

Aboriginal watercraft depictions in Western Australia



Rock painting of a canoe from the Kimberley (Photo: Marco Del Grande, appearing in Leech 1998)

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Acknowledgements and Notes:

I firstly would like to thank the Western Australian Maritime Museum for allowing me to conduct this research as well as to have the chance for doing this internship. I would like to acknowledge for his tremendous, inspirational assistance Dr Michael McCarthy (Curator at the Western Australian Maritime Museum). In the wake of 'Strangers on the Shore', he conceived and designed this research program, and asked the author to undertake it as part of a two month internship undertaken during May-June 2006 with the Maritime Archaeology Department at the Western Australian Maritime Museum.

I also would like to thank for their advice, help and various involvement in the conduction of this research Dr Alistair Paterson, Robert Bednarik, David Nutley, Professor Kenneth Mulvaney, Ron (Doc) Reynolds, Wendy Van Duivenvoorde, Dr Ian McLeod, Carmela Corvaia and Jon Carpenter.

The author asks the reader to bear with him in his expressions and use of English. His parent language is French and his two second languages are Spanish and English. Though the work has been edited to conform, a decision was made by his supervisor to keep the usage and senses as close as possible to the original. The author thanks him for that and hope the reader will accept and understand his decision.

For matters of conventions, the dates will be labeled B.C. (Before Christ) or BP (Before Present) after the figure for more clarity and common sense. Since the study area is located in Australia, a lot of place names are likely to hold both Aboriginal and Western names. When known and available both will be given. Also, it should be noted that in the catalogue, the sites area presented in an alphabetic order.

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Introduction:

In his work entitled *Principles of Geology* (1832), Charles Lyell concluded that:

‘It is probable that a greater number of monuments of the skill and industry of man will in the course of ages be collected together in the bed of the oceans, than will exist at any one time on the surface of the continents’

The present report concentrates on Aboriginal depictions of watercraft located in Western Australia. The term “depiction” encompasses all type of graphical representations created by Aboriginal people. Consequently, this definition can take into account rock paintings, rock engravings, sand drawings, or European-style paintings. Western Australia unlike Northern Territory have a relatively small number of such depictions. Chronologically, it is agreed that the first human beings arrived in Australia at least 40,000 years ago. Additionally, the well known phenomenon of sea level rise which covered substantial parcels of land commenced only around 14,000 years ago. Thus, it seems viable to suppose that archaeological signatures of human occupation from the period between 40,000 and 14,000 years ago might currently be submerged, and could in some cases predate most of Aboriginal sites on land. Obviously, this hypothesis is applicable to rock art in general and potentially to watercraft depictions in particular.

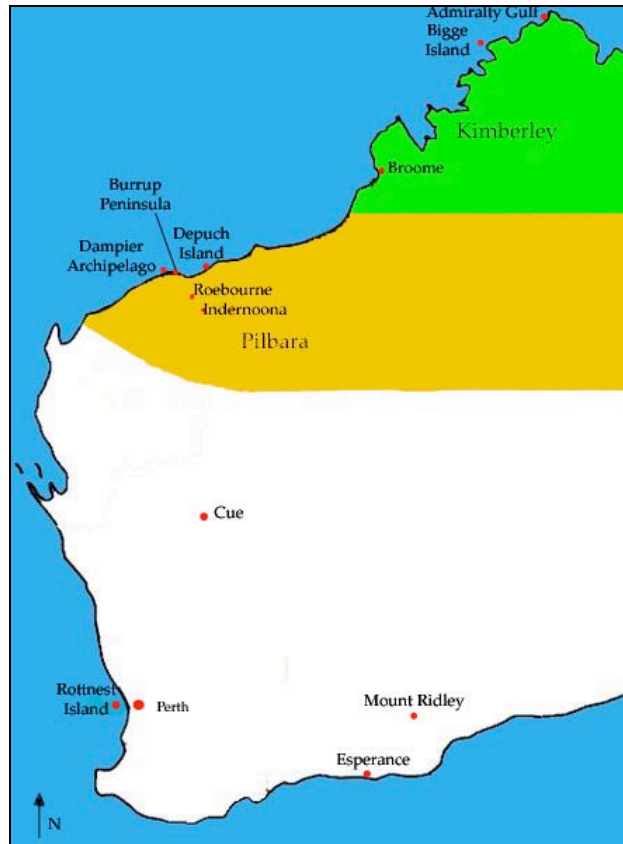
The purpose of this study is also to progress on from Silvester’s (1998) and Dortch’s (2002) studies with the idea to assemble Aboriginal recorded and tangible perspectives on the maritime history of Western Australia. Later the potential of such a study might be extended to the whole Australia and maybe more appropriately in the Northern Territory where Aboriginal depictions of watercrafts mainly as rock art (paintings and engravings) are the most abundant and diverse. This small contribution to the realm of submerged indigenous sites in Australia, also tend to emphasize the growing interest in sites possibly holding the greater capability to provide new insight about the earlier settlement of Australia.

This research program — conceived and supervised by Dr M. McCarthy of the Department of Maritime Archaeology at the WA Museum, is similar in style to the successful *Strangers on the Shore* analysis of the interaction of shipwrecked people with the indigenous inhabitants (McCarthy and Sylvester, 2000) — will produce various outcomes. The first goal apart from producing this report is to yield a hard copy working catalogue with the information associated included within it. Promulgation as a Departmental reporting next, the report will be followed by articles in scientific journals such as the *Bulletin of the Australasian Institute for Maritime Archaeology*. Electronic copies will be made available and a website will follow.

