

CHAPTER TWO

NAVAL ABANDONMENT, SITE FORMATION PROCESSES, AND THE 'ARCHAEOLOGY OF THE EVENT'

Microscopic problems of historical research can and should be made macrocosmic—capable of reflecting worlds larger than themselves. It is in this reflected flicker of truth, the revelations of the general in the particular, that the contribution of the historical method to social science will be found. (Postan 1939: 34)

The drama of a shipwreck focuses attention on the event, but the conditions that produced the wreck and the consequences arising from it are as significant as the event itself (Gould 2000: 13)

Introduction

Archaeological sites in maritime contexts, whether shipwrecks, abandoned vessels, or the remnants of infrastructure once associated with maritime activities, are not mere repositories for broken things that represent past cultures and historical occurrences (Flatman 2003; see also Gould 2001; 197; Staniforth 2003: 29; Firth 2010). On the contrary, such sites also signify varying degrees of temporal and cultural scale, including long-, medium- and short-term events in the vast span of local, regional, and world history. They are also representative of natural and cultural formation processes that acted upon material culture prior to, during, and after its integration within the archaeological record. In an historical context, the scale of events can range from those that are centuries long (such as the emergence and proliferation of European naval forces in the Pacific Ocean), to others that only cover a span of days, hours, or even minutes (for example, an individual military vessel's discard and abandonment). Similarly, formation processes can encompass events that are relatively small (an individual artefact's physical interaction with its surrounding environment) or incredibly vast (large-scale cultural processes and behaviours that resulted in that artefact's manufacture, use, and ultimate deposition within an archaeological context).

Ultimately, investigation of extant material culture serves as the foundation by which a given site's significance and role within the larger scope of historical events and cultural processes may be interpreted and understood. As Rachel Horlings (2011: 22) has observed, 'it is at the intersection of these varying scales and processes...that we see both the individual vessel and its place in the overarching worlds and dramas of which it was a part'.

This chapter is a discussion of two scholarly approaches upon which this research is based: the 'archaeology of the event', which is rooted in the concepts of the *Annales* School of historiography, and cultural transformation processes associated with archaeological site formation. The former has until recently almost exclusively been utilised by maritime archaeologists to interpret shipwreck events; however, its primary thrust, to attempt to connect isolated, short-term occurrences with broader patterns of history and cultural continuity, has applicability to other aspects of maritime archaeology, including the study of abandonment 'events' involving vessels and/or land-based infrastructure. An understanding of archaeological site formation, and particularly cultural transformation processes, provides a means by which human interaction with material culture at all phases of its existence may be analysed and interpreted. Because it often employs a vast array of special investigative techniques to develop explanatory models about a given site's creation and change over time, archaeological site formation has alternately been identified as both a methodological tool and theoretical construct (Shott 1998).

Combining the two paradigms allows them to be analysed relative to one another; it also creates a means by which larger processes and themes may be explored. In Chapters Five and Six, historically documented abandonment events associated with the dissolution of Australasia's torpedo boat defences are interwoven with evidence of cultural transformation at several archaeological sites, including multiple discarded torpedo boat hulls and

abandoned land-based torpedo boat support infrastructure. These event-based data are significant in their own right, but fall short of revealing the entire story. Indeed, the discard and abandonment processes represented by these sites are but single occurrences in a much longer thread of history that includes maritime defence and naval transition in Australia and New Zealand at the turn-of-the-twentieth century; technological innovation and the development of a naval 'arms race' between rival European powers during the late-nineteenth century; and even the sixteenth century origins of a British colonial naval presence in the Asia-Pacific and Indo-Pacific regions. These and other themes comprise the historical context for research addressed in Chapter Four.

Bridging the Temporal Chasm: The *Annales* School, Scales of History, and 'The Archaeology of the Event'

The disposal of military matériel (or any form of material culture, for that matter) does not occur in a vacuum; on the contrary, it is often influenced by a variety of social, political, economic, and cultural decisions and actions that take place across time and space. Similarly, the archaeological residues that result from these disposal activities are 'generated through a series of timescales, from a single event...to palimpsests of material that may build up very slowly over centuries and millennia through a complex combination of human and natural factors' (Gosden and Kirsanow 2006: 30). For the purposes of this study, the multi-scalar perspective offered by event-based archaeological investigation (discussed below) creates an ideal framework within which cultural site formation processes specific to the abandonment of torpedo boats and their support infrastructure may be considered, and the discard behaviours they represent placed within broader historical and cultural contexts.

Several scholars have addressed the concept of temporal scale and the relevance of multi-scalar approaches to archaeology (see Butzer 1980; Fletcher 1992; Westerdahl 1992;

Egmond and Mason 1997; Ramenofsky and Steffen 1998; Adams 2001; Hill, et al. 2001; Staniforth 1997, 2003a, 2003b; Cunliffe 2006; Gosden and Kirsanow 2006; Harris 2006; Lock and Molyneaux 2006; Wobst 2006; Brooks, et al. 2008; De Corse 2008; Head 2008). Trevor Harris (2006: 50) has observed that documentation, analysis and interpretation of archaeological material, and the clues it contains about spatial pattern and process, are heavily reliant on an understanding of scale. The utility of scale in determining the chronological contemporaneity and significance of cultural material is outlined by Chris Gosden and Karola Kirsanow (2006: 36), who note 'almost any piece of archaeological evidence mixes longer and shorter times within it and can appeal to varying sets of discussion of local or more global significance'.

Within maritime archaeology, efforts to link specific events—such as shipwrecks—with much larger and complex scales of interpretation (e.g., Lenihan 1983; Murphy 1983; Anuskiewicz 1998; Fontenoy 1998; Souza 1998; Martin 2001; Delgado and Staniforth 2002; Breen and Lane 2003; Burns 2003; Staniforth 2003; Richards 2008; Ford 2011) have done much to counter and refute persistent, long-standing critiques of the 'extreme' particularistic approach to individual, historically 'important' wreck sites advocated by some of the discipline's early practitioners (see Bass 1983: 91-104; Green 1990: 235). Mark Staniforth (1997: 17; 2003a: 28; 2003b: 102), in particular, was an early proponent of the exploration of temporal scale and its applicability to the archaeological investigation of submerged material culture. He has examined how information derived from individual artefacts, artefact assemblages, and shipwreck sites can be utilised—both separately and in concert—to answer much broader questions about cultural continuity and change. Staniforth's interpretative mechanism, which he describes as the 'archaeology of the event', is rooted in the ideas of a

group of French historians whose work has collectively come to be known as the *Annales* School of historiography.

The Annales Paradigm

The *Annales* School has its roots in an Enlightenment-era French response to, and rejection of, eighteenth century German traditions of historical scholarship, which tended to focus on ‘great men and the development of national character’, and were ‘written in terms of domestic and international affairs of empires, nation states, and churches’ (Bintliff 1991: 4; Clark 1999: x; Johnson 2010: 186-187). Notable French scholars such as Voltaire and Montesquieu were the first to propose changes to this existing mode of historiography; however, it was not until the late nineteenth and early twentieth centuries and the appearance of other major schools of historical thought—such as British Marxists, American Cliometricians and German *Staatswissenschaften* (Political Scientists) (e.g., Conrad and Meyer 1958; Hobsbawm 1959; Thompson 1963; Fogel 1964; Kaye 1984; Fogel and Engerman 1995; Feldman 1997; Strubel 2008)—that the core of what would become known as *Annales* began to take shape (Wallerstein 1982; Knapp 1992: 5). Since the advent of the 20th century, practitioners of *Annales* historiography (hereafter referred to as *Annalistes*) have become the single greatest influence in shifting historical scholarship away from its traditional focus on ‘great men and important events’ to one that explores the everyday lives of ‘common people’ (Burrows 1982: 78; Clark 1999: x-xi, 238-239; Staniforth 2003a: 16; Johnson 2010: 187).

Annaliste scholarship has been broadly divided among four generations, the first of which comprised two French historians and university professors, Marc Bloch and Lucien Febvre. Bloch, a medievalist, and Febvre, an early modernist, challenged the traditional ‘Rankean’ model of history then being taught in Europe and instead advocated an

interdisciplinary approach that strived to create 'total history' through its emphasis on ordinary people and daily life (Bailyn 1977: 1033; Burrows 1982: 78). As A. Bernard Knapp (1992: 5) observed:

The *Annalistes* emphasized holistic rather than 'segmentalized' thought; economy and society rather than politics; long-term patterns rather than short-term events; global man rather than 'fractional' man. They examined quantitative trends instead of chronological narrative, structural instead of political history. They rejected the uniqueness of history in favour of blending history with the social sciences.

Bloch and Febvre derived most of the inspiration for their methodological approach from Febvre's teacher and mentor, Gabriel Monod, who directed their attention to the work of three preeminent French scholars: the historian Jules Michelet, sociologist F. Simiand, and philosopher Henri Berr. The inaugural *Annales* approach adopted Michelet's goal to recreate the total scope of history from a broad range of sources, as well as Simiand's renunciation of 'surface history' for an interdisciplinary alliance that included history, geography, sociology, economics, psychology, and anthropology (Forster 1978: 62-62; Knapp 1992: 5). Finally, Bloch and Febvre admired Berr's rallying cry that 'active, lively, combative, conquering men' in all sub-disciplines of historical inquiry coalesce into a single scholarly body (Knapp 1992: 5; see also Braudel 1973: 454-461; Burrows 1982; Lewthwaite 1986: 58-61, 1988: 161-176).

At its core, all subsequent *Annales*-informed scholarship has utilised a combination of the aforementioned concepts and ideas. In particular, *Annalistes* strive to develop and employ a 'total' approach to historical reconstruction by way of a broad and diverse database derived from several different disciplines, with particular emphasis placed on geography and the social sciences (Braudel 1973: 467; Knapp 1992: 5-6). One of the vehicles by which Bloch, Febvre, and early proponents of *Annaliste* thought shared their ideas was through establishment of the academic journal *Annales d'Histoire Economique et Sociale* in 1929. The

publication persists to this day, although it has undergone several name changes and is currently known as *Annales: Histoire, Sciences Sociales* (Knapp 1992: 4; Clark 1999: xi-xii).

Second generation *Annales* historiography was dominated by (and may be solely attributed to) the work of Fernand Braudel, a student of Febvre and his successor as *Annales* journal editor. Under his direction, the *Annaliste* approach gained international recognition, and its practitioners actively embraced 'the methodology of social science' to define and validate objects of historical inquiry and vastly diversify the existing database of historical topics and information sources. Braudel introduced the principle that 'macrophenomena were determinate and microphenomena indeterminate', and asserted that historic events could attain significance only if exhaustively assessed within spatially extensive, diachronic contexts (Knapp 1992: 6; see also Lucas 1985). However, it is Braudel's tripartite model of historical inquiry, first applied in his thesis *The Mediterranean and the Mediterranean World in the Age of Philip II* (1949) that is perhaps his most significant and enduring contribution to *Annales* thought (see Braudel 1972). It remains a hallmark of the School's historiographical methodology, and is the primary *Annales*-informed framework utilised by archaeologists to interpret material culture (Bintliff 1991: 5, 13; Hodder 1991: 89; Knapp 1992: 6; Dark 1995: 180; Staniforth 1997, 2003b; Trigger 2006: 524; Bintliff 2008: 157).

