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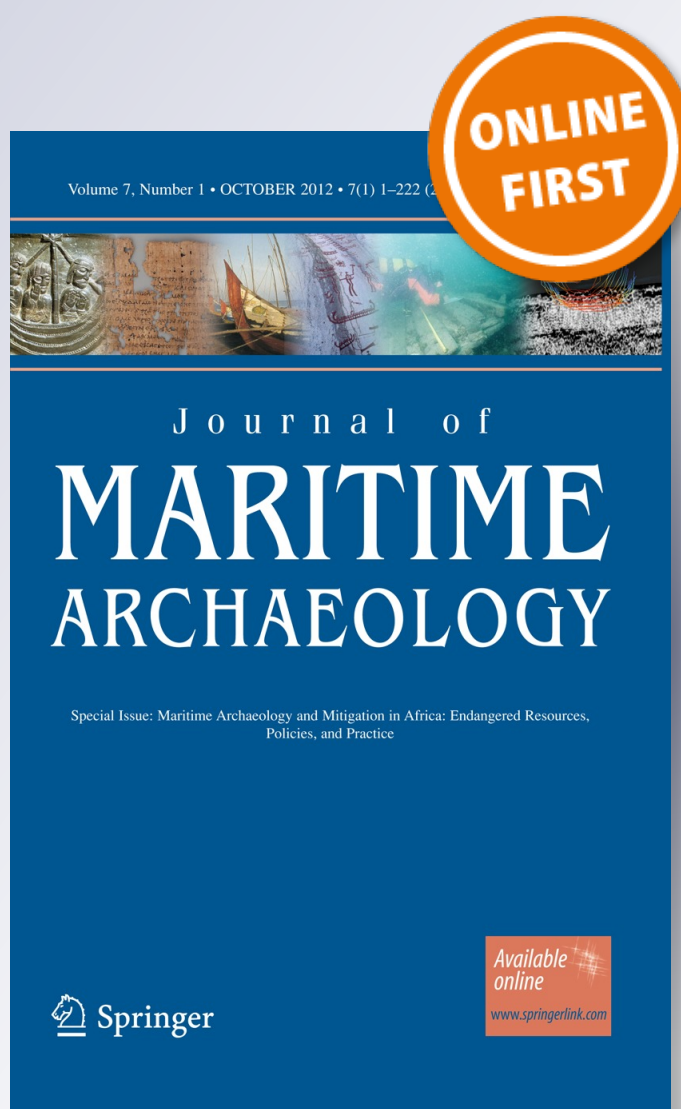
**Daryl Wesley, Jennifer F. McKinnon & Jason T. Raupp**

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# Sails Set in Stone: A Technological Analysis of Non-indigenous Watercraft Rock Art Paintings in North Western Arnhem Land

Daryl Wesley · Jennifer F. McKinnon · Jason T. Raupp

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**Abstract** In 2008 researchers from the Australian National University's Archaeology and Natural History Department and Flinders University's Program in Maritime Archaeology recorded nine non-Indigenous watercraft rock art images in a rock-shelter in the Wellington Range of north western Arnhem Land in the Northern Territory. During the project it was recognised that one of the missing elements of interpreting watercraft in rock art was a comprehensive analytical framework that can be tested and reproduced. The development of such a framework can be used by future researchers to begin addressing the larger issues and considerations represented in non-Indigenous watercraft depictions across Australia.

**Keywords** Rock art · Arnhem Land · Indigenous archaeology · Watercraft · Malarrak

## Introduction

In 2008 the Australian Research Council funded the research project entitled *Baiyini, Macassans, Balanda & Biniñj* to study the timings and nature of non-Indigenous and Indigenous culture contact through the investigation of archaeological sites in the Wellington Range and Anuru Bay region of north western Arnhem Land in the Northern Territory (NT), Australia. Sites including coastal occupation and living areas, resource extraction and processing areas, rock shelters and rock art sites and the landscape and seascape were all part of the material cultural remains available for exploring these issues. Despite a history of archaeological investigations specifically on Macassan period sites in the area (Macknight 1976; Mitchell 1994), little attention is paid to the region's contact period rock art and what it can contribute to our understanding of the interactions between these different ethnic groups. Further to this point, the rock art motifs that most commonly represent non-Indigenous aspects—watercraft—have been paid even less attention

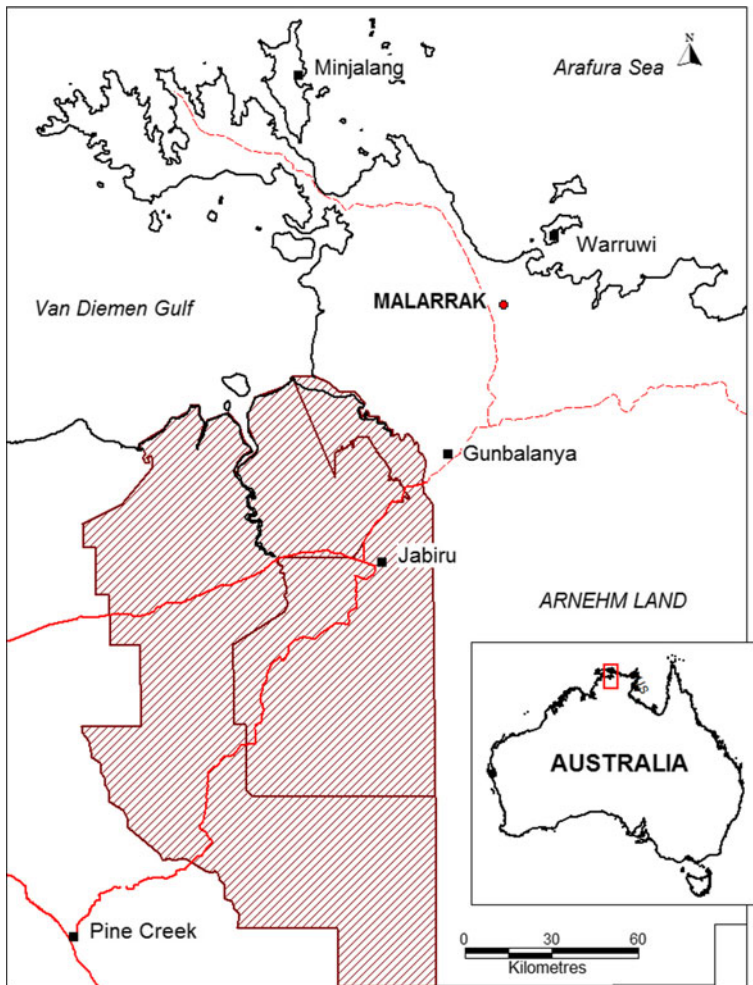
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D. Wesley  
Archaeology and Natural History, Australia National University, Acton, ACT, Australia

J. F. McKinnon (✉) · J. T. Raupp  
Department of Archaeology, Flinders University, GPO Box 2100, Adelaide, SA 5001, Australia  
e-mail: jennifer.mckinnon@flinders.edu.au

(Burningham 1994; Chaloupka 1996; Roberts 2004). An opportunity to record and study watercraft depicted in the rock art of this region presented itself in a collaborative relationship between the Australian National University's Archaeology and Natural History Department and Flinders University's Program in Maritime Archaeology.

