantines, fives sloops, and two schooners. In addition, four ships, five brigantines, and a number of other vessels were burnt and sunk (Arnold 1932, p. 188).

Development at City Point in the eighteenth century appears to be minimal and its society less than desirable. Archaeological testing along the waterfront identified a warehouse structure which contained a variety of eighteenth-century material (Horning 2004, p. 85). A letter from Christopher Roane in 1787, a Searcher responsible for searching ships, describes City Point as a rough and dangerous place. While addressing his pay, he states that he expected his salary to be at least £ 40 more than the previous year, "as the trouble and fatigue is greatly increast [sic]" (Palmer 1884, p. 247). He goes on to state that once in trouble, "it will be too late to apply to a magistrate after we get our brains beate [sic] out or nock [sic] over board. I can venture to say that two-thirds of the people is [sic] as much alarm'd at a parcel of drunken sailors as they wou'd be at so many devils" (Palmer 1884, p. 247). He also describes the condition of the town itself. At the time, there were four houses and two rum shops.

As Roane was attempting to procure a raise for himself, and likely exaggerating his case for that end, he paints a picture of a bleak and rough social atmosphere and a place offering little more than scant accommodations for seamen. Despite that perception, numerous vessels offloaded their freight there in 1787. In a letter dated August 7th, Roane reports to Governor Randolph, "[a]t the port of City Point there has been about sixty-five vessels discharged their cargoes the last Quarter at that place" (Palmer 1884, p. 329).

## The Nineteenth Century

The nineteenth century marked the transition of City Point from a rough landing with minimal accommodations to a bustling port. As the nascent Federal government began to establish an infrastructure in the late-eighteenth century, City Point attracted the interest of both the postal service and customs inspection. While those two entities were initially established at Bermuda Hundred, the office of the collector of customs moved to City Point in 1797 (Watts et al. 2010, p. 16). The post office soon followed, and after it, official appointments were stationed in the community. John H. Peterson was nominated by President James Madison as surveyor for the Petersburg and Richmond Districts and the inspector of revenue for the ports. He was to reside at either City Point or Bermuda Hundred. William P. Porter was nominated for the same position in 1842 by President John Tyler and presented with the same residence options. In 1836, a Rhode Island representative in the commerce committee introduced an $8,000 appropriation bill to construct a marine hospital at City Point, although the plan failed to materialize.

Newspaper accounts from the first decade of the nineteenth century give a testament to the number of ships arriving at City Point from English ports, including Falmouth, Liverpool, and London with items such as "dry goods" and "spring goods" for both Petersburg and Richmond. However, relations with England would soon take a turn for the worse as British warships impressed seamen from American ships. Prior to the War of 1812, an article in the *Raleigh Register* details indignities suffered at the hands of the British by a vessel recently arrived at City Point. The brig *Mary* was fired on by the English frigate *Melampus* 6 miles from Cape Henry. When the brig came to, a British officer boarded the vessel. The newspaper was outraged: "[i]s it not disgraceful that these fellows should be suffered to hover about our shores, molesting coasting vessels, and endangering the lives of our citizens?" (Raleigh Register 1811).

City Point appears to have been spared any hostilities during the war, and by June 1816, the first regular steamboat line servicing City Point was created (Emmerson 1947, p. 12). It was during this period that City Point became an important trading station. Tobacco and other agricultural goods were collected on the town's wharves for export, and, with the rise of steamboats, the location became one of the original stops on the Norfolk to Richmond run (Watts 1998, p. 37). In 1818, an advertisement in the *Richmond Enquirer* was published informing the public of the new steamboat *Norfolk*, the first Norfolk-built steamer, running between Norfolk and Richmond twice a week (Ritchie 1818, p. 1). *Norfolk* was to stop overnight at City Point on the trip upstream, eventually becoming the primary vessel serving the James River in the nineteenth century. In 1822, the steamboat *Petersburg* plied the Washington, DC, Norfolk, and City Point route (Daily National Intelligencer (DNI) 1822), and a year later the steamboat *Potomac* joined the same route (DNI 1823). The same year, the boilers in the steamboat *Richmond* burst while the vessel made her way from Richmond to City Point (1823, p. 2). Despite this accident, the *Daily National Intelligencer* did not report any casualties and the mishap appears to have only delayed the steamboat's arrival at Norfolk. A number of other vessels began making runs up the James River. These include *Columbus*, *Pocahontas*, *Patrick Henry*, *Thomas Jefferson*, *Hampton*, *Old Dominion*, *Champion*, *Balloon*, *Express*, *Augusta*, *Curtis Peck*, *Mount Vernon*, *Belvidere*, *William Allison*, *Comet*, *West Point*, and *Glen Cove* (Watts 1998, p. 37).

City Point's growth during this phase of its history led to its incorporation in 1826 (Bullis 2011, p. 35). Further development of City Point was fueled, in part, by the development of a railroad, which provided an important transit point between rail and river-borne commerce. In 1838, the first train linked City Point and Petersburg (Watts et al. 2010, p. 17). Contemporary maps provide clues about the development of City Point. An 1837 map drawn by engineer John Couty not only illustrates the path of the planned track of the railroad from City Point to Petersburg but also provides a detailed depiction of City Point, outlining lots and structures such as warehouses and stores. More important to the maritime heritage of City Point, this map also shows a large railroad wharf and seven other wharves of various sizes. An 1855 chart shows at least five wharves along the waterfront in addition to the railroad wharf, which had developed into a two-part wharf complex projecting into the river. Unfortunately, these charts are devoid of shipwrecks. Only one pre-Civil War wreck was identified in searchable newspaper databases. An August 25, 1827 article in *The Times* mentions the loss of several lighters at City Point (*The Times* quoted in Watts et al. 2010, p. 17).

## *Civil War*

During the American Civil War, the James River played a vital role in both Union and Confederate strategic plans. After the secession of the southern states, President Abraham Lincoln ordered a blockade of all southern ports on April 19, 1861, with the hope of capitalizing on the South's dependence on foreign commerce and intrastate shipping by denying the Confederacy access to the sea. However, General George B. McClellan's apparent inability to take action against the Confederate Army led Lincoln to issue "President's General War Order No. 1" in January 1862, requiring Union troops to move forward on February 22 (Watts 1998, p. 45). This resulted in the Peninsula Campaign, directly involving City Point in the war. In May 1862, Union Commander John Rogers of the ironclad *Galena* led a force, including two other ironclads, *Monitor* and *Naugatuck*, along with the screw sloop of war *Wachusett*, the gunboats *Port Royal, Maratanza,* and *Aroostook*, and several smaller vessels, up the James River with the goal of forcing the Confederate capital of Richmond to surrender (Watts et al. 2010, pp. 21–25). After a very brief exchange of fire between the Confederates and the flotilla at City Point, Rogers continued upstream. On May 15 the fleet arrived at Drewry's Bluff, where there was a brisk exchange of fire. The Union force was repelled by a battery and infantry in rifle pits; this exchange resulted in 12 killed and 15 wounded aboard *Galena* and the fleet returned to City Point. For the next three months, a number of small skirmishes took place at City Point. Whenever Confederates fired on Union ships, the Union ships would reply, pounding the town with various pieces of artillery. By August 17, when the Union fleet headed downstream to Fort Monroe after the failure of the Peninsula Campaign, the once-burgeoning port was left in ruins. City Point would not see Union forces for another two years.

By the spring of 1864, Union General Ulysses S. Grant devised his plan for a campaign against Confederate General Robert E. Lee and the Confederate capital of Richmond. This preparation included the return of Union gunboats to the James River, along with forces under Union General Benjamin F. Butler, with the goal of cutting the Richmond and Petersburg Railroad thereby isolating General Lee and Richmond. On May 5, 1864, General Butler occupied City Point and Bermuda Hundred. A division of African-American troops under the command of Brigadier General Edward Hunks went ashore at City Point and captured a Confederate signal station. Colonel Thomas L. Livermore witnessed some of the destruction wrought by Union forces in 1862:

> Dr. Eppes' house [Appomattox Manor]. . . was perforated with scores of cannon-shot holes. . . .This cannonade had so effectually ventilated the house that there was but one weather-tight room in it. . . .The wharf at City Point had been burned. . . and I found only the charred piles remaining (Livermore 1920, pp. 337–338).

The following month, on June 18, 1864, General Grant established his headquarters at City Point, ordering General Rufus Ingalls to begin construction of a supply depot (Watts et al. 2010, pp. 25–27). General Ingalls, serving as Chief Quartermaster, was charged with supplying both the Army of the Potomac under the command of General George Meade and the Army of the James under General Butler. Colonel

P. P. Pitkins, General Ingalls' subordinate and depot quartermaster, was directly in charge of all water transportation and recorded all that passed through the depot. They immediately began construction of wharves and storehouses at City Point as well as repairs to the rail line to the front at Petersburg.

Within a few months, City Point was transformed from a town with only a few burned wharves and warehouses to a port supplying 125,000 troops and 65,000 animals and capable of supplying upwards of 500,000 soldiers (Horning 2004, pp. 116, 117). It quickly became the second largest city in Virginia. Eight acres of wharves with over 100,000 $ft^2$ of warehouse storage served over 280 structures including offices, barracks, housing, a bakery, jail, hospital, and an expanded railway terminal and yard (Zinnen 1991). Over 3,000 laborers were on call to unload close to 400 ships connecting City Point with the rest of the Union. General Ingalls described the depot at City Point as "one of the most convenient, commodious, economical, and perfect ever provided for the supply of armies" (United States Secretary of War 1866, p. 589). He went on to report "[t]here was an average of some 40 steamboats of all sorts including tugs, 75 sail vessels, and 100 barges daily in the James River, engaged in the transportation of supplies, and plying between that river and the Northern ports" (United States Secretary of War 1866, p. 589). In addition to mail and passenger service, these ships brought cavalry and artillery horses, mules, ammunition, clothing, subsistence, and other supplies to City Point while taking spent horses and unserviceable equipment back to Washington. An inviting target, the depot became the victim of Confederate sabotage.

On 10 August 1864, Assistant Engineer C. L. McAlpine wrote:

> We had an excitement here yesterday at 11:25 a.m. . . .a Boat loaded with tons of powder, shell and fixed ammunition of all kinds was laying temporarily at the ordnance wharf, when from some unknown cause an explosion took place, five boats in the neighborhood were sunk or blown to atoms—180 feet of wharf is entire extinct—440 ft. of our large warehouse was sent up over the bluffs. The offices built for the Q.M. and all other buildings in the neighborhood are blown to atoms. A perfect shower of shells in one direction, saddles and bridles in another. Muskets in another &c &c Masses of Timber. Iron and debris of all kinds were thrown & scattered within a circuit of a mile. The loss of life has of course been heavy. The Surgeons reported last night 52 bodies found and about. . . 100 injured (Watts et al. 2010, 37–38 citing C. L. McAlpine to Wentz, letter, August 10, 1864, Record Group 92, Entry 1622, National Archives, Washington, DC).

Subsequent reports identify the barge *Col. E. E. Kendrick* as the source of the explosion. *Kendrick* reportedly contained 20,000–30,000 rounds of artillery shells as well as 75,000– 100,000 rounds of small arms ammunition and exploded while being loaded with percussion shells (The New York Times 1864, p. 2). The barge *Major-Gen. Meade* was tied up between *Kendrick* and the wharf. Both *Meade* and another vessel sunk in the explosion, *J. C. Campbell,* contained cavalry equipment. The identities of two other vessels reported by McAlpine as sunk in the explosion are unknown. However, *The Sun* reported that a schooner was among those vessels destroyed in the explosion (The Sun 1864). The wharf was quickly rebuilt and the ordnance wharf relocated downstream to a more remote location.

The source of the explosion remained a mystery until the end of the war. It was assumed that carelessness or an accident had caused the explosion aboard *Kendrick*.

However, after the fall of Richmond, a report of the incident was discovered in the papers of Confederate General G. J. Rains. A Confederate agent, Captain John Maxwell and a local guide, R. K. Dillard snuck behind Union lines and delivered a 12-pound “horological torpedo” with a timer to a barge being loaded with ordnance (Schaff 1990, pp. 234–235). The torpedo, with the timer set and placed in a crate marked “Candles,” was given to a laborer and delivered onboard the barge. Maxwell and Dillard waited nearby until the bomb exploded.

Several other vessels were reported lost or sunk in the vicinity of City Point. On November 27, 1864, the USS *Greyhound* exploded a few miles below Bermuda Hundred with General Butler and Union Admiral David Porter aboard. A Confederate coal torpedo was blamed for the explosion, but this was never definitively proven (Shomette 1973, pp. 65, 66). Another vessel, the canal barge *Oliver Little*, was abandoned at City Point in August 1864, being described as “rotten and worthless” (United States Secretary of War 1868, p. 150).

## *Reconstruction*

Following the war, the Union depot was dismantled and life in the area resumed at a slower pace. Like the rest of the South, tidewater Virginia’s economy was devastated. Steamboat service was slow to revive due to the numerous obstructions and sunken vessels in the James River. Large scale efforts to remove the navigational hazards were not made until the 1870s. Multiple steamboats were put into service on the James River. However, by 1871, *John Sylvester* was the only steamer on the river making a run as a mail packet (Watts 1998, p. 48).

As the economic recovery of Richmond strengthened, more steamboats were needed. Companies such as the Baltimore Chesapeake & Richmond Steamboat Company and the Virginia Steamboat Company plied the waters of the James River, stopping at many towns, including City Point (Stanton 1892). *Pocahontas* began a route on the James River in 1893, making a number of the same stops that were made during the antebellum period, including City Point (Brown 1942).

## The Twentieth Century

By 1910, the population of City Point was only 300, almost the same as it was before the Civil War (Horning 2004, p. 147; Watts et al. 2010, p. 52). Two years later, the E. I. DuPont de Nemours Company, attracted by the deep port, rail connections, and reliable water supply purchased 1,800 acres from the Eppes family on which to build a dynamite factory. With the onset of the First World War operations shifted from the production of dynamite to guncotton, an ingredient in smokeless powder.

Demand for the war prompted a massive expansion of the DuPont facilities, quickly exhausting the local labor pool. By 1916, the population had exploded to

40,000, and in the same year the General Assembly approved a charter for the City of Hopewell (Watts et al. 2010, p. 54). The City of Hopewell was named for the ship *Hopewell*, which the tradition suggests brought Francis Eppes to the New World. City Point was not annexed by Hopewell until 1923. With the rapid expansion of the town came seedier businesses. Gambling and drinking were commonplace and floating brothels called at the City Point docks (Horning 2004, p. 148).

### *Post-First World War*

With the cessation of hostilities in Europe in 1918, the DuPont Company quickly closed its doors. Workers were laid off and many left Hopewell. Unlike the period following the Civil War, however, Hopewell continued to attract various businesses with its river, rail, and road connections. This diversity of industry made Hopewell less vulnerable to the whims of industrial demand. Operations at the Tubize Artificial Silk Company and Allied Chemical continued through the Great Depression (Watts et al. 2010, p. 54). The Second World War stimulated growth in the area. Camp Lee, established during the First World War and named for Confederate General Robert E. Lee, was reactivated and added thousands of military personnel to the area. By 1942, the camp housed 45,000 military personnel (Horning 2004, p. 149). Following the Second World War, Camp Lee was converted to a permanent military installation and renamed Fort Lee.

The chemical industry at Hopewell did not come without a price. On July 24, 1975, Life Sciences Products Company voluntarily closed its doors after a number of their employees were hospitalized with symptoms indicating high exposure to the chemical Kepone (Kiernan 1975, p. B1). Kepone, an insecticide, was developed in the 1950s and patented in 1968 by the Allied Chemical Company. Subsequent investigation proved the chemical was illegally dumped into the James River. Results of EPA testing detected Kepone in the air 16 miles away from the Hopewell plant, in the river 40 miles away, and in shellfish up to 64 miles away (The Washington Post 1975, p. 106). The toxic spill destroyed the James River's commercial fishing and oyster industry. In 1988, a fishing ban was lifted, although a fish consumption advisory is still in effect due to the levels of Kepone and PCBs in river sediments (Huggett 1989, p. 417; Virginia Department of Health 2012). In spite of this setback, the economy of Hopewell and City Point continues to be supported by an active military presence and chemical industry.

## Survey and Analysis

The survey of the James River near City Point was conducted in two parts: a side scan sonar and a photographic survey. Using a Klein 3900 digital side scan sonar, the remote-sensing survey was conducted at high tide the first day. As parts of the vessels were exposed at low tide and shallow water prohibited additional sonar acquisition, the next morning was spent photographing the wrecks to provide supplemental details. Project personnel consisted of Dr. Gordon Watts, Dr. John Broadwater, and the author.

Analysis of the side scan sonar data identified 42 wrecks near City Point that have been divided into five classifications: rectangular barges or ferries, a tugboat, combination barges, ocean-going vessels, and vessels of unknown type. Seven of these are rectangular wooden barges or ferries, one is a tugboat, and three could not be categorized based on the sonar data. Fifteen are classified as combination barges and sixteen as ocean-going vessels.

## *Combination Barges*

While canal barges supplied the Union army during the Civil War, the size of the vessels located in this survey suggest they were used after the war in the late-nineteenth- and early-twentieth century for bulk transport. Similar combination barges were identified by North Carolina archaeologists Richard Lawrence and Mark Wilde-Ramsing in a ship graveyard near Elizabeth City, North Carolina. An investigation of the site revealed that these barges ranged in length from 197 to 206 ft with beams from 20 to 22 ft (Smith 2010). The combination barges at City Point exhibit similar measurements and construction features to those at Elizabeth City (Figs. 5.1–5.2). A 1916 report to the U.S. House of Representatives states that this type of barge was called a "combination seagoing and inland barge," because it was capable of handling the work of both inland and seagoing barges (U.S. House of Representatives 1916, p. 20). These vessels could run along the coast, but they could also operate in canals due to their light draft and narrow beam. The report described these barges as "about 200 ft long, 24 ft beam, and have from 12 to 16 ft sides and no masts or motive power of their own. They can carry about 500,000 ft of lumber or 900 tons of dead weight on a 9 ft draft, but considerably more when fully loaded to a 10 or 11 ft draft" (U.S. House of Representatives 1916, p. 20). They provided a cheap means of transportation, were built at a lower cost, could carry more on a lighter draft, were cheaper to operate compared to other open-water vessels, and could run in both open waters and smaller creeks and rivers.

## *Ocean-Going Vessels*

The ocean-going vessels are composed of wooden watercraft and an iron or steel vessel. The ships exhibit a wide array of dimensions, from 151 to 280 ft in length and 29 to 50 ft in beam. The iron or steel vessel showed signs of partial salvage; the hull appeared to be cut down and no evidence of major machinery was visible at low tide, suggesting its possible removal (Fig. 5.3). These vessels could represent any time

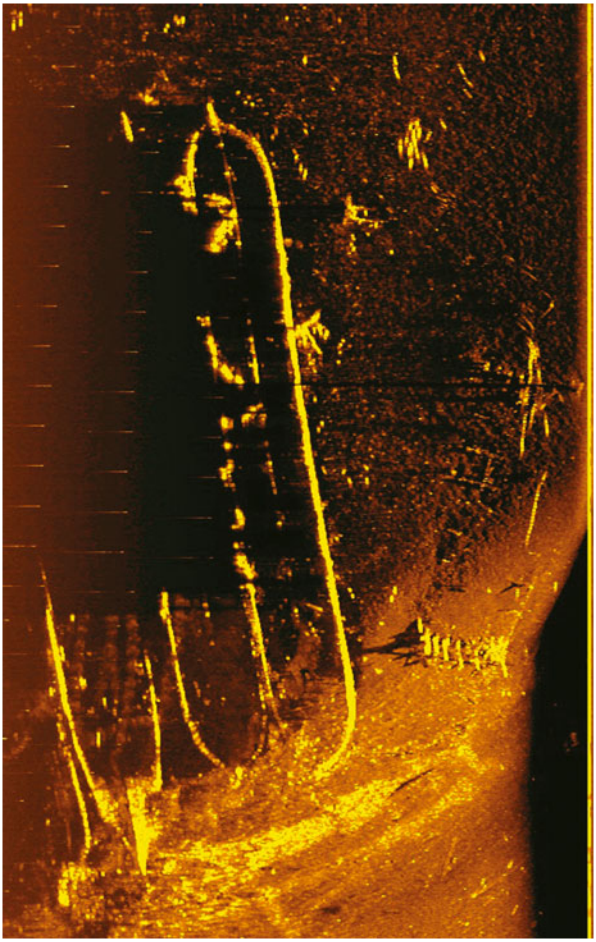

**Fig. 5.1** A side scan sonar image of at least two combination barges. (Courtesy Joshua A. Daniel)

period from English colonization to the modern period. However, the dimensions and design characteristics of some of the vessels are indicative of one particular time period in United States' history. During the First World War, German U-boats were sinking Allied shipping at an incredible rate. To counteract this, the Federal government created the Emergency Fleet Corporation (EFC) to build cargo ships to replace Allied losses. These wooden vessels were initially designed by Theodore Ferris. The contracts for Ferris steamships built for the EFC outlined many specific details, including a length between perpendiculars of 268 ft, a beam of 46 ft, four water-tight wood bulkheads, and diagonal iron straps (Ferris 1917). The length and beam measurements of one of the City Point vessels exactly match those specified in the contracts (Fig. 5.4). Four bulkheads were also identified in the sonar record. Photographs taken at low tide revealed diagonal straps located between the outer hull planking and the frames (Fig. 5.5).

**Fig. 5.2** Construction details of a combination barge with diagonal ceiling planking. (Courtesy Joshua A. Daniel)

**Fig. 5.3** An iron or steel vessel showing signs of salvage. (Courtesy Joshua A. Daniel)

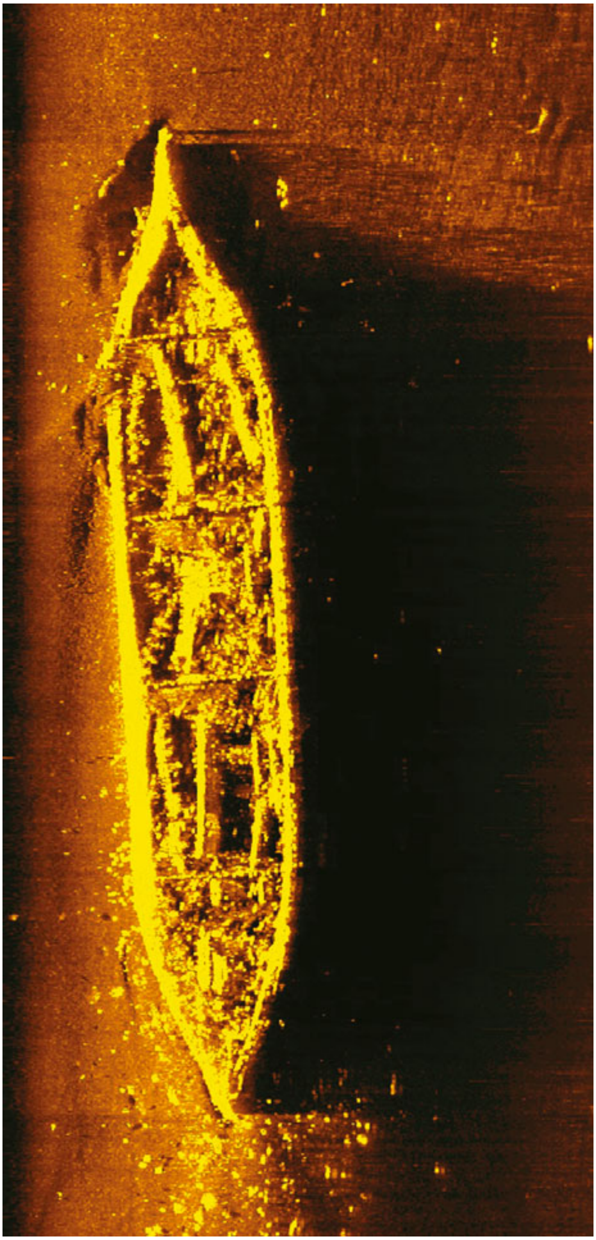

**Fig. 5.4** A potential Emergency Fleet Corporation vessel. (Courtesy Joshua A. Daniel)

Historical research indicates that after the war, most of the EFC vessels were collected on the James River at Fort Eustis, downstream from City Point. A June 1920 issue of *The American Marine Engineer* suggests that the EFC had trouble keeping their wooden ships afloat. The article notes the difficulties the Shipping Board was having taking care of its ships,

**Fig. 5.5** Construction details of a potential Emergency Fleet Corporation vessel with diagonal iron straps. (Courtesy Joshua A. Daniel)

> Recently a number of these vessels were taken up the James River to City Point, Virginia, into fresh water, in order to protect the hulls from the destructive salt water borers. A number of these vessels are laid up at City Point, with merely a skeleton crew aboard to look after the property of the government (The American Marine Engineer 1920, p. 30).

This is not to insinuate that all of the wrecks identified as ocean-going vessels were built under EFC contracts, but it is a possibility that some were produced for that purpose.

Seeking proof of a possible Civil War association, three vessels along the DuPont wharf on the west side of the channel were investigated by Tidewater Atlantic Research archaeologists in 2009. According to historical maps, this location was the site of the Civil War ordnance wharf. Diver reconnaissance identified rubber hose, galvanized pipe, and electrical wiring firmly associated with each wreck, suggesting an early twentieth century connection. Two proved to be the remains of steamships while the other was a tugboat. All had been salvaged of any machinery and were likely deposited after DuPont had abandoned their Hopewell operations, including the wharf. Other wrecks in the tidal flat could represent ships, brigs, brigantines, schooners, or any other type of ocean-going vessel used since this area of the James River was first settled.

## Conclusion

As part of the continuum of a rich and varied maritime heritage, this assemblage of abandoned vessels in the James River has considerable historical and archaeological value. With the potential to represent any time period from the earliest European colonization of Virginia to modern times, this ship graveyard represents a unique opportunity to study an assortment of ships from varying time periods in order to determine commercial trends and methods of abandonment in the James River. While this project is in its initial stages, the ongoing field investigations and archival research suggests that most of these vessels might have been abandoned after two specific events: the Civil War and the First World War. The end of each conflict resulted in a flood of unwanted vessels. After the Civil War, merchant shipping was devastated. The previously lucrative cotton trade had been destroyed by four years of war, and the triangle of trade that existed between the northeast United States, the south, and Europe was broken (The Congress of the United States 1984, p. 8). In addition, import duties prevented the import of iron and machinery, delaying the use of those materials to manufacture superior iron, steam-powered ships. This decline in the U.S. shipping industry, which was set in motion in the Civil War, continued until the First World War.

When war broke out in 1914, international shipping amounted to only 10 % of total American shipping (The Congress of the United States 1984, pp. 10, 11). With the war, most foreign ships were withdrawn from U.S. commerce. Needing a larger commercial fleet to export American goods, the government passed the Shipping Act of 1916, creating the EFC, which would oversee the construction and maintenance of a fleet of merchant ships. Ultimately, 2,247 ships were constructed for or requisitioned by the Corporation (Hopkins 1994, p 20). After the war, a decline in commerce, a depression in shipbuilding, and technological advances made these ships useless and obsolete (Shomette 1994, p. 48). In 1920 and 1921, most of these vessels were taken to Claremont on the James River and attempts were made to auction the fleet at a fraction of their construction costs. Ultimately, some of the ships made it as far upriver as City Point.

This area of the river provided a good anchorage and disposal area. The earliest detailed nautical charts of the James River available from the Office of Coast Survey's online Historical Map and Chart Collection show a dead-end channel behind Eppes Shoal that would enable a vessel with a 10 ft draft to anchor. In addition, this location is out of the main shipping channel, providing a convenient location for beaching derelict vessels. Similar behavior was documented in the region at Mallows Bay, Maryland (Shomette 1994), the Eagles Island Ship Graveyard, North Carolina (Seeb 2007); and the Elizabeth City Ships Graveyard, North Carolina (Smith 2010). The river bottom on either side of the shipping channel shoals quickly, and abandoning vessels there could impede commercial traffic by creating hazards to navigation. However, abandoning vessels on the back side of Eppes Shoal provided a quick, easy, and cost-efficient way to discard unwanted vessels.

Cartographic evidence also provides insight into the development of the island over Eppes Shoal, and the potential relationship between the island and submerged vessels. By 1934, the shoal area was designated a dumping ground for dredge spoil. Two years later, several small islands begin to appear on nautical charts until by 1968 the island reached its approximate current extents. The 1968 chart is also the first time shipwrecks appear in the survey area. It is possible that vessels could be buried under the dredge spoil island.

The goal of the City Point Shipwreck Survey was to identify the number of ships present in the James River near City Point. The side scan sonar data revealed 42 shipwrecks. Beyond a mere inventory, the data provide a starting place for further archival and archaeological research. These vessels reflect the development of technologies created to meet particular needs and requirements while the remnants of cargoes could reveal the nature of both local and regional trade. This assemblage of abandoned vessels provides a representative pattern of trade and transportation from a range of periods in the economic, political, and environmental history of City Point, tidewater Virginia, and the United States.

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# Chapter 6
# The United States Shipping Board Fleet at Mallows Bay, Maryland: Inventory and Assessment

**Donald G. Shomette**

**Abstract** In the spring of 1917, upon the entry of the United States as a major combatant in the First World War, the nation commenced the largest and most ambitious shipbuilding program in history till that date. To counter Allied maritime losses imposed by the German submarine offensive, a goal was adopted to field 6,000,000 tons of merchant shipping, including 255,000 wooden steamships, in 18 months. To meet this goal, the U.S. Shipping Board created the Emergency Fleet Corporation to manage production. Despite a chaos-plagued program, by August 1920 a final total of 285 wooden steamers had been delivered. Few found employment, and most were sold at auction in 1922 to the Western Marine and Salvage Corporation for reduction and salvage of the metals. During the next year, 218 vessels were brought to the Potomac River, 169 of which would eventually come to rest in the shallow waters of Mallows Bay. From 1923 through the end of the Second World War, various corporate regimes and independent salvors would attempt the recovery of metals from the hulks, in the process severely altering the terrestrial and marine landscape. Between 1986 and 1998 an archaeological evaluation of the historic resource base at Mallows Bay was carried out. This chapter discusses the history of the U.S. Shipping Board's wooden shipbuilding program, the salvage efforts on those vessels brought to the Potomac River, and the archaeological evaluation of the cultural resource base of Mallows Bay and its environs as they exist today.

## Introduction

On April 2, 1917, President Woodrow Wilson issued a national call to arms against imperial Germany. Europe had been at war for more than two and a half years, and America's new allies were reeling from the devastating onslaught of Germany's campaign of unrestricted submarine warfare. When the United States entered the conflict, it needed to move everything required for waging war—men, arms, and supplies of all sorts—quickly across the submarine-infested Atlantic to stave off imminent defeat in the Western European Theater. The logistical problems were

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intimidating. Between 1899 and 1915, the shipyards of America had launched only 540,000 tons of blue-water shipping; now, to maintain a large army in Europe and counter the losses imposed by the submarine offensive, the United States would have to build 6,000,000 tons of shipping in 18 months. To do so would require the greatest, most innovative, and aggressive shipbuilding program in history, surpassing by 50 % the total production of the entire western world between 1899 and 1915 (Burgess 1963, p. 165; DeZafra 1918, pp. 33, 34; Williams 1992, p. 109). In February 1917, Frederic Augustus Eustis, a well-known yachtsman, submitted a scheme to William Denman, chairman of the infant United States Shipping Board (USSB) to meet the emergency need. Though unacquainted with ship design himself, Eustis' plan called for the establishment of a large wooden ship construction program to supplement the more costly steel vessels. It would be fast and cheap, it would not tie up shipyards engaged in naval construction, and it could produce vessels with easily trained semiskilled labor faster, it was said, than German U-boats could sink them (New York Times (NYT) 1917a, 1917b; Williams 1992, pp. 57, 58, p. 66).

Denman saw merit in the concept and secured the blessing of President Wilson. The USSB formed the Emergency Fleet Corporation (EFC) to oversee the construction of both steel and wooden ships by private contractors. General George W. Goethals, the famed Army engineer who completed the Panama Canal, was appointed general manager but strongly, and publicly, disapproved of the wooden shipbuilding program. In May, owing to public disputes between Denman and Goethals, President Wilson asked for and received both their resignations. Denman was replaced by Edward N. Hurley and Goethals by Rear Admiral Washington Lee Capps (Chicago Tribune 1917; NYT 1917c, 1917d; Woodrow Wilson to John Denman, letter 1917, George Goethals Papers, Box 43, Library of Congress; Williams 1992, p. 75, 113, 128, pp. 176–179).

USSB's initial plans called for launching 800–1,000 wooden steamships within 18 months, each powered by 1,500 hp engines capable of a maximum speed of 10 knots, and averaging 3,500 dead-weight (cargo capacity) tons. They would be 240–300 ft long and up to 50 ft abeam. Each ship would be built from yellow pine or Douglas fir at a cost, with machinery installed, of $ 750,000 (Ferris 1917a, pp. 7–9; NYT 1917b). Though a prototype plan for a single class of wooden cargo steamer, developed by William T. Donnelly, was published in April, the standard design, drawn up by the EFC's chief naval architect, Theodore E. Ferris, and completed in July 1917 would soon serve as the basic pattern for the 3,500 tons wooden steamship (Donnelly 1917, p. 206; Ferris 1917b, p. 294; Williams 1992, p. 73).

Eventually, owing to various construction constraints and the evolutionary needs of ship production, an additional seven wooden steamship designs and one of composite wood and steel were also soon under production in scores of shipyards across the nation. These designs included Hough, Supple and Ballin, Grays Harbor, Peninsula, Pacific American, Daugherty, and Allen for wooden steamships and McClelland for composite ships. All wooden components would be pre-cut, numbered, and finished to specifications at the mills before shipment to shipyards. New technologies would have to be developed to facilitate mass production, and a nationwide complex of special schools would have to be established to train personnel. Soon contracts were written for more than 500 wooden steamers, as well as for wooden sailing vessels, barges, ocean and harbor tugs, and even a wooden tanker, as well as concrete-hulled and composite wood-steel hulled vessels (Webb 1975, p. 279). Eventually, 35 shipyards on the Pacific Coast, 33 on the Atlantic Coast, 18 on the Gulf Coast, and one on the Great Lakes were under contract to build wooden steamships. Many of the yards existed only on paper until the contracts were awarded. Some critics complained that all anyone needed to secure a government contract was "a piece of land and a keg of nails" (Aldridge 1917, p. 460).

Massive orders for timber suitable for keels, frames, and hulls were being placed by July 1917, but the debilitating power struggle between Denman and Goethals had already delayed approval for the first 433 steamers until October. Paperwork and bureaucracy proliferated, while opposition to the very idea of a wooden steamship program, much of it fostered by the steel industry, blossomed overnight. Still, the EFC was predicting that 6,000,000 tons of shipping, 255,000 of which was to be built of wood, would be produced by the end of the following year (U.S. Congress (USC), Senate Committee on Commerce, Cost of Ship Construction, Letter from the Acting Chairman of the United States Shipping Board Transmitting in Response to a Senate Resolution of November 21, 1918, Information Relative to Existing Contracts for Ship Construction, the Cost of Such Construction, in Both Private and Government Shipyards, 65th Cong., 3rd Sess., 1919, 5. Doc. 315, p. 6; subsequent citation (USC, letter, 1919, 5. Doc 315, p. 6); Burgess 1963, p. 165).

By November, chaos had befallen the program. With the typical Ferris yellow pine ship requiring approximately 1,500,000 board feet and the Douglas fir ship about 1,700,000 millions of feet of timber had accumulated at the shipyards, most of it still green, much of it cut to incorrect specifications, and warping as it lay (Ferris 1917a, pp. 7–9; United States Shipping Board (USSB) 1918, pp. 139–140; Webb 1975, p. 280). Yet, somehow the program lurched forward. On December 1, 1917, eight months after America's entry into the war, the first wooden bottom, *North Bend*, a 240 ft vessel of 4,000 dead-weight tons, launched into the Pacific after 120 days of construction (Lyman 1945; USC, letter, 1919, 5. Doc 315, p. 9). Not until the next May, however, would the first wooden steamship (not *North Bend*) finally be outfitted, undergo sea trials, and be readied for actual duty.

By then, bureaucratic infighting had squelched the EFC's early optimism. In March 1918, accusations and rumors of mismanagement began to appear in the national press as charges proliferated that the ships, built with unseasoned wood, were dangerously unseaworthy. By October 1918, only 134 wooden steamships had been completed; another 263 were less than half finished. When Germany surrendered on November 11, 1918, not one of them had crossed the Atlantic (NYT 1918a, 1918b; USC, letter, 1919, 5. Doc 315, pp. 7–9; USSB 1919, pp. 80, 81).

Congressional charges of bureaucratic ineptitude within the program followed in the wake of the Allied victory. Ten days after the surrender, Senators Warren Harding of Ohio and William Calder of New York called for an investigation and an immediate end to production. The results of the Senate probe were shocking. Of the 731 wooden steamships under contract, only 98 had been delivered. Of these, only 76 had carried cargo in trade, mostly in Pacific coastal waters. Charges flared that the vessels were badly designed, weakly constructed, poorly caulked, leaked excessively, and were too small and expensive for long-distance cargo hauling. Some were unable to withstand even their own engine vibrations (NYT 1918c; USC, letter, 1919, 5. Doc 315, pp. 8–12; Webb 1975, p. 284).

Despite congressional indignation, the ships continued to slide down the ways. By September 1919, 264 of them had been placed in operation, 195 had made an Atlantic passage, and 40 had done it twice. However, the world's dismal postwar economy and, ironically, a glut of shipping soon resulted in the "great 1920 tie-up." Moreover, the introduction of the diesel engine had, almost overnight, made the reciprocating steam plants of the wooden fleet obsolete (USSB 1919, pp. 53–55; Webb 1975, p. 285).

On December 27, 1920, the Shipping Board moved to dispose of what some critics called "the grandest white elephant ever produced:" 285 leaking wooden and composite wood-and-steel ships. Most of the fleet lay mothballed in Virginia's James River, near Claremont, kept afloat by two tugs and a small army of men at a cost of $ 50,000 a month. This armada, which had cost American taxpayers between $ 700,000 and $ 1,000,000 per vessel, was offered for sale as a single unit "as is and where is" (U.S. Congress, Senate, Committee on Commerce, Report of the United States Shipping Board, Letter from the Chairman of the Shipping Board Transmitting in Response to a Senate Resolution of December 27, 1920, A Report Covering the Transactions of the United States Shipping Board and the Emergency Fleet Corporation From Its Inception to February 28, 1921, 67th Cong., 1st Sess., 1921, 5. Doc. 38, p. 18).

The government twice called for bids but rejected the few submissions as too low. Finally, in September 1922, 218 wooden and 9 composite ships of the fleet were finally sold for $ 750,000 to San Francisco attorneys George D. Perry and William F. Humphrey; their declared intention was to turn the fleet over to the newly formed Western Marine and Salvage Company (WM&SC) of Alexandria, Virginia (USSB 1927, p. 147, 151, 247; Shipping Board General File, 605-1-921, Records of the United States Shipping Board, Record Group 32, 1914–1938, National Archives and Records Administration (NARA), Washington, DC). WM&SC's primary objectives were to scavenge the ships for marketable scrap metal. The company immediately sought permission from the War Department to haul the fleet from the James to the Potomac River, where it would be kept at a 1,500 acre government-authorized mooring area off Widewater, Virginia, 30 miles below Washington, DC (Records of the office of the Chief of engineers (OCE), Record Group 77, 1923–1942, Civil Works (CW), Record of the Chief of Engineers, Potomac River, (7245–7249) Serials 81–140, Box 1401, Folder 7175, Part I, Rivers and Harbor File, NARA, Washington, D.C: William F. Humphrey to Ralph V. Sollit, letter, 14 June 1923; (subsequent citation = OCE, 77, CW, NARA)). From there, each ship was to be individually towed to Alexandria to the Virginia Shipbuilding Corporation wharf, leased by WM&SC, for removal of machinery and other equipment suitable for scrapping. It would then be towed back to the anchorage where the hull would be burned to the water line, stripped off of smaller fittings released by the fire, dragged into a nearby marsh, burned once more, and ultimately buried beneath dredge spoil.

In October 1922 the dismantling process began at Alexandria with the arrival of two vessels, *Mojave* and *Alanthus*. Immediately, the project suffered setbacks. When the vessels accidentally caught fire at dockside, the town's entire waterfront narrowly escaped total destruction (Alexandria Gazette (AG) 1923). On April 18, 1923, five more vessels, *Okiya*, *Catawba*, *Aberdeen*, *Quidnic*, and *Gray Eagle* were burned accidentally and sunk in shallow water off Widewater (OCE, 77, CW, NARA: E.G. Huefe to Commanding General Marine Barracks, Quantico, Virginia, April 18, 1923; OCE, 77, CW, NARA: M.C. Tyler to Commanding General, Marine Barracks, Quantico, Virginia, April 19, 1923; OCE, 77, CW, NARA: W.E. McCaughtry to Commanding General, Marine Barracks, Quantico, Virginia, April 15, 1923; OCE, 77, CW, NARA: E.W. Fales to District Engineer, Washington, April 25, 1923; OCE, 77, CW, NARA: M.C. Tyler to Chief of Engineers, April 28, 1923).

The project ground to a halt as federal investigators, worried about the fleet's potential for becoming a hazard to navigation, demanded a full reappraisal of the program. Five months later WM&SC submitted a revised plan. Bonds were posted, and a permit was issued to conduct the burning off Widewater. Local watermen protested to Secretary of Commerce Herbert Hoover. The Widewater burning ground, they complained, was the most important shad and herring fishery on the Potomac and fishing there would be impossible (OCE, 77, CW, NARA: Alvin T. Embrey to Herbert Hoover, September 29, 1923). Their arguments went unheeded, for on September 21st, the steamer *Aberdeen* was burned, systematically stripped off of all fittings, beached in the wetland, burned again, and totally reduced (burned to below the water line). Although detritus from its remains littered the shoals, the experiment was deemed a success; subsequent tests were anything but (OCE, 77, CW, NARA: William J. Bacon to William B. Pistole, October 1, 1923; OCE, 77, CW, NARA: W.A. Snow to Chief of Engineers, October 9, 1923).

By mid-October, four vessels had been burned but only two had been beached. The other two sank at anchor, impairing local navigation. Once more the watermen protested. Then, on October 15, the government announced that as many as 218 more vessels were slated to be destroyed at Widewater. The public barrage of protests increased (OCE, 77, CW, NARA: Henry Taylor to McDonald Lee, 16 October 1923; OCE, 77, CW, NARA: J.A. O'Connor to Alvin T. Embrey, 16 October 1923; OCE, 77, CW, NARA: Snow to Chief of Engineers, 9 October 1923).

The government imposed upon the company a stop to burning after November 1 1923. On December 5, 1923, a modification of the rules and regulations was submitted by Army District Engineer J.A. O'Connor specifically "to better serve the fishing industry." The recommended changes were significant in that they directed that the anchorage grounds be relocated, and that improvements be instituted in the handling and disposal of the dismantled materials (OCE, 77, CW, NARA: J.A. O'Connor to Chief of Engineers, January 12, 1923; OCE, 77, CW, NARA: J.A. O'Connor to Chief of Engineers, May 8, 1925; OCE, 77, CW, NARA: Anchorage Ground in Potomac River off Widewater Virginia and Rules and Regulations Thereto, December 19, 1923). By late 1923, WM&SC's scrapping operation, the largest enterprise of its kind to that date in American history, had been met with mixed results. Several more vessels would be burned before the spring but government and public patience

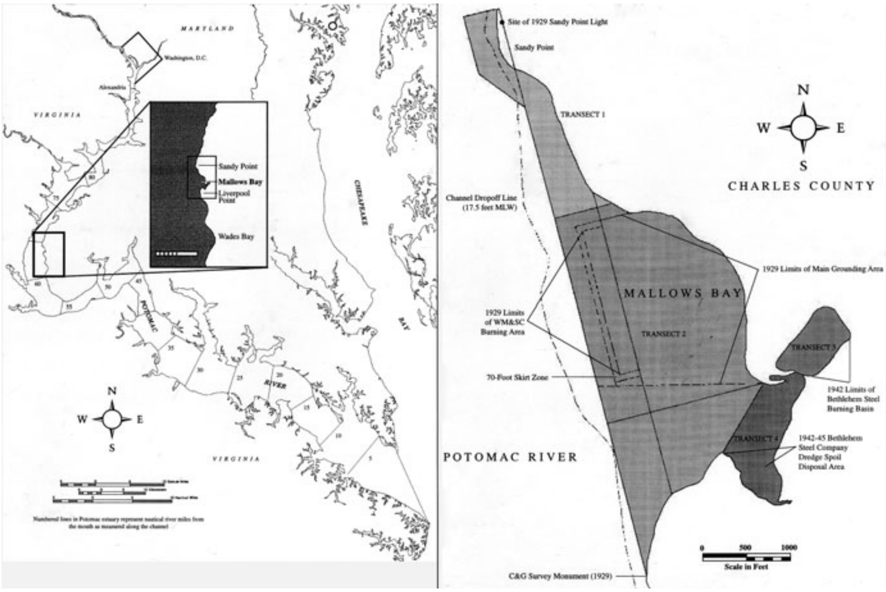


**Fig. 6.1** (*Left*) Location of the Mallows Bay primary study area, 1986–1998, on the Potomac river coast of Charles County, Maryland. (*Right*) The four major transects of the Mallows Bay study area. (Images by Donald G. Shomette)

with the company's recalcitrance to address the fishing community concerns was growing thin. It was clear that WM&SC would have to acquire its own territory to burn the ships. In April 1924, the company acquired 566 acres of farmland girding a small, remote indentation 65 miles above the mouth of the Potomac River opposite Widewater, on the Charles County, Maryland, shoreline. The indent, surrounded by tall bluffs, was known locally as Mallows Bay (Fig. 6.1). The acquisition came none too soon, as 123 ships already lay at the Widewater anchorage and nearly 80 more were to arrive from the James momentarily.

The company streamlined the wrecking process. Four marine railways, wharves, offices, storage buildings, and workers' dormitories were erected at Sandy Point, above the northern lip of Mallows, to facilitate removal and burial of burned-down hulks. WM&SC's difficulties, nevertheless, proliferated. Maryland watermen began to protest the use of Mallows Bay. By 1926, a substantial sturgeon fishing operation and caviar processing plant at the southern end of the embayment, on Liverpool Point, had been forced to close down (The Daily World 1975). The Navy chimed in with its own concerns that the vessels at Widewater were obstructing navigation and might block strategic egress to and from the Washington Navy Yard. Moreover, the Federal Government was growing increasingly impatient with WM&SC's unsatisfactory performance. Moreover, faced with mushrooming expenditures, WM&SC had yet to turn a profit.

WM&SC was forced to act. On November 7, 1925, 31 vessels were bound together in a line by a great steel cable. At 5:00 A.M the greatest peacetime maritime *coup de*

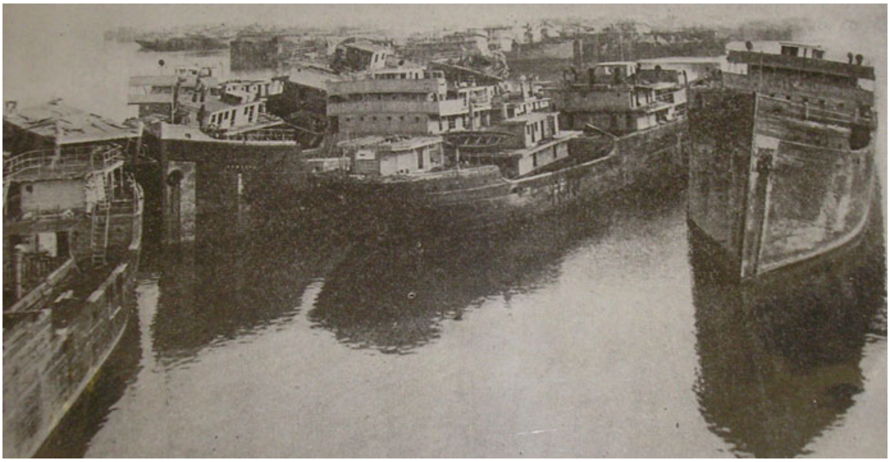

**Fig. 6.2** A view of the U.S. Shipping Board fleet ca. 1928–1929 at Mallows Bay, Maryland. (Courtesy Frederick Tilp Collection, Calvert Marine Museum)

*grace* to that date was administered. On a signal, ten men raced about the decks of the ships touching flaming torches to oil-soaked waste. "As the torch was applied," the *Washington Post* reported, a "horde of squealing rats plunged into the water." Viewed from the nearby Quantico Marine Base the flames appeared, "like the red ball of the sun rising in the east" (Washington Post (WP) 1925). The massive ship fire was spectacular. The program seemed to be back on track. More hulks were hauled to Mallows Bay and the wrecking process began anew. However, soon work again slowed to a crawl (Fig. 6.2).

As the years slipped by, the company sales of salvaged scrap failed to keep pace with expenditures. By August 1929, WM&SC had brought a total of 169 ships of the emergency fleet into Mallows Bay for final dismantling (Fig. 6.3). Then, with the great stock market crash in October of that year, the price of scrap plunged. WM&SC's losses became acute as the Great Depression deepened. In March 1931, the company shut down operations. By the following year, WM&SC was dissolved without providing for the disposal of the remaining hulks (OCE, 77, CW, NARA: William F. Humphrey to Douglas MacArthur, June 18, 1931, Box 1401, Folder 7175, Part II; Harry Steinbraker v. Lorenzo D. Crouse, No. 46, October Term, 1935, Charles County Court, La Plata, Maryland, p. 455, 456, 457, 461; subsequent citation = [Steinbraker v Crouse, 1936]).

Even before WM&SC's abandonment of operations, independent salvors had begun to alight on the scene. Some would later claim that when WM&SC abandoned operations, "they told the residents that any material left on these abandoned hulks could be salvaged if they so desired." Soon, between 50 and 75 residents of adjacent Charles County became actively engaged in picking over the hulls for scrap metal, although market prices continued to plummet. One typical salvor, Preston Dent, made at least two documented trips to Washington with barge loads of 70–85 tons of scrap each, which he sold for $ 6 a ton. Dent declared the profit marginal, considering

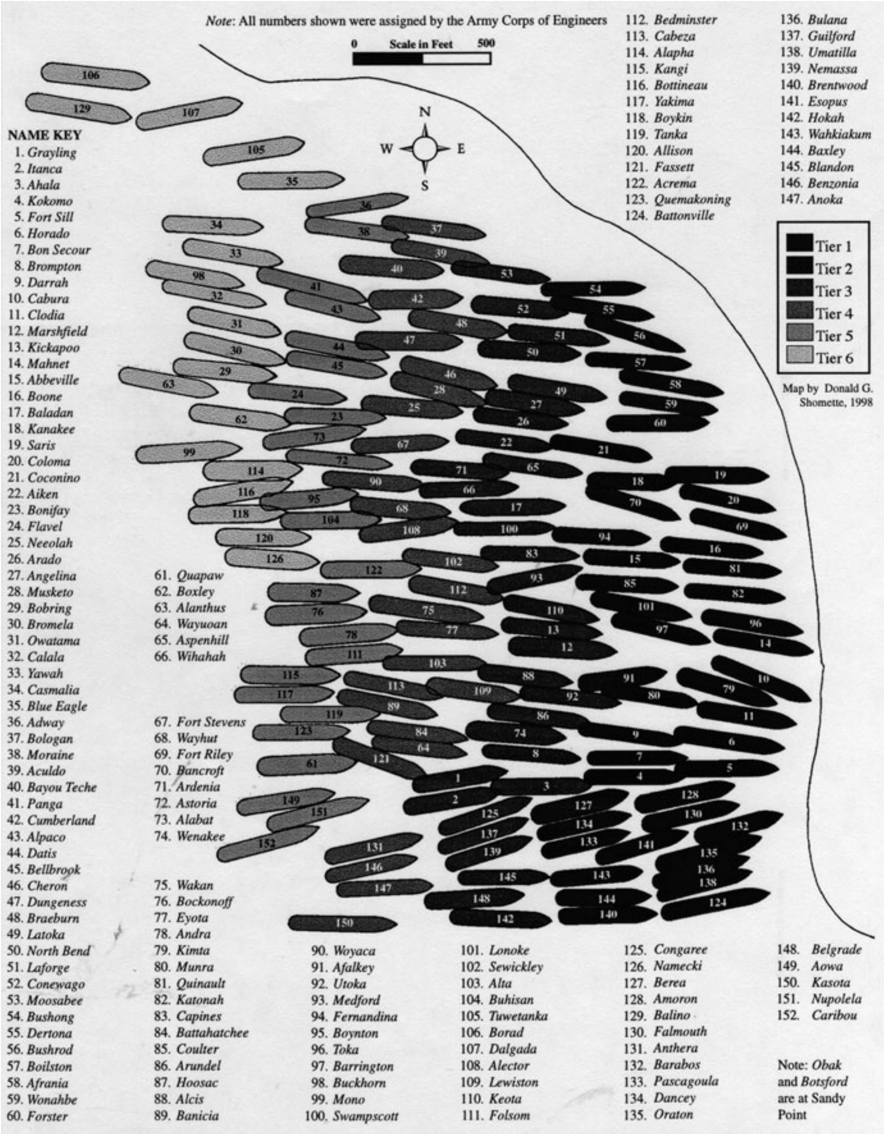


**Fig. 6.3** Disposition and identities of 152 U.S. Shipping Board wooden steamship fleet in Transect 2 in 1929. (Image by Donald G. Shomette after "Potomac River at Mallows Bay survey of grounding area August 11, 1929," U.S. Army Corps of Engineers file copy, Baltimore District, Archives)

the labor involved, and the scrap "barely worth getting." However, for many others, who were unemployed as a result of the depression, the work provided at least a subsistence income (Steinbraker v. Crouse 1936, pp. 455–456, pp. 459–461; OCE, 77, CW, NARA: J. Read Bailey to Stephen W. Gambrill, July 6, 1934, Box 1401, Folder 7175, Part II).

Within a short time, an unorganized system evolved at Mallows Bay involving labor, middlemen, haulers, and sellers. By September 1932, Lorenzo Crouse, one scrap entrepreneur, who had once worked for WM&SC, began his own salvage operation removing lead, brass, copper, and iron. Like most, he recovered and sold small lots, usually marketing the material to a middle-man named Sinclair in parcels of 30 tons each. Sinclair, who bought scrap from scores of salvors, in turn sold the combined lots to one Harry Steinbraker. Although some individuals sold directly to Steinbraker, it appears that this system was not unlike that employed in the Chesapeake Tidewater fisheries and oystering industry (Steinbraker v. Crouse 1936, p. 461).

When Japanese interests in American scrap metal began to drive prices up again, salvors and dealers at Mallows began to vigorously fight for control over the salvage rights. Finally, in December 1934, a local circuit court ruled that the hulks belonged to no one and could be salvaged by anybody. Thereafter, on any given day, scores of independent salvors could be seen dynamiting and picking over the carcasses of the great fleet. The cottage industry in scrapping along the Mallows shoreline would eventually account for at least 15 % of the income of adjacent Charles County. At least five floating brothels and no fewer than 26 illegal stills were reportedly erected on the wrecks or nearby. The true heyday of "hulk scrapping," however, had yet to arrive (Steinbraker v. Crouse 1936, pp. 453, 454; Tilp 1978, p. 294, 308).

When the Second World War began, the price of scrap metal skyrocketed, and on June 28 1940, the federal government established the Metals Reserve Company (MRC) to begin stockpiling strategic metals. Within months of America's entry into the conflict, the War Production Board (WPB), which was formed to coordinate national production for the war effort, began a nationwide salvage effort to recover scrap metals. On 16 July, the WPB's Salvage Program Office forwarded to the MRC a project directive regarding the recovery of strategic metals from the Mallows Bay fleet. On October 10, 1942, Mallows Bay again appeared as a special project of consideration on a list of the same produced by the Salvage Section of the MRC. It was then estimated the hulls were capable of yielding as much as 20,000 tons of scrap. Within two weeks, a U.S. government-sponsored project was launched to recover scrap lying still buried in the derelicts at Mallows Bay. Nine days later, the WPB instructed the MRC to initiate the project. Anticipating the WPB's directive, the MRC had apparently already begun negotiations with the Bethlehem Steel Company "with reference to the recovery of the said metals." The negotiations resulted in a contract providing that the MRC would take steps "as it may deem necessary to acquire title (to the wrecks) and that Bethlehem will do all things that are necessary to recover the maximum amount of metals from the vessels in the water and also in the vicinity thereof." Upon allocation by the WPB, Bethlehem was to transport the metal to its plant at Sparrows Point, Maryland. The MPC would then sell the recovered metals to Bethlehem at Office of Price Administration (OPA) prices. In turn, the MPC would reimburse Bethlehem for the price of the work. Settlement would be effected upon completion of the work with the provision that "if the amount of the metal recovered is in excess of the cost of the work, Bethlehem will remit such excess to the Metals Reserve. While, on the other hand, if the cost of the work is in excess of the price of the metal recovered, Metals Reserve will reimburse Bethlehem for such amount." The MRC was authorized to spend $ 200,000 on the project aiming to recover 20,000 tons of iron, or $ 10 per ton, from 110 hulls still lying in the bay, by hiring the giant Bethlehem Steel Corporation to manage the effort (War Production Board, Salvage Program, July–December 1942, File 179, Box 916, Record Group 179, Military Reference Branch, NARA, Washington, DC; Minutes of the Metals Reserve Company (MMRC), Records of the Reconstruction Finance Corporation (RFC), 1940–1945, Record Group 234, Civil Reference Branch, NARA, Washington, DC: Vol. 14, 357–359; subsequent citation = (MMRC, RFC, 234, NARA); MMRC, RFC, 234, NARA: Vol. 31, October 12, 1942, pp. 123–125; MMRC, RFC, 234, NARA: Vol. 33, March 10, 1944, pp. 156, 157).

The recovery project took on industrial proportions. Bethlehem excavated a huge enclosed marine basin and sealed it off from the bay with giant earthen berms and massive floating gates hinged in concrete sides. Ships could be towed into the basin, the gates locked, the creek-fed water pumped out, and the hulks burned down completely, leaving only their metal fittings.

Yet, the process proved too exhausting and expensive even for Bethlehem. By December 31, 1943, Bethlehem's agreement "to do all things necessary to recover the maximum amount of metal from certain vessels requisitioned at the request of the War Production Board" had cost the company $ 360,000, but had yielded only "a very small recovery of metal." On September 22, 1944, Bethlehem ordered a shutdown of all Mallows Bay operations (MMRC, RFC, 234, NARA: Vol. 31, March 10, 1944, pp. 123–25; MMRC, RFC, 234, NARA: Vol. 35, September 22, 1944, pp. 317).

After two decades of efforts, the scrapping of the USSB's wooden steamship fleet was terminated. Yet approximately 100 hulks remained in the bay, along with the bones of numerous other vessels, including those employed in the salvage itself. For the next two decades, the Mallows Bay "ghost fleet" would sleep undisturbed.

In 1963, at the instigation of a group of local Charles County residents and a real estate development firm called Idamont, Inc., which had acquired the support of Maryland Governor Spiro T. Agnew for a proposed real estate development project at Mallows, the Army Corps of Engineers initiated studies for the total removal of the wrecks. Five years later, acting under a special provision of the 1968 Rivers and Harbors Act, Congress formally ordered the hulks destroyed (Charles County Court, Liber 166, Folio 164, October 31, 1963; Evening Sun, February 10, 1967). Then the project languished while congressional hearings disclosed revelations that would ultimately abort it entirely. During the hearings it emerged that Idamont was little more than a straw corporation employed by the Potomac Electric Power Company to acquire the Sandy Point tract for a giant coal-fired generating plant without having to go through public disclosure or reveal its intentions to stockholders. Removal of the hulks (at government expense) would have permitted unimpeded passage of company coal barges (U.S. Congress, House of Representatives, Report No. 91–1761, Protecting America's Estuaries: The Potomac, 91st Cong., 2nd Sess., 1970, pp. 7–11).

The company's actions were deemed a clear violation of Securities and Exchange Commission regulations and state disclosure laws. Moreover, subsequent testimony in 1971 by the Chesapeake Biological Laboratory, the National Audubon Society, and the U.S. Department of the Interior suggested that over the years the wrecks had become integral components of the environment. Moreover, to remove them would contribute to pollution by releasing heavy metals from beneath bottom sediments deposited over the years from mining and other industry far upriver, thereby severely reducing the natural habitats of life forms that had begun to repopulate the area. The Mallows Bay wreck-removal project was quietly shelved and the "flowerpot" wrecks, as they were now referred to, would remain (U.S. Congress, House of Representatives, Report No, 91–1761, Protecting America's Estuaries: The Potomac, 91st Cong., 2nd Sess., 1970, pp. 6, 7).

## Archaeological Inventory and Assessment

The Mallows Bay Shipwreck Survey was undertaken between 1986 and 1998 to examine and assess the marine archaeological resources lying in and adjacent to Mallows Bay, Maryland. With the exception of a one-year period in 1994, in concert with St. Clements Island-Potomac River Museum, Colton Point, Maryland, under a $ 8,000 grant from the Maryland Historical Trust, the project was privately funded and staffed through volunteer support. The author of this chapter served as Principal Investigator (see Shomette 1998).

The initial objectives of the project were designed to achieve the following goals: (1) to produce, through nonintrusive investigation, a comprehensive inventory of all maritime and archaeological resources remaining within the confines of Mallows Bay, lying in tidal and nontidal waters east of a line drawn between Sandy Point, at the northern extremity of the wreck deposition area, and Liverpool Point, at the southern extremity; (2) to examine the impact upon the local environment of the importation and reduction of as many as 218 wooden steamships produced during the USSB's First World War shipbuilding program, as well as sundry other vessels known or discovered within the survey area; and (3) to conduct limited archaeological assessment on a representative sample of the shipwreck population.

The research design called for all sites to be examined, photographed, measured, and architectural details recorded, specifically to identify vessel typology, construction, and condition. However, owing to lack of conservation capability, limited funding, and the enormous size of the resource base itself, site-specific survey would be carried out only on select sites, but no sampling was to take place on any sites. The major goal of the investigation was to inventory and assess the resources in the study area by placing them in precise context of their history, deposition, movement, environment, and evolution as archaeologically discrete units within the greater holistic fleet unit.

Nonintrusive field investigations of corollary sites not within the study area, but pertinent to an understanding of the history, condition, and extent of the resource base was also undertaken. These sites included: (1) the remains of the Alexandria Shipbuilding Corporation shipyard and launch facilities at Alexandria, Virginia, wherein many of the USSB fleet in Mallows Bay were partially reduced; (2) the fleet anchorage off the Brent's Marsh sector of Widewater, Virginia, wherein at least seven U.S. Shipping Board vessels were lost, and (3) hulks left behind in the James River near Clarendon, Virginia.

The field program's primary objective was to locate, identify, inventory, and assess the condition of all exposed historical resources lying within and surrounding Mallows Bay. The primary riverine research tract, not inclusive of terrestrial property, is an area 7,665,000 ft$^2$ in extent, and was divided into four discrete transects to facilitate investigation (Fig. 6.1). Transect 1 began at Sandy Point, extended to the northern lip of Mallows Bay, and contained an area of 830,000 ft$^2$. Transect 2, the main fleet anchorage area, covered a total of 19.05 acres (5,800,000 ft$^2$). Transect 3, the Burning Basin, was 355,000 ft$^2$ in extent. Transect 4, extended from the boundaries of Transects 2 and 3 to Liverpool Point, and covered 680,000 ft$^2$. Water depths varied from 1 to 18 ft.

During the study period, a total of 187 vessels were documented in the archival record or by discovery during the course of field research as having been definitely lost or abandoned in the study area (Figs. 6.4, 6.5). A total of 177 were accounted for in the archival record, the largest number, accounting for 154 ships that are known by name—out of a total of 218 known to have been brought in—belonging to the USSB fleet. It was determined that a total of 81 wooden USSB ships were still present. Numerous other vessels and sites were also recorded, including a steel-hulled seagoing car ferry named *Accomac*, 11 wooden barges, a possible Revolutionary-era longboat, two mid-nineteenth-century centerboard five-log canoes, a 1949 North Carolina-built menhaden fishing vessel named *Mermentau*, a possible Second World War-era PT boat converted to private use, a 1918 Bath-built four-masted schooner named *Ida S. Dow*, a houseboat raised on stilts (possibly a converted brothel), three unidentified workboats from the late nineteenth and early twentieth century, and the disarticulated remains of an EFC ship lying completely buried inland at Sandy Point. Included among many other significant features discovered were: primitive log-and-earth small craft boat slips; remains of a unique steam-powered hauling system to move scrap to transport trucks ashore; the ruins of the Sandy Point wharf; a net tarring facility; and major components of the Bethlehem burning basin dam, gates, support facilities, and a great bypass canal system.

Of 285 wooden EFC steamships built by August 1, 1920, at least 154, totaling 561,000 dead-weight tons, which would have required 6,680 crewmen and represented eight of the nine vessel types produced during the USSB construction program, ended up in Mallows Bay within a period of nine years. The known USSB population in the embayment includes ships launched by 58 American shipyards, 19 on the East Coast, 14 on the Gulf Coast, 21 in the Pacific Northwest Coast, and 4 on the California coast. These vessels represent nearly 54 % of all American wooden steamships produced in the USSB program, surpassing the total tonnage of all American blue-water ships built in the 16 years preceding the First World War. Today, the remains of at least 30 % of the entire USSB wooden and composite steamship fleet still survive

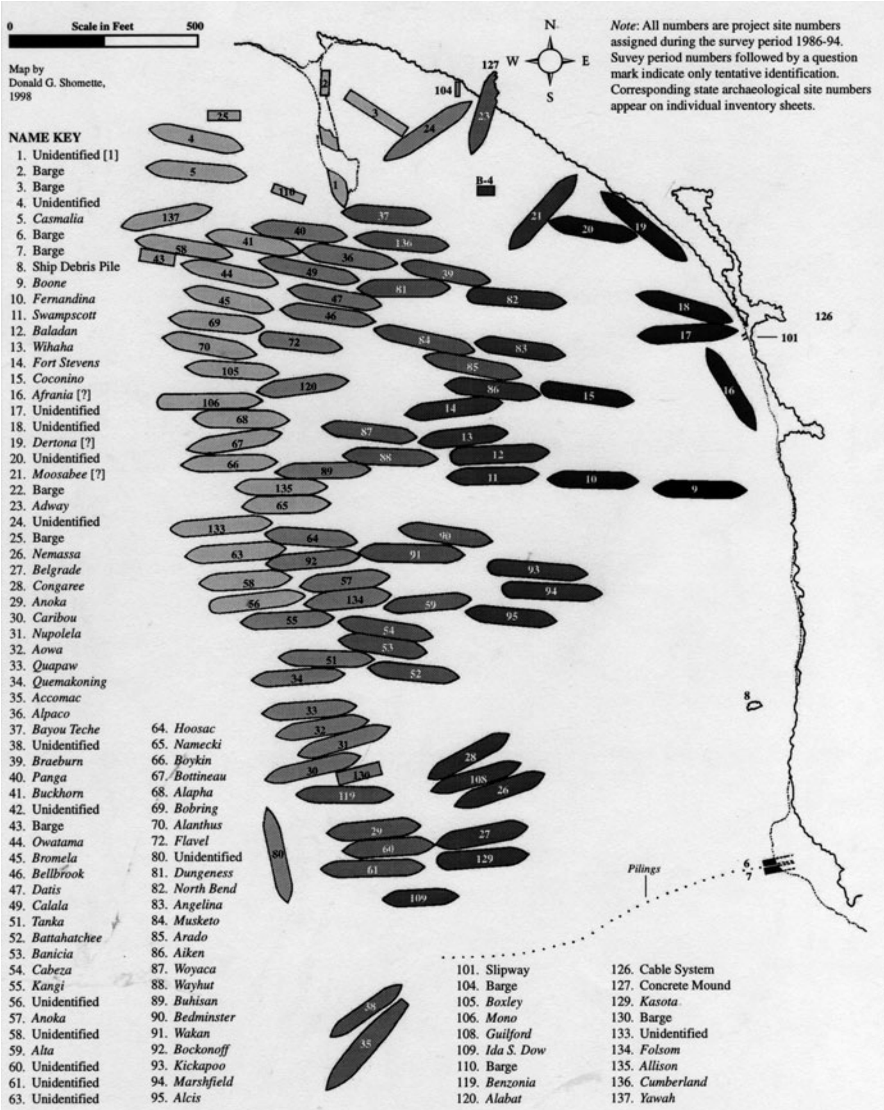


**Fig. 6.4** Disposition of shipwreck population in Transect 2 in 1994. Note the presence of numerous work barges employed during salvage operations from the late 1920s through 1943, the 4-masted schooner *Ida S. Dow*, and the steel hulled car ferry *Accomac*. Note also the accretion of the shoreline mass over several wrecks at the northern and southern extremity of the transect. (Image by Donald G. Shomette)

in the embayment, surrounded by other derelict vessels of all kinds dating from the eighteenth century through the 1980s.

**Fig. 6.5** Aerial view of a cluster of wooden steamship wrecks in central Mallows Bay surrounded by ice during the winter of 1994. (Photograph by Donald G. Shomette)

One of the more significant observations revealed through comparing EFC plans for each of the vessel types to the surviving architecture of site remains indicated that rarely did any vessel conform completely to plan design. For example, in approximately 30 % of the extant hulls concrete frames, futtocks, and stiffeners (the latter usually under the forward gun deck) were discovered, although there is no account in ship plans or contract specifications for the use of concrete in any capacity. Although iron fittings were to be universally employed, many hulls were also found held together not only by iron but wooden treenails, which may reflect availability of materials. Overall, typologically similar vessels in dimensions and architectural characteristics varied from shipyard to shipyard even though they were constructed from the same master plan. In short, it seems that vessels were still being individually built "by wrack of eye" despite government specifications.

The deposition history of USSB hulls and other vessels within the Mallows study area is one of dynamic movement. From their first deposition by WM&SC, in March 1925 to the present time, the ship remains in the primary study area have been subjected to both natural and human factors causing almost ceaseless migration of many hulls both within and beyond the embayment. The record of movement was and is of importance to the identification and management of the shipwreck population still extant. Documentation of the movements of individual vessels over time was attained by a thorough examination of the archival, cartographic, photographic, and archaeological records. This allowed for the development of a model of the sequence of vessel movement, primarily within the Transect 2 embayment, and to a lesser degree, vessels lying within the remaining transects and off the Widewater.

The development of the profile of the sequential movement of hulls was carried out by the creation of site overlays of Transect 2 redrafted from U.S. Army Engineers site plans, U.S. Department of Agriculture aerial photographs, aerial photographs by the author, and other photographs produced between 1929 and 1998. Through an analysis of the vessel numbers and corresponding names indicated in a 1929 Army Corps of Engineers chart of the wreck dispositions, and the rough linear tiers in which the hulls were assembled, it appears likely that the vessels were initially moved into the embayment in numerically sequential clusters (Potomac River at Mallows Bay Survey of Grounding Area August 11, 1929, U.S. Army Corps of Engineers file copy, Baltimore District, Archives). The first cluster was brought into the lower embayment grounding area, the second into the upper central area, the third into the extreme upper sector, and finally the last into the lowest quadrant of the embayment. Smaller clusters and individual vessels were employed to occupy open gaps between the larger clusters until the embayment was entirely filled. From this database, the charting of the fleet reduction sequences by salvors, hull disappearances, migratory patterning by drift action, and periods of stabilization of remaining hulls was possible.

The various regimes of ship-breaking at Mallows Bay intentionally incorporated numerous alterations of the terrestrial and marine environment to further the goal of the wholesale reduction in the most profitable manner. As a consequence of these efforts, and the very act of grounding hundreds of great ships in the shallows of the embayment, the environment itself was notably modified. The alterations of the terrestrial and marine landscape, in many cases, are still evident in the archaeological record. Moreover, the impact of these changes and the ongoing presence of the ship hulls continue to serve as a catalyst for the continuing transformation of the local ecosystem. These transformations, such as reducing rates of erosion in some areas while facilitating accretion of landmass in others, increasing average water temperature within the embayment by altering current flow and thereby accelerating annual growth of subaquatic vegetation, and attracting numerous life forms to the artificial habitats, have been directly influenced by the presence of the fleet remains. In turn, the dramatic alteration of the marine environment has also produced a marked impact upon the maritime archaeological resources themselves.

Prior to the admission of the USSB fleet, Mallows Bay served as a fishing ground for commercial fisheries. Indeed, the two bases for the Monroe sturgeon fisheries of the late nineteenth and early twentieth century period were erected on the two extremities of the study area, at Sandy Point and Liverpool Point. It was perhaps no coincidence that the arrival of the fleet corresponded with the termination of the Monroe operations, including the closure of the caviar processing plant, and most certainly assured the end of the bay as a fishing ground. By the end of the Second World War, Mallows Bay had become an environmental disaster. The last stand of the Potomac snowy egret had been filled with the detritus of salvage, the spawning and feeding grounds of myriad species had been significantly altered and polluted, and the shipwreck population itself, with occasional drifting of vessels into shipping channels during storms, posed hazards to navigation. By the late 1960s, however, natural forces began to reassert themselves causing the embayment to transform again.

Human-induced transformations were equally significant. These changes may be examined in the archaeological record for each significant period of evolution from 1923 to the present. In Transect 1, the major alterations included: the erection of four 250 ft marine railways, assorted support facilities and roadways ashore, and service wharves in the nearshore; the anchorage of one ship directly to the shoreline (at a strategic confluence of shoreline and current flow which induced coastal accretion);

and the burial of as many as five more in the shore itself, as well as the sinking of several USSB vessels and scrapping barges.

Alterations in Transect 2 included: the construction of log slipways for receiving small workboats; construction of "California" yarding facilities and earthen "donkey" engine platforms to facilitate removal of scrap by cable from waterfront to a roadway on the adjacent bluff; erection of levees around the entire transect (no longer extant); the filling of hulls with dredge spoil and gravel; and the erection of a piling line around the embayment to prevent drifting. In addition, sedimentary accretion caused by several steamer and barge wrecks at both the northern and southern transect extremities have generated significant land growth from the shore that now blankets vessel remains once exposed.