As a result, this study will intend first to catalogue the entire set of rock art images known and present in Western Australia being divided between rock paintings, rock engravings and other supports. Then the focus will be on predicatively modeling the survival potential of submerged rock art in Western Australia by looking at deterioration impact factors. Thirdly, Depuch Island

(Pilbara, WA) will be the center of a case study about its potential to discover submerged rock art.

Finally, it is necessary not to mention the exact locations of the paintings and engravings, until the present argument between Graeme Walsh and Ian Wilson in respect to the potentially endangered 'Bradshaw art' is resolved. (Wilson, 2006)



Map of Western Australia with some of the locations mentioned in this report.

1. Western Australian Aboriginal Watercraft Depictions Catalogue

1.1 Introduction on Aboriginal Depictions

The state of Western Australia has two of the major areas where rock art depictions are found in Australia, the Pilbara and the Kimberley. Throughout those two regions, rock paintings and rock carvings are visible and represent a part of the exceptional wealth in Aboriginal rock art of Australia.

As pictorially represented vision of ancestors, events, encounters and nature, all types of rock art have been and still are a mean of communication and a record of memories for Aboriginal communities. The western research developed to understand their nature, technique and antiquity have been able to identify a wide array of styles (presently described as X-ray, Mimi, Bradshaw, etc.) and locations.

In a commonly accepted convention, the rock art have been categorized in two main groups separated into additive (paintings) and extractive (engravings) technique. Paintings can be found in shelters ranging “from enclosed spaces with deep domed roofs to nearly vertical faces with minimal protection from an overhang” (Rosenfeld 1985:9). Even if engravings can appear in this kind of environment, they are more likely to be seen in open areas, such as horizontal natural rocks, cliffs and the blocks resulting from their entity (Rosenfeld 1985).

Technically, paintings use minerals pigments from various sources such as hematite, ochre, and various color type of clays, mixed with water (or occasionally dry) and applied directly onto the rock surface. This mixture was applied according several manners using fingers, stick, bark fibres as brush or pandanus leaves (Brandl 1973), or being blown from the mouth. Due to the nature and the interaction of the elements under consideration for rock paintings, the question of their survival potential relies largely on the depth of penetration of paints which depends onto the “rock porosity and humidity, the viscosity of the paint and the size and shape of the pigment grains” (Rosenfeld 1985:10).

For the engravings, the depiction emerges by emphasizing the dissimilarities and contrast in term of depth, grain, and colour. It can be carried out by altering the surface of the patina to create a visual difference but not real textural distinctions. But the large majority of engravings are the product of a substantial carving of the rock, “by battering or pounding, by chiseling or gouging out closely adjacent pits or by abrasion” (Rosenfeld 1985:11). The identification can be problematic due to the weathering process applying the same colour throughout the rock surface, making the detection of rock art possible only by small visual or textural disparities between layers.

One of the major obstacles in the study of rock art has been the adequate fixing of their antiquity. The process of putting a date to the creation of a rock art belongs still of the sphere of uncertain studies. Unfortunately, “no chronological tests are known which can be applied to the pigments or to the patina of engravings” (Rosenfeld 1985:11). As a result, the only method remaining available to estimate the age of both paintings and engravings relies on the

geomorphological or the archaeological association to it, such as an engraving present under archaeological deposits or under the present sea level, predating a relatively identifiable period.

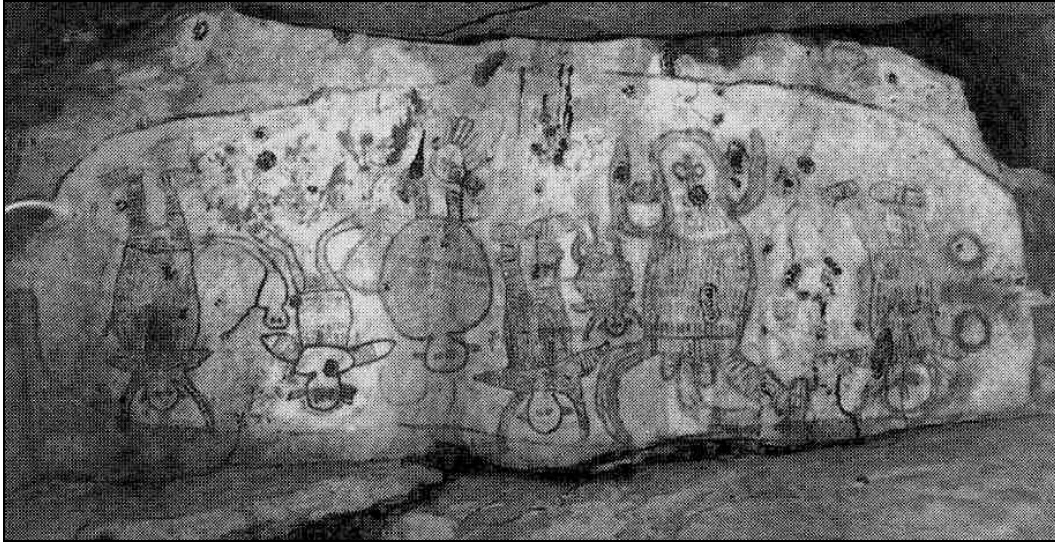
Among the vast array of different subjects being depicted by Aboriginal people on a variety of supporting media our concern in this report is focused on the graphical portray of watercraft used by various industry, in various circumstances, from various origin which have been observed along the coast of Western Australia. Historically, from the time of the first people arriving around the shoreline of this part of Australia, probably at least 40,000 years ago, Aboriginal people have been witness of the Macassan and European (Dutch, French, English and American) vessel's arrival. These were conducting explorations, seeking trepang, or harvesting whales. Some were wrecked with their survivors arriving as 'strangers on the shore' to impact in a variety of ways with Indigenous peoples (McCarthy and Silvester, 2000)