This article presents the results of an archaeological recording project conducted in 2009 of the non-Indigenous watercraft imagery in a rock-shelter known as Malarrak. Malarrak is located 12 kilometres inland of the coast in north western Arnhem Land, on the northern side of a sandstone outlier to the north of the Wellington Range (Fig. 1) and on the traditional lands of the Manganowal Traditional Owners. Excavations at Malarrak reveal an Indigenous occupation from 36,728 to 35,156 cal BP (R32137/3) through the early twentieth century. The archaeological deposit contains remains from the exploitation of coastal shellfish species, stone artefacts, glass, pottery, beads and ochre fragments. The



**Fig. 1** Location of Malarrak rockshelter, Arnhem Land, Australia

complex of sites at Malarrak also contains over 500 paintings, including many dating to the contact period.

Although some aspects of the contact rock art imagery from Malarrak were previously published (i.e., the Macassan knife, monkey in tree and Trepan smokehouse), other imagery of the rockshelter remains undocumented (Chaloupka 1993, 1996; May et al. 2010) (Fig. 2). The rock art assemblage contains a number of Arnhem Land styles including hand stencils, large human figures, simple figures, X-ray, and complex decorative images. Indigenous motifs at the site include depictions of flying foxes, macropods, frilled neck lizard, goannas, saltwater crocodiles, barramundi (*Lates calcarifer*), forktail catfish (*Arius leptaspis*), yams, lily plants, birds, human figures (male and female) with head dresses and spears. Introduced motifs in the site include watercraft, firearms, buffalo, and a mug, as well as a range of Macassan associated imagery.

A record was made of nine non-Indigenous watercraft rock art motifs from three adjacent rock shelters. This project used standard rock art recording techniques and included both specialists in Indigenous archaeology and rock art and maritime archaeologists specialised in the knowledge of ship construction. This collaborative approach, recognized by others (May et al. 2009), provided a productive environment in which varying specialties could contribute useful knowledge and data for a more complex and fuller understanding of the material culture. During the process it was identified that one of the missing elements of interpreting depictions of watercraft in rock art was a comprehensive, systematic analytical framework that can be tested and reproduced and that is specific to the subject matter. The development of such a framework was the starting point for this research and is outlined below. This article also provides some discussion and conclusions about what images of watercraft depicted in rock art can reveal about the interaction between non-Indigenous and Indigenous groups within this region at the time of contact and beyond; the extent of Indigenous knowledge about watercraft; and potential directions for this type of research. By establishing a systematic framework for analysing water craft it is hoped that future researchers can use and develop it further to begin piecing together the larger issues and considerations represented in non-Indigenous watercraft depictions across Australia.



**Fig. 2** A major panel in Malarrak 4 illustrating the range of contact imagery

## Previous Research

An increasing interest within the study of Australian archaeology has been the documentation of Indigenous Australian interactions with colonial Australia (see Veth et al. 2008). Historical and archival records provide one story of Indigenous Australia and archaeological evidence can provide another. It is this period of history that recent archaeological studies in western Arnhem Land are investigating from the early contact with Indonesian seafarers through the early military outposts on the Coburg Peninsula to the later settlement of the NT after 1870 (May et al. 2010, 2011; Taçon et al. 2010). In contrast to the historical documents, the location of Djurlirri (another large rock art gallery located during this research), provided a rich resource of information regarding this period (Taçon et al. 2010). This gallery contains approximately 1300 rock art paintings and illustrates the range of contact Indigenous groups had with European visitors and later settlers. Amongst the paintings are images of Indonesian and European ships and boats which were radiocarbon dated “to have a minimum age of AD 1664” through to the late-nineteenth century (Taçon et al. 2010:6).

Contact period rock art in northern Australia provides a view of Indigenous perceptions and interactions with outsiders and the nature of the culture contact period from the Macassan maritime industry through the time of nineteenth and twentieth century settlement. Nevertheless, contact period motifs have only recently begun to receive the attention due by researchers (Layton 1992; Frederick 1997, 1999). The most recent work on the region's contact period rock art is that of Taçon et al. (2010) and May et al. (2010, 2011). Each of these publications relate to research conducted at sites in western Arnhem Land and represents an approach to establishing both a chronology of the contact imagery and a history of Indigenous interaction with Macassan and Europeans. These studies have raised a number of issues regarding the interpretation of introduced contact imagery, among which include the need for accurate identification of non-Indigenous watercraft. Much of the contact rock art has a specific maritime focus including watercraft, and is an important window into the interaction that Indigenous people had with Macassan fleets and settlements of the time, as well as later periods (Clarke 1994, 2000a, b; Clarke and Frederick 2008; Roberts 2004). Representations of Macassan and European style vessels were documented at sites in several Australian states including Queensland, Western Australia and New South Wales. However, in none of these areas is there such an overwhelming occurrence of them as is found in the NT. Watercraft, such as those at Djurlirri and the ones included in this study, provide a considerable amount of information about the activities and engagement of the contact and later settlement periods in this region. Recording and studying these paintings is significant for our understanding of Indigenous history and the continuity of traditional knowledge and customs in western Arnhem Land.

In general the subjects of ships and seafaring have long captured the imagination of the public, and those depicted in rock art are no exception. Images of Macassan and European vessels depicted in rock art sites around Arnhem Land and Groote Eylandt have featured prominently in popular publications (for example Barrett 1946; Cole 1980; Chaloupka 1993). And while several researchers working in the region provided some description of these types of imagery when encountered, they have generally been treated as one small part of a larger inventory of all motifs within a rock shelter. One of the earliest examples of such inclusion is Turner's (1973) inventory of the rock art of Bickerton Island which offered basic technical descriptions of watercraft, as well as interpretations provided by the island's Indigenous community. Such interpretation became common and illustrations and

descriptions of non-indigenous vessels were generally added as part of a larger discussion of the contact period (Chaloupka 1984; Chaloupka 1988; Layton 1992).

Over the past few decades several publications have emerged with a specific focus on the vessels associated with the seasonal visit to the northern coasts by Macassan voyagers (Burningham 1994; Chaloupka 1996; Burningham 2000; Clarke 2000a; Clarke and Frederick 2006, 2008, 2011). This period in the history of northern Australia is still little understood and these works have made important contributions to understanding how these trips were made possible, and shed some light on cultural interaction. Each of these present discussions of different aspects of the images, including technical and stylistic analyses, as well as interpretations of engagement between Indigenous peoples and Macassans (Burningham 1994, 2000; Chaloupka 1996; Clarke 2000a; Clarke and Frederick 2006, 2008, 2011). Roberts (2004) explores European ships depicted in the rock art of Mt Borradaile, in western Arnhem Land and presents a general inventory of all known European vessels in this area. He also attempts to identify technical and stylistic features to better understand their broader social context (Roberts 2004).