In the Braudelian scheme, the past is examined and interpreted within three primary temporal scales (see Braudel 1981, 1982, 1984). The *longue durée* are long-term processes that correspond to large-scale ecological change, geo-history, or worldviews (*mentalités*). According to Braudel, physical or material factors associated with the *longue durée* act as constraints on human behaviour. Medium-term cycles that range in duration from 10 to 50 years and are social, economic or cognitive in scope are termed *conjunctures*. These are generally documented as quantifiable divergences in normative behaviour or recurrent

phenomena (i.e., demographic or technological changes, or variations in economic trends).

Événements comprise short-term events that pertain to individuals or individual time. Braudel included *événements* as 'little more than a concession to narrative political history', and considered them 'ephemeral... "dust" in the diachronic sweep of historical pattern and process' (Knapp 1992: 6; see also Bintliff 1991; Clark 1999; Burguiere 2009; Johnson 2010: 187).

Braudel's disregard for the world of events and individuals comprises a significant shortcoming in his scholarly writings, and has left him vulnerable to criticism from several quarters (e.g., Hexter 1972: 533; Hufton 1986; Sherrat 1992: 137). Significantly, one such critic is Emmanuel LeRoy Ladurie, a Braudel disciple, third-generation *Annaliste*, and one of the School's most celebrated and prolific writers. Remarking on a generation of *Annales* thought moulded by his mentor, Ladurie (1979b: 111-113) lamented that event-based narrative history and individual biography had been 'virtually condemned to death' in favour of 'the study of structures [and] the persistent patterns' associated with *conjonctures* and the *longue durée*.

It is perhaps for this reason that the majority of third-generation *Annalistes*, including Ladurie and Jacques Le Goff, were 'disinclined to tackle global history *à la Braudel*', and instead refocussed interest towards interdisciplinary investigation of everyday life and ordinary people in the tradition of Bloch and Febvre (Knapp 1992: 7). Ladurie (1979b: 111-116) placed particular emphasis on the information potential of *événements*, which he viewed as significant 'breaks' in normal or established patterns of historical process. Another characteristic of third-generation scholarship is the diverse array of temporal and geographical areas studied by its practitioners. Research areas explored by *Annalistes* during this period include European prehistory and classical antiquity, post-medieval and post-

revolutionary France, and even contemporary Russia, Israel, and the United States (see Bottero, et al. 1973; Austin and Vidal-Naquet 1977; Forster and Ranum 1977; Ladurie 1979a, 1981; Ferro 1980; Vernant and Vidal-Naquet 1981; Demoule 1982; Furet 1984: 156-206; Berelowitch, et al. 1985).

The *Annales* School has now entered its fourth generation, and continues to exert considerable influence over the discipline of history and avenues of historical inquiry. It also has remained largely faithful to its interdisciplinary roots and diverse ideological origins, as evidenced by the number of scholarly publications—including those pertaining to alternate disciplines such as philosophy, sociology, economics, anthropology and archaeology—that have featured *Annaliste* authors and/or articles that engage *Annales* methodology and principles (Knapp 1992: 8; Tackett 2009: ix). However, the movement's rise to prominence has not come without criticism. For example, some scholars have argued that *Annales* supporters put forth seemingly contradictory or counterintuitive viewpoints, particularly in regard to its first-generation ideals. The *Annaliste* tendency to repeatedly refer to tenets proposed by Bloch and Febvre is viewed by some as a hindrance to the School's founding principles, which promoted a search for total history through continual adaptation of its methodological and theoretical approaches (Revel 1992: 75-76; Burguiere 2009: 1-2). However, it is the very aspirations put forth by Bloch and Febvre—to strive for an open-minded multidisciplinary approach to historical research—that has encouraged and enabled *Annalists* to adopt and adapt method and theory from a range of other disciplines and schools of historical thought, assess and reassess the relevance of their own School's existing principles, and ultimately propel the *Annales* movement forward.

Annales and Archaeology

Archaeologists, and maritime archaeologists in particular, have only recently considered the applicability of *Annales*-informed approaches within their respective research domains (Hodder 1987; Little and Shackel 1989; Bintliff 1991, 2004, 2008; Peebles 1991; Bulliet 1992; Knapp 1992; Barker 1995; Gurevich 1997; Kepecs 1997; Staniforth 1997, 2003a, 2003b; Dellino-Musgrave 2006; Delgado 2006, 2009; Van Dyke 2008; Smith 2010; Horlings 2011; Pietruszka 2011). Staniforth (2003b: 104) attributes this phenomenon to a shift in archaeological method and theory away from 1960s and 1970s-era 'positivist, hypothetico-deductive "New Archaeology" approaches' popular at the time the *Annales* School became internationally recognised among academic historians. These processualist ideas, which 'steadfastly resisted any alignment with history', have over time been complemented (and, some would argue, superseded) by the modern post-processual movement in archaeology, which encourages its practitioners to strive for unique, interdisciplinary means of collecting, analysing, and interpreting material culture (see Shanks and Tilley 1987; Leone and Potter 1988; Molino 1992: 23; Hodder 1991, 1999; Shanks 1992; Tilley 1993; Shackel 2000: 769; Miller 2001; Staniforth 2003a: 17, 2003b: 103-104). This approach to archaeology bears more than passing similarity to many historians' view of *Annaliste* scholarship, which has been described as 'an opportunity to gain a hearing for new and adventurous ideas' (Bulliet 1992: 133).

A significant factor in the archaeological application of the *Annales* paradigm has been the tendency of scholars to focus on the *longue durée* and less on the reconstruction of *conjonctures* and *événements* (Staniforth 1997: 18). This may in part be attributed to the specific questions and methods of archaeologists who have previously adopted *Annales*-inspired theoretical frameworks within their research designs. Taking their cue from Braudel and

historians heavily influenced by his work (such as Immanuel Wallerstein, best known for his development of World Systems Theory—see Wallerstein 1974, 1980, 1989), the vast majority of these scholars have focussed on *longue durée* structures such as climate, geomorphology, and ecological change in an effort to illuminate their respective influences on human decision-making processes and actions (e.g., Hodder 1987: 1-8; Cobb 1991; Sanderson 1995; Funari 1997: 190; Kepecs 1997: 193-198). Some archaeologists (see Jones 1991: 98) have argued against the efficacy of material evidence in the reconstruction of *événements* due to the difficulties associated with identifying ‘individual historical events...in the archaeological record’. Still others (Clark 1985; Le Goff and Nora 1985; Fletcher 1992; Barrett 1994; Wallace 2011) have highlighted the apparent failure of the *Annales* framework to ‘provide a logical connection between [its] scales of interpretation’. Roland Fletcher (1992: 39) in particular has observed that the primary problem inherent in the application of the *Annaliste* model to archaeology is that ‘its various kinds of time scale...have not been precisely defined...nor does the [*Annaliste*] hierarchy incorporate a precise relationship between the different magnitudes...of [its] different levels of process.’ In a similar vein, Jan Harding (2005: 8-9) notes that Braudel’s approach to history fails to ‘adequately theorise how temporality is perceived or experienced by people’ and as a consequence detaches ‘temporality from the very social context in which event and structure acquire their specific meaning’. Despite these criticisms, a number of researchers have successfully connected artefacts associated with individuals and individual preference to larger-scale frameworks such as social differentiation and domination, long-term settlement history, and the development of agriculture (see Little and Shackel 1989; Barker 1991; Vallat 1991; Johnson 1993: 327-356, 1996; Shackel 1993: 116-117).

In the case of maritime archaeology, a handful of researchers (e.g., Staniforth 1997, 2003a, 2003b; Dellino-Musgrave 2006; Rönnby 2007; Delgado 2006, 2009; Smith 2010; Horlings 2011; Pietruszka 2011) have effectively applied *Annales*-informed investigatory frameworks to the analysis and interpretation of material culture in maritime contexts. As early as 1990, Richard Gould (1990: 11) noted the Braudelian model potentially offered a ‘useful guide to an appropriate body of theory for archaeology’. However, it was Staniforth who first explicitly outlined the utility of *Annaliste* scholarship in the investigation of underwater sites, and subsequently incorporated the ideas of both second- and third-generation *Annales* historians in his research. Utilising Braudel’s three-tiered approach, he has highlighted social forces (*conjunctures*) such as consumerism, capitalism, and colonialism and their roles in maritime trade and the transfer of cultural attitudes between Great Britain and colonial Australia. At the same time, he applies Ladurie’s and Le Goff’s ‘microhistory’ approach to emphasize and illuminate specific Australian shipwreck events that occurred within the larger British colonial maritime system (see Staniforth 2003a: 27-28, 2003b: 103-104). As Staniforth (2003a: 28) observes, these unintended *événements* and the material culture assemblages that resulted from them are the starting point from which ‘larger scale cultural processes and [their]...underlying *mentalités*’ may be effectively explored and interpreted (see also Bintliff 1991: 177; Fletcher 1992: 41; Veth 2006: 19).

This concept of the ‘archaeology of the event’ is Staniforth’s particular theoretical contribution to *Annaliste* scholarship, and a means by which ‘identifiable people, particular historical events and tangible artefacts’ may be linked together ‘without resorting to either “stretched chronologies” or “fictions”’ (2003a: 30). Although developed primarily with the archaeology of shipwrecks in mind, his event-based analytical framework can very easily be applied to a wide array of maritime topics. For example, the following statement retains

much of its context and meaning when Staniforth's original use of the term 'shipwreck' is substituted with an alternate term such as 'vessel abandonment':

Maritime archaeology...derives from specific events—in particular, the [vessel abandonment] event...[I]t is at the level of the archaeology of the event and by incorporating the event into the longer term, and the larger scale (*conjonctures*, *mentalités* and the *longue durée*) that maritime archaeology potentially has some of its most powerful explanatory value (2003a: 30).

Nathan Richards (2008: 11) has expressed a contrary viewpoint, observing that vessel abandonment 'is rarely an *event*...[but rather] frequently a *process* in which a vessel may undergo salvage or...slowly deteriorate over the years'. However, he has also observed that 'discard processes...have an influence on the nature of discard *as an event*', and that the '*discard event* culminates in the beaching, scuttling, or demolition of watercraft' (Richards 2008: 180). This thesis posits that episodes of discard and abandonment, like shipwrecks, are *événements* that may be perceived as unique in time and space. Although frequently a consequence of different circumstances, behaviours, and temporal spans, the intentional disposal of watercraft and other cultural material shares at least one commonality with Staniforth's (2003a: 30) definition of a shipwreck event: both are 'the result of the actions and interactions of individuals and groups of people leading up to and including a particular event'.