These observations have been in several instances reflected in rock art representations, since "that people seemed to have painted subjects immediate in their experience, and that the more unique these immediate experiences are the more chance they have of being depicted as rock art" (Turner 1973:303). It appears also in some instances that the watercraft depicted may represent a boat of Aboriginal origin suggesting a manner to learn about ancient Aboriginal raft through rock art or at least the stage they reached in developing their skill to recognize hull's shape differences (Wilson 2006). Others can be fairly accurate depiction of the more recent vessels with the potential to identify them.

Apart from the strongly segmented aspect of the information, for both of prior examples, as well as for a majority of rock art depictions, the extent of the knowledge associated with it should be put to attention since much of it reflects interpretations and only a limited part is corroborated with ethnographical evidences, deriving more from "the context rather than the explicit intentions of the artist" (Layton 1992:126). Basically, "the paintings may depict specific, concrete encounters, and those experiences may have been personally new or unique in any number of ways, but the detail and technical knowledge conveyed surely suggests the paintings were informed by general experience and understanding of nautical vessel and maritime industries" (Roberts 2004:41). According to Chaloupka (1996) and Burningham (1994), "Aboriginal maritime paintings were necessarily drawn by experienced mariners who were clearly interested and involved in sailing in these vessels" (Roberts 2004:41). A key may lying in the Wandjina and Kaiara mythology (along the Kimberley coast), being connected to the mythical appearance of beings coming from the far sea (Crawford 1968). By extension, all this is connected to the theory of the initial colonization process of Australia, between the first unique constitutional voyage or the back and forth contact with a new field of possibilities. Overall, watercraft paintings or engravings form in reality anecdotal storytelling, since it seems to have no specific differentiation with non-indigenous because "they were instead depicting and relating their own experiences ... they are stories told about themselves, to themselves" (Roberts 2004:44).

1.2 Catalogue of rock paintings

Admiralty Gulf Watercraft Depiction:



Rock painting outlining the curves of a perahu (Crawford 2001:85)

Location:

In a cave in the Admiralty Gulf area, Kimberley, WA

Depiction Category:

Rock Painting

Description:

The painting outlines “what is almost certainly a perahu (Indonesian fishing boat) with what appears to be a party of men and women on board” (Crawford 2001:85). The author has identified its Indonesian origin.

Additional Associated Information:

Mary Pandilow recalls what Bill Hunter (A Nungulmara man, deceased in the 1970’s, historical knowledge custodian of the Cape Voltaire area) said to her that “when the ‘Malays’ came, Aboriginal men would send them women, one each” (Crawford 2001:85)

Sources of Information:

-Crawford, I., 2001, *We won the victory: Aborigines and outsiders on the North West coast of the Kimberley*, Fremantle Arts Centre Press, Fremantle.

Auwadanju (Owatendu) Watercraft Depiction 1:



Rock painting of a watercraft in Bigge Island (Photo: P. Baker, WA Maritime Museum, WINC 1978)

Location:

Inside a cave, on the Wunambal territory at Bigge Island in the Kimberley, WA. According to Sledge (1978:57) “the paintings were on surfaces of a cave system undercutting the south side of the sandstone cliffs”.

Depiction Category:

Rock Painting

Description:

A contact dinghy propelled by oars with rowlocks and composed of three rowers, holding what could be pipes in their mouth

Additional Associated Information:

The painting is located adjacent to some Wandjina paintings identified as Kaiara. Crawford (2001:112) suggest that what “have happened here is that white people arrived, and because their clothing resembles the body decorations of the Kaiara, and the sound and flash of light from their weapons resembles thunder and lightning, they were incorporated in the Kaiara mythology”. In her work on contact between Indigenous peoples and shipwreck survivors, Silvester (1998:3) interprets it as “shipwreck survivors reaching the shore, or possibly crew from whaling ships looking to renew water supplies”. The boat paintings are recognized as being stylistically similar to the Wandjina and Kaiara drawings which were utilized for representing occurrence of beings coming from the sea (Sledge 1978).

Sources of Information:

-Silvester, L., 1998, *Strangers on the shore: Shipwreck survivors and their contact with Aboriginal groups in Western Australia 1628-1956*, Report - Department of Maritime Archaeology, Western Australian Maritime No. 146.

-Reynolds, R, 1987, The Indenoona contact site: a preliminary report of an engraving site in the Pilbara region of Western Australia, *Australian Archaeology* 25:80-87.

-Sledge, S., 1978, Wreck Inspection North Coast (WINC), Report - Department of Maritime Archaeology, Western Australian Maritime Museum No. 11.
-Crawford, I., 2001, *We won the victory: Aborigines and outsiders on the North West coast of the Kimberley*, Fremantle Arts Centre Press, Fremantle.