Alterations in Transect 3 included the product of Bethlehem's excavation of a burning basin from the Marlow's Creek wetland. This basin is 250 × 900 ft in extent and incorporated: the construction of both concrete and wooden gates; a bypass canal to relieve hydrological pressure from the creek during basin closure; and support buildings and offices. Numerous wrecks still lie within the basin. As a major intentional alteration of the marine environment, the basin represents an industrial site of importance to the overall history of Mallows Bay as it provided, arguably, the means for conducting one of the greatest organized ship-breaking operations in American history, second only to the WM&SC efforts of the 1920s and 1930s.

Alterations in Transect 4 included the creation of four islands from 75,000 cubic yards of dredge spoil excavated from the burning basin, one or more using sunken nineteenth and early twentieth century vessel remains as foundations.

Although it is impossible, within the scope of this chapter, to present the nature and extent of the microenvironment of Mallows Bay prior to the study, limited efforts were undertaken to provide a database for future taphonomic study of both shipwreck evolution and ecological change, and the influences each assert upon the other. Two vessels, a wooden steamship hull (18CH572), and the steel-hulled car ferry *Accomac* (18CH492), were selected for inventory and assessment of all vegetation (except grasses, mosses, and lichens), including aquatic and subaquatic, extant both onboard and within the water areas encompassed by both sites. Inventory, with only limited resources available, did not include seed analysis, testing of soil chemistry, or assessment of the freshwater biochemical variables in and around the two sites. A total of five species of trees, seven woody shrubs, 21 herbaceous perennials and annuals, and eight vines were recorded aboard. The 18CH572 was far less lush and contained a single species of tree, 11 herbaceous perennials and annuals, 1 specimen of vine, one species of floating aquatic vegetation, and four species of subaquatic plants.

Onboard many hulls dense mini-forests of eastern red cedar, green ash, persimmon, red swamp maple, and sweet gum as well as scores of species of woody shrubs, herbaceous perennials and annuals, and vines can readily be found. Birds and mammals that were once endangered or left the region altogether have begun to repopulate the area on and around the wrecks. Scaups, sea ducks, dabbling ducks, Canada geese, whistling swans, ospreys, and American bald eagles have taken up habitation, many onboard the fleet itself. Muskrat, beaver, river otter, nutria, and white-tailed deer have been observed in residence on innumerable hulks.

The flora and fauna aboard 18CH572 is reflective in many ways of that which thrives ashore and in the local wetland environment. A wide range of mammals, birds, reptiles, amphibians, and insects have employed the vessel as a habitat, as evidenced by tell-tale indicators everywhere upon the site. Indeed, 18CH572, similar to the other vessels in the embayment, has become in every way a synthetic environment that replicates a natural island. The physical impact of the animal life upon the site is also readily discernible. Beavers that have taken up habitation cut timber onboard for the construction of their lodges and enlarge holes in the hull as escape tunnels. It is possible that the otherwise excellent state of the submerged portions of the hull may be attributable to the beavers in that they have cut down many of the smaller trees before root structures could grow into and separate hull timbers.

Onboard some vessels, the very fabric of floral regeneration is also increasing the volume of soils as vegetation dies, decays, and becomes an organic pan of the sediments originally deposited upon the site by man to hold the hulks in place. Moreover, the heavy matte of vegetation has shielded the soils from erosion and occasional inundation, while enriching them, providing habitats for macro and micro life forms.

The 18CH492 represents a variant host for the local environment. The car deck, which is the most elevated and exposed area of the ship, is generally inhospitable to vegetation. During the summer, the steel hull becomes superheated by exposure to the sun and prohibits the visitation by most animals. Exposed to winds that sweep across the open deck, aeolian-borne sediments and seed have small opportunity to settle. However, on and beneath the few elevated pieces of machinery and surviving deck architecture, birds, such as osprey, have nested, soils and seed have found shelter from the winds, and light vegetation may be found during the spring and fall.

The aft section of the ship, which is partially awash and sheltered from the winds by extant walls and bulkheads, has accepted colonizing vegetation. Silts deposited by occasionally high water and soils deposited by the winds have accumulated to depths of up to two or more inches. Aeolian, waterborne, or avian deposited seeds have produced vegetation that is thriving in these protected areas. Small trees and other flora typical of tidewater wetlands were observed to be serving as habitats for birds and insects. The root structures of the larger trees are contributing to the segmentation and degeneration of rusting iron and sediment-covered floors upon which they are established, and will ultimately contribute to the collapse of the greater structure of the vessel. In the inundated section of the aft end of the ship, a variety of small shellfish were identified, as well as fin fish.

In the artificial environment of Mallows Bay, the derelict wreck population in its slow but certain transformation has held and enriched the sediments, helping to cement the river's pollution beneath the bottom muds while both filtering them and providing habitats and food sources to a wide range of life forms. In the process, each vessel has, over time, become a mini-ecosystem unto itself. Just as it was once the last refuge of the Potomac snowy egret and the site of Maryland's last sturgeon fishery, so Mallows Bay has again blossomed with biodiversity. In many ways, it is a giant artificial reef to which the creatures of the water, land, and sky flock to flourish, reclaiming this stretch of the river from the trauma of industrial salvage and pollution.

As the embayment continues to evolve, the derelicts do so as well, some moving about, others sinking ever deeper into the muds that have anchored them. And nature's forces continue to be asserted. During Hurricane Isabelle in 2003, a number of vessels shifted position. One ship, *Benzonia* (18CH515) was virtually lifted from its resting place in Transect 2 and laid back down again, its artifact-laden lower hull fully exposed, atop another steamship hull, *Caribou* (18CH531) and the hulk of a wooden salvage barge (18CH589). During a more recent storm, one of the USSB vessels lying off of Widewater was moved 500 yards downriver to a new resting place. Today, an estimated 70 % of the vessels that were visible in Mallows in 1998 now rest just below mean low water even as they are once again being subjected to the stress of the latest round of human action.

In 2001, Maryland launched a landmark program called GreenPrint, designated to save the most ecological and irreplaceable natural resources in the State. With $ 3 million committed by the State and $ 3 million in federal funds, several tracts of land, including the Wilson Farm Tract at Mallows Bay, incorporating much of the land adjacent to Transect 2 and surrounding Transects 3 and 4, were purchased from PEPCO to prevent the sale of the land to commercial gravel mining interests and urban developers. These tracts were to be jointly administered by the Maryland Department of Natural Resources and the U.S. Bureau of Land Management. Soon afterwards, management of the tract was turned over to the stewardship of Charles County. In the summer of 2011, through the efforts of the local parks and recreation office, direct public access was opened to once remote Mallows Bay and to the scores of historic marine and terrestrial archaeological sites therein. Public visitation to the once nearly unapproachable sites is now increasing through promotion of the adjacent parkland, even as the wrecks themselves are becoming tourist attractions. Although management of the vessels still fall under the jurisdiction of the Maryland State Underwater Archaeologist, Maryland Historic Trust, to this date no protection for the innumerable fragile sites or the adjacent archaeological sites ashore has been established to prohibit relic hunting.

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# Chapter 7
# Pacific Graveyard: Adaptive Reuse, Recycling, and Abandonment in San Francisco's Maritime Graveyards, 1849–1959

**James P. Delgado**

**Abstract** California's San Francisco Bay encompasses one of the largest collections of ship graveyards in North America. These graveyards include ships buried beneath subsequent urban development in downtown San Francisco, as well as ships situated along estuarine bay shores in Sausalito, Belvedere, South San Francisco, Oakland, and Benicia. As a large estuary, other shores on the bay also served as a repository for smaller numbers of laid-up craft and individual vessels. Among the more unique of these graveyards are those in and around San Francisco, which now lie buried beneath urban landfill. The majority of these vessels date to the California Gold Rush (1848–1855). They comprise a unique assemblage of vessels that were either purposely beached or surrounded by pilings or filled and recycled into buildings to fill the need for structures during the Gold Rush population boom. After the rush, a number of vessels were further recycled by ship-breakers, whereas others were sunk to establish title to submerged lands. Other craft, either buried or exposed on mudflats, date from the late nineteenth and early twentieth century. Archaeological excavation and study of these vessels has provided insights into the role of recycled ships in the economic and physical geographical study of San Francisco, as well as documenting the characteristics of nineteenth and early twentieth century craft, including previously undocumented examples of regional vernacular craft as well as ships adaptively reused.

## Introduction

San Francisco Bay is the largest Pacific estuary in North America, encompassing approximately 4,100 km$^2$ in four different sub-regions: the South Bay, Central Bay, North Bay/San Pablo Bay, and Suisun Bay. Relatively shallow as a result of siltation, the average depth of the bay is 6 m (Conomos 1979). It was deeper historically in the mid-nineteenth century, when navigation was possible to now inaccessible San Jose in the South Bay and a number of other bay ports now surrounded by shallow

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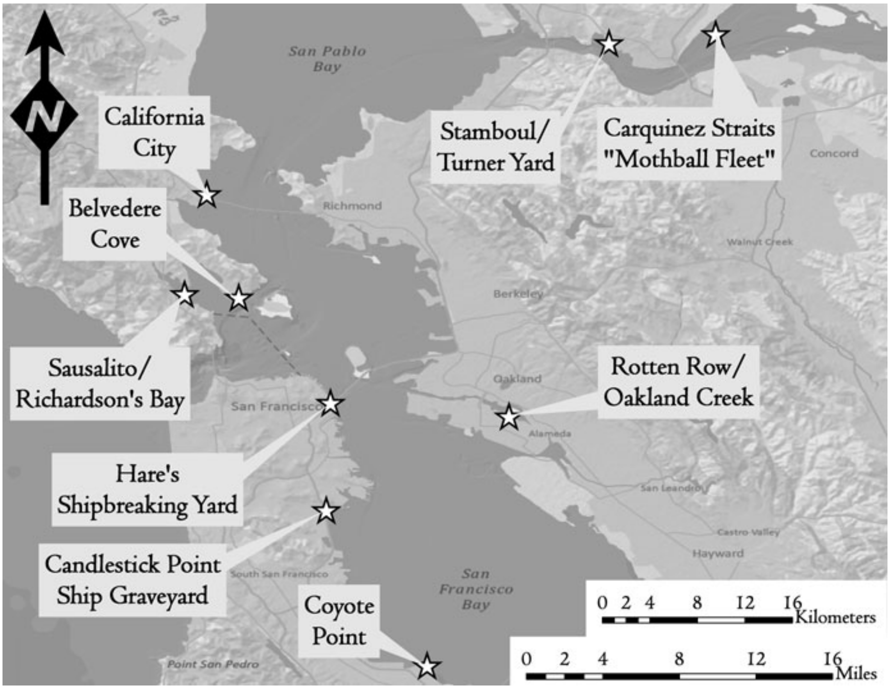


**Fig. 7.1** Major ship abandonment locations in and around San Francisco Bay. (Image by Nathan Richards)

mudflats. San Francisco Bay in the twenty-first century is not only shallower but also substantially smaller than its early nineteenth century area because of siltation and land filling along its shores (Fig. 7.1).

The modern physical geography of San Francisco Bay is an artifact of human modification and exploitation of the region. The siltation is the result of extensive run-off of hydraulically mined sediments from the interior gold fields that were transported by streams and rivers into the larger waterways of the San Joaquin and Sacramento rivers, which in turn lead to the bay. This intensive period of siltation lasted from the 1860s to the early twentieth century. At the same time, deliberate land filling of wetlands and intertidal zones in the major urban centers, beginning in 1849 along the San Francisco waterfront and later extending throughout the Bay Area, reduced the original area of the bay by approximately one-third. In San Francisco alone, an estimated *11,609,907.27* m$^3$ was used to fill the bayfront for urban and industrial development between 1845 and 1920 (Chameau et al. 1991; Dow 1973). It has been asserted that San Francisco Bay is the major estuary most modified by humans in the United States (Nichols et al. 1986).

The process of filling the bay, as well as the abandonment of ships, began in Yerba Buena Cove, the body of water directly in front of the settlement of Yerba Buena (modern day San Francisco). Founded in 1835 as a small outpost on the bay to serve the needs of the hide and tallow trade, Yerba Buena occupied a relatively small area of flat land at the base of tall sand dunes and faced the cove. Yerba Buena Cove was a shallow 1.36 $km^2$ crescent approximately 1.6 km across with sand beaches on its southern shore and mudflats on the northern shore. As a port, as well as a settlement, the town was poorly situated, especially when it began to expand as a result of the American conquest during the Mexican War of 1846–1848 and the subsequent gold rush. Renamed San Francisco, the town blossomed into a metropolis of some 25,000 from a pre-rush population of 850 in April 1848 (Soulé et al. 1855). San Francisco's population growth was spurred by its rapidly evolving status as America's principal port on the Pacific Coast. In 1849, 795 vessels arrived, followed by 656 in 1850 as a result of the gold discovery, carrying passengers and cargo, and by 1850, more than 500 of those ships lay idle off Yerba Buena Cove's shallows, the result of a glut of shipping and desertions as sailors and ship's officers abandoned their vessels to mine for gold (Delgado 2009).

## The First Ship Graveyard: The Gold Rush Storeships

The convergent forces of expansion and an overabundance of ships led to the selective adaptation of approximately 164–200 vessels as floating or beached "storeships," most of them as warehouses but others employed as hotels, offices, saloons, jails, and churches. In all, about 11–14 % of the vessels that arrived at San Francisco were converted to nonsailing use (Delgado 2009, p. 188). While contemporary Gold Rush era observers viewed these ships as abandoned hulks that had been snapped up for entrepreneurial use, the practice predated the rush, with its origins in Britain's use of laid-up warships as receiving ships, warehouses, and the notorious prison hulks in the United Kingdom and the colonies, including ships employed as opium warehouses in Hong Kong. Additionally, none of the vessels on the San Francisco waterfront were legally abandoned. Although crews had deserted, the ships remained in their owners' hands, most with caretakers on board, and all known storeships were either sold, leased, or converted to storeship use by their owners.

Storeship conversion took two forms. The easiest was to simply advertise the vessel as a floating warehouse, reduce the running rig, cockbill the yards to avoid snagging other ships in the crowded "forest of masts" that defined the San Francisco waterfront, and hire a watchman, which was not a problem with a city that faced housing and storage shortages. The most complex form of conversion, employed in no more than a few dozen circumstances, was the physical conversion of the vessel. This involved unshipping the masts, housing over the decks to create a large "barn" shelter on the weather deck, and piercing the hull for large warehouse doors and windows. In some cases, the vessels were hauled into the shallows, grounded in the mud, supported by pilings, and accessed from shore by wharves and piers (Delgado 1990).

In addition to the first beached and housed-over storeship, the former whaler *Niantic*, other permanent storeship conversions included the ships *Apollo*, *General*

*Harrison*, *Thomas Bennett*, *Panama*, *Salem*, *Casilda*, *Piedmont*, and *Arkansas* as well as more than a dozen others that were either beached or ultimately surrounded by the wharves, piers, and fill that gradually converted Yerba Buena Cove into what a visiting Chilean journalist would term:

> A Venice built of pine instead of marble. It is a city of ships, piers, and tides. Large ships with railings, a good distance from the shore, served as residences, stores, and restaurants .... The whole central part of the city swayed noticeably because it was built on piles the size of ship's masts driven down into the mud. (As quoted in Beilharz and López 1976, p. 194)

The majority of the storeships were not caught up in the cove's rapidly evolving and expanding maritime landscape. By late 1850, a newspaper editorial commented on the "numerous floating depots for the storage of merchandise clustered off the waterfront" (Evening Picayune 1850). Their distance saved them when a major waterfront fire consumed much of the town and the "Venice of pine" and three storeships on May 3–4, 1851. Following the fire, landfill consisting of debris, garbage, and sand hauled from the surrounding hills buried the former waterfront and commenced a steady push to deeper water that by the end of 1852 had buried the northern half of Yerba Buena Cove.

The storeships off the town then numbered more than the 148 counted by the harbormaster in the early winter of 1851 (Daily Alta California [DAC] 1851), whereas a summer 1852 list counted 164 (Prices Current and Shipping List [PCSL] 1852). By 1852, the storeships were increasingly viewed by civic and federal authorities as nuisances, and concerted efforts were made to clear the waterfront. Approximately half of the storeships returned to sea, whereas the others were either partially broken up and buried or surrounded by fill and urban development. A few were deliberately scuttled to establish title to as yet unfilled waterlots by "hulk undertaker," Captain Fred Lawson. Other storeships still afloat were clustered in the as yet unfilled southern end of Yerba Buena Cove, which was the city and port's industrial district. The July 1852 *Prices Current and Shipping List*'s account of ships on the waterfront reported that nearly 200 vessels lay off Rincon Point, the southern extremity of the cove, awaiting clearance in one form or another (PCSL 1852). Starting that month, some of the derelict ships were burned. This was quickly seen as wasteful by entrepreneurs such as Charles Hare, who, working in partnership with the city's Chinese fishing community, commenced the systematic dismantling of the hulks (Delgado 1981).

## Charles Hare, the Chinese, and Other Early Ship-breakers

Shipbreaking was a labor-intensive and unpleasant job with a low margin of return, and Hare's partnership with the Chinese provided the means to an end. A fishing village at the southern end of Rincon Point had approximately 150 Chinese residents. While engaged in fishing with a fleet of some 25 vessels, some of the inhabitants of the settlement, according to one reminiscent account, "were employed in breaking up old ships" (Morning Call [MC] 1884).

Immigration from China in response to the gold discovery introduced a growing number of Chinese immigrants to California, although not in great numbers. In 1849, 325 Chinese immigrated to California, followed by another 450 in 1850. In 1851, the flow of immigration increased with 2,716 arrivals (Zhu 1999, p. 43). But while not a large group, the Chinese immigrants were a visible and hated minority. White miners focused considerable antipathy toward all minorities in the mines. In the face of discrimination and violence, the settlers of the Rincon Point fishing village had abandoned the gold mines. Since many of the Chinese immigrants had come from China's coastal Guangdong province, where harvesting the sea was the principal livelihood, building a village and boats to fish the waters of San Francisco Bay was a logical choice, especially since no whites were (as yet) competitively engaged in fishing. This somewhat isolated group and primarily self-sufficient population formed a relatively inexpensive labor force when the opportunity arose to make money by scrapping ships. One scholar notes that the Chinese had a long tradition of working in groups, a practice that played out with good returns in the gold fields, with organized companies of Chinese engaged in placer mining to extract all the available gold from scattered and minimal deposits that white miners either disdained or lacked a large enough cooperative labor force of their own to successfully work. For the Chinese population, "cooperation, not individualism, was the key to success" (Zhu 1999, p. 47). This collective approach to work made the Chinese ideal ship-breakers.

A reminiscent account of the fate of many of the Gold Rush fleet, published in 1882, tallied up 77 vessels that had been Hare's "victims" (DAC 1882). Not all of the hulks broken up by the ship-breakers were hauled to Rincon Point, where Hare maintained his breaking yard. In April 1857, Hare's Chinese work crew broke up the storeship *Arkansas*, an 1849 arrival that had been hauled in and finally surrounded by buildings and landfill at that location. A reminiscent account noted that "the old hulk was cut to pieces and sold for firewood, leaving only a portion of the stern" (MC 1889).

Hare's activities included a ship chandlery where he sold new items as well as merchandise salvaged through shipbreaking, all of which suggest he was recycling into San Francisco's burgeoning shipbuilding industry, also conveniently located near Rincon Point at South Beach. Additionally, the Rincon Point shipbreaking location was not only conveniently located near the shipbuilding yards, it was also close to numerous small foundries that sprang up in the sparsely developed area south of Market street in the 1850s. Both of these industries made ample use of the salvaged components of the Gold Rush fleet.

By 1857, the business of breaking up the old ships was practically at an end. Hare, interviewed early that year, said that "the business must soon all but stop, for want of material, as the old stock of vessels is almost used up, and the decreased . . . shipping will not afford old tubs enough to keep any great number of workmen busy" (Daily Evening Bulletin [DEB] 1857). After 1857, Hare turned to buying and selling scrap. The first era of ship abandonment and shipbreaking had come to an end, and San Francisco's (and the Pacific Coast of the United States') first ship graveyard now lay buried, as Yerba Buena Cove was completely filled along with the rest of the city's waterfront.

## Other "Rotten Rows:" Oakland Estuary, Belvedere Cove, and the South Shore from Hunter's Point to Candlestick Cove

Throughout the last quarter of the nineteenth century and well into the first quarter of the twentieth century, San Francisco and its surrounding bay ports were the center of America's maritime and naval activities in the Pacific. Major industrial facilities included shipyards such as the Union Iron Works, the United States Naval Yard at Mare Island, the marine depot and ironworks of the Pacific Mail Steamship Company at Benicia, a large number of smaller shipyards and boatyards, and private and government warehouses, depots, and docks. In some cases, old hulks from the Gold Rush period persisted after the rush in some of these industrial environments. For example, historians Roger and Nancy Olmsted, studying old Coast Survey charts and photographs, identified two hulks, one of which is visible in the photograph, housed over with a shed, alongside the ways at Henry B. Tichenor's yard at the foot of Second Street at the southern end of South Beach (Pastron et al. 1981, pp. 114–119).

San Francisco was homeport for the United States' whaling industry, which extensively and almost exclusively fished the North Pacific and Western Arctic after the end of the Civil War. It also home-ported the nation's sealing industry. A busy coastal trade, primarily engaged in carrying lumber as well as general cargo and passengers, used San Francisco as a base as well as transpacific trade, because San Francisco linked the Orient, Hawaiian, and South Seas trade to America's primary Pacific port. There was also heavy maritime traffic on the bay by locally designed and built "scow schooners," flat-bottomed heavy carriers perfectly suited to the bay's shallows. These craft, along with passenger trains and car ferries, linked San Francisco's bay and its ports, large and small, as an active maritime landscape.

Such a maritime landscape requires areas outside of the most active zones of urban and industrial development to serve as a place to lay up idle vessels and ultimately be the ideal place to abandon them, and San Francisco Bay was no exception. The rapid development of the northern end of the San Francisco peninsula and the creation of an orderly waterfront with seawalls, bulkheads and permanent piers through the end of the nineteenth and into the first two decades of the twentieth century left little undeveloped space to park large numbers of ships. At the same time, the rapid pace of development as San Francisco's maritime industry expanded allowed little time for the growth of any large assemblage of abandoned vessels on the city shore, save an occasional laid-up vessel used as a sheer hulk or bulkhead for a shipyard or boatyard, such as the one at Tichenor's Ways.

Historical accounts of maritime activity in the region note three areas designated as "boneyards" for old ships. The largest was San Antonio Creek, a fresh water tributary that flows into San Francisco Bay on the east bay shore. Also known as Oakland Estuary and Oakland Creek, this body of water would ultimately comprise a major part of the modern Port of Oakland, opposite San Francisco. The estuary was a perfect locale to lay up ships, in that its fresh waters created an environment hostile to wood-boring marine organisms that infested ship's hulls, as well as retarding marine growth

**Fig. 7.2** Collection of abandoned vessels at the west end of Government Island, on Oakland Creek, California, 18 May 1931. (Photograph by John Proctor, San Francisco Maritime National Historical Park)

on the hulls. Laying up vessels in a salt water environment essentially precluded any future use of a ship, as within a short period of time, both *teredo* and *limnoria* infestation would begin to consume the ship. The creek was well-suited, therefore, as a "boneyard," especially after dredging a sand bar at its entrance in 1859 opened it as a navigable waterway. The vessels laid up in the creek included the whaling and sealing fleets, which operated seasonally. In time, as newer vessels replaced the older sailers, some of these ships never left the creek, slowly deteriorating at their anchorages. They were joined by vessels that had been damaged at sea and condemned uninsurable craft, old ferryboats and river and coastal steamers, tugboats, and a variety of other craft that were not yet candidates for destruction and which needed to simply be set aside (Fig. 7.2). Gradually, as their numbers increased, the creek assumed a new nickname "Rotten Row" (McNairn and MacMullen 1945, p. 121).

Among the whalers, a number of older American ships, some having been built before the Gold Rush, had relocated to San Francisco as their homeport after 1865. Gradually, beginning in the 1880s and running through the first years of the twentieth century, a number of these craft, either active in the trade or "temporarily" laid up in the estuary, were taken out and sold, particularly in response to the need for hulls to transport passengers and goods during the Klondike Gold Rush of 1897–1900. The estuary served as an ideal parking spot for such craft, as indicated by an 1898 account of the whaling bark *Mermaid*, "taken out of Oakland Creek and made a trip last spring to Kotzebue Sound with gold hunters, was sold at auction at San Francisco on the 7th. B.H. Madison bought her for $ 1,250 and will probably send her back to

Oakland Creek for the present" (Coast Seamen's Journal [CSJ] 1898). Other ships were gradually removed for breaking up elsewhere or were in turn broken up in the estuary. One example is the whaling bark *Francis Palmer*, a Maine-built 210 ton whaler of 1852, worked through 1888. In September 1889, after a brief layup, it was reported that "she will be broken up" (MC 1889). Another whaler, the 1854-built *Bounding Billow*, was finally hauled out of the estuary and "ended her career in the boneyard at California City on the Marin County shore" (Hare 1960, p. 110).

Other laid-up vessels joined the parade of ships in the estuary. These included laid-up San Francisco Bay ferries, lumber schooners, including the wooden-hulled steam schooner fleet that gradually assembled in the creek in the 1930s and 1940s as steel-hulled freighters replaced them, and even one former U.S. warship, the stripped down hull of the monitor USS *Camanche*, sold in 1899, cut down to a coal barge, and finally laid up on rotten row in the estuary in the 1930s.

In 1945, maritime historians Jack McNairn and Jerry MacMullen commented that while there were many maritime graveyards "in obscure waters of the Pacific Coast," the "mudflats of Oakland Creek . . . stand out as the Arlington of marine graveyards" (McNairn and MacMullen 1945, p. 121). The creek's laid-up ships were described as "moored with bows nosed into the south shore," along the Alameda side of the estuary, with "heavy planks and beams, square-cut and with iron fittings" along the beach (McNairn and MacMullen 1945, p. 121–122). All of these ships were wooden-hulled, some eighteen of them steam schooners (McNairn and MacMullen 1945, pp. 129–136). In 1945, the graveyard retained only one steel ship, "and this one is being held for speculation and possible service again, rather than for scrapping" (McNairn and MacMullen 1945, p. 123).

The Oakland Harbor Board, anxious to clear the graveyard, ordered the ships be scrapped in the summer of 1931. As a waterfront reporter opined, the demolition would remove a sense of history because "thousands of words might be written of old sailing ships in Oakland Creek," nonetheless they had to go because "sunk deep into the silt and sand, some of them stand out menacingly, and, altogether, they form obstructions" (Examiner 1931). A 1934 survey for the Port of Oakland of hulked and derelict vessels in the estuary counted 69 laid-up vessels in the estuary that could be cleared out at an estimated 118,620 hours of labor and a cost of nearly $ 100,000 to remove and scrap them, but noted that the recovery of costs would net a $ 1,290 profit (Powell 1934).

The Depression and Second World War delayed the clearance of the hulks. A 1950 article commented on the raising of the sunken 1904-built steam schooner *Helen P. Drew*, which was to be towed up the bay and into the Delta to be sunk as part of a levee along the Sacramento River (Call-Bulletin 1950). A 1959 article described how the hulk of the schooner *Chehalis*, laid up for two decades, was "chopped up and carted away" to make way for a new 520-boat marina (Tribune 1959).

A casual cruise down Oakland Estuary in 1999 at low tide revealed the outlines of the bottoms of vessels, large and small, all broken down or collapsed to the mudline, lining the shores of this second and substantial San Francisco Bay ship graveyard (Examiner 1999). Dredging and harbor redevelopment had cleared some but not all of that subtidal landscape even at the advent of the twenty-first century. A century earlier, a number of other vessels in the creek had been pulled and broken up or had been burned at the second ship graveyard site, the before-mentioned California City.

These included steamers of the Pacific Mail Steamship Company, the pioneer American steamship line on the Pacific that had commenced service during the Gold Rush with regular steamer traffic between Panama and San Francisco, with runs north to Portland, Oregon, and after the Civil War had inaugurated American steamship service to the Orient. As the trade grew, and as iron- and steel-hulled propeller steamers replaced wooden-hulled side-wheelers, those vessels not sold were laid up for scrapping. Among the craft scrapped "at San Francisco" in the late 1870s and through the 1880s were a number of the Pacific Mail Steamship Company's large, obsolete wooden-hulled steamers, including the steamers *Antelope*, *Constitution*, *Orizaba*, *Colorado*, *Arizona*, *Montana*, and *China*. Most of this work was done at California City. For example, in 1886, *China* was hauled into position on the shallow beach of California City in Belvedere Cove, where the steamer was then scrapped. During that process, the steamer's saloon was lifted off the hulk and set on pilings on the shore as a cottage. The "China Cabin" survives as a prominent Marin County heritage site administered by the Belvedere–Tiburon Landmarks Society at the edge of Belvedere (Frank 2008, p. 44).

Belvedere Cove, now part of an exclusive bay area residential area at the southern tip of the Tiburon Peninsula and in the lee of Angel Island, was an isolated industrial spot in the 1880s when it was selected as a site for shipbreaking. One factor in its selection may also have been the proximity of a Chinese fishing village at "China Camp" in an adjacent cove, and this would suggest an ongoing role in shipbreaking by the Chinese following the demise of Hare's yard in 1857. China Camp was established around the mid-1860s, and by 1880, it had nearly 469 inhabitants according to U.S. Census records. Another nearby non-Chinese settlement, California City, occupied the shores of Belvedere Bay, and it was here that the bay area's next "boneyard" for ships was established in the last quarter of the nineteenth century. Among the ships broken down were whalers, such as the previously mentioned *Bounding Billow*. An 1890 account of an "ancient craft" at Belvedere described the hulk of the 200 ton allegedly Portuguese ship *Remifaio*, laid up after hauling coal between California and Australia and towed in 1882 "to where she now lies. All the copper and iron have been taken from her hull, and she has been left to bleach in the sun and be carried off piecemeal by the tides" (Chronicle 1890). The shipbreaking at Belvedere Cove may have continued until 1912–1913, when the old whaler *California* was broken up. A series of images of *California*'s breaking are attributed to both Oakland Creek and California City. The latter is more likely. Interestingly, images of the hulk's demise show a systematic dismantling, much like that reported in 1857 for Hare's Chinese collaborators. The last known hulk off the cove, close to China Camp, was the 1883-built barkentine *City of Papeete* (Fig. 7.3), which remained half sunk until blasted below the surface by naval aviation target practice during the Second World War.

The shipbreaking operation at California City declined after the first part of the twentieth century, not because of urban development, as the Tiburon Peninsula was at that stage dominated by a ferry terminal, naval coaling station, and other industrial facilities, but more likely because of the consumption of available vessels from the

**Fig. 7.3** Hulk of the schooner *City of Papeete*, as seen from above, date unknown. (Courtesy San Francisco Maritime National Historical Park)

Oakland Creek/Estuary boneyard. Of the considerable number of craft laid up in the estuary, most survived there through the mid-twentieth century. A handful were broken up in situ, whereas others were shifted to the bay's third ship boneyard, the southern San Francisco shore stretching from Hunter's Point to Candlestick Cove.

This area began to collect floating, half-sunk, and beached vessels, many close to Hunters Point and India Basin. This ship graveyard contained former ferryboats, including the ferries *Bay City*, built in 1878 and abandoned in the 1930s, *Modoc*, built in 1880 and beached and stripped in 1928, and *Caroline*, built in 1902 and abandoned and beached in 1932, and the small ferry *Arrow*, a 1903 craft abandoned at Hunters Point around 1928 (Hamusek-McGann et al. 1998, p. 33). In some cases, the ships were not technically "abandoned." In 1932, during the Depression, a sailor named Oscar Baver converted *Caroline* into a family home, and connected the hulk to water, electrical, and telephone service. Another vessel, the scow *Emma*, was also converted into a home by one A.T. Chick, who erected its pilot house on stilts. Increasing public pressure in the late 1930s, as the area became more urbanized, led to the closure of the graveyard and the removal of the vessels (or at least those that were in view above the tide line).

Further south, in Candlestick Cove, another ship graveyard hugged the shore where ship-breaker William Manuel had been assembling vessels to scrap as early as 1929. These included obsolete iron-hulled steamers of the Pacific Mail Steamship Company, namely *City of Sydney* and *City of Peking*, as well as laid-up wooden steam schooners such as *Carmel*, *Grays Harbor*, *Raymond*, *Greenwood*, and *Georgina Rolph*. Manuel followed the less labor-intensive practice of scrapping by fire. One account of the demise of *City of Sydney* noted a ten hour blaze as “one by one . . . masts teetered and toppled” and the sides caved in, allowing for later salvage by a hired scrapper who hauled the remains close into shore and partly cut them up, with “what finally remained of the stern” going under the wrecker’s torch in 1952 (Chronicle 1962).

The outlines of vessels lined both sides of the point. An image of the cove from the 1940s shows the remains of six vessels close in to shore, with a quote from a local who reminisced about going to the beach then: “okay, it was oil-slicked and hard to get by the stink at low tide, but it was a playground no one else had . . . . The smell did subside the longer you were there, but it was our new world to conquer. It was also strewn with wrecks of old ships” (Visitacion Valley History Project et al. 2005, p. 115). A number of these vessels were filled over beginning in 1958 as construction commenced to build Candlestick Park, San Francisco’s then new baseball stadium, but some remained visible at low tide into the next decades.

In addition to the major ship graveyards, a lesser collection of laid-up craft ended up on the shores of Richardson Bay, north of San Francisco on the western (Marin County) shore off the city of Sausalito. That collection of craft included laid-up houseboats (known colloquially on the bay as “arks”) as well as, after retirement in 1948, the ferries *City of Richmond*, *City of Seattle*, *Issaquah*, and *Vallejo*. There was also the South Seas brigantine *Galilee* and the San Francisco Bay ferry *Charles Van Damme*. Both of these hulks were not abandoned, but like *Caroline* and *Emma* at Hunters Point, they had been converted into buildings. *Charles Van Damme* was initially hauled in close to shore after retiring from service in 1955, and within the next decade brought on shore, becoming a restaurant and nightclub known as “The Ark.” It was also, for a while, the residence of actors Rip Torn and Geraldine Page. *Galilee*, beached and used as a houseboat from 1933 ultimately succumbed to dry rot and teredo worm. Very little of the hull survives above the mud level, especially after the 1975 and 1987 recovery of the bow and stern for display. Surrounded by fill, *Charles Van Damme* was ultimately condemned as a hazard and bulldozed in 1983. Other than the floating collection of laid-up merchant and naval vessels in Carquinez Strait off Benicia, at the Maritime Administration’s facility, known locally and affectionately as the “mothball fleet,” the only tangible traces of ship abandonment, layup, and recycling lay out of sight as archaeological resources. Over the past four decades, many of these resources have been the subject of excavation and study.

## The Archaeology of Ship Abandonment and Scrapping on San Francisco Bay

Archaeological investigation of individual vessels and some of the sites discussed in the historical overview has taken place periodically since 1978. Occasional exposures of some of the buried ships from the Gold Rush period occurred as early as the 1870s and continued through the 1960s in San Francisco, but none of these were

**Fig. 7.4** The excavated hull of the ship *Niantic*, 1978. (Photograph by James P. Delgado)

archaeologically documented. These included vessels such as the storeships *Apollo*, *Arkansas*, *Globe*, and *Cadmus*, and in most cases the vessels were simply reburied, whereas others were in part further broken up for removal. One result of these exposures, and recognition of the possibility of other encounters, was the creation of a map based on historical research that provided a "best-guess" of the locations, both historical and archaeological, of ships on the former, now buried, San Francisco waterfront (San Francisco Maritime Museum 1963).

In 1978, the remains of the first vessel "permanently" converted into a beached storeship, the 1835 packet, later whaler *Niantic*, was hastily excavated at the corner of Clay and Sansome streets in downtown San Francisco (Fig. 7.4). Additional sites in the downtown core subsequently unearthed included piling-supported waterfront structures that had collapsed during the May 4, 1851, fire into the bay as well as the storeship *General Harrison*, excavated at the corner of Clay and Battery streets in 2001 by the consulting archaeological firm Archeo-Tec, headed by Allen Pastron, Ph.D. (Fig. 7.5). Work in this downtown area of several square blocks, now the heart of the city's Financial District and the former "Venice of Pine" of 1850–1851, revealed details of the ships' construction and maintenance, surrounding waterfront infrastructure, and diverse cargoes that reflected San Francisco's extensive maritime trade links to a global market during the Gold Rush. The particulars of the beaching process and some aspects of conversion of both *Niantic* and *General Harrison* were also revealed by excavation. This included the creation of a probable keel channel for *General Harrison* using cement-filled barrels, the placement of pilings, and for a platform supporting a hoisting mechanism installed at the starboard quarter of

**Fig. 7.5** The excavated hull of the ship *General Harrison*, 2001. (Photograph by James P. Delgado)

the ship to facilitate loading during that vessel's conversion. Another interesting archaeological discovery was an apparent lack of physical structure to subdivide storage inside *Niantic* but a nonetheless subdivision of stored goods by the owner (Delgado 2009).

Another significant aspect of the *General Harrison* excavation was the archaeological documentation of the site as the earliest "shipbreaking" job undertaken by Charles Hare and his Chinese coworkers. The process did not involve breaking up the lower hull, which survived the fire, but rather the removal of burned and unburned cargo from the flooded hull, dewatering it, and the selective removal of all copper and bronze fittings, including sheathing on the outer hull. It was determined that this work was done quickly, in extreme and hazardous circumstances, and to maximize financial return with the highest-priced commodity left on the hulk, the "yellow metal" (Delgado 2009).

The analysis of Hare and the Chinese ship-breakers' technique added to the previously done archaeological documentation of half of Hare's yard at the southern end of Yerba Buena Cove and near the intersection of Spear and Folsom streets. That excavation recovered tools and documented piles of ship parts that had been systematically dismantled and gleaned of every accessible piece of iron and yellow metal (Pastron and Delgado 1990). This fit with a contemporary account of the work in the yard that noted "in a short time the skeletons themselves fall to pieces; the iron and copper are stored, the wood piled up and carried away, and not a vestige of the once mighty masters of the deep remains" (DEB 1857). It also nicely fit with another period reminiscence that “Hare purchased them, set Chinamen to picking their bones, broke them up, put the shattered timbers in one pile, the iron bolts in another, the copper in another, the cordage in another, and so in a short time all that remained of these bluff-bowed, old fashioned ships and brigs … was so many ghastly piles of marine debris” (Mulford 1889, p. 46).

The initial excavation of the Hare site, accomplished by Archeo-Tec, was followed by the excavation of the rest of the site in 2006 by William Self Associates, led by James Allan, Ph.D. The 2006 excavation completed the picture of a complex operation that hugged the shoreline, utilized the tides, and with work performed from simply constructed platforms and flats. The process utilized a reverse construction method to break a ship down to its keel, from bow to stern, before chopping up the keel, all the while sorting the various components and parts into piles. The foundations of Hare’s office and home were also excavated on the former sand bluff overlooking the tidal flats, and excavation showed that it was constructed from salvaged ship parts. The largest feature excavated was the partially disassembled stern of what was likely the last ship to be broken at the yard, the 1818-built whaler *Candace*, damaged by Arctic ice and condemned at San Francisco in 1855, from where Hare bought it to scrap along with his rapidly dwindling collection of Gold Rush hulks (William Self Associates 2006).

The excavation of three sites in San Francisco revealed three relatively intact hulks, two of them were Gold Rush vessels. The first, excavated by Pastron and Archeo-Tec in 1979–1980 with historians Roger and Nancy Olmsted, was the 1827-built ship *William Gray*, a former storeship that was beached, filled with rock, and used as a bulkhead and base for waterfront pier at the bottom of Telegraph Hill around 1852 (Pastron and Prichett 1979). Only partially excavated and then reburied, *William Gray* remains beneath the surface at Levi’s Plaza along Battery Street near the Embarcadero. This site does not demonstrate recycling, but rather an early adaptive reuse of the intact ship as a commodity that had been rendered inexpensive by the circumstances of the Gold Rush. This pattern of use would be followed later on the bay and is mirrored by other sites in the world where ships became bulkheads, breakwaters, or fixed docks.

The second Gold Rush ship excavated on the old waterfront was the ship *Rome*, a vessel scuttled in 1852 in what was then deeper water by “hulk undertaker” Captain Fred Lawson, to physically possess and hold title to a submerged water lot. Intact and decked, *Rome* was encountered while boring a waterfront subway tunnel. Only that portion impacted by the tunnel was excavated and recovered in 1994. The remainder of the ship lies beneath Justin Herman Plaza at the intersection of Market Street and the Embarcadero (William Self Associates 1996). The excavation, by William Self Associates and led by James Allan, documented the construction of the ship, determined its identity, and again demonstrated a terminal reuse of a vessel no longer deemed valuable in a glutted market.

In June 1978, construction of the city’s major wastewater transport system at King Street near Second encountered a buried ship that was determined by historians Roger and Nancy Olmsted, working with archaeologist Pastron, to be the Massachusetts-built, 1840 whaler *Lydia*. After being laid up since 1896 in the estuary (Oakland

Creek), *Lydia* was sold in 1901 to the Pacific Coast Wrecking Company of San Francisco in May 1901 "and will be converted into a barge" (CSJ 1901). The archaeological evidence from the excavation in 1978 showed that *Lydia* had not simply lain idle or been reduced to a barge. Rather, the vessel had new chainplates and was possibly in the midst of a refit when a shipboard fire at the bow ended that effort and left her half sunk in the Pacific Mail Basin (Pastron et al. 1981, p. 234). An isolated hulk, *Lydia* remained there until 1907, when seawall construction closed off the basin and the area was filled. This led to the partial dismantling of the hulk just before the basin was filled in (Chronicle 1907).

The discovery of *Lydia* was a surprise in more ways than one: exhaustive historical research prior to the construction had not indicated it was there, the site had been an actively used ship basin and not where an abandoned ship was suspected to lie, and *Lydia*'s fate lay buried in a newspaper account not easily found in a pre-Internet age.

While historical research suggested no boneyard ships where *Lydia* lay, it did indicate others further south, especially around Hunter's Point. At low tide, the outlines of the lower hulls of some of the steam schooners hauled in and burnt by William Manuel in the 1930s were visible in the 1980s. In 1986, James Delgado led an archaeological mapping exercise with a team of student volunteers to assist the State of California and documented the remains of the steam schooner *Grays Harbor*, burnt and scrapped in 1931. In 1989, sewer construction along the edge of Highway 101, which now defines the (filled) western edge of Candlestick Cove struck the buried remains of the iron-hulled Pacific Mail steamer *City of Sydney*, an 1875 vessel that had been converted in 1915 to a five-masted barkentine, finally laid up and scrapped by burning in January 1930 and hacked on until 1952, after which the beach it lay on was filled. The uncovered remains were documented by Archeo-Tec, under the direction of Allen Pastron (Chronicle 1989).

In February 2011, Candlestick Park's environs yielded two buried vessels, one a scow schooner and the other a flat-bottomed barge, from a now land-filled portion of the hulk graveyard south of Candlestick Point just off Highway 101 and close to where Pastron's crew had worked on *City of Sydney*. Archaeologists from Past Forward, led by Rebecca Allen, Ph.D., and Scott Baxter documented the vessels after they were exposed during construction. Further south, in San Mateo, dredging at the Coyote Point Marina in 1987 struck the remains of the 1911-built steam schooner *Daisy Gatsby*, which had been used as a breakwater at the site after being pulled out of Oakland Estuary in 1948. James Delgado and Martin Mayer of the National Park Service documented the remains of the hull, which had been completely removed and fragmented into pieces by the dredging.

Beyond San Francisco's immediate boundaries, in Benicia, the Matthew Turner/James Robertson Shipyard was archaeologically surveyed by James Delgado, Martin Mayer, and volunteers in 1986–1987. The survey revealed substantial remains of the yard's physical infrastructure and two sunken craft: one a barge used to work alongside floating vessels and the other the sunken and largely buried remains of the 1843 whaler *Stamboul*, which the yard utilized as a floating platform for a derrick used to "step" and "unstep" ship's masts. *Stamboul*, pulled out of the Oakland Estuary, had been sold to shipbuilder Matthew Turner and, unlike many "Rotten Row" relics, had not been scrapped or burned but reused in a terminal manner that left a substantial archaeological resource beneath the water and mud—in this case, the rare survival of more than half the hull of a nineteenth century American whaler.

## Conclusions

The ship graveyards of San Francisco Bay are perhaps unique in that they are largely buried and not readily visible. Largely dating to the nineteenth century and tied to the California Gold Rush and its immediate aftermath as San Francisco rose to prominence as America's principal Pacific port, these ships offer a detailed archaeological sense of the development of American and to a certain extent foreign merchant sailing and steamships of the century spanning the early nineteenth to the early twentieth century. They also offer, especially in the case of the San Francisco and California City (Belvedere Cove) graveyards, a focused view of the role of ship-breakers, specifically the Chinese, in the recycling of ships from the bay's maritime boneyards, especially in regard to the aftermath of the Gold Rush. There are also specific and instructive examples of the adaptive reuse of the bay's abandoned ships, whether as property-establishing hulks, piers, breakwaters, or sheer hulks at a shipyard. Although considerable archaeological work has been done with many of these ships, there is much more that can and should be done, especially in regard to the unstudied graveyard at Belvedere Cove and on the Oakland Estuary.

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# Chapter 8
# The Ship Graveyards of New York Harbor: Damaging Drift or Vanishing Resource?

**Andrew D. W. Lydecker and Stephen R. James, Jr.**

**Abstract** Ship graveyards generally refer to specific geographic areas with large concentrations of shipwrecks or hulks resulting from armed conflict, natural disasters, or abandonment. As a result of changing economic patterns, political and military events, or evolving technologies, abandonment of vessels is perhaps the leading cause for the concentration of watercraft in a specific area. The Port of New York contains one of the largest and most diverse collections of abandoned wooden watercraft in existence. The clusters of beached and semisubmerged hulks represent the final century of wooden ship construction within the United States. Archaeological research conducted since the mid-1970s has cataloged and recorded much of this assemblage, and cluster types based on the method of abandonment have been identified and established. This paper outlines this archaeological research, discusses the identified vessel abandonment processes, and examines four specific vessel clusters within the context of this body of work.

## Introduction

Crucial in the development of the state as well as the nation and affecting a political and socio-economic influence felt around the world, the Port of New York has a legacy that is equaled by few. The site of numerous technological advances, the port area once bustled with wooden vessels of all types and sizes, vessels like the walking beam side-wheeler that signaled new technologies and others such as the sailing lighter that strained to compete in the age of steam and iron hulls. Today, the remains of these vessels can be found littering the shores and waterways surrounding the port and comprise one of the largest ship graveyards in the world.

The mass abandonment of vessels resulting from deteriorating economic conditions in the Port began after the First World War. This mass graveyard represents a cross section of working vessels engaged in interstate, intrastate, and coastwise

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shipping in the late nineteenth and early twentieth centuries. Fortunately, this enormous resource has been the subject of considerable cataloging, mapping, and recording efforts under Section 106 of the National Historic Preservation Act of 1966 since the late 1970s, resulting in a large body of archaeological work. Vessels have been examined and cataloged by individual type, and clusters have been studied and cataloged with regards to site formation processes and purpose for abandonment. Vessels have been recorded as part of Phase 3 and HABS/HAER (Historic American Buildings Survey and Historic American Engineering Record, both programs established by the U.S. Government to document America's architectural and engineering heritage) investigations, preserving valuable information for future research.

This chapter will serve as a basic review of historical background and literature regarding vessel abandonment in the Port of New York, with emphasis placed on conditions leading to abandonment and the reasons for the abandonment of specific vessels in particular areas. Four specific vessel clusters in the inner harbor, two at Shooters Island, Cluster 4 on Staten Island, and a collection at Port Johnson (Fig. 8.1) will be examined in detail regarding their known historical background and archaeological investigations.

The term "ship graveyard" generally refers to specific geographic areas that have large concentrations of shipwrecks or hulks. While vessels can accumulate because of a number of reasons, including armed conflict and natural disasters, the most common reason is abandonment. Abandonment can occur for a number of reasons, including changing economic patterns, political and military events, or evolving technologies, and has resulted in prominent collections of hulks all over the world. New York Harbor is no different, as various technological and political events and trends drove the abandonment of thousands of vessels in the harbor during the mid-twentieth century.

The Port of New York contains within its waters and along its shorelines possibly one of the largest and most diverse collections of abandoned wooden watercraft in existence. Represented by clusters of beached and semisubmerged hulks, the vessels represent not only the final century of wooden ship construction within the United States but also the remains of technologies such as steam propulsion, eclipsed by the diesel engine, and wooden hulls, replaced by iron and steel. Abandoned in groups of similar types of vessels and often in single events, hulks often served secondary purposes such as breakwaters or landings, abandoned after anticipated reuse or collected in a single location for scrapping.

Traffic and cargo handling patterns of the Port of New York developed around the area's unique geography coupled with the convergence of rail lines, resulting in the development of many specialized vessel types such as barges, lighters, car floats, and ferries to carry cargo within the port via water. The array of regional jurisdictions and water bodies resulted in the development of a cargo transferring system where even railroad companies delivered freight from terminals by water rather than rail. The Port of New York reached its peak of development in the 1920s, when 150 miles of waterfront contained 550 miles of wharves (Raber 1995, p. 5). Thereafter, changes in regional and industrial transportation and a diminishing share in the overall world trade resulted in a gradual reduction in waterfront use in port activities. This gradual

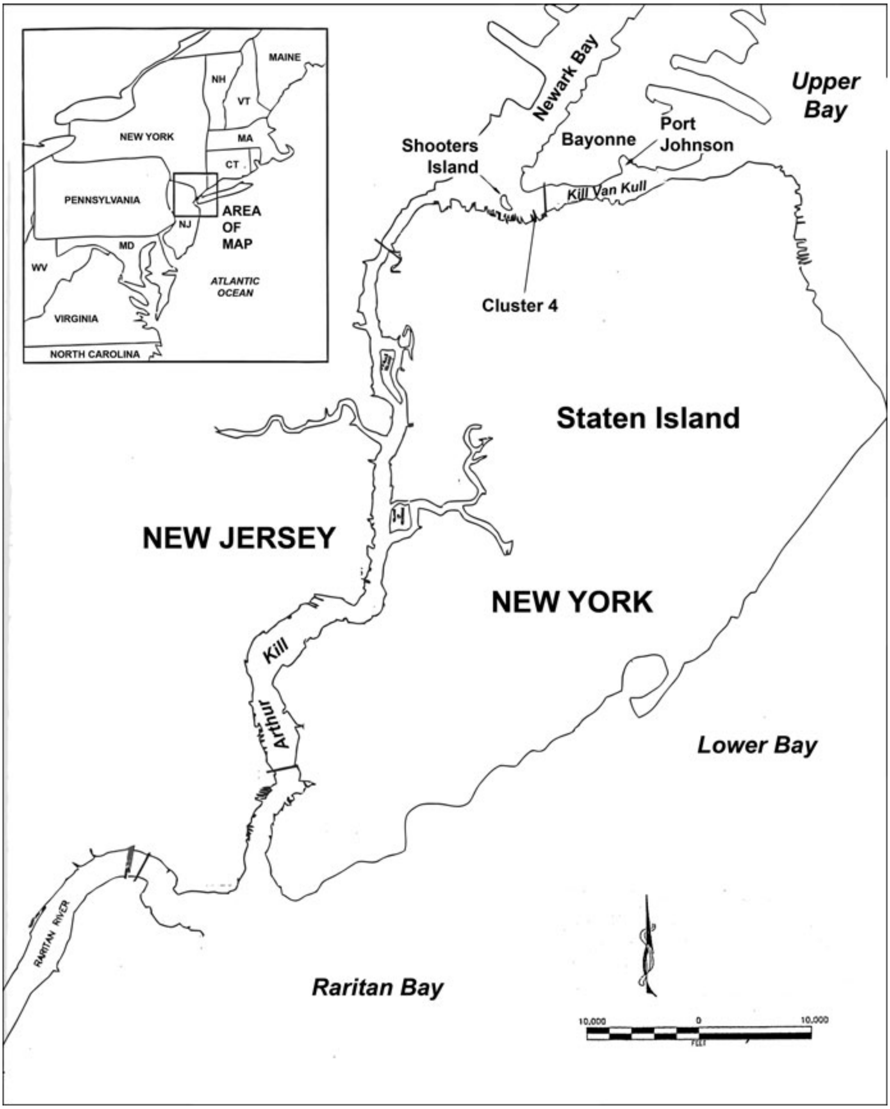


**Fig. 8.1** Map of Staten Island, New York, showing locations mentioned in text. (Image courtesy Panamerican Consultants, Inc.)

decline in traffic and wharfage, changes in cargo handling methods (including the increased use of land-based transportation), and the increasing popularity of iron and steel as construction materials contributed to the reduction in commercial value of the large collection of wooden vessels in use in the port, resulting in the abandonment of thousands of these vessels in newly unused waterfront areas.

Abandonment sites in the port range from individual vessels up to groups numbering in the hundreds, and it is important to discuss the terminology employed in the archaeological literature when discussing these various vessel groups and subgroups within the overall assemblage. According to Raber (1995, p. 8), there were, at the time the vessel surveys were undertaken, no established criteria for defining a graveyard. Raber goes on to state that the use of the term "graveyard" most often implies a deliberate grouping of vessels in abandonment or for scrapping. Raber, however, considered the use of the term "graveyard" confusing, not only because of the complex nature of the vessel assemblage in the port (both geographically and typologically) but also because of the correlation of vessel groups to behaviors other than abandonment, including the reuse of barges as residences, breakwaters and bulkheads, piers or landings, or clubhouses and marina offices (Kardas and Larrabee 1984, pp. 61, 62; Marshall and Brouwer 1981, p. 194; Raber et al. 1986, p. 27, 1995a, p. 75), random drifting (Kardas and Larrabee 1984, pp. 61, 62), vessels laid up for anticipated reuse but subsequently abandoned (Brouwer 1983; Kardas and Larrabee 1984, p. 32; Marshall and Brouwer 1981, p. 194), and the collection and transport of abandoned vessels to a central location for the purpose of scrapping (Flagg et al. 1992). Subsequently, he refers to groups of vessels as clusters rather than graveyards to avoid the obvious confusion in definitions. This term is employed consistently in much of the archaeological work conducted during the 1990s and 2000s.

Marine yards involved in the construction and repair of vessels are, according to Raber (1995, p. 9), the largest type of abandonment site in the Port of New York. Among this genre of abandonment sites are the former shipyard on Shooters Island, Witte's Yard on the Arthur Kill on Staten Island, a yard at Tottenville near the Outerbridge Crossing, a yard in Perth Amboy, New Jersey, and several sites in Jersey City and Hoboken. Other waterfront industries such as canal boat basins, rail marine terminals, and smaller ship and boat yards also served as convenient abandonment points as they themselves were typically closed or abandoned. Examples of these include Port Johnston on Kill van Kull in Bayonne, New Jersey, Shooters Island, Lehigh Valley Railroad Terminal at Perth Amboy, several basins on the New Jersey waterfront across from Manhattan, and Central Railroad of New Jersey terminal at Communipaw, New Jersey.

According to several studies by Raber and associates in the 1990s (Raber 1995; Raber et al. 1995a, b, c), abandonment activity can be divided into two types that explain most vessel clusters in the port—reuse of harbor craft as breakwaters or for marina construction and use of inactive waterfront areas to abandon and salvage vessels that were no longer commercially viable (Raber 1995, p. 98). The latter pattern is regarded as the dominant pattern of abandonment in the port and is further divided into four subgroups: (1) abandonment of harbor craft used by marine operations when those operations went out of business, (2) storage of idle craft at marine yards with the hope of sale or lease but resulting in abandonment when the business failed, (3) conversion of facilities used for vessel layovers, for instance, boat basins, to abandonment locations as demand for those vessels declined, and (4) use, authorized or unauthorized, of vacant waterfront facilities by those not formerly tenants or owners as vessel disposal sites. Examination of four clusters elsewhere in this chapter will demonstrate that vessel clusters can also fall into multiple categories, although for the purposes of typology, the archaeological studies tend to give them a single type.

The large collection of vessels in the Port of New York has fortunately been the subject of numerous archaeological and historical investigations, beginning in the mid-1970s and continuing into the mid-2000s, as part of various jurisdictions' responsibilities under Section 106. Dozens of vessel clusters and hundreds of vessels were identified, cataloged, examined, and recorded during the investigations throughout the port's waterways, with many being identified according to type. Many of these vessels are considered historically significant and deemed worthy of documentation under Section 106. The efforts to identify, assess, and document these historic vessels have resulted in many thousands of pages of documentation of this valuable resource.

Major efforts at inventorying, assessing, and mitigating abandoned vessels coincided with major construction projects by the Port of New York and the U.S. Army Corps of Engineers (USACE). The earliest project was the Water Resources Development Act of 1974, which authorized the USACE to remove Shooters Island entirely. The largest project was the New York Harbor Collection and Removal of Drift Project, undertaken as a result of the hazard created by abandoned vessels, either whole or pieces, and parts of other abandoned objects like structures and piers, breaking loose and drifting into navigation channels. With the goal of removing vessels and structures that posed a danger of drifting, the project encompassed nearly the entire Port. Section 106 compliance for this and other projects resulted in numerous major survey and documentation projects in Arthur Kill (James and Duncan 1999; Raber et al. 1995a, b), Kill van Kull (Raber et al. 1995c), Bayonne (James 1991; Kardas and Larrabee 1984; Raber 1995), Newark Bay (Flagg et al. 1992), Liberty Island (Brouwer 1977), Shooters Island (Brouwer 1981, 1983; Kardas and Larrabee 1985; Lydecker 2005; Lydecker and James 2002; Rockman and Rothschild 1979), Edgewater (Raber et al. 1984), East River (Kardas and Larrabee 1977), and Jersey City (Kardas and Larrabee 1978).

## Vessel Types

The effort of cataloging and mapping the various clusters and vessels during the 1980s and 1990s resulted in a good understanding of vessel types. Not surprisingly, the vast majority of abandoned vessels were those used in local or regional cargo traffic. Additionally, unlike the larger, more glamorous oceangoing vessels, these types had not received significant attention archaeologically until the 1990s.

One of the rarer vessel types identified within the port is the sailing lighter. At one time, one of the most numerous vessel types within the port, today only a few examples of the sailing lighter exist, including the one located along the shores of the Kill Van Kull. Little understood and poorly documented, they are thought to have developed from the Hudson River Sloop, an adaptation of the Bermuda Sloop. Transporting various commodities throughout the port, these single-masted, sloop-rigged vessels with broad, shallow draft hulls continued in the same form until replaced by steam lighterage in the early twentieth-century. In their final form, they can be seen in the earliest photographs of the port dating to the 1850s and were still around during the First World War.

Seagoing sailing vessels present in the port include barkentines and all types of schooners. Associated with the coal, grain, and lumber industries, these vessels include *Camden*, a 186-ft vessel built in Ohio in 1872 as a three-masted Great Lakes grain and lumber schooner (James and Duncan 1999, p. 378), and *Paul E. Thurlow*, a four master built in Rockland, Maine, in 1919 (Lydecker 2005, p. 195). Many of these grand sailing vessels ended their lives as schooner barges, cut down and subsequently towed in groups by large steam tugs in the coal trade. Others were built specifically as schooner barges. One example, *Devon*, rests near *Camden* along the western shores of Staten Island (James and Duncan 1999, p. 382) and another on the Kill van Kull shore in Bayonne (Raber et al. 1995c, p. 42, 61).

Another type of towed vessel located in number within the port is the canal boat or barge. With the opening of first the Erie Canal in 1821, the canals ensured New York's leadership among eastern ports because of its access to markets and goods from the country's interior. With numerous construction variations, many temporally and geographically diagnostic, a number of these early important vessel types litter the shores of the port.

Several recorded vessel types are indigenous to the port area of New York, such as the double-ended ferry, a vessel type that was a quick adaptation to steam power, or represent technologies unique to America, such as the vertical walking beam steam engine often employed in the ferries. Investigated examples that employed the walking beam include *Minerva* (Kardas and Larrabee 1985, pp. 14–16) and *Westfield #2* built in 1862 for the Staten Island Ferry Company and which figured in one of New York's worst maritime disasters when its boilers exploded (James and Duncan 1999, p. 77).

A majority of the vessels investigated represent types which evolved as a result of the port's extensive lighterage industry and were abandoned with the advent of the container system. Historically, New York's leadership position in general cargo portage depended on its ability to move or "lighter" goods from ship to pier, ship to ship, or pier to pier. The term "lighter" generally describes a small boat utilized as an intraport cargo carrier. However, in the New York Harbor, the term also applies to cargo ferrying via scow, barge, derrick, railroad car float, or grain elevator, to and among waterfront terminals or anchored ocean vessels. Many of the vessels were associated with railroads that operated railheads on the waterfront, and by the 1920s, railroads owned outright large lighterage fleets consisting of tugs, car floats, and barges. The wooden harbor tugboat was perhaps the vessel most critical to the evolved lighterage system. Its dominance is attested to by the number of now abandoned wooden tug hulls littering the waterways (James and Duncan 1999, pp. 294–319).

There are several different types of barges represented in the graveyards. The hold barges carried bulk commodities, especially grain and coal, and were sometimes known as coal boxes. These barges were extremely large and many nearly complete examples litter the waterways, especially along the shores of Staten Island. Another common barge type was the bulkhead or rock scow. Identified by a bulkhead on either end, this type of barge carried its cargo on its uncovered deck; its cargo ranged from automobiles to rock, hence its namesake. One of the most important barge types was the railroad car float. Long decked with a series of railroad tracks, these barges carried railroad cars from one railhead to another or from railhead to waiting vessel or waterfront warehouse. Enabling the loading of these car floats from land was the railroad truss bridge. One of only two surviving examples is the B&A Transfer Bridge No. 2 at Staten Island's St. George's terminal (Raber et al. 1995c, p. 41).

Many other watercraft types litter the harbor's shorelines. The Ferris-type ocean freighters offer a classic example of a vessel type eclipsed by political and economic factors, thereby resulting in the abandonment of this vessel type in large numbers. Ordered built in mass quantities by the Emergency Fleet Corporation as a result of the United States entering First World War, the majority of these wooden freighters were not completed by the cessation of the war. Already obsolete at the time of construction, most of the vessels were sold as barges or for scrapping. Many ended up in large clusters around Staten Island, New York. Two examples include the 267-ft *Corone* and *Neal O'Boyle* (James and Duncan 1999, p. 283–285).

Too numerous to describe in detail, various other vessel types are present within the port's assemblage of abandoned vessels. These include floating dry docks with massive wooden submersible floats that raised a vessel out of the water for repairs, the floating grain elevator employed to transfer grain from the many canal barges, steam lighters that conducted any job imaginable, crane barges that raised or salvaged sunken vessels, and the many fishing craft from an industry now since forgotten within the port.

## Shooters Island

Located at the confluence of Kill van Kull, Arthur Kill, and Newark Bay (itself the confluence of the Passaic and Hackensack Rivers) on the northern shore of Staten Island (Fig. 8.1), Shooters Island was the historic location of both a ship yard during the First World War and a petroleum refinery between the First and Second World Wars. The island made for an ideal abandonment area with tidal flats on the west side and abandoned piers on the east, and being uninhabited and unused between 1940s and 1960s. The initial action that prompted the archaeological work was the Water Resources Development Act of 1974, which authorized the USACE to remove Shooters Island entirely. To this end, an archaeological reconnaissance of Shooters Island was undertaken in 1978 (Rockman and Rothschild 1979). This comprehensive survey identified cultural resources from a number of different categories representing several eras of use of Shooters Island.

Investigations indicated that Shooters Island contains two distinct graveyards of two different types (Fig. 8.2). The east end graveyard, with its piers and docks, is associated with the island's industrial past, including its use as a shipyard. It appears that the vessels abandoned on this side of the island were out-of-service ships moored alongside piers and eventually abandoned at their moorings. The west side of the

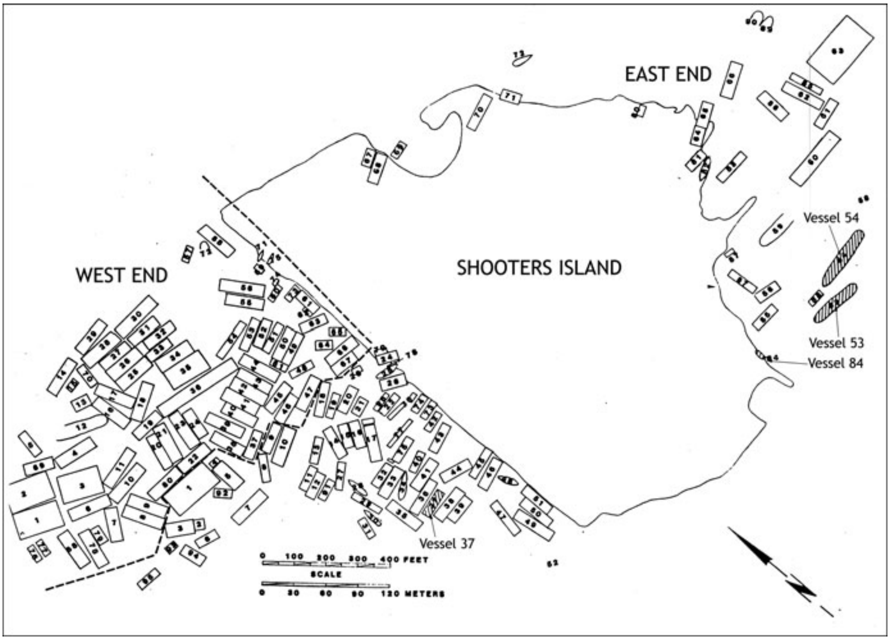


**Fig. 8.2** Shooters Island, New York, with locations of vessels and clusters mentioned in text. (Image courtesy of Panamerican Consultants, Inc.)

island is a mud flat that became a convenient dumping ground for vessels, most of which comprise harbor utility vessels. Aerial photo analysis by Kardas and Larrabee indicates that vessel abandonment began soon after the closing of the shipyard after the First World War. The shipyard docks became storage areas for unused vessels in the 1920s, possibly with the intention of reuse or repurposing. Aerial photography from the 1930s shows the mud flat on the west end of the island to be free of vessels, whereas the east end of the island contains numerous scows and smaller numbers of other vessels, including *Minerva* and a ferry. When, exactly, the west end of the island started to be used for vessel abandonment is not completely certain. Photos from the 1960s show a large number of vessels present on the west end with active secondary salvage of wood and other materials ongoing. The collection of vessels on the west end was essentially in its modern configuration by the mid-1960s, and it consisted primarily of utilitarian vessels of the types, namely scows and barges, that were abandoned in wholesale numbers during the same time period. These vessels represent 96 of the 147 total vessels in the western area (Kardas and Larrabee 1985, pp. 30, 44). Whether these vessels ended up at Shooters Island as a result of the use of the mud flat as a convenient abandonment site or were transported from other locations and brought to Shooters Island for the express purpose of scrapping is unclear; however, it is clear that the vessels at this location were heavily salvaged.

Numerous historic vessel types were/are present at Shooters Island, including covered barges, railroad barges, tugboats, caddies, floating dry docks, a walking beam side-wheel steamer identified as *Minerva*, and the four-masted schooner *Margaret Throop* (Kardas and Larrabee 1985, pp. 14–16). Norman Brouwer stated that Shooters Island represented "an opportunity which should not be lost" with respect to cultural resources (Brouwer 1978, p. 5). Kardas and Larrabee, in referencing Brouwer, recommended that numerous vessels located on or around the island be assessed for their potential historic value (Kardas and Larrabee 1985, p. 45).

An inventory of the vessels completed by Brouwer demonstrated a cross section of vessel types important in New York's maritime past (Brouwer 1981, 1983). Most numerous were the various types of scows and barges, numbering more than 120, inclusive of both the east and west ends of the island, although the west end of the island had a higher percentage of these vessel types. Recommendations from the inventory suggested that none of the vessels on the west end, including several segments of a sectional dry dock, were unique enough to justify further investigation or documentation under Section 106. This recommendation was reassessed in a 2001 remote sensing survey (Lydecker and James 2002). That report recommended that a section of floating dry dock located in the designated area for a project to widen the channel was eligible for listing on the National Register of Historic Places. The former shipyard and postwar storage and abandonment cluster on the east end consisted of nearly 60 vessels categorized as barges and scows and variations thereof such as covered barges, crane barges, floats, and derrick barges. The area also contained several vessels that were considered historical in nature, including Vessel 84, a sailing lighter that predated the construction of the First World War shipyard, schooner *Margaret Throop*, *Minerva*, a walking beam side-wheeler built in Brooklyn in 1873 and abandoned at Shooters in the early 1920s, Vessel 54, a steam powered freight boat dating from the 1880s, and several wooden-hulled diesel tugs (Brouwer 1983, pp. 4, 5).

The Shooters Island's assessments resulted in a HABS/HAER investigation of the graveyards in 1985, which recorded in detail four vessels deemed historically important by previous studies, including Vessel 37 (covered barge), Vessel 53 (steamer *Minerva*), Vessel 54 (package freighter), and Vessel 84 (sailing lighter). At the time of this investigation, Vessel 37 was largely intact. Documentation focused solely on the cargo hold and not on the scow hull, although basic measurements were taken. Vessel 53 was largely deteriorated with only the lower hull, walking beam A-frame, and part of the paddle wheels remaining. At the time of the survey conducted in 2001 by Panamerican Consultants (Lydecker and James 2002), nothing remained above or below water of *Minerva*. Vessel 54 remains consisted of much of the hull to above the deck line, including at least one cargo door (Kardas and Larrabee 1985, p. 112), whereas Vessel 84 was basically the floors to the turn of the bilge.

No other archaeological work was conducted on or around Shooters Island until a 2001 survey of the harbor for a USACE channel deepening project. This project examined the edges of the existing federal channels in the port, including the north and east sides of the island (Lydecker and James 2002). The status of a vessel determined not historic during previous investigations was revisited—Vessel 2, a section of a floating dry dock. Also assessed was a vessel not previously identified in the east end cluster—a small composite hulled tug. Both vessels were ultimately recommended for Phase 3 recordation, which was undertaken in 2004 (Lydecker 2005).

## Kill van Kull Cluster 4

Kill van Kull Cluster 4, as identified by Raber et al. (1995c), is located on the north shore of Staten Island, opposite Richmond Avenue, just west of the Bayonne Bridge, within the Kill van Kull New York Reach (New York/Staten Island side of the Kill). It consists of 37 vessels, including large and small hold barges, tugs, decked scows, and other common working vessels, along with the four-masted schooner *Paul E. Thurlow* (V37) a steel-hulled flush deck motor tanker (V32), menhaden trawler *Fish Hawk* (V33), a suction dredge (V36), and a balanced floating dry dock (V38; Fig. 8.3). The vessels have been attributed to the adjacent Great Lakes Dock and Dredge Company (GLD&D) by James and Duncan (1999), and indeed the majority of the vessels appear to date to circa 1935 (Raber et al. 1995c, p. 127). GLD&D is a multiservice marine company specializing in dredging operations as well as involved in other types of marine work. The company's Staten Island office began operations in the early 1920s, and by 1924, it was located in its present location at the foot of Lake Street (James and Duncan 1999, p. 442).

Aerial photo analysis showed a large number of vessels haphazardly scattered around the location starting from around 1940 (James and Duncan 1999, p. 435). Additional vessels, including *Paul E. Thurlow*, were added in the late 1940s, and the cluster remained unchanged until the early 1970s. The last vessel deposited here was the menhaden trawler *Fish Hawk*, built after the majority of vessels in this cluster were abandoned and was itself abandoned sometime between 1974 and 1984. The majority of the area comprising Cluster 4 began being filled in during the early 1970s, with the majority of vessels removed, cut down, or filled over by 1984.

The type of graveyard represented by Cluster 4 is not immediately clear. The existence of GLD&D adjacent to the cluster suggests that the cluster represents a group of vessels abandoned at the site of a former marine operation. However, the GLD&D site has been in continuous use since the development of the cluster, making this a lesser possibility, although it still could have been an area used for the abandonment of former GLD&D working vessels. The presence of V37, a wooden-hulled hydraulic suction dredge, supports this hypothesis. However, other vessels, such as *Thurlow* and *Fish Hawk*, appear out of place among the more mundane working craft and could possibly represent vessels surreptitiously abandoned at the already established graveyard or vessels acquired for the purpose of scrapping, salvage, or reuse.

Archaeological investigations at Cluster 4 are more extensive than those at either Shooters Island or Port Johnson. Initial reconnaissance was conducted by Raber et al. in 1995, during which time vessels in the Kill van Kull New York Reach were identified, cataloged, and mapped (Raber et al. 1995c). In 1995, Panamerican Consultants (James and Duncan 1999) assessed a large number of vessels in Arthur Kill and Kill van Kill, including those at Cluster 4. The findings indicated that as a whole, Cluster 4 was not eligible for listing to the National Register, though a number of individual vessels in the cluster, including V33 (*Fish Hawk*), V36 (*Paul E. Thurlow*), V37 (suction dredge), and V38 (balanced floating dry dock), were eligible

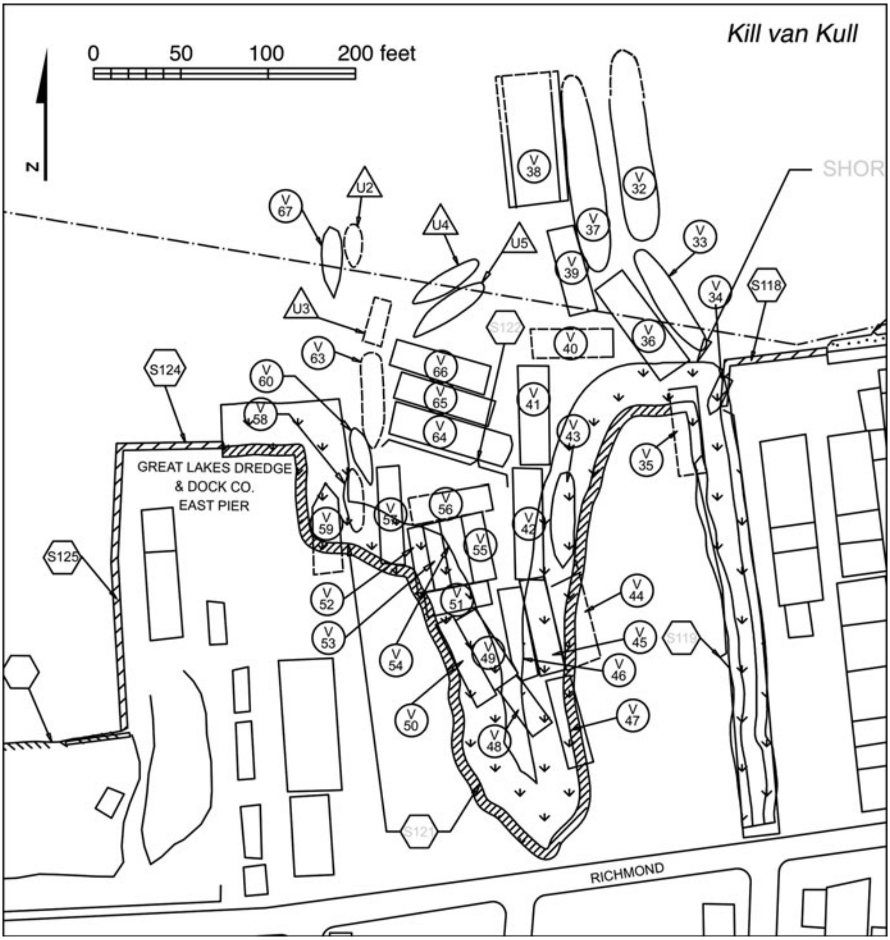


**Fig. 8.3** Cluster 4, north shore of Staten Island, New York. (Image courtesy Panamerican Consultants, Inc.)

for nomination. These four vessels were recorded as part of a larger mitigation project that also included vessels at Shooters Island (Lydecker 2005).