Subsequent scholars have utilised Staniforth's ideas, and expanded the *Annales* paradigm to include other facets of maritime archaeological inquiry. For example, Virginia Dellino-Musgrave (2006) has employed the archaeology of the event to link two specific British warship wrecks, HMS *Swift* and HMS *Sirius*, to British maritime policies and activities in the southern hemisphere during the latter half of the eighteenth century. Of particular interest to Dellino-Musgrave (2006: 137) are the ceramic assemblages from these shipwrecks, the analysis of which provides a means of understanding the expression of British identity

and action 'within the global processes of capitalism, colonialism and consumption'. By linking these event-based data to the concept of *praxis* (or the material projection of 'being in the world'; see Heidegger 1996), she is able to explore the manner in which the notion of 'Britishness' was manifested within physical and social landscapes and used to either bond Royal Navy officers and crewmen together, or set them apart from other social groups (Dellino-Musgrave 2006: 135).

Johan Rönby (2007) has applied *Annales* concepts within a maritime cultural landscape study to explore the effects of specific 'maritime *durées*' on the prehistoric and historic inhabitants of the Södertörn region of eastern coastal Sweden. These long-term structures include the exploitation of marine resources, seaborne communication, and 'the mental presence of the sea', and are integral components of a shared identity that Rönby (2007: 79) posits has existed for millennia and links modern coastal-dwelling Swedes with their Stone Age ancestors. Of critical importance to Rönby—and, he argues, to maritime archaeology as a discipline—is an understanding of the role maritime *durées* play in influencing the 'relationship between humans and their maritime surroundings', as well as the effect(s) such relationships have on human decision-making processes (2007: 79-80).

Similarly, James Delgado's (2006, 2009) discussion of San Francisco's waterfront during the Gold Rush era adopts elements of *Annaliste*-inspired inquiry. He applies these concepts within the framework of Wallerstein's World Systems Theory to interpret multiple archaeological sites—including several hulked vessels converted into stores and warehouses—that once formed integral components of the city's maritime infrastructure and cultural landscape. The individual sites that comprise the study were the result of specific actions or occurrences (i.e., intentional grounding or sudden loss due to fire) and therefore 'may be [considered]...especially good example[s] of the archaeology of *événements*' (Delgado

2009: 28). Delgado argues that it is their 'association with the wider infrastructure of the waterfront, the *conjunctures* or social processes of the world system in the industrial nineteenth century, and the relationship of these elements to the Pacific [Ocean]'s *longue durée*' that constitutes their 'true value' to archaeology and history (2009: 28).

Lindsay Smith (2010) is the first researcher to explicitly apply an *Annales*-based theoretical framework to the archaeological investigation of intentional watercraft abandonment. She employs Braudel's tripartite model in conjunction with cultural site formation mechanisms to examine and interpret an extensive ships' graveyard complex at Elizabeth City, North Carolina. The vessels that comprise the assemblage were assessed for evidence of purposeful discard, salvage, and/or reuse activities. Smith (2010: 8) observes that these abandonment *événements* serve as indicators of larger-scale *conjunctures* and *mentalités*, including 'historic trends in technology, changes in economic environment, prevailing social behaviors, and shifts in waterborne activities'. Ultimately, attributes of the abandonment complex are utilised to explain *longue durée* aspects of Elizabeth City's maritime history, including its 'participation in the [U.S.] eastern seaboard's complex trading networks' during the eighteenth and nineteenth centuries, and eventual 'decline in maritime prominence' during the twentieth century (Smith 2010: 7-8).

Annales-inspired ideas also feature prominently in the recent doctoral research of Rachel Horlings (2011) and Andrew Pietruszka (2011). Horlings utilises site formation data derived from remote sensing surveys and archaeological investigation of submerged sites at Elmina in coastal Ghana to establish an interpretive model for a ca. 1650 shipwreck known as the Elmina Wreck. The model is then integrated within the region's varying scales of historical and environmental process to address the larger theme of maritime trade in West Africa. Of particular significance is the manner in which Horlings interweaves varying levels

of site formation (i.e., specific environmental factors that affect individual artefacts or entire sites) with Staniforth's 'archaeology of the event' to understand and interpret relevant multi-scalar geological, environmental, historical and cultural processes, ranging from isolated shipwreck events to the larger systems that produced them (and continue to exert an influence on their submerged physical remnants).

Pietruszka also focusses attention on the Elmina Wreck, placing particular emphasis on surviving elements of cargo represented within its artefact assemblage. These items are analysed in conjunction with hull remains, iron cannon, and other material culture recovered from another Elmina-based shipwreck (the Benya Lagoon site) to explore Dutch maritime activities in West Africa during the seventeenth and eighteenth centuries. Of particular relevance to Pietruszka is the need to engage both the nomothetic and particularistic attributes of these sites. By incorporating and applying methodological and conceptual approaches specific to microhistory and Braudelian *Annaliste* scholarship he is able to 'move beyond the particulars of the event and the minutia of [each] site to the study of the cultural processes in which [they] were embedded' (2011: 282).

This thesis adopts elements of most of the aforementioned scholarly works, but places particular emphasis on Staniforth's original event-based model, as well as the use of *Annaliste* concepts employed by Delgado and Smith. Delgado's application of the archaeology of the event to a variety of non-shipwreck site types—including purpose-built terrestrial structures associated with waterfront activities and vessels intentionally grounded, modified (or converted), and repurposed for systemic roles other than the one(s) for which they were originally constructed—has direct relevance to this research project, which is concerned exclusively with intentionally discarded vessels and abandoned land-based infrastructure. Similarly, his effort to derive meaning from a broader array of maritime sites

and themes and interpret the waterfront of Gold Rush San Francisco within the global maritime system has precedence for this study, which strives to identify discard processes (*événements*) specific to Australasia's early torpedo boat defences and place the abandonment of the entire defensive system within the broader scope of centuries-long European—but specifically British—naval presence in the Pacific Ocean (the *longue durée*).

Smith's combination of *Annales* concepts and archaeological site formation to illuminate historic watercraft abandonment in Elizabeth City has perhaps the most direct relevance to this research project. Like Smith's study, this thesis applies cultural transformation processes to identify discard behaviours in a maritime context, and then utilises these abandonment '*événements*' to highlight larger-scale processes—in this case, *conjonctures* and *mentalités* that influenced and defined the role and relevance of torpedo boat assets in the defence of Australia and New Zealand between colonisation and early nationhood. However, whereas Smith explores designated ship discard collection areas (ships' graveyards) and focusses exclusively on commercial watercraft, this investigation examines abandonment characteristics of military vessels *and* their associated land-based infrastructure. Another notable difference is the geographic scope of each project: the ships' graveyards of Elizabeth City are restricted to a relatively specific zone in and around the city's boundary; by contrast, discard sites affiliated with Australasia's torpedo boat defences are, with few exceptions, isolated from one another and span a region that includes most Australian states as well as the North and South Islands of New Zealand.

Identifying and Understanding the Signatures of Discard and Abandonment: Archaeological Site Formation and Cultural Transformation Processes

The study of archaeological site formation is a middle-range processual/behavioural method of interpreting material culture (Hodder 1999: 27; Johnson 2010: 65). It is the predominant scholarly approach employed in this thesis to interpret and understand the signatures of discard and abandonment represented by the individual archaeological sites discussed in this study. Site formation-based studies posit that archaeological evidence is derived from human actions and/or behaviour that result in the deposition of cultural material within the archaeological record, as well as subsequent transformative events that affect these objects, either as a result of natural processes or human intervention (Oxley 1998: 46-48). The relationship between archaeological material and the environmental or cultural processes that affect it may be considered at both the micro- and macro-level (Gladfelter 1977; O'Shea 2002: 212; Ward and Larcombe 2003: 1223). Further, data collected as a result of site formation investigations can be applied across a range of scales, from the level of individual artefacts to clusters of sites spanning one or more geographic regions (Schiffer 1987; Stewart 1999: 578; Staski 2000: 43).

The means by which artefacts are transferred from systemic to archaeological contexts are called *formation processes* (see Schiffer 1996: 7). Recognition and interpretation of these processes enable archaeologists to explain how cultural material was actively utilised within a behavioural system, and later deposited within the archaeological record. Further, it explains how these items interacted with the natural environment subsequent to their integration within an archaeological context (Oxley 1998: 48; Richards 2008: 51). A simplistic explanation of site formation processes as they apply to maritime archaeology would be a shipwreck (an event that may result from specific human actions such as navigational error and/or intentional grounding) and the wrecked vessel's gradual alteration or destruction as a

consequence of subsequent natural processes (i.e., disintegration of wooden components from wave action, sand scour, and the predatory actions of marine organisms) and human activities (such as salvage, or even archaeological excavation).

Formation processes are both cultural and non-cultural in scope, and capable of altering material culture 'spatially, quantitatively, formally, and relationally' (Schiffer 1996: 10-11). It has been argued that the recognition that the archaeological record is the product of combined cultural and environmental processes is likely as old as the discipline itself (see Grayson 1986); however it was during the 1960s and 1970s that a handful of archaeologists (e.g., Ascher 1968; Stanislawski 1969a, 1969b; Cowgill 1970; Clarke 1973; Collins 1975; Brieur 1977; Sullivan 1978) first proposed very general conceptual frameworks for formation processes and their effect(s) on material culture. A model developed by scholars at the University of Arizona during the same period (see Schiffer 1972, 1977, 1983, 1995, 1996, 2010; Schiffer and Rathje 1973; Reid, et al. 1975; Schiffer, et al. 1981) refined these ideas and identified specific transformative effects that acted on artefacts before, during, and after they made the transition from systemic to archaeological contexts. These 'transformations' (or 'transforms') were classed within two categories: those manifested by natural or other non-cultural processes were identified as *n-transforms*, while those that resulted from culturally influenced mechanisms were labelled *c-transforms* (see discussion below). Maritime archaeologists have long acknowledged the role of environmental forces in the disintegration and dispersal of submerged cultural material and effectively applied n-transforms to the interpretation of shipwreck and other underwater sites (e.g., Muckelroy 1975, 1976, 1978; Brown et al., 1988; Gibbins 1990; McCarthy 1996; Ward, et al. 1998; Stewart 1999; Veth and McCarthy 1999; Ward, et al. 1999a and 1999b; McCarthy 2000; Hageman 2001; McNinch, et al. 2001; Wells 2001; O'Shea 2002; McNinch, et al. 2006).

Archaeologists have utilised site formation processes as both a methodological tool and theoretical construct, thereby enhancing their applicability within the discipline as a whole, and to the investigation and interpretation of maritime sites in particular (see Hassan 1979; Schiffer 1983, 1985; Ferrari and Adams 1990; Gould 1991; Jones 1994; Schiffer 1996; Oxley 1998: 12; LaMotta 1999; Dincauze 2000: 502; LaMotta and Schiffer 2005). A few of the more notable maritime-based case studies that utilised site formation processes as an integral element of their research designs include investigations of the wreck sites of HMS *Pandora* and SS *Xantho* in Australian waters, as well as remnants of a vessel thought to be *Queen Anne's Revenge* in the near shore North Carolina waters in the United States (McCarthy 1996; Ward, et al. 1998; Veth and McCarthy 1999; Ward, et al. 1999a and 1999b; McCarthy 2000; Hageman 2001; McNinch, et al. 2001; Wells 2001; McNinch, et al. 2006). Among archaeological site formation's many distinct and desirable attributes is a capacity to draw upon and apply a variety of special investigative techniques, methodological frameworks, and theoretical perspectives from related fields, including history, geography, biology, geology, sociology, and ethnography. Michael Schiffer, Keith Muckelroy (1975, 1976, 1978) and, more recently, Nathan Richards (1998, 2002, 2003, 2004, 2008, 2011; Richards and Staniforth, 2006) and Martin Gibbs (2005, 2006) are the most frequently cited authorities on the theoretical application of site formation processes for material culture in maritime contexts.