### **Watercraft as Indicators of Contact, Chronology and Significant Events: Establishing a Maritime Presence in Northern Australia**

Chippendale and Taçon (1998) suggest contact rock art imagery can assist with providing dates for the contact period sequence, and ship identification is certainly one of those avenues. However, there are several issues that need to be addressed with regards to the methodology for the identification of a ship depicted in the rock art. It is important to have an in-depth understanding of the history of maritime shipping in the NT, and the encounters between Indigenous and maritime cultures or to employ or collaborate with a maritime historian who specialises in the production of such histories. Without the original Indigenous painter to provide us first-hand details of the painting, we must demonstrate the historical connection between the ship in this region of Arnhem Land, and the method for identifying the particular ship from others that were known to operate in north Australian waters. Thus, below is a brief contextual overview of the maritime activities in the Northern Territory.

Archaeological evidence demonstrates that Indigenous Australians had an established economic relationship with marine resources in northern Australia over many thousands of years (Allen and Barton 1989; Bourke 2000; Brockwell et al. 1995; Clarke 1994; Faulkner 2006; Mitchell 1994). Shell midden deposits and rock art in Arnhem Land illustrate a detailed knowledge and intensive use of marine resources. The archaeological evidence of shellfish utilisation and fish remains also illustrates Indigenous groups knew of seasonality, abundance and distribution of such resources, and that they developed appropriate technologies to hunt, catch, and collect them. Complex traditional ecological and sacred knowledge of the sea and offshore areas also demonstrates well-established maritime traditions in Indigenous society (Morphy 1991; Berndt and Berndt 1954; Lamilami 1974). Unfortunately, other than this knowledge and the presence of archaeological sites dating to after the Holocene sea level rise, evidence for the methods of early coastal voyaging or island crossings remains elusive.

The first European records of Indigenous interaction with maritime technologies and economies in coastal NT waters comes from Captain King's (1827) account of interactions with Indigenous peoples of Goulburn Island. During a prolonged encounter with an Indigenous group on Goulburn Island, Indigenous men at one point attempted to steal

King's longboat; in retaliation his crew took possession of a dugout canoe from an abandoned Indigenous campsite (King 1827). This is one of the earliest references to dugout canoes in possession of Indigenous peoples in Arnhem Land. It has generally been assumed that dugout canoe technology and usage was introduced by the Indonesian trepang fishermen that visited Arnhem Land (Macknight 1976). Indigenous narratives and testimony have supported the likelihood that the dugout canoe was acquired from Indonesian trepang fishermen (Berndt and Berndt 1954; Thomson 1949; Warner 1937).

While the date marking the beginning of the Macassan trade with Indigenous people along the Arnhem Land coast is still debated, historians are largely focussed on a period post-1720, with significant increases in production in the 1780s (MacKnight 1976, 2008). Recent beeswax dates suggest this contact with Indonesian mariners likely began sometime in the mid-seventeenth century (Taçon et al. 2010). Records and stories show that Indigenous men participated in the trepang fishing industry and worked as crew aboard Indonesian sailing vessels (Macknight 1976; Lamilami 1974). One of the more detailed accounts of Macassan maritime material culture came from accounts given by Yolngu informants interviewed at Yirrkala (northeast Arnhem Land) in 1947 and 1949 (Berndt and Berndt 1954). A number of these informants produced detailed crayon drawings with descriptions of items that were brought with the Macassan trepang fishermen. Amongst the descriptions and notes made are details of the trepang fishing and processing equipment, as well as a variety of other items. For example, Drawing 7152, which is held at the National Museum of Australia, is labelled with the following description:

This drawing depicts in plan view a Macassan trepang processing site at Melville Bay, near Yirrkalla, north-eastern Arnhem Land. Praus are sailing in the large harbour, and various Macassan settlements are shown on the shores.

Yolngu correspondents provided 19 specific Macassan loan words for different parts of a sailing vessel, including features such as the anchor, mast, sails, rigging, rudder and cabins. The fact that these drawings and descriptions were made some 40 years after the last Macassans visited north east Arnhem Land is a significant indicator of the intricate knowledge held by the Yolngu regarding maritime material culture. MacKnight (1976:89) later records a similar experience during his fieldwork in the 1960s, stating "many older Aborigines remember the names for different parts of the prau and can point these out on a photograph."

Thus, when Europeans arrived in Arnhem Land in the nineteenth century, coastal Indigenous peoples were already accomplished mariners using dugout canoes, and a number had developed skills and a familiarity of Macassan maritime sailing technologies. This familiarity with sailing technologies continued to develop when Indigenous peoples of the Coburg Peninsula and surrounding areas interacted with the settlements at Fort Wellington and Port Essington from 1827 to 1849. Records illustrate the close interaction of Indigenous men and sailing vessels and document many going aboard sailing vessels and being employed in various maritime tasks at the settlements (MacGillivray 1852; Mulvaney and Green 1992).

Owing to the late occupation and interest in Australia's north, there was sporadic and minimal European maritime activity until the early 1800s. An early European maritime presence in Australian waters mostly consisted of Royal Navy ships that accompanied the First Fleet. The very first voyages to this region were made on relatively small cutters by Captain Flinders (1814) and Captain King (1827). The early garrisons and settlements at Fort Dundas, Fort Wellington and Port Essington were serviced and occasionally patrolled by a general class of vessel known as a *brig* or *brigantine*. These vessels were typically



sailing ships of the Napoleonic era, two- to three-masted, and usually with a single gun deck. The Royal Navy maintained a presence in NT coastal waters until the abandonment of Port Essington in the 1849; ships that sailed in NT waters include HMS *Britomart*, HMS *Tamar* and HMS *Rattlesnake* (Allen 1972; Calley 1999). There was a 30 year gap in the presence of regular modern European shipping in NT coastal waters until the development of the South Australian colonial outpost of Darwin.

Following the departure of the British colonial settlements, later buffalo shooting, trepang fishing and pearl diving industries develop around the Arnhem Land coastline after the 1870s (Powell 1982). Darwin was established in 1869 to assist with the settlement and economic development of the NT (Bauer 1964; Powell 1982). The settlement was founded in Darwin Harbour which was considered to provide a suitable harbour and anchorage—a feature largely missing from the earlier settlements. A review of contemporary newspapers reveals that major maritime shipping during the colonial period of settlement in the NT consisted mostly of commercial vessels carrying passengers and materials to and from southern ports and Darwin. A fleet of small vessels were permanently stationed in Darwin to work in local maritime commerce and shipping. Minor shipping consisted mostly of local coastal fishing, pearling in particular and supplying remote settlements around the NT coastline to pastoral stations on the Macarthur River and Victoria River. Luggers and schooners appear to be the most common ship utilised in these industries. Buffalo shooting enterprises on the Tiwi Islands, Coburg Peninsula and the Alligator River region also required supply and shipment of hides via small ships (Mulvaney 2004). The early 1900s saw the establishment of a series of Indigenous missions along the NT coastline and islands. The missions were generally serviced by a mission-owned lugger or schooner. Between 1869 and 1911, the South Australian Administration in the NT usually possessed a small steamer or vessel that would carry out government work as necessary for the NT Administrator. This included collecting customs from Indonesian fishermen; police patrols; shipwreck rescues; regular mail runs to missions and pastoral station outposts; government resident doctor inspections; surveying duties; and general colonial government business (Searcy 1907).