## Port Johnson

The Bayonne Peninsula is a geographical area defined by the area bounded by Kill van Kull to the south, Upper New York Bay and the Hudson River to the east, and Newark Bay to the west. Port Johnson itself is located on Kill van Kull, midway between Bergen Point on the southwest tip of Bayonne and Constable Hook on the southeastern tip (Fig. 8.1). Port Johnson itself is the site of a former coal handling facility and the first large industrial development in the area of Constable Hook, which lay east of Bayonne's more valuable residential land in the vicinity of Bergen Point. It preceded most of the late nineteenth and early twentieth century kerosene, oil, and gas industry, for which Bayonne is known and which was responsible for much of Bayonne's historical pollution problems. Begun in 1864 by the Central New Jersey (CNJ) railroad, Port Johnson initially had a single pier, with three timber piers built in an area of a dredged salt marsh by 1882. Each pier had a rail link to the CNJ line through Bayonne. The facility was used for transshipment of coal to points both in the port and surrounding areas. Coal trains loaded sloops, small schooners, and barges, with capacities of between 100 and 1,000 tons—very few seagoing vessels loaded directly at Port Johnson. In the 1890s, the easternmost pier was expanded, whereas the remaining two piers became used primarily for tying up vessels awaiting loading. Beginning prior to the First World War, CNJ leased the westernmost pier to a series of marine repair companies, including Robert Lankford and Port Johnson Dry Dock. Port Johnson itself was eclipsed as a coal handling facility in the 1920s when CNJ opened a new more modern facility in Jersey City. Port Johnson became redundant in the 1920s with the post-First World War economic slowdown that resulted in reduction in demand for coal. By the mid-1920s, the two western piers had been leased to another marine repair facility, and the eastern (the largest) pier, which was used for berthing vessels, was made inactive by the poor post war economic conditions and surplus of cargo vessels. In 1928, the marine repair business, Ballou Dry Dock and Repair, ceased activities and all the piers were then leased for storing unused vessels (James 1991, pp. 9–11).

It is during this period that Port Johnson's history as a ship graveyard began. It is apparent from previous historical studies, including Raber (1995), that CNJ continued to own the property and piers well into the 1930s and lease space to ship owners wishing to store vessels believed to be commercially viable. By 1930, there were more than 30 vessels either at the piers or in nearby waters (Raber 1995, p. 93). According to John Noble, a local artist who maintained considerable interest in the port's decaying marine infrastructure, Port Johnson was leased by Captain George Beebe to provide a location for vessel owners to store their vessels to await improved economic conditions (Noble 1969).

Aerial photographs analyzed by Raber indicated that most of the vessels present by the 1930s were schooners or schooner barges formerly used in the coal trade, along with a smattering of other vessel types including barges, tugs, and steamships. Half of the vessels, and all the schooner barges, were owned and had been operated by the Durham Navigation Company (Raber 1995, p. 93). Although a few of the vessels appear to have been removed and possibly put back into service, the majority of the vessels stored at Port Johnson never moved again except to make room for other vessels. CNJ abandoned maintenance of the tracks to the Port Johnson piers in 1933, and at this time, the property became wide open for the abandonment of vessels. At this point, the vessels were used primarily for salvage, being stripped of usable parts. Noble noted a number of scrapping operations in the 1930s that involved demasting and burning vessels to recover iron and bronze fasteners. By 1940, only nine vessels remained. By 1951, all the vessels had been moved to their present positions (Fig. 8.4).

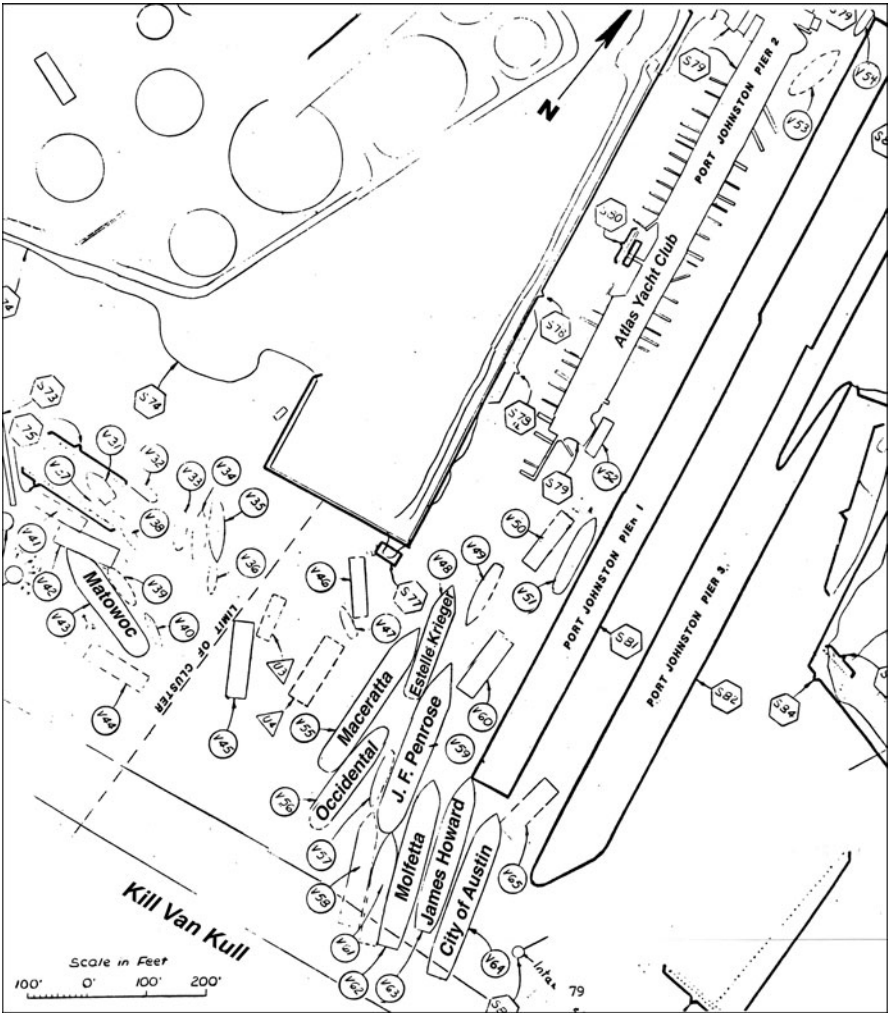


**Fig. 8.4** Port Johnson, New Jersey, showing locations of vessels and structures mentioned in text. (Image courtesy Panamerican Consultants, Inc.)

The major type of abandonment activity present at Port Johnson appears to have been storage with the intention of reuse, but ultimately, abandonment was the result when economic conditions did not improve. This abandonment behavior was identified during archaeological and historical investigations and appeared to be a major reason for abandonment in the port in general and specifically Bayonne (Brouwer 1983; Kardas and Larrabee 1984; Marshall and Brouwer 1981; Raber 1995, p. 98). Port Johnson differs from the other abandonment sites within this chapter because there is a higher percentage of oceangoing bulk cargo vessels abandoned within the port as compared with the other graveyards. In addition, there is a greater amount of historical documentation than is typically found pertaining to these kinds of sites. This is primarily due to several factors. First, Port Johnson was one of the first port areas of substantial size to cease operating, and it did so at the time business began to decline in the coastal bulk cargo trade. Second, Port Johnson's large size and continued maintenance by the site's owner, CNJ, created conditions fortuitous to the preservation of a large number of these types of vessels.

Archaeological investigations of the Port Johnson vessels began in the mid 1980s, with a reconnaissance survey conducted by Kardas and Larrabee (1984). They determined that no vessels were eligible for nomination to the National Register with the exception of the large oceangoing bulk carriers (Kardas and Larrabee 1984, p. 86). The vessels identified as historically significant include multiple examples of late nineteenth and early twentieth century oceangoing bulk carriers. These examples are rare and provide physical evidence of late sailing vessels and the construction and technology representative of the transition from sail to steam. Vessels and vessel types present include *Occidental*, a downeaster converted to a schooner barge, *Estelle Kreiger*, a-four masted schooner owned and operated by Crowell and Thurlow of Boston (Lydecker 2005), three five-masted barkentines (*Maceratta*, *City of Austin*, *and Molfetta*), *James Howard* (a Ferris-designed freighter converted to a barge), and the diesel tanker *J.F. Penrose*. Subsequent studies, including James (1991) and Raber (1995), confirmed that these vessels represent a significant cross section of vessels from the nadir of the sailing trade in the United States. In addition, Raber (1995) recommended an eighth vessel, four-masted schooner *Matowoc*, be added to the previous list of NRHP-eligible vessels. Further investigations of the vessels have been hampered by hazardous conditions, including unstable wreckage and unsafe sediments.

## Conclusions

Archaeological and historical investigations have determined that the various vessel clusters making up the giant ship graveyard in New York harbor not only represent a large cross section of working vessels from the late nineteenth and early twentieth centuries but also can be subdivided into types based on method, purpose, and location of abandonment. The most common of these include use of an abandoned basin or anchorage for the storage of vessels for anticipated reuse with subsequent abandonment, storage of vessels at a marine repair or dry dock facility with subsequent abandonment when the yard went out of business, reuse of vessels as breakwaters or marina docks or structures, and use of empty salt marshes and mud flats as convenient places of abandonment. It is found, and demonstrated through examination of several examples, that vessel clusters can fall into one or more of several of these categories. In the case of Port Johnson, a defunct wharf area was used as storage for later reactivation of the vessels stored there, but it resulted in an area with eventual abandonment and some use of the cluster for salvage. In the case of the west end of Shooters Island, initially it was an area that provided a convenient and inexpensive location for the disposal of vessels and later apparently became a central location for the salvage of vessels brought in from other locations. In the case of the east end of

Shooters Island, we see vessels undergoing active repair or storage at a marine site but subsequent abandonment when the venture closed and eventual use of the area as a dumping ground for unused vessels. Cluster 4 was an active marine yard shunting unused vessels off to the side, with the subsequent addition of other vessels, possibly for salvage, storage, later reuse, or a combination of these behaviors.

Archaeological work has identified numerous classes of historic vessels scattered throughout the port and succeeded in documenting a significant portion of this valuable historic resource. Individual examples of vessel types identified collectively represent a comparative sample of vessels, the historical value of which transcends their value as individual vessels. Much archaeological work has been done, but much remains to be undertaken to fully document this vanishing resource.

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# Chapter 9
# Yukon Hulks and Ship Graveyards

**John C. Pollack and Robyn P. Woodward**

**Abstract** The 1896 Klondike Gold Rush in the Yukon Territory of Canada precipitated an unprecedented surge of shipbuilding along the West Coast of North America. More than 260 riverboats operated on the Yukon River, of which at least 131 were launched in 1898. The route to, and upon, this large northern river system was fraught with hazards, there was intense competition between riverboat companies, and major route changes occurred because of new gold strikes in other areas and the completion of rail linkages. As a result, a large portion of the Yukon fleet was wrecked or abandoned within two decades. This chapter describes historical, economic, and technological factors that resulted in a unique pattern of vessel abandonment in northwestern Canada. Additionally, it describes a significant stern-wheel steamboat graveyard at West Dawson, Yukon Territory, containing no less than seven large vessels.

## Introduction and History

Steamboat operations are inextricably linked to the settlement and development of western North America. In the absence of roads and railways, the rivers provided the corridors along which people and goods moved en masse (Hunter 1994/1949). This situation was also true for the development of the northern mining and fur trading communities in the Yukon Territories and Alaska where steam-powered riverboats remained in operation until the 1950s.

The discovery of gold on Rabbit Creek in Canada's Yukon Territory (Fig. 9.1) in 1896 produced one of the largest mass exoduses of people into an unknown northern wilderness. Over the next two years, the population of the area mushroomed from

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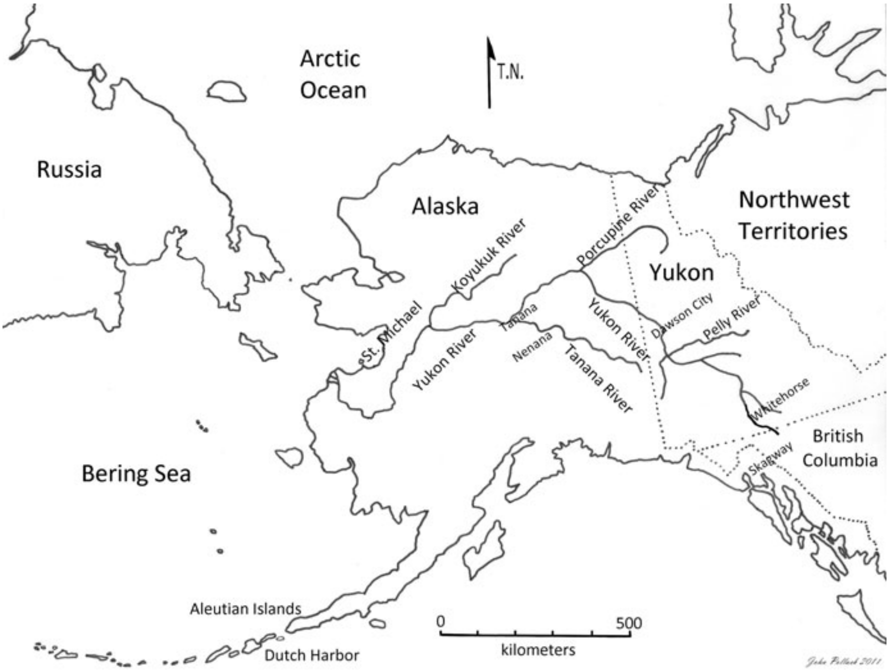


**Fig. 9.1** Location of the Yukon River and its major tributaries, towns, and villages. (Image by John Pollack 2011)

less than 1,000 to nearly 50,000 by 1899 (Special Concession of the Commissioner and Council of the Yukon Territory [SCCCYT] 1901, p. 42). Few of the prospectors who set off for the gold fields of Dawson City understood the perils; they were obsessed by the prospect of "striking it rich" after a decade of economic depression that had gripped most of North America (Berton 2007, p. 52).

The Yukon is snow-covered for much of the year and its mountain ranges, muskeg (extensive bogs of northern North America consisting of sphagnum mosses and stunted black spruce trees), vast forests, and swift rivers impeded the building of roads and rail links. The Yukon River is the fifth largest river in North America in terms of discharge, rising in the mountains of northern British Columbia and flowing north and then west for 3,200 km before reaching the Bering Sea 180 km south of St. Michael, Alaska. Combined with its many tributaries, the total drainage area covers nearly 845,000 km$^2$ (Brabets et al. 2000, p. 7).

In 1897, there were two main routes to Klondike. The long "All-Sea" route entailed a 4,800 km ocean voyage from Seattle Washington to St. Michael, Alaska, followed by a 2,700 km trip upstream to Dawson City. The shorter but more challenging "headwaters" route required a 1,700 km ocean voyage to Skagway followed by an arduous 50 km hike over the coastal mountains and a dangerous 800 km trip down river to Dawson City (Berton 2007). Prior to 1896, a handful of prospectors and fur traders had been serviced by three small steam-powered stern-wheelers operating out of St. Michael, but these vessels could not meet the demand of the "stampede," and within three years, more than 44 new Canadian and US transportation companies, and a host of independents, brought ships into the region (Affleck 2000, pp. 87–92). A few companies purchased riverboats already in service on the rivers in southern British Columbia but the majority ordered new vessels from shipyards along the west coast of North America. By the end of 1897, there were more than 60 ships or barges on the river that were joined by at least 100 others in the following year (Cohen 1982, p. 4).

Affleck (2000, pp. 71–85) compiled a detailed list of specifications and operational histories of 266 stern-wheel and side-wheel steamboats known to have operated on the Yukon River or one of its tributaries. At least 131 of these ships were launched in 1898. Vessels were built in 44 shipyards stretching from southern California to Dutch Harbor in the Aleutian Islands and St. Michael in Alaska (Pollack et al. 2009). Some of the riverboats were constructed in Washington state or southern British Columbia and then towed north, whereas others traveled in convoy under their own power (Knutson 1997). There were many problems in moving flat-bottomed riverboats up the west coast of North America and into the Bering Sea. Consequently, a large number of the ships were prefabricated in southern yards and their components were shipped north for assembly in Alaska to avoid the perils of open ocean travel in shallow-draft riverboats. While the majority of ships operating on the river originally entered the system via St. Michael, a number of smaller prefabricated vessels were hauled over the mountain passes into Canada and assembled on the shores of Lake Bennett to transport the miners as far as Miles Canyon immediately upstream of Whitehorse (Affleck 2000; MacBride 1948–1949).

Yukon riverboats operated either on the lower river route hauling freight and passengers upstream from St. Michael to Dawson City or downstream from Whitehorse to Dawson City. Initially, all heavy freight came upstream from St. Michael. Regardless of where the riverboats were based, the Yukon River was only navigable for four months a year, June through mid-October, before freeze up. Although the lower river was larger, it was shallow in the Yukon Flats section of the delta and at St. Michael, where cargo often had to be lightered from ocean steamers onto the riverboats or barges.

On the headwaters route, once the White Pass and Yukon Railway (WPYR) Company built a railway from the coast to Lake Bennett in 1899, it became possible to move heavy freight over the coastal mountains. The completion of the rail link in 1900 to Whitehorse offered a fast, practical alternative to the St. Michael's route (Graves 1970/1908, pp. 64–65). The 742 km downstream route from Whitehorse to Dawson was still challenging. It crossed Lake Laberge and reentered the river in a shallow, rock-filled stretch known as "the Thirty Mile." Below this obstacle, the river widens, but there were two sets of dangerous rapids at Five Fingers and Rink before reaching Dawson City.

Prospecting activity in the Klondike peaked in 1899 and subsequent gold strikes in Nome (in 1899) and Fairbanks, Alaska (in 1901), lured the transient miners away from Dawson City. The departing prospectors were partially replaced by the merchants, government officials, and wage laborers as a number of large corporate mining interests moved into the area (Bennett 1978; Brand 2003). Therefore, the end of the Klondike Gold Rush did not diminish the role of the river as the major transportation corridor, as settlements sprang up around each new mine, and the region continued to rely on the steamboats to supply and sustain them until the 1950s (Bennett 1978).

During the early years of the Gold Rush, competition between riverboat companies was fierce, service was poor and expensive, and the boats were frequently overloaded (Cohen 1982; Downs 1972; Graves 1970/1908). More stern-wheelers had been constructed than could be operated at a profit, and many of the shipping companies that sprang up in 1897/1898 began to fail (Bennett 1978). The WPYR moved to establish dominance on the river, and in 1901, the WPYR purchased its major rivals the Canadian Pacific Railway (CPR) Company fleet and the Canadian Development Company (CDC) to form a river division, the British Yukon Navigation Company (BYNC), to provide service to Dawson (Bennett 1978; Graves 1970/1908). The BYNC established a shipyard and terminal in Whitehorse adjacent to the rail line to facilitate the direct transfer of people and goods from the trains onto their growing fleet of steamships. Unable to compete with the BYNC, the remaining shipping companies either disappeared or were consolidated, and by 1903, all but three ships on the upper river were operated by BYNC (Bennett 1978).

On the American portion of the river, a similar consolidation of shipping companies took place between 1901 and 1907, with the Northern Navigation Company (NNC) emerging as the sole operator (Anderson 1983). Gold was discovered in Fairbanks in 1901, and the lower river route through St. Michael remained competitive as it avoided the high freight rates of the WPYR/BYNC system and its two customs crossings. By 1910, Fairbanks was the largest town in Alaska, and the direction of traffic within the Yukon River basin shifted. A record amount of freight transited through St. Michael that year, but 94 % was destined for US customers. WPYR business on the upper river to Dawson, although healthy, began to decline (Anderson 1983, p. 64).

In 1912, BYNC put two vessels on the Fairbanks route precipitating a rate war, which ended in 1914 when the company purchased the entire NNC fleet. Their new American division, the Alaska Yukon Navigation Company (AYNC) established a virtual monopoly over all the river transportation, the full length of the river with the exception of a few independents, and the Side Streams Navigation Company that formed in 1909 with Canadian government subsidies to operate small, light-draft steamers on the Stewart and Pelly rivers (Bennett 1978).

Changing regulatory and legislative regimes coupled with the completion of a new American-owned railway between Seward on the Pacific coast of Alaska to Fairbanks in 1921 with a link to Nenana on the Tanana River in 1923 further curtailed the need for ships along the western end of the lower river (Bennett 1978; Wilson 1979). The Alaska Railroad Company formed the Alaska Steamship Company (ASC) in 1923 and brokered an agreement to take over the shipping services on the lower river route from Nenana to the mission at Holy Cross while the BYNC/AYNC retained routes up river on the Tanana (Wilson 1979). With the addition of these routes, freight could be transshipped from the new railway onto stern-wheelers mid-river, circumventing St. Michael and shortening the all-water route from Seattle to Fairbanks by over 3,800 km (Anderson 1983, p. 69). This final consolidation and closing of service on the lower river resulted in additional ships being abandoned in St. Michael.

The construction of the Alaskan Highway in 1942 precipitated the demise of the stern-wheel steamboats, and the last vessels retired in Alaska and the Yukon in the 1950s (Affleck 2000).

## Previous Research

Three projects have been conducted in the Yukon drainage to locate and catalog submerged cultural resources, wrecks, and hulks. Waddell (1979) conducted a reconnaissance survey of the upper Yukon River and the Chilkoot Trail on behalf of the National Historic Parks and Sites Branch of Canada. His team examined artifacts located in the headwaters lakes along the trail and the remains of *Vidette* in northern Lake Laberge.

Easton (1987) completed an extensive reconnaissance survey of the region between Carcross and northern Lake Laberge, but did not work in the Thirty Mile or further north at West Dawson. His archival research ascertained the general locations and the scale of losses on the Yukon River.

Institute of Nautical Archaeology (INA) teams have conducted ongoing annual surveys along northern Lake Laberge, the Thirty Mile, Carmacks, Shipyard Island, and West Dawson since 2005. The objectives were to complete a more intensive reconnaissance inventory of the wreck and hulk sites upstream of Dawson City and to examine the range of variation in the design and engineering of these vessels. In seven seasons, the INA added 16 stern-wheeler sites to the Canadian national inventory, examined the seven hulls at West Dawson, performed a Light Detection and Ranging (LIDAR) survey of *Evelyn* on Shipyard Island, and conducted detailed surveys of *Seattle No. 3* and *Julia B* (Pollack et al. 2009, 2010, 2011). In 2008, an INA team discovered the intact wreck of *A.J. Goddard*, a small prefabricated stern-wheel steamboat on northern Lake Laberge. In the following year, the INA assembled an international team to inventory and map the site (Davidge et al. 2010), and in 2010, Lindsey Thomas undertook a detailed study of the site (Thomas 2012).

## Yukon Pattern of Abandonment

Several factors led to a distinctive pattern of abandonment in the Yukon River drainage. First, the initial "boom" of shipbuilding was sudden with at least 131 riverboats constructed in West Coast shipyards in a single year, often 7,000 km from the Klondike gold fields. Typical of many western mining landscapes, the Yukon experienced a rapid migration of prospectors, many of whom arrived too late to profit

**Table 9.1** Ship construction and loss/abandonment on the Yukon River by decade. [By John Pollack and Robyn Woodward; build data were available for 249 of the 266 vessels listed in Affleck (2000); loss data were available for 168 of the 266 vessels listed in Affleck (2000)]

| Decade | Number of ships built | Percentage of ships built by decade | Number of ships lost or abandoned | Percentage of lost or abandoned ships by decade |
|---|---|---|---|---|
| 1860s | 1 | 0.4 | 0 | 0 |
| 1970s | 3 | 1.2 | 0 | 0 |
| 1880s | 8 | 3.2 | 0 | 0 |
| 1890s | 174 | 69.9 | 19 | 11.3 |
| 1900s | 37 | 14.9 | 53 | 31.6 |
| 1910s | 18 | 7.2 | 56 | 33.3 |
| 1920s | 4 | 1.6 | 17 | 10.1 |
| 1930s | 4 | 1.6 | 8 | 4.8 |
| 1940s | 0 | 0 | 6 | 3.6 |
| 1950s | 0 | 0 | 9 | 5.4 |
| Total | 249 | 100 | 168 | 100 |

**Table 9.2** Fates of riverboats on the Yukon River. (By John Pollack and Robyn Woodward; data were available for 168 of the 266 vessels listed by Affleck 2000)

| Fate | Number | Percentage |
|---|---|---|
| Abandoned or dismantled | 70 | 41.7 |
| Wrecked or burned on the Yukon River | 66 | 39.3 |
| Lost at sea in transit to St. Michael | 18 | 10.7 |
| Other causes | 14 | 8.3 |
| Total | 168 | 100 |

and many who departed within 2 years as new discoveries were made elsewhere, and small-scale placer mining activity declined near Dawson City (Brand 2003). Hence, by 1899 there were too many riverboats competing for an ever-shrinking market. Our analysis of Affleck's list of Yukon River stern-wheel steamboats shows that 64.9 % of the vessels built for the Yukon River in 1898 and 1899 were either lost or laid up in the two decades following the gold strike and the Yukon fleet shrank in size (Table 9.1).

Secondly, in the initial "stampede," neither the new shipping companies nor the shipyards that built ships for the Klondike fully understood the physical demands that the hostile northern environment would place on these ships. Because of the speed of the shipbuilding "boom," most shipbuilders drew on the past experience from other areas, not firsthand experience from the North. Thus, not all of the new vessels were well-suited for the shallow and hazardous swift-water conditions (Graves 1970/1908). Attrition due to misadventure was common. Approximately 10.7 % of the riverboats sank on the ocean passage to the Yukon, and a further 39.3 % were wrecked, burned, or crushed in the ice while in service (Table 9.2).

One revelation was the preponderance of small vessels brought into this large river system and their shorter life span. The cargo capacity of 32 % of the fleet was less than 100 tons and 59.1 % had a gross displacement of less than 300 tons (Table 9.3).

**Table 9.3** Average length of service by tonnage class on the Yukon River. (Compiled from Affleck 2000)

| Tonnage class | Number of ships | Percentage | Average length of service (years) |
|---|---|---|---|
| < 100 | 73 | 32.4 | 8.2 |
| 100–299 | 60 | 26.7 | 15.7 |
| 300–499 | 34 | 15.1 | 13.2 |
| 500–699 | 22 | 9.8 | 15.1 |
| 700–899 | 24 | 10.7 | 15.1 |
| 900 + | 12 | 5.3 | 25.8 |
| Total | 225 | 100.0 | |

Thus, in the face of high labor and fuel costs and falling shipping rates, many of the original ships built for the Yukon could not compete against the larger vessels on the longer routes.

As a result, the length of service of smaller vessels of less than 100 tons gross displacement was only 8.2 years as compared with 13.2–15.7 years for the vessels between 300 and 900 tons displacement. The largest ships on the river averaged 25.8 years of service (Table 9.3). It is true that some small vessels operated successfully during low-water conditions on the upper river immediately following "break-up" or on the tributaries or as tow boats for scows on the lakes, but many small ships were taken out of service. None of these vessels have survived as hulks and the only intact headwaters vessel located to date is *A.J. Goddard* (Davidge et al. 2010).

Size alone was not always advantageous. Shallow draught and maneuverability were desirable characteristics of riverboats on the Yukon River. Some of the largest vessels were Mississippi packet-style vessels designed by the Howard Shipyards of Jeffersonville, Indiana, but despite their elegance, these ships drew too much water to safely negotiate the headwaters between Whitehorse and Dawson City, particularly in the low flows of late May and October. *Hannah* and its sister ships drew 5.5′ (1.7 m) fully loaded, whereas the WPYR River Division preferred vessels that could carry 100 first-class passengers and 300 tons of cargo, while drawing only 4′ (1.2 m) of water (Graves 1970/1908, p. 146; Klondike Nugget [KN], 24 June 1899).

Piloting tactics also differed on the upper river. Fully loaded WPYR vessels headed downstream from Whitehorse to Dawson City had to "back" or run their engines in reverse almost continuously as they came down through the Thirty Mile canyons, "bent" or cocked the barges they pushed, and checked their forward speed in the dangerously sharp meanders. On the return run to Whitehorse, their design had to allow for adequate stern-wheel penetration when moving upstream empty. These limitations put deep-draught vessels at a great disadvantage and kept many of them on the lower river route. A preferred Yukon riverboat design gradually developed while some deep draught vessels, such as *Mary F. Graff,* were retired after sustaining severe damage on the upper river (Graves 1970/1908, pp. 141–158).

The most significant abandonment factor, however, was the progression of company consolidations and completion of rail linkages that in turn changed profitability of, or completely eliminated, some routes. As shipping capacity surpassed the demand, many serviceable ships were simply laid up following a takeover. Twenty-six vessels were lost or taken off the river in 1914 when the NNC was acquired by the AYNC, and the Canadians obtained a near monopoly on the lower river. An equally notable consolidation was the completion of the Alaskan Rail link to Nenana, which precipitated a “gentlemen’s agreement” between the competing American and Canadian companies and the abandonment of the St. Michael route in the early 1920s. These factors led to 41.7 % of all vessels on the Yukon River eventually being abandoned or dismantled (Table 9.2).

A small percentage of the surplus ships were used for secondary purposes. Some vessels were converted into barges or were used as shipyard storehouses or accommodations and others were dismantled, their components used for building supplies. Many of the ships abandoned in St. Michael were cut up as firewood, whereas their boilers were used in the construction of the docks (Cohen 1982; MacBride 1948–1949).

However, the majority of the surplus vessels were left on land. In most jurisdictions, ships are abandoned such that they do not pose a threat for future navigation, i.e., they are either abandoned in shallow, disused waterways or deliberately scrapped and sunk in deep water (Richards and Staniforth 2006). In the Yukon, the placement of abandoned ships was different because of the unique physical and economic environment in which the fleet operated. During the fall “ice-up,” ships in the Yukon were either moved into a shallow slough or preferably pulled completely ashore in one of the major shipyards near a settlement to prevent them from being crushed by the ice during spring “break-up.” In the spring, any vessel that was too badly damaged during operation or deemed surplus for the following season was either left in the sloughs or shifted to a position furthest away from the river in a shipyard to be dismantled or scavenged for parts. Hence, many abandoned vessels lay in clusters near the major settlements, whereas wrecked vessels were scattered throughout the wilderness. A few were deliberately scuttled (Table 9.4).

Once placed in storage, these ships were used extensively for spare parts and building materials. Without records, it is impossible to speculate at what stage of the discard process many of the abandoned fleet were salvaged. In some cases, the vessel was dismantled in a certain year as noted by the Register of Ships (Affleck 2000; MacBride 1948–1949), whereas in others, salvage went on intermittently and only when specific components were required to repair another ship. Given the shrinking population, the declining size of the riverboat fleet, and the abundance of abandoned vessels, there was little pressure to completely dismantle the vessels, and many were simply left on the ways at the old shipyards.

## Abandoned Vessels in the Yukon River Drainage and at West Dawson

The largest known concentration of abandoned stern-wheel steamboats in North America lies at St. Michael, north of the Yukon River delta. There were at least 18 large stern-wheel steamboats abandoned in this location between 1898 and the 1930s (Affleck 2000, pp. 71–85). However, this remote village is located north of the

**Table 9.4** Major abandonment and loss locations. Some riverboats were wrecked on numerous occasions, salvaged and returned to service. The table statistics refer to total losses as compiled in Affleck (2000). Data were available for 139 of the 266 vessels listed in Affleck (2000). (By John Pollack and Robyn Woodward)

| Category | Location | Number | Percentages |
|---|---|---|---|
| Population centers | St. Michael | 18 | 12.9 |
| | Dawson and West Dawson | 17 | 12.2 |
| | Whitehorse | 14 | 10.1 |
| | Fairbanks | 6 | 4.3 |
| | Carcross | 4 | 2.9 |
| | Minto | 3 | 2.2 |
| | Nome | 3 | 2.2 |
| | Holy Cross | 1 | 0.7 |
| | Russian Mission | 1 | 0.7 |
| Subtotal | | 67 | 48.2 |
| Wilderness and Ocean | Ocean Passages | 18 | 12.9 |
| | Koyukuk River | 6 | 4.3 |
| | Thirty Mile | 6 | 4.3 |
| | Lake Laberge | 5 | 3.6 |
| | Tanana River | 5 | 3.6 |
| | Andreaofsky Slough | 4 | 2.9 |
| | Other areas (1-2 vessels per location) | 28 | 20.1 |
| Subtotal | | 72 | 51.8 |
| Total | | 139 | 100.0 |

tree line, and over the decades, residents salvaged the vessels for building materials and fire wood, leaving only the boilers, engines, and associated machinery scattered along the beach.

Many of the hulks in the Yukon Territory between Carcross and Dawson City escaped this fate. The region contains the largest and best-preserved collection of late nineteenth-century stern-wheelers in North America. Of the 24 known sites, 21 are wooden-hulled vessels and all lie in forested areas so that they were not primary sources of firewood or building material for residents. Eight of these ships are intact because of their abandonment on land, and another five hulls lie on seasonally dry sites.

After St. Michael, the old shipyard at West Dawson contains the next largest number of historic stern-wheel steamboats in North America. The diversity of these vessels makes this graveyard unique, and possibly the premier concentration of historic stern-wheelers in North America. Seven large vessels lay on the banks of the Yukon River in an old shipyard, in two groups across the river from Dawson City and 1.6 km upstream. In addition to the seven steamboats, two additional vessels, a barge and a smaller watercraft of unknown type, lie almost completely buried along the foreshore (Fig. 9.2).

The shipyard was originally controlled by the CDC in 1900. It was taken over by the WPYR shortly thereafter and transferred to the BYNC in 1901 (KN, 19

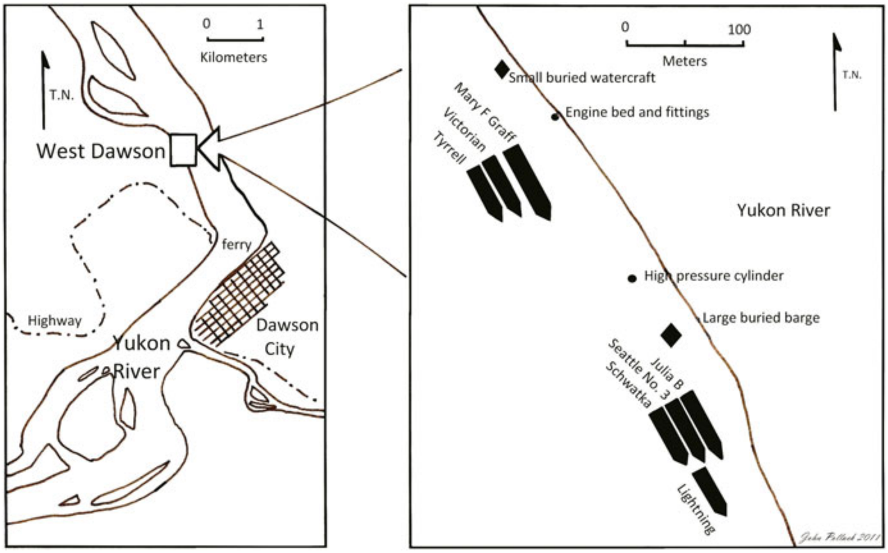


**Fig. 9.2** The location of the seven major vessels and two barges at the West Dawson Shipyard. (Image by John Pollack 2011)

April 1900). The first ship abandoned in the yard dates to 1903, and the last was laid up in 1924, according to the histories compiled for these vessels by Affleck (2000). Most ships have partially or completely collapsed superstructures but the majority of the hulls are intact and three-dimensional, and a considerable collection of machinery, engines, and boilers also remain in situ (Table 9.5).

The vessels are grouped into two clusters (Fig. 9.2). An upstream cluster of four ships includes *Julia B*, *Seattle No. 3*, *Schwatka*, and *Lightning*. The downstream cluster of three ships includes *Mary F. Graff*, *Victorian*, and *Tyrrell*. The ships were closely packed together, and even today it is possible to walk across the decks of three vessels without touching the ground (Fig. 9.3). All are large vessels with registered length between 42.7 and 54.8 m built in 1898 with the exception of the 1908 *Julia B*. Likewise, all of the ships are wooden-hulled steamboats with the exception of the composite-hulled *Tyrrell.*

*Julia B* is a heavily built, wooden-hulled, stern-wheel towboat with an operational history summarized by Affleck (2000, pp. 76–77). It was constructed by Cook and Lake in Ballard, Washington, in 1908 with a registered length of 48.4 m. The ship was towed up the west coast of British Columbia through the Bering Sea and into the port town of St. Michael near the mouth of the Yukon River. *Julia B* was designed as a freight boat for the St. Michael to Fairbanks route, with scant passenger accommodations. A typical load involved 1,600 tons of cargo and four barges, often pushed (e.g., “towed”) in front and alongside the vessel. In the open ocean, the ship was fitted with an 18.9 m tall mast to allow it to tow a string of barges astern. *Julia B* often

**Table 9.5** Vessel characteristics at West Dawson. (By John Pollack and Robyn Woodward)

| | Lightning | Julia B | Seattle No. 3 | Schwatka | Mary F. Graff | Victorian | Tyrrell |
|---|---|---|---|---|---|---|---|
| Location constructed | Vancouver, BC, by B.C. Iron Works for Stacey-Hiebert and Yukon Syndicate | Ballard, WA, by Cook and Lake for the Yukon Transportation Co. | Dutch Harbor, Aleutian Islands, AK, by Moran Bros. Co. for the Seattle-Yukon Transportation Co. | Port Blakely, WA, by E.G. Rathbown for Canadian Pacific Railway | Seattle, WA, by Moran Bros. Co. for Seattle-Yukon Transportation Co. | Esquimalt, BC, by John H Todd for the Canadian Development Co. Ltd. | Vancouver, BC, by J.M. Bulger for Canadian Pacific Railway |
| Date constructed | 1898 | 1908 | 1898 | 1898 | 1898 | 1898 | 1898 |
| Registration | Canada | USA | USA then Canada | USA | USA then Canada | Canada | Canada |
| Hull material | Wood | Wood | Wood | Wood | Wood | Wood | Composite hull |
| Length (m) | 42.7 | 48.4 | 45.7 | 44.5 | 53.7 | 44.7 | 43.3 |
| Breadth (m) | 9.1 | 11.6 | 9.9 | 9.1 | 10.8 | 10.2 | 9.2 |
| Hull depth (m) | 1.5 | 1.8 | 1.8 | 1.5 | 1.8 | 1.4 | 1.5 |
| Boilers | Unknown | Twin locomotive boilers | Single locomotive boiler | Two-boiler battery, Western Rivers design | Three-boiler battery, Western Rivers design | Unknown | Unknown, likely single locomotive boiler |
| Engines | Two horizontal compound cylinders, 16–32 × 84" | Two horizontal high-pressure cylinders, 18 × 72" | Unknown | Two horizontal high-pressure cylinders, 16 × 72" | Two horizontal high-pressure cylinders, 20 × 84" | Two horizontal high-pressure cylinders, 15 × 72" | Two horizontal high-pressure cylinders, 16 × 72" |

**Table 9.5** (continued)

| | Lightning | Julia B | Seattle No. 3 | Schwatka | Mary F. Graff | Victorian | Tyrrell |
|---|---|---|---|---|---|---|---|
| Common routes | Lower river | Lower river | Lower river | Lower river | Upper river | Upper river | Both upper and lower river |
| Date of abandonment | 1916 | 1924 | 1922 | 1924 | Winter 1903–1904 | 1916 | 1924 |
| Reason for abandonment | Unknown | Consolidation of shipping companies | Consolidation | Consolidation | Severely damaged on upper river | Consolidation | Consolidation |
| Secondary salvage | Fittings, capstan, paddle shaft, engines, boiler, hogging posts and hogging chains, superstructure, and most of hull are salvaged | Fittings and bow capstan salvaged, otherwise intact | Engines, capstan, paddle shaft, hogging posts and hogging chains, and tillers/rudders salvaged | Fittings, capstan, and one boiler in the two-boiler battery salvaged along with rudders, rudder shafts, hogging posts, and hogging chains | Fittings, paddle shaft, tillers and rudders, and hogging posts and hogging chains salvaged. Burned aft of triple boiler battery | Fittings, boiler, capstan, hogging posts and hogging chains, engines, and hull bottom planks salvaged | Fittings, engines, boiler, capstan, superstructure, king post and hogging chains, and hull bottom planks salvaged |


**Fig. 9.3** Stern-wheel steamboats *Julia B*, *Seattle No. 3*, and *Schwatka* derelict at West Dawson in the early 1930s. (Image 1981.58.1.47 permission of the Dawson City Museum)

operated in tandem with a smaller stern-wheeler in order to deal with groundings in shallow water (Adams 2002).

*Julia B* was sold to the Dominion Commercial Co. and Reagh and People Co. in 1912 and then to the American Yukon Navigation Co. in 1914 (Adams 2002). The ship operated on the St. Michael to Fairbanks run on the lower Yukon River at least until 1917 and was likely decommissioned with *Seattle No. 3*, *Schwatka*, and other AYNC vessels in West Dawson in 1923. The Alaska Railway purchased the AYNC's vessels in 1943, at which time all Canadian operations ceased on the Alaskan side. The sale included ownership of the derelict *Julia B* at West Dawson.

The vessel was assessed in detail in 2010 (Pollack et al. 2011). At that time, the ship displayed major damage caused by river ice in the 1979 flood when all portions of the hull and superstructure outboard of the port longitudinal bulkhead were destroyed. The hull is strengthened internally with three solid timber longitudinal bulkheads and rows of hold stanchions atop stringers. The ship has been cleaved longitudinally, and the timbers and machinery for a third of its beam on the port side now lie scattered downstream along the shore of the Yukon River. The superstructure of this two-decked vessel has collapsed onto the freight deck except for portions of the engine and boiler compartments. The starboard engine is intact but partially disassembled. Deck planks and deck beams cover the remaining portions of the hull. Twin locomotive-style boilers sit on their bearers, and the starboard boiler has both its breeching and stack intact. The starboard engine is partially disassembled, and the paddle wheel axle is attached to the starboard pillow block and pitman arm. The vessel has three steam-assisted overhead tillers and wooden rudder posts that pass through rudder wells in a false transom. The port rudder stock and tiller are disarticulated and lie below the transom.

*Seattle No. 3* is a sturdy, wooden-hulled, stern-wheel towboat prefabricated in Seattle by the Moran Bros., then shipped to Dutch Harbor, Alaska, where it was assembled in 1898. Its operational history was summarized by Affleck (2000, p. 82) and the ship was documented in detail by INA in 2009 (Pollack et al. 2010). The vessel had a registered length of 45.7 m. It was built for the Seattle-Yukon Transportation Company and initially worked on the 2,800 km run from the delta of the Yukon River upstream to Dawson City. The vessel's later history is unclear, but it appears to have been sold to the NNC and then to the AYNC in 1914. It was decommissioned at West Dawson no later than 1923. Currently, the vessel lies entirely above water, and it is immediately adjacent to *Julia B*. The entire superstructure has collapsed except for the aft crews' quarters and engine/steering compartment (Fig. 9.4). The main deck, deck beams, and wooden hull are intact and complete except forward of Frame 12–13, where the deck beams have collapsed into the hull and the bow has separated and dropped as a unit. The hull contains four great truss-built longitudinal bulkheads, two of which are curved. A single locomotive-style boiler and stack with breeching are in situ. The stern-wheel and engines are missing. This vessel contains a unique but incomplete example of a four-tiller system that had tiller arms mounted slightly above the main deck. Iron-sheathed wooden arcs are affixed to the main deck, which provided running surfaces for rollers affixed to the ends of the two central master tillers. The rollers, tillers, rudders, and rudder posts are missing. The hull contains five large transverse carriers to support centerline hogging posts and a single boiler.

*Schwatka* is a wooden-hulled stern-wheel steamboat built at Port Blakely, British Columbia, for the CPR in 1898 with a registered length of 44.5 m. The ship's history was summarized by Affleck (2000, p. 82) and the hulk was subject to a reconnaissance-level assessment in 2008 by INA. Ownership was transferred to the NNC and later to the AYNC in 1914. The vessel was active until at least 1917, but was derelict at West Dawson by 1923. The superstructure has collapsed. The wooden hull is complete except at the bow where the deck planks and deck beams have collapsed, leaving the hold open to the sky. Two engine cylinders remain in situ but are missing valves, levers, and wipers. A single boiler and stack remain in what was a two-boiler battery with a brick, Western Rivers firebox. The paddle wheel is complete, although the cylinder timbers have partially collapsed and the bucket planks on the wheel are missing. The vessel contains a complete tiller and roller steering system with four tillers positioned below the main deck. The rudder posts are circular steel shafts supported by pillow blocks. The vessel contains solid and truss-built longitudinal bulkheads as well as five massive transverse carriers or beams resting on top of side keelsons or stringers. These carriers supported a forward mast, boilers, and two central hogging posts (Pollack et al. 2009, p. 290).

**Fig. 9.4** The collapsed superstructure of *Seattle No. 3* in 2010. (Photograph by John Pollack 2010)

The last ship in the upstream cluster was assessed by INA in 2008 and 2011 and tentatively identified as *Lightning.* The vessel was built in 1898 by the BC Iron Works for the Stacey-Hiebert and Yukon Syndicate, and it was subject to multiple ownership changes including sale to the British America Corporation (Affleck 2000, p. 77). It was laid up after 1916. INA assessments in 2008 and 2011 found a deteriorating hull measuring 42.7 m bow-to-transom. The wooden-hulled stern-wheel steamboat has a centerline keelson supporting hold stanchions, two solid wood longitudinal bulkhead assemblies, and four truss or stanchion-supported cylinder timbers. It once possessed four steel rudder posts and pillow blocks. Only scattered remnants remain of the superstructure, and only the aft-most 7 m of the main deck is intact while the remainder of the hull is open to the sky. The rare compound engines, boiler(s), stack(s), and capstan are missing as are the hogging posts and hogging chains, paddle wheel, rudders, and tillers. The bow has collapsed. This ship was heavily salvaged after it was abandoned, and the longitudinal bulkheads, central keelson, and hull planking from the centerline to the chines have been sawn out except at the bow and stern (Pollack et al. 2009, p. 290).

A second group of three stern-wheelers lies 250 m downstream, with *Mary F. Graff* being situated closest to the river. This ship has a registered length of 53.7 m. It is one of the 12 identical vessels built simultaneously by the Moran Brothers Shipyard of Seattle in 1898 and then moved north up the Inside Passage of British Columbia, through the Aleutian Islands, and into the Bering Sea to St. Michael (Knutson 1997). One of the 12 ships was lost in transit. The vessel was built for the Seattle-Yukon Transportation Company, and subsequently owned by the Alaska Exploration Company and the CDC (Affleck 2000, p. 78). It was acquired by the BYNC but was severely damaged between Whitehorse and Dawson City in October 1903. The ship was deliberately run aground twice to avoid sinking and hastily repaired, and upon arrival at Dawson City, 61 frames were found to be shattered (Graves 1970/1908, p. 166). *Mary F. Graff* was subsequently laid up at West Dawson and not returned to service in 1904.

Between 2008 and 2011, INA found that substantial portions of the engines and machinery were extant including a complete example of a three-boiler Western Rivers battery, the two high-pressure cylinders, the Pitman clamps and eccentric control rods, and an air pump. The shaft and iron circles from the paddle wheel are missing. Subsequent to being laid up, a fire consumed the ship aft of the boilers, and the wooden hull was destroyed except for the outer frames, deck beam clamps, and hull planking. Deck beams and deck planking are not present except at the bow where they have collapsed into the hold. A steam-powered Hyde windlass built in Bath, Maine, lies on the main deck near the bow (Pollack et al. 2009, pp. 290–291).

Immediately adjacent to *Mary F. Graff* is the stern-wheeler *Victorian*. Affleck (2000, p. 84) noted that the ship was built by John H. Todd for the CDC in Victoria, British Columbia, in 1898 with a registered length of 44.7 m. The ship worked on the Stikine River and then moved into the Yukon via St. Michael under its own power. It was acquired by the BYNC in 1901, and operated until at least 1916. The vessel now rests between *Mary F. Graff* and *Tyrrell,* with the wooden hull open to the sky except for the forward most 12 m of the bow. All superstructure and machinery are missing, and most of the deck planks and deck beams are gone except at the bow. The lower hull, frames, and longitudinal bulkheads are intact below the deck beam clamps. There is a complete tiller-and-rudder system at the stern, where three manually operated overhead tillers turn on pairs of gudgeons in rudder wells between the transom and false transom (Pollack et al. 2009, p. 291).

A major discovery in 2011 was the presence of three subtle but distinctive wells protecting the leading edges of the three large balanced rudders in the raked stern or apron of the vessel. These sophisticated, protective structures differ from that found on *Montana* (Corbin and Rodgers 2008, pp. 65–70), given that the single floors above the wells are not straight, but have been sawn to include three distinct curves. The hull bottom planks were nailed onto these progressively curved floors to create the apron wells, which disappeared at the true transom and the leading edge of the rudder wells.

The seventh and final ship at West Dawson is the composite-hulled, stern-wheel steamboat *Tyrrell*, prefabricated by the Polson Iron Works of Toronto in 1898 and shipped west by train for assembly in Vancouver. The vessel had a registered length of 43.3 m and was intended for use by the CPR on the Stikine River route to the Yukon gold fields (Turner 1984). When this route collapsed, *Tyrrell* went through a series of ownership changes including ownership by the British America Corporation and the BYNC. The ship was laid up after 1917 at West Dawson (Affleck 2000, p. 84).

In 2008, INA found *Tyrrell* to be a markedly different vessel type from the other abandonments at West Dawson (Pollack et al. 2009, p. 291). The composite hull was constructed with metal sides, bulkheads, floors, frames, and deck beams, but the bottom of the hull was planked with wood. While many of the Yukon steamboats possess barge-like hulls with model bows and long, flat lines, the plan view of *Tyrrell* displays a continuously curved hull with molded bilges. The only flat portions of the hull are its bottom and the transom. Multiple watertight transverse and longitudinal bulkheads divide the hull into 15 separate compartments.

A single unattached engine cylinder and a monkey rudder (an auxiliary rudder mounted on a frame aft of the stern-wheel) lie on the main deck, whereas the second monkey rudder lies alongside the vessel. The vessel was converted into a barge after 1917, at which time the superstructure, boiler, second engine cylinder, hogging posts, hogging chains, tillers, rudders, and paddle wheel were removed. Since abandonment, the majority of the wood hull planking has been salvaged.

## The Significance of the West Dawson Ship Graveyard

The Klondike Gold Rush was a formative event in the development of Canada as a nation. Although the majority of the "stampeders" were American, the Dominion Government of Canada reinforced its claim to sovereignty over the region, provided effective administration and law enforcement, and ensured the Territory stayed within Canada.

The West Dawson shipyard site contains a broad representation of late nineteenth century riverboat technology, hull designs, and shipbuilding techniques used in one of the last great gold rushes in North America. Over the past 150 years, at least 260, and possibly as many as 350, stern- and side-wheel steamboats operated within the Yukon River drainage. The Klondike Gold Rush created a sudden boom in which some 44 shipyards along the west coast produced more than 131 stern-wheel steamboats in a single year, including six of the seven West Dawson hulks.

The West Dawson vessels represent the larger and more successful ships of the Klondike Gold Rush. Although the majority of Yukon stern-wheel steamboats were small (Table 9.3), the West Dawson vessels ranged from 484 to 864 tons gross displacement, and represented the largest 26 % of ships in the drainage. Hence, the West Dawson Ship Graveyard contains those vessels capable of dealing with the large distances and heavy loads either steaming downstream from Whitehorse or upstream from St. Michael, to the goldfields at Dawson City. All were large enough to handle

**Fig. 9.5** The excellent state of preservation within the hull of *Seattle No. 3*. (Photograph by R. Woodward 2011)

barges and profitable enough to remain in service until irreparably damaged, or deemed surplus owing to corporate mergers.

The West Dawson site is significant because of its excellent state of preservation. Although the superstructures have largely collapsed, the hulls of *Julia B*, *Seattle No. 3*, *Schwatka*, *Tyrrell*, and portions of the remaining ships remain completely intact (Fig. 9.5). They are also terrestrial sites where excavation is minor and may consist of removal of a thin layer of silt from the bilges. Conservation and reconstruction are not required, and precise documentation of the ships' hulls can be accomplished with sophisticated land-surveying instruments. In the hulls of *Julia B*, *Seattle No. 3*, and others, frame numbers, the shipwrights notations at the frame stations, and penciled calculations can still be seen on the deck beam clamps, 110 years after construction. This level of preservation means a small team can document a hull in 6–8 days. To date, only two of the seven vessels have been studied in detail (Pollack et al. 2010, 2011).

Finally, this site is significant because of the diversity represented in the engineering and ship designs of the collection of vessels. West Dawson is ideal for collecting comparative information about not only the range of variation within the Yukon fleet but also contrasting design types to other stern-wheel steamboats in North America. This variety allows for the assessment of the degree of standardization on ship design in the late nineteenth century. Insurers of the day wanted to limit their risk, and by this date, the Rules and Regulations of Lloyd's of London had created standards for the construction of ocean-going vessels. Although there existed an innately higher level of risk in the gold rush, the research presumed that there would be a degree of standardization within the design of the hulls. Likewise, assembly-line production in some yards, notably the fleet of 12 identical ships built by the Moran Brothers Co. in Seattle, Washington, implied some generally accepted approaches to design.

The hulls at West Dawson and elsewhere in the Yukon Territory provided the opportunity to test these hypotheses. The hypothesis in the research design predicted a wide variation in some custom features such as the hogging post and hogging chain systems and hull designs that would follow some common precepts. However, the West Dawson site contained hulls that utilized a wide range of approaches. Hull shape ranged from the beautifully crafted sweeping lines of *Tyrrell* with its sharp bow and curved chines to the barge-like hulls of *Schwatka* and *Seattle No. 3*. The construction of the chines was markedly different in all seven ships. Longitudinal bulkhead designs differed substantially, and although a number of designs used small triangular futtocks (e.g., "cocked hats"), the longitudinal strength members at the chines ranged from small chine clamps to large bilge keelsons. In the case of the *Schwatka*, no chine reinforcement was used at all. Instead, the builder utilized a rounded-knuckle construction without a bilge clamp, of similar construction to a chine described by Kane (2004) in his review of western (US) river steamboats.

There was also great variation in hogging systems on the West Dawson vessels. Stern-wheel steamboats have long, broad, but very shallow hulls, and these hulls rely upon vertical beams and iron rods (e.g., hogging posts and hogging chains) to eliminate hull flexing and provide cantilever reinforcement to the ships. The large loads concentrated at the bottom of these hogging posts can punch through the hull, and they must be carefully situated or reinforced. Some side and centerline hogging posts rested on short, massive beams (e.g., footlings) spanning four to six frames, whereas other central posts rested on small assemblages of thin beams and planks, spanning only three frames that appear to have been added as an afterthought. Some ships also had massive transverse timbers (e.g., carriers) running athwartships to support the central hogging posts or the boiler(s).

The boiler types also showed considerable variation. Both *Schwatka* and *Mary F Graff* contained examples of western river boilers. *Schwatka* had a two-boiler battery from which one boiler was salvaged, and *Mary F Graff* contained a three-boiler battery. *Julia B* contained two locomotive-style boilers and *Seattle No. 3* contained a single locomotive-style boiler resting on massive transverse carriers. Boilers were missing from the remaining vessels.

Thus, the West Dawson site provided numerous opportunities for direct comparisons among the above components and many other hull and mechanical features, including rudder-and-tiller systems, engines, bow construction, and capstan platform reinforcement. Some discoveries were unique, as per the identification of a complex raked stern or apron incorporating wells to protect the leading edge of balanced rudders in a wooden hull. These comparative studies are now the focus of an annual field program supported by the INA.

## Conclusion

The late nineteenth and early twentieth century stern-wheel steamboats of the Yukon River drainage represent the final stage of the evolution of riverboat design in North America. The large collection of hulks at West Dawson contains intact hulls of varying design, and a wide range of mechanical systems and construction methods. The site is perhaps the premier stern-wheel steamboat graveyard in North America, and as such holds significant potential for ongoing comparative studies in riverboat design and construction. Further studies are in progress under the auspices of the INA, and the authors expect they will provide new insights as to the range of technological and engineering approaches and innovations used by the builders of stern-wheel steamboats at the end of the nineteenth century.

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# Chapter 10
# The Rural Vessel Abandonment Areas of North Creek, North Carolina

**Lawrence E. Babits**

**Abstract** This chapter reports on planning, methodologies, and results of East Carolina University's initial boat abandonment survey in the Albemarle-Pamlico Estuarine System. The survey was initiated following student reports of abandoned water craft in the sounds. Supported by a NC Department of Cultural Resources Survey and Planning Grant, the ECU Program in Maritime Studies conducted historical research and a shoreline and remote sensing survey along the Pamlico River's north shoreline. While many individual wrecked and/or abandoned watercraft were encountered, this chapter reports on boat abandonment areas that were located.

## Introduction

In 1992 and early 1993, East Carolina University's (ECU) Program in Maritime Studies (PMS) students reported many abandoned watercraft in Albemarle-Pamlico Estuarine System (APES) tributary streams. Given the varied boat descriptions, it was apparent many vessel types existed as abandoned or wrecked sites. Suggestions of a chronological element were involved, both typologically and geospatially.

The PMS decided to concentrate on the Pamlico River due to student and faculty interest in small boats, local vernacular shipbuilding, and a specific lack of knowledge about APES watercraft. Other reasons for conducting this survey were predicated on successful systematic surveys in the lower Cape Fear River Basin (Jackson 1996; Overton and Lawrence 1996; Watts 1988), permit mitigation surveys on the Pamlico River (Brooks and Wilde-Ramsing 1988, pp. 24–25), and known sites near Bath (Lawrence et al. 1984). Finally, the Pamlico was adjacent to ECU's location in Greenville, making it possible to conduct survey segments during nonclassroom time without major displacement of students, staff, and equipment (Fig. 10.1).

Student research led to a grant funded by the North Carolina Department of Cultural Resources (DCR). The DCR was responsible for allowing construction and dredging permits to proceed if significant cultural resources were not impacted.

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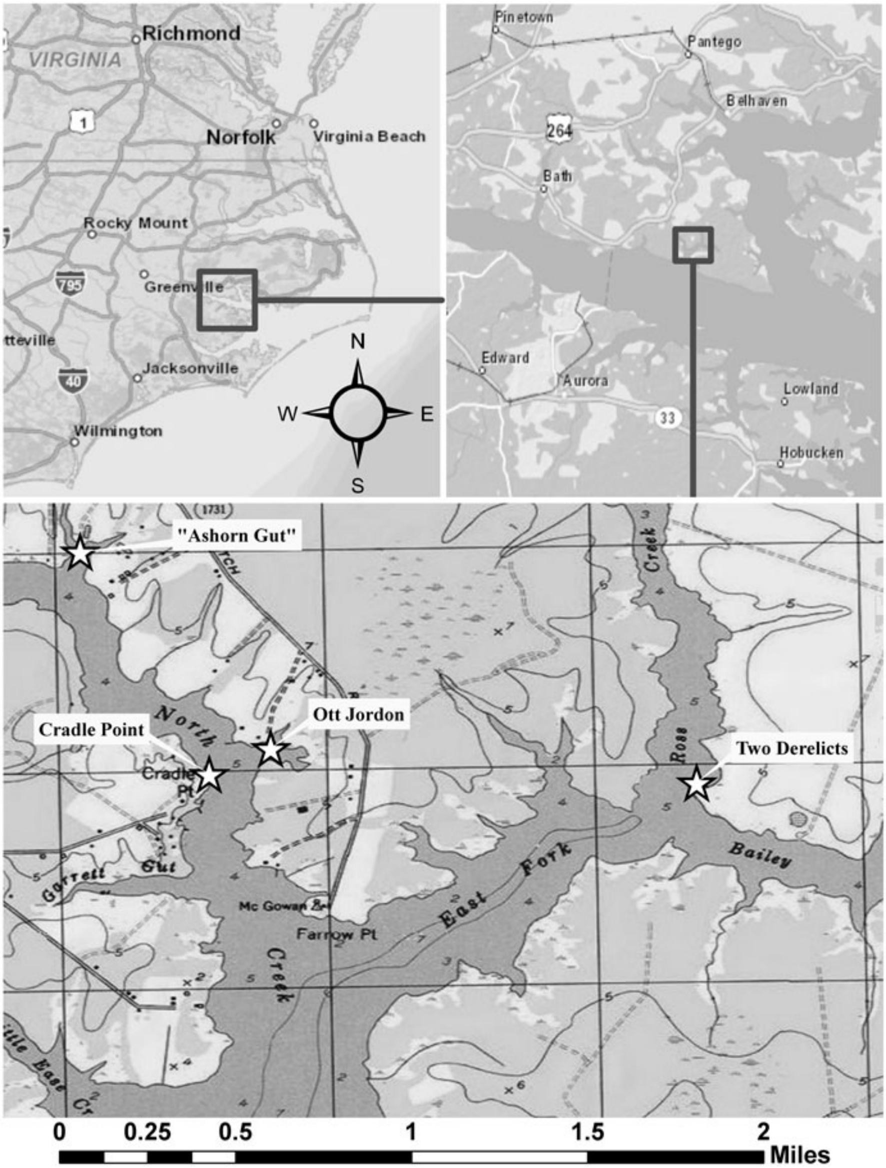


**Fig. 10.1** Project area and abandoned sites map. (Courtesy of Nathan Richards)

Assessing significance would not be creditable unless some idea of the universe of those vessel types was unknown and rarity of archaeological or surviving boat types could not be rationally assigned. In effect, the ECU survey was designed to inventory surviving abandoned and wrecked vessel sites and the presence, or absence, of magnetic anomalies that might be clues to sunken watercraft.

## Methodology

Prior to commencing field work, research into the APES environment, history, and boat types was conducted to prepare surveyors for expected situations and watercraft. Several variables were identified that affected search methodology including environmental conditions, types of archaeological sites identified through prior research, historical documentation, especially by maps, and a limited knowledge of working watercraft.

### *APES Environment*

Few environmentally oriented reports dealing with the APES had been prepared. Most reports dealt with the North Creek complex midway between Bath Creek and the Pungo River (Stephenson n. d.; Stephenson et al. 1975; Stephenson and Bailey 1975), or the Albemarle Sound (Riggs and Ames 2003; Riggs et al. 2011). Although they were not directly related to archaeological sites, they helped clarify boat graveyard settings.

Perceptions of environmental conditions along APES shorelines were based on four natural conditions: wind patterns, water depth, tributary stream configurations, and arable higher land. The natural conditions affected each other in terms of erosion and creating landforms that impacted maritime site formation processes. They included the observation that prevailing seasonal winds generally blow from the south or southwest. Exceptions include occasional westerly winds, northeasters, and hurricanes. These latter storm events are a major altering force in the APES (Garrett 1983, pp. 39–40; Riggs and Ames 2003; Riggs et al. 2011).

In tributary streams, channels are often fairly deep close to land. The conjunction of navigable water close to elevated land meant boats could move very close to the shoreline. Historically, this configuration meant subsistence strategies used both land and water with minimal travel. On maps indicating water depth, it was fairly easy to predict where use occurred by noting roads ending at landings on smaller tributaries and where the cultural interface between terrestrial and water-based activity occurred. A 1919 soil map (Cobb et al. 1919) provided confirmation of arable land. The presence of post offices and road junctions indicated increased nearby habitation, even if no potential archaeological sites were shown. Some settings seemed more likely to contain vessel remains such as headlands and river bends that provided lee shores for sheltered anchorages. Nearby secondary and tertiary streams served as potential vessel disposal areas.

Terrestrial archaeological sites can be eroded by a combination of factors, including wind, channel configurations, and sea-level rise. Dynamic shoreline waters not only destroy sites, but can create new sites by forming hazards to navigation such as sand bars. In particular, wave action related to tide, wind, and boat wakes, plays a major role in shoreline erosion. While sea-level change causes slow erosional damage, more rapid wind and wake damage hardly compared with major storm event devastation (Garrett 1983, pp. 37–40; Riggs and Ames 2003; Riggs et al. 2011).

APES tributaries play major roles in creating the archaeological record based on their width, current, and tidal flow. In conjunction with protective headlands and ridges that interrupt the wind, streams running into the sounds provide shelter as docking areas. Consequently, a small but deep water cove or stream adjacent to higher, well-drained ground, behind a wind, wave, and tidal barrier, would be a prime location for docking activity. Nearby, upstream shallow areas or marsh zones can be utilized as disposal points for debris, including damaged or worn out watercraft. These disposal areas, boat graveyards, can build up over time to create a multicomponent, stratified, archaeological record of vessel chronology. In some cases, it suggested that local variants interspersed with better known regional watercraft fill in gaps in the historical and archaeological record.

After locating concentrations of abandoned craft in the North Creek embayment, perceptions of vessel disposal shifted from the survey goals, and North Creek became a focus of later survey stages. North Creek is first identified as North Dividing Creek on the 1733 Moseley Map. The creek is actually two creeks, the East and West Prongs, with several tributaries that run into them. These watercourses have local names that do not appear on historical maps such as Ross Creek, Garrett Gut, and Ashon Gut.

North Creek features several small working docks as well as a numerous recreational piers. Channels are often quite, deep but shoal quickly in adjacent streams. Boat building was once common, but no new craft have been built since about 1980. The last trawler under construction was never completed. It rotted, and then was burned and bulldozed to make land on Cradle Point.

## *Cartographic Research*

An examination of historical maps showing the survey area was conducted as part of the background research. The North Carolina Department of Cultural Resources reproduced a series of maps covering the period between 1585 and 1896 (Cumming 1966). In addition to this set, the Map Collection in the North Carolina Collection, Joyner Library, East Carolina University, was inspected. Additional information was found in the 1919 US Department of Agriculture Soil Map for Beaufort County, USGS topographic maps, and contemporary and historical nautical charts. Taken as a group, these maps provide contemporary impressions of the APES and suggest both natural and cultural landscape changes.

## *Archaeological Research*

Prior to 1993, only small local APES areas had been surveyed for maritime or terrestrial sites. As with the southeast generally (Garrett 1983, p. 55), surveys and site inspections were the result of permits to dredge channels, erect docks, or emplace bulkheads. This unsystematic, site-specific, response was the result of on-going population change. Sites tended to exist in a near vacuum, until population growth expanded and development occurred.

Terrestrial sites were identified in the Office of the State Archaeologist, DCR. These were all prehistoric. While no previous archaeological work had been conducted within the survey area, several investigations had taken place in the APES. The earliest search was to identify sites associated with the 1587 Lost Colony (Haag 1958). Other survey work had been done in Albemarle Sound and a vessel (0002PUR) was located in Pungo tributary Upper Dowry Creek (Wilde-Ramsing 1987). An investigation associated with a never completed ECU student thesis was conducted off Woodstock Point by Gordon Watts and Susannah Pavelle.

Particularly important information provided by Glen Credle, a Beaufort County resident and marina operator, after the survey commenced. Credle identified many unsuspected sites, often providing vessel names and descriptions as well as time of loss. The project benefitted from master's thesis produced by ECU PMS students (Cox 1989; Lamb 1981; Merriman 1996: Newell 1986; Sloan 1971; Turner 1993). Postsurvey theses amplified research results and provided a broader interpretive range (Dodds 2009; Friedman 2008; Hayman 2011; Lawrence 2003; Leuchtmann 2011; Marcotte 2011; McCabe 2007; Meverden 2005; Price 2006; Seeb 2007; Smith 2010; Southerly 2006).

## Operating Assumptions/Hypotheses

Methodology involved two distinct aspects; theoretical and practical. Theoretical approaches integrated historical and environmental information to develop predictive models about what might be found. To a large extent, the survey was guided by an interpretive study of wrecked vessel magnetic signatures and site formation processes (Gearhart 1988; Muckleroy 1978). Practical methodology involved visual shoreline searches coupled with magnetic sensing to locate sites. For boat graveyards, visual identification proved adequate in their core areas, but outlying zones, especially approach channels, revealed magnetic anomalies that fit predicted vessel signatures.

If modern wind conditions do not differ from the past, vessels would have washed ashore since humans first travelled on the APES waters. Given prevailing wind conditions, it was anticipated that derelict vessels would wash up on northern shores, where they were subjected to salvage, burning, or disintegration. Land areas with steep vertical shorelines would be less likely to retain vessel remains while marshes would likely trap vessels. Protected waters behind headlands, hammock lines, or up wide creeks, would likely trap floating vessels that did not wash up on the river's shoreline.

It was predicted that deep water channels were the most heavily utilized areas. Shallow areas bordering channels such as those in front of Mixon, St. Clair's and North Creeks were likely zones for vessel remains since they presented navigational hazards. Accordingly, efforts were concentrated in currently existing shoal areas and those inferred from cartographic analysis.

For a variety of reasons, it was not anticipated that this survey would be a total maritime project. It was restricted geographically to a fairly shallow water zone that had seen maritime use in the past few hundred years. The project did not invest much research effort on land, but terrestrial maritime activities were noted.

Theoretical modeling intended to explain what was expected in the field and why archaeological materials would occur where they did was based on the work of Gearhart (1988) and Muckleroy (1978). Expectations were derived from historical sources, prior archaeological work, both locally and in the southeast generally, and personal observations. Submerged dynamic sites have been subjected to considerable study. Gearhart (1988), following Delgado et al. (1984), described wrecked vessel signatures for interpreting anomalies at the land/water interface. Signatures included "Buoyant Hull," "Buoyant Hull Fracture," and "Buoyant Structure." These signatures have particular applicability for sites that might be found along the Pamlico River shoreline and behind bars across creek mouths where a combination of wave-related factors affect archaeological resources.

The "Buoyant Hull" signature produces a "linear distribution of multiple anomaly peaks within the overall patterns produced by the remains of an intact hull." The long axis "may often be oriented parallel" to the shoreline "due to the tendency of a drifting vessel to turn broadside to the waves" (Gearhart 1988, pp. 40–41). For those vessels that sank in place after abandonment in a less dynamic environment such as North Creek, Buoyant Hull signatures are expected because the vessel did not break up. The "Buoyant Hull Fracture" represents a ship which broke apart and then scattered. This type "consist[s] of a pattern of multiple anomalies (i.e., wreck scatter) radiating upslope and down current from an area of more tightly clustered, higher-intensity anomalies (i.e., the area of hull break-up)" (Gearhart 1988, p. 41). Buoyant hull fracture sites should be different from the buoyant hull type because they would be lower in intensity and scattered along the shoreline down wind, or down current, from a major concentration where the wreck broke up. Gearhart's final type was the "Buoyant Structure." This was not necessarily a wreck, per se, but rather a remnant portion of a vessel that broke up and then floated to its current location. Gearhart's interpretive magnetic signatures and theoretical descriptions of what might be encountered would be more useful along a river's shoreline than tributary creeks.

Submerged sites could be divided into two broad types based on natural environment; dynamic and stable. Dynamic environment sites were those wave action zones including shorelines, bars at creek mouths, and areas subjected to boat wakes. Stable environments are more protected locations subjected to far less wave damage including small creeks and marsh zones where current, wind, and wake are minimized by shallow water, protective headlands, and shoals.

Site formation processes are relevant because they affect information potential and site condition. Was the vessel present at the site because it was a derelict, wrecked or abandoned; accidentally or deliberately grounded, stripped or burnt before deposition? Muckleroy (1978, p. 164) addressed site formation processes that provide a model for what might be encountered in the APES. Basic site typology distinctions in more protected waters relate to vessel condition and location, rather than type.

Muckleroy drafted five wreck classes ranging from nearly intact (I) to virtually destroyed (V) vessels. All five Muckleroy types were expected and it is particularly important that his classification scheme had no bias toward age since the survey anticipated finding non-“historic” vessels. Muckleroy’s model was seen as having greater utility applied within more protected waters where all site classes could fit a variety of vessel types, time periods, and site formation attributes.

Muckleroy’s Class I site would include abandoned, stripped, awash vessels, a type generally equating with Gearhart’s Buoyant Hull. A Class I site would include vessels that were stripped and partially disintegrated while settling in place. A Class II site would be a sunken boat that fell apart, but remained within protected waters with minimal disturbance. Class III sites would be found in more dynamic waters, including some protected shorelines. This type would have minimal remains and a weak magnetic signature caused by fasteners and other fittings. Given the protected nature of some site locations, the remains would likely be fairly coherent. Gearhart’s Buoyant Hull Fracture fits within Classes II and III. Class IV and V sites were anticipated outside protected waters.

Initial document research and personal observations allowed predictive hypotheses regarding site/wreck locations. Predictions were archaeological abstractions in the presurvey stage. Practical methodology was designed to locate cultural material, or sites, using a magnetometer and visually inspecting the shoreline to verify assumptions about site location. Watercraft leave specific indications in an archaeological context, including fasteners and other fittings that can be detected using magnetic sensors. The magnetometer was expected to note sizeable quantities of ferrous nails, pins, and other elements such as gudgeon straps and pintles.

Regardless of natural environment, APES wrecked and abandoned craft are systematically utilized as sources for equipment, parts, and raw materials and this recycling must be considered when examining any wreck site or magnetic anomaly.