Muckelroy was a pioneer in the field of maritime archaeology, and has long been recognised as one of the first individuals to develop and apply a coherent and formalised theoretical approach to the investigation of underwater sites (Murphy 1990: 2; Lenihan and Murphy 1998: 234; Gibbs 2006: 4; Harpster 2009: 67; Martin 2011: 52). His ideas were influenced by the research of David Clarke (1968) and Graham Clark (1939), and rooted in

the interpretation and application of site formation processes, although he never used this term, preferring instead to label the mechanisms responsible for creating the archaeological record 'extracting filters' and 'scrambling devices' (Muckelroy 1976: 283, 286; Harpster 2009: 72-73; Martin 2011: 52-54). By encouraging researchers to understand site formation and its effect(s) on material culture from the moment it enters the underwater environment, Muckelroy hoped to move beyond mere descriptive analyses of ship remains and artefacts and instead 'explain archaeological problems and... understand human past activities' (Dellino-Musgrave 2006: 23; see also Adams 2009: 84; Harpster 2009: 75).

One major drawback to Muckelroy's site formation model is that it is based entirely on data derived from the remnants of vessels lost under accidental, and oftentimes catastrophic, circumstances. Deliberately discarded watercraft, such as the Australasian torpedo boats addressed in this study, represent an entirely different type of archaeological site, and exhibit their own specific set of cultural and environmental transformation processes. The same can be said of torpedo boat support facilities that comprise the other major data set analysed in this thesis. Significantly, although Muckelroy identified maritime archaeology as 'the scientific study of the material remains of man and his activities on the sea', he also marginalised terrestrial sites in maritime contexts, claiming they were not the purview of maritime archaeologists (Muckelroy 1978: 4-6). This too is reflected in his site formation model, which focusses on shipwrecks to the exclusion of all other site types (see Muckelroy 1978: 158, Fig. 5.1). More than three decades on, scholars continue to debate these and other shortcomings of Muckelroy's ideas (e.g., McGrail 1984; Gibbs 2006; Adams 2009; Harpster 2009).

Despite such misgivings, many maritime archaeologists have until recently largely adhered to Muckelroy's original concepts, and limited site formation-based research to

shipwrecks and their environmentally influenced post-depositional (i.e., post-wrecking) characteristics (Gibbs 2006: 6). For example, Ward and Larcombe (2003), Stein (2001), and Quinn (2006) worked to identify and delineate formation mechanisms that act on site preservation, while Oxley (1992, 1998), Ward, et al. (1998, 1999a, 1999b), O'Shea (2002) and Wheeler (2002) studied the interaction between shipwreck material and the depositional environment(s) in which it is embedded. A few exceptions exist, including a handful of investigations (e.g., Jung 1996, 2001, 2007, 2008, 2009; McCarthy 1997; Ford 2006; Arnold 2010, 2011; Bell 2010) that have emphasized formation mechanisms and their effect(s) on underwater sites other than shipwrecks, including historic aircraft crash locales and intentionally discarded military vehicles.

While the discipline has unquestionably benefitted from these and similarly themed studies, *cultural* factors in maritime site formation have not been appreciably developed (those that *have* incorporated cultural site formation to varying degrees include Murphy 1983; Keith and Simmons 1985; Lenihan, et al. 1987; Anuskiewicz 1998; Souza 1998; Gould 2000, 2005; McCarthy 2001; O'Shea 2002; Auer 2004; Gibbs 2005, 2006; Richards 2008; Smith 2010; for a discussion of this issue, see Gibbs 2006: 6-7). One notable exception is a site formation model developed by Martin Gibbs (2006). Expanding upon themes developed by Muckelroy, Gibbs' model considers an array of cultural processes—and associated behavioural catalysts—that may act upon shipwreck sites before, during, and after a given wrecking event. He posits that it is only through the evaluation of shipwreck sites within a 'process orientated' framework that the archaeologist is able to 'integrate and synthesize the documentary, oral and archaeological evidence of human response to a shipwreck into a structure which parallels the physical progress of danger' (Gibbs 2006: 6-7).

Critical to this evaluative process is an understanding of the nature of the shipwreck event itself. For example, a 'catastrophic' shipwreck elicits human responses and behaviours—and creates distinct archaeological signatures—that are fundamentally different from those that result from events in which vessels are 'intentionally deposited' or abandoned (Gibbs 2006: 7; for a discussion of the intentional deposition of shipwrecks, see Stewart 1999: 570). Gibbs also explores human response(s) to disaster (both during and after a shipwreck event), and defines two separate forms of shipwreck salvage. The latter, comprising 'systematic' and 'opportunistic salvage', have relevance to vessel discard and abandonment, and will be addressed in greater detail later in this chapter.

Richards (2008: 52) attributes the relative exclusion of cultural transformation processes within maritime archaeological studies to a failure on the part of researchers to perceive shipwrecks as anything other than accidental occurrences, with little or no human influence or intent. Muckelroy has been identified as one of the prime culprits in perpetrating this point of view, going so far as to state that 'human interference, undoubtedly the most important...agent in a terrestrial context, is minimal under water, and limited to a few identifiable activities' (Muckelroy 1978: 158; Murphy 1983: 66; Lenihan and Murphy 1998: 237). The shortcomings inherent in Muckelroy's site formation model have prompted more recent generations of maritime archaeologists to adopt Schiffer's version, which according to Richards (2008: 51) is much better developed and more universal in its overall approach and interpretive potential. The Schifferian version also places much greater emphasis on cultural processes, particularly those pertaining to discard and abandonment; consequently, its tenets of cultural site formation are ideally suited to, and will form the basis of, the interpretive framework utilised in this thesis.

Schiffer's exploration of site formation mechanisms is based on a behavioural approach to archaeology (see Schiffer 1995, 2010). He spearheaded the concept that an understanding of the transformative processes artefacts undergo from deposition to discovery is essential to their overall analysis and interpretation, and has argued that 'behavior...proximately forms the archaeological record' (Skibo and Schiffer 2008: 6). Behavioural archaeology developed during the mid-1970s and was the brainchild of Schiffer, J. Jefferson Reid, and William Rathje (see Reid, et al. 1974, 1975). Its practitioners strive to redefine the discipline as one 'that studies relationships between people and things in all times and all places' (Skibo and Schiffer 2008: 5-6; Preucel and Mrozowski 2010: 5; see also Arthur 2002; Longacre, et al. 2000; Arthur 2007; Beck and Hill 2004; Shimada and Wagner 2007; Smith 2007; Silva 2008). The central focus of behaviouralist studies is material culture: archaeological investigation of its manufacture, use, and deposition is utilised to elucidate past human behaviour and everyday activities, while an understanding of formation processes provides a means for exploring the influence of human agency in the creation of the archaeological record (Walker, et al. 1995: 5).

While formation processes have been used to good effect within the discipline of maritime archaeology, the site formation approach has also been the target of some scholarly criticism. In the wake of the publication of the first edition of Schiffer's synthesis work, *Formation Processes of the Archaeological Record* (1987), some questioned whether the ideas it contained should be accepted as formalised theory (see Rick 1989: 657). At issue was Schiffer's inability to systematically apply his site formation concept(s) to the investigation of archaeological sites. These concerns are echoed by Ian Oxley (1998: 87), who laments the Schifferian model's lack of 'objective methodology' and inability to identify quantifiable links between specific formation processes and 'complexes of archaeological phenomena'.

In their zeal to focus on the cultural aspects of shipwrecks and submerged sites, some researchers initially downplayed or disregarded archaeological site formation, particularly its environmental influences. For example, Larry Murphy (1983: 87) took an opposite tack to Muckelroy when he stated 'there is little need to consider ecological aspects of [site] context, as required in terrestrial communities, except in the most general way; thus the archaeologist can focus directly on human behaviour'. It should be noted, however, that Murphy's opinion changed over time and that he ultimately came to embrace the value of both cultural and non-cultural aspects of site formation-based approaches (see Murphy 1990).

Others have been far more reticent, and continue to dismiss the utility of site formation processes, and their potential interpretive value in the investigation of submerged sites. David Gibbins (1990: 382) has noted instances in which maritime archaeologists developed historical particularist-based research designs that explicitly disregard the significance of formation processes in favour of the potential 'intrinsic interest' generated by the discovery of hull remains and artefacts. More recently, Davis Blackman (2000: 592) has questioned the utility of formation processes to the archaeological investigation of historic sites, arguing its irrelevance in instances where pertinent archival data is available. He also posits that 'middle range theory has more or less come to mean the study of site formation processes', a viewpoint that is misguided at best and eminently debatable (see Anuskiewicz 1992, 1998; Raab and Goodyear 1998; Shott 1998; Trigger 1998: 22-23).

In stark contrast to the views of Rick, Oxley, Blackman, and others, Michael Shott (1998) has advocated the existence of a 'formation theory' that governs archaeological site formation. Such an overriding body of theory is necessary, he argues, because archaeologists

‘deal directly only with assemblages of materials and contexts that were formed by formation processes’. Further, he goes on to state:

All archaeologists should have an interest in general, that is cultural, theory and its testing against the material record. Yet that record is the product of formation processes; its reasonable and valid interpretation requires the application of some body of coherent theory that links assemblages in the material record to the cultural behavior and organization that produced them (Shott 1998: 322).

Shott (1998: 311) has also observed that Schiffer’s concepts regarding archaeological site formation have considerably more utility in reconstructing ‘shorter-term contexts’, as opposed to the large temporal and spatial scales that characterise site formation models proposed by other archaeologists, most notably Lewis Binford (e.g., Binford 1981, 1983: 65, 391; see also Dunnell 1992: 87; Stern 1994; Tschauner 1996: 8-10). This particular attribute renders the Schifferian site formation model a useful complementary approach to the *Annaliste* framework of scholarly inquiry—and specifically the concept of the ‘archaeology of the event’—utilised in this thesis.