During this period Indigenous groups became involved in the various colonial industries and were employed to crew the luggers and schooners that were used to supply various outposts and fishing activities (Lamilami 1974). Although these industries went into decline in the early twentieth century, the establishment of mission settlements along the Arnhem Land coastline necessitated maritime shipping activity. Indigenous crew and skippers operated luggers and smaller craft to supply the settlements of the Methodist and Anglican missions. This is aptly demonstrated at the Goulburn Island mission, especially in a series of photographs taken by Axel Poignant in 1954 (NLA Collection). Mission boats and canoes continued to be used not only for transportation of people between the mainland and islands, but also for traditional hunting and fishing. Therefore, throughout the period of contact with Europeans, the relationship and development of nautical skills and knowledge of maritime technologies and European shipping continued and evolved.

## Methodology

As mentioned above, non-Indigenous watercraft comprises a significant proportion of the motifs represented in Indigenous contact and post-contact rock art. Their study can contribute to understanding the cross-cultural engagement between Indigenous and non-Indigenous visitors and settlers over time (O'Connor and Arrow 2008:400). Additionally,

studies of watercraft can highlight Indigenous knowledge of these visitors and their mode of transportation to, from and within the region. To test these assumptions this study addresses a set of watercraft motifs located in the Wellington Range at the complex of Indigenous rock shelters known as Malarrak. The watercraft depicted range from Macassan praus to sail and steam powered vessels and are presented in different rock art styles.

Though previous studies tended to be less systematic and lacked a representative sample of depictions of boats in rock art (Burningham 1994; Chaloupka 1996; Roberts 2004; O'Connor and Arrow 2008), each has made a significant contribution towards understanding such motifs. For instance, Burningham (1994) provides excellent technical analysis of shipping characteristics of Macassan prau and lugger-rigged vessels in rock art, while Roberts (2004) presents a detailed overview of the general historical implications for depictions of shipping and engagement with Indigenous peoples in Arnhem Land.

This article responds to previous works that lack a methodological framework to incorporate such a framework based on maritime technical and historical knowledge. It argues that a systematic framework for analysing non-Indigenous watercraft motifs, alongside an analysis of context, is crucial for the establishment of an ongoing research agenda in watercraft in rock art. Thus, it is a first attempt at placing non-Indigenous watercraft motifs represented in rock art into a more rigorous framework by which a set of data are tested and falsified or supported quantitatively. This framework is constructed purposefully to be inclusive of all types and features of non-Indigenous watercraft so that it can be used in the future to assess watercraft motifs from Indigenous through contact to post-contact and modern vessels. Further, this framework can be used to analyse relevant motifs across Australia and even around the world. Finally, it can be used to place previous subjective studies of cultural material where motifs are either assessed individually or compared in a non-systematic approach into a systematic framework in which all data can be compared.

To date, relatively little rock art research in Australia has included the expertise of maritime historians or maritime archaeologists. When compared to the amount of iconographic studies that were undertaken by maritime researchers around the world, this lack of collaboration appears mismatched. Maritime and nautical archaeologists have for some time been involved in iconographic studies which tend to focus on ship details, ship types, ship construction and understanding the chronology of ship construction over time—particularly when the physical evidence of ships are not available (McGrail and Anthony 1979; Pritchard 1987; Basch 1989; Mott 1990, 1994; Maarleveld 1995; Kingsley 1997; Langdon and Van de Moortel 1997; Martin 2001; Turner 2007). Thus, this paper not only presents another contribution in the growing area of contact period and post-contact period watercraft rock art through combining areas of specialization, but also increases the scope of work conducted on iconographic studies in maritime and nautical archaeology.

The recording process for this project involved standardized, detailed site recordings of individual motifs and included scaled photographs, measured drawings, Munsell colour readings, orientation, dimension measurements, technique, style, accompanying motifs, super-imposition motifs and condition assessments. The digitized images and measured drawings were then processed and analysed further in the lab. Analysing motifs is complex and includes a number of biases including cultural differences, differences in researcher's expertise and inconsistency between recorders. To minimize the amount of biases, a standardized framework for analysis was necessary. Because no systematic framework for standardizing the analysis of watercraft existed prior to this research, it was imperative to develop this methodological framework.

Thus, a classification framework for simplifying and categorizing the basic components or structural elements of watercraft was necessary for describing and quantifying Indigenous depictions of non-Indigenous watercraft in rock art. This framework was borrowed from maritime archaeologists' frameworks used to describe the technological elements of ships and shipwrecks (Gibbs 2006:6–7). In this study, five 'elements' are identified including: *major structural*, which incorporates the basic structure of the hull and large items that are permanent or integrated within the hull itself; *minor structural*, which incorporates auxiliary pieces of machinery and objects that are large and not normally removed or moveable, but that could be; *fixtures or fittings*, which incorporates the moveable, operable parts of a ship and minor fixed items; *cargo and contents*, which incorporates non-fixed objects that are not associated with ship operation and were meant to be moved or removed; and *people*, which incorporates humans in any capacity from crew to passengers (Table 1). Within each element the watercraft is further reduced to 'features' which more specifically describe the elements. These include: *hull structure*, *superstructure*, *propulsion*, *internal structure*, *mechanical items*, *rigging* and *auxiliary items*. The features are then further elaborated through a list of 'attributes' which are specific items or objects that perform a function. These elements, features and attributes are flexible in that they can be expanded or reduced. They can also be applied to and used for depictions of a range of watercraft from Indigenous to large ocean-going vessels.

The identification of elements, features and attributes is the phase that requires a great degree of expertise in maritime technologies and ship construction. Without this knowledge interpretation is haphazard and incomplete and any attempt to compare watercraft to each other or watercraft across rock art sites compounds these inadequacies. Certainly if a maritime historian, maritime archaeologist, or ship construction specialist is available for corroboration, the results are more nuanced and accurate.

During the analysis of the Malarrak watercraft motifs, the above framework was utilised to identify the presence and absence of technological elements and features represented. A table was compiled that calculated the number of elements and features, and graphs were produced illustrating the relationship between these categories. Where the researchers were uncertain as to the identification or function of a specific feature or attribute a question mark was placed next to the identification; however, these were still included in the total numbers (Table 2).

## Results

In total, nine watercraft were recorded and analysed (see Table 3). The watercraft were identified as to specific types (i.e., schooner, sloop, prau) and ethnic affiliation (i.e., European, Macassan) utilising basic information about ship design, construction and historical narrative. The watercraft motifs were also analysed and interpreted with regard to stylistic attributes.