Auwadanju (Owatendu) Watercraft Depiction 2:



Rock painting of two masted lugger (Photo: P. Baker, WA Maritime Museum, WINC 1978)

Location:

Inside a cave, on the Wunambal territory at Bigge Island in the Kimberley, WA. According to Sledge (1978:57) "the paintings were on surfaces of a cave system undercutting the south side of the sandstone cliffs".

Depiction Category:

Rock Painting

Description:

Two masted lugger (A form of pearling vessel common on this coast) with bowsprit and a gaff on the mizzen mast. Both masts are portrayed as going through the deck to the keel-line (Sledge 1978).

Additional Associated Information:

The painting is located adjacent to some Wandjina paintings identified as Kaiara. Crawford (2001:112) suggest that what "have happened here is that white people arrived, and because their clothing resembles the body decorations of the Kaiara, and the sound and flash of light from their weapons resembles thunder and lightning, they were incorporated in the Kaiara mythology". Silvester (1998:3) interprets it as "shipwreck survivors reaching the shore, or possibly crew from whaling ships looking to renew water supplies". The boat paintings are recognized as being stylistically similar to the Wandjina and Kaiara drawings

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-Crawford, I., 2001, *We won the victory: Aborigines and outsiders on the North West coast of the Kimberley*, Fremantle Arts Centre Press, Fremantle.

Auwadanju (Owatendu) Watercraft Depiction 3:



Rock painting of a canoe in Bigge Island (Photo: P. Baker, WA Maritime Museum, WINC 1978)

Location:

Inside a cave, on the Wunambal territory at Bigge Island in the Kimberley, WA. According to Sledge (1978:57) “the paintings were on surfaces of a cave system undercutting the south side of the sandstone cliffs”.

Depiction Category:

Rock Painting

Description:

A canoe has elevated stern and at least two stick-type figures rowing. The figures seem to be wearing a helmet. It has been suggested that this drawing characterize “a sailor’s back flap blown up his neck or a three-cornered hat” (Sledge 1978:78).

Additional Associated Information:

The painting “is partly obliterated by the white background preparation for a more recent painting” (Sledge 1978:78). The painting is located adjacent to some Wandjina paintings identified as Kaiara. Crawford (2001:112) suggest that what “have happened here is that white people arrived, and because their clothing resembles the body decorations of the Kaiara, and the sound and flash of light from their weapons resembles thunder and lightning, they were incorporated in the Kaiara mythology”. Silvester (1998:3) interprets it as “shipwreck survivors reaching the shore, or possibly crew from whaling ships looking to renew water supplies”. The boat paintings are recognized as being stylistically similar to the Wandjina and Kaiara drawings which were utilized for representing occurrence of beings coming from the sea (Sledge 1978).

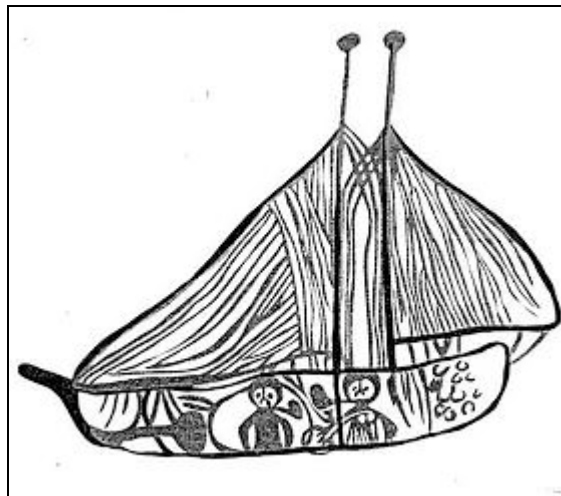
Sources of Information:

-Silvester, L., 1998, *Strangers on the shore: Shipwreck survivors and their contact with Aboriginal groups in Western Australia 1628-1956*, Report - Department of Maritime Archaeology, Western Australian Maritime No. 146.

-Reynolds, R, 1987, The Indenoona contact site: a preliminary report of an engraving site in the Pilbara region of Western Australia, *Australian Archaeology* 25:80-87.

-Sledge, S., 1978, Wreck Inspection North Coast (WINC), Report - Department of Maritime Archaeology, Western Australian Maritime Museum No. 11.

-Crawford, I., 2001, *We won the victory: Aborigines and outsiders on the North West coast of the Kimberley*, Fremantle Arts Centre Press, Fremantle.

Auwadanju (Owatendu) Watercraft Depiction 4:

Interpretative drawing of the rock painting of the a 2 masts sailing ship (Crawford 1968:77)

Location:

Inside a cave, on the Wunambal territory at Bigge Island in the Kimberley, WA. According to Sledge (1978:57) “the paintings were on surfaces of a cave system undercutting the south side of the sandstone cliffs”.

Depiction Category:
Rock Painting

Description:

The ship with two mast and triangular sail has been “almost obliterated by sand” (Crawford 1968:76). The outline has been drawn in black, but there are two characters inside the hull, that Crawford identified as Kaiara representation.