For his part, Schiffer has never explicitly stated that archaeological site formation is a theoretical construct, and even commented in the 1996 edition of *Formation Processes of the Archaeological Record* that ‘no single theoretical conception of formation processes has been widely adopted’ (Schiffer 1996: 8). Indeed, he notes in the same paragraph that his synthesis work was actually framed within transformation theory and ‘the transformation perspective of behavioral archaeology’ that was being developed by academicians during the 1970s and 1980s (Schiffer 1996: 8). However, Schiffer (2010: 5) has also stated that behavioural archaeologists have made ‘sustained efforts to craft distinctive bodies of theory’ and generate ‘[their] own principles (theories, models, and laws) through experimental research and ethnoarchaeology’. Additionally, he later observed that *Formation Processes of the Archaeological Record* embodied a ‘theory of evidence’ that defined cultural formation processes and enabled

archaeologists to draw a 'complementary relationship between the historical and archaeological records' (Schiffer 2010: 31-32). Schiffer's (thinly-veiled) implication is that archaeological site formation actually constitutes a theoretical perspective in its own right, a topic that—as noted above—continues to be hotly debated within the archaeological community.

In the interests of answering the research questions addressed in this thesis, archaeological site formation will be utilised as a scholarly approach that emphasizes both its proven utility as an analytical tool and applicability as a theoretical construct. Site formation signatures outlined by both Schiffer and Richards comprise a preexisting data set that can be compared to specific archaeological indicators of discard and abandonment exhibited by Australasia's torpedo boat defensive sites. Analysis of the material culture of these sites within a site formation framework provides a means of identifying and interpreting past human behaviour and actions that resulted in its deposition. These data can in turn—when used in conjunction with the *Annales* approach—potentially identify historical processes that influenced these behaviours, and thereby answer questions regarding cultural continuity and change.

Although non-cultural transformative mechanisms have undoubtedly had an effect on the various land-based, intertidal, and submerged sites addressed in this research, cultural transformation processes comprise its primary analytical approach and interpretive framework. This is because the signatures of discard and abandonment visible in the archaeological record are almost exclusively the result of human behaviour—which in turn may or may not be directly attributable to environmental influences. Although practically impossible to generalize in the manner of n-transforms (the effects of which are almost universally deducible through scientific means), cultural processes are nonetheless an

important aspect of archaeological interpretation, and 'pivotal to the understanding of discard behaviors' (Richards 2008: 54). With this in mind, the remainder of this chapter will explore cultural transformation processes, placing particular emphasis on concepts outlined by Schiffer and Richards, the scholars who have contributed the most literature to the identification and definition of specific archaeological signatures of discard and abandonment.

Cultural Transformation Processes

Schiffer (1995: 26) identifies human behavioural processes that affect material culture as cultural (or c-) transforms. These processes occur in the wake of an artefact's initial use and operate on it within two contextual areas. The first, termed *systemic context*, addresses objects that exist within a behavioural system and are subject to direct human interaction. *Archaeological context* describes material culture that has passed from active use into the archaeological record. In the Schifferian model, the systemic and archaeological contexts of a given artefact are analysed and interpreted via a six-stage 'life history' (Schiffer 1995: 26-33, 2010: 22-25; for alternate artefact life history models, see Kopytoff 1986; Shott 1989; Holmes 1992; Holtorf 2002; Miller 2007). The systemic aspect of the object's life cycle commences with the acquisition of raw material for its production; this is followed by a manufacturing stage that results in its transformation into a useable product. The artefact is then utilised for purposes that are practical (*techno-function*), social (*socio-function*), or ideological or symbolic (*ideo-function*) in nature, or a combination of two or more of these attributes (Schiffer 1996: 14; earlier models upon which Schiffer's systemic divisions are based can be found in White 1959 and Binford 1962). Once cultural material reaches the end of its use life, it may be reused or recycled (thereby continuing its existence within a systemic context)

or discarded, at which point it is transferred into an archaeological context as refuse. The life history model is by no means absolute or inflexible—for example, artefacts may not necessarily follow a linear path through its various phases, or even touch upon (and in turn be affected by) each individual stage (Schiffer 1972: 159; 1995: 27).

Objects that exist within Schiffer's life history model undergo c-transforms at each of its six stages. Many processes responsible for manifesting these changes are applicable to the investigation of Australasia's early torpedo boat defences, including deposition, reuse, discard, abandonment, reclamation, and disturbance (Schiffer 1996: 25-140). Richards (2008: 54) identifies three general perspectives of site formation that have applicability to the abandoned watercraft in this study. These include evidence of activities that a vessel was engaged in during its use life, revelations about that vessel's process of abandonment, and evidence of activities imposed upon the vessel post-abandonment. These same criteria also have utility in the evaluation of torpedo station abandonment. In its entirety, the assemblage of discarded watercraft and dismantled facilities that comprise this defensive system can be assessed for these behavioural characteristics on two separate levels. The first posits that each site be analysed and interpreted individually, while the second recognises the respective roles of each site within the larger torpedo boat defensive network, and complex of discarded vessels and stations that resulted from its subsequent abandonment.

Reuse Processes

Artefacts that are retained and utilised within a systemic context rather than discarded and transferred to an archaeological context can be evidence of reuse processes. These behaviours have been defined as changes to the 'user or use or form of an artefact, following its initial use', and are evident in the archaeological record in one of four

identifiable mechanisms [Schiffer 1996: 28-36; Richards 2008: 55; see also Deal and Hagstrum (1995) for a comparative ethnoarchaeological study of reuse; Lillios (1999) for a discussion on heirlooms; and Busch (1987) and Purser (1999) for an examination of the reuse and adaptability of glass and metal artefacts, respectively]. *Lateral cycling* is the process by which an artefact is transferred between individuals and/or social units, so long as its form and use are not altered. Schiffer (1996: 29) notes lateral cycling is widespread in many societies, but that it is often difficult to identify in the archaeological record because there are 'no changes in [an artefact's] formal dimension...attributable to a change in [its] user'. An example of this mechanism within the context of maritime defence would be the transfer of a torpedo vessel or its support facility from one military branch or unit to another (i.e., colonial navy to Commonwealth navy, or Royal New Zealand Navy to Royal New Zealand Army), or capture by an opposing naval force. Evidence of watercraft lateral cycling, while difficult to detect in the archaeological record, is sometimes discernible in bills of sale or transfer, or other forms of archival documentation [Richards 2004: 44, 2008: 55; additional examples of reuse processes in maritime contexts can be found in Townrow (1987) and Pearson (1992)].

Recycling is a reuse process in which an artefact is altered by industry so that its fabric is transformed to serve a new form and/or function (Schiffer, et al. 1981: 68; Schiffer 1996: 29-30, 2010: 33; Richards 2008: 55). According to Schiffer (1996: 29) recycling is easily distinguishable from *maintenance*, which also causes (relatively minor) alterations in artefact form, but does not change its original function. Richards (2008: 55) cites salvage of shipboard objects and partial or complete dismantling of watercraft as examples of recycling in a maritime context. Recycling activities are often motivated by perceived economic advantages on the part of the salvager, whereby the time, effort, and cost expended to obtain

materials from abandoned watercraft are outweighed by their financial benefits (Seeb 2007: 18). Salvage constitutes the most obvious example of recycling behaviour observed among the assemblage of military sites examined in this thesis; however, these archaeological signatures have to be evaluated in conjunction with archival sources to determine whether salvage activities entailed recycling, other reuse processes, or a combination thereof.

Reuse of material culture that changes its function but does not significantly alter its form is termed *secondary use*. In the vast majority of cases, an object enters a secondary use function due to extensive wear and/or obsolescence (David 1971; Schiffer, et al. 1981: 68; Bray 1982; Schiffer 1996: 30-32, 2010: 33; Richards 2008: 55). Schiffer (1996: 30-31) notes that the results of wear, maintenance, and breakage occasionally enhance the suitability of an artefact for secondary use, providing the example that 'worn-out ground-stone axes make excellent pounding tools'. He also insists an artefact must exhibit unmistakable physical evidence of alternate use-wear for the archaeologist to infer its use in a secondary capacity. Maritime archaeology has provided a variety of examples of secondary use of objects, the majority of which involve transformation of an obsolete or worn-out commercial vessel from its original role to a secondary support function such as a hulk or lighter (Richards 2008: 55; Smith 2010: 26). In the context of this study, an example of secondary use would include transfer of military-owned matériel to civilian control and operation.

Conservatory processes are a form of secondary use in which an object's original techno-function is converted to a socio- or ideo-function so that it may be preserved for posterity or as a 'memory object' (Schiffer 1996: 32-35; see also Langford 2001; Smith 2005; Mills and Walker 2008; Richards 2008: 55). In the maritime sphere, conservatory processes often manifest themselves in the form of historic watercraft that are maintained and exhibited for heritage tourism. In some cases, communities with a strong connection to historic maritime

activities not only preserve one or more vessels in this manner, but also individual structures, or even entire segments of historic port or town infrastructure. Regional examples of this phenomenon include the steam tug *Yelta* and sailing vessel *Failie* in Port Adelaide, South Australia, or the historic drydock facilities of Lyttelton, New Zealand, and the Australian city of Brisbane.

Discard Processes

When cultural material no longer fulfills a functional role, and is not subject to any of the reuse processes outlined above, it is transferred from a systemic to archaeological context (Schiffer 1996: 89; for specific examples of discard processes in the archaeological record, see Hammond and Hammond 1981; Walker 1995; Kamp 1998; Pearson 1999; Silverman and Small 2002; Chapman 2003; Shimada, et al.; Shea 2006; Richards 2008). The mechanisms that facilitate this transfer, known as discard processes, are a form of cultural deposition. The discarded objects themselves, which are no longer capable of operating within an active behavioural system due to irreparable use-wear, deterioration, or breakage, are labelled *refuse* (Richards 2008: 56). Schiffer (1995: 38) notes that some artefacts are also discarded into the archaeological record as a consequence of their obsolescence, limited reuse value, or accidental loss.

Analysis and identification of an object's composition, location, frequency, and relationship with other archaeological artefacts and/or sites is critical to understanding why material culture discard occurs in certain areas, as well as the processes that contribute to it. Schiffer (1996: 15-21, 2010: 19-20; see also Rathje and Schiffer 1982: 64-65) describes four dimensions of variability that contribute to the identification of discard mechanisms in the archaeological record, all of which are directly relevant to the defensive sites addressed in

this thesis. *Formal dimension* refers to an artefact's 'measurable physico-chemical properties' and includes its form, size, colour, weight and material type (Schiffer 1996: 15). The basis of all artefact typology is rooted in formal dimension variability; however, inattention to—or indiscriminate mixing of—the systemic and archaeological contexts associated with artefacts has contributed to 'terminological, procedural, and even theoretical confusion' among some archaeologists (Schiffer 1996: 15). By the same token, an understanding of the additive, reductive, and chemical processes that alter material culture's formal dimension is critical, as the vast majority of items or deposits that survive within archaeological contexts typically undergo some degree of formal change. Maritime defensive sites, including vessels of war and their various forms of water- and land-based support infrastructure, may manifest changes in formal dimension through alterations in their size, material composition, and architectural arrangement.