The survey and analysis revealed a range of vessel types and complexity of detail and style. Though in some cases the images were affected by erosion and water damage, enough of the motif remained to allow the identification of vessel type. Of the nine watercraft depicted, one represents a Macassan prau (W8) (Fig. 3) and likely dates from at least 1650 to the early twentieth century. The remainder of depictions represents European style vessel types, possibly dating from the early nineteenth to the early twentieth centuries. These watercraft include four single-masted sailing vessels (such as cutters or sloops)

**Table 1** Framework outlining distinctive technological elements, features and attributes of watercraft

Elements	Features Attributes
Major structural	<i>Hull structure</i> Hull planking, frames
Minor structural	<i>Superstructure</i> Cabins, wheelhouse <i>Propulsion</i> Engine Boiler, funnel, smoke stack Rudder Anchors, anchor chain Masts <i>Internal structure</i> Decks Bulkheads <i>Mechanical items</i> Auxiliary engines, boilers Winches, windlasses, capstans Pumps
Fixtures or fittings	<i>Rigging</i> Sails Shrouds, forestays, backstays Spars, bowsprits, booms, yards, derricks Halyards, sheets, braces, guys, crosstrees <i>Auxiliary items</i> Tanks Ventilator Steering assembly, steering oars, oars, paddles Davits Portholes, hawse holes Cannons, gun ports Antennas Flags, flag pole Name plates, load numbers
Cargo and contents	Ballast Cargo Ship's boats
People	Crew Passengers

**Table 2** Presence of maritime elements, features and attributes in ship motifs at Malarrak

Elements	Features Attributes	Watercraft 1	Watercraft 2	Watercraft 3	Watercraft 4	Watercraft 5	Watercraft 6	Watercraft 7	Watercraft 8	Watercraft 9
Major structural	<i>Hull structure</i>	x	x	x	x	x	x	x	x	x
	Hull planking, frames									
Minor structural	<i>Superstructure</i>									
	Cabins, wheelhouse			x	x				x	
	<i>Propulsion</i>									
	Engine			x						
	Boiler, funnel, smoke stack			x						
	Rudder			x					x	
	Anchors, anchor chain								x	
	Masts		x				x	x		x
	<i>Internal structure</i>									
	Decks									
	Bulkheads	x							x	
	<i>Mechanical items</i>									
	Auxiliary engines, boilers									
	Winches, windlasses, capstans				x					
	Pumps									
Fixtures or fittings	<i>Rigging</i>									
	Sails	x	x		x		x	x	x	x

Table 2 continued

Elements	Features Attributes	1	2	3	4	5	6	7	8	9
Cargo and contents	Shrouds, forestays, backstays	x	x	x	x	x	x	x	x	x
	Spars, bowsprits, booms, yards, derricks		x	x	x	x				
	Halyards, sheets, braces, guys, crosstrees									
	<i>Auxiliary items</i>									
	Tanks									
	Ventilator					x				
	Steering assembly, steering oars, oars, paddles		x							
	Davits									
	Portholes, hawse holes									
	Cannons, gun ports									
People	Antennas									
	Flags, flag pole							x	x	
	Name plates, load numbers						x			
Cargo and contents	Ballast									
	Cargo			x						
	Ship's boats			x						
People	Crew									x
	Passengers									

**Table 3** Maritime vessel motifs recorded at Malarrak

Motif number	Technique and style	Colour	Max dimensions (cm)	Motif description	Interpretation
1	Applied pigment; X-ray; some red outline and line; white outline with some white solid infill	Polychromatic; White/cream: 5YR8/4 Pink: 5YR8/3	36 × 56.5	Single-masted sailing vessel; jib sail; fore & aft mainsail; mast with rounded bulb stepped into keel at midships	Possible Sloop; an earlier motif located in the forward section of the vessel; red lines interpreted as stays, but could be associated with another motif or later outlining of features eroded by water
2	Applied pigment; X-ray; white outline some solid infill	Monochromatic; White/cream: 5YR8/4	41 × 21	Sailed vessel; possibly single-masted with two sails; mast stepped into keel with rounded top; stay connecting mainsail to stern	Possible sloop; heavily eroded; similar in appearance to Watercraft 1; no associated motifs close to the vessel
3	Applied pigment; X-ray; outline and some solid infill	Monochromatic White: 2.5YR8/0	92 × 41	Steam vessel with smoke stack with four sets of double stays; smoke billowing from stack; stack connected to keel; smoke stack stays and supporting rod; rectangular shaped hull; rudder and steering assembly on deck; five box like structures within aft hull; small bowsprit; small ships boat in tow?; unidentifiable feature within forward bow section	Steam vessel under way with smoke; possibly linked to OTL Young Australian; possible forward cabin/deck cargo and an aft wheelhouse; box structures possibly cargo or engine/boiler; appears to be a transom stern
4	Applied pigment; Outline with solid infill; Complex decorative;	Polychromatic; red outline with white line and solid infill Pink: 5YR8/4 White: 2.5YR8/0 Red: 7.5YR3/6 Yellow: 10YR7/6	143 × 127	Sailing vessel; double-masted; three sails and possibly a fourth visible; jib, foresail, mainsail, possible second jib; only one mast visible due to erosion through centre of motif; hull eroded; partial bow and partial transom stern; two rigging lines on jib, one connecting to bowsprit; bowsprit; forward capstan; rudder/steering oar below aft sails; boom on mainsail	Fore and aft rigged sailing vessel; possible schooner, ketch, or lugger; possible rigging lines connected to aft rudder; accompanying motifs: Martini-Henry rifle, buffalo, and kangaroo; other accompanying motifs using same technique (i.e. Martini-Henry rifle)

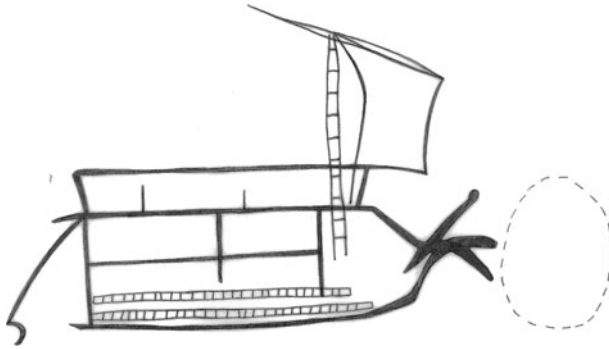
Table 3 continued

Motif number	Technique and style	Colour	Max dimensions (cm)	Motif description	Interpretation
5	Applied pigment; X-ray; outline with some solid infill	Monochromatic White: 2.5YR8/0	137 × 80	Steam vessel; two masts stepped into keel; smoke stack; aft mast: fore and aft stay topside; fore mast: fore and aft stay topside; structures on deck; two funnels either side of smoke stack; capstan; elevated bow; bowsprit; two human figures painted within the vessel, both hands on hip, one with top hat, and large phallus	Steam vessel; possible porthole or window in stern of the vessel; hull appears to be divided into compartments; human figures possibly added at later date to the vessel; Watercraft 6 located under the vessel; associated motifs: smoking pipes, buffalo
6	Applied pigment; outline with some solid infill	Monochromatic Pink: 5YR8/3	30 × 28	Sailing vessel; single-masted; two stays aft connecting to deck; one forward, top of mast to bow; small line off that stay to deck; round top on mast; bulkheads that create fore and aft with rectangle in centre; one end solid infill	Possibly cutter or sloop; difficult to determine bow from stern; coarse execution of the painting; possible flag off top of mast
7	Applied pigment; outline with some partial solid infill	Monochromatic Pink: 5YR8/3	40 × 47	Sailing vessel; single-masted; fore and aft rig; bowsprit; foresail—unidentifiable markings inside of foresail; mainsail—partial infill with three lines; forward section of hull partial infill; line dividing bow and amidships; possible bulkhead and stanchion; partial line dividing stern and hull; line off end of stern	Possibly cutter or sloop
8	Applied pigment; X-ray; outline with some partial solid infill	Polychromatic: White: 7.5YR8/2 Yellow: 2.5Y8/6	100.5 × 76	High curved bow, flat-keeled vessel; tripod mast forward; steering rudder; bowsprit; internal components of ship depicted; bow; partially eroded at stern	Macassan prau; likely to be at anchor; yellow pigment is a later addition to outline the prau and add a sail; yellow pigment could depict 'rat lines'; indicative of a combination of time periods; possible boxes or materials on deck indicating some sort of superstructure; also may indicate vessel was at anchor and used as a living space; pole on the bow for flying a flag