Additional Associated Information:

The painting is located adjacent to some Wandjina paintings identified as Kaiara. Crawford (2001:112) suggest that what “have happened here is that white people arrived, and because their clothing resembles the body decorations of the Kaiara, and the sound and flash of light from their weapons resembles thunder and lightning, they were incorporated in the Kaiara mythology”. The boat paintings are recognized as being stylistically similar to the Wandjina and Kaiara drawings which were utilized for representing beings coming from the sea (Sledge 1978).

Sources of Information:

-Silvester, L., 1998, *Strangers on the shore: Shipwreck survivors and their contact with Aboriginal groups in Western Australia 1628-1956*, Report - Department of Maritime Archaeology, Western Australian Maritime No. 146.

-Reynolds, R, 1987, The Indenoona contact site: a preliminary report of an engraving site in the Pilbara region of Western Australia, *Australian Archaeology* 25:80-87.

-Sledge, S., 1978, Wreck Inspection North Coast (WINC), Report - Department of Maritime Archaeology, Western Australian Maritime Museum No. 11.

-Crawford, I.M., 1968, *Art of the Wandjina*, Oxford University Press: Melbourne.

Auwadanju (Owatendu) Watercraft Depiction 5:

ILLUSTRATION: Not Available

Location:

Inside a cave, on the Wunambal territory at Bigge Island in the Kimberley, WA. According to Sledge (1978:57) “the paintings were on surfaces of a cave system undercutting the south side of the sandstone cliffs”.

Depiction Category:
Rock Painting

Description:

European-type vessel (Sledge 1978)

Additional Associated Information:

The painting is located adjacent to some Wandjina paintings identified as Kaiara. Crawford (2001:112) suggest that what “have happened here is that white people arrived, and because their clothing resembles the body decorations of the Kaiara,

and the sound and flash of light from their weapons resembles thunder and lightning, they were incorporated in the Kaiara mythology". The boat paintings are recognized as being stylistically similar to the Wandjina and Kaiara drawings which were utilized for representing occurrence of beings coming from the sea (Sledge 1978).

Sources of Information:

-Silvester, L., 1998, *Strangers on the shore: Shipwreck survivors and their contact with Aboriginal groups in Western Australia 1628-1956*, Report - Department of Maritime Archaeology, Western Australian Maritime No. 146.

-Reynolds, R, 1987, The Indenoona contact site: a preliminary report of an engraving site in the Pilbara region of Western Australia, *Australian Archaeology* 25:80-87.

-Sledge, S., 1978, Wreck Inspection North Coast (WINC), Report - Department of Maritime Archaeology, Western Australian Maritime Museum No. 11.

Kimberley Watercraft Depiction 1:



Rock painting of a canoe from the Kimberley (Photo: Marco Del Grande, From Leech 1998:19)

Location:

Exact location unknown but present in the Kimberley region, WA

Depiction Category:

Rock Painting

Description:

"Monochrome red boat painting of 395mm in length, 30 mm in hull width, and 110mm from tip of the high pointed prows to the underside of the hull. It shows a very distinctive silhouette, with the prominent fore and aft prows rising 260 percent above the width of the hull above the leeboard. Four seated figures show two clearly wearing a swept back headdress, but the others are too deteriorated to confirm. Both rear passengers clearly hold the shaft of long paddles extending well beneath the hull, and a third passenger is possibly

holding a similar object. A very interesting feature appears at the rear hull underside, with the silhouette initially, suggesting some form of trailing steering oar/rudder, or possibly a form of rear keel or stabilization device. Unfortunately, sectional deterioration on the rear hull silhouette makes determination of the detail uncertain." (Walsh 2000:30).

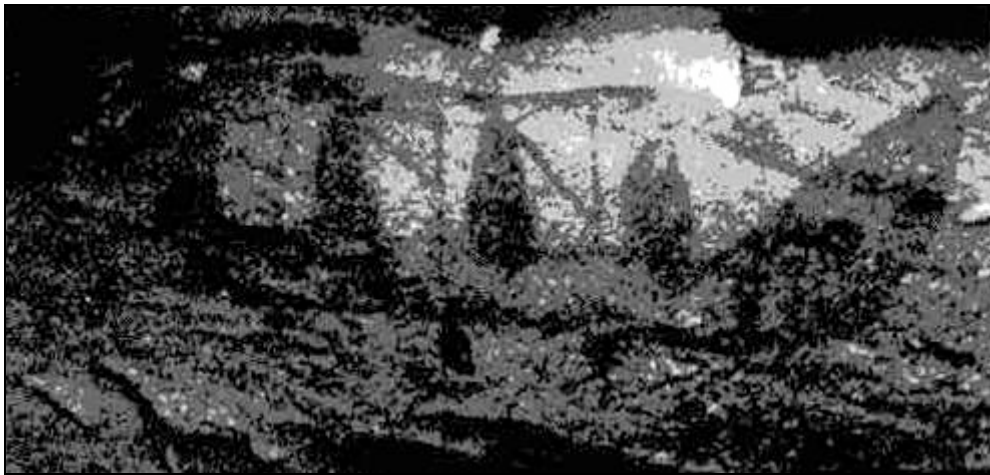
Additional Associated Information:

Walsh claimed this depiction as being around 17000 years old. But Robert Bednarik (2006 pers. communication) author of "Australian Apocalypse" recommended strongly disregarding this age claim due to its unfounded character, being generally not accepted as valid.