The number of times a particular object occurs in the archaeological record is referred to as its *frequency dimension*. According to Schiffer (1996: 18), the quantity of a given form of material culture is often its most 'clearcut variable, one readily measured in archaeological context'. However, a variety of formation processes act on an artefact's frequency dimension, each of which may target a particular attribute of its manufacture, composition, use and discard (e.g., Varien and Mills 1997; Varien and Potter 1997). Smith (2010: 29) observes that, within the context of a ships' graveyard, the frequency dimension refers to the total number of watercraft abandoned within it. For the purposes of this research project, frequency dimension would seem to have limited utility as an analytical tool, as each torpedo vessel and land-based station addressed within the study comprises an isolated abandonment complex. For this reason, the assemblage of abandoned sites was instead analysed in its entirety as a means to best detect its quantitative variability.

Schiffer (1996: 19-20) identifies a *relational dimension* as an identifiable pattern of association between two or more artefacts within an archaeological context. These patterns can in turn be sub-divided into *singular associations* and *recurrent associations*. The former addresses two or more cultural objects discovered in close proximity to one another, while the latter describes a series of singular associations that occur repeatedly at one or more sites. Richards (2008: 56-57) has applied the concept to the study of watercraft abandonment, labelling the occurrence of two or more discarded vessels in the same area as examples of singular association, and the existence of these sites within 'the same spatial and behavioural contexts from region to region' as recurrent associations. This idea has applicability in the investigation of military abandonment practices; for example, the discovery of a discarded torpedo boat in close proximity to its former support facility would constitute a singular association, while a recurrent association would comprise a repeat of this phenomenon at two or more locales within Australia and/or New Zealand.

Discard processes may also be elucidated through analysis of the distribution and spatial relationships of abandoned cultural material. *Spatial dimension* refers to the location of an artefact, but may also describe 'behaviourally significant divisions of space' ranging from activity areas within a particular structure, to regional systems that encapsulate one or more social groups (Schiffer 1996: 17). The behavioural aspect of spatial dimension in the abandonment process is perhaps best illustrated by Schiffer's (1996: 62) statement that 'people tend to dump trash where others have previously dumped trash'. Resultant concentrations of discarded material can be further sub-categorised into *primary refuse* and *secondary refuse* (Schiffer 2010: 34; see also Wilson 1994; Beck and Hill 2004). As it applies to watercraft abandonment, primary refuse would comprise vessels—and their associated material culture—that are disposed of in locations where they once operated within a

systemic context. Once these objects are transported to designated discard areas, such as ships' graveyards, they become secondary refuse (Richards 2008: 56; Smith 2010: 30).

Secondary refuse may be further distinguished as evidence of *maintenance processes* or *waste streams* (Rathje, et al. 1992; Wheeler 2000). The former involves upkeep activities and associated waste removal that occurs on both a predictable and *ad hoc* basis, while the latter term defines the path(s) through which discarded material is moved from one place to another. Schiffer (1996: 66) uses the analogy of household rubbish, a by-product of the maintenance process of 'spring cleaning', as but one example of a single waste stream. This waste stream is merged with others within the household, before being deposited in communal rubbish bins, the first of several secondary refuse sites. Ultimately, the waste streams of several households, businesses, factories, and other entities are combined in sanitary landfills. Applying the concept within a maritime context, Richards (2008: 56) observes that the often extensive and complex nature of ship-breaking and salvage results in the transport of condemned watercraft to an initial dismantling site, followed by removal and subsequent deposition of what remains of those vessels at one or more alternate localities.

Abandonment Processes

Processes associated with abandonment bear some similarity to those associated with discard, and the meaning of the term 'abandonment' itself varies depending on the circumstances surrounding its use (e.g., Cameron 1991; Inomata and Webb 2003; Deal 2008; Richards 2008: 57; Smith 2010: 31). Schiffer (1996: 89) defines abandonment as the mechanism by which 'a place—an activity area, structure, or entire settlement—is transformed to archaeological context', and notes it may be the result of occurrences ranging

from relatively normal and premeditated (such as abandonment of a 'decay-ravaged house in the tropics') to those that are unanticipated and utterly catastrophic (such as the vacating of an entire village destroyed by a mudslide or other natural disaster). Prior to the 1970s, archaeologists tended to identify abandonment with large-scale catastrophic events, such as the destruction of Pompeii and Herculaneum in 79 A.D. (Cameron and Tomka 1993: 3). More recent research has resulted in a paradigm shift in which abandonment is viewed less as a solitary occurrence and more an element of the continuum of settlement processes (see Cameron and Tomka 1993: 3; Rothschild, et al. 1993: 136; Tomka and Stevenson 1993: 192).

The abandonment process results in two means of artefact deposition—*de facto refuse* and *curate behaviour*. The former refers to functional cultural material that is left behind when an activity area is vacated, while the latter describes the removal and transport of functional or repairable items from an abandoned area to another locale for continued use or reuse (Binford 1976, 1979; Bamforth 1986; Kuhn 1994; Schiffer 1996: 89-90; Shott 1996; McKee 2007). Stevenson (1982) explored the role of *de facto* refuse production and curate behaviours in the abandonment of historic sites by correlating archival and archaeological evidence from gold rush settlements in the Yukon. He proposed that two primary conditions influence the extent to which *de facto* refuse and curate behaviours are represented in the archaeological record: 1) a given activity area's rate of abandonment; and 2) the likelihood that occupants of the abandoned activity area would return to it at a later date (Stevenson 1982: 241, 252-253). A third factor proposed by Lightfoot (1993: 166) concerns issues of proximity and accessibility to abandonment areas. In instances where members of a culture group need only cover a relatively short distance between a vacated site and their new activity area, or have a means of transporting material between the two locales quickly and efficiently, the occurrence of *de facto* refuse in the abandoned area is significantly greater. By the same token,

these characteristics would theoretically reduce or inhibit the ability of other cultures to scavenge assemblages of *de facto* material (Lightfoot 1993: 166).

In the context of vessel abandonment, *de facto* refuse can generally be defined as all useable components of the discarded vessel itself, including surviving elements of the hull and its internal and external machinery and fittings. Ships' graveyards are simply larger collections of this *de facto* material, and their formation is dependent upon a variety of factors, including 'the rate of abandonment, the degree to which abandonment is planned, the available transport for access to the site, the season of abandonment, the distance to the closest populated area, and the size of the local community' (Richards 2008: 57). As with terrestrial sites, these spatial and logistical factors influence salvage behaviour, which in many cases is manifested by the amount and variety of *de facto* refuse encountered at a ship abandonment site. Sometimes, the accumulation of *de facto* material is detrimentally affected—and in some cases completely negated—by curate behaviour:

At the extreme end of this activity, curate behaviours may see humans completely strip sites of useable materials for recycling and eventual reintegration into systemic contexts. Both processes exist in the planning phases of abandonment activities, and they tell us whether there is an expectation of a return to the site. We can see this especially at intertidal ships' graveyards, where the highly exposed remains of unwanted watercraft become sites of repeated return for the purposes of salvaging materials (Richards 2008: 57).

Similarly, reuse processes such as lateral cycling, maintenance, recycling, secondary use and conservatory actions, and reclamation processes such as salvage and looting (see below), may limit the amount of material culture that enters the archaeological record as *de facto* refuse.

For this reason, objects abandoned as *de facto* material cannot always be counted on to provide an accurate representation of a site's systemic attributes (Lightfoot 1993: 166; Smith 2010: 35).

Reclamation Processes

Although it is common for artefacts deposited within an archaeological context to remain there, the process is by no means irreversible. Reclamation processes comprise mechanisms by which material culture reverts from an archaeological context back to a systemic context (Schiffer 1996: 99). As they apply to ship abandonment, the same behaviours have also been termed *additive and reductive processes* (see Seeb 2007). Reclamation activities tend to occur in locations that are the subject of repeated occupations of the same—or similar—duration, although they may also be carried out in conjunction with periodic episodes of curate behaviour (Schiffer 1996: 101; Richards 2008: 58). Richards (2008: 58) identifies *salvage* and *scavenging* as the most common forms of reclamation process observed in association with watercraft abandonment, and associates them with two specific behaviours—salvage of *de facto* refuse items (such as moveable objects and architectural elements) for reuse, and salvage and/or scavenging of structural components for their material constituents. Salvage is identified as the reclamation of artefacts—with particular emphasis placed on construction materials—from abandoned sites, while scavenging is a somewhat generic term that addresses the exploitation of discarded objects. When applied to wrecked or abandoned vessels, the latter frequently ‘has a socioeconomic context related to the unsanctioned, illegal, and often clandestine salvage of material...for profit’ (Richards 2008: 58).

Schiffer (1996: 107) identifies scavenging activities that occur at secondary refuse areas as *gleaning*. This behavioural process is largely influenced by the reusability of certain *de facto* refuse items. For example, material culture that is intact or has the potential to be reused for a protracted period of time generally exhibits a higher probability of collection via gleaning activities. Other determinants include the desirability, utility, and availability of an

artefact within a given society, the demand that that society places on it, and its condition at the time it is scavenged (Schiffer 1996: 106-111). These and other behaviours associated with gleaning, such as the retention of *de facto* refuse areas in close proximity to inhabited settlements, are described as *resource-use strategies* (Schiffer 1996: 107; Richards 2008: 58).

In some instances, archaeological deposits are reclaimed and utilised as construction fill in an effort to transform nonfunctional areas into land for settlement or other systemic uses (South 1977: 297; Schiffer 1996: 111). This material is referred to as *displaced refuse* and has been used in a variety of maritime contexts, including as the foundations for wharves, jetties, breakwaters and other waterfront infrastructure, from antiquity to the modern era. The relatively large size and preexisting architectural attributes of abandoned vessels have historically made them well suited for this role (Richards 2008: 58). Consequently, they comprise a significant archaeological data set all their own (see Meiggs 1960: 155; Johnstone 1976: 100-101; Reiss 1987: 90; Marsden 1994: 11, 97, 104; Lemee, et al. 1996; Lemee 1997; Reiss 1997: 349-350).

Collecting and *looting* (or *pothunting*) are two other reclamation mechanisms frequently associated with archaeological objects and sites; however, they differ from salvage and scavenging in that they are perpetrated by members of a cultural group other than the one that created them (Schiffer 1996: 114). Both involve the disturbance, removal, and transfer of artefacts from archaeological contexts to one or more systemic contexts elsewhere, but one (collecting) applies solely to surface material and the other (looting) to objects recovered from subsurface deposits. Schiffer (1996: 114) observes that the effects of these 'intersite [reclamation] processes' were largely constrained prior to the development of wheeled transport and heavy machinery, because societies would only have been able to collect and loot objects that could be physically lifted and carried by one or more individuals.

Cultural Transformation Processes Specific to Watercraft Abandonment

Culturally determined processes of discard and abandonment, as they pertain to watercraft and the maritime environment, comprise their own set of circumstances and defining characteristics, and consequently require nomenclature distinct from that used to describe transformation mechanisms in terrestrial contexts. Similarly, behaviours associated with deliberate acts of vessel discard differ significantly from those that result in, or are a product of, catastrophic ship loss (Richards 2008: 7; Smith 2010: 32). Donald Shomette (1995: 6-7) was one of the first researchers to explicitly state that shipwrecks and abandoned watercraft are the result of very different systemic processes and therefore constitute alternate site types. This dichotomy proved critical to the subsequent research of Nathan Richards (2002, 2008, 2011), who has credited Shomette with steering 'the direction of [his] work' (Richards 2008: 8, 2011: 858). But whereas Shomette considers abandoned vessels to be little more than 'an important variation' of shipwrecks, Richards classifies each site type as 'related but discrete aspects of the maritime archaeological record' (Richards 2008: 8).