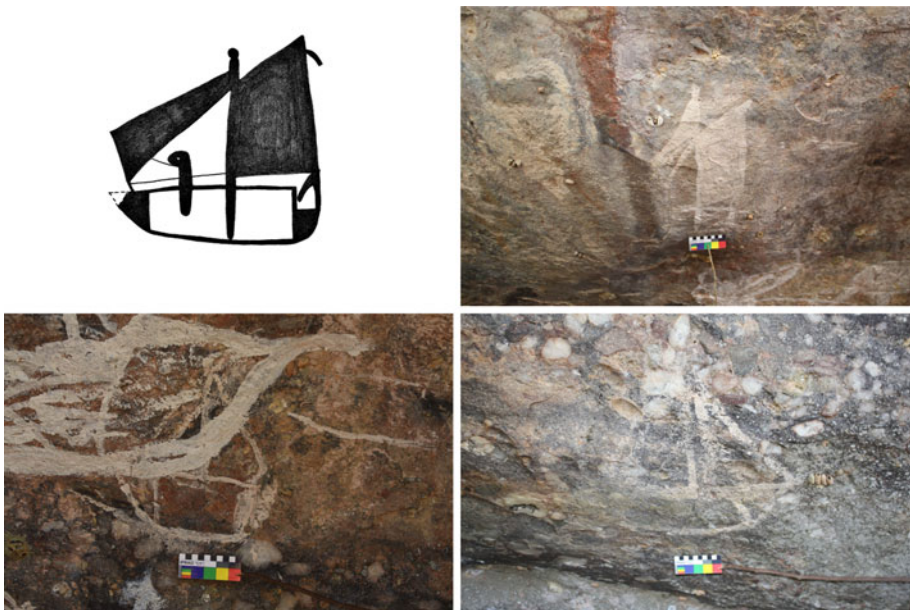


**Table 3** continued

Motif number	Technique and style	Colour	Max dimensions (cm)	Motif description	Interpretation
9	Applied pigment; outline with some partial solid infill	Monochromatic Yellow: 2.5Y8/6	38 × 31	Partially preserved sailing vessel; two masts (fore and aft) and bowsprit, jib and foresail; stay connecting foremast to end of bowsprit; aft section of boat eroded; sail on forward mast top quarter solid infill; solid infill of bow section	Schooner, lugger, or ketch



**Fig. 3** Watercraft 8 is an example of a Macassan prau

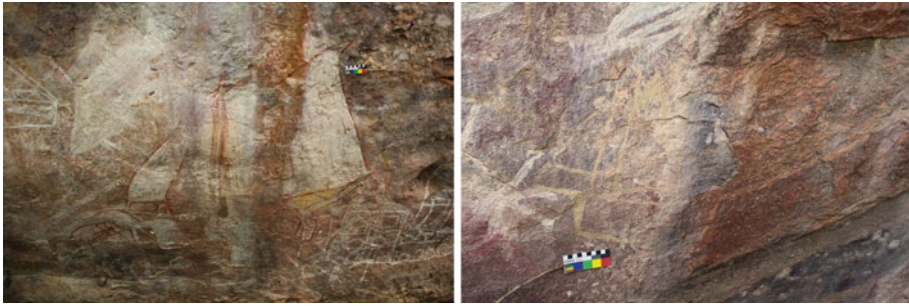


**Fig. 4** Watercraft 1 (*top left*) is a possible sloop; watercraft 2 (*top right*) is a possible sloop; watercraft 6 (*bottom left*) is a possible cutter or sloop; watercraft 7 (*bottom right*) is a possible cutter or sloop

(W1, 2, 6, 7) (Fig. 4), two double-masted sailing vessels (such as luggers, schooners or ketches) (W4, 9) (Fig. 5) and two steam-powered vessels (W3, 5) (Fig. 6).

### Technological

Table 3 demonstrates the specific technological elements, features and attributes of watercraft that may be present or absent in rock art representations. It includes five elements, seven features and thirty attributes; these are hierarchical in that elements are broader, more general categories while attributes are more specific details of watercraft



**Fig. 5** Watercraft 4 (left) and 9 (right) are double-masted vessels and probably represent a schooner, ketch or lugger

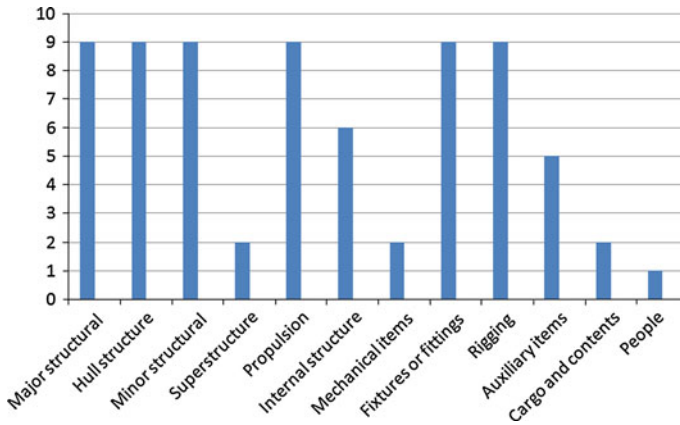


**Fig. 6** Watercraft 3 (left) and 5 (right) are steam-powered vessels

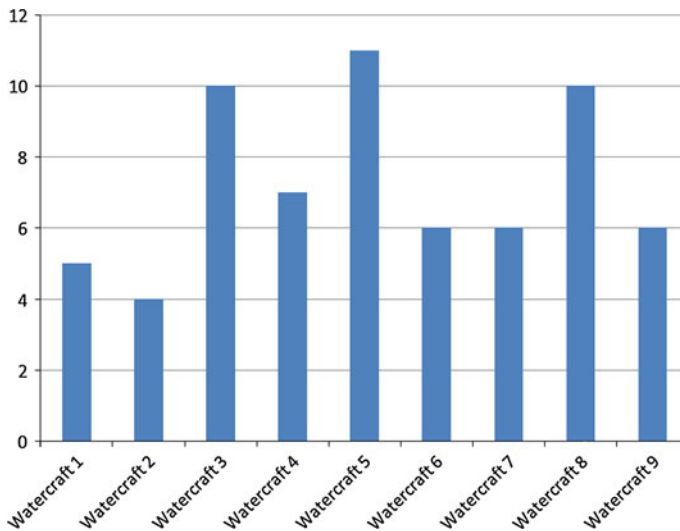
construction often linked to a type of vessel (i.e., sailing vessel such as schooner, ketch, etc. or steam vessel).