Linking archaeological assumptions, or hypotheses, and empirical phenomena has been described as middle range theory (Anuskiewicz 1992, p. 92; Raab and Goodyear 1984; Thomas 1990, p. 164). While pre-survey research determined something of how the past was perceived, the survey tested these assumptions against what was encountered in the field. Expected sites ranged from terrestrial Native American sites to submerged contemporary watercraft. Based on background knowledge of the natural and cultural environment, sites were anticipated in different locations depending on age, cultural period, and site formation processes (Anuskiewicz 1992, pp. 93–94).

Since there might be several vessels deriving from a particular period as well as variables relating to location, loss, and current condition, it was anticipated there would be different potentials for certain areas and that these differences would extend to site types. That is, an intact, abandoned vessel would more likely be encountered in a relatively stable small creek whereas a badly damaged vessel would more likely be found as a scatter in turbulent water over and shoreward of a creek-mouth bar.

## Findings

Eight prehistoric and two historic terrestrial sites were identified. Twenty-two wrecked and abandoned vessels were located outside four graveyards. Many additional magnetic anomalies were identified; some were reported as vessels by local informants, and are included with the individual wrecks dealt with elsewhere (Babits et al. 1995). Boat graveyards are defined here as concentrations of more than four abandoned watercraft in the maritime landscape. This definition is based on what was encountered during the survey and may require revision after additional surveys are conducted. This study is important because it deals with rural depositions rather than more commonly studied urban harbor abandonments.

## The Boat Graveyards

North Creek has four graveyards, at Cradle Point (now all submerged), Ashon Gut (still active), a third on the East Prong that was removed without recording during development after 2000, and a fourth upstream from Cradle Point across from Ott Jordon Gut. This last complex might no longer be active. Encountered among terms for catch boats (trawlers, oystering boats, and crab skiffs) were two additional phrases. Run boat is a local term for vessels that went out to the working boats, picked up their catch, and delivered it to market. In the Chesapeake, these were called "buy boats" (Beitzell 1973:51, pp. 93–94), a term also used in North Creek. As with catch boats, run boats were anticipated. Those which were found included sail and engine power as well as at least one converted from sail to gasoline engine.

### *Two Derelicts Boat Graveyard*

The Two Derelicts Boat Graveyard was identified cartographically as a wreck symbol in Ross Creek, an East Prong tributary. This "shipwreck" (USGS 1983), was actually two awash vessels, a totally sunken barge and additional magnetic anomalies. The first vessel was a shrimp boat, identified as *Ida Coal* by Glenn Credle. This round-stern vessel was built circa 1943 and abandoned during the 1980s by Credle (18 April 1994, personal communication). A second vessel was a shrimp trawler with an unusual "slab side" pointed stern, a distinctive configuration known in the Chesapeake as a diamond, V, or "Poquoson stern" (Chowning 1985, pp. 79–80).

A large magnetic anomaly identified as an "old wooden barge" by Glenn Credle was near the visible craft. Additional low-order magnetic anomalies were located to the east and north. The Two Derelicts Complex was expanded by other boats during 1995 or 1996. These boats were all removed before 2002 (Fig. 10.2).

**Fig. 10.2** Two Derelicts Abandonment Area, 1993 *above*, 2007 *below*. Magnetic sensing revealed numerous anomalies around the visible vessels. (Courtesy of Lawrence Babits)

## *Ashon Point Boat Graveyard*

A cluster of post-1950 vessels was noted at an unnamed headland across North Creek's West Prong from Ashon Gut (Fig. 10.3). At least two wooden trawlers and a barge were awash in slips cut into the stream bank. A small, partially submerged iron barge was adjacent to these vessels. A sunken wooden sailboat was a short-distance west of the iron barge near two abandoned docks. The sail boat was a "cut-down, one masted bateau" (Glen Credle, 4 December 1993, personal communication).

## *Cradle Point Boat Graveyard*

Cradle Point is a landform on the west bank of North Creek's West Prong one mile above its mouth. Shown as "Cradle" Point on maps, it is derived from the Credle

**Fig. 10.3** Ashon Gut Abandonment Area 2007. This is only one portion of a more widely dispersed abandonment area involving at least ten vessels

family. The Cradle Point Graveyard contained at least two sunken vessels, the *I Hope* and the *Miss Lilly*, in a little bay on the upstream, side of the point. Another fragmentary craft was seen on the bottom. Identifications of the larger craft were derived from oral interviews with Glenn Credle, a local resident. A third known vessel is *Ann Bryan*, located just south of Cradle Point.

*I Hope* was a two-masted schooner owned by John Credle that was a blockade runner during the Civil War. After 1865, it was a work boat (Glenn Credle, 3 December 1993, personal communication). The vessel's documentary record shows it rated at 16.22/100 tons, with one deck and two masts. Its length was 45.2/10 with a beam of 15 ft and a depth of 3.7/10 s. According to the original bill of sale, dated 31 March 1868, currently in Credle's possession, its total tonnage was 11.22/100 s. This vessel was possibly built in Beaufort, North Carolina, as it was enrolled there before it was sold in Washington, North Carolina, in 1868. *I Hope* was blown onto Cradle Point by a storm. Later, a brushfire spread and *I Hope* caught fire and burned to the water line. The remains of *I Hope* consist of linear timbers running roughly east–west in the northern half of the cove.

More detailed inspection suggests that the most visible remains are those of a square transom, single-masted skiff approximately 15 ft long and 3.5 ft wide (Ann Merriman, 6 December 1994, personal communication). If Merriman's recent inspection is correct, then *I Hope's* structural elements rest in deeper mud or under the marsh. *Miss Lilly* is a fan tail "run boat," converted from sail to engine power that operated between North Creek and Washington, North Carolina. The tiller bar extends above water south of *I Hope*. *Miss Lilly* seems much better preserved than *I Hope*. Merriman's inspection suggests a collapsed deck structure, possibly a cabin, is along the starboard side of *Miss Lilly* (6 December 1994, personal communication).

In front of Cradle Point is a magnetic anomaly identified as *Ann Bryan* (or *Brian*). This vessel was built in Georgia, probably in Glynn County, in the twentieth century. Abandoned, it was sunk by 1980. There is a distinct possibility that several other boats are located here because the little cove is "full of old boats" (Glenn Credle, 3 December 1993, 8 April 1994, personal communication). The presence of numerous small vessels was confirmed by Ann Merriman, who noted at least three small wooden vessels in addition to *Miss Lilly* (6 December 1994, personal communication).

An additional vessel may be located between *Ann Bryan* and the tip of Cradle Point. A concentration of large, sawn timbers was noted during Merriman's site inspection. The disarticulated timbers are typical of those used in late nineteenth century deck and hull construction. The large size (4 × 8 in) suggests a vessel rather than a skiff, dock, or pilings (Ann Merriman, 6 December 1994, personal communication).

## *Ott Jordon Gut Graveyard*

Ott Jordon Gut is a small slough located east of Ott Jordan Point, across the West Prong from Cradle Point. Just off its southeastern point was a skiff that is possibly log bottomed. Inside the gut itself there were seven visible craft, and suggestions of others under them and in water along the gut's east edge. Visible craft include two large vessels and five skiffs (Fig. 10.4).

Two skiffs are located side by side at the stern of a larger vessel, a buy boat. The skiff bows were in the marsh with sterns on the bottom. A fourth skiff was sunk in the gut with its bow showing. Skiff V is a small crab/shrimp boat with a 1988 license plate. The superstructure, including small cabin and a "roll bar" frame for pulling in nets or crab pots were added to an earlier, recreational boat.

The two largest craft were "run boats." The outer boat had a 1971 license plate, and additional numbering on the aft the main hatch timber: "NO 227855" over "Gross 41 NET 28." Inshore of the first buy boat was a sunken, earlier type with at least two hatches, a forward cabin, and a mast stump. Far more decayed than the first, it was identified as *Miss Brenda*, a Chesapeake-built sailing vessel brought down and converted to power for use as a buy boat, according to Glenn Credle.

An interface site located on Jordan Point, the northwestern corner of Ott Jordan Gut, was initially identified as a magnetic anomaly (Fig. 10.5). Two iron rails and a boat cradle were visible; anomalies were immediately adjacent to the rails. On land, a brick mounting block, with its displaced engine, sat near rails leading into the water. This marine railway must be considered part of the Ott Jordon Gut Boat Graveyard.

**Fig. 10.4** Ott Jordan Gut Abandonment Area, 1993 *above* and 2007 *below*. The large vessel at *top* is one of the two Chesapeake Bay vessels brought to Pamlico Sound for use as run boats. *Bottom* view shows the same site in 2007. *Arrow* points to cabin remnants of the run boat surrounded by other vessel remnants. (Courtesy of Lawrence Babits)

## Interpretations

Heavy erosion of the Pamlico's north shore suggests vessels that washed ashore were either broken up by wind and water action, recovered through salvage, possibly burned, or is now in water off the modern shoreline. By reconstructing shorelines, it may be possible to detect submerged landforms and, by using a combination of sub bottom profilers and magnetometers, and conducting survey transects paralleling the previous shoreline.

Vessel types encountered during the survey were predicted based on the chronological assessment of what might be found. Sites dated between the 1840s and circa

**Fig. 10.5** The Ott Jordan Gut Abandonment Area in 2007. Boats being broken up for timbers in left middle distance on south side of gut. Cradle Point in far background. (Courtesy of Lawrence Babits)

1995. This temporal span affected the full range of vessel types, but is probably not complete due to the remote search technology. Watercraft represent types reflecting local, regional, and Atlantic coastal vessels. There were locally built, Pamlico River versions of deadrise workboats, Chesapeake-built "buy" boats, and a recreational pontoon boat.

Chronological sequencing of the four North Creek boat graveyards can be postulated using the abandoned vessels' ages. The Cradle Point embayment is adjacent to a known ship construction point still in use in the 1980s. The Credle docking area was on the southeastern side of the point where derelict vessels would interfere with ongoing activity, so abandoned craft were taken around the point and run aground. *Ann Bryan*, a vessel sunk west of the Credle dock pilings, tends to confirm this interpretation. The boat was sunk after the dock, was no longer used and then only after it was stripped to provide material for *Starlon C*, a trawler built here during the 1950s. *Ann Bryan* was sunk where it would not interfere with launching *Starlon C*, or activity on adjacent property where at least four workboats currently dock.

The potential for identifying a long series of vessels at Cradle Point should not be understated. It might be similar to the Back River between the South Carolina mainland and Hutchinson's Island in Savannah, Georgia (Leech et al. 1994). Since erosion occurred, and continues to occur, existing marsh probably built up over abandoned hulls that confined silt. The embayment has opened somewhat so *I Hope* and *Miss Lilly*, which were once in the marsh, are now fully submerged. Since vessels noted at Ott Jordon Gut are newer, the Cradle Point Graveyard may have the earliest remains in North Creek.

The Ott Jordon Gut boat graveyard was the second West Prong graveyard and was associated with the marine railway. Once Cradle Point embayment filled up about

1955, and after abandoning the marine railway, unwanted craft were towed to Ott Jordon Gut, tied to pilings and abandoned for stripping. The gut seems to have filled with abandoned watercraft fairly quickly. Because the vessels here represent the shift from sail to gas power, the era when run boats went out to pick up cargo from catch boats, it may be that two distinct periods are represented. The earlier would be circa 1920–1930; the later during the 1960s. In 2004, new abandonments in Ott Jordon Gut were being disassembled with their timbers stacked across the gut, continuing activity that probably when the marine railway was operating.

The Ashon Point boat graveyard was probably still in use during the survey. The last abandonment area was in Ross Creek, an East Prong tributary vessel abandonment commenced about 1970 based on license numbers. The worn out boats were placed behind an old wooden barge where derelicts would not interfere with any current or proposed activity.

Based on environmental and historic data collected as background research and the sites identified during the survey, several projections about site location can be made for future research. The most common abandonment locations were in sheltered sites and consisted of two types of deposition, boat graveyards and single vessels. Watercraft were abandoned way from channels and work areas. In some cases, partially stripped vessels were brought into the site for disposal, stripped again, then burned for metal parts and, finally, pulled onshore and burned to rubble. In other cases, they were simply abandoned. As word of a vessel's abandonment spread, others took advantage of the boat for additional salvage.

The second most common site location relates to ship losses. Wrecks occurred on shoals and sand bars. These wreck sites fit well with Gearhart's and Muckleroy's model for badly damaged wreck with little remaining intact material. A refinement for the APES relates to predicting site locations based on shoal waters and sand bars. A negative corollary to this site class is that few watercraft sites will be found along existing bluff lines due to the large scale erosion over the last 100 years.

A third predicted site location is at navigable stream heads. The term "navigable stream" is relative, especially given the small size of watercraft encountered during the survey. Boats expected at stream heads are small skiffs. It is possible that a considerable accumulation of abandoned small boats might occur over time in conjunctions with mills, docks, and other terrestrially oriented service sites such as bars, stores, and post offices.

Another observation is that small skiffs are often found abandoned at boat-launching sites adjacent to creek headwaters. There were several instances of abandoned boats noted at docks and landings in the North Creek area. Outside the survey area, other examples were noted on Tar Kiln Creek, at Durham Creek (Stuart Derrow, 20 December 1994, personal communication), and on Indiantown Creek in Currituck County (Jones 1996). A similar observation was made by Koski-Karell for Delaware streams where "more abundant evidence of cultural activity than other portions of the river" would be found (Koski-Karell 1994, p. 198).

Interpretations of Pamlico abandonment patterns agree with observations made about Maryland's Patuxent River where archaeological vessels are a representative sample of watercraft used, lost, and abandoned in the area and that "vessel abandonment constitutes the single greatest cause of cultural deposition" (Shomette and Eshelman 1981, p. 168; Shomette 1995). Shomette and Eshelman also found the greatest site concentrations were in commercial areas that were not necessarily urban such as North Creek and Bradley Creek off the Pungo River (Marcotte 2011).

Any generalized model predicting small boat sites is hampered by another small boat activity. To avoid obstructions or floating debris, local watermen routinely pull abandoned vessels ashore for recycling and burning. Such cultural processes are normal maritime activity and must be considered when predictive modeling does not coincide with observed phenomena.

## Conclusions

The Pamlico River survey began with several interlocking concepts in mind. These included observations that, while no systematic regional survey had been conducted; environmental conditions seemed to allow predictability about site locations; and, that change over time could be documented for watercraft. When the lack of knowledge about historic and contemporary small craft was coupled with government requirements for permitting actions, it was clear that an assessment of regional resources was necessary since the sampling universe was unknown. A survey would provide a baseline for comparative purposes and allow a better determination of significance.

The survey provided a limited regional context for vessels found in and along a main APES river as well as identifying rural abandonment areas for future study. As a starting point for evaluating vessels found in the APES, the survey clearly indicated that abandoned watercraft were placed within locally agreed upon spatial contexts, and that recycling followed certain rules of behavior.

The close proximity of two distinct boat-building traditions undoubtedly influenced the study area, but to an unknown degree. Traditionally, Albemarle Sound area is seen as the Chesapeake Region's southern border whereas Pamlico Sound was a mixing zone reflecting traditions associated more with southeastern North Carolina and the South Carolina/Georgia maritime environment (Fleetwood 1995). The survey provided some indications that this is correct while also demonstrating that considerably more research was needed.

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# Chapter 11
# The Commercial Fishing Graveyard and Memory: Wright's Creek, Belhaven, North Carolina

**Jacqueline L. Marcotte**

**Abstract** A 1994–1995 survey (Babits and Kjorness, 1995, Final Report on an Archaeological Survey of the Western Shore of the Pungo River from Wade's Point to Woodstock Point. Department of History, East Carolina University, Greenville, North Carolina) discovered the presence of several abandoned vessel complexes in Wright's Creek, a rural area located between the Pamlico and Pungo Rivers in North Carolina. These boat graveyards, composed of the discarded vessels and equipment of the commercial fishing community, serve a purpose for those who create and maintain them along their property boundaries, bestowing them with meaning and regard. Rather than aesthetically displeasing "eye-sores," these sites serve as a repository for the memories and nostalgia of the commercial fishers. In addition, they provide materials for salvage and reuse, aiding in maintenance of working vessels, proving a financial boon in the process of boat breaking. The archaeological study of a commercial fishing graveyard allows interpretation of the social, economic, and technological changes affecting the surrounding community. The concentration of abandoned vessels in this embayment presents a unique opportunity to study behavioral patterns associated with a rural boat graveyard, as the adjacent community is still interacting with the discarded material remains. Continued interaction demonstrates social significance as the surrounding community has intimate ties to the abandoned watercraft. This area of Belhaven, once a vital waterway for commercial fishers, is experiencing economic decline as evidenced by the high number of vessel and equipment graveyards.

## Introduction

The study of the Wright's Creek Commercial Fishing Graveyard allowed examination of an aspect of maritime history and culture rarely investigated in an archaeological capacity. This study, completed in 2011 (see Marcotte 2011) through East Carolina University (ECU), concentrated on the discarded vessels and equipment of the commercial fishing industry located on the banks of Wright's Creek, a rural community

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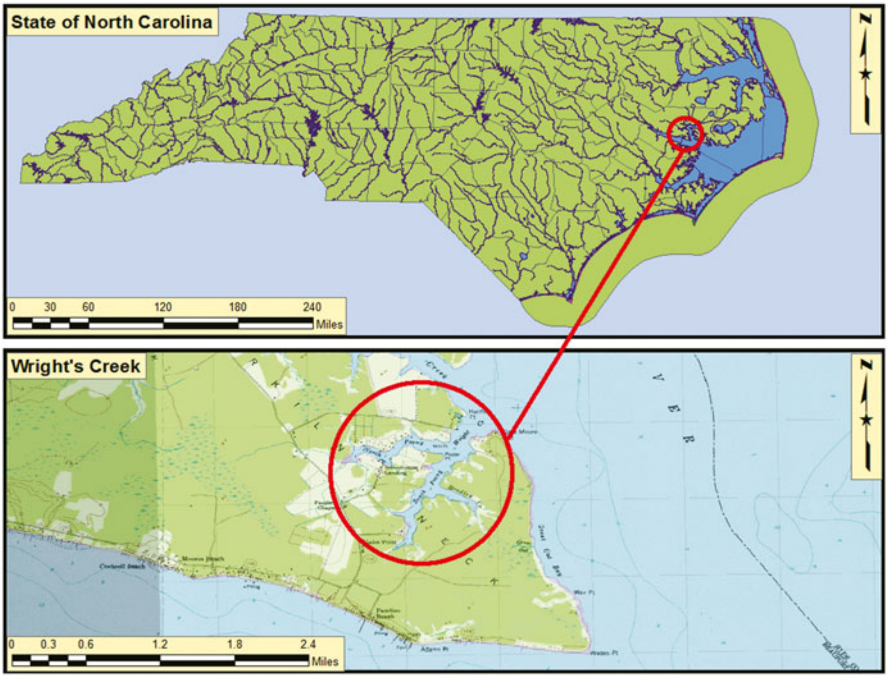


**Fig. 11.1** *Top* topographic map of Wright's Creek, Belhaven, North Carolina. *Bottom* topographic map depicts location of project area in relation to the eastern part of the state. (Image by Jacqueline Marcotte)

in Belhaven, North Carolina (Fig. 11.1). The artifacts comprising the commercial fishing graveyards are the discarded cultural materials of the Wright's Creek community. As such, these graveyards hold valuable evidence relating to their heritage, as well as the technological, economic, and political changes influencing their rural North Carolina community. From a wider perspective, study of the commercial fishing assemblages contributes to the understanding of behavioral archaeology and site formation processes testing theories presented by the community of archaeologists.

There has been little archaeological research completed on rural commercial fishing graveyards as vessels abandoned in this type of setting are usually isolated and escape public knowledge. Consequently, there is a lack of information concerning related vernacular shipbuilding techniques, local maritime history, and vessel abandonment behaviors in rural environments. An appropriate corollary for this research was found in the comparative study of Australia's rural farm graveyards conducted by Diana Smith (2005). Like the commercial fishing graveyard, rural farm graveyards are monumentalized by the farming families that sustain a meaningful connection to the landscape through the retention and maintenance of obsolete agricultural materials (Smith 2005, p. 22). Other comparative research considers the body of work concerning formation processes observed in the archaeological record, particularly

**Fig. 11.2** Foster's Seafood in December 2008. Note the Foster's commercial fishing fleet in the foreground. From *left*: *Moon River, Cracker Boy, Cap'n Sam, Cap'n Lennie, and Miss Sara*. (Photograph by Jacqueline Marcotte, 2008)

those relating to salvage, reuse, discard, and abandonment (Richards 2008; Schiffer 1987).

Examining the graveyard in both a systemic and archaeological context provided an observable link between the behaviors that led to its creation and maintenance, as well as the signatures of these behaviors in the archaeological record. Research questions stemmed from observations concerning use of vessels in the systemic context, the behavioral processes that drive an artifact's entrance into the archaeological record, and resulting signatures. Of particular importance is the perception of the graveyard as examined through the memory of the community responsible for its creation and continued curation as well as any effect this perception has on the resulting formation processes observed within the archaeological record. The Wright's Creek Graveyard, a combination of dynamic and static discard sites, provided the opportunity to study a culture that is rapidly fading from history.

## Wright's Creek—A Commercial Fishing Community

Part of Beaufort County, Belhaven was incorporated on March 7, 1899 (Boyette et al. 1999, p. 8). Although incorporated in 1899, maps and deeds of the area demonstrate occupation as early as the eighteenth century. Fishing became one of the town's major industries, boasting two oyster-packing houses. The Wright's Creek area of Belhaven appears as an active community of small, commercial fishers, housing three prominent seafood factories (Fig. 11.2). The local commercial fishing industry is comprised mainly of family-owned businesses, some with an ancestral history of vernacular boatbuilding (Jonathan (Johnny) Daniels, personal communication 2010; Carl Foster, personal communication 2009; Ernest Floyd Foster Sr., personal communication 2009). The economic and social contribution of commercial fishing on an isolated, rural community such as Belhaven is palpable. Fish landings and vernacular boatbuilders contributed to the economy and traditional cultures found in these waterfront communities, providing a necessary infrastructure for the continued success of commercial fishing. These long held fishing traditions, once a vital part of North Carolina communities, are fading due to continued hardships faced by the seafood industry (Garrity-Blake 1996, pp. 5–9; Garrity-Blake and Nash 2007, p. 10).

Although small, Wright's Creek currently provides the majority of Beaufort County fishers a place to ply their trade. Beaufort County Vessel Registration for 2008 indicates this area is home to 69 % of the commercial fleet for Beaufort County (USCG 2008). Identification of the fishing fleet reveals most vessel owners reside on or near the creek, and call Belhaven their hailing port. Family names in the ownership register reflect the generational practice of commercial fishing, as many residents hold deeds dating to the nineteenth century and earlier.

In addition to demonstrating longevity, the commercial fishing fleet is a study in the persistence of wooden boatbuilding technology in North Carolina, as 92.5 % of the fleet is comprised of *vernacular* wooden fishing vessels. The remaining vessels are of steel construction. Vernacular boatbuilding describes a particular method of construction whereby the shipwright constructs the vessel by the "wrack of the eye," meaning the shipwright has knowledge of the appearance of a vessel's lines and can build it to these visual standards without formal plans (Fleetwood 1995 p. 89; Kelly and Kelly 1992 p. 72; Maiolo 2003 p. 43).

Construction typically took place in three types of boat yards, the large commercial yard, private yard, and the boat builder's backyard. While boatbuilding traditions on Roanoke Island, Cape Fear, and the Beaufort area are well known, the Pamlico River is somewhat of an anomaly (Babits and Kjorness 1995; Babits et al. 1995 pp. 1, 2). Several backyard boatwrights participated in building the Wright's Creek fleet. Major Wilson Foster of Belhaven was a productive builder of small skiffs and commercial fishing vessels up to 60 ft in length (Carl Foster Sr., personal communication 2009). Some of these vessels are extant today, while others list awash near the family dock, evidence of hard times for small fishing craft. In addition to the Fosters, several other families demonstrate a tradition of wooden boatbuilding, including the Hopkins and Kirk families (Carl Foster Sr., personal communication 2009; USCG 2008).

Declines in fish stock coupled with the low return price for fisheries product in North Carolina has led to a fall in the number of youth carrying on a family's commercial fishing roots. This has considerable economic and socio-cultural ramifications for an industry long known for generational continuity and cultural identity (Garrity-Blake 1996 p. 4). Long struggling fishers in this community are encouraging their children to pursue other work, leading to the realization that the generation fishing North Carolina waters today may be the last to exploit this independent lifestyle (Garrity-Blake and Nash 2007 p. 5).

**Fig. 11.3** Graduate students using baseline offset to record vessels in Bradley Creek. (Photograph by Jacqueline Marcotte, 2008)

## Methodology

Archaeological fieldwork commenced in November 2007, with subsequent field visits to record formation processes concluding in May 2010. Fieldwork began with initial site inspection and documentation of vessels in the north and south prongs of Wright's Creek (Fig. 11.3). Site inspection included 40 individual vessels, 38 located within five graveyard complexes, the remaining two vessels representing individual vessel discard. Site documentation was concerned with the creation of site maps and individual vessel histories for a sample of 14 vessels. Documentation of 26 remaining vessels included photography and site mapping. Side scan sonar aided in site reconnaissance and location of fully submerged vessels.

A critical component of research for this study involved the memory of the commercial fishers living and conducting operations from the shores of Wright's Creek. Oral interviews with residents, occurring with approval from East Carolina University (ECU) Medical Center Institutional Review Board, proved essential, providing historical images and information not available in a public forum. In many cases, identification of abandoned vessels would have been impossible without local informants, as removal of all traces of vessel identity typically occurs before deliberate abandonment or discard. Aside from aiding in identification of abandoned vessels, oral interviews facilitate an understanding of vernacular boatbuilding techniques, the evolution of commercial fishing, and the behavioral aspects of material culture discard in this small community through its intimate association with the abandoned vessels. In addition to oral interviews, informants generously donated family photographs, as well as documents pertaining to family genealogy in order to generate a more complete representation of the inhabitants of Wright's Creek.

## Theory

Social theories concerning the preservation of cultural heritage through meaning and memory also provided a framework for analyzing the graveyard's significance to its creators and those responsible for its maintenance (Anderlini et al. 2010; Assmann 1995 pp. 125–133; Eyerman 2004 pp. 159–169; Langford 2001; Van Dyke and Alcock 2003). The maritime tradition of commercial fishing, historically a generational profession, is facing economic peril, and with it, the decline of other associated maritime trades, such as vernacular boat building. The commercial fishing graveyard, fragile in its existence, holds clues, and perhaps access to these fading memories.

To interpret the archaeological evidence and cultural links to the surrounding community, it is necessary to define the perception of the commercial fishing graveyard. The Wright's Creek commercial fishing graveyard complex is a collection of discrete sites or assemblages that display patterns in the discard of material culture and serve a specific purpose for the surrounding community. In addition, these sites provide a means to discover potential ties to the community through the memories and meaning of their maritime cultural heritage (Assmann 1995 pp. 125–133; Langford 2001 p. 5; Smith 2005 p. 19; Van Dyke and Alcock 2003). In other words, the commercial fishing graveyard can be understood as a cultural phenomenon possessing clues to the relationship between the archaeological record, and the maritime lifeway of commercial fishing.

The function an artifact carried during its systemic life often carries implications for its regard and future formation processes once the object has served its purpose and reaches the point of discard. An artifact's value in a social system is determined by several factors, including stages in its development cycle, its monetary value, and in some cases the artifact's emotional ties to its owner (Schiffer 1994 p. 12). According to Diana Smith (2005 pp. 79, 80) in her research of farm graveyards and meaning, a process of personifying vehicles and machines develops through a bond of regard and affection by the people who own and use them, linking them to important events, places, and other people in their lives. Regard arises for vehicles and machines that served a particular owner for a protracted length of time, or have demonstrated years of service, often perceived as "loyalty."

The behavioral and archaeological study of boat and equipment assemblages connected with commercial fishing increases the knowledge concerning the little known maritime heritage and lifeways of rural fishing communities. Archaeological principles and theory offer a framework for connecting the processes that form the physical and nonphysical aspects. Specifically, the physical aspects of the graveyard are the discarded fishing vessels and associated equipment (artifacts) of the surrounding community. The nonphysical aspects of the graveyard refer to its meaning within the community that created it, and access to memory provided by the graveyard, critical factors in preserving the community's maritime cultural heritage. In other words, the graveyard may represent a microcosm of the cultural, economic, and technological changes affecting the commercial fishers of Wright's Creek and possibly the region of North Carolina.

In a similar study concerning rural farm graveyards, meaning, purpose, and ties to social memory, Diana Smith (2005) explains an understanding of rural discard sites requires examination of site operation and transformation through ongoing use (formation processes) to determine if an established set of principles can explain the phenomenon. She further contends these sites are not simply abandonment or discard sites in the traditional sense of the terms. Rather, these sites are dynamic systems closely linked to modern farming identity, facilitating access to the past (Smith 2005 p. 46; see also Cameron and Tomka 1993 p. 138). Exploration of these graveyards through the consideration of site creation, conditions of abandonment, site maintenance, and other formation processes informs archaeological analysis and interpretation (Smith 2005 p. 38). The rural commercial fishing graveyard, a collection of the discarded vessels and tools of that maritime lifeway, discarded on or near commercial fishing property, stands as a corollary to the rural farm graveyard to which these principles apply.

The fishing graveyard, because of its patterning in both a material and social sense, and the meanings invested in it, operates within wider cognitive systems that encompass rural commercial fishing assemblages. Creation of these assemblages occurs through the placement of new items, and maintenance occurs through the movement or removal of artifacts. Continued interaction demonstrates a range of functions tied to discard, abandonment, and reuse, stimulating a dynamic system, tying the graveyard to the surrounding community as a repository of memories, reflecting attitudes toward the maritime past. Much like the rural farm graveyard, if fishers create and maintain assemblages of discarded cultural material acting as a functioning site, then meaning and purpose are inevitably conferred (Smith 2005 pp. 41–46). Continued maintenance of the graveyard has implications for its active and fleeting nature, amplifying the need for study of these ephemeral sites before they suffer destruction through cultural and/or noncultural formation processes.

## Archaeological Survey Results

The archaeology of Wright's Creek encompasses the 40 watercraft discovered in various states of discard or abandonment near the shores of the commercial fishing community (Fig. 11.4). Survey results in this section concentrate on the location of

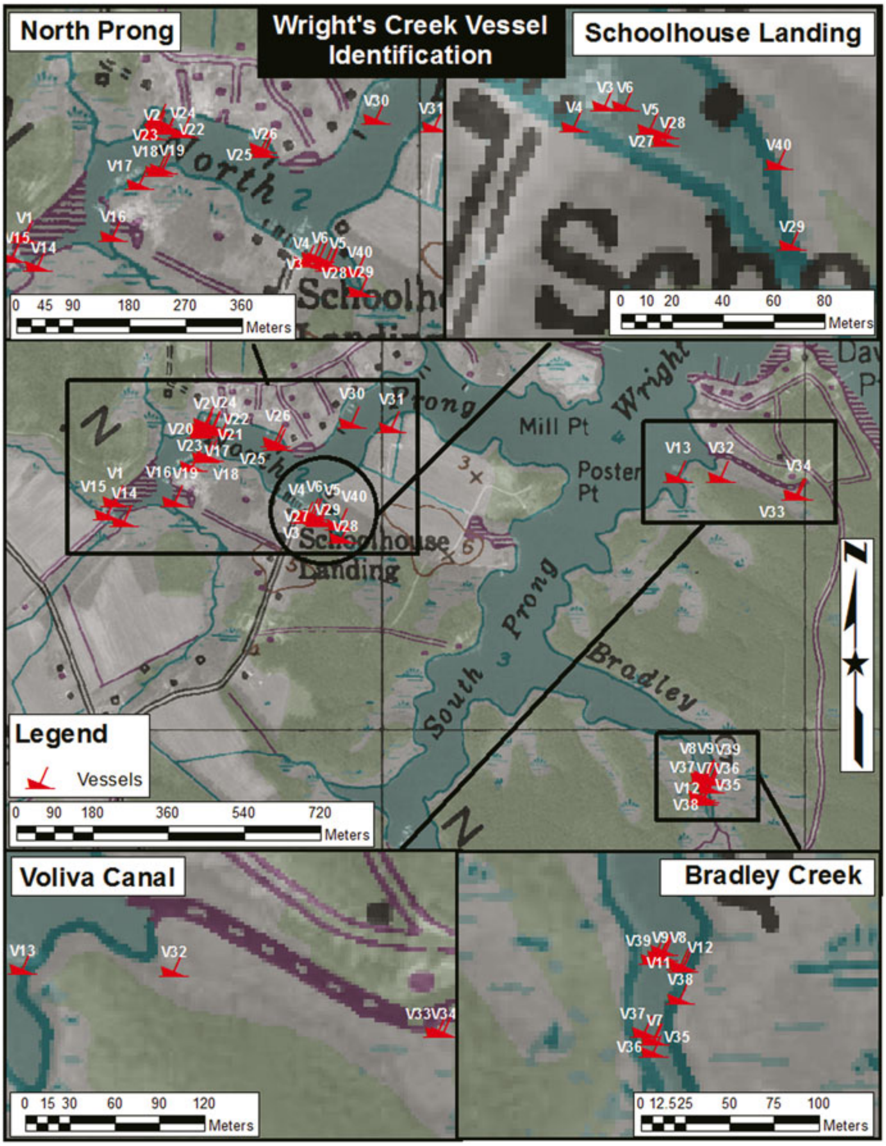


**Fig. 11.4** Map of vessels identification in Wright's Creek and its tributaries. (Image by Jacqueline Marcotte)

graveyards and vessels within Wright's Creek, the condition of their associated cultural material, and observed formation processes. Upstream from its mouth, Wright's Creek divides into north and south prongs. The north prong contains 25 vessels discarded near working docks, while the south prong contains 15 sites. Formation processes involve a combination of cultural and noncultural transforms. Cultural transforms include salvage, reuse, and discard activities. Initial discard events may be temporary, while vessels and associated equipment await reactivation through recycling. These events are often followed by permanent discard through abandonment. Noncultural, or natural transforms, cause damage to the vessels wrought by wind, wave action, water pH and salinity, as well as acidic mud.

There are two main types of cultural material associated with a commercial fishing graveyard—discarded vessels with associated equipment, and related refuse. The rural commercial fishing graveyard assemblage contains commercial fishing vessels purposefully discarded on or near the vessel owner's property for a variety of reasons including, but not limited to, technological change, economic hardship, and use-wear. These cast-off fishing vessels are potentially complex artifacts holding information about technology, chronology, manufacture, use, and eventual disposal. The location of a rural commercial fishing graveyard is an important aspect of archaeological and cultural interpretation. Given the technical aspects of boat breaking and discard, and the isolation associated with rural commercial fishing, it is impractical to float watercraft long distances from the breaking area in a stripped-down state. Logically, this would force most commercial fishing operations to discard vessels on or near their commercial or residential property. In fact, in many instances, a fisher's commercial and residential property is one and the same.

Archaeological surveys include reconnaissance and research conducted during the years 2007–2010. Of the 40 vessels surveyed during those years, 22 bear site numbers from the North Carolina Underwater Archaeology Branch (UAB) based upon Babits and Kjorness (1995) reconnaissance. Since several vessels were not included in this survey, having entered the archaeological record after 1994, renumbering for this study included all the vessels to aid in identification during 2008–2010 survey. Table 11.1 provides a synthesis of vessel information, including assigned numbers (both ECU and UAB), location, name, description, observed site formation processes, and vessel dimension.

## Uselife, The Graveyard, and Memory

Through exploration of its primary feature, the commercial fishing vessel, examination of the meaning and purpose of the commercial fishing graveyard is possible. The perception of a vessel held by its owner or surrounding community influences how its uselife proceeds, and finally terminates. Analysis of an artifacts function, and the effects of memory on behavioral processes leading to vessel discard, can inform archaeologists on possible signatures of these processes found in the archaeological record.

Exploration of the functions served by the vessel while acting in the systemic context allowed a better understanding of the intrinsic tie such functions have on creating the fishers' memory. In particular, this includes evaluation of, *technofunctions, sociofunctions*, and *ideofunctions* served by the vessel. Finally, the connection

**Table 11.1** Wright's Creek surveyed vessel. (By Jacqueline Marcotte)

| Vessel number | 1994 UAB Site number | Location | Vessel name | Vessel description | Length in ft ([a]) | Beam | Build year ([a]) |
|---|---|---|---|---|---|---|---|
| V1 | 0026PUR | North Prong | *Miss Shirley* | Wooden sloop. Rebuilt in 1949, likely built in 1920s | [a]31.5 | [a]10.4 | [a]*1949* |
| V2 | None | North Prong | *Miss Betty J* | Wooden trawler, raked transom, forward deck house | 45 | 15 | [a]1972 |
| V3 | 0008PUR | North Prong | *Miss Dorothy* | Wooden trawler, square transom, forward deckhouse | 36 | 11 | 1920–1940 |
| V4 | 0007PUR | North Prong | *Bumper* | Wooden net-haul boat. Dory style, flat bottom—Plywood. | 22 | 8 | Ca. 1950 |
| V5 | None | North Prong | *Miss Amber* | Wooden trawler/rum/oyster boat. Longitudinal planking | 47 | 13 | 1928 |
| V6 | None | North Prong | *High Roller* | Wooden trawler, square transom, keel first, machine cut | 57 | 19 | [a]1968 |
| V7 | 0040PUR | Bradley Creek | Unknown | Wooden "Fernandina Beach" style trawler. Flat bottom | 46 | 13 | Ca. 1920 |
| V8 | 0031PUR | Bradley Creek | Unknown | Wooden trawler. Flat bottom, lapstrake, square transom | 26.1 | 9.5 | 1920–1940 |
| V9 | 0030PUR | Bradley Creek | Unknown | Wooden fishing boat. Flat bottom, square transom | 22 | 11 | Ca. 1980 |
| V10 | 0029PUR | Bradley Creek | Unknown | Wooden fishing boat. Core sound design above waterline | 23.7 | 6 | Late 1970s |
| V11 | 0033PUR | Bradley Creek | Unknown | Harker's Island workboat, converted yacht | 36 | 10 | 1950–1970 |
| V12 | 0032PUR | Bradley Creek | Unknown | Wooden fishing boat | 26.4 | 9.5 | 1920–1940 |
| V13 | 0015PUR | South Prong | *Fred W. Olcott* | Steel barge/tow boat, "Louisiana Pusher," I and L frames | 110 | 40 | [a]1948 |
| V14 | None | North Prong | Unknown | Wooden trawler, forward deckhouse, raised deck | 28 | 13 | Ca. 1970 |

**Table 11.1** (Continued)

| Vessel number | 1994 UAB Site number | Location | Vessel name | Vessel description | Length in ft ([a]) | Beam | Build year ([a]) |
|---|---|---|---|---|---|---|---|
| V15 | None | North Prong | Unknown | Wooden trawler, converted to storage vessel | *42* | 14 | 1970–1980 |
| V16 | None | North Prong, Hopkins Complex | Unknown | Small wooden trawler, transom stern, forward deckhouse | *24* | *8* | 1960–1970 |
| V17 | None | North Prong, Hopkins Complex–south shore | Unknown | Wooden trawler, round—rebuilt stern, A-frame rigging | N/A | N/A | 1960–1970 |
| V18 | None | North Prong, Hopkins Complex–south shore | *Terry Sue* | Wooden trawler, transom stern, forward deckhouse | *36* | *12* | 1960–1970 |
| V19 | None | North Prong, south shore | Unknown | Wooden trawler, round—rebuilt stern, forward deckhouse | *32* | *11* | 1960–1970 |
| V20 | 0024PUR | North Prong, Foster's Complex | *Cheryl Ann* | Wooden vessel, longitudinal planking | *36* | *12* | Ca. 1970 |
| V21 | 0023PUR | North Prong, Foster's Complex | *Pearl Dee* | Wooden trawler, forward deckhouse, transom stern | N/A | N/A | 1960–1970 |
| V22 | None | North Prong, Foster's Complex | *Betty Rebecca* | Wooden trawler, forward deckhouse, transom stern | [a]48.2 | *16* | [a]1955 |
| V23 | None | North Prong, Foster's Complex | *Little Henry* | Small, sharpie like wooden vessel w/low freeboard to stern | *24* | *8* | Ca. 1960 |
| V24 | None | North Prong, Foster's Seafood | *Miss Allena* | Wooden trawler, forward deckhouse, transom stern | [a]53.7 | 18 | [a]1970 |
| V25 | None | North Prong, north shore east of Foster's | Unknown | Wooden trawler, transom stern | N/A | N/A | N/A |

**Table 11.1** (Continued)

| Vessel number | 1994 UAB Site number | Location | Vessel name | Vessel description | Length in ft ([a]) | Beam | Build year ([a]) |
|---|---|---|---|---|---|---|---|
| V26 | None | North Prong, north shore E. of Foster's | Unknown | Unknown | N/A | N/A | N/A |
| V27 | 0007PUR | North Prong, Schoolhouse Landing | Unknown | Wooden net-haul boat | N/A | N/A | N/A |
| V28 | 0008PUR | North Prong, Schoolhouse Landing | Unknown | Wooden net-haul boat | N/A | N/A | N/A |
| V29 | 0012PUR | North Prong, Schoolhouse Landing | Unknown | Small wooden skiff | N/A | N/A | N/A |

[a]Registered in year 2008

between the graveyard and memory illuminates how the community's shared memories influence perception and meaning of the graveyard held by those responsible for its existence.

An analysis of artifact function as it acted in a systemic context reveals clues as to its importance, and the possible regard placed upon it by its users. These functions, referred to as technofunctions, sociofunctions, and ideofunctions, describe the utilitarian, social, and ideological capacities served by the activities of the artifact while in use. The working vessels of Wright's Creek serve all three functions, often acting in many phases of uselife before eventual discard, and it is likely the same is true for the vessels that have been retired and discarded. It is through performance of these functions as a vessel acts in the systemic context that memories are made with its owner(s), thereby influencing the import placed upon the vessel, and the behaviors related to its maintenance and eventual disposal.

## *Technofunction*

The vessels serve a clear utilitarian purpose, or technofunction (Schiffer 1992 p. 10). In order for a fisher to participate in harvesting particular species, a purpose-built vessel equipped with modern harvesting gear is essential. The vessels serve as transport to and from fishing sites, provide the main platform from which to conduct fishing, and serve as the main storage area for the product sold at the fish house. The boat and its associated fishing equipment represent an integral part of the commercial fisher's life, without which the fisher would be unable to make a living. In order to provide this necessary technological tool, several fishers living along the creek participated in boatbuilding in their own back yards, constructing vessels purpose-built for commercial fishing. This activity provided not only the fishing platform, but also a ready savings on the expenditure of purchasing a shipyard built boat. In fact, the building of a vessel was often a familial event, the knowledge passed down to younger generations along with family-held preferences that influenced technological and stylistic variability. It is therefore not surprising to find that the importance placed on a vessel as it serves a technological or utilitarian capacity reflects also on its social and ideological importance.

## *Sociofunction*

The very same vessels that hold such significance in a utilitarian capacity also provide important sociofunctions (Schiffer 1992 p. 10). These functions include the transmission of information concerning social phenomena between members of a particular group, or between one group and others, serving as signs or a social symbol. The fishers of Wright's Creek maintain intimate ties with their working vessels, and often with those that are retired and eventually disposed within the boat graveyard. These vessels serve as not only symbols of their social standing as commercial fishers, but also reflect their familial ties to the profession. Many fishers name their vessels after family members and social ties are reflected through photographs and memories shared with the community through oral recall. A significant example of the social function served by these vessels is evident in the naming or christening of boats by their owners. The Foster family christened several boats with the names of their family members, including but not limited to *Miss Allena*, named after Carl Foster, Sr.'s mother, *Betty Rebecca* named after his sister, and *Miss Betty J* named after his wife (Carl Foster Sr., personal communication 2009). The memories created by these families include their commercial fishing boats, the symbolism strengthening their identity as commercial fishers and all that title implies. The importance of the vessel as it acts in this sociofunction overlaps in many ways with its function in an ideological capacity (Schiffer 1992 p. 10).

## *Ideofunction*

The importance placed on the commercial fishing boats of Wright's Creek in regard to both technological and social functions is mirrored by its significance in serving activities representing ideofunctions (Schiffer 1992 p. 11). Fishing boats serving in this capacity represent the ideas, values, knowledge, and information transferred from parents and other community members directly to their younger counterparts, essentially perpetuating the commercial fisher's way of life. This includes knowledge of boatbuilding, the proper maintenance and use of the fishing vessel, and proper business practices. The vessels themselves serve as a platform for the transmission of these values and ideas, as family members teach their offspring the tools of the trade while trawling the sounds and rivers. Evidence of this is visible in family photographs, sons and daughters frequently depicted working and posing on fishing boat decks.

The creation and maintenance of the commercial fishing graveyard along the commercial fishers' property lines, and the resulting shared memories held by the community, are comparable to Diana Smith's (2005) findings in the archaeological study of Australia's rural farm graveyards. Farm graveyards are located on the farmer's property and consist of their obsolete vehicles, machinery, and implements required for agricultural production. Smith found that the farm graveyards served a wide range of functions, from physical systems of reuse to repositories of memories and attitudes about the rural farmer's agricultural past. The creation and continued employment of graveyard sites by the farmers conferred meaning, giving it a definitive purpose. In addition to these similarities with the commercial fishing graveyard, Smith disclosed that the landscape of these sites changes from reuse processes, creating a dynamic and fragile environment for archaeological study. Further, these sites may be abandoned for an indefinite period, until the family finds a need for maintenance or removal of an item, whereas other sites remain abandoned (Smith 2005 pp. 30, 41, 43, 346).

## The Dynamic and Static Graveyards

Several commercial fishing graveyard complexes observed within Wright's Creek present an active picture of salvage, reuse, discard, and eventual abandonment. Their dynamic nature is largely the result of cultural formation processes, and the fact that they still function largely within the systemic context. In contrast, the Bradley Creek Complex appears to have experienced little cultural transformation since original deposition; its current state is the result of noncultural formation processes, and an entrance into the archaeological context through abandonment. Truly abandoned in every sense of the word, these latter sites have obscure histories. The disparity between the two types of sites, the *dynamic graveyard* and the *static graveyard*, is the product of several factors, including topography, the intent of abandonment, and the location of the larger commercial fishing operations within the north prong.

The dynamic graveyards, located primarily within the north prong, are the result of the commercial fishing community's predepositional salvage, recycling, and discard of their vessels and associated equipment. The active cultural site formation processes at these sites result in a fragile, fleeting system, its primary features subject to constant change. Analysis of site formation processes provides a platform for interpretation concerning the activities involved with salvage, reuse, and discard.

Factors contributing to the disparity between site types have likely contributed to the lack of information concerning the static graveyard. Located in a shallow tributary, it exists out of sight of residents and commercial fishers, buffered from cultural intrusion, strong winds, and wave action. Residents offered only vague information relating to deposition, and attempts to contact property owners were unsuccessful. Repeated observation of this graveyard showed little change to the graveyard's features, save for the transformations from non-cultural formation processes.

### *The Dynamic Graveyard*

The north prong is the main waterway utilized by most of the commercial fishing community, containing the most dynamic graveyard sites. Analysis of site formation processes acting on these *primary discard* sites provides a better understanding of the events influencing creation and maintenance of the graveyards. Primary discard sites are created in the location of an artifact's original use, whereas secondary discard sites occur away from the manufacture and intended use of an artifact (Rathje and Schiffer 1982 p. 116; Schiffer 1987 p. 58). Investigation includes interpretation of active cultural formation processes at these sites including salvage, reuse, and discard activities. Comparison of these activities provides a clearer understanding of the decision-making processes driving site formation, and the resulting signatures of these processes in the archaeological record.

Primary salvage is a main component of cultural formation process activities occurring in the dynamic graveyards of the creek (Richards 2008 pp. 155, 156).

This stage of hull minimization includes scrapping and recovery of valuable marine equipment. Scrapping activities are initially focused on rigging components, followed by fittings during the final stages of discard. Recovery of marine equipment includes the electrical and propulsion components and remaining commercial fishing equipment. Continued hull minimization often occurs through disassembly of the remaining vessel or final destruction onshore by burning.

Primary salvage is a necessary and early stage of discard at the Fosters' Seafood Complex providing components for reuse and assisting in hull minimization. Vessels observed under salvage at the Fosters' docks include Vessel 21 (*Pearl Dee*), Vessel 22 (*Betty Rebecca*), and Vessel 24 (*Miss Allena*). Vessel's observed undergoing primary salvage at the Hopkins' Seafood Complex include Vessel 16 and Vessel 18 (*Terry Sue*), both docked in the north prong, as well as Vessel 5 (*High Roller*) grounded in Schoolhouse Landing. Vessels 16 and 18, observed with rigging intact in November 2007, underwent scrapping to remove these elements before March 2008. An online check for scrap metal prices during this period (November 2007–March 2008) confirmed a price hike in 2007, and predicted fall in 2008 (Universal Wrecking Corporation 2010 p. 1).

Reuse activities in these dynamic graveyards include lateral cycling, secondary use, and recycling (Richards 2008 p. 55; Schiffer 1987 pp. 29, 30). Lateral cycling is visible in the transfer of ownership of these vessels between family members and among the community in general. Recycling activities include the destruction of obsolete vessels for reuse of materials on working vessels. Secondary use includes a change in function, primarily seen in the use of vessels as permanent storage facilities.

Lateral cycling and recycling activities are common within the Fosters' Seafood Complex. The wheelhouse and galley structure of Vessel 24 (*Miss Allena*), intact and in fair condition as of November 2007, underwent salvage in 2010. Currently owned by Wilkins' grandson Randy Lozon, the superstructure roof was salvaged for reuse on Carl Foster, Jr.'s working vessel *Morning Star* (Carl Foster Sr., personal communication 2010). Repair of this vessel included elements of Vessel 24's roof, as well as new planks (Fig. 11.5). The two vessels are similar in construction and were built within two years of each other by local boatwrights. Construction on Vessel 24 occurred in 1970 by local resident Carl Wilson Foster, Sr. Slightly older, *Morning Star* was constructed in 1968 by Hoyle Varnam in Supply, North Carolina. The similarity in building styles, apparent in the line of the vessels, aids material recycling between vessels, as does the close relationship between the Fosters and Wilkins families.

Discard activities observed within active graveyard areas include aspects of hull minimization, including destruction through burning and disassembly or "boatbreaking." In other areas, salvaged and discarded vessels are left *in situ*, degrading through noncultural formation processes. Both intentional and unintentional vessel discard is apparent within the creek. Unintentional discard is often related to the death of the vessel owner or damage from weather events.


**Fig. 11.5** Vessel 24 (*Miss Allena*) *top-left* and *top-right* undergoing salvage for recycling. Working vessel *Morning Star* (*bottom left* and *bottom right*), utilizing Vessel 24's recycled material with new lumber to facilitate maintenance of wheelhouse and galley. (Photo by Jacqueline Marcotte, 2010)

## *The Static Graveyard*

Unlike the dynamic graveyards located near active commercial fishing operations, the static graveyard in Bradley Creek is isolated near the head of a shallow tributary. The shallow nature of the tributary may have led to this area's seclusion, unfit for residential occupation or the berthing of large commercial fishing vessels. This isolation creates an ideal site for secondary discard and abandonment of obsolete, damaged, and salvaged vessels away from working vessel navigation and daily view of the community (Rathje and Schiffer 1982 p. 116; Schiffer 1987 p. 58). This fact certainly did not escape local residents and commercial fishers, and the lack of "memory" concerning this site may be intentional, related to the fact that these vessels are not discarded along property lines of commercial fishing families, and therefore are subject to legal retribution from the State of North Carolina. Salvage activities include primary salvage, and possibly secondary salvage, although these signatures in the archaeological record are blurred with that of primary salvage (Richards 2008 pp. 155–162).

The vessels within Bradley Creek have undergone extensive salvage, resulting in reduction of superstructures and removal of rigging, electrical, and propulsion elements. Exceptions to this pattern exist in Vessels 8 and 10. A comparison of

Vessel 8 between 1994 (Babits and Kjorness 1995) and 2008 displays an articulated superstructure and mainmast rigging remaining after salvage. The 1994 survey occurred soon after salvage and discard, so it is unlikely that gleaning created the stripped appearance of the vessel (Cameron and Tomka 1993 p. 4; Richards 2008 pp. 148–154).

Although the propulsion system was no longer attached to Vessel 10, a marine engine and battery were found within its open stern. Given the appearance of crab pots and other fishing related artifacts situated over the engine, it is likely that removal occurred during salvage operations, placing it inside the stern in preparation for towing to site. The engine's presence indicates either its deliberate abandonment with the vessel, or a forgotten item during discard. Local informants suggest purposeful disposal of the engine, as items such as these can be recovered and rebuilt later (Jonathan (Johnny) Daniels, personal communication 2010; Carl Foster Sr., personal communcation 2009).

Signatures of reuse are more difficult to determine on the Bradley Creek vessels because they are in an advanced state of degradation and have been abandoned for an extended period. Considering the construction techniques used on the vessels, including the decorative strip-laid decking and splash rail noted during the 1994 survey (Babits and Kjorness 1995), it is likely Vessel 11 was built as a luxury recreational vessel. The Harker's Island style boat underwent a functional change at some point in its uselife, switching to commercial fishing. This argument is strengthened by the presence of fishing gear within the open hull, surrounding the collapsed cabin. The presence of fishing related equipment illustrates for secondary use as a repository maritime related refuse.

The vessels within Bradley Creek are a model of abandonment through discard. All the boats have undergone primary salvage, transportation to site, and discard with the intention of abandonment. Although difficult to determine given their condition, it does not appear that any secondary salvage or gleaning occurred after secondary discard on site (Cameron and Tomka 1993 p. 4; Richards 2008 pp. 148–154; Schiffer 1994 p. 30). Evidence indicates activities are largely concerned with deposition, rather than salvage. Their purposeful discard is visible in their stripped and salvaged nature, as well as the placement assurance installed to prevent their dislocation and possible hazard to navigation. Repeated visits to the site during survey did not reveal evidence of cultural formation processes acting on remaining vessels, their transformation being a function of noncultural processes.

It is interesting to note some contrast in the placement of the farm graveyards within the locus of individual properties. Smith (2005 p. 335) noted that farmers preferred to locate their graveyards away from roads and public view. Due to their rural environment near a small waterway, the commercial fishers' graveyards are not on display for the public to see, but are limited to those with access to the creek. While not a large population, the graveyards are in view of the entire community and not just the family responsible for its creation and maintenance. The complete disappearance from public and community view can be found in relation to the forgotten graveyard located in Bradley Creek, composed of abandoned vessels no longer subjected to the processes of reuse.

## Conclusion

Studies of vessel abandonment sites have shown that they serve as more than simple refuse piles along shorelines and waterways (Richards 1997, 2005, 2008; Richards and Staniforth 2006; Seeb 2007). This is especially true with the commercial fishing graveyard. The use, reuse, and maintenance of these graveyards by successive generations of commercial fishers endow them with recognition as a significant area on their properties. The commercial fishing graveyard serves an important function as an assemblage of material culture, viewed through the discarded vessels and equipment of the surrounding community. Moreover, the retention of obsolete vessels and equipment for future reuse demonstrates the graveyard's significance to the commercial fishers past, present, and future. Their continued caretaking of the graveyard bestows these artifacts with meaning and purpose, passed on through the memories of the commercial fishers to successive generations.

Opportunities to examine these aspects of rural maritime history and culture are rare, and the dynamic archaeological nature of these sites includes a wide range of salvage, reuse, and discard activities that culminate in the physical graveyard. The location of the graveyard contributes to the range of activities conducted at the site, as well as the retention of memory concerning its individual vessels. Graveyard complexes located along individual fishers' waterline property demonstrated continued active site formation processes and a dynamic environment. In contrast, the complex located in Bradley Creek is affected by its isolation. Abandoned vessels ultimately create a static environment virtually unaffected by cultural transformation. Non-cultural processes are responsible for site formation on vessels within the static graveyard.

The study of the commercial fisher's vessel and equipment graveyards demonstrates that these discard sites are more than aesthetically displeasing piles of refuse. Instead, they act as a repository of memories and nostalgia. They serve a further useful purpose as a staging area for salvage, reuse, and discard of obsolete or damaged vessels. The dynamic graveyards, owned and maintained by the community, stand in sharp contrast to the abandoned site at Bradley Creek. The collection of vessels and equipment, the discarded cultural materials of the commercial fishers, is a microcosm of the social, economic, and technological changes occurring in this rural North Carolina area.

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# Chapter 12
# Cape Fear's Forgotten Fleet: The Eagles Island Ship Graveyard, Wilmington, North Carolina

**Sami Kay Seeb**

**Abstract** Settlers established Wilmington, North Carolina, on the east bank of the Cape Fear River in 1731. The town grew rapidly as a result of the lucrative naval stores industry supported by the abundant pine forests of the surrounding the area. From the early nineteenth century through the turn of the twentieth century, Wilmington grew to be the most populous city in North Carolina and the only significant port. Wilmington continued to grow and decline with changing local and global economic and cultural conditions, but its maritime industry always remained at the forefront of the development of the port city.

Eagles Island sits directly across from downtown Wilmington and for decades was the location of several industrious commercial maritime operations. The active maritime commerce no longer exists in that location on Eagles Island, but the abandoned vessels adjacent to Eagles Island are a reminder of the vibrant industrial past. This chapter demonstrates how the wrecked and discarded abandoned watercraft that form the Eagles Island Ship Graveyard represent a microcosm of the cultural, economic, and technological characteristics and changes of Wilmington and Southeastern North Carolina. Correlating data from archaeological fieldwork to the comprehensive historical record of the area provides the means for analysis. Interpretation of the archaeological remains is based on the theoretical framework of behavioral archaeology. Accordingly, site formation processes reflect behaviors motivated by conditions of the cultural climate.

## Introduction

The Port of Wilmington is situated 174 miles northeast of Charleston, South Carolina, 259 miles northeast of Savannah, Georgia, and 412 miles south of Norfolk, Virginia (Board of Engineers for Rivers and Harbors 1940, p. 3). The mouth of the Cape Fear River provides a deepwater approach to the Port of Wilmington from the Atlantic Ocean. The city of Wilmington lies on the east bank of the Cape Fear River about 30 miles north of the mouth of the river, and Eagles Island sits directly across from

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Wilmington bordered by the Cape Fear River on the east and the Brunswick River on the west.

Settled in 1731, the abundance of products derived from the pine forests surrounding the area resulted in the rapid growth of Wilmington. Naval stores including tar, pitch, and turpentine formed the primary industry with shingles, barrel staves, and lumber providing additional export items. Early inhabitants settled along the navigable streams to facilitate production and transport, resulting in nearly all commerce passing through Wilmington or nearby Brunswick Town (Jackson 1996, p. 24). From the beginning of the nineteenth century through the turn of the twentieth century, Wilmington developed and remained North Carolina's most populous city and only significant port (Watson 1992, pp. 46, 136).

At the outset of the twentieth century, Wilmington's economy began to fall behind other cities with more developed industrialization and expanding large businesses (Watson 1992, pp. 139–140). During the World Wars and the Great Depression, the economy fluctuated due to a variety of localized, national, and international circumstances. By the 1950s, trade in Wilmington's port dwindled to little more than a trace of its vibrant past. While history provides remembrances of Wilmington's importance as a trade center in North Carolina, the landscape of the Cape Fear River augments those memories with the large collection of abandoned vessels, wharves, marine railways, and associated structural features. These abandoned watercraft and maritime features are a testament to the once thriving industry that endured on both banks of the Cape Fear River in the vicinity of Wilmington (see Fig. 12.1). While to many locals and tourists alike, the derelict remains are an eyesore in their scenic port (Wilde-Ramsing 1986, p. 1), to the scholars of history and archaeology, the abandoned vessels provide a valuable and tangible means of studying past societies. This chapter examines how the wrecked and discarded abandoned watercraft that form the Eagles Island Ship Graveyard represent a microcosm of the cultural, economic, and technological characteristics and changes of Wilmington and Southeastern North Carolina (see also Seeb 2007).

To explore this subject, observations and interpretation of archaeological data collected from Eagles Island will be correlated to information from local and regional archival sources to explore behavior and decision-making through three specific areas of analysis: abandonment activities and site formation, economic trends, and technological trends. A theoretical framework built from anthropological maritime archaeological scholarship (see Lenihan 1983; Muckelroy 1978; Murphy 1983) and behavioral archaeology (see Cameron 1993; Reid 1985; Richards 2008; Schiffer 1972, 1975, 1996; Schiffer and Rathje 1973; Stevenson 1982; Tomka and Stevenson 1993) presents a structure for the analysis of the data accumulated from the archaeological record to be correlated to additional historical information. Crucial to conducting the analysis using the generated theoretical framework is recognizing the formation processes present in the archaeological record and determining the behaviors associated with those processes in order to ascertain the cultural, economic, and technological conditions that motivated that behavior. The theoretical basis used for this examination broadened the scope from a localized, particularistic study to a larger exploration of site formation processes and behavior. Three phases of the


**Fig. 12.1** The research area for the project and 2006 site plan of the Eagles Island Ship Graveyard. (Map by Sami K. Seeb)

project included historical research, archaeological documentation, and a correlative analysis of the data accumulated from the historical and archaeological records in the context of the theoretical framework developed to support and broaden the analysis. The results from the correlative analysis interpret signatures present in the archaeological record to explore the use and deposition of the graveyard. In addition, the analysis is an investigation of the post-depositional processes of additive and reductive activities represented by signatures within the archaeological record. Overall, signatures in the archaeological record reveal activities and behaviors linked to the conditions present in Wilmington throughout the development of the ship graveyard, and the signatures represent cultural, economic, and technological aspects of Wilmington through history.

## Temporality of Deposition

The physical remains of the industrial past on Eagles Island are a testament to the history of the port of Wilmington. State cultural heritage managers, the Corps of Engineers, and other resource managers conducted investigations of the remains and environment of the ship graveyard on Eagles Island, but the collection of information did not explore the underlying behavioral analysis associated with abandonment, necessitating a re-examination of previous results and additional archaeological work to generate data associated with archaeological themes not previously explored (Hall 2004; Jackson 1996; Lawrence 1985; Overton and Lawrence 1996; Pleasants 2005; Wilde-Ramsing 1986). Investigation, verification, and additional documentation of previously noted vessels generated a greater amount of information applicable to the study of abandonment on Eagles Island. Nine additional sites were discovered and historically and archaeologically documented. Also, the additional fieldwork resulted in a large amount of highly accurate global positioning system (GPS) data that was integrated into a geographic information system (GIS) project. The product of the GPS data and the GIS integration was a site map showing the actual sizes, shapes, and positions of the abandoned vessels, providing insight into site formation (see Fig. 12.1).

### *Phases of Deposition*

Understanding significant events or trends in association with the temporality of vessel abandonment at Eagles Island provides a means of interpreting behaviors linked to the working lives of the ships by explaining the factors that led to the deposition. In order to recognize temporal patterns in the abandonment of watercraft at Eagles Island, the date or range of dates of abandonment had to be determined for each vessel. These determinations were based on the historical record, aerial photographs, and the spatial position of vessels in association with other material remains on the island. The beginning date for the abandonment ranges comes from the deposition of *Waccamaw* because newspapers indicate that it was the earliest vessel abandoned along the shore of Eagles Island (Wilmington Messenger [WM] 1888; Wilmington Star [WS] 1886, 1887).

Of the 41 vessels sampled for analysis, only four can be isolated to the exact year of deposition. Several have short ranges (2–3 years), whereas a majority of the assessed vessels maintain a range between 8 and 14 years. Large ranges occur with the smaller local and vernacular craft because there are no references in the historical record and those vessels are too small to see on aerial photographs.

Table 12.1 shows the ranges of abandonment and the justifications for establishing those ranges from the historical record, aerial photos, interviews, and spatial analysis from the 2006 site plan.

Graphic form of the data shows that vessel abandonment at Eagles Island occurred in noticeable stages, resulting in recognizable phases of abandonment (see Fig. 12.2). The groupings illustrate that the temporality of abandonment behavior is a direct result of the cultural climate of Wilmington. Abandonment phases generated from the Graph reveals six eras of abandonment on Eagles Island from 1884 through 1963.

Phase 1 (1884–1909): The earliest abandoned vessels are clustered in the northern and southern portions of the graveyard. The collection of vessels in the northern section consists of small craft often built locally and used for transportation of residents and goods in the Wilmington area. That cluster of vessels abandoned in that particular location can be attributed to number of conditions. First, the river bottom there is flat and the water remains relatively shallow through tidal variation making it easier to see the bottom. It is possible that additional, similarly typed vessels are abandoned within the graveyard but are difficult to locate through visual inspection or remote sensing. The location of the cluster also suggests an association to the naval stores companies and grocers that operated in that location and maintained a large dock structure (Sanborn Map and Publishing Co. Limited [SMPC] 1893, p. 22, 1898, p. 31; WS 1871). Perhaps residents conducted trade through these vessels, delivering locally produced goods to the storage and shipping warehouses located there. Also, a small wooden boat containing barrels for storing tar is among the cluster and indicates a direct correlate to the naval stores operations in that location.

The abandonment behavior associated with the vessels in the southern section is unclear. Though the final vocation of *Waccamaw* is unknown, in the years preceding the deposition of the vessel, newspapers indicate it was used for excursions down the river and for towing other vessels. The names of Barge 2 and the Iron Rudder wreck are unknown, making it difficult to discern the function of those vessels. A newspaper article indicates that the corresponding shore activity in that location was a shipyard in 1888 (WM 1888). It is possible that the vessel owners abandoned watercraft in that location in order to salvage them at the shipyard, but this assumption cannot be verified. Regardless, the clustering process reiterates Schiffer's (1996, p. 62) refuse distribution characteristic indicating that people tend to dump trash where others previously dumped trash.

Phase 2 (1910–1921): The next phase of abandonment in the sequence correlates temporally to the establishment and growth of the Hamme and Stone Marine Railways (Seeb 2007, pp. 97–107). Vessel clusters immediately south of each railway

**Table 12.1** The range of vessel deposition and the justification for that range for vessels. (Sources: Berman 1973; Board of Engineers for Rivers and Harbors 1935, 1961; Ray Bordeaux 2007, personal communication; Corps of Engineers 1909, 1937; Hall 2004; Lawrence 1985; Pleasants 2005; Ron Register 2007, personal communication; Stone 1934, p. 13; Stone Towing Line Records [STLR], 1946–1959, Manuscript Collection #679, ECU Manuscripts Collection, Joyner Library, East Carolina University, Greenville 1946:679.4b, 1947:679.4c, 1950:679.4e; United States Coast and Geodetic Survey 1922; WM 1888; Wilmington Morning Star (WMS) 1948, 1958; WS 1886; Richard Womack 2006, personal communcication)

| UAB no. | UAB name | Start | End |
|---|---|---|---|
| 0001 CFR | *Waccamaw* | 1884 | 1884 |
| 0004 CFR | Barge 1 | 1925 | 1937 |
| 0005 CFR | Barge 2 | 1884 | 1909 |
| 0006 CFR | Bulkhead tugboat | 1910 | 1924 |
| 0007 CFR | Barge 3 | 1910 | 1924 |
| 0008 CFR | Barge 4 | 1910 | 1924 |
| 0009 CFR | Steam crane barge 1 | 1910 | 1922 |
| 0010 CFR | *Stone 5/Sadie E. Culver* | 1946 | 1954 |
| 0011 CFR | *Dolphin* | 1954 | 1954 |
| 0012 CFR | *Stone 6/Atlantic City* | 1958 | 1958 |
| 0013 CFR | *Minnesota/formally Bonheur* | 1925 | 1948 |
| 0014 CFR | *Stone 3/Isabel* | 1925 | 1948 |
| 0015 CFR | *Argonauta* | 1925 | 1933 |
| 0016 CFR | *John Knox* | 1937 | 1937 |
| 0017 CFR | Eagles Island skiff 1 | 1884 | 1983 |
| 0018 CFR | Last one wreck | 1884 | 1909 |
| 0019 CFR | Eagles Island Launch | 1884 | 1983 |
| 0020 CFR | Bulkhead barge | 1910 | 1924 |
| 0021 CFR | Stone dry dock and marine railway | 1948 | 1950 |
| 0024 CFR | Sanded barge | 1922 | 1923 |
| 0025 CFR | Little barge | 1922 | 1923 |
| 0026 CFR | Government barge | 1922 | 1923 |
| 0027 CFR | *H.G. Wright* | 1925 | 1933 |
| 0028 CFR | *Stone 4/Eva* | 1946 | 1954 |
| 0029 CFR | Iron rudder wreck | 1884 | 1909 |
| 0030 CFR | Splayed wreck | 1884 | 1909 |
| 0031 CFR | Argonauta barge | 1925 | 1937 |
| 0032 CFR | Wright barge | 1925 | 1937 |
| 0033 CFR | *Cherokee* | 1935 | 1954 |
| 0034 CFR | Eagles Island other skiff | 1884 | 1983 |
| 0041 CFR | Intact Tug/*Isco* | 1960 | 1969 |
| 0042 CFR | Steam Crane barge 2 | 1910 | 1924 |
| 1001 CFR | Stockpile 1/Stone 20 | 1962 | 1983 |
| 1002 CFR | Stockpile 2 | 1962 | 1983 |
| 1008 CFR | Lifeboat 1 | 1960 | 1969 |
| 1009 CFR | Lifeboat 2 | 1960 | 1969 |
| 1003 CFR | Lifeboat 3 | 1950 | 1959 |
| 1004 CFR | Barrel boat | 1884 | 1931 |
| 1005 CFR | Shove skiff 3 | 1884 | 2006 |
| 1006 CFR | Barge | 1922 | 1933 |
| 1007 CFR | Steam Crane barge 3 | 1960 | 1969 |

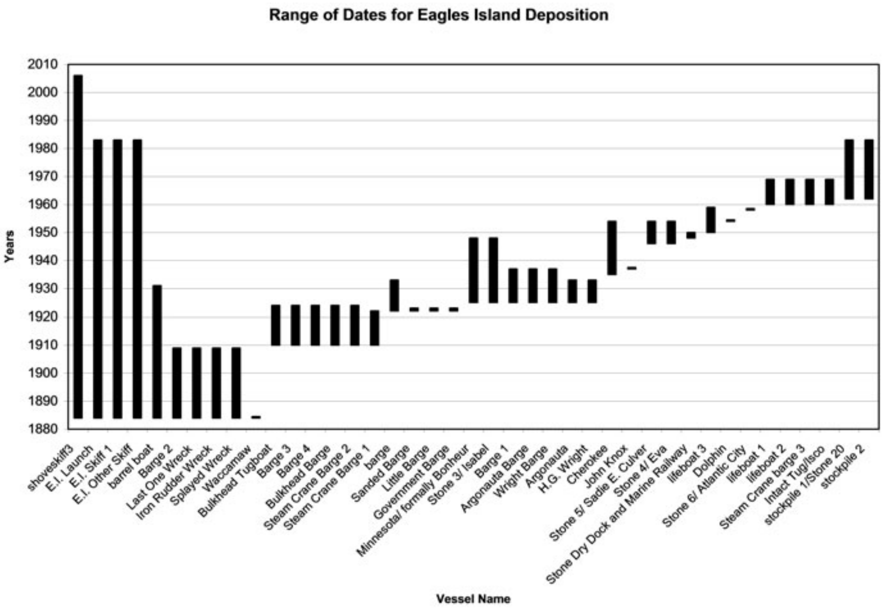


**Fig. 12.2** Range of dates for deposition of vessels at Eagles Island

served secondary reuse (a type of reuse in which objects take on new functions without significant modification to the form or structure of the object (Schiffer 1996, pp. 30, 31)) functions as bulkheads and breakwaters to protect and maintain the waterways near the railways. The temporal correlation of the abandoned vessels illustrates secondary reuse function. The Wilmington Marine Railway, owned by the Stone Family, began operation immediately north of the upper cluster of barges in 1912 (WS 1912). In 1924, the Stones purchased the property and constructed an additional railway, operating two in that location (WS 1924). The formation and subsequent growth of successful railway operations temporally coincides precisely with the associated cluster of abandoned vessels.

The same is true near the Hamme Railway. Hamme purchased the land in 1910, began operating a railway there in 1915, and began building the second railway in 1919 in order to meet demand for the growing business (Wilmington Dispatch [WD] 1910, 1915, 1919). The deposition of the barges and tug, which archaeological evidence shows were used as a bulkhead, corresponds temporally to the growth of maritime commerce in that location. The temporal and spatial correlations of abandonment during Phase 2 directly relate to economic growth of industry on Eagles Island.

Phase 3 (1922–1934): In 1934, Russell Stone (1934, p. 12) wrote that Stone Railway grew significantly in the 1920s and 1930s resulting in the purchase of real estate and more efficient tugs for the growth of Stone Towing and Marine Railway. The larger and more powerful vessels replaced older equipment with the growth of the business, and that is apparent from the abandoned vessels surrounding the railway yard in Phase 3. Also, Stone (1934, p. 13) mentioned sinking older vessels to keep extra equipment available for the constantly developing tug industry. Deposition of the older tugs is a direct result of economic growth for the business.

The other vessels abandoned during the phase were all barges or government workboats, including a cluster in the southernmost section of the railway. The type of abandoned watercraft in association with the temporal and spatial characteristics of abandonment provides direct correlations to the events occurring in Wilmington. The location of the cluster is immediately north of the Government Yard on Eagles Island. In the 1920s and 1930s, the Corps of Engineers in Wilmington conducted and completed three significant waterway projects (Hartzer 1984, pp. 53, 54, 57–60). The abandonment of eight barges (the largest quantity of one type of vessel abandoned during any phase) simultaneous to the laboring and completion of three major Corps projects suggests a direct correlation. The projects, all major undertakings, required vessels to labor under hard conditions that would expedite use-life of the vessels, leading to the deposition of heavily warn vessels and their replacement with newer vessels. The events in the Wilmington district during Phase 3 precipitated the technological and economic conditions that provided an impetus for abandoning the barges.

In a comparative case study, Nathan Richards (2008, p. 74) suggests that the Great Depression was, "the single most important event in the history of vessel abandonment in Australia," noting that the discard trend peak during the Great Depression is a direct result of a decline in trade from before the Depression and running through about 1939. This was not the case in Wilmington where the local maritime industry grew, rather than declined during the depression (Seeb 2007, pp. 76–84). Richards (2008, p. 179) also says that the tendency to dispose of watercraft often occurs when economic and technological circumstances are rapidly changing. This was indeed the case at Wilmington during Phase 3 when local industry experienced growth and the region developed to enhance maritime trade; but the local economic and technological circumstances contrast to those of the same period in Australia.