Richards' 2008 book, *Ships' Graveyards: Abandoned Watercraft and the Archaeological Site Formation Process*, is derived from his doctoral research and constitutes the first concerted effort to identify, evaluate, and define cultural site formation mechanisms associated with ship discard. It expertly demonstrates the utility of Schiffer's site formation model within maritime contexts, and builds upon it by incorporating terms and definitions that apply exclusively to archaeological signatures of watercraft use and abandonment. However, for all of its useful attributes, Richards' study does not differentiate or describe discard behaviours specific to military watercraft, a shortcoming that has been noted by Richards himself (pers. comm., 30 May 2011). This is countered somewhat by his tacit acknowledgement that many potential research themes have emerged 'from the need to refine the abandoned vessel data

set and more comprehensively establish, dismiss, and discuss any number of discard trend correlates', including the intentional disposal of obsolete military vessels (2008: 183).

The first of Richards' watercraft-specific discard terms, labelled *catastrophic abandonment*, *consequential abandonment* and *deliberate abandonment*, illustrate what he refers to as the 'three major classifications of [vessel] abandonment behavior' (Richards 2008: 8-10). Episodes of catastrophic abandonment generally occur in conjunction with shipwreck and are precipitated by a need to preserve the lives of those aboard a given vessel. Richards (2008: 8) provides the examples of RMS *Titanic*, HMS *Pandora* and *Sea Venture* (see also Ballard and Archbold 1995; Gesner 1991, 2000; Harris and Adams 1997). In each instance, the ship in question was abandoned as a consequence of collision or some other catastrophic event that rendered it unseaworthy. Another common factor in this form of abandonment is a perception of impending doom among the crippled vessel's crew and passengers. Whatever the catalyst, the value of the vessel and any cargo, armament and/or equipment it may have been carrying is overlooked in favour of preserving human life, and a 'bona fide' shipwreck is the result (Richards 2008: 8-9, 2011: 858).

Intentional loss of a ship carried out as a preventative measure to preserve the lives of those aboard, and forestall damage or ruin of its cargo and 'other structures' is termed consequential abandonment (Richards 2008: 9; 2011: 858). An example of this form of behaviour would comprise intentional grounding or scuttling of a vessel in shallow, protected waters rather than risk shipwreck on a deep, rocky coastline open to the elements. Richards notes that episodes of consequential abandonment were generally carried out with a clear understanding that inaction would result in substantial loss, or complete destruction, of a given ship and the lives and property associated with it. He also draws a parallel between consequential abandonment and *deliberate wrecking*, or decision-making processes that

culminate in a vessel's purposeful destruction (Richards 2008: 9; Smith 2010: 33). Although catastrophic and consequential abandonment are the result of human decision-making processes, neither is made willingly; as a result, both forms of abandonment are classified examples of *premature loss* (Richards 2008: 9; 2011: 859).

By contrast, deliberate abandonment constitutes premeditation and planning at every stage, and occurs 'without urgency...[or] genuine threat to life or cargo' (Richards 2008: 10). It also differs significantly in that human intent, decision-making, and actions determine where and how a vessel is discarded, its condition at the time of abandonment, and whether any portable material culture is disposed of within, or in some cases outside, its hull. Richards (2008: 10) identifies one exception to this paradigm, stating that an abandoned ship may occasionally befall 'catastrophe en route to its location of discard, or...[an accident] during preparations for its disposal'. Intentional abandonment relies heavily on several behavioural processes, the most important of which include the vessel owner's conscious decision to dispose of their property and subsequent actions that facilitate its transition from a systemic to archaeological context. In exceptional circumstances, discarded watercraft may be repaired, refloated, and reused until abandoned a second time and reintegrated within the archaeological record (Richards 2008: 10; 2011: 859-860).

Documentary evidence reveals that the torpedo boats discussed in this thesis became archaeological sites as a consequence of deliberate abandonment. However, archival sources are not forthcoming about causal mechanisms that resulted in these discard episodes, nor do they address specific means by which each vessel passed from a systemic to archaeological context. As a consequence, each torpedo boat abandonment site was analysed for specific 'archaeological signatures' of use and discard (see Richards 2008: 118, 145). These signatures, outlined in the following pages, are tangible representations of behaviourally influenced site

formation processes, and may be utilised to discern specific attributes of watercraft use (or reuse), modification, and disposal.

Archaeological Signatures of Watercraft Use

Richards (2008: 118) observes that the term *use* may be defined in a number of ways when employed to describe deliberate watercraft abandonment. He notes that hull design and construction, which are indicative of a vessel's intended function, may also reveal details about human agency in its selection and purchase. Similarly, alterations in technology and/or economic climate—and the reuse behaviours that accompany them—may be discerned via hull modifications or conversion. These same changes can also be indicators of a vessel's use in a functional post-abandonment capacity. Ultimately, all of the evolutionary phases in a ship's existence are critical to understanding the reason(s) for its abandonment, as well as the 'inclination of [the owner] to discard...or use [it] in post-abandonment functions' (Richards 2008: 118). Although Richards applies his explanatory model to commercial watercraft, many—if not all—of the uses he describes were also common in military contexts, and can therefore be applied to the torpedo boats addressed in this study.

A vessel's original intended function is identified as the *primary phase* of its use-life, and is characterised by two significant variations. Richards (2008: 118-120) labels these *primary mercantile* and *primary support* phases and differentiates them according to whether a given watercraft is built to fulfill either an 'intended mercantile or commerce related function' or a non-commerce support role (such as a barge or lighter). Once a ship passes from its primary function to another use, it enters a *secondary phase* comprising corresponding *secondary mercantile* and *secondary support* variations. The former describes change in a vessel's commercial role that results in modifications to its hull (i.e., conversion of a cargo ship to a

passenger ship), while the latter comprises hull alterations that transform merchant ships into support craft such as hulks or tenders (Richards 2008: 120).

Two forms of use processes common to vessels in both primary and secondary systemic contexts are *conversion* and *modification*. Both can be correlated to reuse mechanisms outlined in Schiffer's site formation model, particularly *secondary use* (Richards 2008: 120). In mercantile systems, watercraft conversion is most often influenced by economic change and carried out with the implicit purpose of enabling it to perform a task for which it is grossly inadequate or obsolescent (see Kenderdine 1994: 93). Similarly, economic and other cultural factors have resulted in the conversion of ships constructed for use in a commercial capacity to naval roles, and vice-versa (Richards 2008: 120). A particularly famous (and widespread) example of the application of civilian-to-military watercraft conversion is the Allied use of ocean liners as auxiliary cruisers and troopships during the First and Second World Wars (see Newell 1963; Harding 1997).

Modification, by contrast, implies any alteration to a vessel that results in a transition from its primary to secondary use-life. The most common examples are those made to a ship's propulsion system or its hull, and are enacted primarily to increase competitiveness and delay or prevent discard. In effect, it is a form of curate behaviour (Richards 2008: 121). Modifications to a ship's propulsion system are heavily influenced by the introduction of technological innovations, and involve replacement of one propulsion type with another. In the vast majority of cases, these changes constitute *technological augmentation* or *technological substitution*. The former describes processes by which a new or different propulsion system is added as an upgrade to a vessel's existing hull structure (i.e., addition of an auxiliary steam engine to a sailing vessel), while the latter refers to replacement of one form of motive power with another (i.e., conversion from a steam- to petrol-powered engine). However,

changes in propulsion are sometimes characterised by seemingly retrograde actions (such as replacement of an engine with sail power). These forms of modification, termed *technological reduction*, are often influenced by economic conditions—such as fuel costs—but may also be indicative of certain social factors, such as changes in trade regulations (Richards 2008: 122-123). HMVS *Nelson*, a warship in the service of Victoria's colonial navy, is an example of technological augmentation in a military context. Originally launched as a sail-powered line-of-battle ship for the British Royal Navy in 1814, it was later outfitted with auxiliary steam screw propulsion before being transferred to Victoria in 1867 (Gillett 1982: 84-85).

Hull modifications are usually manifested via changes in dimension(s) and/or structural composition (Richards 2008: 124). Examples of material alteration in watercraft include shifts from exclusively timber- or iron-hulled ships to composite-hulled variations, a change from timber-hulled to iron-hulled construction, or the opposite of any of the aforementioned. Dimensional modifications normally comprise an extension of a hull's length and breadth in an effort to increase its tonnage, although episodes of size reduction are not uncommon (Richards 2008: 124-125). Richards (2008: 127) notes that the reasons for hull modification are many and varied, and extend beyond mere carrying capacity to include environmental adaptations or a desire to increase vessel efficiency. It goes without saying that modification can have considerable utility in the context of naval warfare and tactical decision-making, as a change in hull material and/or propulsion can greatly enhance a warship's speed, manoeuvrability, armament carrying capacity, and ability to withstand enemy fire. The Confederate navy's transformation of surviving elements of the wooden-hulled U.S. Navy frigate USS *Merrimac* into the ironclad ram CSS *Virginia* during the American Civil War (1861-1865) constitutes a particularly notable example of this phenomenon (James 2004; Egan 2005: 373-376; Symonds 2006: 24-26).

In some instances, modification of a given watercraft may result in its conversion from a primary or secondary use to another function. The creation of secondary support vessels, such as hulks or tenders, has particular relevance in the application of site formation theory to the study of watercraft abandonment because the adaptive processes involved are comparable to *recycling* and *secondary use* reuse mechanisms (Richards 2008: 129-131). An example of a secondary support vessel with particular relevance to this thesis is the ship *Aladdin*, which began life as a whaler but was ultimately purchased by the Tasmanian colonial government and used as a powder hulk (State Library of Tasmania: TRE 1/1/1436-3207; see also Richards 2008: Figure 30). While serving in this capacity, *Aladdin* became the designated storehouse for torpedoes and other armament associated with the Tasmanian torpedo vessel *TB 191*.

Ships that serve in a secondary capacity that is exceptionally specialised in nature are said to fulfill *special support roles*. Like their 'regular' secondary support counterparts, these vessels may retain signatures of alteration specific to the role for which they have been adapted (Richards 2008: 132-133). Relevant examples from an Australasian military context include HMVS *Cerberus* and HMQS *Gayundab*. *Cerberus* was a breastwork monitor that served in the naval defence of Port Phillip Bay in Victoria, but was later employed as a floating explosives store and submarine tender before being decommissioned (Gillett 1982, 90-97; Cahill 1983: 15; Herd 1986: 14). *Gayundab* entered service in 1884 as one of two gunboats that defended the coastal waters of colonial Queensland, but was sold out of service in the 1920s and ended its days as a gravel barge on the Brisbane River (Gillett 1982: 37-45).