Sources of Information:

- Leech, G., 1998, The first boat people, *The Australian Magazine*, 18 July, p.18
- Wilson, I., 2006, *Lost world of the Kimberley extraordinary glimpses of Australia's ice age ancestors*, Allen & Unwin, Crows Nest.
- Walsh, G.L., 2000, *Bradshaw Art of the Kimberley*, Takarakka Nowan Kas Publications, Toowong.

Kimberley Watercraft Depiction 2:



Rock painting of a high prow canoe (Photo: I Crawford, Burningham 2000:69)

Location:

Exact location unknown but present in the Kimberley region, WA

Depiction Category:

Rock Painting

Description:

Canoe with a high prow and three paddlers

Additional Associated Information:

Burningham suggested that a Javanese or Madurese origin is possible according to the watercraft hull profile.

Sources of Information:

-Burningham, N., 2000, Sublime but not ridiculous: Observations on the technical analysis of ships of first contact represented in various genre of arts, *Bulletin of the Australian Institute for Maritime Archaeology* 24:63-70.

Kimberley Watercraft Depiction 3:



Rock painting and interpretative drawing of a boat in the Kimberley (Walsh 2000:29)
[No reproduction for publication without approval from G. Walsh]

Location:

Exact location unknown but present in the Kimberley region, WA. Walsh (2000) specified that the painting were located on the very hard sandstone surface of a shelter.

Depiction Category:

Rock Painting

Description:

The boat measures are 290x310 mm. The painting depicts a “monochrome red painting of an unusual watercraft with at least six individuals standing on it ... [furthermore] the standing front passenger appears to hold a spear or harpoon, and the second rear passenger wears some form of swept-back headdress. This silhouette is unlike any form of ethnographically documented Australian watercraft” (Walsh 2000:29).

Additional Associated Information:

Despite the location of the painting, “seepage has unfortunately ‘blurred’ its appearance. The hull shape, extending to a long, tapering, erect prow, strongly suggests a typical reed boat construction” (Walsh 2000:29). Inside the same publication Thor Heyerdhal, had the following comments about it: “The black and white line drawing however, does definitely not suggest a wooden vessel, but has the typical sickle shape of reed vessels as they are normally depicted in

the art of the Old as well as the New World. There can be no longer any question that long range coastal as well as overseas contacts by navigators using reed ships occurred from the early Bronze Age. Australia was obviously within the range of voyagers from early Asia in the Western Territories" (Walsh 2000:29).

Sources of Information:

-Walsh, G.L., 2000, *Bradshaw Art of the Kimberley*, Takarakka Nowan Kas Publications, Toowong.

Kimberley Watercraft Depiction 4:

ILLUSTRATION: Not Available

Location:

Exact location unknown but present in the Kimberley region, WA

Depiction Category:

Rock Painting

Description:

The painting represents some sort of high prowed "potentially ocean-going vessel carrying than 29 crew and passengers" (Wilson 2006:3).

Additional Associated Information:

Discovered by Graeme Walsh

Sources of Information:

-Wilson, I., 2006, *Lost world of the Kimberley extraordinary glimpses of Australia's ice age ancestors*, Allen & Unwin, Crows Nest.

Marbeerup Watercraft Depiction:

ILLUSTRATION: see Ron (Doc) Reynolds

Location:

Marbeerup (Mount Ridley), North-East of Esperance, WA

Depiction Category:

Rock painting

Description:

Sailing ship

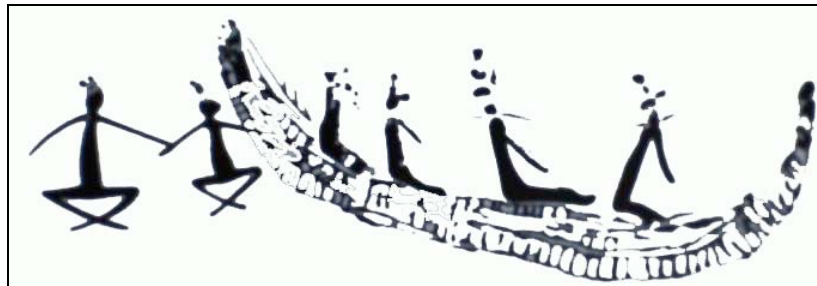
Additional Associated Information:

The watercraft depicted seems to be associated with a painting of a whale tail.

Sources of Information:

-Reynolds, R. (Doc), 2006, traditional owner, personal communication.

Mitchell River Watercraft Depiction 1:



Rock painting and interpretative drawing of a bundle canoe (Walsh 2000:32)
[No reproduction for publication purposes without approval from G. Walsh]

Location:

Near Reindeer Rock, but down stream from Mitchell Falls, Kimberley, WA

Depiction Category:

Rock painting

Description:

Canoe with high prow and stern, and which seems to have been made from bundles of “reed fibres that were lashed together with strings” (Wilson 2006:109). Additionally, Walsh (2000:32) explained that “the boat is 370mm long and 150mm high ... [and] the very high tapering prows present a silhouette typical of reed construction”.

Additional Associated Information:

There are apparently 3 or 4 people seated inside the watercraft. “The bright paint of the hull appears to have been modified by later ‘repaint’, while the deteriorated paint and the solid infill of the four occupants remain in their original form” (Walsh 2000:32).

Sources of Information:

-Wilson, I., 2006, *Lost world of the Kimberley extraordinary glimpses of Australia's ice age ancestors*, Allen & Unwin, Crows Nest.