All of the watercraft demonstrate three of the five elements (*major structural*, *minor structural* and *fixtures or fittings*) while only two vessels depict the element *cargo and contents* (W3, 5) and only one vessel depicts *people* (W5) (see Fig. 7). This range might indicate that the three elements depicted in all of the watercraft are significant enough to be repeated time after time in watercraft motifs. When looking at the next categorical level of features it becomes even more obvious what features are important to depicting watercraft. Within this level, all nine of the watercraft depict three features—*hull structure*, *propulsion* and *rigging*—each under separate elements. These three features may indicate a basic combination of characteristics needed in the production of a watercraft motif; an idea which will be elaborated in the discussion.

Interestingly, over half of the water craft depict both *internal structure* (W1, 5, 6, 7, 8, 9) and *auxiliary items* (W3, 5, 6, 7, 8). Within *internal structure* all six include bulkheads or internal compartments as attributes and within *auxiliary items* the attributes are more varied including possible flag poles or flags, steering attributes and a ventilator. Figure 8 illustrates the number of technological attributes present on each watercraft motif. The maximum number of attributes present on a motif is 11 (W5) out of a total of 30, with the least number present being four (W2).



**Fig. 7** Distribution of elements and features

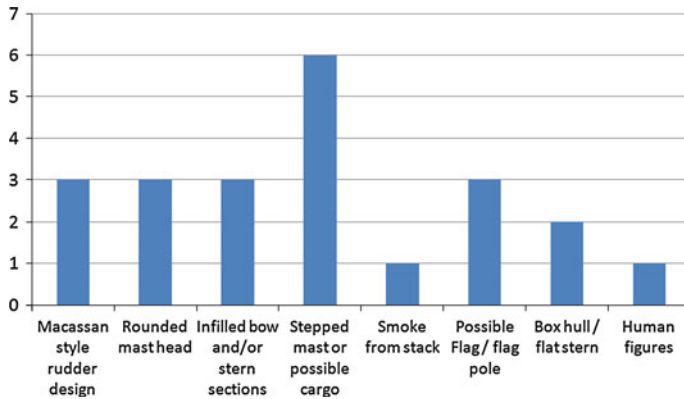


**Fig. 8** Presence of maritime attributes identified on each watercraft motif

## Style

Two main styles of rock art are represented in the non-Indigenous watercraft at Malarrak: X-ray and complex decorative. Chaloupka (1993) describes X-ray as a style of rock art in which the internal skeleton and organs of humans and animals are depicted. Complex decorative can be defined as 'line and outline' designs with infill elements and commonly consists of anthropomorphic and zoomorphic figures. This complex decorative manner is applied to the contact imagery owing to the presence of infill and outline design.

Table 2 describes the manner of the painting, pigment colours, details of each motif, and a basic interpretation. Of the nine watercraft depicted, eight are painted in the X-ray style (W1, 2, 3, 5, 6, 7, 8, 9) and one in complex decorative (W4). The X-ray style appears to have been chosen as a way to illustrate features that exist within the hulls or in



**Fig. 9** Distribution of artistic maritime elements

superstructure areas on the decks and may be associated with vessel operations or activities that occurred on-board (Fig. 9). These features include structural elements such as masts stepped into keels, steering mechanisms extending through the stern or elements of rigging (W1, 2, 3, 5, 8); below deck compartments or cargoes and/or possible engines (W3, 5, 6, 7, 8, 9); and human figures (W5). The single motif that falls into the complex decorative category depicts a two-masted sailing vessel outlined in red and completely infilled with white clay, possibly at a later time.

Other notable stylistic features relate to specific attributes of the particular vessels being depicted, to the visible by-products of machinery in use, to a combination of attributes of different vessel types being included in one watercraft motif. Examples of this first category include rounded mast heads depicted on some of the single-masted, European style sailing vessels (W1, 2, 6) and a box-shaped hull and/or flat stern on European style vessels (W2). An interpretation of by-products of machinery in use can be seen in the addition of smoke billowing from the stack of an apparent steam-powered vessel (W3). The other area noted for artistic interpretation pertains to vestigial features and elements of earlier types of vessels being included in depictions of later vessel types—a sort of hybridization process. Examples of this include Macassan-style flag poles and rudders being included in depictions of European style vessels (W1, 3, 4, 6). Another example is the presence of a possible Macassan-style lowered stern platform depicted on a European-style vessel (W1). The idea of a hybridization process raises an important concern in that some vessels were refitted or altered over time. For example, a sailed vessel may have been converted to steam or vice versa. Thus one must be careful when interpreting watercraft imagery to account for these changes or Indigenous knowledge of these changes.

## Discussion

The process of Indigenous artists depicting watercraft in rock art is complex. Unlike a photograph, the artist makes a series of decisions on what information about the vessel is added and left out of the painting. Although we cannot interview the original artist, we can begin to investigate elements of the Indigenous engagement with maritime endeavours and the painting process by examining the presence and absence of elements and features that were included in the watercraft motif. Like all archaeological remains, there is a

transformation process that occurs when, in this case, the concept of the watercraft, is transferred to a rock art image (Schiffer 1987). In this sense we are dealing with behavioural archaeology where a series of choices are made by an individual that contribute to the final archaeological object (Skibo and Schiffer 2008). In order for the final object or artefact to exist, there must be a series of activities, interactions and choices which range from the technical to the performance that are involved in its creation (Skibo and Schiffer 2008). Many of these elements are present in the depiction of maritime rock art; thus it is necessary to create an analytical framework specific to the object or artefact to extract this data.

This article set out to identify and describe in a systematic manner the non-Indigenous depictions of watercraft in the Malarrak shelter in Arnhem Land. It sought to establish an analytical framework and methodology that could be used to extract information about choices, activities, interactions and knowledge on the subject matter. It was hoped this framework could be used in the future to compare the range of watercraft motif types in the Wellington Range with the range of motif types at other sites in the region and across Australia.

### Indigenous Experience and Knowledge of Non-Indigenous Watercraft

Indigenous artists were shown to be adept at depicting various elements of animal morphology, especially in X-ray rock art (Chaloupka 1993). Chaloupka (1993) discusses the Indigenous artist as ecologist and scientific observer. The precise execution of the animal allows the observer to identify not only the generic type of animal, i.e., a fish, but also the specific species, i.e., barramundi (*Lates calcarifer*). It is this principle that was applied to this study of depictions of maritime craft at Malarrak. According to Palmer and Neaverson (1998) archaeologists who study the products of the industrial age (i.e., ships) need to understand the characteristics of the artefacts within the context of the site, region and time. The same principles need to be applied when we are investigating the crossover from the industrialised to the Indigenous. As suggested by Palmer and Neaverson (1998:4) this approach was developed in an attempt to extract the maximum information from material remains by making observations within a 'framework of inference'.