Phase 4 (1935–1945): Phase 4 coincides with the Second World War period. In addition to the private launch *Cherokee* abandoned by the Stones, *John Knox* wrecked in 1937. The pattern of a hiatus from deposition for the period is indicative of the economic and cultural climate at that time. American shipping went up from 16 % to 62 % of the total world shipping during the Second World War (Culliton 1974, p. 9). Specifically in Wilmington, the maritime industry boomed as a result of the establishment of the North Carolina Shipbuilding Company and the production of Liberty and Victory ships along the Cape Fear River (Watson 1992, p. 154). The pattern of abandonment at Eagles Island during Phase 4 reflects a local, national, and international shipping boom and the prosperity of the shipping industry during that period (see Richards 2002, pp. 216–218, and 2008, pp. 76, 77 for similar patterns in Australia).

Phase 5 (1946–1959): Abandonment trends in Phase 5 reflect both localized and national changes in the economic and technological climates associated with the maritime industry. Abandonment is spatially associated explicitly with the Stone Marine Railway yard, locally reflecting major changes to the Stone Towing and

Marine Railway business. During the summer of 1946, a fire ripped through the Stone Yard on Eagles Island, causing nearly $ 40,000 worth the damage (Wilmington Post [WP] 1946). The beginning year for the range of abandonment for at least two vessels in Phase 5 is 1946, suggesting a correlation to the abandonment of those vessels and the debilitating fire. Also during Phase 5, the Stones stopped using the railway and drydock and, in 1952, indicated that they had not operated the railway commercially for 5 or 6 years, the cessation of which also coincides with the year of the fire (STLR 1950:679.4e, 1946–1959; STLR 1952:679.4h, 1946–1959).

Despite the decline in the use of the railway, company records indicate they purchased several vessels, including Army tugs and barges, from the government throughout Phase 5 (STLR, 1946–1959). From a local perspective, the abandonment of older tugs on Eagles Island coincides with both the cessation of use of the Eagles Island property as a result of the decline of the railway side of business and an increased fleet of more efficient, modern vessels resulting from an increase in the towing aspect of the Stone operations. In addition, newspapers and company records indicate that the Stone Towing Company continued to insure the laid-up tugs, possibly for future use with the anticipated development of their tugging business after the closure of the railway (STLR, 1946–1959; WMS 1958). From a national perspective, the abandonment of the older tugs on Eagles Island coincides with a national surplus of military vessels mass produced during the war (Culliton 1974, pp. 9–11). Civilian maritime industries benefited from surpluses of war-built ships at low costs (Hutchins 1974, p. 55).

Phase 6 (1960–1963): Phase 6 represents a pivotal point in the establishment of the Eagles Island Ship Graveyard because it is the point at which deposition ceased. The conclusion of abandonment behavior on Eagles Island corresponds temporally with the establishment and subsequent growth of the State Port Authority and State Docks in the southern part of town. The State Docks opened in 1952 and grew in importance throughout the following decade, moving the heart of Wilmington's maritime industry downstream, away from downtown Wilmington and the Eagles Island Ship Graveyard. Marine repair facilities and towing companies today operate closer to the state port facilities.

In addition to indicating the end of abandonment activities, Phase 6 shows evidence of processes not seen in previous phases that correlate to the complete abandonment of the activity area. Stockpiles of materials accumulated at the Stone yard during Phase 6 of abandonment and consist of materials used for commercial activities in which the Stone Family no longer participated. The stockpiling, an example of curate behavior (removing and transporting useful or repairable items from an abandonment area for continued use elsewhere), suggests that the Stones intended to return to the site to salvage that material under the right conditions. The majority of material abandoned during Phase 6 is *de facto* refuse (usable or reusable cultural materials left behind during abandonment of an activity area) which the abandoner had no intention of reusing. The Stones abandoned the lifeboats north of the railway yard because they did not need them on the tugs they purchased from the military (Richard Womack 2006, personal communication). The wooden vessels abandoned north of the Hamme yard (*Isco* and Steam Crane Barge 3) were abandoned because of their wooden construction and difficulty to maintain (Ray Bordeaux 2007), personal communication. The accumulation of *de facto* refuse during Phase 6 is indicative of the abandonment of the entire area owing to the closure of commercial operations in that part of Eagles Island.

## Abandoned Watercraft Use-Life

Use patterns in the archaeological and historical record correlate to human decision making. Richards (2008, p. 118) contends,

> Use and modification processes are important because they have direct influences on discard processes and influence the time and nature of the transformation of a vessel from systemic context to an archaeological context.

Identification, quantification, and analysis of the use, modification, and reuse of vessels may demonstrate a correlation to the eventual deposition of those vessels from the systemic context to the archaeological context. Using Schiffer's (1996, pp. 15–19) dimensions of variability provides a guide to assess the temporal, spatial, and relational variables evident in the archaeological remains. Recognizing and understanding those variables provides a framework to correlate the material remains to related historical records, and, thereafter, to the cultural, economic, and technological conditions both locally and on a larger scale, that influenced deposition.

### *Modification*

Primary phase conversions or modifications take place while the vessel is still operating its intended function. Secondary phase modifications take place before physical abandonment of a vessel, but likely after the original function of a vessel changes. Vessel modifications are essentially indicators of economic change (Richards 2002, pp. 290–304, 2008, pp. 120–129). At Eagles Island use-life modifications are difficult to discern in the archaeological record based on the visible remains; the historical record is vital to determining the probability of such modifications. Because the material remains at Eagles Island consist of a large number of unknown vessels, however, the historical record does not provide significant insight into the operational life of these vessels while performing the as-built intended function. In addition, there is little historical information about physical alterations to the vessels. Use-life modifications occurred on 20 % of the vessels, did not occur on 22 % of the vessels, and are unknown for 58 % of the 41 vessels in the statistical sample. This does not mean that vessels in the unknown category did not undergo such modifications; rather, it is likely that many did, but evidence is not available.

Propulsion modification was the most common alteration performed to the vessels on Eagles Island. Many older tug engines went from steam to gas or gas to diesel (Damian 2006, p. 6; Dodds 2006, pp. 6–9; Friedman 2006, pp. 5, 6; Tock 2006, p. 8).

Changing the propulsion was a means of increasing the efficiency of the vessel. The more technologically advanced vessels performed better. Smaller, locally built skiffs or unused lifeboats remained unmodified and were not known for their contributions to the commercial industry of Eagles Island and Wilmington. The site sampling and historical record suggest that, despite the large percentage of unknowns, modifications to tugs and barges were common along the Cape Fear River. The number and type of modifications suggest that alterations were important to increase the efficiency and expand the life span of vessels operating in the vicinity of Wilmington.

## *Reuse*

Reuse of a vessel before physical abandonment but after the vessel is no longer serving the original intended function is typical behavior. Archaeological remains indicate that definite reuse occurred for 41 % of the vessels at Eagles Island. Among the abandoned watercraft at Eagles Island, the processes of lateral cycling (a change in the user of the artifact, but not in the form or use of the artifact itself) and secondary reuse are the two types of reuse behaviors exhibited (Richards 2008, p. 55; Schiffer 1996, pp. 28–31). Converting a vessel for a new role in a different trade is movement from primary phase use to secondary phase use (Richards 2008, p. 120). This is exhibited with the lateral cycling of vessels at Eagles Island. At least 13 vessels at Eagles Island had previous owners prior to ownership and use by industries on Eagles Island.

Four vessels among the sample underwent minimal physical changes, but took on an entirely different function, demonstrating secondary reuse processes. Archaeological remains indicate that a cluster of two barges and a tugboat immediately south of the Hamme Railway demonstrates secondary reuse behavior, becoming a bulkhead for the railway yard to the north. The Bulkhead Tug sits parallel to shore, is filled with rock and brick debris, and the bow abuts the Bulkhead Barge to the north. The Bulkhead Barge sits parallel to shore crossed on the north by Barge 3, which sits perpendicular to shore. The barges form a T-shape barrier and have a concrete wall built between them. The concrete wall connects the barges and is built directly into the wood fabric (see Fig. 12.3). Also, piles line the north side of Barge 3 suggesting it was used in the structure of a dock, in addition to its role as a bulkhead. The fourth vessel, *H.G. Wright*, was used as a dining hall for the Stone Towing Company workers (Jackson 1996, p. 164). Archaeological evidence through the years suggests that the Stones left the main structural features of the vessel (such as the A-frame, boiler, engines, and paddlewheel) and simply pulled it onto shore in the railway yard (Jackson 1996, p. 164).

Assessment of the archaeological record indicates that reuse likely occurred with an additional 32 % of the vessel remains on the island. Of the vessels that were likely reused, lateral reuse is uncertain with other remains suggesting that 100 % of the 13 vessels exhibit behavior associated with secondary reuse (as bulkheads, dock structures, and platforms). An example is a cluster of barges directly south of the Stone Marine Railway. Though there were no noticeable physical changes to

**Fig. 12.3** Evidence of reuse can be seen among the abandoned remains. *Top* The bow of Bulkhead Tug in the foreground, which is filled with brick and rock debris, abuts the Bulkhead Barge, creating a bulkhead for the railway to the north. A concrete wall connects two barges, creating a bulkhead. The concrete wall built into the structure and fabric of the Bulkhead Barge (*bottom left*) and the concrete wall extending north out of the Bulkhead Barge toward Barge 3 (*bottom right*). (Images by Sami K. Seeb)

the barges themselves (like the bricks and concrete wall in the vessels south of the Hamme Railway), the eastern side of the cluster is lined with piles, suggesting use in a dock structure. Also, the cluster pattern and location immediately south of the Stone yard mimic the behavior observed south of the Hamme yard and suggest secondary reuse for land reclamation and protection for the railway to the north. There is also a third cluster of barges in the southernmost portion of the site with a similar spatial layout to the other two clusters.

This behavior relates to what Schiffer (1996, pp. 13, 19–21) described as recurrent associations of artifacts in the relational dimension of variability or correlations between artifacts in meaningful patterns that are preserved together despite the variation inevitable in the site formation process. The recurring barge clusters spread throughout the site with similar spatial dimensions (configuration and association with shore features) suggests that this type of secondary reuse behavior was typical at Eagles Island. Two conditions existed to provoke the behavior illustrated with this process. Primarily, there was an abundance of barges in Wilmington that were no longer useful for their primary function. This could reflect the changing trade of the region (reduction or cessation of hauling certain products such as wood, cotton, or tobacco when those industries declined), or the active role of the Army Corps of Engineers in the Cape Fear River (for improvement projects throughout southeastern North Carolina). Also, the process illustrates that the environment (swampy marsh) of Eagles Island challenged the ability of the industries to operate to the best of their ability. As a result, they had to create structural resources to offset the effects of the environment and reusing materials was cost-effective and efficient.

Richards suggests that the conversion of a vessel to a secondary role occurs for a range of economic reasons. According to his analysis, vessels modified during primary and secondary reuses benefited significantly from modifications (Richards 2002, pp. 302, 315, 2008, pp. 129, 136). This hypothesis proves true at Eagles Island where modifications extended use-life. Vessels cycled into secondary reuses had life spans beyond the generally accepted 20 years (Culliton 1974, p. 5). The vessel operators chose to make modifications and reuse vessels for the economic benefit of increased efficiency.

Secondary reuse for the purposes of breakwaters is one of the most common types of reuse behaviors exhibited at Eagles Island, which corresponds to results from research around the world (Merriman 1997; Moore 1995; Richards 2008, p. 137). The reuse of vessels as breakwaters and buildings at Eagles Island eliminated costs associated with purchasing materials and labor to construct structures for the intended purposes. Therefore, the secondary reuse is an example of behavior that directly reflected economic benefit to the users.

## Reading the Archaeological Remains

After deposition, characteristics observable in the archaeological record provide a means of analyzing behaviors and decision making associated with deposition. Reductive activities consist of removing archaeological remains to ensure that the materials left behind are unwanted refuse. Reduction also occurs in association with reuse for the express purpose of using removed materials. Similarly, additive processes help to assure the ultimate deposition of materials is refuse, but also, in some cases, incorporate more material into the archaeological record to transfer deposited items from the archaeological back into the systemic context. Analysis of the ultimate disposition of material as refuse provides characteristics indicative of the behaviors that transformed materials into the final stage in the life-cycle of an artifact.

## Salvage Activities

There are three types of noticeable reclamation processes on Eagles Island: salvage, scavenging, and conservatory processes. Although it is difficult to differentiate between salvage and scavenging behaviors from the material remains on Eagles Island, it is apparent that both types of activities occurred and continue to occur. In several cases, there is archaeological evidence of salvage that indicates it was either professionally or semi-professionally done. The engines from both *Isco* and Steam Crane Barge 3 are no longer on site. Physical evidence from the Steam Crane Barge suggests the engine was salvaged using metal cutting instruments (see Fig. 12.4). The fact that the vessels were abandoned adjacent to one another and approximately at the same time suggests that similar salvage processes occurred on both abandoned vessels.

Iron cutting appears in several other locations throughout the site where there are concentrations of sheeted iron. There is evidence of cutting on *Argonauta*, the only known metal-hulled vessel on the site and on Stockpile 1, which might be the metal barge *Stone 20*. The position of cut marks on both *Argonauta* and Stockpile 1 suggest that significant amounts of iron were not being salvaged, but rather smaller sections. Both sites, located in the Stone yard, sat under the watchful eyes of the Stones until 1982 when they stopped occupying the building across the river (Richard Womack 2006, personal communication). Therefore, it is likely that any salvage was done either by them or with their consent, perhaps reusing small sections of sheet metal in repair jobs.

There is also evidence of wood removal at several locations throughout the graveyard. Evidence of wood cutting appears on at least two vessels, *Stone 3* and *Waccamaw* (see Fig. 12.4). These wooden watercraft, cut to the waterline, show more signs of salvage than metal vessels. Salvage also occurred on wooden barges using crowbars. Evidence of prying wooden decking appears on Barge 2 where an alignment of fasteners is bent in the same direction while the next alignment is bent in the opposite direction.

Archaeological signatures present on wood indicate that salvage on Eagles Island was often post-depositional. Vessel locations show that they were floated to their positions at the end of their use-life. Vessels needed to maintain minimum structural integrity to be moved and deposited, suggesting that salvage occurred after discard. This is not to say that major components of vessels were not removed before discard, but the evidence of pre-discard removal does not appear in the archaeological record. Indications of post-depositional salvage are important because they reflect cultural conditions at the time of discard.

## Scavenging

Scavenging occurred historically and continues to take place on Eagles Island. The boiler and machinery from *Waccamaw* were still in place when boys started a fire on the vessel two years after the owner laid it up (WS 1886); eventually, however,

**Fig. 12.4** Signatures of salvage appear through evidence of cutting. On Steam Crane Barge 3, an empty engine mount (*top left*) and evidence of cutting on the crankshaft (*top right*). (Images by Sami K. Seeb). *Bottom* On *Waccamaw*, cut marks can be seen on the wood in the bow. (Image by Nathan Richards)

a salver or scavenger recognized the value of the machinery and removed the engine and cut the boilers. This scavenging did not occur immediately, as indicated by the archaeological record, because the amount of sediment inside the remains of the boiler and hull indicate the vessel was in the archaeological context for a considerable amount of time before salvage/scavenge (see Fig. 12.5). Additionally, a newspaper in 1887 reported the trial of a Wilmington man who stole iron off the abandoned *Waccamaw* that year (WS 1887). As previously suggested, the economic benefit to remove the ferrous material was not present at the time of discard, and only developed after the deposition of the vessel.

Unsanctioned scavenging of the graveyard is known to have occurred and continues to occur today. A former resident of Wilmington remembers visiting the intact Stone buildings on the island in 1975 and 1976. He walked along the decks of intact tugs and observed furniture and company papers scattered throughout the buildings. None of the heavy machinery was still in the machine shop, but smaller pieces like the leather belts and shafts were there (Robert Browning 2007, personal communication). The visibility of the site from downtown Wilmington, the accessibility to the site, and the sheer amount of material remains provided incentive to scavenge the site. Stone descendent Richard Womack (2006, personal communication) recalls a number of materials disappearing from the Stone yard in the 1960s, including a large propeller and a Mark V diving suit. He also frequently sees material taken from Stone vessels on display in Wilmington restaurants. While conducting this research, instances of people visiting, and in some cases removing material, have been brought the attention of the author. An unnamed Wilmington local admitted he takes wood from the vessels on Eagles Island to make and sell wooden furniture and flooring—an example of entirely opportunistic scavenging. People gain satisfaction from collecting pieces of history. Also, scavenging is related to economic circumstances because people are able to sell materials they retrieve from Eagles Island.

## *Conservatory Processes*

Evidence of conservatory processes is visible throughout Wilmington. The paddlewheel and engines from *H.G. Wright*, for example, took on a new function of teaching about Wilmington's maritime past when installed at the Cape Fear Museum. Other examples of conservatory processes exist in public and private collections around town including a veritable museum of Stone memorabilia in Womack's home near Wilmington. Conservatory processes show a unique type of reclamation behavior. The conservation of materials from an abandoned site for posterity shows a level of human intrigue or emotion associated with those materials.

## *Absent Reclamation Processes*

Noticeably absent from the archaeological context was the salvage of most of the major iron machinery from many of the vessels and stockpiles. The salvage of metals is driven by the price of scrap and is directly related to the economic climate at the time. Scrap metal data from the United States indicates that from the 1930s through the early 1970s, the consumption of scrap metal rose relatively steadily, except for a small decline in consumption through the 1960s. The unit value cost reflected the high demand through the Second World War and in the immediate era following the

**Fig. 12.5** The remains of the cut and salvaged boilers on *Waccamaw*. The sediment level indicates salvage of the machinery did not take place immediately after deposition, but rather after the vessel had been *in situ* for a considerable amount of time. (Image by Sami K. Seeb)

war until 1956 when the unit value began to drop (United States Geological Survey 2006).

The Stone tugs and the barges immediately south of the Stone yard still had salvageable machinery at the time of this research. Deposition of nearly all the vessels with machinery was just before, during, or in the decade after the Second World War when the unit value and consumption of scrap metal peaked. However, the Stones were not salvaging the machinery or allowing others to salvage it, indicating that the Stones laid up vessels for spare parts or for the prospect of reactivation and reuse (Stone 1934, pp. 12, 13; STLR, 1934–1959; WMS 1958; Richard Womack 2006, personal communication). The tendency to "save" the machinery and vessels surrounding the Stone yard is a clear example of curate behavior. The Stones did not like to sell their equipment because they did not want to see their old vessels competing for business on the Cape Fear River (Richard Womack 2006, personal communication). They did not need the money from salvage or sale and therefore were not economically driven to salvage their machinery, and rather, had the economic ability to curate.

## *Addition and Reduction*

An aspect of cultural behavior observable in the archaeological record in relation to discard is “placement assurance” wherein the methods used to ensure deposition leave signatures that relate to behavior associated with abandonment and other contexts, such as reuse. There is significant archaeological evidence at Eagles Island of placement assurance trends of various types.

*Hull Treatments*. Hull breaking occurred at Eagles Island after it was determined that vessels would no longer be reactived. Historical images of *Argonauta, Minnesota,* and *Stone 3* reveal that all three vessels underwent major hull minimization after 1961. The archaeological record shows signatures of cutting on all three vessels, an indication of a type of hull treatment used at Eagles Island. Another hull treatment for placement assurance is through-hull attachment to the substrate. The frequency of this behavior at Eagles Island is difficult to gauge with varying water levels, but at least one example exists in the archaeological record where a large iron spike, the type of which is not seen anywhere else on the barge, attaches the hull of Barge 2 to the substrate. Another hull treatment at Eagles Island was hull fill, a method of placement assurance observed at other ship graveyards (Richards 2008, pp. 169, 170; Shomette 1996, p. 283). A considerable amount of rock and brick debris filled the Bulkhead Tug. Also, the Army Corps of Engineers frequently deposited dredge spoil onto Eagles Island. Several of the barges reused for bulkheads and reclamation have accumulated sedimentation inside. Though this could be from natural processes, it is likely a placement assurance process in which dredge boats deposited spoils into reused barges to ensure placement.

The most common type of placement assurance visible on the island is pile utilization. Throughout the entire graveyard, there are many instances where an abandoned vessel is surrounded on one or more sides by piles. The Stone tugs, for example, are literally “penned in” by piles. Some piles were used for docks in addition to their use for placement assurance, but a newspaper article from 1958 shows both *Dolphin* and *Minnesota* tied onto the piles surrounding them with rope, indicating that the piles provided a mechanism to secure the vessels in place (WMS 1958). Concrete piles were used in association with the Government Barge. The concrete appears similar to the concrete used to make the bulkhead wall between the Bulkhead Barge and Barge 3, suggesting that the same person assured the placement of Government Barge and built the wall, possibly for reuse in both cases.

*Environmental Conditions*. The placement of vessels can often be influenced by environmental conditions. Evidence at Eagles Island indicates that the appropriate environment was a consideration in placement assurance behavior. The muddy substrate at Eagles Island worked to the advantage of those abandoning vessels. Richard Womack (2006, personal communication) remembers his great-grandfather and uncles telling him that they left the vessels in the mud so that it would preserve the wood. The substrate was a definite consideration in abandoning the vessels along the island. The Stones also accounted for tides. The three lifeboats pulled off the ex-army tugs in the 1950s and 1960s are abandoned high on shore and on the remains of the railway. The placement of the lifeboats reflects the thought process and decision making of the Stone workers that the vessels needed to be far enough away from water to preclude them from floating away.

*Placement for Reuse*. In addition to ensuring a vessel will remain in a particular spot, placement assurance processes reflect intended reuse processes associated with the abandoned vessels. The filling of the bulkhead vessels with rock, brick, and dredge spoil ensured that the vessels would not float away from their location as well as facilitated the construction of the bulkhead there for the Hamme Railway. The locations of abandoned vessels next to barges (such as *Argonauta*) or dock features (such as the Stone tugs) provided structure both to keep the vessels in place and conduct salvage from the vessels if the Stones deemed it necessary. Also, Barge 3 and the Wright Barge appear to be both set in place by pilings and incorporated into dock structures using those pilings. The process of placement assurance reflects both the decision making associated with ensuring the actual abandonment of vessels and the possible reuse of those vessels. Therefore, placement assurance on Eagles Island is both a reflection of economic processes in the systemic context (the reuse through placement assurance mechanisms) and the discard process in the life-cycle of artifacts.

## *Refuse*

Refuse is the final phase in the life-cycle of an artifact. Refuse is often transformed from the archaeological context to the systemic context when cultural processes act upon it, changing it to reused material. When there is no ongoing cultural activity surrounding material remains, as is typically the case at Eagles Island, the area is theoretically considered a discard site and the cultural material is refuse.

*Primary and Secondary Refuse*. Schiffer (1996, p. 58) explained that artifacts discarded at the place of use are considered *primary refuse*, whereas artifacts discarded adjacent to or away from the activity area are *secondary refuse*. Richards (2002, pp. 237–241) recognized that it was more efficient and economical for shipbreaking and shipbuilding to occur in the same area because of the preexisting link between the two activities. Conversely, abandonment after salvage was often removed from the building/breaking location in order to keep vessels away from major activity areas, making ship graveyards mostly secondary refuse sites. The abandonment behavior at Eagles Island contradicts both Schiffer's and Richards's expectations of primary and secondary refuse sites. Deposition surrounds the major activity areas where railways, docks, and wharves operated on Eagles Island, indicating that the discard behavior exhibits signatures of primary refuse. Also, abandoned vessels and material maintain direct association with what was a major activity area, the river channel. In addition, the commercial operations and river traffic continued despite the accumulation of abandoned materials throughout the years. Even today, the area is an active waterway.

*Refuse Typology*. Abandonment sites from studies around the world, such as Thunder Bay in Canada and Mallows Bay in Virginia, exhibit the *de facto* refuse properties of discard (Harris and Laroche 2005, p. 61; Shomette 1996, pp. 268, 269). Eagles Island presents different conditions of abandonment, making it an interesting case for refuse type analysis. The Stones abandoned vessels in locations with easy access and preservative conditions demonstrating true curate behavior. The southern portion of the graveyard, however, is an example of pure *de facto* refuse. After the reuse of vessels, transformation from the systemic context to the archaeological context left them abandoned as *de facto* refuse with no intention of future reuse. Eventually, as the Stone vessels fell into disrepair and suffered from depletion through salvage and scavenge, the vessels morphed from examples of curate behavior to definitive *de facto* refuse.

As Stevenson (1982) suggested in his study of abandoned gold mining sites, the conditions of site abandonment are the determinants of refuse typology. When conditions of abandonment were *gradual* with *anticipated return*, such as in the area surrounding the Stone yard, Stevenson suggested that there should be a clustering of valuables away from the activity area and there should be a small accumulation of *de facto* refuse in the activity area. This is not the case at Eagles Island. The Stones clustered their valuables directly in the activity area. That behavior correlates to Lightfoot's (1993, pp. 167, 168) hypothesis in relation to abandonment processes in prehistoric pueblos that the condition of easy access encourages more curate behavior. The distance to the "new location" or the office across the river in Wilmington from which the Stones operated the company after the cessation of use of the marine railway facilitated the curate behavior of the tugs surrounding their yard on Eagles Island.

When conditions of abandonment were *gradual* with *no anticipated return*, such as at the Hamme railway yard, Stevenson suggests there should be no caching of valuables, but there should be abundant trash and evidence of dismantling through planned salvage. These characteristics are partially represented in the archaeological record. In the southern part of the graveyard, there was indeed limited salvage, but there is not an abundant amount of trash, as Stevenson suggests there should be. Structures remain standing, the railways are relatively intact, and the reused vessels were not garbage at the time of their abandonment but were still available for future use, and therefore aspects of the systemic context prior to the ultimate abandonment of the activity area. The conditions at Eagles Island resoundingly indicate that curate behavior outstripped reuse behavior in the geographic top half of the graveyard, whereas reuse and *de facto* refuse conditions dominate the geographic bottom half of the graveyard.

## Conclusion

In July of 1888, a resident of Wilmington, North Carolina, complained in the local paper, "the sunken steamboat at the ship yard on the west side of the river is not an attractive addition to the scenery of our port; on the contrary it is an eyesore and some little risk to navigation, and somebody ought to be made to remove it" (WM 1888).

Historians and archaeologists can be grateful that no one removed that "eyesore," the side-wheel steamer *Waccamaw*. From the single abandoned vessel, grew a collection of discarded watercraft, representative of a segment of Wilmington's commercial maritime industry. The abandoned vessels and associated maritime materials that line the shore of Eagles Island on the Cape Fear River provide a valuable resource for the study and analysis of the history of Wilmington.

The correlation of the historical and archaeological records in combination with the investigation of the material remains at each stage the artifact life-cycle generated a comprehensive analysis of the archaeological remains present on the Eagles Island. The examination of deposition provided a means to analyze the temporality and spatial association of abandonment on Eagles Island. There are six clear phases of abandonment with direct and highly specific correlations to conditions of the cultural climate.

Use-life modifications likely occurred on a majority of the vessels within the Eagles Island Ship Graveyard and are a significant indicator of economic conditions. Vessel modification extended the use-life of vessels and provided an economic benefit to the vessel owners and users. Regardless of the type of modification, the goal of undertaking such work was to increase economic efficiency through design and technological advancement. Reuse at Eagles Island appeared in the historical and archaeological records in the form of lateral cycling and secondary reuse, both of which relate to cultural conditions. Lateral cycling provides a cost effective means of maintaining a business through the purchase, use, and modification of previously owned or used vessels. Secondary reuse demonstrates that the abundance of materials that surpassed their originally intended function can continue to serve in the systemic context. At Eagles Island, the need for infrastructure to aid commercial operations and maximize efficiency of those operations provided a secondary function for a variety of materials. Analysis of lateral cycling and secondary reuse shows that reuse was the most cost-effective means to accomplish efficient operations and maintenance of commercial industries on Eagles Island.

The analysis of post-depositional processes also provides insight into the cultural conditions associated with the abandonment of vessels. Salvage, scavenging, and conservatory processes are three types of reclamation known to exist in the archaeological and historical records, and reclamation processes show behaviors associated with transforming materials from the archaeological context back into the systemic context. Analysis of refuse characteristics reveals that Eagles Island varies from most other graveyards or watercraft abandonment sites on a number of levels. Primarily, it disputes theoretical suggestions and archaeological evidence from other sites that graveyards are typically secondary refuse sites because it is purely a primary refuse site. In addition, analysis of refuse typology indicates that characteristics on Eagles Island vary from established models of abandonment conditions. In general, the analysis proved that Eagles Island not only is similar to other abandonment and ship graveyards around the world but also has unique aspects not reflected by the theoretical framework of abandonment or other ship graveyard sites.

This research demonstrated that the Eagles Island Ship Graveyard is indeed a microcosm of the cultural, economic, and technological development of Wilmington and southeastern North Carolina. The theoretical framework focused on the importance of recognizing behaviors associated with specific site formation processes and characteristics in order to correlate those behaviors to the conditions that motivate them. The conditions that motivate behavior were assessed on the basis of the correlation of the archaeological record to the historical record. The Eagles Island Ship Graveyard remains as a testament to Wilmington's historic past and bright future as a commercial maritime center for the state of North Carolina.

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# Chapter 13
# Annales School and the Elizabeth City Ships' Graveyard: A New Theoretical Approach to Ship Abandonment Studies

**Lindsay S. Smith**

**Abstract** The Elizabeth City Ships' Graveyard in the Pasquotank River represents the largest assemblage of deliberately discarded watercraft found in North Carolina to date. Applying Annales School principles to the abandonment complex surrounding Elizabeth City, illuminates the city's historic maritime interaction on Fernand Braudel's three levels of history, the *longue durée*, *conjonctures*, and *l'histoire événementielle*. Grounded in a behavioral/psychological theoretical framework, this research also provides an analysis of the abandonment complex's site formation and abandonment processes. This investigation successfully demonstrates the feasibility of a combined Behavioral-Annales theoretical approach for supplementing Elizabeth City's established maritime history, expanding archaeologists' knowledge of abandonment patterns seen throughout North Carolina, and contributing to existing worldwide archaeological research on abandoned vessels.

## Introduction

Elizabeth City, from its incorporation in 1793 through the dawn of the twentieth century, was a growing metropolis in northeastern North Carolina. Historical research has demonstrated that the area that would become Elizabeth City was settled due to its access to navigable waterways for trade, transportation, and sustenance. A prime location, with access to two main transportation waterways, the Albemarle Sound and Dismal Swamp Canal (DSC) via the Pasquotank River, dictated Elizabeth City's development of a rich maritime-based heritage that has persisted throughout its over 200-year history.

Authors have thoroughly documented Elizabeth City's maritime culture for posterity (Brown 1970; Griffin 1970; Meekins 2007); however, the cultural landscape surrounding the city remains an untapped resource to supplement this record. The physical imprint left behind by local maritime industry consists of decrepit wharves and docks, rusting marine railways that disappear into the murky depths of the Pasquotank, and abandoned ships that litter the banks of the river above and below

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**Fig. 13.1** From right to left: *Chelsea* (1013PQR), *Clarence A. Holland* (1009PQR), Unidentified Vessel (1051PQR), *Texaco 144* (1011PQR), and *O.T. & Lloyd Jr.* (1010PQR) looking north along the Pasquotank River's eastern shore in February 1954 (Lemuel S. Blades III Collection)

Elizabeth City. These relics of a time gone by, such as the ones seen in Fig. 13.1, evoke memories of the once thriving maritime culture that built and sustained Elizabeth City.

One of the main vestiges of the city's economic development is a complex of 84 abandoned ships known as the Elizabeth City Ships' Graveyard. While these abandoned vessels may be considered a nuisance to some, much as residents of Wilmington, North Carolina have historically viewed the Eagles Island Ships' Graveyard as "not an attractive addition to the scenery of our port... [and] an eyesore" (Seeb 2007, p. 208), they are often overlooked as a substantial resource for archaeologists that may either support or redefine the established history.

## The Annales School

Archaeological studies of ship graveyards, newly prominent in the maritime archaeology field, endeavor to answer questions regarding human behavior and interaction with the maritime environment. Significant research has been conducted on the behavioral basis of abandoned material culture, much of which is applicable to vessel discard. Researchers have previously combined archaeological, anthropological, and behavioral/psychological approaches in their theoretical analysis of vessel abandonment sites. These combined approaches attempt to decipher the motivations behind human decision-making based on patterns and behaviors observed in the archaeological context. Archaeologists studying ship abandonments have stressed the importance of process and underlying abandonment behavior over face-value description and analysis, but have failed to take the next step and put those processes into societal context at the time of the event, in the overlying trend, and within the overall history (see, for instance, Richards 2002, 2008; Richards and Staniforth 2006; Schiffer 1987, 1995; Skibo and Schiffer 2008). Investigating the Elizabeth City Ships' Graveyard through Annales School principles builds upon these previous behavioral/psychological approaches and demonstrates the significance of abandoned vessels in the context of Fernand Braudel's three-tiered hierarchy of temporal rhythms (to be discussed).

The Annales School is a style of historiography that provides an alternative to traditional historical theory models. Specifically applicable to this investigation is Fernand Braudel, a second-generation Annales scholar, who presents a three-tiered model of temporal rhythms: the *longue durée*, *conjonctures*, and *l'histoire événementielle* (Knapp 1992, p. 6; see also Braudel 1972). The *longue durée* examines elements of the macrohistory, long-term social and environmental factors that influence human behavior. *Conjonctures*, the medium level of history, are short cycles of history ranging from 5 or 10 years to 50 or 100 years long that document divergence from normative behaviors. Technological change and economic elements, such as wages and prices, are often seen as indicators of these changes. These recurring aspects of a culture can be assessed when events disturb the established order of society. *L'histoire événementielle* are occurrences on the micro level of history, most often involving a single individual or event (Knapp 1992, p. 6; see also Bintliff 1991; Burguiere 2009; Clark 1999). This investigation places the derelict vessels in temporal context within the historical conditions that led to the abandonment events (*l'histoire événementielle*), the prevailing social, economic, and technological atmospheres of the vessels' use life and conditions leading up to abandonment (*conjonctures*), as well as their place in the associated society's complete history (*longue durée*).

Despite being conducive to an interdisciplinary approach to historical analysis, archaeologists have been slow to adapt tenets of the Annales School. Barbara Little and Paul Shackel (1989, p. 495) are among the few terrestrial archaeologists to utilize an Annales-informed approach to analyze terrestrial sites, and Staniforth (1997, 2003) and Delgado (2009) are, thus far, the only maritime archaeologists to integrate Annales School theoretical principles into their published research. Staniforth focused on specific shipwrecks, their cargo, and artifacts, whereas Delgado applied Annales principles to his investigation of the San Francisco waterfront, but did not treat the ships and buried stores as an abandonment complex at the time. Thus, the Elizabeth City Ships' Graveyard is the first abandonment complex to be analyzed using Annales-based principles.

The Elizabeth City Ships' Graveyard represents a microcosm of changes in the city's historic economy, culture, and technology. Analysis of the complex according to Annales School sensibilities questions Elizabeth City's established maritime heritage and is the cornerstone of this research. Concurrently, behavioral theory is applied to identify and understand the behaviors reflected in the material remains and illuminate historic trends in technology, changes in the economic environment, prevailing social behaviors, and shifts in waterborne activities. This research supplements Elizabeth City's documented maritime history, expands archaeologists' knowledge on abandonment patterns seen throughout North Carolina, and contributes to existing worldwide archaeological research on abandoned vessels.

## Methodology

Research for this investigation was divided into three related categories. Comprehensive historical research revealed a framework in which Elizabeth City and its surrounding areas developed over time. Research identified the economic, social, and technological trends and events that led to the abandonment behaviors seen in the Pasquotank River. The city's developmental chronology was used to track and analyze these trends in maritime-related activity throughout Elizabeth City's entire history and identify how they are reflected in the abandonment complex under investigation.

Archaeological fieldwork and research provided data to understand the evolving life of the Elizabeth City abandonment complex. Goals of the fieldwork were threefold. The primary objective was to establish the extent of the graveyard and produce an accurate map representing the spatial patterning of the vessels. The second aim was to conduct individual site inspections to record observations about vessel type, construction, relative position, environmental conditions, depositional characteristics, and salvage activity. Researchers created detailed site maps for a representative number of the individually inspected vessels. The third goal was to document the abandonment complex photographically and with a Global Positioning System.

Finally, geospatial analysis of the correlated historical and archaeological avenues identified temporal and spatial patterns within the graveyard and statistical analysis revealed relationships between the abandonment complex and Elizabeth City's economic, social, and technological development on Braudel's three-tiered hierarchy of history.

Completing fieldwork created a supplementary dataset to challenge and reevaluate the historical research and allowed the author to conduct a comprehensive analysis of the Elizabeth City Ships' Graveyard. The abandonment complex was an untapped resource reflecting Elizabeth City's historic economy, society, and technology that when studied, revealed new aspects of the city's interaction with the maritime environment. Integrating the data gained from the archaeological fieldwork with historic documentation supplied the means to understand Elizabeth City's maritime culture on the three levels of Braudel's historical model, the *longue durée*, *conjonctures*, and *historic événements*.

## Individual Site Analysis

Abandonment and site formation processes strip the vessels off their individual identity and attempt to silently erase them from history. Assimilating the various historic and archaeological datasets for the Elizabeth City Ships' Graveyard allowed for the identification of 101 vessels and 3 maritime-related sites in the Elizabeth City Ships' Graveyard. Spatial analysis then revealed correlations between a number of the vessels thereby reducing the complex to 87 sites, 84 ships, and 3 marine railways, Fig. 13.2.

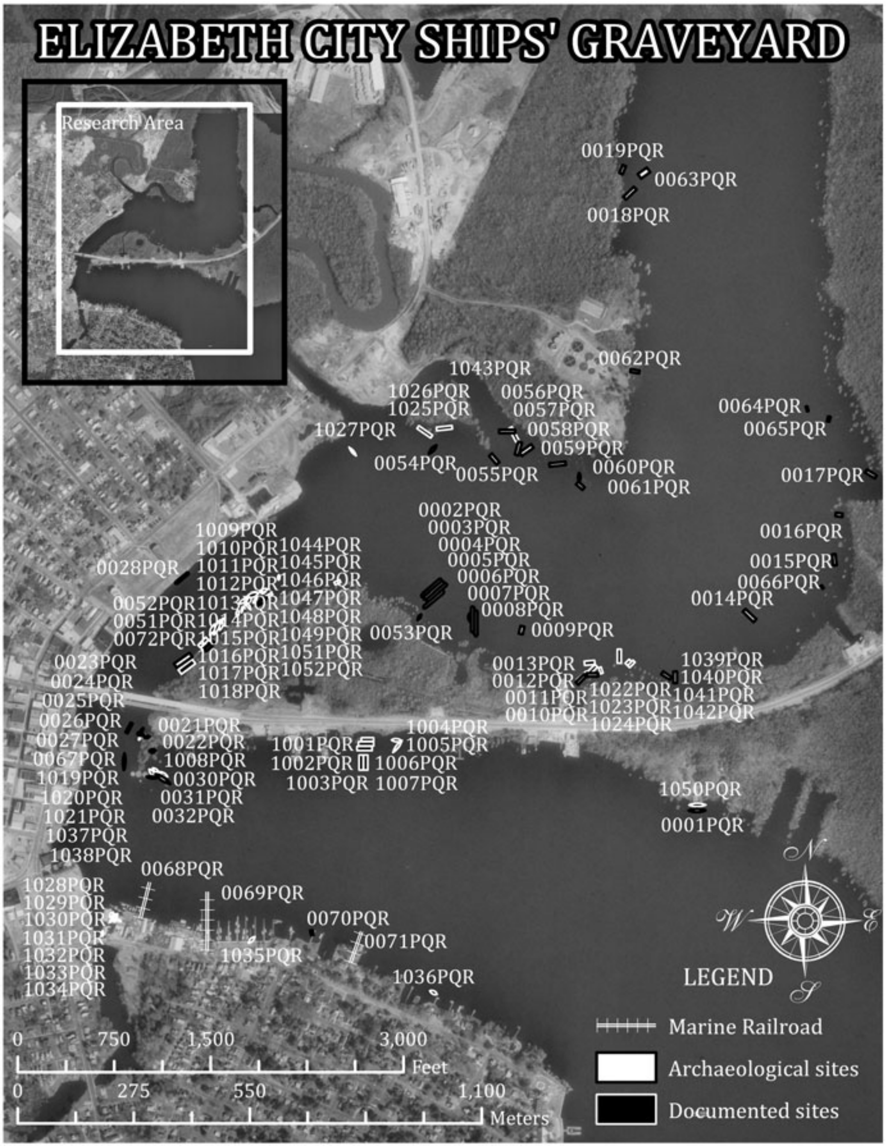


**Fig. 13.2** Updated site plan of the Elizabeth City Ships' Graveyard (year 2010 map by author). Vessel dimensions are exaggerated.

Individualized vessel profiles were created for the 84 ships identifying each vessel's life-cycle. Guided by the behavior-oriented theoretical framework, evaluation of these life-cycles generated information about identity, function, and the human behaviors and decision-making processes that created the graveyard. These vessel profiles illustrated post-depositional deterioration for some of the hulks while others provided information about vessels' function within Elizabeth City's historic economy. Some ships stand out because of their distinctive construction while others are singled out because they have been removed from the archaeological record and represent the longevity and continuity of the graveyard.

Identifying and evaluating the vessels' use and deposition revealed information about the human decisions that resulted in individual abandonments as well as the creation of the collective graveyard. Richards (2008, p. 287) posits that use and modification processes directly influence discard processes and "can be seen to influence the time and nature of the transformation process from systematic context to an archaeological context." This statement was supported repeatedly by observations of vessel use and modification that gave insight into the decision-making process driving the abandonments at Elizabeth City. Many of the ships function primarily as generic work vessels that serviced local industries and hauled cargo to northern and coastal markets. Minimal reuse was observed in the Elizabeth City Ships' Graveyard; however, this does not mean that it did not occur. For a majority of the vessels in the abandonment complex, their construction did not limit their function to a single industry or purpose but instead allowed for variability in the function and service it provided without noticeable modification to the hulls. Lateral-cycling and secondary use was probably very prevalent in the complex's vessels because it is a cost-effective way of running a business by modifying a vessel physically or changing a vessel's function to suit current needs, it just is not visible in this archaeological record. However, research determined that vessels transitioned from systemic to archaeological context when influenced by economic change or technological advancements that rendered all variations of its function obsolete.

Spatial analysis of the complex revealed patterns in the relationships between the types of abandonment and their location in the graveyard. Vessels associated with industries within Elizabeth City were often discarded across the river from the downtown waterfront area where commercial and industrial operations were centrally located. Urban expansion pushed larger industries such as lumber mills and cotton factories to the fringes of the city and the vessels associated with these industries are abandoned at a corresponding distance from the city. There are only a handful of instances where a vessel was abandoned outside its primary use area suggesting the ongoing desire for the associated industries to have access to the abandoned vessels if necessary. Further support for this conclusion manifested in researchers observing evidence of placement assurance throughout the ship graveyard, for example, vessel 0070PQR seen in Fig. 13.3. The immediate result of placement assurance is to ensure that a ship does not move from its deposition area; however, the motivation behind this behavior is one of economic prudence. If the vessel stays in place, it is easily accessed for post-depositional salvage and there is no possibility of the derelict vessel causing damage to viable structures or vessels operating in the associated area.

Analysis of post-depositional processes provided additional insight into the creation of the ship graveyard and human abandonment behaviors. The reduction processes of salvage, scavenging, and conservation were observed in both the archaeological remains and associated historical record. Reclamation processes, though

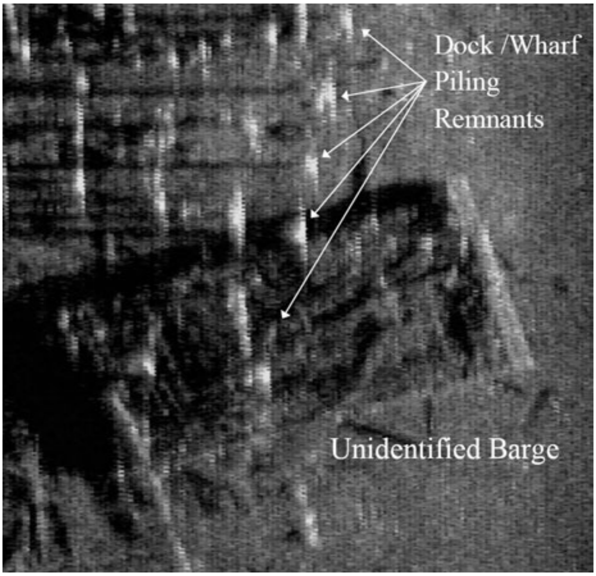


**Fig. 13.3** Site 0070PQR side scan sonar image demonstrating placement assurance. Remnants of dock or wharf pilings pierce the unknown barge's hull, and whether intentional or coincidental, this vessel is assured to stay in place because of those measures. (Image by Lindsay Smith)

minimal in the complex, identified behaviors that reintroduced material from the archaeological context back into the systemic context. Hull minimization treatments, such as burning and removing superstructure were also evident, though removing superstructure via cultural-transformations rather than environmental-transformations is more difficult to determine. Conservation processes reflecting the desire to retain material for posterity was documented in only one case in the abandonment complex. The nature of these abandoned vessels, for the most part, does not lend itself to conservation processes because they rarely have anything of conservation value on board. This is exemplified by the city's lack of maritime artifacts that usually decorate coastal towns with historic ties to and reliance on the maritime environment.

## Annales School Analysis

Applying Annales School principles to the abandonment complex surrounding Elizabeth City illuminates the city's historic maritime interaction on Braudel's three levels of history, the *longue durée*, *conjonctures*, and *l'histoire événementielle*. If one were so inclined, Elizabeth City's historical interaction with the maritime environment could be viewed as a four-act play in which each subsequent act narrows in temporal scope, culminating in the grand finale that reveals the total picture for the audience.

Act One: The *Longue Durée* evaluates the role geography plays in the development and use of a specific area and looks at how inhabitants interact with that environment over time. This section stresses maritime interaction during pre-historic Native American settlement, European colonization, Elizabeth City's formative years, and briefly looks at the city's development through the twenty-first century.

Within the framework of the *longue durée* there are *conjonctures*, smaller time periods of concentrated influential activity. Act Two: The Main *Conjoncture*, hones in on Elizabeth City's heyday, is a period from 1881 to 1950 when maritime interaction soared and shaped the city's development. It is during this *conjoncture* that Elizabeth City reaches its peak involvement in waterborne commerce throughout the mid-Atlantic.

The main *conjoncture* establishes the framework that allows the *historic événements* to take place. Act Three: The *Historic Événements* relate the smallest level of history, individual abandonment events and the ship graveyard, to Elizabeth City's changing culture. Viewing the ship graveyard as a microcosm of technological advancement, economic change, and shifting cultural perception of the once life-sustaining maritime environment allows microhistoric events like ship abandonments to contribute to the bigger picture. Discussing Elizabeth City's history on these three time scales develops the most complete picture to date.

## *Act One: The Longue Durée*

Braudel's largest level of history, the *longue durée*, examines elements of the macrohistory in terms of long-term social and environmental factors that influence human behavior. He asserted that "macrophenomena were determinate and microphenomena indeterminate" and that only with diverse and comprehensive analysis would historic events attain significance (Knapp 1992, p. 6; see also Lucas 1985). Analyzing the geographic elements, which made the area that would become Elizabeth City ripe for settlement, and looking at long-term human interaction with that environment is the first step to the diverse and comprehensive analysis that Braudel supports.

Milton Ready, professor of history at UNC Ashville and author of *The Tar Heel State: A History of North Carolina* (2005), captures the importance of geography in shaping an area's history when he wrote, "For North Carolina, as for so many other states, nations, and regions, geography has been a part of its destiny" (Ready 2005, p. 1). Moreover, it is really the most logical place to begin when compiling a complete history. Studying North Carolina's geography sets the foundation for understanding human interaction with the natural environment throughout its history. Looking briefly at Native American settlement patterns in the Albemarle region, European colonization on the Pasquotank River, and Elizabeth City's history from its incorporation through the end of the nineteenth century demonstrates long-term trends of human interaction and relationship with the maritime environment.

The end of the last ice age represents a critical juncture in coastal North Carolina's history. Following the last glacier's retreat, around 11,000 BC, rich dense forests repopulated the newly exposed Coastal Plains (Ready 2005, pp. 1–5). The dense forests, rich soil, and glacial-formed rivers, coupled with a humid subtropical climate, were the necessary resources that would first sustain Native American settlements, and later provide the building blocks for European fur-trading stations and colonization in the Albemarle Region (Ward and Davis 1999, pp. 29–31).

Advantageous geography and natural resources were the only advertising needed to draw settlers to the Pasquotank River area. Unrestrained colonial expansion throughout North Carolina created racial tensions and conflicts between the two vastly different cultures as Europeans sought to posses the same key natural resources and geographic positions that Native Americans had previously identified as valuable. Historian Samuel A' Court Ashe (1908, p. 59; Griffin 1970, p. 3) captures early settlers' decision to move south, "It was not oppression that drove these first settlers into the wilderness... they were bold, enterprising, hardy Virginians... who were wooed to this summer land by the advantages of its situation." Repeated infringement of or blatant disregard for treaties between European colonials and native North Carolinian tribes resulted in numerous wars, brutal in nature and high in casualties.

Despite being one of the first areas settled in North Carolina in the late 1660s, and continuously occupied thereafter, Elizabeth City was not chartered until after the American Revolution. The first mention of a city in this area, by the name Narrows in 1764, describes a landing for naval stores and imported goods at the bend in the Pasquotank River (Griffin 1970, p. 19). Alternate sources, however, claim the town was first called Shingles Landing as early as the 1750s (Pasquotank Historical Society 1955, p. 54). Regardless of the first name, the land at the most narrow point of the Pasquotank River was destined to become a prominent establishment. An enterprising, or perhaps just practical, settler began a ferry service to the opposite shore at some point early in the area's history, and this initial maritime activity allowed a small community to emerge with great potential for future expansion and growth.

Opportunity for expansion came in 1793 when the North Carolina General Assembly determined that the town at the Narrows was to be the terminus city of the DSC and chartered the town of Redding (Griffin 1970, p. 26). Renamed Elizabeth City in 1801, this was the final in a number of name changes for the town, and an ambitious one at that (Griffin 1970, p. 7). Only time would tell if the small town of Elizabeth City would live up to the great expectations of its name.

The DSC promised unprecedented opportunities for growth and it was recognized early on that developing this resource would provide an important connection between the Albemarle Region, southern Virginia, and the Chesapeake area for trade, communication, and navigational ease. Digging commenced on either end of the canal in 1793 and after many setbacks during construction, the DSC opened in 1805 (Brown 1970, p. 57). With a safe interior waterway linking, the Chesapeake Sound with the Albemarle Sound and beyond, Elizabeth City was able to overcome all the largest hurdles hindering coastal North Carolina towns; lack of deep-water ports, shifting sandbars that rearrange coastal inlets after heavy storms, and the treacherous Outer Banks.

Completion of the canal not only opened up an intracoastal waterway for trade between Virginia and North Carolina and beyond, it also provided access to the natural resources long hidden in the swamp's depths. Bald Cyprus, Black Gum, Juniper, and Pine trees were now available for harvesting for the naval stores industry; an industry that extended beyond simple milled lumber to include shingles, turpentine, resin, pitch, and tar (Federal Writers Project 1939, pp. 89–91). Thereafter, participation in

North Carolina's largest industry, naval stores, became the driving force for Elizabeth City's growth throughout the first half of the nineteenth century (C.E. Weaver Series 1915, pp. 1–22; Griffin 1970, pp. 74–78).

While the city enjoyed the spoils of antebellum economic growth and prosperity, national tensions were building and the Civil War loomed on the horizon. Access to a large portion of the southeastern seaboard made Elizabeth City a key occupation point for both Union and Confederate troops so that, in this instance, Elizabeth City's strategic geographic location and related resources were a detriment to its development. The Civil War severely hindered the city's progress and in some areas, such as the DSC's near impassable condition, caused significant setbacks that would require massive rebuilding for Elizabeth City to regain its prewar status. Elizabeth City emerged from the Civil War worse for wear and the spring of 1865 saw the beginning of a rebuilding process that would be slow to gain momentum (Meekins 2007, pp. 16, 29–30). Repeated occupation and maltreatment from Rebel and Yankee forces throughout the war was trying on the town's population both spiritually and structurally. The recovery and rebuilding process, especially for the maritime transportation industry, would extend into the beginning of the twentieth century (Brown 1970, pp. 154–155).

Elizabeth City endured its share of social instability following the Emancipation Proclamation, an outfall of war that took longer to fix than the physical destruction to the landscape (Harper's Weekly, 17 January 1863, p. 84). Change, especially immediate change at gunpoint, such as the end of slavery, is a difficult pill to swallow and Elizabeth City citizens rose to meet that challenge with varying degrees of success. Racial relations were tenuous following the cease-fire and "Reconstruction" following the war pertained to restructuring social equilibriums in addition to economic and physical rebuilding. After the large-scale setbacks created by the Civil War, Elizabeth City's industries demonstrated their ability to lead the city's Reconstruction when they experienced financial success amid the mistrust of new railroads and unreliability of the DSC that defined the end of the nineteenth century (University of Virginia, Geospatial and Statistical Data Center (GSDC) 2007).

Baring the nationwide depression years from 1930 to 1935, overall economic success rivaling its antebellum prosperity flourished in Elizabeth City for the first half of the twentieth century. The 1950s marked a turning point for Elizabeth City's maritime economy. Railroad technology and popularity replaced traditional waterborne commerce via canal boats, barges, and tugboats as the accepted and expected transportation method for most industries (Jeb Stuart, personal communication 2009). The DSC, and for the most part, the Pasquotank River and Albemarle Sound, became obsolete waterborne trading routes during the mid-twentieth century. Adapting to the changes wrought by technological advancements, the Pasquotank River and DSC underwent a functional evolution from the once life-sustaining commercial shipping industry to a source of recreational activity. Modern Elizabeth City, nicknamed the Harbor of Hospitality, is able to honor its maritime-focused heritage without wallowing in the past. From its current financial success, it is evident that Elizabeth City is able to adapt to the changing economy without forgetting its maritime history (Dismal Swamp Canal Welcome Center 2011).

Evaluating Elizabeth City's history on Braudel's largest tier of temporal rhythms, the *longue durée*, first identified the geographic and environmental factors that made the Albemarle Region optimal for human habitation. Reviewing long-term human occupation in northeastern North Carolina then revealed the ways in which these geographic features and environmental factors influenced the course of this area's history. Analysis determined that geography played a large part in settlement patterns, political and social affiliations, regional communication, and trade patterns for Native Americans, European colonists, and established Elizabeth City citizens alike. Finally, looking specifically at human interaction with the maritime environment discovered that throughout Elizabeth City's over 200-year history, and stretching back through European colonization and Native American settlements, inhabitants of the Coastal Plains, specifically the Albemarle Region, have continuously relied on the maritime environment for sustenance, transportation, communication, and economic development (see Smith 2010, pp. 162–175).

One specific period of development within the *longue durée* directly influenced the creation of the Elizabeth City Ships' Graveyard. Technological advancements, economic fluctuation, and a change in social perceptions during the years of 1881 to 1950 directly affected the abandonment complex. In Act Two: The Main *Conjoncture*, close examination of the city's development during this critical period, paying special attention to changes in waterborne technology, economic cycles of prosperity and loss, and social identity with the maritime environment, identifies the prevailing conditions under which the ship graveyard was created.

## *Act Two: The Main Conjoncture*

Fernand Braudel defined *conjonctures* as small periods of history that represent divergences from normal behavior (Knapp 1992, p. 6). The *conjoncture* immediately related to the creation of the Elizabeth City Ships' Graveyard involves the years from 1881 to 1950. This period of history witnessed many technological advancements, economic change and upheaval, and social evolution, particularly in the town's residents' perception of the maritime environment and its role in the city's operation and development. Chronicling these changes throughout the 69-year *conjoncture* will highlight the prevailing conditions that precipitated the creation of the Pasquotank River abandonment complex. The smallest level of history, *l'histoire événementielle*, in this case the individual abandonment events, will then be placed into the larger context of the prevailing culture.

Beginning around 1880, Elizabeth City experienced a "new wave of prosperity" that, save the depression years 1930 to 1935, continued into the mid-twentieth century (Wood 1963, p. 13). The impetus for Elizabeth City's prosperity can be ascribed to multiple sources, namely, advancements in the transportation industry, industrial and commercial expansion, and the successful growth of key municipal projects. These events were instrumental to Elizabeth City's growth and development from 1881 through the first half of the twentieth century.

Transportation improvements were, by far, the most influential factors on Elizabeth City's development and the creation of the ship graveyard. The reopening of the DSC in 1899 and introduction of the Norfolk & Elizabeth City Railroad in 1881 were the two crucial events in transportation improvements; however, steamship services, developments in ship construction, and the personal automobile were also key advancements.

The DSC underwent many small changes between 1876 and 1899, but a complete overhaul, completed in 1899 by the Army Corps of Engineers allowed local industries to conduct business on a larger scale, distribute their goods to a wider geographic area, and drew prosperous northern business south to Elizabeth City via the canal (Brown 1970, pp. 109, 143, 150). Consequently, Elizabeth City businesses operating on a regional or national scale were then prepared and able to adapt to the technological and transportation changes that shifted focus away from maritime transportation to railroad, and later, automobile distribution methods. Elizabeth City's economy had revolved around the maritime environment since its establishment, and ironically, one of the main events that spurred Elizabeth City's rapid growth and development during the end of the nineteenth and beginning of the twentieth centuries was, in time, destroyed by the growth it initiated.

Southern railroad expansion played an equal, if not more important, role in shifting Elizabeth City's economy away from its traditional maritime focus (Depew 1895, p. 111). The railroad's arrival stimulated significant industrial growth, which in turn initiated commercial development, geographic expansion, and population growth. Once established, commercial railroad distribution would become the main contributor to outmoding commercial maritime transportation, mainly via the DSC, and replacing it as the primary method of transporting goods (Butchko 2008, Sect. 1.6.1; Cheney 1981, p. 445).

Continuing transportation advancements in the automobile industry during the 1920s through the 1950s would change commercial transportation methods again. The increased affordability and availability of shipping goods via trucks and tractor-trailers assimilated a majority of the business that railroads had previously taken from the maritime environment. Automobile popularity for personal transportation superseded steamship travel, further decreasing Elizabeth City's reliance on the maritime environment (Butchko 2008, Sect. 1.6.1).

Incorporation of these early twentieth century advancements suggests city residents accepted, and perhaps even embraced, the myriad of changes to waterborne transportation, in both the personal and commercial arenas; it was old-fashioned, antiquated, slow, yesterday's technology, and it was time for a change. This is hardly surprising considering the numerous technological advancements seen in such a short period. The Wright Brothers were flying in Kitty Hawk, North Carolina, iron steamers of enormous proportions were breaking the transatlantic voyages records weekly, and personal automobiles were all the rage (The New York Times, 21 August 1921).

Industrialization was the second most influential factor in Elizabeth City's growth during the main *conjoncture*. Increased manufacturing companies supplemented the city's previous agricultural-based export commodities and supported the city's growing population (GSDC 2007). Mechanization of Elizabeth City's agricultural industry was also an integral component of the city's overall growth. Commercial expansion followed in the wake of the industrialization, providing a venue to market goods locally to an ever-increasing economic base that extended beyond Elizabeth City's borders to the surrounding rural towns (GSDC 2007; North Carolina Business History 2006; United States Census Bureau 1790–1860).

Waterborne commercial transportation was an essential aspect of Elizabeth City's economy for over 100 years; however, events during the 1881–1950 *conjoncture* resulted in the complete dismissal of the maritime environment in favor of the newer land-based transportation options. Act Three: The *L'histoire Événementielle*, identifies and contextualizes the abandonment events that created the Elizabeth City Ships' Graveyard. These *l'histoire événementielle* represent specific examples of people's interaction with the maritime environment that reflect the ongoing changes seen in this main *conjoncture* of Elizabeth City's history. Discussing these *événementielle* demonstrates how the abandoned vessels reflect the economic change, technological advancements, and shifting perceptions of the maritime environment during Elizabeth City's main *conjoncture* and *longue durée*.

## *Act Three: The l'Histoire Événementielle*

The microlevel of history, *l'histoire événementielle*, looks at individual or specific events. Fernand Braudel gave the least amount of attention to these single events, most likely because they represented the traditional historical focus from which the Annales School was trying to break away. Alternately, Braudel's former student Le Roy Ladurie argued that *l'histoire événementielle* should be viewed as critically significant events that break established patterns, an assertion that is directly compatible with abandonment studies (Knapp 1992, p. 6). Researching single events has its purpose when that event is related to the larger context and is imbued with a new significance. In a similar vein, Brooks et al. (2008, p. 5) emphasize "the large lessons discovered in small worlds" when examining microhistoric events. Analysis on this level of history hones in on the cultural behaviors reflected in the individual vessel abandonments, specifically, economic shifts, technological advancements, and changes in societal perceptions. This allows the individual abandonment events to then be weaved into the larger context of Elizabeth City's main *conjoncture* and the *longue durée*.

The individual abandonment *événementielle* that comprise the Elizabeth City Ships' Graveyard are many and varied, taking place over numerous decades, each within a specific set of circumstances. Correlating the historic record and archaeological remains provided an avenue to assess how the abandonments in the ship graveyard represent the historic culture, economy, and technology of Elizabeth City. Statistical analysis of this dataset revealed a tailored deposition range for each of the 101 vessels in the complex. Verifiable information for each vessel from sources such as photographs, maps, and archaeological data allowed some vessel's deposition to be pinpointed to a specific year, whereas others span multiple decades. Within these deposition ranges, Fig. 13.4 highlights the most likely abandonment dates for

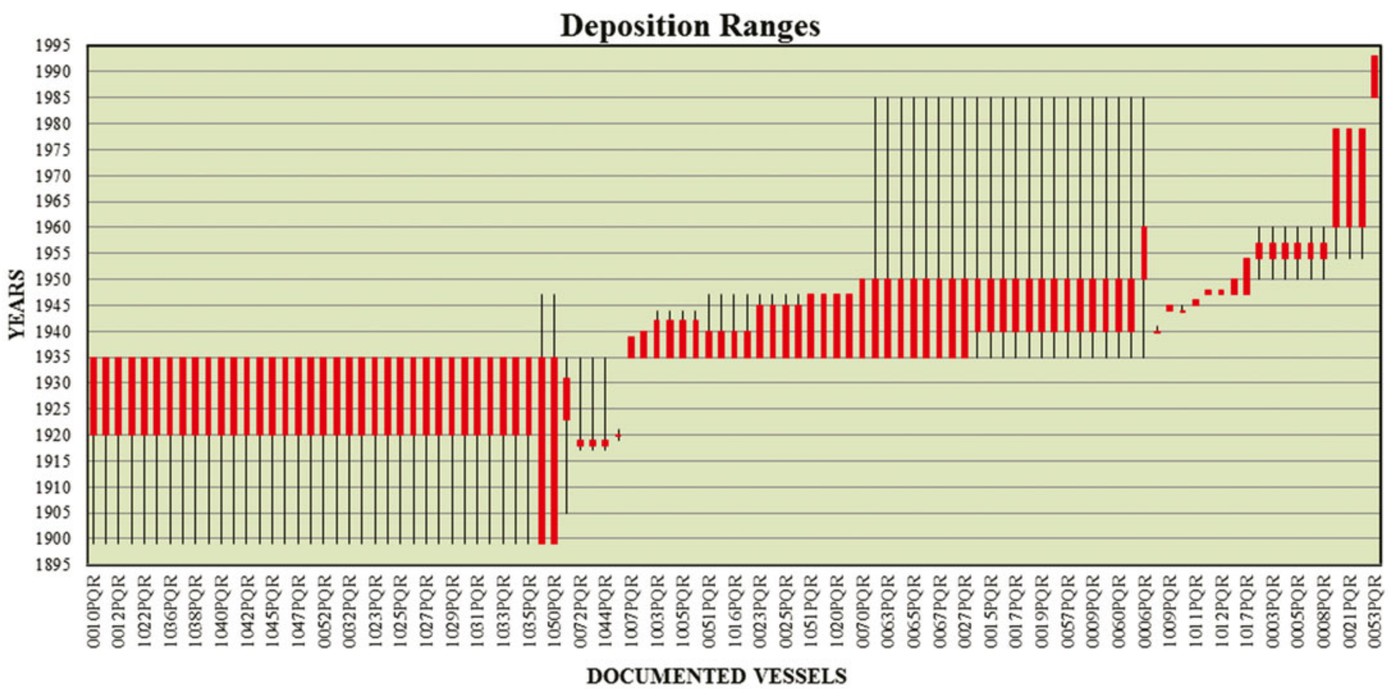


**Fig. 13.4** Deposition ranges for all 101 vessels in the Elizabeth City Ships' Graveyard. Correlated archaeological and historic vessels are included under their official identification numbers. Thicker bars represent the most probable abandonment dates within each deposition range determined by analysis of cultural conditions such as economy, technology, and cultural perception of the maritime environment. The five temporal phases are represented here, arranged from earliest to most recent based on the earliest date at which the vessels could have been abandoned. Space along the horizontal axis only allows 51 site numbers to appear however all 101 vessels are represented in the chart. (Data from Smith 2010)

each vessel. The abandonment dates are slightly more subjective than the deposition ranges as they were determined by analysis of less tangible data such as cultural changes in economy, technology, and social perception.

Once the 101 individual deposition ranges were determined, the graveyard was analyzed to establish its chronological development. Graphing the individual vessels' abandonment ranges generated five temporal depositional phases: *Pre-1935*, *1935–1950*, *1950–1960*, *1960–1980*, and *1985–1993*. The vessels within each phase reflect different cultural behaviors based on the time period in which they were abandoned. Understanding the behaviors reflected in the discarded vessels allows the ship graveyard to be placed into the larger context of the 1881–1950 *conjoncture* and Elizabeth City's maritime interaction over the *longue durée*. Each of the five depositional phases were created utilizing the earliest possible deposition date for each vessel and mapped to provide a means of viewing temporal and spatial relationships.

Each phase of the graveyard reflected specific elements of the culture that created it, but also reflected ongoing trends in technological changes, economic practices, and cultural perceptions of the maritime environment. Table 13.1 synthesizes each phase of vessel discard, the number of vessels deposited during the phase, and the formative elements reflected through the archaeological record.

The earliest phase, *Pre-1935*, initiated the ship graveyard with the earliest abandonment after 1899 and set a precedent for abandonment behaviors in and around Elizabeth City's waters. Vessels abandoned during the Phase Two, *1935–1950*, reflect many aspects of Elizabeth City's changing culture following the first decades of the nineteenth century, especially the long-term economic, social, and technological impact of transportation advancements. Phase Three, *1950–1960*, reflects the completion of railroad dominance over waterborne transportation and its accompanying economic implications. Additionally, Phase Three addresses the culture's changed perception of the maritime environment from a life-sustaining function to pleasure and recreational use. Phase Four, *1960–1980* illustrates the rapid technological advancements in modern personal watercraft as well as the continuing social perception of the river as a source of pleasure and recreation. The final phase, *1985–1993*, reflects Elizabeth City's prosperous economy and the complete transformation away from reliance on the local maritime environment, as well as a new environmentally aware society.

Every societal perception, technological change, and economic shift reflected in these abandoned vessels relates the ship graveyard to a context larger than the individual abandonment event. Changes observed in the Elizabeth City Ships' Graveyard reflect the prevailing circumstances during the 1881–1950 *conjoncture* that precipitated its formation and through that, relate the ship graveyard to the *longue durée* of human interaction with the maritime environment. Trends in the archaeological record echo national and worldwide events such as WWI, the Great Depression, and WWII extending the significance of the Elizabeth City abandonments far beyond localized importance. Additionally, every culture studied over the city's *longue durée* that has utilized the geographic area in question had depended on the waterway as a significant aspect of their survival, be it for sustenance, defense, economic gain, communication, or transportation. Elizabeth City's shift away from reliance on the

**Table 13.1** Five temporal deposition phases and the cultural themes reflected therein. (From Smith 2010)

| Phase | No. of vessels | Themes |
|---|---|---|
| One<br>Pre-1935 | 30 | Initial shift from waterborne to railroad commercial shipping<br>Initial transition of DSC's function from commercial to recreational<br>Industry-specific utilization of the maritime environment<br>Maritime technological advancements in domestic commercial oil trade<br>Experimental ship construction during WWI<br>Roadway expansion and increased availability of personal automobiles<br>Economic prosperity from 1900 through the 1920s<br>Economic recession from 1929 to 1935 (Great Depression) |
| Two<br>1935–1950 | 44 | Economic recession from 1935 to 1945 (Great Depression ended by entrance into WWII)<br>Economic boom following the end of WWII in 1945<br>Technological advancements in iron ship construction<br>Increasing economic dependence on railways for commercial transshipment<br>Continuing decline in utilization of steamship passenger service<br>Increasing utilization of automobiles for personal transportation<br>Initial shift of societal perceptions of the maritime environment from a commercial function to a recreational function |
| Three<br>1950–1960 | 6 | Completion of the shift from waterborne commercial shipping to railway use<br>Continuing shift in cultural perceptions of the waterway's function to recreational use and increasing aesthetic value<br>Continuing difficulties with reoccurring droughts cause sporadic DSC closures<br>Personal automobiles are mainstream and dominate personal transportation<br>Initiates the decline of active abandonment activities |
| Four<br>1960–1980 | 2 | Completion of the shift in the waterway's function from commercial to recreational<br>Continuing trend of depositing outdated technology in the graveyard<br>EPA enacts laws regarding pollution and navigational hazards<br>Maritime technological advances in personal watercraft such as resin and fiberglass construction, outboard motors, and personal yachts<br>Completion of the waterfront beautification project shapes abandonment behaviors in relation to location and number<br>Further reduction in abandonment activities |
| Five<br>1985–1993 | 1 | New environmentally aware society curbs abandonment behaviors<br>Culture places high value of river aesthetics over function<br>Economic prosperity of the late-twentieth century<br>New abandonment behavior type seen in the complex, behavior is furtive or secretive and influenced by cultural beliefs<br>Cessation of abandonment activities |

maritime environment as a life-sustaining resource during the mid-twentieth century represents the first such departure in the history of the area's settlement.

What this assemblage of vessels does not reveal is as telling as what it does. Although there is no shortage of wooden constructed ships and barges, there is a dearth of ferrous ships in the abandonment complex, especially mechanized commercial vessels. The transition to mechanized ships, using steam, oil, or diesel, was an important phase of shipbuilding and domestic trade throughout the USA and is patently absent from the Elizabeth City Ships' Graveyard. Additionally, while there is a small amount of negative evidence reflecting the loss of steamship prominence, passenger steamboats are not represented in the complex. The ship graveyard reflects major changes in Elizabeth City's development but the nuances are absent from the collection. Small-scale shifts in the economy and technological advances during the main *conjoncture* were not observed in the graveyard. Finally, the amount of lateral-cycling observed in the abandonment complex is middling to none. That does not mean it did not occur, but rather that, in this instance, it is imperceptible in the archaeological record. This translates to changes on a small scale or of a temporary nature. Short economic downturns likely resulted in temporary abandonments, but are not observed in the archaeological context because the vessels re-entered the systemic context after a brief time. Similarly, it is likely that there were failed maritime technological innovations at some point in time, but they were removed or replaced once their ineffectiveness was determined, thus explaining why they are not observed in the complex today.

Each abandoned vessel has specific circumstances leading to its discard and while it is possible to hypothesize about individual circumstances, there is no way to perceive every contributing factor or the absolute accuracy of these hypotheses. It is possible, however, to determine large-scale factors such as economic growth and recession, technological advancements, environmental conditions, and changes in social perception of the maritime environment because they are reflected in the abandonments themselves. In this way, it is possible to provide evidence that affirms the Elizabeth City Ships' Graveyard is a miniature embodiment of Elizabeth City's twentieth century development, and while the complex reflects aspects of the city's evolving culture, it is not a looking glass that reflects an identical facsimile of Elizabeth City throughout its development.

## The Finale: The Conclusion

Analyzing Elizabeth City's history on each level of Fernand Braudel's three-tiered model of temporal rhythms, *longue durée*, *conjoncture*, and *l'histoire événementielle*, has provide the most complete picture of Elizabeth City's maritime history to date. The *longue durée* illuminated the geographic characteristics that identified Elizabeth City's settlement potential. Analyzing the Albemarle's geography revealed the underlying motives for the region's settlement throughout pre-history and into the present. Within the framework of the macrohistory, the main *conjoncture* from 1881 to 1950 represented the critical phase of Elizabeth City's development. It was during this period that Elizabeth City reached its peak involvement in waterborne commerce throughout the mid-Atlantic before rapidly shifting away from the maritime environment as a life-sustaining resource. The 1881–1950 *conjoncture* established the framework that allowed *l'histoire événementielle*, or abandonment events, to take place. Applying Braudel's three levels of history to the Elizabeth City Ships' Graveyard has provided the means to relate the abandonment complex, a microcosm of technological advancement, economic change, and cultural perception, to the larger context of human interaction with the maritime environment and Elizabeth City's established maritime history.

This investigation incorporated ideas from history, geography, anthropology, archaeology, and behavioral psychology. The interdisciplinary approach created a theoretical framework within which the abandonment complex was thoroughly evaluated. Understanding site formation processes at work in the archaeological record, including identifying the behaviors that created the processes, was another primary goal of this research. Correlating the historic research and archaeological data provided the means to analyze and understand the site formation processes, cultural behaviors, and the motivation behind them expanding this research beyond just a particularistic study.

Utilizing Annales scholar Fernand Braudel's three-tiered hierarchy of temporal rhythms: the *longue durée*, *conjoncture*, and *l'histoire événementielle* as a theoretical foundation demonstrated that Annales School sensibilities can be successfully applied to a ship graveyard study. Evaluating the ship graveyard on three levels of history allowed the author to relate the individual abandonment events to human interaction with the maritime environment throughout Elizabeth City's known history. This created a more complete history by establishing a relationship between a single set of events and the larger historical context, and developed stronger ties between the individual sites and the processes that affected their deposition and post-depositional transforms. Further, the combined Annales-Behavioral theoretical approach provided a deeper understanding of the Elizabeth City Ships' Graveyard than would have been achieved through a purely behavioral/psychological approach, the established methodology for ship abandonment studies. Ultimately, this interdisciplinary approach demonstrated that the Ships' Graveyard scattered throughout the Pasquotank River at "the narrows" is a valuable resource for contributing to the established history of Elizabeth City's trade on local, coastal, and domestic levels, represents Elizabeth City as a historic center of maritime commerce, and stands as a testament to the extent of development that has brought Elizabeth City to its current state.