-Walsh, G.L., 2000, *Bradshaw Art of the Kimberley*, Takarakka Nowan Kas Publications, Toowong.

Mitchell River Watercraft Depiction 2:



Rock painting and interpretative drawing of a bundle canoe (Walsh 2000:31)
[No reproduction for publication purposes without approval from G. Walsh]

Location:

Near Reindeer Rock, but down stream from Mitchell Falls, Kimberley, WA. More accurately, Walsh (2000:30) describe the location as a “shelter is similar to a gigantic, sunken, inverted 30 meters diameter ‘basin’, with a collapsed central ceiling section and visually spectacular entrance via a long climbing crevice”.

Depiction Category:

Rock painting

Description:

The boat has “a mild crescentic shape, with gently upswept rounded prows rising higher than the occupants headline. The total hull length measures 730mm and the actual hull depth 50mm, while the total height from under hull to prow tip measures 155mm. At least four (and possibly 6) individuals are visible seated in the hull, 4 of whom appear to hold the vertical shafts of long paddles” (Walsh 2000:30).

Additional Associated Information:

It appears that this painting was originally a “monochrome red, they have been partially painted over Wet season seepage areas, ... [but some] superimposed accretions now make sections of the boat paintings appear faint and it is difficult

to see the detail, except during the Wet season when seepage reduces the opacity and enhances the embedded artwork" (Walsh 2000:30). Walsh also explained that because the ratio hull length to depth of at least 14:1 together with the prows rising 200 percent of the hull depth, "these relative proportions make this a very distinctive craft, and certainly atypical of any known Australian type" (2000:30).

Sources of Information:

-Wilson, I., 2006, *Lost world of the Kimberley extraordinary glimpses of Australia's ice age ancestors*, Allen & Unwin, Crows Nest.

-Walsh, G.L., 2000, *Bradshaw Art of the Kimberley*, Takarakka Nowan Kas Publications, Toowong.

Mitchell River Watercraft Depiction 3



Rock painting and interpretative drawing of a bundle canoe (Walsh 2000:31)
[No reproduction for publication purposes without approval from G. Walsh]

Location:

Near Reindeer Rock, but down stream from Mitchell Falls, Kimberley, WA. More accurately, Walsh (2000:30) describe the location as a "shelter is similar to a gigantic, sunken, inverted 30 meters diameter 'basin', with a collapsed central ceiling section and visually spectacular entrance via a long climbing crevice".

Depiction Category:

Rock painting

Description:

Although, the boat has here also a length of 750mm, “the seated occupants suggest that it represents a smaller craft, with the stern ending in a gentle sweep. Both craft share a basically similar form of crescentric hull, but this one measures 135mm in depth. A similar high, rounded prow rises to 245mm, or less than 100 percent of hull depth above leeboard. At least two people are seated in the craft, with large deteriorated ‘rounded shapes’ between them. The rear passenger seems to be seated in a rear-facing alignment and holds a long ‘paddle’ shape, clearly extended well below the hull, and reminiscent of a steering oar” (Walsh 2000:30).

Additional Associated Information:

It appears that this painting was originally a “monochrome red, they have been partially painted over Wet season seepage areas, ... [but some] superimposed accretions now make sections of the boat paintings appear faint and it is difficult to see the detail, except during the Wet season when seepage reduces the opacity and enhances the embedded artwork” (Walsh 2000:30).

Sources of Information:

-Wilson, I., 2006, *Lost world of the Kimberley extraordinary glimpses of Australia's ice age ancestors*, Allen & Unwin, Crows Nest.

-Walsh, G.L., 2000, *Bradshaw Art of the Kimberley*, Takarakka Nowan Kas Publications, Toowong.

Mitchell River Watercraft Depiction 4:

Rock painting and interpretative drawing of a watercraft (Walsh 2000:32)
[No reproduction for publication purposes without approval from G. Walsh]

Location:

Near Reindeer Rock, but down stream from Mitchell Falls, Kimberley, WA

Depiction Category:

Rock painting

Description:

The depiction of the boat is 400mm long and 170mm high. Even is the painting highly deteriorated, there seems to have had five seated occupants originally (Walsh 2000).

Additional Associated Information:

Additionally, Walsh (2000:33) asserted that “sufficient details remain of the deteriorated head and headdress area, to confirm that the figures have worn some form of nose bone feature with headdress similar to variant found on clothes peg figures”.

Sources of Information:

-Walsh, G.L., 2000, *Bradshaw Art of the Kimberley*, Takarakka Nowan Kas Publications, Toowong.

Reindeer Rock Watercraft Depiction:

Rock painting of a boat at Reindeer Rock (Wilson 2006:226)

Location:

Mitchell Fall Area on the Mitchell River, Kimberley, WA

Depiction Category:

Rock painting

Description:

A boat or canoe with some human figures standing up inside, and possessing high prow and stern, and approximately “around one meter high”(Wilson 2006:8).

Additional Associated Information:

There is apparently two standing up human figures around the boats aft section and two more vague representations of human figures at the prow. The figures seems unmistakably belonging to the Bradshaw style (Wilson 2006). Wilson has identified the second figure from the left as some sort of “VIP occupant” of the watercraft. The striking aspect of this figure lies in the clothe it wears, being a long robe or skirt likewise the figure immediately behind him.