Roberts (2004) has previously linked the depiction of maritime vessels in rock art to Indigenous social history. In this study, the results indicate the Indigenous artist has developed a high level of knowledge regarding the new maritime technologies being introduced to coastal Arnhem Land. The presence of a large number of recognisable elements, features and attributes in the ship motifs is an indicator of the interaction between artists and the watercraft. This was previously identified by Burningham (1994:14);

It seems very likely that the artist who drew these luggers was intimately familiar with the labour that the fore-guy represented. This seems to be a significant characteristic of the northern Australian Aboriginal nautical artists: their art was not developed in a school of 'pier-head artist', rather they were skilled mariners recording aspects of foreign maritime traditions.

Returning to the technological framework, of all the watercraft analysed, each includes the elements: *major structural*, *minor structural* and *fixtures or fittings* and the features: *hull structure*, *propulsion* and *rigging*. As noted above, it is these three elements and features which may comprise the combination of characteristics needed in the production and identification of watercraft imagery. The argument can certainly be made that *ahull*

*structure* (such as that of a simple outline of an Indigenous canoe) could indicate a watercraft quite clearly; however it does not provide the necessary detail to communicate or move up the ladder of inference to make assumptions about the type of watercraft that the features *propulsion* and *rigging* can detail. To complicate matters it is quite possible for an artist to draw a simple hull which to them might not represent an Indigenous canoe but rather represents a non-Indigenous boat or ship in its basic form or even represents, in the artist's mind, a full rigged ship. This makes interpreting watercraft motifs with regards to type more difficult. Thus, it is difficult for any conclusions to be drawn about a watercraft motif with regards to type, time period or ethnic affiliation if less than two elements or features are represented. This observation then provides a baseline for future research projects and sets a standard for identification which can be reproduced and tested. It also acts as a foundation for which further information about Indigenous knowledge of maritime traditions and watercraft can be sought.

### Historical Narrative in Rock Art

The historical overview presented earlier defines certain periods of possible engagement between Indigenous peoples of Arnhem Land and the Macassan trepang fishermen and Europeans. There appears to be three distinct periods of maritime history: a Macassan trepang fishing period (circa 1720–1906), the early British exploration and settlement (1805–1849) and the later period of colonial settlement post-1870. Each of these periods and cultural groups were accompanied by a specific set of maritime technologies and watercraft types. The Macassan maritime technology remains virtually unchanged over a 200 year period, whereas European maritime technologies change significantly during the nineteenth century, particularly with regards to changes in propulsion from sail to steam. The element and structural analysis presented in this study demonstrates the Indigenous artists' ability to clearly distinguish between maritime technologies. While some of the motifs were interpreted as having included elements from two periods or ethnic watercraft types, this does not indicate a confusion or lack of knowledge on the part of the artist to depict accurate images. It may in fact allude to the artists understanding of the evolution of technologies and types and could represent either a demonstration of this or even a retouch episode.

Roberts (2004:41) lists many recorded instances of Indigenous men participating in the Macassan and European maritime industries. There are numerous references of Indigenous men participating on-board ships as sailors with British shipping at Port Essington. The evidence certainly indicates that Indigenous people had a deep knowledge of a variety of Macassan and European maritime sailing techniques and technology. It is expected that those who sailed and participated in the maritime activities could reproduce a high number of watercraft characteristics whereas those with ephemeral interaction would have a more limited knowledge and thus produce limited elements and features. Therefore a hypothesis can be put forward that Indigenous painters with greater maritime experience were able to reproduce a higher number of ship elements, and vice versa. Through the application of the above analytical framework, this hypothesis could be tested in a regional study of watercraft in rock art. For example, more inland rock shelters where access to the sea was restricted by virtue of geography may include watercraft with fewer elements, features and attributes.

Observations concerning the type of contact, interaction and knowledge specific to watercraft diversity and time periods could also be deduced through a regional analytical approach. In comparison with published depictions of boats across Arnhem Land in areas

such as Mt Borradaile, Red Lily Lagoon, and Nourlangie Rock, the Wellington Range certainly contains the greatest diversity and abundance of watercraft motifs (Roberts 2004; Chaloupka 1993; 1996; Taçon et al. 2010). Though Roberts (2004) states that the maritime rock art of Mt Borradaile is related specifically to the modern period of settlement of the NT, post-1870 into the early twentieth century, maritime motifs found elsewhere at Red Lily Lagoon and Nourlangie Rock also appear to be related to that period as well. However, in the Wellington Range, paintings of watercraft span a much longer time period, from the mid-seventeenth century (Taçon et al. 2011) and also contain a higher diversity of motif types and maritime technological elements. This difference may indicate that the Indigenous occupants of the Wellington Range had greater and more sustained access to shipping during the nineteenth century and certainly during the early contact periods of the mid-seventeenth century.

### Continuity of Rock Art Traditions or Watercraft Attribution?

Through the technological analysis of the watercraft motifs it was determined that six of the nine images included bulkheads or partitions. Bulkheads are wooden or metal lateral dividing walls that separate areas of a ship and may even be watertight. Typically bulkheads separate the cargo area from living spaces or other storage areas such as powder magazines. It was assumed that the inclusion of bulkheads in the X-ray style represented an artist's knowledge of the inner workings of the watercraft. Thus, the notion that a vessel is not a homogenous floating container, but rather a container that has compartments and perhaps differing functions for those compartments is certainly one that could be argued in terms of Indigenous knowledge of watercraft. After contextualizing these motifs with the larger rock art traditions and styles a quandary was presented in that perhaps these were not bulkheads but rather an extension of the tradition of compartmentalizing objects depicted in rock art. In investigating Late Holocene rock art motifs from the Wellington Range, a painting convention is clearly repeated across a range of subject matter; motifs of people and animals have limbs, heads, and tails segmented from the body. It appears that this painting convention continues to be applied to contact imagery with the fore and aft of the ship being segmented from the body or hull of the ship. This might demonstrate a transference of understanding about the Indigenous universe to the new technologies that appear during the contact period and should be read and interpreted with care.

### Conclusion

This study has demonstrated that a comprehensive methodological and analytical framework is necessary for a full understanding of Indigenous depictions of non-Indigenous watercraft in rock art. A technological framework provides a foundation for the identification of watercraft motifs and their composite elements, features and attributes. On the basis of archaeological typologies, generally there must be a minimum number of features present to be able to assign a type to an object—a basic number of one element was identified as necessary for researchers to conclude that an image is in fact a watercraft, but two or more elements or features are necessary to make any conclusions about watercraft type, time period and ethnic affiliation. Further, such a framework is necessary to move into a more interpretive discussion about Indigenous interaction with watercraft and knowledge of maritime traditions. As demonstrated, the importance of sampling a specific part of the archaeological record and analysing it within the context of the greater



archaeological fabric of the site, region and history is important. Information related to specific Indigenous histories or continuity in stylistic traditions are only revealed in this manner.

The methodological and analytical framework presented in this paper is both reproducible and testable and may reveal data about the more complex nature of Indigenous contact and interaction within the coastal regions and with non-Indigenous watercraft. It can be expanded or reduced, however it provides a baseline for identifying motifs as watercraft in the first instance, and secondly can be used in quantifying the level of detail and possibly even knowledge of watercraft by the artist. By utilising such a framework, a more nuanced description and interpretation of the representations is achieved.

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