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# Chapter 14
# World War One German-built watercraft on the Wingecarribee River

**Cosmos Coroneos, Brad Duncan, and Caroline Wilby**

**Abstract** In the aftermath of the First World War, a fleet of German and Austro-Hungarian vessels was intentionally scuttled on the Wingecarribee River in the southern highlands of New South Wales. These were not warships or merchant vessels, but a collection of timber canoes and kayaks, handcrafted from local materials by mariners interned at the Berrima Detention Camp from 1915 to 1919. These watercraft were used for daily leisure but soon became the focal point of carnivals held by internees, during which vessels were elaborately embellished to appear as gondolas, submarines, biplanes, models of famous German yachts and clippers, dragons and even a shark. Such fantasy craft were paraded in competition and pitted against each other in mock battles; festivities that increasingly attracted spectators from as far away as Sydney. In 1978, one of these watercraft was found washed up on river bank. It was retrieved, conserved and now holds pride of place in the Berrima District Museum. Since then, several efforts have been made to locate the submerged fleet. This chapter recounts what is known about these watercraft from historical sources, the unusual circumstances and motivations behind their abandonment, their significance from both a research and social perspective, and the ongoing search to find them.

## Introduction

In 1978, a timber dugout canoe was found washed up on the banks of the Wingecarribee River near the village of Berrima, approximately 130 km south-west of Sydney in the southern highlands of New South Wales (NSW). The canoe was salvaged and housed by the Berrima District Historical and Family History Society, where, in the

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1990s, it was identified by local historian John Simons as one of a group of vessels handcrafted by German and Austro-Hungarian internees at the Berrima Detention Camp during the First World War. These watercraft were used for daily leisure but soon became the focal point of popular carnivals staged by the prisoners, whereby the vessels were elaborately embellished to appear as a range of fantasy craft, paraded in competition, and engaged in mock battles. In 1919, the internees deliberately scuttled the bulk of their watercraft prior to their departure from Berrima at the end of the war.

The identification of this canoe provided stimulus to ongoing efforts by the Berrima District Historical and Family History Society and the Berrima Branch of the National Trust of Australia (NSW) to document, preserve, and showcase the fascinating and curious story of the First World War-era Berrima Detention Camp. The possible identification of a submerged canoe in the Wingecarribee River by the Royal Australian Navy in 2003 further spurred the project. In 2004, Cosmos Archaeology Pty Ltd was commissioned by the National Trust and the NSW Heritage Branch to conduct a historical and archaeological assessment of the potential for further submerged vessels to occur within the river, and to examine options for possible recovery, conservation, management, and display.

Drawing on the findings of studies conducted by Cosmos Archaeology Pty Ltd and augmented by inspections carried out by the NSW Heritage Branch, this chapter recounts what is known about these watercraft from historical sources, the unusual circumstances and motivations behind their abandonment, their significance from both a research and social perspective, and the efforts made to locate the submerged fleet.

A rich and detailed account of the Berrima Detention Camp during the First World War can be found in John Simons' 1999 publication *Prisoners in Arcady: German Mariners in Berrima 1915–1919*, published by the Berrima District Historical and Family History Society and adapted in an impressive exhibit in the Berrima District Museum.

## Historical Context

When Australia joined Britain to enter First World War in August 1914, an internment policy against enemy aliens within Australian borders was swiftly pursued. Each state Government established a number of detention camps; in New South Wales, the primary camp being established at Holsworthy Military Base, Sydney, with three smaller, satellite camps set up at Bourke, Trial Bay, and Berrima.

In general, each camp held a particular category of prisoners. Of the 329 men interned at Berrima from 1915 to 1919, the majority comprised German merchant mariners from ships seized in Australian waters, ranging from junior officers and engineers to first officers, chief engineers and captains. The remainder included warrant officers from German naval vessels, Austro-Hungarian mariners and a handful of non-seamen (Helmi and Fischer 2011; Simons 1999).

Similar to several other internment centres, the Berrima Detention Camp was established in a recently closed nineteenth century gaol. Berrima was unique, however, in that the gaol was situated in the middle of a village—*albeit* an isolated one set on the banks of the picturesque Wingecarribee River. This setting and close proximity to local residents no doubt set the stage for the development of one of the most unusual wartime dynamics and a fascinating and unique sidelight of the First World War in Australia (Simons 1999).

In the beginning, the internees named their prison *Ahnenschloss,* "Castle Foreboding," yet this soon proved to be a surprising and utter misnomer. Whilst required to be locked down in the Berrima gaol overnight, the internees were permitted extensive daytime liberties including the freedom to visit the general store in the Berrima village and roam within a two-mile radius along the banks of the river. Local residents viewed the prisoners with curiosity rather than hostility, and over the years an atmosphere of mutual respect and friendly rapport developed (Simons 1999, pp. 6–10).

The regimented and structured nature of their maritime training and culture resulted in the Berrima internees being largely self-regulating and soon after their arrival they began using their energy and skills to contribute to the local community. Most notable are the construction of a 100 m long high-level timber footbridge over the Wingecarribee River—the "Hansa Bridge"—providing the townspeople with long desired direct access to recreational areas on the western bank, and the damming of the river to create a popular local swimming hole, named by the internees as "Lake Titicaca" (Samuels 1919, pp. 7–12; Simons 1999, pp. 6–36).

The Wingecarribee River became the focus of daily life for the internees and to escape the cramped quarters of the gaol they began erecting an array of timber day huts along both banks. Originally designed as simple bathing huts, these structures grew in number and extravagance as the months and years passed until the area took on the appearance of a quaint waterside village, complete with jetties, bountiful gardens, and a large communal hall. The fame of their activities and spectacular transformation of the river landscape soon spread, placing Berrima under the spotlight as a popular and unusual wartime tourist destination (Samuels 1919, pp. 7–12; Simons 1999, pp. 6–36).

## Historical Account of the Watercraft

As the waterside huts began to spread along the banks of the river, Wilhelm Köster, a 19-year-old merchant mariner and former fourth officer of the seized freighter *Pfalz*, raised the idea of building a rowboat. Despite being ridiculed, Köster persevered, and with the help of some friends he successfully launched the cloth-over-timber-frame canoe *Nelly* on May Day 1915 (Simons 1999, pp. 27–28, 105–106).

It was several months, however, until other internees decided to try their hands at boat building. In August 1915, a simple dugout canoe was constructed by unknown internees and was soon used by many to paddle up and down the river. The success of this canoe may have been the spark that ignited the internees' enthusiasm, as by the end of the year a flotilla of small craft had been produced (Simons 1999, pp. 105–106).

On February 2, 1916, these vessels formed the heart of a grand "Venetian Carnival," held by the internees on "Lake Titicaca" in celebration of Kaiser Wilhelm II's birthday. The day began with a parade of watercraft elaborately adorned with handcrafted decorations and disguises, led by occupants dressed in accordance with the style of their craft past a judge's pavilion to be scored on the quality, originality and ingenuity of their designs. First prize went to a canoe that had been converted with frame and cloth to form the raised swan-necked prow and stern of a gondola (Samuels 1919, pp. 17–21; Simons 1999, pp. 105–112).

Some of the other most popular creations of the festival included:

> … two swans with white necks and wings, one with a red beak and the other with a black one, and with their feet paddling the water. … .a very startling black swan artfully decorated with three arches of oak leaves [with] the imperial crown mounted on the middle arch [that] mechanically moved up and down its pole. … a yacht with funnel, bridge and little life-boats and pennants flying. … a second gondola, lit by candles and covered in red cloth. … a boat with green arches attached and carrying King Neptune with trident in hand. … a fire-boat Elbe 2 that could toot its foghorn, and Elbe ferry and many other kinds (Hurtzig 1914–1919).

A few weeks following, the vessels were borrowed by the Berrima Military Guard to host a carnival of their own. Staged as an evening affair, the Hansa Bridge was festooned with lights and decorated and illuminated craft were paraded in front of a large audience lining the river banks. Of particular excitement was a reenactment of the Battle of Cocos (Cocos (Keeling) Island, November 1914) between Royal Australian Navy cruiser HMAS *Sydney* and the Imperial German Navy cruiser SMS *Emden.* The fact that the internees had not only inspired such an event but also loaned their watercraft for the occasion illustrates the harmonious and rather unique relations that had developed between the guards and prisoners. This was perhaps even more surprising given that some of the Berrima internees were actually imprisoned warrant officers from SMS *Emden* (Simons 1999, p. 107; The Southern Mail, 3 March 1916).

The Venetian Carnivals became a regular event for the prisoners throughout the years of their internment, staged on special occasions such as the birthdays of Kaiser Wilhelm II, the German Crown Prince Wilhelm and the Emperors of Austria–Hungary Franz Joseph I and Karl I. In between such grand spectacles, the watercraft were used in undecorated form for daily leisure activities and regular aquatic meets involving various games, group exercises, races, and formation manoeuvres (Hurtzig 1914–1919).

In January 1918, the last, and without doubt the greatest, carnival at Lake Titicaca was held. Berrima villagers and scores of sightseers from as far away as Sydney lined the banks of the Wingecarribee as the internees staged a magnificent pageant. Every craft that had been built took part, embellished in a fantastical array that included perfectly rigged sailing ships, flower-decked gondolas, fire-boats, war canoes, a Chinese junk, models of nineteenth century German clippers RC *Richmers* and *Preussen*, a vegetable-bedecked agricultural display, a dragon-boat, and a shark. Elaborately designed paddle-wheelers, a "bicycle boat" and propeller-driven models of tugs and liners steamed amongst them. There were so many different disguises that many of the assembled crowd, particularly those who had witnessed earlier carnivals, erroneously believed that an extraordinary number of different vessels had been made (Hurtzig 1914–1919; Machotka 1940).

The culmination and highlight of the festival was a mock battle involving a Zeppelin canoe and the bicycle boat fitted out as a German bi-plane attacking a kayak decorated as a "submarine" or "English fishing boat laying mines." The event, however, took a rather disastrous but exciting turn. The "fishing boat" was supposed to sink ablaze at the end of the battle, but the wind freshened causing the Zeppelin collide with the others, setting fire to all three (Horstmann 1919–1920; Machotka 1940).

## Types of Watercraft

Using historical accounts and contemporary photographs, Cosmos Archaeology Pty Ltd (Coroneos and Berringer-Pooley 2006) developed a typology of the watercraft built by the internees of the Berrima Detention Camp during the First World War. Two main types based on hull characteristics were evident; shell-built craft and skeleton-built craft. Within these types, five subcategories have been identified that accommodate the more distinctive forms of Berrima watercraft.

### *Shell-built Type 1: Dugout Canoe*

Dugout canoes were the most popular type of watercraft built at Berrima; possibly a factor of their perceived durability and relative simplicity of construction. These canoes were made by cutting a section of tree trunk measuring 4–5 m in length and around half a metre in width, and then hollowing it out. Several of the canoes also had timber stem and stern posts and keel subsequently affixed.

The most commonly used trees were Eucalypts, which ultimately presented difficulties due to the substantial levels of sap contained in the fresh wood. Several dugout canoes were apparently lost due to their initial high density, leading some internees to install buoyancy tanks in their vessels (Simons 1999, p. 106). It is most likely that Eucalypts continued to be used simply due to the fact that the prisoners were limited in their choice of available raw materials.

Many of the stars of the internees' carnivals were elaborately decorated dugout canoes (Fig. 14.1), including *Seestern, Ajax, Miobe* and *Störtebeker;* the latter two often appearing dressed as fully rigged sailboats (see also below for more on *Störtebeker*). *Ariadne*, a larger dugout measuring almost 8 m in length was particularly admired for having the sleek lines of a racing shell and was sometimes fitted out as a five-oar warship or an extravagant dragon. One of the most popular, however, was *Hannover*, a two-person canoe propelled by a small steam engine that variously appeared dressed as a tug or fire-boat named *Elbe* or more elegantly as a model of the Kaiser's yacht *Hohenzollem* (Hurtzig 1914–1919; Horstmann 1919–1920).

**Fig. 14.1** A river craft decorated to look like a zeppelin during an aquatic carnival arranged by German inmates of the internment camp, Berrima, New South Wales, c. 1917. (By unknown photographer, Australian War Memorial, Image No. H12168; donated by Justice Harvey)

### *Shell-built Type 2: Kayaks*

The second shell-built watercraft type comprises a smaller collection of large kayak-like canoes (Fig. 14.2). These were also constructed through the hollowing out of a Eucalyptus trunk, however the kayaks exhibited more refined craftsmanship, showing sleek lines and smooth varnished surfaces. Nonetheless, despite their form and apparent lighter construction, these vessels were not very fast on the water (Horstmann 1919–1920; cited in Simons 1999, p. 107). One of the most renowned appearances of this type of watercraft was in the festival of 1918, where one of the kayaks was fitted with a cardboard conning tower and model cannon to create a submarine; the very submarine that was engaged in the catastrophic mock battle in January 1918 (Simons 1999, pp. 110–111).

### *Skeleton-built Type 1: Cloth-over-frame Canoes*

Cloth-over-frame canoes represent the foremost type of watercraft constructed by the Berrima internees. These vessels were crafted by building a timber frame, approximately the same length as the dugouts but broader in the beam, over which sailcloth waterproofed with oil paint was stretched. *Nelly*, the very first vessel built and launched, was a cloth-over-frame canoe. Her owners shortly thereafter built two larger versions; *Blitz* and *Attila*. *Attila* proved to be a particularly reliable and long-lived canoe that appeared in every sporting event and carnival over the next three

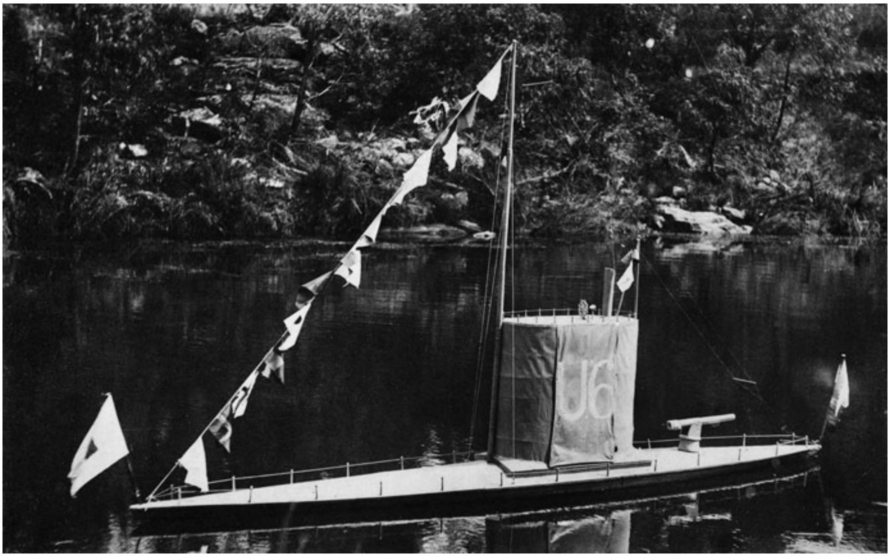


**Fig. 14.2** A decorated canoe on the Berrima River at the German Concentration Camp, Berrima, New South Wales. By unknown photographer. (Australian War Memorial, Image No. H12172; donated by Justice Harvey)

years, disguised as a gondola or covered in vegetables as the floating agricultural display "Viewlanden" (Simons 1999, pp. 105–111).

## *Skeleton-built Type 2: Paddle Wheelers*

One of the more elaborate categories of watercraft was the paddle wheelers; at least two of which, *Pirat* and *Emil*, are known to have been built (Simons 1999, pp. 108–111). These vessels were constructed of a cloth-over-frame hull with paddle wheels, also made of timber and cloth, mounted on the sides. The paddles and rudder were driven by a cranked axle attached to a driving shaft complete with steering wheel, which was operated by metal pedals at the driver's feet (Fig. 14.3).

## *Skeleton-built Type 3: "Bicycle boat"*

Perhaps the most unusual watercraft type was the "bicycle boat," only one of which was built. This vessel comprised of two narrow cloth-over-frame floats connected with timber, over which a metal frame resembling a bicycle was mounted. The craft was powered by a small metal paddle wheel fitted at the rear between the two floats, driven by the bicycle pedals. The frame and wheel was apparently constructed from


**Fig. 14.3** A hand-driven paddle boat named *Emil*, which was constructed by a German inmate of the internment camp, Berrima, New South Wales, c. 1916. By unknown photographer. (Australian War Memorial, Image No. H12132/41; donated by Justice Harvey)

scrap metal and tubing that had been found amongst the bush near an old coal mine (Horstmann 1919–1920).

The bicycle boat made a stunning appearance in the final carnival of 1918, covered with a large frame to form a German biplane, complete with an Iron Cross on the side—winning its creator first prize. This plane was one of the protagonists in the disastrous mock battle at the end of the carnival (Simons 1999, pp. 108–112).

## From a Systemic to Archaeological Context

The signing of the Armistice on November 11, 1918, brought a general relaxation to the rules of confinement that had governed the Berrima Detention Camp. Internees were no longer strictly required to be locked in the gaol house overnight and were allowed to travel outside their previous two-mile parole limit.

With the new expanded freedoms, interest for activities along the Wingecarribee River, including hut building, gardening and boating, swiftly dwindled as internees moved into houses in Berrima township, visited nearby villages and made forays into the surrounding countryside. The spectacular carnival held in honour of the Kaiser's birthday the previous January was the last ever to be staged.

However, Armistice did not, as many of the internees had fully hoped and expected, bring their release and return journey home. Until the Treaty of Versailles was signed on June 28, 1919, the majority of the inmates at Berrima continued to be held as prisoners of war. As the months of waiting in limbo dragged on, and news of the state of Germany and the nature of the peace terms reached Berrima, the atmosphere among internees declined from optimism and cheerfulness into anxiety, uncertainty and foreboding. The Allies' demands that the greater part of Germany's merchant fleet be forfeited caused particular and significant concern; as the majority of internees were merchant mariners, they saw this condition as destroying any chance of resuming their former occupations after returning home (Simons 1999, pp. 214–216).

In May 1919, the first prisoners of war held in Australia were repatriated including a small group from Berrima. As departure finally started to appear a reality, the internees of Berrima held formal discussions over what would be done about the huts, gardens, and boats they had created. The majority opinion was that all should be left as a gesture of goodwill—a memento, in effect, of the years of the camp. This decision held firm until July 1919 when reports of recent events at Trial Bay reached the Berrima camp (Horstmann 1919–1920).

Trial Bay Gaol had held between 500 and 700 internees during the course of the war; the majority of whom were German professionals and officers of the German Army, Navy and Colonial Service. At their own cost and with permission of the Australian Department of Defence, the prisoners had erected a monument on the hill overlooking the gaol in memory of companions who had fallen, and specifically those who had died at Trial Bay. The monument was built of three tiers of solid granite, over 6 m in height and 3 $m^2$ at its base. Four graves surrounded it, each with inscribed slabs of polished granite and encircled with rounded kerbing. On the side facing the ocean, a large tablet inscribed in German read "To the memory of our dead. Built by interned comrades at Trial Bay Prison during the world war, 1914–1919" (Sydney Morning Herald [SMH], 14 July 1919),

> This monument had been the cause of regular protests—particularly regarding its size and prominent location—by local bodies, including the Returned Soldiers' League and the Kempsey Chamber of Commerce. Several threats had been issued that it would be destroyed and on the night of July 1, 1919, after all internees had been relocated to Holsworthy, the first attempt was made. This act caused only partial damage but a second attempt using explosives two nights later reduced the monument to a heap of crumbling stone. The graves were said to remain undamaged (SMH, 7 July 1919).

Upon learning of this destruction, the internees at Berrima immediately decided to reverse their decision to leave all their works untouched. They were not willing to risk their own personal monuments of their time spent in the Detention Camp and now resolved that nothing would remain. The huts would be burnt or razed to the ground, gardens would be destroyed and the handcrafted vessels would be sunk. Some of the watercraft had apparently already been sold to various local residents, however, in the final days of the camp during late July and early August 1919, the internees carried out their vow to scuttle their fleet (Horstmann 1919–1920).

For maximum effect, several watercraft were destroyed during a visit by senior military personnel, one internee recording that:

> in front of his eyes, we fired about a dozen huts and sank about a dozen boats saying, "That's for the destruction of the memorial" (Bahl 1930).

Another account by a local resident implies that many of the watercraft were set alight during the sinking, writing:

> .... the lovely little craft which had been fashioned with so much care had been given a Viking's burial, and so that no alien hands might desecrate the hearths they had called "home" for so many weary months, they fired most of the pretty huts (Machotka 1940).

It is possible that the Berrima internees may have been influenced by the scuttling of Germany's extremely powerful Kaiserliche Marine's High Seas Fleet around a month earlier at Scapa Flow in the Orkney Islands, Scotland. The fleet had been interned under the terms of Armistice pending a decision on their fate in the Treaty of Versailles. Following nine months of what was considered contentious and disgraceful captivity as the peace talks dragged on, an atmosphere of resentful defiance permeated the skeleton crew interned with the ships, led by Rear Admiral Ludwig von Reuter. In late June, Reuter learned of Germany's refusal to ratify the naval terms of the Treaty, which involved the surrender of the High Seas Fleet. Subsequent rumours of a British plot to seize the fleet and news of the ultimatum given by the Allies that Germany either accept the peace terms by June 21 or face renewal of hostilities, led Reuter, apparently independently, to make the final decision to scuttle the ships (George 1973; van der Vat 2007).

On the morning of June 21, the message went out. Seacocks and flood valves were opened, internal water pipes and condensers were smashed and charges were laid on vulnerable parts of the ships. Many portholes and bulkhead doors had already been loosened, welded open or perforated with holes to facilitate the spread of water once scuttling began. Despite desperate attempts by the British Royal Navy to prevent the destruction and beach some of the vessels, of the 74 German capital ships, cruisers and destroyers interned in Scapa Flow, a total of 52 were successfully sunk (George 1973; van der Vat 2007).

In an interview at Weimar the following week, German Admiral Reinhard Scheer, Chief of Naval Staff and former Commander of the High Seas Fleet, voiced jubilation over the event, stating:

> Our seamen were unwilling to bear the final disgrace or suffer that the ships should be turned over to the British.... This humiliating and painful sight is now spared us by the brave deeds of Scapa Flow....
> I rejoice that the stain of surrender has been wiped from the escutcheon of the German Fleet. The sinking of these ships has proved that the spirit of the fleet is not dead. This last act is true to the best traditions of the German Navy (The Times Publishing Company 1920).

## The Watercraft 'Störtebeker'

In 1978, a dugout canoe was found half buried amongst the rushes on the banks of the Wingecarribee River by a local council worker, situated approximately 500–700 m downstream of the Berrima township. It is believed that the vessel was dislodged from the riverbed and beached in a sandbank by the regional floods of 1976 (Fig. 14.4).

**Fig. 14.4** *Störtebeker* canoe, 2009, Berrima District Museum. (C. Wilby, Cosmos Archaeology Pty. Ltd)

The canoe was removed to the Berrima District Museum, where a purpose-built shed was constructed to house the vessel during repair and conservation work. Over the following years, the timbers were treated with creosote to form a protective coating, the rusted ferrous fastenings of the keel were replaced with copper alloy bolts and the stern post was reattached using stainless steel bolts (Robert Williams, personal communication 2005). In 1999, the canoe was relocated inside the museum's main building, where it now sits as a key attraction in the impressive and popular "Prisoners in Arcady" exhibit that details the operation and daily life of the Berrima Detention Camp during 1915–1919.

Based on a comparison of the form and structure of the canoe—including the shape of the hull and the presence of both stern and stem posts—with a collection of historical photographs, the dugout was identified as *Störtebeker*; a rather well known canoe that appeared in several of the internee's carnivals as a four-man rowboat or dressed with a mast and sail. Various historical photographs show different groups and individuals using *Störtebeker* suggesting that it may have been regarded as communal property. Unfortunately, the builder/s of this vessel is unknown (Simons 1999).

It is believed that the canoe was named in honour of Klaus Störtebeker, a legendary fourteenth century Baltic leader of the "Victual Brothers" privateers and later captain of the pirate group the "Likedeelers." The name "Störtebeker" was a nickname, either heroically translated from Old German to mean able to "empty the mug with one gulp" or less heroically as "drunkard" or "tosspot." Störtebeker was captured and beheaded in Hamburg with over 70 of his companions, and has since been immortalised by many as a valiant freedom fighter (Hannay 1912, pp. 74–75; Simons 1999, p. 108).

Examinations of the *Störtebeker* canoe in its current condition show that the vessel was crafted from a fallen tree that was halved and cut to the required length, with the interior hollowed out and the exterior carved into the desired hull shape. Signs of shrinking and warping due to uncontrolled drying are evident along the length of the hull, and splitting and loss of timbers at bow and stern are visible. Nevertheless, it is estimated that the hull is approximately 90 % complete (Coroneos and Berringer-Pooley 2006).

Some evidence of the canoe's superstructure also remains. Visible on the exterior surface of the hull are small ferrous tacks, which very likely held in place the fabric that formed the fantastic adornments erected on these watercraft during festivals and regattas. In some places on the hull, at the bow and stern, hessian and thin ferrous sheeting are still attached and the stern post appears to have been painted red. On the gunwales at the stern, there also appears to be the remains of ferrous rub plates that would have prevented the wearing of the timber from the rubbing of oars and paddles.

Of particular interest are a series of patches of blackening visible on both the interior and exterior surfaces of the canoe, which may be interpreted as signs of burning resulting from the *Störtebeker's* apparent fiery scuttling at the end of the war (Coroneos and Berringer-Pooley 2006).

## The Scuttled Fleet—Physical Context and Archaeological Potential

In 2004, Cosmos Archaeology Pty Ltd was commissioned by the NSW Heritage Branch and the National Trust of Australia (NSW) Berrima Branch to conduct an archaeological assessment to determine the potential for further watercraft built by internees during the First World War to be identified within the Wingecarribee River.

Based on historical records and surveys of the locale, it was determined that the scuttled watercraft were most likely to be situated within an approximately 1.25 km section of the river, northwest of the Berrima township. This stretch represents the location of the artificially constructed "Lake Titicaca" and adjacent narrows along which the majority of the internees' day huts were sited. The rock and clay dam wall built by the prisoners to create the lake has since been washed away, consequently restoring the river levels to what they were prior to the First World War.

The Wingecarribee River passes through a landscape of sandstone bedrock at this location that outcrops in a series of ledges and overhangs both above and below normal river levels. Water depths reach and exceed 5 m at some places and whilst the general water flow is almost imperceptible, the river is sometimes subject to quite violent flooding following heavy rains. The riverbed is comprised of sandstone and silt and is heavily littered with fallen trees and vegetation.

The number of watercraft that were scuttled by the internees in 1919 is unknown. Historical records suggest that at least 50–60 were built, some of which were lost prior to 1919 due to flaws in their initial high density, experimental craftsmanship and mishaps during use. The total number of vessels constructed may be rather higher as it is unclear whether the historical sources refer to all types of craft or dugout canoes alone. However, it also appears that several watercraft were sold or given away to local residents prior to the camp being closed and the remainder being scuttled. Ultimately, from a combination of historical accounts (including Bahl 1930; Horstmann 1919–1920; Hurtzig 1914–1919; Machotka 1940) it may be estimated that at least between one to two dozen watercraft built by the internees were sunk in the Wingecarribee during the First World War.

The differing construction techniques of the watercraft—particularly shell versus skeleton hull type—the manner of their sinking and the environment of their final resting place all dictate the potential state of preservation, structural integrity, and consequently archaeological potential. The dugout canoes are the types most likely to survive owing to the dense material composition and simple form. The skeleton-hulled, cloth-framed watercraft could be expected to have fared worse, however, there is the possibility that some may have come to rest in situations favourable for the maintenance of their structural integrity; such as being buried in silt soon after wrecking or wedged in rock crevices.

Various factors such as turbulent flood events and sand-mining that has occurred along the river banks during the twentieth century are likely to have served to further disturb, damage, or destroy some of the watercraft. However, the 1970s discovery of the *Störtebeker* canoe in good condition attests to the chances of other vessels surviving relatively intact.

## Significance of the Watercraft

In 2009, as part of the project initiated by the Berrima Branch of the National Trust of Australia (NSW) and supported by the NSW Heritage Branch, Cosmos Archaeology Pty Ltd was asked to prepare supporting documentation for the nomination of both the *Störtebeker* canoe and the submerged watercraft to the NSW State Heritage Register; a statutory register established and maintained under the NSW *Heritage Act 1977* (see Coroneos and Lewczak 2010a, 2010b). As part of this nomination, the heritage significance of the watercraft was assessed according to the standard evaluation criteria adopted by the NSW Heritage Branch. These criteria encompass the four generic heritage values in the nationally recognised Australia ICOMOS "Charter for the Conservation of Places of Significance" (*The Burra Charter*) 1999, including historical, aesthetic, scientific and social significance, and are set out as follows:

> Criterion a) An item is important in the course or pattern of the cultural or natural history of NSW;
> Criterion b) An item has strong or special associations with the life or works of a person, or group of persons, of importance in the cultural or natural history of NSW;
> Criterion c) An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW;
> Criterion d) An item has strong or special associations with a particular community or cultural group in NSW for social, cultural or spiritual reasons;
> Criterion e) An item has potential to yield information that will contribute to an understanding of the cultural or natural history of NSW;
> Criterion f) An item possesses uncommon, rare or endangered aspects of the cultural or natural history of NSW, and;
> Criterion g) An item is important in demonstrating the principal characteristics of a class of cultural or natural places/environments in NSW. (NSW Heritage Office 2001).

The assessment found that the both *Störtebeker* and the submerged watercraft possess heritage significance under all criteria and have an overall significance at a State level.

The watercraft are considered to be of particular significance due to their historical associations with the German and Austro–Hungarian mariners held as prisoners of war at Berrima during the First World War. The context of the construction of the watercraft and the popular festivals surrounding the decorated vessels captures the positive and determined character of the prison community and demonstrates the unique environment of the Berrima Detention Camp, including the degree of freedom permitted and the civilised and friendly relations between the prisoners, the military guards and the local residents. The nature of the postwar scuttling of the watercraft further reflects the surviving pride and defiance of the internees, despite four years of captivity and their nations' ultimate defeat.

The watercraft are also of socio-cultural value to both the descendants of the internees and local villagers as well as current residents of Berrima and beyond. This is evident in the levels of enthusiasm, interest, and effort shown by the local community in the collation of historical documents and artefacts associated with the Berrima Detention Camp, and the particular efforts extended in the research, recovery and conservation of the canoes. Just as the internees' water carnivals drew thousands of sightseers during the First World War, the display at the Berrima District Museum, with the *Störtebeker* canoe as a key exhibit, is one of the most popular tourist attractions in the region.

The watercraft represent a unique collection of vessels that has the potential to expand current knowledge regarding the skill and ingenuity of the internees, and various details of the resources, materials and techniques of construction, decoration, modification, and repair. The remains of the submerged fleet may potentially contribute to the typology created for the watercraft via comparative physical analysis of their design and provide insight into the precise nature of the final scuttling.

Both the *Störtebeker* canoe held in the Berrima District Museum and the potential archaeological remains of the submerged watercraft in the Wingecarribee River have since been included in the NSW State Heritage Register listing No. 01848 "Berrima Internment Group," gazetted on January 14, 2011 (*NSW Government Gazette* 2011, p. 45).

## Archaeological Investigations Carried out till Date

Up until mid 2012, five fieldwork visits have been conducted to try to relocate the scuttled German watercraft. In October 2003, the Royal Australian Navy (RAN—Clearance Diving Team 5) undertook a side scan sonar survey of the likely scuttling location of the canoes, at the request of the Berrima Branch of the National Trust of Australia, with the support of the NSW Heritage Branch. Approximately 20 anomalies or potential targets were identified during this exercise. When RAN divers inspected one promising anomaly in zero visibility conditions, they identified it as a timber canoe filled with bricks—suggestive of a vessel that had been weighted down and sunk. Unfortunately, the exact location of the site was not recorded due to difficulties experienced with the GPS unit.

In August 2004, the NSW Heritage Branch commissioned Cosmos Archaeology Pty Ltd to undertake a desktop heritage assessment of the use of watercraft by the internees of the Berrima Detention Camp. This study included a predictive assessment of the likelihood that archaeological remains might be retained and established a staged approach for any future archaeological management and recovery projects. The study aimed to support the National Trust of Australia (NSW) "Berrima 1914–1918 Project" to search for and recover canoes for local display at the Berrima District Museum.

A second stage of this project was initiated in 2009, whereby the NSW Heritage Branch commissioned Cosmos Archaeology Pty Ltd to undertake a search for the "canoe" and other anomalies identified by the RAN in 2003 via qualified maritime archaeologist diver inspection. This study was conducted in preparation for the nomination of the submerged watercraft to the NSW State Heritage Register. Over two days in April 2009, a team including Cosmos Coroneos and Caroline Wilby (2009; Cosmos Archaeology Pty. Ltd.); Tim Smith, Sarah Ward and Stirling Smith (NSW Heritage Branch); and Colin Browne and Phil Clark (Manly Hydraulics Laboratory) conducted more than forty dive transects at two separate locations along the Wingecarribee River, including Locus 1; the general location of the "canoe" identified by RAN, and Locus 2; "Lake Titicaca" and the site of five additional RAN anomalies. As no position information was recorded during the RAN survey, dive locations were based on RAN field photographs and the memory of Mr. Dennis Brown, Chairman of the National Trust "*Berrima 1914–1918 Project*" who was present during the 2003 inspection.

The dive transects were carried out diagonally across the width of the river at Locus 1, forming a grid pattern that extensively covered the location of the RAN identified "canoe." At Locus 2, a series of dive transects were carried out in an arc from five central points on the southern bank in the location of the additional RAN anomalies, and one double longitudinal transect was surveyed along the length of this particular bend of the river.

Despite such intensive coverage, no evidence of the RAN "canoe" or other RAN anomalies was identified. The dives were significantly hampered by near zero visibility, underwater sandstone outcropping, ledges and overhangs, and a vast tangle of riverbed debris comprised of tree trunks and branches. This chaos of natural debris and irregular bedrock outcropping raises the question of whether the anomalies detected by the RAN were actually cultural objects.

Notwithstanding, several locations of archaeological potential were identified during this survey, including a regular row of timber stakes observed along the southern bank of the river, which may have been associated with a jetty or pier; some rock overhangs where a canoe could easily be caught and not detected using side scan sonar; and an overflow channel that would be filled when the river is in flood and may represent a location where dislodged canoes could be washed up and reburied.

Further side scan sonar surveys were undertaken by the RAN in April and December 2009. These surveys aimed at relocating the 'discovered' canoe and completing the remote sensing survey of the main river stretch. Whilst several anomalies were detected, ongoing positioning issues meant that no accurate fixes were obtained for later diving inspection.

In September 2011, the NSW Heritage Branch (2011) contracted Frits Breuseker of Seasee Pty Ltd to undertake an additional side scan sonar survey of the Wingecarribee River along the riverbank fronting the Internment camp using a Tritech SeaKing Towfish Side Scan Sonar.

The survey was coordinated by Heritage Branch maritime archaeologist Sarah Ward, and included three days scanning the river bed for potential targets. No diving was undertaken during this survey, the data from which was processed after returning from the field. The survey identified over 38 possible targets, which was later refined down to 10 promising sites. The use of side scan survey in this area was problematic in that the underlying sandstone substrate often protruded from the river bank in finger-like projections, whose appearance could be initially be interpreted as canoe outlines. However, several targets were identified as possible cultural sites, including a possible dinghy; a possible canoe or shipwreck; and at least two sites that appeared to consist of several regularly spaced pier piles—possibly the remnants of the wharves and hut sites built by the internees along the banks of the river (Fig. 14.5).

In February 2012, Heritage Branch maritime archaeologists Tim Smith and Brad Duncan undertook further fieldwork to inspect the targets identified in the previous survey. Divers were deployed to inspect these sites and confirmed that many of the finger-like protuberance signatures were actually sandstone outcrops. This fieldwork used a Humminbird 898 Side Imager as a pseudo side-scan sonar to aid in underwater

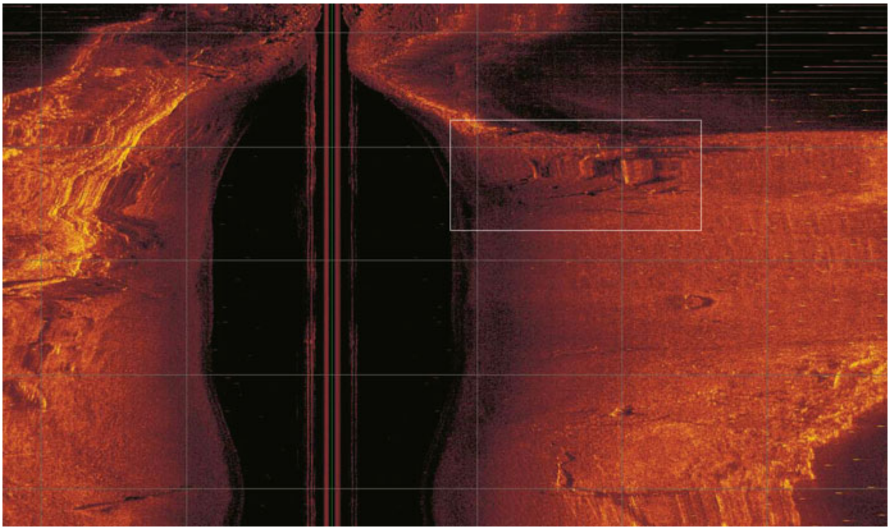

**Fig. 14.5** Target P9A—side scan sonar still image taken during 2011 survey showing a regular shape that comes to a point; possibly representing the end of a dugout canoe, Wingecarribee River, Berrima, NSW. (F. Breuseker/Seasee Pty. Ltd.)

target relocation. Although the fieldwork was cut short due to logistical reasons and inclement river flooding, the presence of two of the potential maritime infrastructure sites were confirmed when postprocessing the side imager readings.

An ongoing problem with trying to identify underwater sites in this river is the inability to accurately pinpoint the target on the river bed. The setting of the river at the bottom of the deep valley, its narrow width, and overhanging trees all restricted the accuracy/availability of GPS readings taken in association with the side scan sonar surveys to within approximately 5 m accuracy on the ground. Limited underwater visibility, when combined with submerged obstructions such as fallen trees and tree roots protruding from the bank, prohibited the use of standard survey sweeps using guide ropes and restricted the ability to accurately relocate targets identified on the river bed. For this reason, the next underwater survey to be conducted at the site will probably utilise differential GPS to provide 1 m accuracy on the river bed in combination with real time data from either a side scan or side imager unit. Further fieldwork at the site is planned for late 2012.

## Conclusion

The watercraft intentionally abandoned by German and Austro-Hungarian internees at the Berrima Detention Camp in the aftermath of the First World War represents more than just a repository for physical expressions of ingenuity and frivolity. These watercraft were not merely utilitarian and recreational vehicles but represent actual extensions of the personalities and character of those who owned and built them. They encapsulate the positive and defiant character of a wartime community formed in captivity on enemy soil.

With fear that the anti-German desecration at Trial Bay would be repeated—an action that would represent both an attack on themselves and their legacy—the prisoners chose to destroy their creations rather than risk them falling into malicious hands. The vessels were sunk by the internees' with affection, pride and defiance; a possible emulation of their comrades' actions at Scapa Flow a few months earlier.

The submerged fleet forms an underwater graveyard created by purposeful and symbolic intent; a memorial rather than a result of neglect. The discovery and documentation of this unique underwater resource will allow further interpretation and insight into the fascinating and unusual experience and activities of the internees at the Berrima Detention Camp during the course of the First World War.

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# Chapter 15
# Bikini Atoll: Abandoning Hot Ships in a Cold War

**Daniel J. Lenihan**

**Abstract** The atomic bomb tests carried out by a US Army/Navy joint task force at Bikini Atoll in 1946 marked the world's fourth and fifth detonations of nuclear weapons. The avowed purpose of the Bikini tests was to gauge the ability of warships to withstand nuclear attack, though conducting them served also to aggravate Cold War tensions between the United States and the former Soviet Union. On a local scale, the blasts displaced Bikini islanders from their home. In an effort to resettle the Bikinians, the Department of Energy in 1988 requested the National Park Service (NPS) Submerged Cultural Resources Unit be sent to survey the target vessels and evaluate the possibility of creating an underwater historical park. The team was to determine if the abandoned ships might become a focus for visiting divers and a sustainable source of income for the islanders. They were to address condition of the ships, historical significance, and level of hazard they presented to divers. The work took place in 1989/1990 with a report issued in 1991. This chapter is a discussion of a unique episode in submerged cultural resources management.

## Introduction

In the summer of 1946, two atomic bombs were detonated amid a fleet of warships at Bikini Atoll Lagoon in the western Pacific Ocean. Many of the vessels were aging and battle damaged, others perfectly viable, only a couple of years old. "Operation Crossroads" was a test with the stated purpose of gauging vulnerability of naval forces to nuclear attack. A year earlier, two similar bombs had been dropped on Japanese cities. They were not a test. Their stated purpose was to hasten the end of the Second World War by forcing Japan's surrender. The necessity for bombing Hiroshima and Nagasaki will be debated long into the future, but the results cannot be argued—within a week the war ended, as did more than a 100,000 human lives.

In contrast, Crossroads caused no human fatalities, but few doubted the tests were intended in part, as a warning growl to the Soviet Union. There was growing distrust of the Soviets among fellow "Allies" (those allied against Germany, Italy,

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and Japan). The war's end had been definitive. Germany and Japan were soundly defeated and grisly photographs of Mussolini's corpse became the lasting memory of Italy's dalliance with Fascism. Allied occupation of Eastern Europe, however, became a tense affair. Despite common interest in defeating Germany, the Russians had deep ideological differences with America and Western Europe.

By the end of the Second World War, the Soviets had repelled the invading Germans, but paid a staggering price in blood. Estimates of military and civilian casualties run higher than 20 million (Hosch 2009, p. 248; Machlis et al. 2011, p. 137). As Germany fell, the Soviets and their increasingly uneasy western allies maneuvered to claim land and influence in postwar Europe. Through 1945, the victors remained mobilized for a war that had ended, each suspicious of the other's intent. When plans to conduct the Crossroads tests at Bikini were announced in early 1946, it did little to improve the political climate. Later that year, the test results were reported in *Operation Crossroads : the Official Pictorial Record* (United States Joint Task Force One [JTF-1] 1946). The term Joint Task Force referred to the combined services Army/Navy entity that conducted the tests. It opened with "A Message from the Commander," Vice Admiral Blandy:

> The purpose of these tests was to determine the effect of the atom bomb against various types of naval vessels. With the information secured we can improve our ship design, tactics and strategy to minimize our losses in the unfortunate event of war waged with atomic weapons. . . not only warfare but civilization itself stands virtually at the crossroads. Hence the name of this operation (JTF-1 1946, pp. 5–6).

There was little doubt in 1946 which nations such an "unfortunate event" might involve. Whatever the motives, "nuking" an array of ships greater in size than most nation's navies was a spectacle that drew international attention. Aftereffects would be evident for decades as Crossroads instigated a new type of "cold" warfare; one whose roots were quite old, embedded in the prehistory of human conflict. More than 40 years later (1989–1990), the ships sunk at Crossroads, became the subject of an archeological study by the US National Park Service. Observations and conclusions associated with that project are the focus of this chapter.

## Operation Crossroads

To assess the effect of nuclear bombs on warships, the US military conducted a spectacular and expensive scientific experiment. Extraordinary expense had already been the hallmark of atomic weapons research since the Manhattan Project, the 3-year effort that made the bomb a reality. National wealth was the key ingredient and urgency the catalyst. The effort to out-compete Germany in devising a superweapon was spurred by need for an alternative to an Allied ground invasion of Japan. The result was successful detonation of an atomic bomb at the Trinity site in New Mexico on 16 July 1945.

Few knew the significance of a bright flash in the predawn sky over a remote desert bombing range (now White Sands). However, for those who knew where to look, it was visible 200 miles away. Scientists unable to join their colleagues at the test site watched from a hilltop at Los Alamos, a secret nuclear laboratory that existed officially only as P.O. Box 1663 in Santa Fe. The far-off flash told them that their 2 years of feverish effort to harness the power of the atom had succeeded. It happened as the war drew to a close. Germany had surrendered 2 months earlier, but the Japanese seemed resigned to a bloody war of attrition. The Trinity detonation was not a widely celebrated accomplishment; it was a closely guarded military secret. The world did not learn of the first nuclear blast until a second leveled Hiroshima 3 weeks later (Boyer 1985, pp. 3–7; Los Alamos National Laboratory (LANL) 1986).

Operation Crossroads had none of the secrecy that surrounded Trinity. It was largely designed to be a show—a demonstration of might. The US Congress openly committed funding for the deployment of 42,000 men (and 37 women). Primarily staffed by Navy personnel, there were also pilots from the US Army Air Forces (not yet the US Air Force), civilian nuclear experts, observers, medical specialists, and journalists. A large number of sailors were needed just to move almost 100 target ships, set up instruments to gauge blast effects, and clean up afterward. Among those accepting an invitation to observe the tests were a contingent from the Russian military (JTF-1 1946, p. 95; Shurcliff 1947, p. 184).

Resistance to Operation Crossroads came from several quarters, some coalescing around a scheduling conflict with the United Nations, a new player in the postwar scene that the United States was instrumental in creating. The Bikini tests were slated to start in May 1946, very close to a planned meeting of the UN Security Council. Radio Moscow commented that the United States was "... brandishing the atomic weapon for purposes which have little in common with the peace and security of nations" (Weisgall 1994, p. 91). President Truman, under pressure to cancel the tests, chose only to postpone them. Congressional Representative Ludlow (D–Indiana) introduced another resolution to cancel them entirely: "If we go ahead with the Bikini Atoll demonstration, we will be saying... to every other nation: 'We are going to show you how many of you we can kill if you get ugly. So don't start anything.' What an approach to world peace. What a travesty" (Weisgall 1994, p. 97)!

Many believed interservice rivalry, not national security, was the motive for the tests. They saw the Navy as desperate to justify its existence since recent events had demonstrated nuclear bombs could be carried to enemy lands without ships. Other critics thought the animals chained to the target ships' decks added a dark dimension to the experiment. Dogs were given a reprieve, but not the goats, pigs, guinea pigs, 5,000 rats, and other creatures with no vocal constituency in the American public (JTF-1 1946, pp. 67, 108, 110, 220). Rescheduled for July, the tests went forward.

The two bombs detonated at Bikini (Able and Baker blasts) were the world's fourth and fifth use of atomic weapons (Fig. 15.1). The Crossroads bombs were both implosion-type plutonium devices, similar to those used at Trinity and in the attack on Nagasaki. The design of the bomb used over Hiroshima was different. Both types caused an explosive chain reaction by forcing a key volatile component to reach critical mass. In the Hiroshima bomb, the substance was uranium; in the others, plutonium. Measurements of the blasts vary, but all five were roughly in the range of

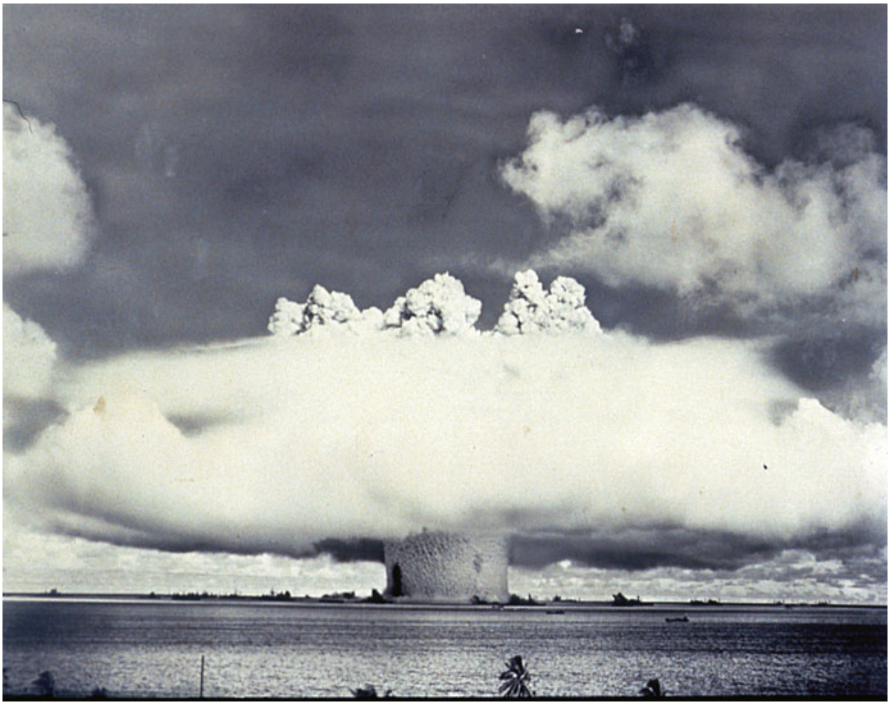

**Fig. 15.1** Atomic bomb blast Baker at Bikini Atoll: Atomic bomb blast Baker at Bikini Atoll in 1946 tests. Target fleet is partially visible around base of nuclear cloud. (Courtesy of United States Naval Institute)

20 kilotons (20,000 ton) of TNT. Their effects were also similar—an enormous release of energy creates an expanding fireball and shock wave that levels everything within 1/3–1/2 mile. Damage to structures is severe; fuel and wooden decking on ships may ignite within that range from exposure to the intense heat. As the fireball expands, its circular outer surface allows energy to rapidly disperse and strength to dissipate accordingly (JTF-1 1946, pp. 125–222; Weisgall 1994, pp. 182–205).

When the tests were over, reactions to Crossroads were different than expected; public angst over nuclear weapons was at first muted. The bomb's power had been amply illustrated at Hiroshima and Nagasaki—a background against which results at Bikini seemed anticlimactic. Most target ships remained afloat after two detonations of a type of bomb many viewed as apocalyptic. Some philosophically observed that atomic bombs dropped on Japanese cities were probably no worse than explosives used to firebomb Osaka or Dresden during the war (Boyer 1985, p. 213). Photographs of warships dwarfed by a huge mushroom cloud from Baker were dramatic, but many journalists had left the test-site after Able. Maybe distance from surviving cameras was too great or peoples' capacity for dread and spectacle overtaxed. Then, the other shoe dropped. Unexpectedly, post-test abandoning of the ships raised concerns the blasts had not. Reclaiming vessels that survived the tests was more difficult than projected. Target ships towed elsewhere for cleaning were sunk in frustration. Nuclear historian Paul Boyer in *By the Bomb's Early Light* would later write, "It was Bikini, rather than Hiroshima and Nagasaki, that first brought the issue of radioactivity compellingly to the nation's consciousness" (Boyer 1985, p. 90).

There were 78 target ships in the Able test array and 75 repositioned in the Baker array. Five would sink after the first blast and all told, 13 large vessels after both blasts. However, 61 would eventually be judged unsuitable for further service (Delgado et al. 1991, pp. 11–37). Much of that determination was the result of an invisible toxic presence that defied attempts at remediation. Most test ships were considered too "hot" to use again. There followed an even more worrisome realization—some support vessels, not part of the target fleet, acquired significant levels of contamination; it was as if some ships were contagious. Just putting scientists on board between tests seemed to spread the problem. Terrible as was the explosive power of the bombs, the public fixated on the prospect of invisible poison floating about, paying no heed to national borders (Boyer 1985, pp. 90–93, 292–323). The first newspaper photos from Bikini showed smiling sailors in shirtsleeves "sweeping radiation" from the decks of surviving ships—a casual attitude soon to change (Delgado et al. 1991, p. 30). Other things were also about to change including humankind's most basic notions of cold and hot and war and peace.

At first, only the Americans "had the bomb." British and Canadian scientists played important roles in its development, but only the United States could produce and deploy the weapons. This changed in 1949, when an atomic blast in Kazakhstan heralded the USSR becoming an atomic power. Great Britain followed in 1952. By that time, the United States and Soviet Union had begun a wildly escalating arms race. The phrase "mutually assured destruction" (MAD) became a popular acronym. Increasingly, it was also the only real constraint on an unthinkable confrontation—particularly unthinkable after the introduction of Hydrogen bombs in the early 1950s. There followed a half-century of espionage and proxy wars in places such as Korea and Vietnam as superpowers attempted to win "conflicts" between their surrogates rather than engage in apocalyptic exchanges of missiles (Boyer 1985, pp. 340–345, 352–367; Richter 2002, p. 7).

Science-based accomplishments in weaponry were the new measure of national power and it took a major commitment of national wealth to sustain them. Superiority through competitive "tests" marked decades of what became known as "the Cold War." The conflict ended in 1991 with dissolution of the Soviet Union. Armageddon did not occur, but the threat of global conflagration dominated the nightmares of two generations. Americans in grammar school in the 1950s, including the author, recall joining schoolmates under their desks for air raid drills. The nuclear bombs detonated on the target fleet at Bikini were early shots fired in this dangerous mock war.

On the local level in the Marshall Islands, a population of 167 Bikinians displaced for Operation Crossroads sought redress. After long litigation, they received substantial monetary compensation. By 1988, a major issue in their resettlement was the role the target ships might play in the new Bikini. Should they be seen as nuclear trash and gotten rid of? Or, was there some way to find a use for the ships? Perhaps the

Bikinians should follow the lead of their Micronesian neighbors in Chuuk (formerly Truk) and model their approach on Truk Lagoon? Just as Operation Crossroads resulted in ships at the bottom of Bikini Lagoon, Operation Hailstone (Allied bombing raids in 1944) resulted in Japanese ships at the bottom of Truk Lagoon. When self-contained underwater breathing apparatus (SCUBA) diving grew popular as a leisure time activity, Truk became an international diving destination and the sunken ships a significant source of income. To evaluate the potential for doing the same at Bikini, the Council turned to the US government through their attorney Jonathan Weisgall.

## The 1989/1990 Survey—Participants/Roles

An agreement called the "Compact of Free Association" had been signed between the United States and the Republic of the Marshall Islands in 1986. Jonathan Weisgall, the attorney who ushered the Bikinians through litigation, strongly supported having the wrecks bequeathed them as an historical resource. The Department of Energy (DOE) through Dr. Catherine Courtney coordinated a Federal agency effort to assist the Council in understanding both benefits and threats posed by the sunken ships.

In 1988, Courtney requested the assistance of the Mobile Diving Salvage Unit One (MDSU-1) based at Pearl Harbor—the US Navy's chief diving capability for the Pacific. MDSU-1's leader, Cmdr. David McCampbell agreed to provide Navy help, but recommended Courtney ask the Department of the Interior (DOI) to contribute the National Park Service's Submerged Cultural Resources Unit (SCRU) to the effort (note: SCRU was renamed the Submerged Resources Center (SRC) in 1999).

McCampbell had worked closely with SCRU's leader (the author) for several years in a cooperative arrangement called "Project Seamark" (Connors 1988, pp. 18–25). Its purpose was to accomplish underwater preservation tasks by focusing efforts of the Naval Reserves on these missions as part of their annual readiness training. Initiated in 1986 through the efforts of Naval Reserves Commander James Orzech and the author for work in Pearl Harbor, McCampbell witnessed the program in action and decided to adopt it on a larger basis. His commitment to the effort greatly increased the program's range and effect. Additional Seamark operations had already taken place in Guam, Palau, and Molokai and another followed Bikini in the Aleutian Islands. For Bikini, McCampbell proposed SCRU document the ships after a Navy Explosive Ordnance Disposal (EOD) team located them. EOD would conduct ROV (underwater robotic) inspections for hazards including ordnance and radioactivity, and set secure descent lines for NPS divers. Courtney took his advice.

Meetings were held both in Honolulu and SCRU's headquarters in Santa Fe, New Mexico. McCampbell, Courtney, and Weisgall worked closely with the Park Service team in planning the underwater operations and coordinating with various media interested in covering what fast became a high-profile project. For the first year, former ABC anchorman for San Francisco (Lee McEachern) and his partner George Lang also provided key support.

NPS team members selected by the author were the same for the 1989 and 1990 field sessions. Larry Murphy, Deputy Chief of SCRU was second in charge—besides his extensive archeological skills, he was a former NPS diving and blasting Officer. Archeologist Larry Nordby and Scientific Illustrator Jerry Livingston would be responsible for rendering line drawings. They were veterans of SCRU large-vessel documentation projects at both Isle Royale and the USS Arizona Memorial. Jim Delgado was the agency's Maritime Historian and a productive contributor to many SCRU projects. The author was the Principal Investigator.

## Objectives and Methodology

The primary objective for the NPS team was to learn enough about the ships, to meaningfully advise the Bikini Council regarding their archeological significance and attributes as a diving destination. A discussion of health threats from the radiological dose divers would receive from 2 weeks exposure at Bikini came from W.L. Robison of Lawrence Livermore National Laboratory. Radioactivity was a new issue for the NPS team. Reaction to its presence on the site seemed to include components both psychological as physiological. Several individuals who often worked on SCRU projects declined invitations to participate—they were experienced diving archeologists and no strangers to reasonable risk, but there were unknowns here that made them uncomfortable. This served as a warning—when questions about radioactivity move from the hypothetical to the personal and imminent, they demand close attention. Knowing our conclusions about the ill effects from diving at Bikini would be heavily scrutinized, it was comforting to learn that Dr. Robison was both expert and articulate. But he was not divine. So, in addition to his assessment, the author obtained other opinions, most importantly from Jim Sprinkle, a radiation-health specialist at Los Alamos National Laboratory and a personal friend. He agreed completely with Robison's conclusions. Simply put, background radiation at Bikini for 2-week diving exposures poses no significant risk. Such a determination is largely based on equivalencies, i.e., diving at Bikini offers no more exposure to radiation than X or Y. For example, X might be flying across the Pacific in an airplane or Y, working at one's computer at an elevation of 7,000′ in Santa Fe. The author, certainly no expert in these matters, pursued the safety issue in lengthy discussions until satisfied that, to the degree appropriate scientists understood radioactivity, diving at Bikini was a reasonable decision.

The Bikini Council specifically requested that SCRU assess the viability of establishing a diving park. In the United States, the association between heritage preservation and National Parks has been long evident in law and policy (1906 Antiquity Act, 1916 act establishing the NPS), but it is by no means a universal principle. However, Micronesians have the example of Truk Lagoon and SCRU had previously worked with Palau (now Belau) and Guam in similar ventures and a model for capturing the specific nature of Second World War ships could be applied from the team's prior work on USS *Arizona* and USS *Utah* in Pearl Harbor (Lenihan 1995, 1998).

Line drawings in association with photography had proved the most effective means for conveying information about large ships underwater. SCRU found video useful for fast data acquisition since the mid-1970s, especially for large shipwrecks at Isle Royale National Park (Lenihan 1987, pp. 10–12). But even with good visibility (often 60′ + at Bikini), imaging the *Saratoga* alone was a significant challenge. At the depth of the flight deck (90–110′), neither a diver's eye nor the film in a camera can "see" more than one-tenth of the length of an 890′ ship. Though *Saratoga* lies in water much clearer than the 5–7′ visibility of *Arizona*, it is also larger and much deeper—up to 180′. To present a comprehensive image for archeological or park management purposes, three views (a bird's eye, port, and starboard) are needed. Considering that the ship's overall length at the flight deck is roughly equivalent to three football fields, the team had to image nine football fields or about a half mile of ship to obtain sufficient coverage (Fig. 15.2).

The deep water meant contact time with the sites was limited. Most dives would be 100–130′ and some to 160–180′. Divers' air supplies do not last as long (using open-circuit SCUBA) and significant time must be spent decompressing on ascent. Nitrogen narcosis also reduces divers' cognitive abilities, but this factor is mitigated at Bikini by good visibility, high light penetration, and warm water. The author determined the task doable largely because the setup time on sites had been greatly facilitated by Navy divers. But it was also made clear to DOE that having only ten contact-days with the ships would negatively affect level of detail in site documentation. The problem was solved when a second field session was approved for 1990. Thus, the team had a total of 24 contact-days averaging two dives a day per person. This amounted to well over 200 person-dives being conducted by SCRU during the project. Dives conducted by ABC camera teams for television or National Geographic for magazine illustrations are not included in that number.

## The Ships

The ships abandoned at Bikini comprise a remarkable display of Second World War naval history. Thirteen large target vessels (including a yard-oiler and floating repair dock) remain clustered on the lagoon floor within little more than a mile of each other. Some were significant for their roles in the Second World War and all for the unique manner of their abandonment. All but three were selected from an American Navy in the process of downsizing from its wartime maximum. These included the battleship *Nagato* (1919–1946) and cruiser *Sakawa* (1944–1946) from Japan's Imperial Navy and *Prinz Eugen* (1938–1946), a storied German cruiser. Unless otherwise noted, the following remarks are based on the project's report (Delgado et al. 1991) and the author's personal observations.

*Nagato* was flagship of the Japanese Navy during the attack on Pearl Harbor. It hosted Admiral Yamamoto, as he awaited reports from the strike force sent to


**Fig. 15.2** Starboard profile view of *Saratoga*: Starboard profile view of *Saratoga* by Larry Nordby and Jerry Livingston from 1989/1990 SCRU project at Bikini Atoll, Marshall Islands. This is part of a set of line drawings made to illustrate the nature and condition of the sunken fleet after atomic bomb tests during Operation Crossroads. (NPS photo courtesy of SCRU 1989/1990 Bikini, Marshall Islands)

Pearl under Admiral Nagumo. Yamamoto overheard the famous “Tora Tora, Tora,” transmission from the flight leader informing Nagumo that the American fleet was in port and vulnerable—an iconic moment in film, print, and the social memory of Americans regarding the Second World War. In January 2013, the author queried Amazon.com for titles of Movies and TV productions that included “Pearl Harbor,” finding 557entries. For “Tora Tora Tora,” there were 129.

The sum effect of the Able and Baker blasts was to leave *Nagato* upside down, its keel bent 90 ° at the stern. This fortuitously kept the mid-ships area from being crushed by the weight of the hull. The Park Service team found that they could easily swim under the inverted deck to the muzzles of the 16-inch guns. The team had little doubt this point would become a great attraction for divers who might visit Bikini as an underwater park. Of special historical note, the Japanese bomb responsible for destruction of USS *Arizona* at Pearl Harbor had been modified from a projectile originally manufactured for the 16-inch guns of *Nagato*. Also, the ship’s bridge where Admiral Yamamoto received the coded transmission noted above, was found sheared from the deck and relatively intact on the bottom (Delgado et al. 1991, pp. 57, 128–130). SCRU had several years earlier mapped USS *Arizona* where the remains of almost a thousand of the 1,177 men who died on the ship have become one with the silt covering internal surfaces. Connections, real and symbolic between these ships sometimes make scientific detachment elusive. Many old ships, abandoned or wrecked, have symbolic attributes that give them power as touchstones to the past—a point at which the relative values of history become tangled in the less yielding fabric of archaeology.

The Japanese cruiser *Sakawa* was not found during the Park Service study. But the team’s report (Delgado et al. 1991, p. 137) suggests that when sunk during the Able blast, *Sakawa* came to rest between *Arkansas* and *Saratoga*—very near the point that Baker was detonated. As Baker was an underwater detonation (the bomb suspended under a landing craft), the report concludes that the remains have been flattened into the lagoon floor and will remain difficult to locate. Delgado returned to Bikini a few years after the NPS report was published. He relates in his book *Ghost Fleet* that divers reported seeing a flattened metal mass in the subject area (Delgado 1996, p. 153).

The third non-US vessel that was part of Operation Crossroads was the German cruiser *Prinz Eugen*. In 1940, prior to the United States entering the war, *Prinz Eugen* joined the battleship *Bismarck* in a dramatic sea battle with the British Royal Navy, wherein HMS *Hood* was sunk with great loss of life. After the Crossroads tests *Prinz Eugen*, though minimally affected structurally by the blasts was highly contaminated with radiation. It was towed to Kwajalein Atoll where in December 1946, possibly due to an open sea valve, it took on water and turned over in the lagoon. Its screws still protrude above the surface. Here, the team made its first observation while on snorkel—the latest copy of *Jane’s Fighting Ships* said the ship had four screws—we counted three. Although separated from the “fleet” at Bikini, *Prinz Eugen* was included in the study as an unexpected target of opportunity. During both field sessions, local transportation delays isolated the team for periods at Kwajalein—from those setbacks came the opportunity. Most of the team’s dive gear remained in shipping containers awaiting transport to Bikini, but tanks loaned to us by the "Kwaj Dive Club" made brief assessment dives possible (see Delgado et al. 1991, pp. 134–138).

Among the US ships selected for Crossroads, the aircraft carrier *Saratoga* (1925–1946) had greatest name recognition. It was a sentimental favorite of American sailors, especially after its massive deck and hangar space was contributed to "Operation Magic Carpet," a concerted effort to rush troops home at war's end. In its new role in what has become a marine historical park, *Saratoga* is the centerpiece. Sitting upright and largely intact, it was the only aircraft carrier in the world accessible to divers until May, 2006 when the USS *Oriskany* was sunk to serve as an artificial reef near Pensacola Florida. Similar to all complex artifacts, sunken ships have archeological information lodes, but warships in particular often have symbolic weight. *Saratoga* makes a viewer reach for superlatives in describing it, but as part of the collection of vessels at Bikini it serves as an entree to the entire visitor experience.

The Crossroads ships present visual stimuli much different than, for example, American Civil War battlefields. The latter memorialize the greatest bloodletting in US history, but leave the imagination to discern carnage in carefully tended headstones and mowed green lawns. The world's transition to the atomic age had obvious consequences for warfare, and at Bikini, they are starkly exposed. Divers feel transported to where time has been curiously compromised. The growth of corals encrusting steel with life is a product of time, but the marks of catastrophic violence are always evident beneath. Armament of the Second World War dominates the seascape except for the occasional intrusion of blast towers on the wrecks. Also called "Christmas Trees" by Crossroads technicians, these were robust structures designed to hold gauges that measured nuclear blast effects—see photos in (Delgado et al. 1991, p. 116)

The diver's eye is frequently confronted with contradictions at Bikini. Saratoga's starboard torpedo blister, which was less than 400 yards from the Baker blast, seems to have been shrink-wrapped over its internal framing. A depression several hundred feet along the flight deck marks where water crashed down after being raised into the stem of a nuclear mushroom. Forward from there, the smokestack has collapsed onto the deck. But remarkably, the takeaway impression is how intact the ship seems. Divers have no doubt they are on the damaged but quite recognizable remains of *Saratoga*. Helldiver planes with folded wings are neatly stowed 130" deep in the hangar with intact instrument gauges. Light bulbs that had been 400 yards from an atomic blast are unbroken along the overheads of the hangar deck.

Bombs and projectiles (some plaster-filled for the tests, but most live) are found throughout the ship (Fig. 15.3). The easiest choice for explosive ordnance specialists is to "safe" bombs by placing a charge on them and hitting a switch. But that propagates the explosion to all bombs in the vicinity, often destroying visually compelling areas of a ship. The NPS team greatly appreciated the willingness of Navy specialists to work with them on solutions that helped keep intact the integrity of the site. In a well-preserved area of the hangar deck, they agreed to "safe" a bomb by pouring epoxy through a hole in the nose to clog the corroded initiating mechanism. More recently, managers of tourist diving operations have reported that Saratoga's bridge has

**Fig. 15.3** Bombs in Hangar Deck: Author examines tail assemblies of bombs in hangar deck of USS Saratoga sunk at Bikini Atoll in 1946 during atomic bomb tests. (NPS photo by Larry Murphy SCRU 1989/1990 Bikini Atoll, Marshall Islands)

slumped severely, making it hazardous to visit the ship's command center.Gradual deterioration over decades, interspersed with such dramatic events seems to be the path followed by all metal ships embraced by the sea.

Two destroyers, *Anderson* (1939–1946) and *Lamson* (1936–1946) were also sunk at Bikini, but were not a focus of work by the NPS team. The USS *Arkansas* (1912–1946), an older battleship and veteran of the First World War is completely inverted and appears to have been shoved deeply into the sediment by the force of the blasts. The two submarines, *Pilotfish* (1943–1946) and *Apogon* (1943–1946), are comparatively intact (Fig. 15.4). *Apogon*, with surficial damage, but a still-intact pressure hull after the Able blast. It was suspended at 100′ (keel depth) for the Baker blast (850 yards away) and suffered damage that made it unsalvageable. It was not evaluated by the team. The Navy also located a Yard Oiler (YO), an ARDC (floating repair dock), and two attack transports, *Carlisle* (1944–1946) and *Gilliam* (1944–1946). The latter two were workhorses of the war key to moving supplies and men in both the Pacific and Atlantic theaters. *Gilliam* was unintentionally almost ground zero for Able—an air blast which was dropped embarrassingly far from the intended zero point (the USS *Nevada*).

**Fig. 15.4** Sketching US Submarine *Pilotfish*: NPS scientific illustrator sketches US Submarine Pilotfish sunk during atomic bomb tests at Bikini Atoll in 1946. The submarine lies 175′ deep. (NPS photo by Larry Murphy SCRU 1989/1990 Bikini, Marshall Islands)

## Abandoning the Ships

Abandonment of many ships at Bikini became a much more involved process than anticipated. Usually, owners abandon vessels when they age and become unfit for service. However, many vessels in the Crossroads experiment were still perfectly functional. Sailors would have fought and died to keep them afloat a year earlier. Large ships are expensive, complex machines often owned by nations or private conglomerates. They can be "broken" for parts, run aground as maritime markets, and serve as docks or foundations for bridge construction. Some are left on the seabed for centuries but not abandoned, meaning without intent of forfeiting ownership. This applies to state-owned warships sunk in combat and sometimes to vessels lost in combat against them. This was the case with former commerce raiders of the Confederate States of America. When the CSS *Alabama* (sunk by USS *Kearsarge* during the American Civil War) was partially excavated off Cherbourg France, access to the site was controlled by the French while the United States remained rightful owner.

The abandonment process at Bikini, however, did not follow a traditional path. Bombing almost a hundred of one's own ships, including some of the largest afloat and recently built at great expense, is unusual behavior that leaves unique material residues. Though chosen as part of a target fleet and towed thousands of miles to be subjected to nuclear explosions, there was intent to reuse the Crossroads ships that did not sink. The attempt to reclaim the still-floating ships eventually took on an air of desperation. Some vessels were repeatedly sprayed with soap and caustic chemicals and sandblasted to remove radioactive particles from their hulls. Sand used in the sand-blasting process was itself retrieved and packed in 50 gallon drums for disposal. The light aircraft carrier *Independence* was taken to San Francisco and put through a decontamination odyssey for years before finally being sunk in deep water (Delgado et al. 1991, pp. 29–33).

Nathan Richards and Mark Staniforth are among those addressing the unique nature of abandoned ships as archeological phenomena. They emphasize that abandoned ships are an act of intent; the result of a decision to dispose of ships rather than keep them in operation for their original purpose (Richards 2008; Richards and Staniforth 2006). This distinguishes them from most vessels we commonly refer to as shipwrecks that were lost due to a catastrophic event.

The work of Richards and Staniforth discusses locales where abandoned ships graveyards are likely to be found—often near areas of high commercial use (where decisions to discard are made), but where they would not for create hazards to navigation. Hence, discarded vessels can be predicted in nearby wetlands that are shallow and unused, or conversely, in deep areas where they are unlikely to inhibit commerce. The latter being feasible only if access to deep water is close by—San Francisco Bay being a good example. They also make a specific exception for target ships used in tests (Richards and Staniforth 2006, p. 90) which, of course, include those at Bikini. However, their model is still useful as a base for comparison. Crossroads ships result from different intent than those discarded due to age, wear, and outmoded propulsion, but the behavior exists in the same world, subject to the same constraints. Collections of discarded ships offer statistical strength to meaningfully address issues of patterned behavior (see Seeb 2007). This is of more anthropological interest than studies confined to descriptive discussions of unique historical events or specific shipwreck sites and a type that many, including Gould (1983, pp. 6–9, 2000, pp. 327–330), Murphy (1983, pp. 69–70), and McCarthy (2000, pp. 4–6) have encouraged and demonstrated for some time.

Operation Crossroads could be seen as an act of ship abandonment with extreme prejudice. The ships at Bikini were purposely provisioned and armed—an unusual condition for ships bound for intentional destruction. But then, intentional loss of functional well-cared ships has happened—not for the purpose of scientific experiment as at Bikini—but with intent to demonstrate grief or respect. It brings to mind Viking burial offerings or other cases where ships or valuable facsimiles are destroyed or given away to garner prestige. Archeologists on the NPS team thought the closest analogy in an ethnographic or archeological sense to Bikini was the Potlatch,


**Fig. 15.5** Scrap values: This is an attempt to justify the expense of Operation Crossroads by showing the target ships scrap value equal to only half the cost of one new destroyer. It does not address the obvious questions about loss of naval deterrent capability in the sunken ships. (Joint Army/Navy Task Force One photograph released May 3, 1946)

a ceremony practiced by the Northwest Coast Indians in the United States. Delgado et al. (1991, p. 143) in the project's report writes:

> . . . the United States was demonstrating its wealth, a fact underscored by the sacrifice of a tremendous fleet of target ships, all in a destructive display that echoed the potlatch ceremonies of Northwest Native Americans who proved their wealth by purposeful destruction of valued and valuable items.

In an orgy of conspicuous consumption, gifts are made, or objects of worth demonstratively destroyed. What consumption could be more conspicuous than blasting with an atomic bomb? However, at Crossroads the disposal of wealth was not just the ships, but the process itself. The Crossroads leaders made a strong point that the scrap worth of the target fleet would equal only half the cost of one new destroyer (Delgado et al. 1991, p. 21; Fig. 15.5). This of course, assumes one has already accepted loss of the ships' value as deterrents to a potential aggressor in their former role as warships.

War dances and sacrifices of enemy prisoners before battle in Central Mexico; Sioux Indians "counting coup" (harmlessly striking an enemy with a spear or coup stick) and similar practices in antiquity or the present, mirror behavior evident in Crossroads and the Cold War that followed. One frightens the enemy with the ritual of war, but avoids the costly losses of actual engagement. Old ideas with new toys in the box can have serious consequences. Sioux coup sticks did not have plutonium tips that held 20,000 ton of TNT.