Vessels that have been discarded, but continue to operate within a systemic context, are a form of *functional post-abandonment use*. Richards (2008: 137-139) lists six common examples that apply to Australian vessels in mercantile/commercial contexts: landing stages,

wharves, artificial reefs, protective structures, reclamation devices, and breakwaters. Of these, breakwaters often comprise the most frequent usage for unwanted ships, particularly those constructed with more robust and resilient iron hulls (Stone and Loney 1983: 9; Richards 2008: 137-138). Perhaps unsurprisingly, three iron-hulled ships that served in the colonial (and later national) naval defence of Australia, HMVS *Cerberus*, HMQS *Gayundab*, and the cruiser HMCS *Protector*, were intentionally scuttled as breakwaters at the end of their respective use lives (Cahill 1983: 15; Gillett 1982: 45, 68, 97; Herd 1986: 14; *Redcliffe and Bayside Herald*, 4 June 2008; Gillett 2011: 2).

Archaeological Signatures of Watercraft Discard

Watercraft discard, like vessel use, creates unique archaeological signatures. These may be discerned through the systematic examination of ship abandonment sites, and potentially illustrate the human decision-making and behavioural processes associated with disposal activities (Richards 2008: 145-147). The most obvious signatures pertain to efforts to dismantle and destroy a given vessel's physical remnants; others, such as abandonment location and impairment of a hull's integrity to ensure its permanent placement, are more subtle, but equally significant. Among other things, these data are key to deducing the technological aspects of ship deconstruction, as well as its various geopolitical and socioeconomic catalysts (Richards 2008: 147). As with the use processes discussed earlier, Richards' discussion of discard signatures is applied primarily to commercial watercraft, but has relevance to studies of military vessel abandonment in general, and particularly to the discarded torpedo craft examined in this thesis.

In situations where an abandoned vessel's surviving structure is perceived as a hazard to navigation, it may undergo *harm minimization*, or systematic reduction to its smallest

possible size. Such behaviour is dictated by a variety of constraints that are 'technological, temporal, economic, and environmental in nature', and manifested via processes termed *structure minimization* and *hull reduction* (Richards 2008: 148). All the aforementioned are interrelated and define the strategies by which a ship is systematically dismantled. In general, the greater the minimization of a hull's structural elements, the greater the reduction of the hull in its entirety, with the final result an overall lessening in the degree of potential harm to other vessels operating near the abandonment site.

Activities integral to the structural reduction of discarded ships are *salvage* and *scrapping*. Richards' (2008: 148) definition of salvage as it applies to watercraft is essentially identical to Schiffer's use of the term in other contexts, with the only notable differences the form of the artefact(s) described (i.e., a vessel and its related machinery and equipment) and the (largely intertidal and/or submerged) environment(s) in which it is located. There is also often a direct correlation between salvage and abandonment behaviour. As Sarah Kenderdine (1994: 22) has noted in her examination of discarded riverine craft on Australia's River Murray, 'abandonment and eventual sinking implies that a vessel would have been stripped of all moveable items, and even the not so moveable but valuable boiler and engines'. Richards (2008: 148) concurs, observing that salvage and subsequent recycling of salvaged material from discarded ships was 'common practice' due to its potential economic benefits to vessel owners.

Scrapping is a significant form of salvage behaviour, and focusses primarily on the dismantling and removal of a vessel's hull fabric and other constituent material for its eventual resale in various scrap markets (Richards 2008: 148-149). In many cases, these activities target specific attributes of a ship's architecture, with particular emphasis placed on

large composite items such as engines, propeller shafts and propellers, boilers, and rudders.

As Richards notes:

The fact that the characteristic elements missing from abandonment sites center on the propulsion of a particular vessel illustrates their perception as composite objects. It also shows the easy reuse of major aspects of a vessel guides their salvage and hence facilitates their integration into the archaeological record (2008: 149).

Scrapping mechanisms may also be defined by prevailing cultural conditions. Economic factors, in particular, can have a significant influence on where, when and how scrapping activities are carried out. Michael McCarthy (1983: 1) has observed this phenomenon in relation to the intentional removal of cupreous metal fasteners and hardware from abandoned vessels, while others (see Coroneos 1998: 45) have drawn correlations between fluctuations in scrap prices and salvage of discarded iron and steel watercraft.

Processes specific to salvage behaviour have been the focus of prior scholarly inquiry within the discipline of maritime archaeology (see Gould 1989; Steinberg 2005, 2006, 2008). For example, McCarthy (2000: 157, 213) has proposed the term *primary salvage* to describe contemporary recovery of items from a shipwreck by 'owners, insurers or their agents', and *secondary salvage* to define these same actions when carried out by 'professional salvers' [sic] or members of the sport diving community. Martin Gibbs (2006: 14-18) has also addressed salvage within the context of shipwreck events, and adapted his ideas—and associated terminology—to Muckelroy's site formation model. *Crisis salvage* occurs at the outset of the wrecking process, and typically involves removal of 'survival oriented' items and personal possessions (Gibbs 2006: 12). This is followed in short order by *survivor salvage*, which comprises limited recovery of all accessible material culture by those who have survived the wrecking event.

Subsequent rescue of a vessel's surviving crew and passengers is followed by phases of *systematic salvage* and *opportunistic salvage*. Gibbs (2006: 14) notes the former is similar to McCarthy's primary salvage in that a vessel's owner(s) or their authorised representatives typically perform the task. It is a largely professional endeavour that utilises 'time, workforce and technology to undertake an intensive and sustained effort to remove all or some of the cargo, fittings, minor and major structural elements' (Gibbs 2006: 14). Opportunistic salvage, by contrast, can be manifested by anyone with adequate means and motivation. It may occur either before or after systematic salvage activities, and is based largely on 'changing perceptions of a wreck's economic, social and other values, as well as changing technological capabilities for accessing the site' (Gibbs 2006: 14).

Richards (2008: 155-162) has adapted elements of these classifications and applied them specifically to the study of discarded watercraft. He notes that his scheme differs from the others because it 'concerns a deliberately disposed of resource that is defined by its use as a material source' before it 'has become part of the archaeological record'. Three categories comprise Richards' model: the first, also termed *primary salvage*, is similar to McCarthy's and Gibbs' definition(s) in that it involves intentional hull reduction and/or removal of material from vessels by their owners and operators. However, these processes occur *before* the vessel is abandoned and while it is still afloat (and therefore still capable of being moved to its final dump site). In contrast to the other models, Richards' version of *secondary salvage* describes reuse activities undertaken by the owner and operator of a given vessel once it has entered a post-depositional context. Finally, opportunistic, unauthorized removal of cultural material from a discarded ship by individuals or groups unaffiliated with its original ownership or operation is labelled *tertiary salvage*. These activities are frequently intermittent, occur over a protracted period of time, and are comparable to Gibbs' definition

of opportunistic salvage or McCarthy's version of secondary salvage (Richards 2008: 155; Smith 2010: 36).

Those responsible for disposing of watercraft frequently perform actions to ensure that the vessels they abandon remain in place. Richards (2008: 162-163) describes these processes as *placement assurance* and notes their importance to the interpretation of ship abandonment behaviour in instances where it is 'less adequately described in historical sources'. Placement assurance strategies are generally enacted by ship owners to combat the potential for a discarded vessel to float away from its disposal site and inflict damage upon operational watercraft and/or port infrastructure (and thereby cost the ship owner money). They may be deduced via a series of archaeological signatures that are most commonly manifested in one of two forms: *appropriate hull treatment* and *appropriate abandonment environment* (Richards 2008: 164).

Hull treatment is designed to impair a ship's buoyancy by breaching the hull below the waterline. One of the most common techniques incorporates the use of explosives to loosen or rupture hull planking or plates, although other hull-breaching procedures, such as 'chiseling, hammering, drilling, or perforation by oxyacetylene equipment' have been identified from both historical and archaeological sources (Richards 2008: 166-167). A particularly noteworthy archaeological example of hull perforation in a military context is HMB *Betsey*, a British naval vessel sunk in 1781 during the siege of Yorktown via a 'scuttle-hole' intentionally cut into its starboard hull and ceiling planking (Broadwater, et al. 1985: 806-810; Broadwater 1995: 60-61). Other common forms of hull treatment include the placement of excessive amounts of heavy, disposable material—particularly stone, sand and, in some cases, hard rubbish such as engine blocks—within a vessel's hull to pin it to the substrate in which it is embedded, or driving of piles adjacent to, or through, a discarded

ship to prevent its movement (Richards 2008: 169-171). Some methods are far less common, but creative in their execution. For example, in at least one archaeologically documented case an iron pontoon was deposited atop the stern of the abandoned barque *Moe* after it floated free from its disposal site on two prior occasions (see Richards 1997: 59-60).

Vessels abandoned in shallow water or intertidal environments are often subject to natural factors that can detrimentally affect or completely negate hull treatment measures. As a consequence, the process of placement assurance often involves selection of an environment that prevents, or at least significantly inhibits, an abandoned watercraft's subsequent removal (Richards 2008: 172). Bottom composition often plays a critical role in discard site selection, with silty or muddy areas given particular preference. This is because these substrates permit a hull to settle deeply within them, thereby reducing the likelihood that it will float away (Richards 2008: 173; see also Babits and Corbin-Kjorness 1995: 3). Similar motives may also result in the abandonment of wooden-hulled vessels on rocky shores, as any subsequent damage would detrimentally affect their seaworthiness.

Another critical environmental factor in intertidal or shallow water discard site selection is *tidal height and variation*. Archaeological research (see Delgado 1981: 4; Richards 2002: 374-375) has demonstrated that episodes of historic watercraft disposal frequently occur in conjunction with high tide events. The primary motives for this behaviour are twofold. Placement of a vessel as far above the tide line as possible helps ensure that it will not float away, and also facilitates hull minimisation activities at low tide (Richards 2008: 175).

The speed at which a ship is beached as well as its orientation relative to shore once it has been grounded, also plays a role in placement assurance strategies. Research conducted by Richards (1997: 89) at the Garden Island Ships' Graveyard near Port Adelaide, South

Australia, has revealed a tendency on the part of ship owners to beach mid-sized watercraft with their bows oriented between 45- and 90-degrees relative to shore. Smaller ships, by contrast, were grounded approximately parallel to the shoreline, while large vessels were generally run ashore at perpendicular angles. Whatever their size, the majority of vessels abandoned at Garden Island were grounded at a high rate of speed in an effort to 'make the most of the space at hand, place the vessel as high up on the beach as possible, and inflict the maximum amount of damage to [its] hull' (Richards 2008: 177).

Summary

This chapter has illustrated the two scholarly approaches upon which this thesis is based: the *Annaliste* concept of the 'archaeology of the event', and cultural transformation processes of reuse, discard and abandonment. It is proposed that a combination of these conceptual frameworks provides a means by which isolated, short-term occurrences, such as the discard and abandonment of elements of Australasia's early torpedo boat defensive system, may be identified, analysed, and assessed, and then connected with broader patterns of history and cultural continuity. In subsequent chapters, the applicability of this model will be tested on relevant torpedo boat and torpedo station abandonment sites in both Australia and New Zealand.