Operation Crossroads entailed the abandonment of great ships through fiery explosions, using the most expensive of weapons while harnessing the energy of 42,000 people. The most frightening aspect of the Cold War that dawned at Bikini was the speed of acceleration in weapons development. In less than a decade, bombs of the type tested at Bikini were needed just to trigger the thermonuclear or hydrogen bombs that followed. The blast that ultimately spread radioactive isotopes throughout Bikini Atoll was not from Crossroads bombs in 1946, but a hydrogen blast (Castle Bravo) in 1954—an explosion 750 times more powerful than the Able or Baker blasts (Bascom 1988, pp. 154–163; Weisgall 1994, pp. 302–307). Nor were planes necessary any longer to deliver the bombs; that job taken over in the 1960s by Intercontinental Ballistic Missiles (ICBMs). One can imagine thousands of missiles carrying warheads of Castle Bravo's size passing each other on their way to cities in the United States and the Soviet Union. The most accurate analogue would be a variant of one the author recalls being popular during the height of the conflict—combatants in a basement, ankle-deep in gasoline, throwing lit matches at each other.

## Conclusion

The media, similar to archaeology, has variable substance, but undeniable importance for historic preservation. The Park Service team knew a narrative would develop around its work as it does for any high-profile project, one that would be important for the Bikinians. Convinced that controlled diving access was best for both historic preservation and the people of Bikini, the team worked to ensure the public had a clear understanding of threats and lack of same. Rational assessment of things nuclear is in short supply and the Bikini Council wanted divers to visit a site nuked twice and then, thermo-nuked—meaning it hosted hydrogen bomb tests including BRAVO, the largest weapon America ever detonated. A *National Geographic* writer accompanied us on the second field session. John Eliot's story in the June 1992 issue addressed the key diving concerns regarding live explosives and nuclear radiation:

> Although much ammunition is live, both Navy experts and SCRU team leader Dan Lenihan feel that the risk to divers is minimal "unless they attack the ordnance with a hammer" says Lenihan. And there is essentially no danger from radiation in the water according to William L. Robison at the Lawrence Livermore National Laboratory in California (Eliot 1992, p. 77).

It was exciting to contemplate the islanders finally benefitting from what had plagued their existence for decades. Weisgall put it well when he reflected a couple of years later in *USA Today*: "'This is an opportunity for the Bikinians to capitalize on the nuclear legacy that left them without a home,' says Jonathan Weisgall, a Washington lawyer for the Bikinians" (Hoversten 1995).

A site similar to Bikini comprises a unique link to a time of transition in the twentieth century. At the end of the Second World War, when it seemed the stakes could get no higher, came the specter of destruction on a scale unimaginable. During Operation Crossroads, bombs similar to those that obliterated Japanese cities were dropped on ships essentially to see what would happen and impress one's enemies. The Cold War which followed became an age of brinksmanship in which a minor miscalculation could have made consequences of past conflicts seem trivial in comparison. Now, it has faded from at least the front page of our nightmares.

The abandoned ships of Bikini are a gift to heritage conservation in the new millennium. History is lived over on land, but sinks to a less volatile environment on the seabed. Although some vessels including *Nagato* and *Saratoga* are historically significant in themselves, they are of far greater value where together they now rest. The NPS team's report was completed and distributed in 1991; a period with its own Cold War importance as it marked collapse of the Soviet Union in Eastern Europe.

The obvious archeological, memorial, and recreational potential of Bikini overcame the initial reaction that the ships were nuclear trash to be gotten rid of. It would have taken much of the dollars hard won in the Bikinians' settlement to dispose of something that did not need disposing of. In the park service team's (then) home town of Santa Fe, New Mexico, proposals for commemoration of the Manhattan Project are consistently shouted down by people averse to "glorifying nukes." However, historical sites are not supposed to be endorsements—they are recognition that something exceptional has happened; witness NPS management of Ford's Theatre where Lincoln was shot; Andersonville Civil War Prison Camp where treatment of fellow American prisoners was horrific; and Manzanar internment center, where American citizens were imprisoned because they were guilty of being Japanese.

The conclusions of SRC regarding Bikini resulted in support at a critical time for the site's historical, archeological, and monumental worth. These results were supported by many and hotly debated by others—a healthy process for historic preservation. As an afterword, it should be mentioned that in August 2010, Bikini Atoll was designated a World Heritage Site by UNESCO. To the author that is an appropriate and satisfying outcome.

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# Chapter 16
# Vessel Reuse and Abandonment in Post-military Contexts: Examples from the Colonial and Early National Navies of Australia and New Zealand

**James W. Hunter, III**

**Abstract** Between 1863 and 1891, the colonial governments of Australia and New Zealand purchased a variety of iron-hulled warships as a means of augmenting the defense of their coastal waters, harbors, and inland waterways. By the beginning of the twentieth century, these once formidable warships were largely obsolete, and while those in New Zealand were either lost or disposed of, their Australian counterparts were retained for service in the Commonwealth Naval Forces and Royal Australian Navy until after the First World War. Ultimately, however, these vessels too were also sold out of service. Many were subsequently used in a variety of secondary civilian roles before they were discarded, while others were ignominiously disposed of and forgotten. Archaeological investigation of a handful of these warship abandonment sites has revealed discard signatures that differ from those generally associated with contemporary commercial watercraft. This chapter will highlight these sites and explore tentative explanations for their unique discard attributes through the filter of archaeological site formation.

## Introduction

In the 1860s, the colonial governments of Australia and New Zealand began purchasing a variety of iron-hulled warships as a means of augmenting the defense of their coastal waters, harbors, and inland waterways. Although a naval capability already existed in the form of the British Royal Navy's Australia Squadron, the vessels assigned to it were charged with patrolling the vast waters of the South Pacific and Southern Ocean in addition to those immediately surrounding Australia and New Zealand (see Bach 1986; Frame 2004, pp. 47–48; Macandie 1949, pp. 14–16). As a

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**Fig. 16.1** Maps of Australia and New Zealand, showing the locations of abandoned naval vessels discussed in this chapter. (Image by James W. Hunter, III)

consequence, they were rarely in any one Australasian port at any given time, leaving the majority of the region's settled areas virtually undefended. In New Zealand, internal disputes between colonial European settlers and indigenous Maori in the early 1860s only exacerbated this issue, as did subsequent (unsubstantiated) reports during the 1870s and 1880s that foreign powers—most notably Imperial Russia—intended to assault both New Zealand's and Australia's wealthiest ports by sea in the event of war with Great Britain (see Colwell 1973, p. 72; Cooke 2000, pp. 36–38; Evans 1986, pp. 23–24; Nicholls 1988, p. 38, pp. 60–61; Wimmer 2008, p. 13). In response to these real and imagined threats, most of the Australasian colonies purchased at least one large naval vessel and one or more smaller torpedo boats capable of harbor defense and/or near-shore coastal patrols (Frame 2004, pp. 56–58; Gillett 1982, p. 3, pp. 6–9; Stevens 2001, p. 8).

By the beginning of the twentieth century, these once formidable warships were largely obsolete, but many that had served in the Australian colonial navies were retained for the Commonwealth Naval Forces (CNF) and Royal Australian Navy (RAN), where they were relegated to secondary and/or specialized support roles (Gillett 1982, pp. 3–4). New Zealand's colonial navy, by contrast, had either lost or disposed of all of its vessels by this time. Australia's decision to keep its older naval craft proved wise, for with the outbreak of the First World War in 1914, those still in operation were modified and reinstated as active-duty assets of the nation's "home" fleet. Ultimately, all were sold out of service, although many were subsequently used in secondary civilian roles before being discarded (see the next section). The following case studies highlight surviving archaeological examples of abandoned Australasian warships constructed during the colonial era (Fig. 16.1). Some were established as breakwaters or retention barriers at the conclusion of their active use lives, while others were ignominiously disposed of and forgotten. All, however, exhibit discard signatures that differ from those generally associated with deliberately abandoned commercial watercraft.

## Archaeology and Watercraft Abandonment

Discarded watercraft have been addressed extensively in archaeological literature; however, studies undertaken by Richards (1997, 1998, 2002, 2008, 2011) constitute the first concerted effort to identify, evaluate, and define cultural behaviors and activities associated with processes of ship abandonment. His research has demonstrated the utility of cultural site formation approaches—as advocated by scholars such as Schiffer (1972, 1983, 1995, 1996; see also LaMotta and Schiffer 2008; Skibo and Schiffer 2008), Muckelroy (1975, 1976, 1978) and Gibbs (2005, 2006)—within maritime contexts, and builds upon existing models by incorporating terms and definitions that apply exclusively to archaeological signatures of watercraft use and discard (see Richards 2008, pp. 118–177). Each of the sites addressed in this chapter comprise examples of what Richards terms *deliberate abandonment*, or vessel abandonment that "involves premeditation in every sense," including intentional acts of methodical discard and destruction that are executed over a protracted span of time (Richards 2011, p. 859). This differs from *catastrophic abandonment* and *consequential abandonment*, both of which involve unplanned willful destruction of a vessel—often during situations of considerable duress—in an effort to preserve human lives, cargo, and/or other structures (see Richards 2011, pp. 858–859).

Richards (2008, pp. 118–144) identifies archaeological signatures of use that operate as indicators of a vessel's functional utilization in pre- and post-deliberate abandonment capacities. These include a ship's conversion and modification into one of a number of secondary functional roles (i.e., hulks and lighters) or specialized support craft (such as a floating storehouse or workshop). By the same token, discarded vessels may be adapted to a variety of functional post-abandonment uses, the most common of which include breakwaters or groynes (a *groyne* is a wall or breakwater built out from a riverbank or seashore to control erosion. They are also commonly referred to as *spur breakwaters*, and while typically constructed from wood, stone, or concrete, were also occasionally formed from the hulls of one or more scuttled vessels). Although the bulk of Richards' explanatory model is applied to commercial watercraft, many—if not all—of the behaviors he describes were also common in respect to vessels either actively or formerly used in military roles. They are, therefore, utilized as a means of assessing the warships addressed in this chapter.

Similarly, deliberately abandoned ships may exhibit one or more specific signatures of discard, including: structural minimization, a variety of pre- and post-depositional salvage and scrapping behaviors, methods of preventing a vessel's movement once abandoned (labeled *placement assurance*), as well as the overall discard environment and abandoned craft's orientation within it (see Richards 2008, pp. 145–177). A particularly noteworthy and common archaeological signature associated with deliberately abandoned ships is their inclusion within officially designated discard areas such as ship graveyards. Military craft are commonly deposited in ship graveyards, but more often than not as a strategic means of inhibiting "enemy penetration of navigable waterways or strategic shorelines" (Richards 2011, p. 866).

Other discard behaviors specific to military vessels such as their intentional destruction for offensive or defensive tactical purposes (i.e., as block ships or fire ships; see Blackburn 1978, p. 142; Kemp 1988, p. 112) are noted in Richards' model, as are a handful of those in noncombat contexts (i.e., forcing a vanquished navy to scuttle its warships, or using captured vessels as target practice; see Delgado 1996, p. 18, pp. 21–22; Lenihan 1998). However, one theme that has received relatively little attention is the intentional disposal by navies of their own decommissioned warships in postwar contexts. A small number of notable exceptions such as the archaeological investigation of the War of 1812-era US Navy vessels *Eagle*, *Ticonderoga*, *Allen*, and *Linnet*, have identified economic factors and postwar downsizing of military infrastructure as catalysts for abandonment (see Cassavoy and Crisman 1996, p 177, 179, pp. 185–186; Crisman 1983, 1987, 1995, pp. 4–8; Emery 2003; Washburn 1998). The primary focus of this chapter is to identify and assess reuse and discard behaviors associated with decommissioned vessels of Australasia's colonial and early national naval fleets. It utilizes Richards' site formation model to build upon this largely unexplored aspect of deliberate watercraft abandonment.

## From Battleships to Breakwaters

The following section considers reuse and abandonment characteristics of four large iron-hulled warships that served in the colonial navies of Australia and New Zealand between 1860 and 1901. One, a paddle steamer, was purchased during the second series of New Zealand Wars (1860–1870) and used as a riverine transport for colonial troops and equipment. The others, comprising a breastwork monitor, cruiser, and gunboat, respectively, entered service between 1871 and 1884. These vessels were purchased in response to public concerns about potential Russian seaborne assault on Australia's largest port cities (a period in Australian history known as the "Russian Scare"), and assigned to coastal patrol and/or port defense duties. All were later transferred to the CNF and RAN, before being sold out of service to civilian interests. Ultimately, each ended its days as a partially submerged breakwater or barrier. Among the four abandonment sites discussed in the next four sections, only two have been archaeologically investigated. However, the others have been photographed extensively from their year of abandonment to the modern era, and these images provide a means of developing general inferences about both natural and cultural site formation processes that have affected each vessel. Significantly, some discard signatures normally associated with commercial watercraft do not appear to be present among these former warships.

## P.S. *Rangiriri*

Following the outbreak of hostilities between Maori *iwi* (tribes) and colonial soldiers and settlers in the Waikato region of the North Island of New Zealand in 1863, the colony's government placed an order for two iron-hulled paddle steamers to transport troops and equipment into the Waikato hinterland via its extensive river system. Both vessels were ordered from Sydney, Australia and transported in prefabricated sections to New Zealand, where they were assembled and outfitted for military service (Dodd 2008, pp. 7–8). The second steamer to arrive was named *Rangiriri*. It was launched in mid-June 1864, but never saw combat because hostilities between Maori and colonial forces had ceased at the end of the previous month (Campbell 1985, p. 11). The steamer spent the remainder of 1864 transporting troops and equipment along the Waikato, and subsequently engaged in the movement of goods for the region's growing colonial settler population (Dodd 2008, p. 9).

Between 1864 and 1868, *Rangiriri* was involved in a number of mishaps that resulted in damage to its superstructure and hull (Vercoe 1997, p. 37). Ultimately, this may have prompted New Zealand's government to remove the vessel from service and sell it to commercial interests. Under new ownership, it reportedly suffered a litany of mechanical problems, and was accidentally grounded on several occasions. Finally in 1889, *Rangiriri* ran aground near the town of Hamilton and could not be refloated. Its engines and machinery were salvaged the following year and the partially submerged hull abandoned to serve as a retaining wall for the adjacent riverbank. In subsequent years, local residents also used it as a swimming and diving platform (Dodd 2008, p. 10; Lennard 1986, p. 118).

A team of archaeologists working in conjunction with Hamilton's Waikato Museum excavated and documented *Rangiriri's* interior and immediate surroundings in 1981. Although the vessel's superstructure was entirely absent, the hull from the keel to the weather deck was almost completely intact. Numerous articulated components manufactured from iron, including multiple frames and hull plates, four keelsons and several bulkheads, were present. Significantly, so were a large percentage of the vessel's deck planking, beams, stanchions and bulkheads, much of which was built from robust Kauri timber. In addition, both wooden rudders—one of which was still largely intact—were located immediately adjacent to the hull. Because they were deposited within a combined freshwater and silt riverbed environment, these various iron and wooden components were reportedly in "excellent condition" when uncovered (Dodd 2008, pp. 16–17).

Given their exceptional state of preservation, it is surprising that surviving elements of *Rangiriri*'s iron and wooden hull structure were not salvaged or scrapped following the vessel's loss. Unlike iron components exposed to seawater, those immersed in freshwater riverine environments are generally less affected by corrosion. With this in mind, it would seem the majority of surviving iron that comprised *Rangiriri*'s hull would have been in good enough condition to warrant its removal for recycling and/or reuse. The same could be said for the steamer's wooden architectural components, particularly elements of the weather deck that were wholly or partially exposed above the river's surface and relatively easy to access.

Despite its abandonment within an active section of river adjacent to a relatively large, bustling colonial waterfront community, *Rangiriri* does not appear to have been subject to structure minimization or hull-reduction efforts. Further, archaeological investigation of the steamer's hull during the 1980s did not indicate that placement assurance strategies were utilized to prevent its movement following abandonment. Both of these findings are odd, given *Rangiriri*'s abandonment location on the edge of an active shipping lane within the Waikato River. As a stationary object, the derelict hull was a potential snag for near-shore river traffic; similarly, it could have conceivably morphed into a hazard to watercraft, bridges, and land-based infrastructure had it broken free of its original abandonment site and floated into the main river channel.

## HMVS *Cerberus*

In an effort to bolster the seaborne defense of Melbourne against foreign commerce raiders and naval vessels, the Victorian colonial government ordered the iron breastwork monitor Her Majesty's Victorian Ship (HMVS) *Cerberus* from British shipwright Palmer Shipbuilding and Iron Company in 1866. It was launched in December 1870 and arrived at Melbourne the following year (Gillett 1977, p. 23, 1982, p. 91). Until Federation of the Australian colonies in 1901, *Cerberus* operated primarily as a stationary gun platform, alternately moored at a variety of locations within Melbourne's Port Phillip Bay that gave its guns a commanding field of fire over its entrance (Nicholls 2001, p. 128). After Federation, *Cerberus* was transferred to the CNF, and ultimately became a fleet asset of the RAN in 1911 (Cahill 1983, p. 14; Gillett 1977, p. 23, 43; Tulley 2009, p. 131).

Upon entry into the RAN, *Cerberus* was assigned an HMAS (His Majesty's Australian Ship) designation, but its function remained largely the same. During the First World War, it was nominated the "Guard Ship" for Port Phillip Bay, a role it more or less continued to fulfill until 1921, when it was renamed HMAS *Platypus II* and reassigned as a depot vessel for the RAN's flotilla of six J-Class submarines (Cahill 1983, p. 15; Gillett 1977, p. 113, 1982, p. 95; Gould 2000, p. 278; Herd 1986, p. 12; Odgers 1985, p. 22; Tulley 2009, p. 131). In its final years, it also functioned in a special support role as both a floating magazine and workshop (Richards 2008, p. 133).

*Cerberus* was declared obsolete, removed from naval service, and put up for sale in April 1924. It was subsequently purchased, at which point its engines, boilers, and elements of its superstructure were removed (Gillett 1977, p. 113). Some of the hull's protective breastwork plating was also removed and sold to the Victorian Railways, as were elements of the iron armor that protected the aft turret (Anderson 2002, p. 6; Gould 2000, p. 278; Noble 1979, p. 100). Ultimately, however, most of the armor plating was left *in situ* because its removal was considered too difficult and uneconomical (Effenberger 1995, p. 7; Tulley 2009, p. 131). In 1926, representatives of the Sandringham Yacht Club on Port Phillip Bay's eastern shore purchased what remained of *Cerberus*. It was subsequently scuttled as a breakwater near the Yacht Club's entrance, where it remains to this day (Anderson 2002, p. 1, 5; Cahill 1983, p. 15; Gillett 1977, pp. 30–31, 1982, p. 97; Gould 2000, p. 278; Odgers 1985, p. 22).

Based on the findings of archaeological surveys conducted by Richard Gould in 1993 and Heritage Victoria's Maritime Heritage Unit in 1999, it can be inferred that *Cerberus*' scuttling process involved opening the vessel's valves to the sea. Gould (2000, p. 278) observed that the hull was "intact and rested upright and level" on the seabed. He also noted the only visible hull damage was to plating along the vessel's seaward site, which had "corroded completely through" from continual contact with an alternating wet and dry saltwater environment. Such findings would seem to preclude certain forms of placement assurance such as the use of explosives or other methods of physically breaching the hull below the waterline. However, at least one source (Effenberger 1995, p. 8) notes that "architectural rubble" was utilized as "ballast" during the scuttling process. The weight of this material, when combined with the massive size and weight of the hull itself was likely considered enough to anchor *Cerberus* to the seabed once its buoyancy had been compromised. Remnants of the rubble ballast are believed to exist within the hull, although this has not been confirmed archaeologically (Anderson 2002, p. 6).

Although stripped of a variety of fittings and machinery at the time it was scuttled, *Cerberus* remained largely intact until its lower hull catastrophically failed in heavy weather during the early 1990s (Anderson 2002, p. 1, 16, 20; see photographs in Gillett 1982, p. 96). During his survey, Gould (2000, pp. 278–279) observed that in addition to its hull, *Cerberus*' "deck, armored breastwork, conning tower, and two Coles turrets (each complete with its guns)... [were] preserved" *in situ*. Its structural elements below-decks—including most of the robust iron framing, hull, and bulkhead plating, and the 23–28 cm thick wooden interior reinforcement for the ship's armor—were also largely intact and untouched. The only obvious signs of cultural transformation associated with historic salvage or similar activities was a "large opening in the midships area decks" used to facilitate the removal of the monitor's engines, and the absence of its propellers and rudder (Anderson 2002, p. 12; Gould 2000, p. 278).

Significantly, *Cerberus*' intact wooden deck planking, deck features such as large iron bollards and cleats, an iron deck capstan, and a number of fittings associated with its steering gear, were all present and "in surprisingly good condition" during the 1993 survey (Anderson 2002, pp. 13–16; Gould 2000, p. 278). While it is understandable that large-scale salvage or reduction activities would have potentially compromised the hull's function as a breakwater, some of its more portable elements could have been salvaged with a relative degree of ease and either reused, recycled, or sold for their monetary value. Although humans have removed little, if anything, from *Cerberus* since its abandonment, they continue to leave evidence of their interaction with its abandoned hull—most recently (and visibly) in the form of graffiti on exposed elements of its surviving breastwork structure and turrets (see photograph in Gillett 1982, p. 97).

## HMCS *Protector*

At the behest of the South Australian colonial parliament, British shipbuilder Sir William Armstrong and Company commenced construction of Her Majesty's Colonial Ship (HMCS) *Protector* in November 1882 (Gillett 1982, p. 61; Odgers 1985, p. 23). The vessel was completed in May 1884 and departed for South Australia two months later, arriving in the colony's main entrepôt Port Adelaide at the end of September (Gillett 1977, p. 28, 1982, p. 61). Until the turn of the twentieth century, *Protector* led a largely uneventful career, alternately deployed on station at Largs Bay (near Port Adelaide) or cruising South Australia's coastal waters (Gillett 1982, p. 62). The warship's relatively laconic existence was briefly disrupted in 1900, when it joined a combined British colonial naval force assembled to suppress the Boxer Rebellion in China (Odgers 1985, p. 23, pp. 32–33). Upon its return to Port Adelaide, *Protector* was integrated into Australia's newly created CNF and spent much of the next-decade patrolling the waters of the continent's southern and eastern seaboards (Gillett 1982, p. 64; Odgers 1985, p. 23).

In 1911, *Protector* was transferred to the RAN and within two years was operating in a secondary capacity as a tender to HMAS *Cerberus*. Following the outbreak of the First World War, it also served as a depot ship for the Australian submarines *AE1* and *AE2*, and as a minesweeper in the coastal waters of Victoria (Gillett 1977, p. 48, 1982, p. 65; Odgers 1985, p. 49). In 1921, *Protector* was assigned to the naval depot at Western Port, reverted to its role as a tender, and was renamed HMAS *Cerberus* (at the same time the monitor *Cerberus* was renamed *Platypus II*).

Three years later, *Protector*'s naval career ended when it was declared obsolete, removed from naval service, and released for disposal. It was subsequently purchased and its armament, turrets, engines, and other moveable components stripped and sold at auction (Gillett 1977, pp. 111–112, 1982, p. 68). The remaining hull was converted into a lighter for the storage and transportation of fuel oil. By the end of 1929 most of the necessary modifications were completed, the most notable of which were the alteration of the former warship's ammunition magazines into fuel oil storage tanks, and inclusion of high-pressure lift pumps to transfer the oil aboard other ships (Gillett 1977, pp. 111–112, 1982, p. 68). In addition to its fuel oil-carrying capability, *Protector* was used as a storage hulk for general cargo.

*Protector* was purchased in 1931, renamed *Sidney*, and converted to a wool lighter. It operated in this capacity and then as a coal lighter until 1943, when the US Army requisitioned it for military service during the Second World War. While en route to its deployment station, *Protector* collided with a tug off the Queensland coast. It was subsequently towed to Heron Island on the Great Barrier Reef and beached so the extent of damage to its hull could be assessed (Fig. 16.2). Deemed unworthy of repair, the ship was abandoned (Gillett 1977, p. 112, 1982, p. 68). The discarded hull was eventually towed a short distance away from Heron Island and scuttled as a breakwater along the edge of a navigation channel that connects the island with the open ocean.

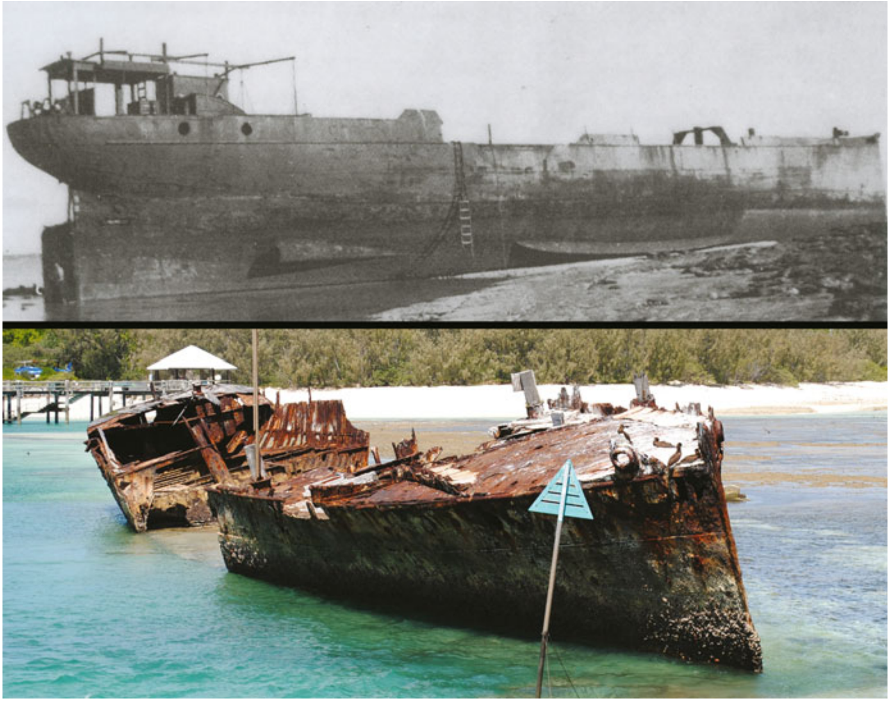

**Fig. 16.2** *Top*, lighter *Sidney* (ex-HMCS *Protector*) aground at Heron Island shortly after its collision in 1943; *bottom*, HMCS *Protector* today, in its functional post-abandonment use as a breakwater for Heron Island's sole navigation channel. (*Top* photograph reproduced with kind permission of the South Australian Maritime Museum; *bottom* photograph by the author)

*Protector* has never been the subject of archaeological investigation; however, numerous photographs have been taken of its abandoned hull since its initial grounding at Heron Island in 1943. These images in turn provide a means with which to draw general inferences about cultural formation processes that may have acted on the site over the past 70 years. Overall, it appears the former warship has experienced very little human interference and alteration during its time as a breakwater, and that the majority of transformative processes acting on the site have resulted from environmental factors.

The earliest photographs of *Protector* aground at Heron Island reveal that its hull was largely intact, although certain elements of superstructure and deck fittings such as the wheelhouse, masts, and capstan(s) were clearly absent (see photographs in Gillett 1982, pp. 67–68). Although difficult to deduce from these early images, it is also likely the ship's engines, lift pumps (if they were still present), and any additional machinery were also salvaged at this time, as they are distinctly absent from the site today. Ross Gillett (1982, p. 67) notes that *Protector*'s hull appeared in "very good condition" when abandoned, despite having been in continual service for approximately 70 years. It appears little consideration was given to the placement of the hull when it was scuttled, based on its pronounced list to starboard. Further, *Protector* is situated on the edge of Heron Island's navigation channel and heeling *toward* it, meaning that any material falling away from the hull would tend to be deposited within the very area it was meant to protect and keep clear of intrusive sediment and debris.

Interestingly, the damage the vessel incurred from its collision is not evident in any of these early photographs, nor is it readily apparent in subsequent images of the abandonment site. These pictures also do not feature obvious evidence of placement assurance in association with *Protector*, including hull perforation, filling, and/or placement of piles to anchor it in place. A viable explanation for the absence of these and other discard signatures might be that the collision that disabled *Protector* breached its hull below the waterline to such an extent that its seaworthiness was completely compromised. Damage on this scale would have placed it beyond the repair capabilities then available at Heron Island, and could account for the US Army's decision to arbitrarily abandon the ship rather than make an attempt at refloating it.

While the overall condition of *Protector*'s hull may have been good at the time it was discarded, there is no indication that subsequent efforts were undertaken to dismantle its constituent parts for their reuse or resale value. To the contrary, modern photographs (see Fig. 16.2) reveal the former warship's hull is nearly as intact and articulated as it was in 1943. Notable exceptions include areas of significant structural collapse that have occurred in the midships section and aft weather deck. The collapse appears to have been a gradual process wrought by environmental factors such as the corrosive effects of seawater and/or heavy seas. Photographs from the 1970s and 1980s (see Gillett 1977, p. 30, 1982, p. 68) show appreciably more of the now-missing midships structure still *in situ*, while subsequent images reveal progressive hull degradation in this area. Further, a number of recent images clearly show sections of the midships upperworks lying within *Protector*'s surviving hull. Had these components been targeted for salvage, it seems logical they would have been systematically removed from the hull and transported elsewhere for reuse and/or recycling.

As with *Cerberus*, certain "portable" elements of *Protector*'s architecture, including iron bollards and stanchions, wooden decking, and the ship's rudder, were not removed at the time of discard, nor were they salvaged in subsequent years. This is even more curious, given that the absence of these items would have in no way detrimentally affected its use as a breakwater. Of course, the apparent lack of salvage that characterizes the site could be attributed to the remoteness and relative inaccessibility of Heron Island. Any potential benefits—financial or otherwise—that might have been generated from the removal of material from *Protector* would almost certainly have been overshadowed by the amount of money, time, and effort necessary to access the site and dismantle its desired structural elements.

## HMQS *Gayundah*

The government of colonial Queensland ordered two identical iron-hulled gunboats from the British firm Sir W.G. Armstrong, Mitchell and Company in 1883 (Gillett 1977, p. 109, 1982, p. 37; Nicholls 2001, p. 133; Odgers 1985, p. 23). The second of these vessels to be commissioned, Her Majesty's Queensland Ship (HMQS) *Gayundah*, was launched in early November of the following year. By the end of that month, the gunboat was en route to Australia, but did not arrive at its homeport of Brisbane until March 1885 (Gillett 1977, p. 28).

*Gayundah* spent the remainder of the nineteenth century conducting coastal cruises and participating in naval exercises with its sister-ship HMQS *Paluma* and the Queensland torpedo boats *Mosquito* and *Midge*. In 1901, it was transferred to the CNF, and later integrated into the RAN in 1911 (Gillett 1977, p. 43, 1982, p. 43; Odgers 1985, p. 23, 36). During the First World War, *Gayundah* patrolled the coastal waters of Queensland and New South Wales, and was alternately engaged as both a training ship and minesweeper. The vessel was paid off and placed in ordinary in July 1918; three years later it was purchased by a Brisbane-based commercial interest and converted into a gravel barge (Gillett 1977, p. 109, 1982, p. 45). It operated on the Brisbane River in this capacity until 1958, when the hull was stripped and subsequently beached as a part of an erosion control breakwater at Redcliffe on Moreton Bay.

As with *Protector*, *Gayundah*'s abandoned remnants have never been investigated archaeologically, although the site has been photographed extensively since the late 1950s. Based on these images, it appears *Gayundah*'s hull has been affected primarily by environmentally manifested formation processes, the most active and transformative of which has been corrosion of its steel fabric. The hallmarks of cultural transformation processes are also evident in the photographs, and complimented by descriptions of the vessel's use as a breakwater that appear in contemporary newspaper accounts.

Unlike the seemingly haphazard nature of *Protector*'s abandonment, the establishment of *Gayundah*'s hull as a breakwater was executed in a manner that maximized its obstructive potential and ensured it would remain in place for a considerable amount of time. Archival photographs (see Gillett 1982, p. 44) reveal the former gunboat was embedded within the intertidal zone a short distance from, and parallel to, the base of the bluff at Redcliffe. A large linear hole was excavated into the bay floor to a depth of 5 ft to solidify the vessel's position relative to the bluff (*Brisbane Courier* 1958). Its hull was subsequently filled with seawater, "sunk" within the excavated area, and later filled with cement as a means of placement assurance (*Brisbane Courier* 1958; Gillett 1982, p. 45). A "large hole. . . on the seaward side" of *Gayundah*'s abandoned hull was noted by Ross Gillett (1982, p. 45) during visits to the site in the 1970s and 1980s; however, this breach is not evident in circa-1958 photographs and instead appears to have resulted from the gradual effects of corrosion and other natural impacts on the ship's steel fabric.

These same transformative processes have clearly been the most influential factors in *Gayundah*'s disintegration during the past 55 years. A comparison of the vessel's overall structural integrity in photographs taken between the late 1950s and late 2000s reveals the hull has undergone significant corrosion during the last three decades. The area that exhibits the most visible degradation is the bow superstructure, which is now approximately one-third of its original size. Similarly, elements of the stern superstructure, as well as both sides of the midships hull above the turn of the bilge, have collapsed and/or corroded away. Photographs of *Gayundah* at low tide depict several disarticulated architectural components, including hull plates from one or more of the collapsed sections, lying on the bay floor immediately adjacent to the vessel's seaward (starboard) side. Interestingly, some of these images also show numerous large stones within the midships hull. It is presently unclear whether these stones constituted *Gayundah*'s original complement of ballast, or were added as a form of undocumented placement assurance either during, or subsequent to, the vessel's establishment as a breakwater.

Items stripped from both *Cerberus* and *Protector* at their time of abandonment were also salvaged from *Gayundah*, although it appears removal of deck fittings and other portable items was much more thorough in the latter instance. Photographs of *Gayundah* in the immediate wake of its placement as a breakwater reveal nearly every major fitting and element of deck machinery, including bollards and capstans, were removed before the hull was abandoned. Significantly, so were the rudder and its associated steering apparatus. Fittings left *in situ* include the taffrail and bow rail, but even these items appear to have been at least partially dismantled before the vessel's disposal, as only a few sections are still visible in the circa-1958 images. By 1974 these too had all but disappeared from the surviving deck structure (see photograph in Gillett 1982, p. 44).

## Torpedo Boats: Australasia's Throwaway Naval Assets

Between 1884 and 1924, a total of 14 torpedo boats served in the naval defense of Australia and New Zealand. Australasia's colonial governments purchased these vessels from British manufacturers J.I. Thornycroft and Company and Alfred Yarrow and Company as a consequence of the Russian Scares of the 1870s and 1880s. They were intended to provide harbor protection, as well as augment the defensive capabilities of larger fleet assets such as HMVS *Cerberus* and HMQS *Gayundah*. Between 1900 and 1924, the entire torpedo boat fleet was decommissioned and put up for sale. Whether purchased or not, each was ultimately stripped of its most valuable components and its surviving hull abandoned. Four of these vessels have been the focus of archaeological investigation, and—individually or as a whole—exhibit reuse and abandonment attributes distinctly different from documented trends associated with contemporary commercial watercraft, and even the Australasian naval vessels discussed in this chapter.

## HMVS *Lonsdale*

HMVS *Lonsdale* served in the colonial navy of Victoria from 1884 until 1901, at which point it transferred to Australia's CNF. It was put up for auction the following year, but failed to find a buyer and was subsequently transferred to the RAN in 1911 (Cahill 2009, pp. 133–135; Gillett 1982, pp. 115–119). In 1914, *Lonsdale* was put up for sale a second time, but was once again overlooked and ultimately ended up abandoned on the beach at Queenscliff, Victoria sometime after 1915 (Fig. 16.3). Archival photographs of *Lonsdale* reveal the degree to which its hull still appears much as it did when in operational service (see archival photographs in Gillett 1982, pp. 115–118 and Hewitt and Tucker 2009). Outwardly, the shell of the torpedo boat is clearly intact to the gunwales and various hull components are all still in their original positions. The only obvious exception is the steel plating that comprised the weather deck and armored casemate. These architectural elements appear to have been either removed or cut open in an effort to facilitate removal of the torpedo boat's engine and internal machinery. The conning tower hatch cover and majority of external fittings are also absent, although at least one deck-mounted lifting lug is visible.

Data recovered during archaeological investigations of *Lonsdale*'s abandonment site has proven useful in the development of general hypotheses regarding its discard (see Hewitt and Tucker 2009). Between the time it was discarded and scientifically excavated, the site was gradually buried by shoreline accretion of the Queenscliff waterfront (Hewitt and Tucker 2009, p. 16). When exposed and documented, the torpedo boat's conning tower and the hull beneath it were still largely intact and appeared much as they did when photographed during the early twentieth century (see Fig. 16.3). The same can be said of the hull aft of the conning tower, which appears to have retained its overall structural integrity (D. Cahill, as cited in Hewitt and Tucker 2009, p. 32). By contrast, the foreship and bow are no longer articulated with the remainder of the vessel. Indeed, the vast majority of *Lonsdale*'s forward section disintegrated into largely incoherent structure as a consequence of "gross corrosion" and collapse of the hull subsequent to its complete burial (Hewitt and Tucker 2009, pp. 30–32). Discovery of *Lonsdale*'s disarticulated prow constitutes the only archaeological evidence of culturally manifested alteration of its discarded hull. However, as the prow was ultimately redeposited on site, its removal almost certainly did not constitute salvage activity. To the contrary, its presence lends credence to local lore that states it was intentionally cut away and moved aside during boundary fence construction at Queenscliff's former Buoy Depot (Ferrier 1989).

Based on available information, *Lonsdale* does not appear to have been subject to any form of placement assurance. Strategies to neutralize the hull's buoyancy were neither evident among its documented remains, nor were tidal variation or orientation of the vessel carefully considered factors in its disposal process. *Lonsdale* appears to have been discarded almost exactly perpendicular to the shoreline in a manner more common to larger watercraft (see Richards 1997, p. 89). Further, its orientation suggests it was originally abandoned with its midships positioned roughly at the

**Fig. 16.3** *Top*, HMVS *Lonsdale*'s hulked remnants at Queenscliff, Victoria circa 1915; *bottom*, *Lonsdale*'s conning tower (*center*) and disarticulated bow section (*bottom right*) as they appeared when excavated in 2005 and 2006. (*Top* photograph reproduced with kind permission of the Queenscliffe Maritime Museum; *bottom* photograph by Geoffrey Hewitt, courtesy Terra Culture Heritage Consultants)

interface between sea and land (Hewitt and Tucker 2009, p. 30). This would seem to contradict contemporary practice, which advocated that vessels be beached at high tide in order to leave them as high and dry as possible when the water receded (Richards 2008, pp. 176–177).

## HMVS *Countess of Hopetoun*

Similar to *Lonsdale*, HMVS *Countess of Hopetoun* was an asset of the Victorian colonial navy, entering service in 1891. The torpedo boat was transferred to both CNF and RAN control before being decommissioned in 1920. *Countess of Hopetoun* spent the next four years in ordinary before being purchased and stripped it of its engines and machinery. Ultimately, it ended up abandoned on a beach at Swan Island in Port Phillip Bay (Cahill 1983; Gillett 1982, pp. 126–132, 1991). Archival evidence of its discarded hull is represented by a single photograph taken sometime between 1922 and 1932 (Fig. 16.4). Architectural elements visible above water included all hull plating between the gunwale and sea, the entire deck structure forward of the conning tower, and the conning tower itself. Although certain deck fittings were removed prior to the torpedo boat's abandonment, the vast majority remained untouched and in their original positions. Save for isolated flash rusting of their steel fabric, the vessel's surviving architectural elements do not exhibit significant signs of corrosion or damage and appear to have been structurally sound at the time it was abandoned.

The photograph depicts a form of placement assurance used in *Countess of Hopetoun*'s abandonment process. A crude mooring line comprising a length of cable is shown extending shoreward from the torpedo boat's bow. A number of trees are present in the image along the shoreline and it is possible that the mooring line was attached to one or more of these in an attempt to prevent *Countess of Hopetoun*'s movement after its abandonment. Orientation does not appear to have played a role in the discard process, as the abandoned hull was partially awash and oriented perpendicular to the shoreline when captured on film.

Archaeological investigations revealed *Countess of Hopetoun*'s hull is still largely intact and retains much of its articulated bow and stern structure (see Fig. 16.4). When documented between 1986 and 1996, the foredeck was complete for much of its original length (Anderson 1996; Heritage Victoria n.d.; Williams 1983, 1986, 1992). Most bow fittings were present and bore no indication of attempted salvage. The stern was also largely unaltered. Although *Countess of Hopetoun*'s engines and boilers were removed prior to its abandonment, the steel propeller and propeller shaft did not share the same fate. Curiously, neither exhibited outward signs of wear or damage that would have precluded their removal and reuse.

Perhaps *Countess of Hopetoun*'s most unexpected *in situ* features were its rudder and tiller. Both appeared largely complete and undamaged, save for degradation resulting from the site's surrounding marine environment. Richards (2008, p. 149) observes that the rudder is the structural element most frequently missing from beached and abandoned watercraft, not only because of the ease with which it can be unshipped and transported, but also its potentially lucrative resale value. He also notes "it is even more common to find vessels without *in situ*. . . engines, prop shafts, or propellers" (Richards 2008, p. 149). *Countess of Hopetoun* was stripped prior to its hull being put up for sale, so it is surprising that these components were not salvaged for their reusability. Equally perplexing is that they were not later removed for their

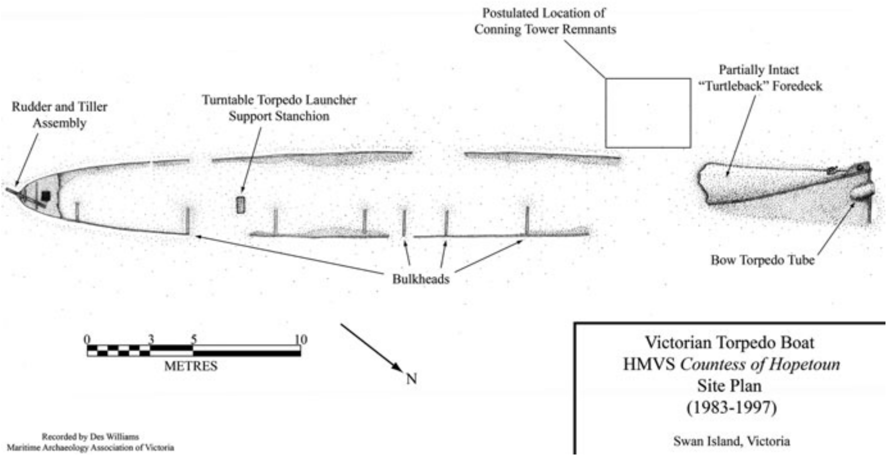


**Fig. 16.4** *Top*, HMVS *Countess of Hopetoun* hulked at Swan Island, Victoria circa 1930; *bottom*, archaeological plan of the *Countess of Hopetoun* site as it appeared during the 1980s and 1990s. (Photograph reproduced with kind permission of the Queenscliffe Historical Museum, Inc; Site plan illustration by the author)

scrap value. This behavior is all the more unusual given that the vessel's engines and machinery were removed and—presumably—reused or recycled in some capacity.

A length of steel cable was also observed in association with *Countess of Hopetoun*'s stern structure (Williams 1992). Although tentatively identified as the remnants of a towline, its diameter appears to approximate that of the mooring cable visible in the archival photograph. The presence of the cable could account for the absence of other methods of anchoring the discarded hull in place. Alternate forms of placement assurance were not observed archaeologically and do not appear to have been utilized, even though their absence runs counter to Richards'

(2008, pp. 172–177) discussion of what constitutes a logical vessel abandonment scenario in a beach environment.

The discard locations of both Victorian torpedo boats are situated a relatively short distance from the Barwon Heads Ship Graveyard, which became the final resting place of a number of former Australian warships (Ryan et al. 2009). It is especially curious that *Countess of Hopetoun* did not join the increasing number of watercraft abandoned there during the early twentieth century. By 1924, five vessels had "officially" been scuttled in its waters; three years later it would become the final resting place for seven more watercraft, including four decommissioned J-Class submarines (see Beringer-Pooley 2005, p. 48; McCarthy 2009, p. 143; Ryan et al. 2009; Smith 1990).

## New Zealand Torpedo Boat *Defender*

*Defender* was one of four torpedo boats purchased for the naval defense of New Zealand during the Russian Scare. It arrived in the port city of Lyttelton in 1884 and remained in service until 1900, when a local steam launch operator purchased the vessel, stripped it of its engines and machinery, and abandoned the hull at Purau Beach on the southern shore of Lyttelton Harbor (Cooke 2000, pp. 129–130; Moffat 1996, p. 5, pp. 11–13, p. 35). During the 1930s, the local county council broke the hull into two sections during an attempt to move it further away from the water (Ogilvie 1970, p. 75). *Defender*'s remnants were a distinct landmark at Purau Beach for several years until they were intentionally broken up and buried with heavy machinery in 1959.

A circa-1930 painting entitled *Purau Beach* depicts *Defender* in a secondary discard context, after its broken hull was removed from Purau Bay's foreshore. One particularly noteworthy aspect of the torpedo boat's remnants, as they are shown in this painting, is that they were still largely intact approximately 30 years after being abandoned. Aside from obvious hull separation and isolated flash rusting, both the bow and stern sections are largely complete. The same can be said for the vessel's conning tower and adjacent casemate. Elements missing from *Defender* include the conning tower hatch cover and various deck fittings. By the 1940s and 1950s, when the surviving hull was documented photographically, some hull plating and casemate structure visible in the painting was noticeably absent. This likely occurred as a consequence of both natural and cultural processes.

Examination of the torpedo boat's existing architectural elements has confirmed a significant portion of the discarded hull survived up to its burial in 1959. This is particularly true of the bow and stern sections, which in their reconstructed form are approximately 65–75 % intact (Hunter 2011a). Most hull elements visible in historic renderings of *Defender*'s remnants have survived to the present day, as have internal components such as framing and bulkheads (Hunter 2009, pp. 6–9, 2010, p. 152, 2011a; Thornycroft Torpedo Boat Museum 2003). *Defender*'s conning tower was not discovered among the site's buried components and its current whereabouts remain an open question, although at least one source claims it was acquired by the Lyttelton Museum and later accidentally sold to a scrap merchant (Cooke 2000, p. 132).

Forms of placement assurance were neither evident in archival images of *Defender*'s hull, nor were any observed during the excavation, suggesting they were not utilized during the initial abandonment episode. This includes archaeological evidence of fill material within the hull or damage consistent with intentional hull-breaching methods. To the contrary, it appears little or no consideration was given to scuttling *Defender*, based on the discovery of a pair of wooden bungs in association with its screw aperture. These were hammered into both ends of the aperture in an attempt to keep the hull watertight and afloat during transport to its disposal site. As they were still *in situ* when found, it appears no effort was made to remove them and compromise the hull's ability to float away before abandoning it to its fate.

*Defender*'s discard locale is situated a mere 1.1 km southwest of Wreck Bay, a small cove within Purau Bay that functioned as a ship graveyard during the late nineteenth century. Although it is unclear whether the ship graveyard was inactive by the time *Defender* was discarded in 1900, it is surprising a known discard area would be overlooked for what appears to be a randomly chosen abandonment site in such relatively close proximity to it.

## HMQS *Mosquito*

Queensland's colonial navy acquired HMQS *Mosquito* in 1884. It remained on the active roster—subsequently serving the CNF and RAN—until 1913, when it was purchased, stripped of its engines and machinery, and abandoned in a tributary of the Brisbane River (Adlam 1981, p. 29; Foote 2001, p. 2; Gillett 1982, pp. 33–36). In 1966, *Mosquito*'s discarded hull was photographed and revealed to still be largely intact (Hunter 2011b, p. 379). The bow and stern sections, in particular, were articulated and in an upright position. As with *Lonsdale*, steel plating that comprised the weather deck appears to have remained largely *in situ*, but only in areas where it did not restrict access to the vessel's engines and internal machinery (Hunter 2011a).

By contrast, the sides of the hull, all but one bulkhead, and the remaining upperworks had collapsed either within or outside the hull and become partially or completely buried in mud by 1966. A single articulated bulkhead visible in the photographs seems to have played a significant role in holding the torpedo boat's surviving stern structure together. The vessel's conning tower, which by the 1960s was disarticulated from the rest of the hull and lying on its side, was still almost completely intact as an architectural element. Attached to the conning tower was a surviving—but heavily corroded—section of its hatch cover (Hunter 2011b, pp. 379–382).

Archaeological investigation of *Mosquito*'s discard site has confirmed most of the exposed hull collapsed and subsequently settled into the mud and silt of the swamp floor (Hunter 2011b, pp. 381–384). By contrast, *Mosquito*'s stern, already largely buried at the time of the 1966 photographs, appears to have retained its structural integrity. This is best evidenced by results of a probe survey, which detected contiguous metal contacts along the hull's projected stern centerline. A series of similar contacts were encountered during an athwartships probe transect in the same area (Valis 2010, p. 1).

Based on available evidence, human alteration of *Mosquito*'s hulk prior to 1966 seems to have been restricted to the conning tower, which was removed and re-deposited at some point between the boat's disposal at Boggy Creek and when it was captured on film. Individual artifacts, including the complete stern section of its casemate, were removed between 1966 and 1972. All were eventually donated to the Queensland Museum and later accessed and analyzed by the author (Hunter 2011b, pp. 381–382). A notable feature of these objects is their relatively good state of preservation. For example, the casemate section is intact, ductile, largely free of corrosion, and still retains paint over much of its exterior surface. If these attributes are indicative of the overall condition of *Mosquito*'s hull at the time it was discarded, it is surprising the majority of its metal constituents were not targeted for salvage.

With the possible exception of the mud and silt substrate in which the hull was embedded, placement assurance strategies do not appear to have played a role in *Mosquito*'s abandonment (Hunter 2011a). Inspection of the site's visible components neither reveal evidence of treatments such as filling or induced perforation of the hull, nor are indicators of these techniques apparent in the 1966 photographs. As happened with *Lonsdale* and *Countess of Hopetoun*, *Mosquito* was beached roughly perpendicular to the existing shoreline, with its bow facing away from Boggy Creek.

*Mosquito*'s discard site is located a short distance from Bishop Island Ship Graveyard (Hunter 2011a). Bishop Island functioned as Brisbane's "official" ship abandonment site from approximately 1912, until it was buried beneath land reclamation and the city's modern port facilities. Included among the many vessels discarded along its foreshore was the colonial government steamer *Miner*, which tended submarine mine fields in Moreton Bay and frequently participated in naval exercises with *Mosquito* (Gillett 1982, p. 55; McLeod 1973, pp. 23–26).

## Conclusion

On August 3, 1912, the Melbourne newspaper *Argus* reported that the "obsolete torpedo boats" *Lonsdale* and its sister-ship *Nepean*, after nearly 30 years of military service, were to be "blown to pieces by the guns of the cruiser *Encounter*." The same article also observed:

> In view of the fact that the new store-ships have been provided for on the Estimates, it is considered likely that the historic old harbor defense-ship *Cerberus*, which for so many years was the pride of the Victorian navy, will be doomed to the same fate. At present the *Cerberus* lies at anchor, with neither guns nor engines to grace her, while barnacles accumulate about her armored sides. The *Cerberus* will probably be towed down the bay and meet the honorable fate of a fighting ship, sinking as the result of a hail of shells. (*The (Melbourne) Argus* 1912)

Contrary to this prognostication, neither the torpedo boat *Lonsdale*, nor the ironclad breastwork monitor *Cerberus* ended their days in a "hail of shells," as befitted their status as former warships. Indeed, archaeological investigation of these and other deliberately abandoned vessels from Australasia's former colonial naval fleets would seem to suggest rather ignominious ends to their lengthy—and in some cases, quite distinguished—careers. Although they comprised critical assets of Australia's maritime defense before, during, and after the continent's colonial naval forces combined to form a new national navy, *Cerberus*, *Protector*, and *Gayundah* were all ultimately sold to civilian interests and concluded their functional lives as breakwaters. Similarly, *Rangiriri*, a veteran of the New Zealand Wars and one of the nation's first purpose-built warships, operated in a limited commercial capacity before it met its end as a *de facto* shoreline retention wall on the Waikato River.

While these vessels may not have been granted "honorable fate[s]," their post-military lives are nonetheless indicative of the high regard accorded their overall design and construction attributes. By the time they were sold out of service and converted to functional secondary roles in the commercial sector, *Gayundah* and *Protector* had been in continual operation for nearly half a century. Despite their age and predominantly wrought-iron construction, both ships were actively used for at least another 20 years, offering testament to their survivability and adaptability. Ultimately, the large robust hulls of these ships proved ideal as breakwaters, a functional post-abandonment role that each continues to fulfill to this day.

*Cerberus*' low freeboard, heavy iron breastwork armor, and specialized hull design significantly limited its functional post-military use(s); however, these very same features also made it an ideal breakwater. For 87 years, it has served in this capacity and its effectiveness remains largely undiminished, despite the hull's partial collapse nearly two decades ago. Ironically, it was this incident that prompted the Victorian government to assess *Cerberus*' structural integrity and initiate measures to preserve its surviving hull (Anderson 2002, pp. 1–2). It also resulted in the recovery and *in situ* conservation of the monitor's guns—the first time a major element of its architecture or armament had been removed since its establishment as a breakwater in 1926 (Tulley 2009, pp. 131–132).

*Rangiriri*'s use as a riverbank retention wall and swimming platform appears to have been more a result of circumstance rather than an intentional act of functional post-abandonment use. However, the vessel's robust construction and excellent preservation (as a result of its loss in a freshwater, riverine environment; see Dodd 2006, 2008, p. 18; Fry 2001) made its surviving hull eminently suitable to both roles. In fact, the extent to which *Rangiriri*'s hull survived ultimately resulted in its recovery, "restoration," and establishment as a heritage exhibit on Hamilton's riverfront. It continues to serve as one of New Zealand's most intact and accessible examples of its early naval fleet, but has unfortunately also been plagued by "unnecessary removal of heritage fabric and accelerated deterioration" brought about by poor conservation planning and the result of well-intentioned—but misguided—attempts to restore the hull to its pre-abandonment condition (Dodd 2008, p. 19).

A clear distinction seems to exist between former naval vessels established as breakwaters under civilian ownership, and those abandoned at the hands of the military. Placement assurance strategies, such as the use of heavy fill material, were employed on both *Cerberus* and *Gayundah*, and it is evident that steps were also taken to position their hulls in a manner that maximized their effectiveness as protective barriers. *Protector*, by contrast, was deposited in an orientation that made it a potential hazard to the navigation channel it was meant to protect. Methods of anchoring the former warship's hull in place also appear to have been disregarded—an oversight that is all the more unusual, given its precarious location on the edge of the channel in an area prone to tropical cyclones and other significant storm events.

In the wake of abandonment, *Protector*, *Cerberus*, *Gayundah*, and *Rangiriri* all retained relatively portable material that could have been salvaged for reuse or recycling. The decision to leave these items *in situ* may have been intended as a means to retain the structural integrity of the vessel with which they were associated, thereby augmenting its function as a breakwater. Alternatively, they may simply not have been worth the time, effort, and money necessary to access, remove, and transport them off site. Another possibility may relate to their former careers as warships. Unauthorized salvage, no matter how limited, may have historically been considered a form of desecration to vessels that deserved honor and respect for their military service. Whatever the reason, the continued presence of transportable items on these vessels is certainly unusual, particularly when compared against commercial watercraft, which as a general rule are stripped of these same features.

Australasia's torpedo boats exhibit reuse and discard attributes distinctly different from those of both commercial vessels *and* the abandoned warships discussed in this chapter. None of the examples described in the previous sections underwent conversion or modification, nor were they adapted to roles in either a specialized secondary or functional post-abandonment capacity. Similar to *Protector*, *Gayundah*, and *Rangiriri*, each torpedo boat was stripped of its engines, boilers, machinery, and armament once decommissioned. However, this is hardly surprising, as these items would have had considerable reuse and/or recycling value. In the case of weaponry, threats to public well-being likely precluded the release of these items into civilian hands. Even outmoded and obsolete weapons posed potential security and safety risks, and consequently would have been retained by military authorities for proper deactivation and disposal.

Placement assurance strategies and environmental considerations played little, if any, role in the disposal of Australasia's torpedo boats. Archival and archaeological evidence indicates that *Lonsdale*, *Countess of Hopetoun*, *Defender*, and *Mosquito* were not subject to structure minimization or hull-reduction activities—one of the few attributes they share in common with the larger warships discussed previously. Similarly, post-abandonment salvage activities do not appear to have affected the vast majority of torpedo vessels addressed in this chapter, although *Defender* and *Mosquito* were both subject to collection of specific hull components and other artifacts for their historic value.

The specialized construction and tactical application of torpedo boats meant they were uniquely unsuited for other military roles; this problem was further compounded by their general obsolescence at the time of discard. The small size and relatively light construction of these watercraft precluded their use in secondary military functions and likely reduced the value of their constituent parts to such an extent that they simply were not worth the time, money, and effort to dismantle or dispose of properly. Many, if not all, of these same factors could also explain why the torpedo boats addressed in this study ultimately did not end up in ship graveyards. When faced with financial and other costs required to deposit these vessels in designated abandonment areas, military officials likely opted instead to discard them in locales that were relatively remote and removed from significant maritime activity (but still relatively close to official graveyard sites). Doing so provided a cheap, effective alternative for disposing of obsolete hardware—a problem that was probably low priority for defensive planners focused on developing new, modernized national naval forces. In turn, it appears these military prejudices against torpedo boats, and the practices enacted to deal with their decommissioned remnants, may have carried over to contemporary civilian populations. This would explain—in whole or in part—why their stripped hulls were not reused in a functional nonmilitary capacity, and instead abandoned in a relatively intact condition near, but not within, established ship graveyards.

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# Chapter 17
# Raising Wilmington's Forgotten Fleet: Uncovering History with Mobile Video Technology

**Michael Dermody, Calvin H. Mires, and Christine Russell**

**Abstract** In spring 2007, archaeologists from the Program in Maritime Studies partnered with faculty from the Department of Communication and the Department of Technology Systems at East Carolina University (ECU) to create a dynamic, multi-media, user-controlled experience for a proposed maritime heritage trail in Wilmington, N.C. The project, "Wilmington's River Walk iPod Experience," uses video podcasts to present an audio-visual walk for tourists visiting Wilmington's waterfront. This is a public outreach component for ECU's archaeological investigation examining submerged vessels and cultural remains of Wilmington's maritime industries. Utilizing the mobile device to leverage audio and video storytelling potential, visitors can experience the rich stories of submerged vessels, as they walk along the Cape Fear River. Video mobile messages offer an exciting medium to disseminate information in an outdoor, dynamic environment, such as a maritime trail. Designing content for mobile podcast presentations, however, presents considerations much different than designing content for the average television or computer screen. This chapter will present our proof of concept Riverwalk Tour Project as a case study exhibiting the ways this new mobile technology can aid archaeologists in reaching audiences who rely heavily on mobile technology such as smart phones and iPods.

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## Introduction

Eagles Island sits on the western shores of the Cape Fear River directly across from Wilmington, North Carolina (Fig. 17.1). Here, nature and time have submerged, covered, and altered at least 35 ships representing more than 120 years of maritime history. They are the tangible reminders of maritime industries and commerce that made Wilmington North Carolina the most significant port city in the late eighteenth and nineteenth centuries. Visitors to Wilmington can view these remnants of the past as they stroll down the Riverwalk—a short boardwalk overlooking the Cape Fear River and Eagles Island to the west, and lined with shopping, dining, lodging, and entertainment venues of the historic downtown area to the east (Fig. 17.2). The question, however, for researchers is what do people see when they look across the river at these cultural resources? Do they consider them historically significant collection of Wilmington's maritime heritage, or do they simply see "junk" and "eyesores" rusting and rotting along the shoreline? Unfortunately, but not surprisingly, public perceptions have tended toward the latter viewpoint that the discarded watercraft seem more like a superfund site, than a historically significant one.

In 2007, archaeologists from East Carolina University's (ECU) Program in Maritime Studies partnered with faculty from ECU's Department of Communications/Fine Arts to develop a plan to integrate new media technology into the Riverwalk area that would allow visitors to better engage with the wrecks and artifacts that at the time were submerged and damaged in ways that left them unappealing to the general visitors. The goal of this project specifically was to create a maritime heritage trail along the Riverwalk describing the history and stories of Eagles Island's vessels as well as those who owned, operated, rode, and worked on them and to develop videos that shared the information in an appealing format that was also mobile and could be accessed by individual mobile technologies—whether the user employed tablets, phones, or MP3 players. The ECU group proposed a pilot project to produce small, high-quality educational videos that could be downloaded and played on any of these mobile devices or in some cases preloaded devices would be made available for the user to check-out from an Information Booth on the boardwalk.

The goal for this project was to provide archaeologists and maritime historians a way to engage the public—particularly younger generations (often referred to as the "millennial" or "digital native" generations). The hope was that by creating a more relevant way for users of mobile technology to view the history right there in their environment, the historical and cultural significance of these artifacts would be rediscovered by the general public and this younger generation in particular. When creating mobile-learning experiences, archaeologists, historians, scholars, and message designers must first consider that these audience members are different in many ways than the generations preceding them. These millennials have always had access to mobile technology, and they expect to be connected to interactive, "on-the-go" material, wherever they go. Smart phones and mobile technology provide researchers a unique opportunity to reach this group and to broaden the history and stories younger consumers can share. These videos bring the human stories and history to life right in front of the remaining artifacts allowing new generations to experience the exhibit and the history as they walk through the environment.


**Fig. 17.1** Aerial view of Eagles Island (*left*), Cape Fear River, and Wilmington (*right*). (Figure by Sean-Michael Hoban)

This chapter discusses tools necessary to design on-the-go video content, which will package effective historical content hopefully engaging a new generation, while also vastly improving our processes of preserving cultural heritage and history. A critical concept in the development of mobile video content includes the necessity to plan, develop, and execute highly engaging story lines. Information must both entertain the audience and impart the valuable historical content for the audience's edification as well. This process is neither simple nor easy to execute. Poorly planned or executed material that does not adapt well to the mobile device medium will fail to impress or impact the audiences that are masters of using these devices.

## Background

Established in 1731, Wilmington, North Carolina, grew to be the state's most populous city as well as its most significant port during the eighteenth and nineteenth centuries. The city enjoyed an enviable location that allowed it access to inland,


**Fig. 17.2** Wilmington's Riverwalk. (Photograph by Michael Dermody)

coastal, and ocean waters. It also had plentiful pine forests nearby that supported burgeoning maritime industries such as tar, pitch, turpentine, barrel staves, and lumber. Many of these commodities were stored at Eagles Island, which became the main depot for Wilmington and consequently saw supportive infrastructure such as railways, docks, and boat slips constructed. Wilmington's maritime commerce fluctuated greatly, however, in the early twentieth century with volatile local and global markets. By mid-century, the town's maritime vibrancy and importance ultimately was extinguished (Seeb 2007, pp. 2–3).

For nearly 40 years, the only reminders of Wilmington's once thriving maritime commerce were the abandoned vessels, wharves, and other smaller artifacts deteriorating on Eagles Island's shores. Then in the 1970s, the North Carolina Underwater Archaeology Branch (UAB) began conducting investigations and surveys around Eagles Island in order to identify different vessels. The acquired archaeological and historical research motivated UAB to nominate sites around Eagles Island to the National Register of Historic Places. UAB continued investigating and documenting different ships and watercraft through the 1990s, during field schools and comprehensive studies of the Cape Fear and Northwest Cape Fear Rivers, collaborating with local middle schools and US Army Corps of Engineers, respectively (Seeb 2007, pp. 115–116; Wilde-Ramsing 1986). Beginning in 2005, archaeologists from ECU's Program in Maritime Studies began studying use and reuse patterns of the vessels and cultural remains to demonstrate how they represented a microcosm of the cultural, economic, and technological characteristics that occurred in the Wilmington area specifically, and in North Carolina in general (Seeb 2007).

Between 2006 and 2007, developers proposed the construction of high-rise hotels on Eagles Island, creating a series of debates and meetings to discuss the best uses of the island's wetlands. In 2007, county commissioners eventually passed an ordinance restricting building height on the island to less than 75 ft, but negotiations on the controversy are on-going (Gonzales 2011). It was during this period that the authors were looking for an appropriate location to create a proof of concepts mobile tour.

Various options were discussed to determine the best setting for the outreach component, ranging from developing river tours using kayaks or canoes to creating maritime trails along the shoreline of Eagles Island. It was decided that the Riverwalk would be an excellent venue for a potential maritime heritage trail, since it overlooked the Cape Fear River, Eagles Island's eastern shore, and many of the abandoned vessels. In addition, the Riverwalk was already a destination frequented by tourists and locals, since it runs through the heart of Wilmington's old town district and is advertised as a connection between the city's maritime heritage and contemporary commerce (Wilmington Insider Info 2011):

> The heart and soul of downtown Wilmington is its riverfront. Once a bustling, gritty confusion of warehouses, docks and sheds, all suffused with the odor of turpentine, the wharf was the state's most important commercial port. Much has changed today. Now you can experience Wilmington's charm and historical continuity by strolling The Riverwalk. Dining, shopping and lodging establishments line the walk, and live entertainment takes place at the small Riverfront Stage. Immediately to the north, schooners, pleasure boats and replicas of historic ships frequently visit the municipal dock. Coast Guard cutters and the occasional British naval vessel dock beyond the Federal Court.

Different methods of presenting information about the ships and their history along the trail were discussed as well. Pamphlets, signage, posters, and guidebooks are traditional products used to provide public information about sites and lookout points on a maritime trail. Jameson and Scott-Ireton's (2007) edited work, *Out of the Blue*, provides examples of innovative ways these modes of interpretation have been applied to maritime heritage trails, such as in Florida (McKinnon 2007; Smith 2007) and Cayman Islands (Leshikar-Denton and Scott-Ireton 2007). Some of these trails incorporate the Internet to varying degrees. Watts and Knoerl (2007) expand the discussion on how the Internet can be effectively used to create computer reconstructions of shipwrecks and virtual tours of underwater sites. They correctly point out that technology—both contemporary and developing—creates new and exciting opportunities for archaeologists to involve the public in maritime archaeology. The authors also wanted to utilize current technology to engage people with the rich maritime history of Eagles Island and Wilmington; so, they proposed something like a maritime heritage trail tour using video mobile technology.

## Mobile Media Technology

The proliferation of mobile media such as smart phones, podcasting devices, and tablets with video capability has made video storytelling a staple in peoples' lives. It is rare to go through a day without observing someone using a phone or other mobile device to access the Internet. Although this particular project was developed and tested with a target audience of millennials and/or digital natives, these devices have become so obsequious in today's society that the project can and does impact a much broader audience than originally designed for. With that said, any group planning these projects in the future should evaluate their own audience when they begin to design story lines and content and adapt their strategies accordingly. In the case of this project, one of the primary goals was to draw in the newest and next generation of learners, so that maritime history in this region would not be lost in time. Consequently, this project's focus for target audience is the millennial and digital native generations.

One of the most attractive benefits of mobile technology is that it allows new and dynamic possibilities for public outreach and maritime heritage trails. First, it allows people to be untethered from a dedicated, static communication environment such as a sign or kiosk. Mobile media permits people to walk along a trail and experience the stories and history of cultural resources in (or close to) the *actual* environment where the resources exist. Second, mobile technology allows us to leverage high-quality video and audio to create a world, where the user can receive engaging information and historians can reinforce educational content beyond text-based methods. Third, this media can layer levels of information ranging from very detailed to more general. This helps democratize information because every individual can choose what he or she watches. The user can also decide whether or not they want more detailed information on a given topic—again creating a more personal experience for the individual.

However, designing audio and video content for mobile devices presents certain design considerations. When a new medium such as mobile video technology is introduced, it is often thought of in terms of old medium applications, creating problems related to designing, and executing appropriate learning and educational content (Dermody and Mires 2007; Stanton et al. 2001). In order to develop, produce, and implement audio and video for mobile devices, three important design considerations *must be* addressed because of challenges they create versus other media such as television, computer monitors, or signage: environmental distractions, content creation, and video production.

## *Environmental Distractions*

While the mobility and flexibility of mobile technology is obvious, one of the greatest concerns when creating content for this medium includes the existence of significant environmental distractions. In an outdoor setting such as a maritime trail a person using a mobile video device interacts not only with the presented audio and visual story, but also interacts with the surrounding environment. This has both positive and negative consequences. On one hand, the individual participates in the environment, where the cultural resource is located, creating a multisensory, collective experience. On the other, research has shown that when individuals are faced with external stimuli or complicated task requirements, they have difficulty recalling information or important directions (Bell and Buchner 2007; Lustig et al. 2006; Sack et al. 2007; Svenson and Patten 2005).

This obviously has important implications for designing content for mobile technology, where users will be walking and be expected to switch their attention from the external surroundings to the video and audio presentation. This implies an element of risk because a walking viewer may stumble, run into objects or other people, possibly injuring themselves or others while engrossed in the video content. In addition, even if users stand in one place, environmental distractions (such as cars, boats, birds, wind, other people, and the river itself) still abound. Each distraction presents a possibility of diverting the user's attention from the message. The challenge in designing content then is twofold: (1) content must provide viewers with clear instructions to stop and start easily without losing their place or losing the ideas and storyline in the video presentation; and (2) the planning and use of the content must limit environmental distractions and focus attention of viewer on the message through actual content structure.

## *Content Considerations*

Without an individual's targeted attention aimed at the content of the message, there will be a decrease in retention and critical thinking related to the information. Therefore, content design must account for the mobility factor and corresponding environmental distractions. Previous approaches to the design of more standard video content are not wholly suitable for this medium or for how people engage mobile devices. One cannot rely solely on "talking heads" and long, linear-based narratives and expect to keep an individual's attention with significant surrounding environmental distractions (Brown 2005; Clyde 2004; Keller 2008; Kinshuk 2006). In addition, different people find different aspects of information and experience interesting. Therefore, content design should be developed with the following guiding principles: nonlinear format, short length, cascading presentation, and highly engaging, proven storytelling, and cinematic techniques. Each of these principles is discussed in more detail below based on observations from the Riverwalk Tour project.

## *Video Production*

There are two production considerations that make using mobile technology as a medium for disseminating information different from traditional video development. First, while the screen size on different mobile devices varies, it is still smaller than average computer monitors or television sets. This means that these devices often display fine text (defined as anything less than 36 points) poorly. Consequently, content should be audio and visual based with limited use of text. Second, because

**Fig. 17.3** Remnants of a tugboat from Stone Towing Company, which operated from late nineteenth century to late twentieth century. (Photograph by Michael Dermody)

each user will have a headset, or "ear buds," there will be a greater opportunity to speak directly to the user, leveraging the power of sound effects to create a vivid learning environment. Therefore, scripts should be written to speak to the individual with one-on-one visual and audio constructs because the target audience of learners is voluntarily engaging with the information and as a consequence can turn it off at will if they do not find the material interesting or engaging (Dermody and Mires 2007).

## Proof of Concept

With the environmental, content, and video production considerations in mind, we developed two "proof of concept videos" that may be used to demonstrate how mobile technology can work for maritime heritage trails in general, and Wilmington's Riverwalk and Eagles Island specifically. One proof of concept video focused on the first abandoned shipwreck on Eagles Island, a Civil War gunboat, *Waccamaw*. The other video focused on the many abandoned tug boats (Fig. 17.3) along the shoreline in order to connect the island's historic maritime industry with contemporary operators and vessels as a continuum of Wilmington's maritime heritage. From 2007 to 2008, the creative and research team shot over 20 hours of video footage (Fig. 17.4), collected historic photographs, and examined the archaeological and historical records provided by ECU's Program in Maritime Studies, North Carolina's Underwater Archaeology Branch, and the National Park Service's Submerged Resources Center.

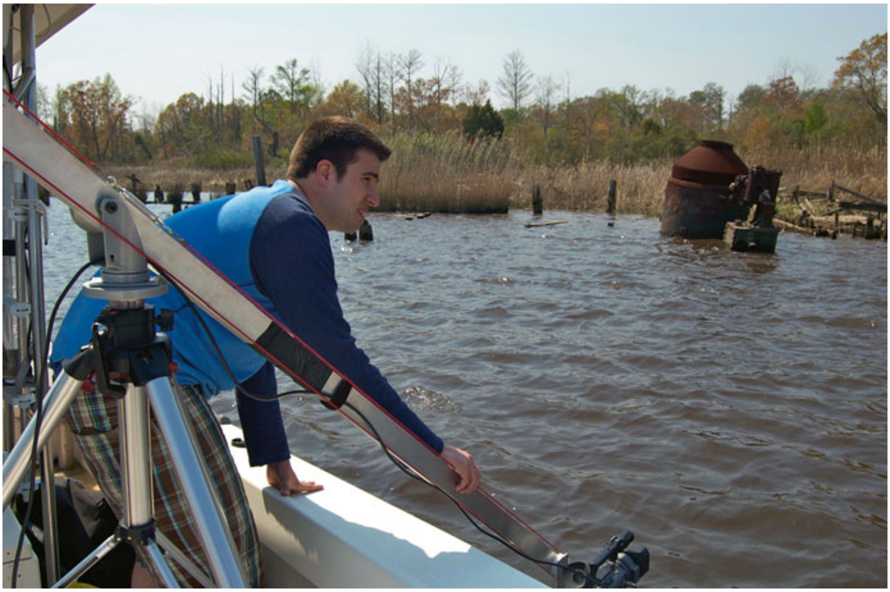

**Fig. 17.4** Shooting documentary video along the Cape Fear River. (Photograph by Michael Dermody)

Testing followed production of the mini documentaries. For the proof of concept demonstration the process worked as follows: Participants were given the option of taking a preloaded video iPod on the Riverwalk tour. After a museum attendant gave verbal instructions on how to use the device, participants put on the headphones and watched the introduction video that provided a brief context of the tour and demonstrated how the device can be used to enhance the tour experience. Once on the walking tour, as they approached a fixed placard with a number on it, participants engaged the corresponding video presentation (Fig. 17.5). Now, with GPS locators incorporated into most mobile devices, users can use this technology to smooth the walking process without interacting with the placards, if they wish so. This allows the user to adapt their individual experience as they see fit. In these instances, the device will automatically filter the available videos for a particular point on the tour, based upon the location of the participant.

## Observations

The authors conducted several tests of the video-walking tours, and conducted informal interviews with participants. The team also made observations of use efficacy and behaviors of the participants throughout the tests. The results, though not scientific, revealed a number of general issues related to the users' interactions with the

**Fig. 17.5** Taking the tour along Wilmington's Riverwalk. (Photograph by Michael Dermody)

content and the devices. Interestingly, the users' anecdotal feedback in interviews and based on observations was positive overall. For example, most participants stated that video messages enhanced the tour experience. As they were taking the tour, users consistently looked between the video screen and the prescribed site. This indicates that they were examining the video content as it related to the site in front of them. Users did report difficulties, however. Not everyone found the user-interface of the mobile device intuitive. There was also a period of adjustment, when the user had to carry or wear the device while simultaneously looking at the vessels across river and walking to the next stop. The majority of users waited until they reached the designated spot to engage the videos. Once at a designated spot, users tended to stop and focus on the video and site while the related content played.

## Recommendations

After developing and briefly testing a proof-of-concept presentation for the Riverwalk Tour project in Wilmington, North Carolina, we designed a number of emergent development guidelines that we believe will make the difference between the successful application of mobile technology for this purpose and the unsuccessful technology application. These guidelines include designing video with distractions in mind and managing those distractions in the design process.

Due to environmental and other distractions that divert attention, it is prudent to keep video content short. This means messages should be delivered in less than 120 s, if possible. Two minutes is then, the maximum length of time for content delivery recommended for this medium in outdoor environments. Ideally, however, video should be between 60 and 90 s. The time frame of 60–120 s is reasonable to ward off competing aural and visual distractions, allowing for increased information retention, and a higher probability that the user will continue the tour. Short lengths also make replaying easier, if the person becomes distracted and misses some information.

Next, always keep in mind the primary purpose of the video message is to support the cultural resources. The purpose of the video messages must not be forgotten in favor of becoming enamored with the production of the video itself. Designing messages that play a supporting role in a live environment is drastically different from designing the entire story. Designers must maintain a focused story line with short segments that simply bring the cultural resource to life for the visitor. The video should show-not-tell the story or content pertaining to the cultural resource.

In addition, consider a cascading presentation of video messages providing the means for the user to select additional information. One of the advantages of mobile technology is that users can choose what they want to watch and how much or little information they would like to see for each video segment. This means that designers should consider modular, or cascading, presentation of video messages. If designers break multiple messages into cascading presentation, they should put critical information (or macroinformation) first with secondary detailed (micro) information following. This will allow users to choose whether or not they want more information on the topic. For example, with a shipwreck as an artifact, the first video could put the vessel in context by explaining its type, purpose, and construction location and year. The next video could tell the story of its demise. Finally, a third video may emphasize the ship's importance and/or its relation to the environment and people/culture it represents today. By presenting the video messages in this fashion the user is empowered to select only those topics that interest him or her. Allowing the user to select which information he or she deems important will result in increased attention for a longer period of time.

Also, always design the message to be highly engaging by using proven structural techniques. Video as a medium has specific strengths including the ability to deliver stories, compress time, move between multiple locations, and create an emotional connection to a topic. What video does poorly; however, is relay static bullet points of facts and numbers. It is critical that video messages be restricted to visual and aural storytelling. First and foremost, each message should have a clear and concise narrative structure with a beginning, middle, and end. This is the structure that most people are familiar with and allows them to know what to expect in the delivery process of the story. It will also permit them to keep their focus on the content because they know where it is going and the order in which it will be delivered. This medium for this use is *not* the place to experiment with too much artistic license. It is necessary to keep the structure of the content clean and coherent.

Second, the video message must be highly engaging. It is not enough to repurpose or reuse old videos created for conventional media or to videotape an expert who talks directly into a camera without additional footage. Seek to leverage professional cinematic techniques. For example, one might access the following and integrate them into the video where appropriate:

- Historical photographs
- Historical film footage
- New footage of the location
- Sound effects and interviews with as many people as possible

Use of the professional techniques and the above-listed materials will help keep the video created by the historians visually and aurally engaging. They help bring the subject matter to life.

Now, consider using audio-only messages in conjunction with video messages. Because users will have headsets, audio production plays a significant role in the storytelling and needs to be considered in concert with video messages. Audio and video messages can be used in concert or separately in various ways. For example, you may create an audio-only message that plays a musical tune for the time period that the tour was targeting. This technique may be used to help transition users from one display to the next. One good reason to use only audio as the transitional device is that if the user is walking, it is easier to walk to the next point when only concentrating on an audio message. Also, audio can add drama and power to the video. When using audio for a specific purpose, it is important to be consistent with the techniques within a given set of materials because the user will come to recognize them as the signals that they are—such as transition to a new locale.

## Conclusions

With these considerations and themes in mind, researchers have an opportunity to leverage the power of mobile media technology and video assets presenting a new set of opportunities to engage and educate current and future generations about the importance of cultural resources. This is not a simple process of pointing and shooting a camera. Archaeologists should consult professionals experienced in designing content for this particular medium. New generations (such as the millennial and digital natives) are sophisticated in their use of media. If done well, this format of information presentation will draw new users in and create interest and buzz among your audience members. If done poorly, users will abandon the tour and move on to the next item that they find more interesting.

Mobile video technology is a natural fit for maritime heritage trails. Unlike a static poster or sign, it allows people to move untethered from one point to the next along the trail. For example, visitors can experience deeper levels of information of their own choosing in the outdoor environments where ships have come to rest. Even if a vessel is completely submerged, there are video production techniques that allow it to be raised virtually out of the water, which can capture a user's attention far better than pamphlets or signage. By effectively using the technology's video and audio capabilities, information can be presented with more dynamic and richer content that engages a broader array of the users' senses. Not only they can see and hear the presented story, but they also can experience the sights, sounds, smells, and feel of the actual environment, where the ship came to rest because they are standing in the physical environment. This creates a more personal and intimate experience, thereby creating a stronger connection between the individual and the cultural resource. One of the more exciting developments in the use of mobile technology involves the geo-location devices and capabilities now available. At this point, we can create a system that will intuitively know which artifact the user is in front of and the device can automatically retrieve the appropriate content for the user's location point. In time, this capability will dramatically improve user's use and experience with content using a mobile device.

The goal of using mobile technology to create a maritime heritage trail for the Eagles Island Ship Graveyard was to stay ahead of the curve and relate to the changing demands of tourists and visitors to Wilmington's Riverwalk. In addition, the creative and research team hoped to develop a way to actively draw in younger users to perpetuate the transmission of the historical knowledge about the sites, which they were viewing and which were submerged in the water in front of the them. Overall, feedback was positive from the users and new projects for developing maritime heritage trails along North Carolina's coast have commenced. The above recommendations can be applied to maritime archaeological sites and other heritage trails with confidence that good planning and execution will bring about effective and engaging learning tools for younger and more mobile audiences. By engaging the public with this mobile medium, archaeologists can take perceived "eyesores" or even enhance limited visually available historical artifacts and still educate people about the significant role and importance the resources hold to interpret a community's maritime past.

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# Chapter 18
# Abandoned Watercraft as a Teaching Resource

**Martin Read and Pollyanna Magne**

**Abstract** Abandoned watercraft can form a rich learning resource for higher education students. Using a series of case studies, this paper looks at ways in which hulks can be used as a teaching resource and discusses the benefits of 'on site' work in terms of experiential learning and the discipline-specific skills that are developed through this kind of learning. Those participating need to be made aware of the nature and difficulties of working in this environment. Tasks need to be clearly defined and manageable for the conditions and the time span available on-site. The results of this fieldwork could be beneficial both, in terms of student learning and as a contribution to the knowledge and understanding of our maritime past.

## Introduction

The remains of hulks or abandoned watercraft, located along the edge of the river and the intertidal zone are an important component/evidence of our maritime past. Many of the estuaries of the southwest of England are littered with the remains of hulks which have been abandoned at the end of their working life. Sometimes these are concentrated in hulk assemblages or 'ships graveyards' and as such, create a useful resource for teaching aspects of maritime archaeology and other related skills to students.

This chapter will look at ways in which hulks can be used as a teaching resource and discuss the benefits of 'on site' work as one element of a wider curriculum. It will include case studies of both undergraduate and master's-level student projects undertaken by students from Plymouth and Bristol Universities in various locations including: Hooe Lake, Plymouth; Estuaries along the South coast of the counties of Devon and Cornwall; and the Exe Estuary (South Devon) (Fig. 18.1). In very general

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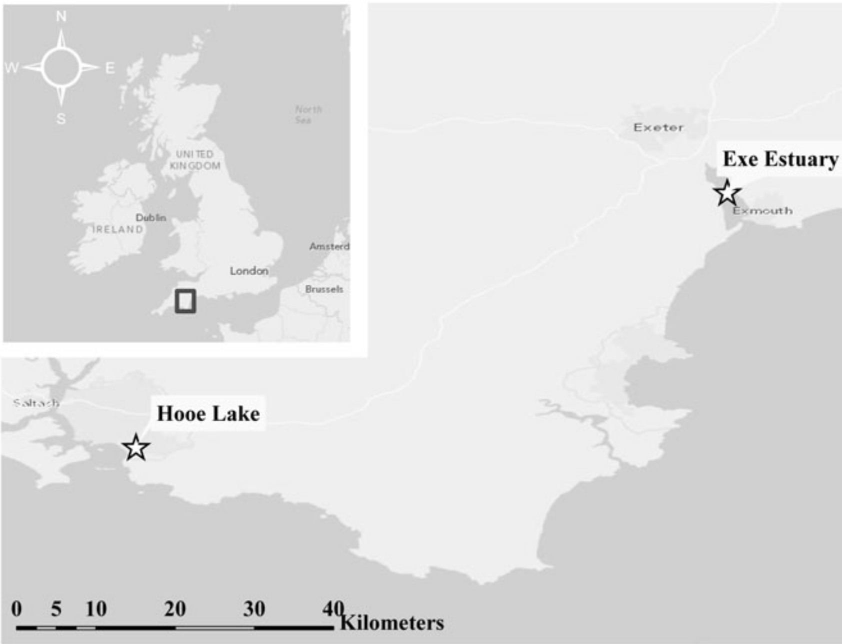


**Fig. 18.1** Location of the two primary research sites. (Map by Nathan Richards)

terms, the authors will focus on two key areas: the pedagogy which underpins the idea of experiential learning and the discipline-specific skills that are developed through this kind of learning.

## Hulks as an Experiential Learning Resource

Kolb's classic work, *Experiential Learning* (1984) argued that learning can be thought of as a process of adaptation to the world, whereby knowledge is created through experience. Experiential learning emphasizes on the central role that experience plays in the learning process and assumes that ideas are not fixed but are formed and reformed through experience. Experiential learning encompasses a range of approaches, including laboratory work and fieldwork, and has become widely accepted as an effective method of teaching and learning in universities.

Across a range of university subjects, practical aspects of fieldwork are regarded as central to the nature of the disciplinary knowledge and an essential part of the curriculum. Part of the argument for fieldwork in general, and hulks more specifically, is that by engaging with the subject matter in its 'natural' setting students make the shift from a surface level approach to learning (whereby they may just focus on reproducing knowledge they have acquired) toward a deeper learning approach (Marton and Saljo 1976). This "deep learning" is often closely associated with fieldwork tasks which encourage students to apply information to the real world environment, synthesize ideas, and develop individual perspectives (Biggs and Tang 2007). For example, methods used to survey a hulk can be taught in the classroom. However, if students are then taken 'on site' and given the task to survey a hulk in the intertidal zone, they automatically move from being passive recipients of information toward active participation, whereby they engage in a 'deep learning' approach.

In this experiential setting, students have to consider the health and safety practicalities of the intertidal zone and how to apply the survey methods in less than ideal conditions (such as soft mud, wind and rain). They also develop a working knowledge of additional factors that come into play in a real survey situation which may then be reused later in other, even less favorable, environments (such as an underwater diver survey) where there is less scope for teaching to be carried out. Following the fieldwork, students may analyze the experience and identify factors that are vital in the field, but seemed less important in the classroom setting. A summary of the fieldwork experience might be "More than just learning *in* the field: learning *about* the field and how to work there" (Ramsay 2007, p. 13). In addition to this, we know that if we have engaged in a process, the knowledge developed through that learning experience is more likely to "stick" (Buzan 2000).

Experiential learning can also act on a motivational level. Students have varied levels of motivation. Some are intrinsically motivated to learn and others need more extrinsic motivators such as fieldwork and participative tasks to help them along. Biggs and Moore (1993), who discuss student motivation and active learning as key elements of 'good teaching,' also highlight the need for a well-structured and integrated knowledge base.

Where there are opportunities to go beyond the classroom, a well-designed curriculum will make the links between the classroom activity and the fieldwork tasks explicit. For example, students may first learn about specific parts of a vessel in the classroom, where they can examine photographs and diagrams and learn the terminology. If they are also told in advance that they will subsequently be asked in the field to identify the bow and stern, whether the boat is of carvel or clinker construction, what clues there are about the propulsion of the vessel, and so on, the students may have an increased motivation to absorb the classroom material in preparation for the fieldwork activity. A well-designed curriculum does not only serve to motivate students, but it also reflects the principles of constructive alignment whereby the tasks and assessment closely align with the learning outcomes of the module (Biggs and Tang 2007).

Another common feature of fieldwork is the group work element. Outside of University life, group working (or team working) is almost universally practiced in business and industry. Many of the students who have undertaken modules that have used hulks as a learning tool have gone into careers such as hydrographic survey, which require the ability to work in teams. The Prospects website (Prospects 2011) explains that employers place just as much importance on graduate skills such as good communication, team work, and leadership as they do on discipline-specific skills.

Although working in groups can be fun, stimulating, and challenging, Macdonald (1997) also notes that group work can also be potentially boring, threatening, and unrewarding. This again points to the necessity of constructively aligned tasks and the need to plan ahead. An academic preparing a survey of a hulk designed for Level 4 students (those in the first year of their degree) may assign groups, offer a breakdown of the task, the equipment they will need, and the roles of each individual. However, the same survey task designed for Level 7 students (those undertaking a Master's degree) may just give a 'task briefing' and an outline of the intended outcomes, leaving the students themselves to organize groups, equipment, identify the roles, and who might take responsibility for each part of the task. In this example, the same survey task is undertaken, but the level of skill required to complete the task is greater for the Master's students because much of the decision-making and task design has been left to them. So not only are they learning discipline-specific skills, but are also engaging on a deeper level with those 'soft' communication, leadership, and teamwork skills that employers are looking for.

In their discussion about good teaching, Biggs and Moore (1993) also point us to the value of interaction with others. Some students find studying alone isolating and group work enables average or weak students to study with students who are more able, helpful, and stimulating (Gibbs 1994). Macdonald (1997) goes on to tell us that much of the learning done in groups occurs independently of the lecturer, and groups are able to achieve more than individuals. The learning of the students is also potentially of much better quality as the students are actively involved (collaborative learning). Cooperation and good communication are vital in the intertidal zone. A group that spends a little time at the start discussing how they will approach the tasks and work together with the equipment is more likely to complete the survey, for example, than a group that does not communicate well. In addition to this, we know that peer learning forces students to communicate their ideas and collaborate, thus developing a shared learning experience (Boud et al. 2001).

One other advantage of working with hulks in the outdoor environment is that the students are removed from the classroom and placed in a very different learning space. This simple strategy of using different teaching and learning spaces helps to vary and deepen the learning experience (Kent et al. 1997). Fieldwork also supports the development of cognitive, affective (the manner in which we deal with things emotionally), and psychomotor skills in students as well as more general field skills, problem solving, and understanding of the subject. If designed well, fieldwork tasks should promote autonomy and responsibility in students and enhance their confidence, independence, and questioning. In addition to this, research tells us that fieldwork is an effective method for achieving academic and social integration: it has a positive effect on student motivation and aids the progression of students through successful completion of their degrees (Boyle 2007).

## Project Planning for the Hulk Surveys

Project planning for hulk surveys is essential and can be broken down into safety and risk assessment, equipment and discipline-specific skills. This provides an opportunity to introduce the students to the challenges of working in an intertidal environment. Students are encouraged to draw on any previous experience they have of working in similar environments in order to identify safety procedures and protocols that they will use in the field. Safety of both staff and students must be a primary concern when planning for any work taking place in the marine or intertidal zone and is always addressed in the introductory stage of the project planning.

## *Safety and Risk Assessment*

Clearly it is important for the students to gain an appreciation of the importance of safety in fieldwork, and it is also important not to make assumptions about the level of experience people may have when you are about to take them into a potentially hazardous environment. With Level 4 undergraduates there can be no assumption that they have previously worked in a marine or intertidal environment. Therefore it is a good idea to start, as the authors do, with a basic field week risk assessment for all fieldwork activities. This is completed by students in advance before the fieldwork starts, to involve them in thinking about potential risks of working in this environment.

When disembarked from transportation and prior to going on-site, the initial activity involves asking students about their perception of potential risks, taken partly from their own experience and initiative and partly through the use of directed questioning. Important risks such as the potential of being cut off by the tide, with the need to identify safe exit routes from a site, and of working in a muddy environment (including the importance of not working alone and carrying a rope to help if trapped). Access to emergency radio or telephone communication (as well as making people aware of when and where they are working and the time they are due back) and other topics such as the effects of the weather (and the need for appropriate clothing), food/drink, and lavatory facilities should also be considered.

Many Master's (Level 7) students may also not have a maritime background, so no assumption can be made that they have worked in a marine or intertidal environment previously. The students are directed to comply with the safety procedures of their University such as completing a risk assessment, prior to the fieldwork. Initial on-site activity, as with Level 4 students, also involves discussion about potential risks, though with an expectation that Master's students would have a greater contribution to make, based on their general experience, and ability to think critically about a range of scenarios and preventative actions or solutions.

## *Equipment Needs*

A handout is provided to students prior to the fieldwork with the list of activities and the equipment used. Students at Level 4 carry out the tasks and activities, gaining knowledge of the requirements of the task and the use of equipment and any limitations. The post fieldwork tutorial is also used to discuss these points.

Level 7 students are given a list of equipment and the responsibility for locating as much of it as possible from their own resources and then supplying a list of unattained equipment prior to the fieldwork. At the beginning of the second day of the survey, a session is dedicated to the students planning their survey activities for the day and deciding on their equipment needs.

## *Discipline-Specific Skills*

The safety briefing is followed by a questionnaire designed to promote a discussion of what they would do if they only have limited time and resources to record a site. An example would be if a site were discovered whilst the tide was coming in and there were no plans to return to the area in the near future. What records would they make? Most groups suggest taking GPS fixes, photographs, and basic measurements. With a little prompting, other records such as making site descriptions, annotated drawings as well as the use of other positioning and basic recording methods can be discussed.

The initial design of the Level 4 fieldwork involved four recording activities: the use of hulk recording forms, offset survey (a measured survey positioning features relative to a baseline positioned through a site), profile survey (vertical equivalent of an offset survey, often of a section through a site), and planning frame survey (a detailed drawing of an area, normally using a square frame or quadrat). These tasks were designed to enable students to learn and experience different survey methods and techniques. In practice in the first year of the field week, it was found to be difficult for a single tutor to manage four groups doing different tasks at the same time and also led to limited time being available for students to perform each of the tasks. In subsequent years, the number of tasks was reduced by removing the profile survey (being a variation on an offset survey).

Each group is given an activity sheet which describes the procedure to be undertaken. An initial briefing is then given with clear explanations of the processes and procedures for the task and a demonstration of how to carry them out and record the results. During the task, groups are regularly monitored with the use of simple, direct, and noncritical questioning. Directions are given and support offered, with suggestions for improvements in technique.

Offset, profile, and planning frame surveys are techniques commonly used in archaeology and some other disciplines to record sites. In maritime archaeology, they are used to record details of the size and shape of a vessel's remains, its component parts, and how they relate to each other (Beattie-Edwards and Satchell 2011; Milne et al. 1998). Practicing recording techniques illustrates some of the problems of how to record a three-dimensional object in a two-dimensional way. Directed questioning allows potential sources of error and inaccuracies to be discussed such as the problems of parallax, wind and current disruption of the baseline, snagging on obstructions, and the problems of producing scale drawings from recorded data such as the likelihood of having missed recording some measurements.

The hulk recording forms, based on a modified version of the Medway survey recording form (Milne et al. 1998) are used to record basic measurements and give a technical description of the remains. Given the limited time available (approximately 40 min per task, less initial briefing), it was fairly obvious that Level 4 students, often with little knowledge of watercraft or boat structure, would be unable to fill in all of the fields, mostly lacking both the technical knowledge and time. The fieldwork also needed to be designed so that it did not assume prior knowledge. The Medway survey provides some useful technical descriptions and diagrams which can be used by the students to distinguish between, for instance, carvel or clinker built hulls. In practice, the students have time to draw a simple plan of the site, record the presence of basic structure (such as stempost, sternpost, keel, and keelson), take a few measurements (overall length, length between perpendiculars, width, height), identify materials used in construction, the methods of propulsion, and to distinguish between carvel/clinker construction techniques.

The hulk used for the field survey comprises the decayed remains of a wooden vessel which has at some point been burnt. There is nothing now remaining to positively identify this vessel, which Langley and Small (1988) describe as being the houseboat *Roger*. The hulk recording form is used to demonstrate evidence-based research and has evolved slightly with use to illustrate the scientific method and the critical use of data and sources, with basic observational data and measurements being used to build up a model of the boat and its history.

The students are given a photocopied passage about the hulk and asked to comment:

> The former Belgian trawler, now serving as a houseboat, is moored in the shade of the trees on south bank. A small steel-built motor trawler, she was built in Nieuport in 1947 and sold to Brixham in 1966. She fished out of Brixham with the portmark BM 172 under an owner/skipper named Ribbie, until sold to a Plymouth fisherman in May 1974. (Langley and Small 1988, p. 63)

Most (but, strangely, not all) students immediately recognize that the hulk is quite clearly of wooden construction and not made of steel, demonstrating the potential problems with the uncritical use of published data. Was this simply a transcription error made during writing/editing or had they researched the wrong boat?

When visiting a site of abandoned watercraft, critical thought can be introduced by asking questions. This encourages those you are working with, to shift from being passive observers toward a more investigative approach. For example, in this case, students were asked to consider: Is there any evidence that the hulk was a trawler that had been refitted as a houseboat? Is there any evidence of it being Belgian? Some students expressed the opinion that because something is published, it must be true (even after correctly identifying the vessel as being of wooden rather than steel construction). These questions can be used to measure the accuracy of the published text against any physical evidence and to introduce a degree of scepticism into their thought processes.

If examined carefully, there is some physical evidence consistent with *Roger* having elements seemingly of Continental European construction and also originally


**Fig. 18.2** Plymouth University Level 6 students recording the remains of hulks on Hooe Lake. (Photograph by Martin Read)

being a trawler (such as the overall shape, remains of wooden bins used to hold the fish, fittings on the stempost similar to those on a nearby French trawler hulk, and a massive pair of wooden engine mounts for the large engine needed to pull the trawl at speed through the water, see Read 2011). There are also some signs of the boat being refitted as a houseboat (the engine now present is small and was most probably a generator belonging to the houseboat and there are signs of a cabin deck having being constructed over the original engine mounts).

The hulk's dimensions can also be used to support this being the remains of *Roger*. Langley and Small (1988) gave the original length of *Roger* as being 60 ft (ca.18.3 m). The lower hull remains *in situ*, with the full length of the keel and keelson being present (as well as floors and at least parts of most of the futtocks). The stempost has broken approximately a meter above the keel, whilst the rudder and counter at the stern of the vessel have fallen away from the hull and lie scattered around. The present length is just over 15 m (or 49 ft). If an estimate/allowance is made for the missing counter and foreshortened bow, this could be consistent with an original overall length of 60 ft.

Near to *Roger* are the remains of three hulks lying beside one another on the eastern foreshore of Hooe Lake (see Cotton 2011 for 1980s images). These were believed by Langley and Small (1988) to be an unidentified Tamar Sailing Barge, the Tamar Sailing Barge *Pearl* and (Fig. 18.2), the Brixham Sailing Trawler *Wendew* (a 'mule' class trawler built in Brixham in 1912).

The Tamar Barge was a type of wooden merchant vessel of simple hull form and rigging (round bows with no overhang and a flat transom stern, usually smack or ketch-rigged) which operated both, within the Tamar river system around Plymouth and along the south coast of Devon and Cornwall, between Salcombe and the Lizard. Only two Tamar Sailing Barges are now extant, *Lynher* and *Shamrock*. Both were abandoned at the end of their working lives, becoming hulks and have subsequently been restored (see Read 2011).

*Shamrock* is a ketch-rigged Tamar Sailing Barge, built in Plymouth in 1899, which was abandoned in Hooe Lake in the 1960s, from where it was rescued and taken to Cotehele Quay, on the River Tamar, to be restored in the 1970s by the National Maritime Museum and the National Trust (Viner 1983), where it can still be visited.

Research by Langley and Small (1988) into the middle of the three vessels found a Tamar Sailing Barge with the name *Pearl* built in 1840, but they gave no further details. However, it seems the three boats were abandoned post Second World War and it is unlikely that a working boat would have lasted over a century before being broken up.

Only the base of this vessel now remains sunk into the muddy sediment. Most of the keelson can be seen, together with ribs, internal and external planking, and the base of the stem and stern posts. The recorded *in situ* overall length of 107 ft or ca.32.6 m (and which could originally have been longer) is far too long for the hulk to be the remains of a Tamar Sailing Barge, which seem to have generally been up to 60–70 ft in length; the *Shamrock* is only 57 ft (ca.17.4 m). The hulk is most likely to have been a merchant coaster of some sort and provides further evidence that published sources needs to be critically examined.

Discussions with students later in their degree who have taken part in these surveys indicate that some have subsequently used some of the skills taught, such as planning frame surveys, including use of skills underwater. For others, the main benefit has been the survey and recording process itself and the realization of the importance of recording basic information regarding the survey such as the date and personnel, site name and location, and direction of North.

## Case Studies

Having examined the general principles which promote hulks as an experiential learning resource, and all the benefits that fieldwork opportunities and learning in groups can have, we now turn our attention to a series of four case studies of working with abandoned watercraft. The following examples demonstrate how hulks can be used to develop distinct skills and knowledge within a discipline, and how students can use these fieldwork experiences to develop other more generic skills, such as inquisition and critical analysis.

Plymouth University has, since 1997, used the remains of abandoned watercraft in its degree program. The first case study is a field week which focuses on survey skills taught using the hulks present in Hooe Lake, a tidal inlet in Plymouth, UK. This is one of a variety of field activities included as part of a Level 4 fieldwork week. The second case study is a Level 7 Master's intensive 2-day program. The third and fourth case studies outline extensive area and estuarine surveys where students practice and refine their skills.

## *Case Study 1: Field Week*

The survey task for the field week students is designed to enable students to practice and assimilate data-gathering techniques in field conditions and gain an appreciation of the appropriateness of these activities. The learning outcomes indicate that by the end of the field week, the students should be able to:

- Appraise the requirements for a fieldwork activity relevant to the learner's program.
- Plan the activity in accordance with the program specification and any applicable external regulations.
- Carry out the planned activity using appropriate technology to gather data.
- Analyze and report on the outcome of the activity.

Over the course of a week in late October/early November, various field activities, including hulk recording, are taught lasting approximately 3 hours each. A 2-hours briefing session is given for each of the field activities to the students prior to the practical week, covering the purpose of the exercise, equipment, parameters, and reporting issues (together with the provision of support materials such as handouts describing techniques and example recording forms, available online, and reference to sources of further information). This enables the students to put the tasks into context and recognize their value as a learning opportunity. It also encourages the students to ask pertinent questions and plan ahead. A 1-hour post-exercise tutorial on the processing of data and writing up is also given. The purpose of this is to engage the students in some reflection—this is the moment where they identify what they have learned from the fieldwork, begin to explore their ideas further, and deepen their level of understanding through discussion and critique (see Kolb 1984).

## *Case Study 2: Master's Intensive Program*

The Master's intensive hulk recording course takes place over 2 days and is an expansion of the field week, redesigned specifically to develop a higher level of skills and with a higher level of responsibility and organization being placed on the students. This course has also taken place in Hooe Lake for students studying for the Master's in Maritime Archaeology and History program at the University of Bristol. More recently, this hulk recording course has been adapted to run on a single day for Level 6 students who have not taken part in the field week (such as direct entry students) and who are recording hulks as part of their final-year individual projects.

## *Case Study 3: South Devon and South East Cornwall Surveys*

The third case study involves the use of hulks as a resource for Level 6 students (in the third year of their undergraduate degree). Since 1997, students from Plymouth University have recorded the abandoned watercraft on most of the estuaries of South Devon and southeast Cornwall, from the River Teign in the East to the River Fowey in the West. A total of ten river systems have been explored, covering over 70 miles of waterfront.

County archaeologists from both Devon and Cornwall requested the University to examine the estuaries as they were getting significant numbers of planning applications from developers to remove hulks. However, the archaeologists had no information on which they could assess the hulks heritage significance, value, or interest. This lack of information made it difficult for them to determine which of the hulks were worthy of preservation or survey prior to their destruction. Following an examination of the estuaries, more informed decisions could be made on which hulks might be important enough to be left undisturbed, if any were of some interest and worth having a full survey carried out prior to their removal or if they had no significant archaeological interest and could be removed unrecorded.

The students carry out these surveys as either group projects or individual dissertations (including two underway at the time of writing). The area surveys cover not only hulks and watercraft remains, but also include any other waterfront and intertidal archaeological remains they might find evidence for, such as tide mills, fish traps, and lime kilns. These projects utilize skills already gained/acquired during their degree, such as research and physical survey. In some ways, the projects can be thought of as the culmination of a student's field learning, as well as an extension of their field experience.

With Level 6 students, there is an assumption that they have worked in a marine/intertidal environment previously (such as taking part, for instance, in the field week). University procedures entail the completion of an agreed risk assessment prior to commencement of any fieldwork and the initial on-site activity again involves discussions about potential risks, though with an expectation that the student has a greater contribution to make, based on their experience. These students are responsible for planning activities and equipment needs ahead of any fieldwork and for organizing the booking and collection of equipment with University technicians.

After an initial briefing, the students generally take responsibility for carrying out the project, with tutorial support, and are accompanied on some site visits. The group projects take place over a 12-week term, and are designed to be overall of the same standard and size as an individual dissertation, which is undertaken during the first two terms of their final year (and often includes some work during the preceding summer as well).

The hulk recording aspects of these surveys are designed to look for, describe, and take basic measurements of any hulks found in a given area. This was based on the Medway survey (Milne et al. 1998) which described a hulk recording system divided into three levels. A Stage 1 survey records a vessel's position, a Stage 2

**Fig. 18.3** Plymouth University Level 6 students recording the remains of *Iverna* on the Kingsbridge Estuary, South Devon. (Photograph by Martin Read)

survey involves the use of a hulk recording form and a Stage 3 survey includes excavation/measured survey. The student surveys would seek to record a Stage 2 survey (using a modified hulk recording form), or a detailed measured Stage 3 survey of selected hulks. These projects have resulted in over 20 reports being generated, copies of which have been passed on to form part of the Historic Environment Record kept by the District and County Councils in Plymouth, Devon and Cornwall.

Summaries of some of this work have been generated over the years (Read 2000, 2001) showing that nearly 100 hulks have been located and recorded so far. These include a number of significant 'ships graveyards,' including Hooe Lake (17 hulks), the lower River Lynher (8 hulks), Old Mill Creek on the River Dart (8 hulks), and Tosnos Point on the Kingsbridge Estuary (8 hulks). All have in common their proximity to harbors where large numbers of vessels were in use (illustrated by the closeness of Hooe Lake to the historic Sutton Harbour and the Cattewater anchorage in Plymouth and the lower River Lynher to Devonport Dockyard). A variety of abandoned watercraft have been found, including nineteenth century Tamar Sailing Barges, Brixham Sailing Trawlers, coastal ketches, and military craft originating from countries as diverse as Belgium, Netherlands, Denmark, France, and the USA.

Several vessels have been considered significant enough to be the subject of Stage 3 surveys, including the late nineteenth century Americas Cup Racing Yacht *Iverna* on the Kingsbridge Estuary (Kirkwood et al. 2000) and an unidentified Maltese (Fig. 18.3) tug on Tamerton Lake (Richardson et al. 2000). Other craft such as the nineteenth century paddle steamer *Empress* and the remains of a rare horse-boat ferry on the River Dart have been identified as being worthy of full recording in the future (Ashton et al. 2000).

The results from these projects show both, the benefits and limitations of the use of students to carry out this type of survey. The benefits include the deployment of significant amounts of resources and personnel (which must have come to over 50 students so far) which has enabled a large area of water frontage to be examined at a relatively small cost (compared with a professional survey). Limitations include issues of quality control, the length of time taken to carry out each of the projects, and the overall time taken for complete coverage of the area, which has taken a number of years.

As a result of these surveys, several significant threats to this resource, apart from natural decay, have been identified, including reclamation and development/redevelopment of the foreshore, vandalism (both, in urban and rural areas) and the desire to 'tidy up' or 'improve' the look of the estuaries and creeks, particularly by often newly arrived homeowners buying recently developed waterfront properties. At least one harbormaster regularly clears the remains of any hulks found within his area of responsibility to provide a nice 'clean' estuary, and locals on one tidal creek regularly saw off timbers from nineteenth century hulks to provide a village bonfire for traditional celebrations in November. Apart from that, it was not so long ago that the nearby Dartmoor National Park was spending a lot of money trying to remove all evidence of its mining past as a result of the perception that the industrial spoil heaps were in some way spoiling the 'natural' landscape and ruining views. In more recent years, a lot of resources have gone into conserving the Dartmoor mining heritage as being part of the development of this landscape over time. It is all a matter of perception as to whether something is an 'eyesore' or a part of our past worth preserving. This highlights the need for more educational development to take place to try to change attitudes toward our maritime heritage and to make hulks of greater value to the local community who might then be more likely to lobby for their preservation.

### *Case Study 4: Exe Estuary Survey*

The fourth case study is of a 5-day archaeological field survey of the Exe Estuary, Devon, carried out in 2005 with students from the Master's in Maritime Archaeology and History program at the University of Bristol (Read 2005, 2006a) with funding provided by the Exe Estuary Office, Devon County Council. The eight students (plus one tutor) who originated from Britain, Ireland, the United States, and Canada carried out a general area survey of the Exe (to Stage 2 of the Medway survey) and detailed survey of four vessels in reedbeds on the opposite bank of the river to the historic Topsham Quay (a Stage 3 survey) using a combination of offset surveys, photographs, and measured drawings. Vessel positions were fixed through the use of National Grid Reference (NGR) (Fig. 18.4), Global Positioning System (GPS), and Electronic Distance Measuring Device (EDM).

**Fig. 18.4** Bristol University Master's students recording on the Exe Estuary. (Photograph by Martin Read)

As with the 2-day Level 7 field course (Case Study 2), the students were given responsibility for locating as much of the equipment as possible. The students worked in groups and all were given the chance to carry out both area surveys and individual hulk recording. Some students had archaeological backgrounds and all the necessary survey skills, so could help and support the others in the group. Briefings took place at the start of each day prior to the surveys taking place with a review at the end of the day.

A complication for the survey was that the Exe Estuary has widely diverse habitats which, due to their ecological importance, have resulted in the estuary having various protections, including being designated as a Special Protection Area (SPA) under the EU Birds Directive, a Site of Special Scientific Interest (SSSI) under the Wildlife and Countryside Act 1986, and a Ramsar Site under the International Convention on Wetlands of International Importance (Exe Estuary Partnership 2012).The group of hulks concentrated opposite Topsham Quay are located amongst the reedbeds, on the boundary of Exminster Marshes RSPB Nature Reserve, managed by the Devon

Wildlife Trust. This reserve is maintained principally for the benefit of wildlife and great care was taken in the operation of the survey to avoid disturbance of reed warblers, such as the survey taking place in April prior to nesting. Entry and exit routes into the survey area also had to be carefully thought through by the students.

A significant area of the estuary was examined, including the entire west bank from Topsham Lock to the Dawlish Warren Peninsula. Due to access restrictions such as the Royal Marines training camp at Lympstone being out of bounds, the east bank of the estuary was not as thoroughly surveyed, mostly being confined to the area between Exton and Topsham.

Much of the river edge and intertidal zone of the estuary was examined on foot and a total of 16 vessels (and one possible platform) were recorded (Read 2006b). A further group of, mostly relatively modern, hulks were also located, but not recorded. The recorded vessels were found to be mainly from the late nineteenth and first half of the twentieth century and included several types of vessels such as three Sailing Barges and the largest collection of Brixham Sailing Trawler remains yet located, with at least five known to have been abandoned on the Exe estuary (Read 2010).

The remains varied from vessel to vessel, but almost all were found to be in a state of highly advanced decomposition, where visible above the river silts, with the timbers being generally limited to posts and frames, though there was some evidence of the lower parts of the vessels being better preserved within the anaerobic silts.

The concentration of hulks on the opposite bank to Topsham must be related to the use of the port and quay (with a similar relationship between Hooe Lake and Sutton Harbour, as discussed earlier), but in particular to the breaking up of vessels in the Trout boatyard on Topsham Quay. However, some were only partly dismantled and abandoned on the opposite bank, forming a small ship graveyard (Fig. 18.5).

An additional part of this course was that the students carried out historical background research in the archives of Topsham Museum which supplied historic photographs of Topsham and the vessels/hulk remains in various stages of decay, along with their identification of vessels (Read 2010). One hulk, probably the barkentine *Leader* (a 3-masted schooner built in Salcombe, Devon, in 1869 and abandoned sometime after 1918), was located amongst the reedbeds only through the use of aerial photographs supplied by the Museum. The students also carried out interviews as an oral history project to record the memories of some of those using the River Exe (including the late Daniel Trout who provided his memories of the Trout Boatyard).

## Conclusion

Abandoned watercraft can make a rich learning resource for higher education students at both, undergraduate and more advanced degree levels. Those who lead fieldwork in the intertidal zone must ensure that they make no assumptions about the knowledge and abilities of those they are leading and, as part of any fieldwork, those participating need to be made aware of the nature and difficulties of this environment and how to

**Fig. 18.5** Bristol University Master's students recording an unidentified hulk on the Exe Estuary opposite Topsham Quay. (Photograph by Martin Read)

work safely within it. Tasks must be clearly defined and manageable in the potentially challenging conditions and the limited time span available on-site. However, the potential benefits of fieldwork in the intertidal zone can be huge, both in terms of student learning and as a contribution to the knowledge and understanding of our maritime past.

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# Chapter 19
# Victoria's Ship Graveyard and Abandonment Sites

**Peter Charles Taylor**

**Abstract** In this chapter, the reader will be introduced to a number of ship graveyard areas and abandonment sites within the state of Victoria. Explained are methods used for scuttling vessels and a method of position fixing for updating government survey charts. Examined are possible reasons for scuttling a vessel in preference to dismantling a vessel for scrap metal or firewood. An innovative method of research successfully used to find two scuttled wrecks in an early ship graveyard off Port Phillip Heads will be explained. And, to finish off, is the history of a particularly interesting and historic vessel (SHB *Batman*) that was once a part of Victoria's Colonial Navy and part of Victoria's nineteenth century defense system.

## Introduction

Commencing in 1913, ship owners and public authorities have used a ship graveyard located off Barwon Heads, Port Phillip Bay (Commonwealth Designated Area 3) to scuttle obsolete vessels (Fig. 19.1). This area has received the full gamut of vessels from the nineteenth and twentieth centuries forming a unique collection of watercraft. This miscellaneous group of vessels includes: steamers, sailing vessels, and unpowered craft. When scuttled, all were well past their prime or required expensive refits to keep them going. Although they were scuttled and abandoned, they are of great historical importance to Victoria's relatively recent post settlement maritime history.

Abandonment and ship-breaking sites are of value too, providing a place for recreational, leisure, and research activities. Some of these sites are now close to urban centers, providing an insight and a place to touch Victoria's maritime history.

The attractiveness of ship graveyards and abandonment sites as dive sites and places of interest stem from their recreational value rather than the stories of human catastrophes synonymous with shipwreck events. There is a great contrast between the reporting of an event such as the wrecking of *Loch Ard* off Victoria's West-coast in 1878 (Argus [Ar] 1878) and that of the scuttling of an old a vessel. The scuttling event was rarely reported in such detail. On one hand, the testimonies of lone survivors

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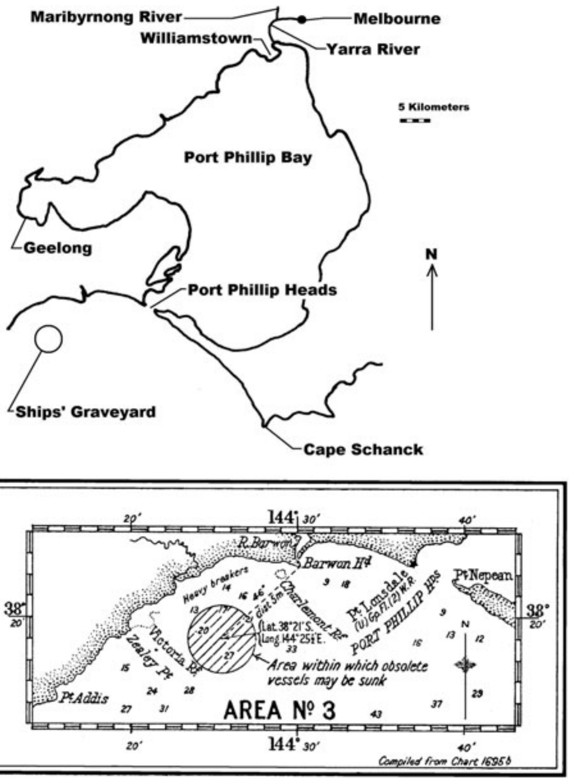


**Fig. 19.1** Map showing Port Phillip Bay (*top*) and the official location of the government-designated ship graveyard (*bottom*). (Images by Peter Taylor and from Commonwealth Government, Statutory Rules, Commonwealth Acts 1933, p. 99, respectively)

(Eva Carmichael and Tom Pearce in the case of *Loch Ard*) make for vivid reading likely to be distributed around the world. But for the towing and demolition crew on a scuttling job, it was likely to be just another job and unlikely to be widely reported.

Scuttled ships can provide answers to some intriguing marine engineering, historical, and ship construction questions. The shipwreck resource of the ship graveyard has proven to be a valuable asset that has helped support Victoria's dive industry and has played a critical role in providing training of advanced nitrox, decompression, and mixed-gas technical divers.

## Victoria's Ship Graveyard

In 1932, the Australian Federal parliament passed the *Fishing Grounds and Sea Routes Protection Act*, which led to the designation of 14 specific areas around Australia for the disposal of obsolete vessels. Victoria was ascribed area number three: "In about 25 fathoms within a circular area 3 miles in diameter, with centre in latitude 38° 21′S., longitude 144° 25 ½′E., with Barwon Heads bearing 46 degrees distant 5 miles" (National Archives of Australia [NAA], Fishing Grounds Act 1932, MP 150, 403/201/170).

**Fig. 19.2** Scuttling the hulk *White Pine*, 1947. (Image courtesy: Peter Taylor collection)

The vessels scuttled in the ship graveyard range from small iron clippers such as the 477 tons *White Pine* (1879–1947) (ex *Quathlamba*; Fig. 19.2) that could out-sail contemporary steamers (*The Age* [TA] 1947), to the humble mud barge: VHB-*54* (n.d.-1970) (Sinking of Barge No. 54, Records of the Australian Hydrographic Service [AHS], Royal Australian Navy, received to AHS 15 January 1971). After stripping any useful or saleable items, and when conditions were suitable they would be towed down Port Phillip Bay; then out through the Port Phillip Heads for the deep waters of Bass Strait (Ar 1931; TA 1931). To sink a vessel, a series of explosive charges were placed against the hull plates and detonated. The dredge *Beverwyk 19* (n.d.-1963) was sunk in the ship graveyard by this process using 9 kg of gelignite in sticks, and covered with sandbags to drive the explosive force outwards (*Geelong Advertiser* 1963).

Occasionally, spectacular shows would occur with the bow of the vessel rising high into the sky before taking its final plunge. Timber decking could be blown several feet into the air by pressure created underneath the forecastle as air trapped within the hull was forced upwards during the sinking (Ar 1915). The people who performed the scuttlings, including tug captains, merchant seamen, marine surveyors, and explosive experts, little suspected in years to come, men and women in rubber suits would be actively searching for, and diving on these old hulks.

Victoria's Ship Graveyard contains an interesting and eclectic cross section of ships: coastal steamers, World War One submarines, sailing ships, hulks, lighters, dredges, hopper barges, and at least one tug boat. For anyone with an interest in Australia's maritime history, it is simply a matter of arranging for a dive on one of the numerous charter boats that operate in the area, or by diving from a private boat. The ship graveyard is one of the most popular areas to dive with one dive operator deriving his main source of income from the region. The depths range from 27 m for the World War I submarine J-*4* (1916–1927), to 72 m of water where the former bark *Don Diego* (1855–1916) lies. The variation in depths allows for the properly trained and qualified air diver to dive to 40 m on some interesting wreck sites. At the other end of the scale are the advanced tech divers who will dive with either a rebreather or open circuit trimix to over 70 m.

Historical research indicates that there are approximately 44 vessels scuttled in the immediate graveyard area. This extends from south of Port Phillip Heads to Torquay, a distance of approximately 39 km. Although not officially in the ship graveyard, two former wooden barks and one composite built vessel have been included. They were taken out of Port Phillip Heads for disposal in Bass Strait. The recently scuttled ex HMAS *Canberra* (1978–2010) has not been included as this was scuttled for recreational purposes.

The first scuttling appears to be that of the former bark *Brunette*, constructed of iron; it was built in 1859 and scuttled in 1913. The last vessel to be scuttled in the designated ship graveyard was *VHB 53*; a dumb hopper barge that originated in Holland (year of build unknown), and was scuttled in February 1971 (Taylor et al. 2009, p. 129). There is the distinct possibility that other vessels were scuttled before 1913 as Dickson Gregory in his book *Australian Steamships Past and Present*, writes of the steamship *Rob Roy* (1867–1910) "having been converted into a hulk it was finally sunk," most likely in the Ship Graveyard (Gregory 1928, p. 246).

The class of vessels scuttled in the Ship Graveyard can be broken down into seven categories: ex-sailing vessels (13), steam freighters and passenger vessels (12), a steam tug (1), steam hopper barges (6), dumb hopper barges (2), dredges (6), and submarines (4). Of these vessels there are 17 steel, 20 iron, 3 wood, 1 composite, and 3 undetermined (most likely steel) scuttled vessels (Taylor et al. 2009).

The total number of operating years of the 44 vessels equates to 1,974 years of service. This can be further subdivided into 1,148 years of service for the vessels built of iron, with an average age of 57.40 years. For the vessels built of steel, the total number of years of service equals 541 with an average age of 31.82 years. Although only a small snapshot of wooden vessels (three), they equal a total of 214 years of service. Surprisingly, they have the longest average age of 71.3 years. The oldest vessel in the fleet was the former bark *Casablanca* (1858–1950); built of iron; it was 82 years old at the time of its scuttling in 1950.

## Breaking-up and Abandonment Sites

Research about the abandonment and disposal of unwanted vessels enabled the author to isolate three distinct areas used for breaking and abandoning of vessels adjacent to Port Phillip Bay. One area used by people for this purpose (usually illegally) was the back of what once was a rifle range in the bay side suburb of Williamstown. The second was in the backwaters of the Yarra and Maribyrnong Rivers where vessels were broken up for firewood or scrap metal (Bob Leek, personal communication

2000). A third off Port Phillip Heads was where vessels could be sunk in deep water (Taylor et al. 2009, p. 2).

Breaking and abandonment activities were invariably guided by economic concerns, with salvers intent on making profit. For example, when ship-breakers planned to transform the timbers of the teak-built *Mary Moore* (1868–1968) into furniture, they had a profit-motive in mind (The Sun 1967). However, depending on the lease conditions negotiated for the ship-breaking site and the speed at which the vessel was broken up, money could be lost on dismantling projects. The breaking of the steel-hulled ex-bark, *Garthsnaid* (1892–1938) is an example of how money could be lost on a ship-breaking project and perhaps may explain why so many iron and steel vessels were scuttled. Owned by George Milne and Company's Inver line and named *Inversnaid*, it was registered in Aberdeen and employed in worldwide trading. Sold in 1919 and renamed *Garthsnaid*; in 1923 it was demasted in a storm off the south eastern coast of Australia. Towed to Melbourne, it was sold to steam ship owners, Howard Smith Limited, and converted into a coal hulk for bunkering steamers in the port of Melbourne (Leek 2006, pp. 21–22).

The vessel's dimensions were $72.5 \times 11 \times 6.6$ m and 1,418 tons gross. It was estimated that as the vessel floated on 9 December 1937, *Garthsnaid* had an approximate weight of 1,021 tons. There were deductions totaling 185 tons for items on board such as: coal (25 tons), stone ballast (15 tons), boiler and piping (4 tons), winch (3 tons), deck and ceiling [planking] (30 tons), water and tank (81 tons), cement lining (15 tons), and sundries amounting to 10 tons. The owner, Mr. Overell, estimated that there was 836 tons of scrap steel, less 3 tons for cutting waste. This left a total of 833 tons of saleable scrap metal. For shipping and handling purposes, the hulk was to be cut up into pieces no bigger than $1.8 \times 0.76 \times 0.61$ m.

The ship-breakers planned to use oxyacetylene to first cut the sides into large sections, and then lift them away. They would then be reduced to the required dimensions by further cutting. This was no small task as the total length of cuts required to reduce the hull was 6,005 linear meters (Melbourne Harbor Trust correspondence [MHTc] 9 December 1937, Bob Leek binder No. 11 [BLb], p. 11). It was estimated that the whole job would be completed within 2 weeks; however, due to slow progress, the task took 24 days to finish. As a result, the operational costs of breaking up the hull amounted to £ 1,247. Due to the overestimation of some 300 tons of recoverable steel; there was only 548 tons, and the hulk owner incurred a loss. Although the owner sold the scrap for £ 1,733, the hulk had cost him £ 850, and after expenses, the owner lost approximately £ 240 (MHTc 24 June 1938, BLb, p. 11).

Breaking up a wooden vessel was a serious task that required a location with low overheads. This is where the backwaters of the Yarra and Maribyrnong proved to be ideal—in these locations it was possible for a ship-breaker to lease suitable low rent locations. One vessel, the composite built, former bark, *Elizabeth Graham* (1869–1933) had reached the end of its economic life. In late 1933, the hulk was acquired from the Melbourne Steamship Company and the new owners proposed to break it up for firewood. *Elizabeth Graham* was built in the UK, with the dimensions of $50.5 \times 8.9 \times 5.5$ m and 607 tons (Leek 2006, p. 19).

Mr. George Burton (the new owner) negotiated a lease arrangement where he paid the Melbourne Harbor Trust rent of £ 1.00 per week (MHTc 22 November 1933, BLb, p. 7). This compares to the owner of *Garthsnaid* who had to pay £ 300 for the use of the Alfred Graving Dock at Williamstown (MHTc 24 June 1938, BLb, p. 11). To ensure that the job was completed within a reasonable time and any debris removed from the breaking site, the Harbor Trust required that Mr. Burton place the sum of £ 300 with them as a refundable guarantee. The task of breaking the hulk commenced in February 1934 and was finally completed in late June 1934, with the firewood selling for 17 shillings and 6 pence per ton (Ar 1934a). Unfortunately, there are no documents available that show the labor and operational expenses involved in breaking the vessel. However, from the brief information available, some basic calculations can be compiled to work out approximate expenses and profit.

The simplest form of calculation to estimate a return is to multiply 17.5 shillings per ton of firewood by 607 tons of wood in the hull, whereby a gross return figure of £ 531 is produced. This can be approximated in 2011 terms by comparing the price of gold in 1934 to the price of gold in 2011. In June 1934, gold was trading at £ 8, 9 shillings and 3 pence per fine ounce (Ar 1934b). At this value, in 1934, £ 531 would buy 64.130 ounces of gold. With gold trading at approximately US$ 1,800 an ounce in 2011, 64.130 ounces of gold would equate to US$ 115,435. Therefore, the firewood would have an approximate 2011 value of US$ 115,435.

In July 1934, the basic wage was set at £ 3, 5 shillings and 6 pence per week (Ar 1934c). By multiplying this by the breaking-up time of 24 weeks, and if the ship-breaker employed one person, the wage bill would amount to £ 72 and 12 shillings. Assuming that there would be at least four workmen on the job, the total wages bill equals £ 288 and 8 shillings plus £ 24 for the site rental; a total of £ 312 and 8 shillings, or rounded off to £ 312. This leaves a healthy profit of £ 219; or in 2011 terms, an approximate profit of US$ 46,634. As indicated by the figures, if the overheads were kept low, it was more profitable to break a wooden vessel, as compared to that of an iron or steel hull.

## Disposing of Vessels by Means Outside the Law

Although poorly documented, the dumping of old wooden vessels had for some time been conducted in the waters off Williamstown (Fig. 19.3). Having been abandoned by its owner, the sunken lighter *Verulam* (1858–1930) was raised from the bottom of the Maribyrnong River by the Melbourne Harbor Trust in November 1927. The following year, the Melbourne Harbor Trust was looking for a place to beach and abandon it. In September 1928, the Port Engineer reports being informed that other lighters had been run ashore and abandoned at the back of the Williamstown Rifle Range. They had subsequently broken up in heavy weather and the wood was taken away to be burnt (MHTc 28 September 1928, BLb, p. 22).

The Victorian Lighterage Pty Ltd was a company that owned a number of lighters and coal hulks; some of which were quite old and in poor condition. They feature

**Fig. 19.3** *Agnes* ashore Williamstown Rifle Range 1933. An example of the salvaging of material from a wreck. (Image courtesy of Jack Loney collection)

predominately in the story of deliberate abandonment of hulks and lighters in Victorian waters. The company was incorporated in 1911, acquiring some of the vessels and the plant of the late Norman McLeod, former lighter owner and operator. The company went into liquidation in May 1955, shortly after they lost their last lighter (Volum 1995). While being towed from Melbourne to the port of Geelong; within Port Phillip Bay, the iron lighter *Albert William* (1863–1955), broke adrift from the company's tug *Swiftness* (1920-n.d.) and was blown ashore on the Williamstown Back Beach (Ar 1955, p. 1).

In order to save costs, the Victorian Lighterage Pty Ltd would at times flout the law and dispose of their old and unseaworthy vessels by illegal means or abandon them completely. In December 1928, they had, without permission, moved one of their lighters from the Yarra River, whereby it sank off Breakwater Pier, Williamstown. The company abandoned the vessel and was fined £ 5, however the company's manager, Mr. Treacy, could not see what the fuss was about as other vessels had previously been abandoned at the Williamstown Back Beach without objection (Ar 1929).

The abandonment and destruction of the wooden vessels *Carmen* (1879–1936) and *Ester* (1886–1936) are also prime examples of the company's methodology of illegal disposal. In early 1936, the two vessels were first "stripped for firewood and rough timber." The hulks were then run ashore behind the rifle range in Williamstown, where the manager doused the vessels in kerosene and set them on fire (Ar 1936a, 1936b), as the *Williamstown Chronicle* (1936, p. 1) reports:

> Burning from stem to stern, two lighters, veterans of the days of sail, were burnt last Monday off the Williamstown rifle range. They are the Victorian Lighterage Co's *Ester* and *Carmen*. The manager of the company (Mr Treacy) set fire to the vessels on Monday afternoon.

> Formerly a three masted bark, the *Ester* was built in Scandinavia for shipping timber to Australia. Of four hundred tons, she was 35 years old and had been trading between Melbourne and Geelong for 20 years. The *Carmen*, a brigantine, was built in Italy 55 years ago. As a Norwegian whaling relief ship in the Antarctic she brought oil to Melbourne and Hobart. For 20 years she traded in the [Port Phillip] Bay.

The company was again pursued through the courts, this time by the Ports and Harbors Department with the objective of having them remove their abandoned lighters (this was not done as the sites were found by the author in the early 1990s). Not to be deterred by the law, the company was again under scrutiny. In March 1938, they were charged and fined for illegally abandoning one of their lighters; the composite lighter *Helen* (1864–1938), in a bay 17 km southeast of Port Phillip Heads. They were previously warned not to proceed with the project, but they ignored the advice. In the end it would seem as though they got out of their dilemma quite cheaply as they were fined £ 50, with court costs of £ 3 and 19 shillings (Ar 1938).

## Early Scuttlings

The illegal abandonment of vessels within Port Phillip Bay was no doubt a major concern for port authorities and their locations appear to have been noted in correspondence (MHTc, 28 September 1928, BLb, p. 22). However, for scuttlings that took place in the early twentieth century off Port Phillip Heads, there did not appear to be any particular method of recording the location of the scuttlings. It was not until the late 1920s that a system of recording the positions was put into place by the Ports and Harbors Department. The sinking locations were recorded by taking bearings off prominent landmarks and recording these in the files of the Ports and Harbors Department. The dredge *John Nimmo* (1887–1931) was scuttled in 1931, and in a later report of the sinking addressed to the engineer at the Ports and Harbors Department, the officer in charge of the sinking noted in his account that, "Up to 1926, there was no definite organization in vogue in respect to the sinking of vessels outside, and many have been sunk from 1916 to 1926, goodness knows where" (MHTc 18 March 1935, Bob Leek files).

Finding records of the early scuttlings was a difficult task, and it is through maritime historian Bob Leek's research that a number of previously unknown scuttlings have been discovered. The earliest recorded, and possibly the first to be scuttled in the ship graveyard was the iron lighter *Brunette*; built in the UK in 1859 and rigged as a bark. It had its register closed with "Towed to sea and scuttled in July 1913." There is no further information in contemporary newspapers or in port authority reports. It might be that the story was considered unremarkable by the newspapers and so went unreported. However, with the scuttling of the iron barge *Kingswear* (1883–1915) in April 1915, there was some press coverage of the event, with the newspapers describing the vessel as being "unceremoniously sunk in forty fathoms" [73 m] (Ar 1915).

In February 1916, Howard Smith Limited, owners of the iron lighter *Don Diego*, informed the Harbor Master that they intended not to put any more coal into the vessel and proposed to scuttle it at sea. After scuttling the vessel on 26 May 1916, Howard Smith Limited duly informed the Harbor Master that the lighter had been taken out to sea and scuttled about 8 miles from Point Lonsdale (MHTc, 8 June 1916, BLb, p. 7). Importantly, this is the first documented evidence of the distance, and general location of a scuttled vessel.

## Hulks and Lighters

With the popularity of SCUBA diving taking off in the 1960s, the Victorian coastline offered many varied wreck sites, ranging from international sailing vessels and steamers to craft from Victoria's Mosquito fleet (small sail traders under 100 tons). However, with the relentless swell that breaks on Victoria's coast line, most of these shallow water sites had been smashed to pieces.

The Geelong Skindivers Club was one of the pioneering clubs when it came to wreck diving, with its members constantly seeking new dive sites. Geoff Nayler, a former member of this group is an author and wreck diver. Geoff began diving in the late 1950s; he assisted Victorian west-coast fishermen, freeing fouled crayfish pots in exchange for information and a free dive. In the early 1970s, a west-coast fisherman mentioned to Geoff that he had been recovering rusty colored crayfish from deep water off Torquay. In those times, a 30-m dive was considered to be deep and not to be taken lightly. The graveyard wreck they were about to dive was located in 46 m of water. In late October 1972, a dive on this new site was organized. A team of experienced divers was assembled; they had all recently purchased new SOS decompression meters, assembled twin tanks with twin regulators, and were breaking new ground in the Victorian dive scene.

As could be imagined, there was a high degree of anticipation amongst the team at the prospect of diving a completely new site. The wreck stood up some meters above the seabed, with the profile being recorded on the boat's old-style paper chart depth sounder. The first dive team left the surface in bright sunlight, descending through the decreasing light, but upon reaching the bottom, the divers found the remains of an almost intact steamer. This site was quite unlike any of the other wrecks on the Victorian coast and except for damage at the stern caused by the scuttling charge, the site was quite complete (Nayler 1976, p. 84). Older, local fishermen knew that there were more wrecks out there and a few could remember other vessels having been scuttled in the general area. Knowing this, Geoff began to research the records of the Department of Transport and his investigations indicated that this new wreck was the SHB *Batman* (1883–1935). This was a new and exciting discovery for the dive team.

In between the initial findings in the early 1970s, and until the mid 2000, many of the scuttled wrecks were found. There were still a few wrecks, however, that were not yet located. Southern Ocean Exploration (SOE), a group of avocational maritime archaeologists pursues deep-water wrecks for historical and recreational purposes; reporting any finds to the Maritime Heritage Unit of Heritage Victoria (a state government agency).

Greg Hodge, one of the founding members of SOE took it upon himself to conduct extensive research, studying relevant magnetic survey data of the area with the aim of locating a number of missing vessels. The survey data showed that the northern part of the graveyard had underlying geology with strong magnetism that obscured quite a few of the known scuttled wrecks. But further out, some distinctive bright spots indicated the presence of at least two sites. Greg's innovative approach in the use of magnetic survey data in the state of Victoria saved many months of remote sensing operations.

Plotting the anomalies onto a marine chart indicated they were just off the approach to Port Phillip Heads, suggesting that they were scuttled wrecks. This made perfect sense when it was realized that a number of the known sites were just off the approaches too, but closer to the coast. In January 2006, SOE conducted a towed magnetometer survey in the area of the anomalies. They were eventually located after searching for about 20 min per target. One of the new sites is seven and a half nautical miles south of Port Phillip Heads, indicating that this might be the remains of the aforementioned *Don Diego*.

A team of trimix divers dived the sites and confirmed that they were in fact iron wrecks. On subsequent visits, the divers noted that the wrecks had the appearance of ex-sailing ships (Mark Ryan, personal communication 2006), which fit in with the supposed scuttling locations of *Brunette* and *Don Diego*. Subsequently, these scuttlings were tentatively identified as these ex-sailing vessels.

## Victoria's Colonial Navy

Before the formation of the Royal Australian Navy, there was a time when each state and territory in Australia had its own naval forces for seaboard protection. Victoria's navy was the biggest, and best equipped, having the monitor class vessel HMVS *Cerberus* (1867–1926), four torpedo boats, two gun boats, and 16 auxiliary vessels. The auxiliary vessels came from the fleets of the Melbourne Harbor Trust and local steamship owners (Gillett 1982, p. 134).

Constructed of mahogany in the UK, Victoria's first warship arrived in Melbourne on May 31, 1856 (Jones 1986, p. 15). From this point in time until the late nineteenth century, Victoria assembled an impressive fleet. Other vessels were acquired by the colony of Victoria such as the three decked, wooden ship *Nelson* (1814–1926), launched in the UK, becoming part of the fleet in 1867. This was followed by *Cerberus* (1870–1926), which arrived in Melbourne in April 1871 (Gillett 1982, p. 85). But in the summer of 1881–1882, with the visit of the Russian corvettes *Afrika* and *Platon* as well as the sloop *Vestnik*, Australia was overtaken by a serious bout of paranoia. People were gravely concerned, no doubt prompted by articles in the *Melbourne Age*, and urged for stronger defenses (Jones 1986, p. 44).

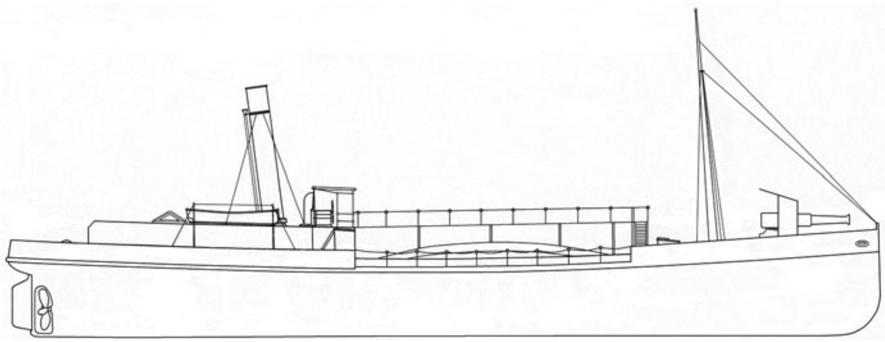

**Fig. 19.4** Profile diagram of SHB *Batman*. (Drawing by Peter Taylor)

Victoria responded by allocating £ 85,000 for the purchase of two gunboats and three torpedo boats (Ar 1882b). In August 1882, Messrs Thornycroft and Company accepted the order for the vessels (Ar 1882c). With the coming of Australian Federation in 1901 and the abandonment of individual state navies, the remnants of the fleet were integrated into the Commonwealth Naval Forces in 1904, and into the Royal Australian Navy 7 years later (Gillett 1983, p. 54).

## The SHB Barges Batman and Fawkner

Contemporary with the order for the gun and torpedo boats, was the decision in June 1882 by the Works Committee for the Melbourne Harbor Trust to expand their fleet of hopper barges. The committee recommended the purchase of two steam hopper barges from the UK, each with a capacity of 508 tons, and at an estimated cost of £ 10,500 each (Ar 1882a).

By early August 1883, shipbuilders Messrs W. Simons and Company of Renfrew, Scotland had almost completed the vessels (Ar 1883). The two new vessels were to be known by the surnames of the pioneers of Melbourne: John Pasco Fawkner and John Batman (Ar 1884b). Typical of the delivery method for the times, *Fawkner* (1883–1935) had been rigged as a topsail schooner for the voyage out to Australia, and arrived in Melbourne early in March 1884. The vessel was described by the Melbourne *Argus* as "a queer looking craft." The newspaper also reported that *Batman* should arrive shortly (Fig. 19.4), and that both *Batman* and *Fawkner* could be easily adapted to take a 12-pound gun (effectively turning the vessels into gunboats). With these two craft and the imminent arrival of the torpedo boats, authorities considered that there would soon be a fine fleet in Hobson's Bay (Ar 1884a). The dimensions and engine capacity of the vessels were described in detail:

> *Fawkner* is 46.786 meters (153 ft. 6 in.) in length, the beam being 7.924 meters (26 ft.), and the depth of the hold 3.708 meters (12 ft. 2 in). The gross measurement of the hull is 387 tons, and the net register is 169 tons. It is of great strength, and well braced and held together. The engine-room of the barge is right aft, and the hold or receptacle for the silt

> raised takes up a good share of the vessel's length. The barge is propelled by a screw driven by engines of 70-horse power nominal, or 350-horse power effective. The boiler, which is multi-tubular, is constructed of steel, and was subjected to a severe pressure to test its strength. The present working pressure is 6.1 atm. (90 lb). The engines are compound, and are fitted with surface condensing apparatus. They also work direct action on the screw. The diameters of the high and low pressured cylinders are 558 mm (22 in.) and 1.016 meters (40 in.) respectively, and the stroke is 685 mm (27 in.). The barge has a guaranteed speed of 16.6 klm. [nine knots]. (Ar 1884a)

*Batman* finally arrived in Melbourne on March 31, 1884, having previously left Glasgow on December 25, 1883. *Batman* and *Fawkner* were described as peas in a pod, in that they were both built with extra strength, and of the same dimensions, with not a fraction of an inch difference (Ar 1884b). In November 1884, on the Prince of Wales holiday, *Batman* and *Fawkner* took part in a joint exercise with the Victorian Colonial Navy. In war games being staged off Picnic Point, on Port Phillip Bay, the two vessels provided support for the HMVS *Nelson*. The naval games were a great spectacle as crowds of more than 24,000 caught the train from Melbourne to Brighton to watch the event. Melbourne newspaper *The Argus* went onto describe how *Batman* and *Fawkner* had been built to carry a gun on the bow and the guns that they were carrying were smoothbores. These were taken off the HMVS *Nelson*, and only mounted the day before the exercises. The guns appeared to be an interim measure as "metal of a modern make was being manufactured in England" (Ar 1884c).

Initially, it was unknown if the modification to take a gun on the forecastle was carried out in Victoria or the UK. However, research confirmed that the shipbuilders fitted *Batman* and *Fawkner* with turntables and Vavasseur carriages to take a 6-inch breech loading gun. The cost of fitting, supplying, and alterations to the barges to take the guns amounted to £ 1,400 for alterations and £ 3,000 for the guns and accessories (NAA, 3758, 1883/31, 51026).

In May 1885, the two vessels participated in further war games when a sham battle with the fleet was held off the St Kilda Bank (Port Melbourne). As part of the exercises, a 114 kg mine was to be placed on the St Kilda Bank and fired. At the dropping of a signal flag, the *Lion* (armed launch) was to attack the *Batman*, and the *Spray* (armed launch) was to attack the *Fawkner* (Ar 1885a).

By October 1885, at the suggestion of the naval commandant, the Navy carried out work on the vessels to strengthen susceptible parts of the gunboats with steel plates. It was the original intention to fit each craft with a 6-inch breech-loading gun only. But with the vessels being vulnerable to machine gun, the government decided to furnish each with two, 1-inch four-barreled Nordenfelt guns, and one or two 12-pounder breech-loading guns. The dockyard was to carry out works to the vessels whereby the 12-pounders were to be fitted at the stern (Ar 1885b).

It is doubtful that the stern guns were ever fitted, as a watercolor painting of the Victorian squadron shows either *Batman* or *Fawkner* with a bow gun only. Divers who frequent the site have not noted any special reinforcement in the stern area suitable for a heavy gun (Michael Whitmore, personal communication 2009). It was suggested that 12-pounders from the South Melbourne battery could be used, as larger guns were still on order from England (Ar 1885b). Further modifications were carried out to the vessels in Melbourne which included: fitting magazines and shell rooms as well as berths for officers and men when on active service (Ar 1886).

The vessels continued as auxiliaries in the Victorian Colonial Navy until they were paid off in 1896 (Gillett 1982, p. 134). However, they did continue to operate as steam hopper barges for the Melbourne Harbor Trust until being laid up in 1930. Both were subsequently sold for scrap metal, stripped, and in May 1935 were scuttled in the ship graveyard (Taylor et al. 2009, p. 14).

## The Batman Project

In the ship graveyard are three auxiliaries from the Victorian Colonial Navy, these being: the steamer *Courier* (1887–1928) and the SHB *Batman* and SHB *Fawkner* (Gillett 1982, p. 134). One vessel in particular, the SHB *Batman*, the author thought worthy of further research and dive investigations. Early research that I had carried out indicated that both, the *Batman* and *Fawkner* each carried a gun mounted on the foredeck. But what sort of reinforcing system was in place to hold such a big gun? Surely there had to be some sort of sturdy mount to prevent the gun from ripping the fore-deck off the vessel when fired. Furthermore, if there was some sort of reinforcing system, would there be any archaeological evidence remaining on the vessel?

Unfortunately, there appears to be no surviving plans of the two vessels; so this left only one alternative: that an inspection dive be made on the wreck of *Batman*. A dive team consisting of experienced deep-water divers was put together from SOE members. The aim of the dive was to locate and record any evidence of mounting and reinforcing systems on the vessel. Although not in overly deep water, at 46 m, a dive on *Batman* is not for the inexperienced.

Since its finding by the Geelong Skindivers in 1972, the site has deteriorated somewhat, with the bow collapsing, and the sides falling over. Although having no expectations of what was to be found; on reaching the bow, it soon became apparent that there was indeed evidence of its previous use as an auxiliary in Victoria's Colonial Navy. This was an exciting find and immediately, the mapping process began. There appeared in the bow area, a circular structure made of iron, a heavy deck beam having fallen across this, distorting it slightly. A number of stanchions that had previously supported this were in a state of collapse. The first team of divers set about obtaining detailed measurements and dimensions of this structure. The second team then finished the survey.

The gun mount appeared to have been made of riveted iron rolled into shape, with an external diameter of 1.73 m and an internal diameter of 1.42 m, with a depth of 280 mm. The top of the mount protrudes at a right angle to the vertical structure 150 mm so that it would sit in a rebate in the wooden deck. It is assumed that this would have been flush mounted in the fore-deck of the vessel, and that there was some sort of covering when not in use. To support the structure, a series of six stanchions were riveted to the vertical section of the mounting. These were 100 mm in diameter,

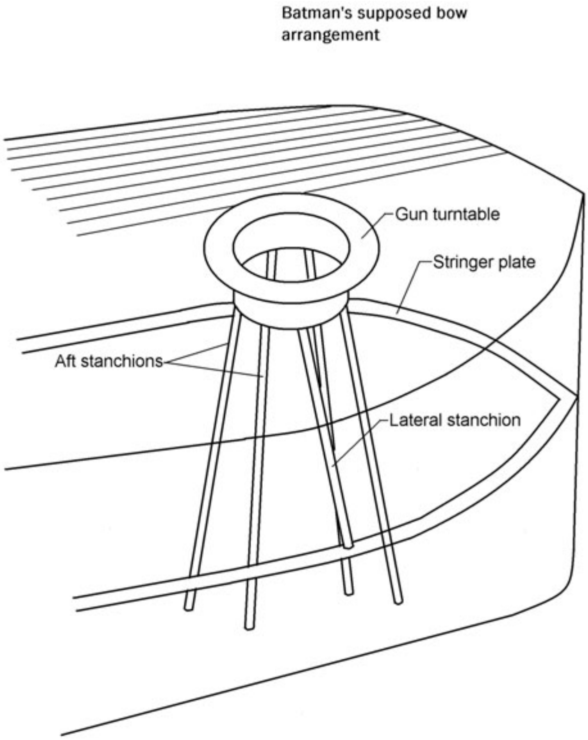


**Fig. 19.5** Supposed arrangement of gun mount on *Batman*'s bow. (Drawing by Peter Taylor)

with two forward, two aft and two lateral supports (one port and one starboard). The port and starboard supports went back to a stringer plate that ran fore and aft with these being affixed to the plate with rivets (Fig. 19.5).

For comparative purposes, Colin Jones provided a photograph of a 6-inch gun that was once on the South Australian Colonial navy gunboat *Protector*; the gun is now located in a park in Adelaide, South Australia. The *Protector's* gun sits on a turntable that appears to be very similar to the one on *Batman*. It would seem that the questions originally posed, had been answered by one dive in the Ship Graveyard.

## Conclusion

Over the past 40 years, Victoria's Ship Graveyard has proven to be a highly valuable resource for recreational divers. Research and diving groups such as Southern Ocean Exploration cut their teeth and honed their wreck hunting and deep-diving skills on these sites. Although the wrecks were stripped of most valuable material before scuttling, their skeletal remains can provide structural information. On any weekend, when the weather is suitable, divers can be found on a number of scuttled vessels. It is the eclectic nature of the wrecks that helps to make this a fascinating place to dive.

**Acknowledgments** The author would like to thank all the divers from SOE that helped out with the *Batman* project and also the author of *Australian Colonial Navies* (1986), Colin Jones.

To maritime historian Bob Leek, this chapter would have been somewhat diminished without his research. Bob has researched the histories of 235 coal hulks and lighters, assembling a collection of 24 lever arch binders. This resource has been used extensively by the author in the writing of this chapter.

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