Sources of Information:

-Wilson, I., 2006, *Lost world of the Kimberley extraordinary glimpses of Australia's ice age ancestors*, Allen & Unwin, Crows Nest.

Walga Rock Watercraft Depiction:

Walga Rock steam ship painting (Photo: WA Museum)

Location:

Near Cue, 750 km south of the Inthanoona site, and 300 km from the western Australian coast, near the head of the Sanford River, WA

Depiction Category:

Rock Painting

Description:

Steam ship with false gun ports, two masts, and a funnel

Additional Associated Information:

The depictions is supposed not to be of Aboriginal origin, but maybe from one of the ‘Malay’ divers that CE Broadhurst (owner of the *SS Xantho*) brought to Australia for use in the Nickol Bay and Shark Bay pearling industries. McCarthy; (2000:61) explained how “around 1917, some 45 years after the loss of the *SS Xantho*, a former Shark Bay pearler named Sammy Malay is reputed to have joined an Aboriginal group at a soak near Walga Rock inland from the mouth of the Murchison River. Soon after he arrived there a ship painting appeared in a

nearby cave (S. Gratte to P. Playford, January 9, 1997; Gratte to McCarthy, October, 17, 2005)".

Note: The term 'Malay' is generally, but incorrectly used in the 19th Century to refer to labourers brought to Western Australia, for use in the pearling and pastoral industries, from the islands to the north, (e.g. present day Malaysia, Indonesia, Timor) including the Philippines.

Sources of Information:

-McCarthy, M., 2000, *Iron and Steamship Archaeology: Success and Failure on the SS Xantho*, Plenum Publishers, New York.

-Silvester, L., 1998, *Strangers on the shore: Shipwreck survivors and their contact with Aboriginal groups in Western Australia 1628-1956*, Report - Department of Maritime Archaeology, Western Australian Maritime No. 146.

-Layton, R, 1992, *Australian Rock Art: a New Synthesis*, Cambridge University Press, Cambridge.

-Reynolds, R, 1987, The Indenoona contact site: a preliminary report of an engraving site in the Pilbara region of Western Australia, *Australian Archaeology* 25:80-87.

1.3 Catalogue of rock engravings

Inthanoona (Indenoona) Watercraft Depiction 1:



Rock engraving believed to represent the *Xantho* (Photo by A. Paterson) and its interpretative drawing (I.Warne).

Location:

The site is located at 32km southeast from Roebourne, at 25km from coast (east Pilbara, WA). More accurately, it is situated at “the northeast end of the granophyre knoll that rises some 20m above a permanent pool on the Jones River” (Reynolds 1987:80)

Depiction Category:

Rock Engraving

Description:

Steam ship assisted by sails appearing to be a two masted square-rigged vessel. It shows pennants and smoke from funnel blowing forwards.

Additional Associated Information:

The site retains a level of significance associated with “the motifs and ... the date of their creation ... predominantly of subjects related to European occupation of the area” (Reynolds 1987:80). This representation has been subject to identification and it is believed to portray the *SS Xantho* which was the first coastal steamer to work along the Western Australian coast. It is recorded as being a topsail schooner (i.e. it had elements of fore and aft and square rig). The only other steam driven sailing vessel of the time is HMS *Cossack* a three masted full-rigged steam ship.

Sources of Information:

-Reynolds, R, 1987, The Indenoona contact site: a preliminary report of an engraving site in the Pilbara region of Western Australia, *Australian Archaeology* 25:80-87.

- McCarthy, M., 2000, *Iron and Steamship Archaeology: Success and Failure on the SS Xantho*, Plenum Publishers, New York.
- Silvester, L., 1998, *Strangers on the shore: Shipwreck survivors and their contact with Aboriginal groups in Western Australia 1628-1956*, Report - Department of Maritime Archaeology, Western Australian Maritime No. 146.
- Paterson, A., 2006, personal communication

Inthanoona (Indenoona) Watercraft Depiction 2:



Rock engraving of a sailing ship at Inthanoona (Photo by A. Paterson)

Location:

The site is located at 32km southeast from Roebourne, at 25km from coast (east Pilbara, WA). More accurately, it is situated at “the northeast end of the granophyre knoll that rises some 20m above a permanent pool on the Jones River” (Reynolds 1987:80)

Depiction Category:

Rock Engraving

Description:

Two masted ship with representation of an anchor line, a rudder, crew members, a funnel expelling smoke, and some rigging.

Additional Associated Information:

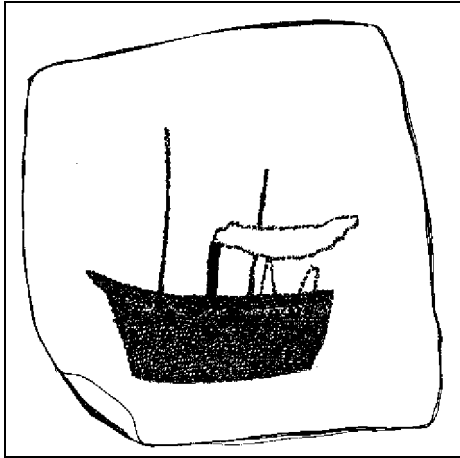
The site detains a level of significance associated with “the motifs and ... the date of their creation ... predominantly of subjects related to European occupation of the area” (Reynolds 1987:80). Believed to be SS *Xantho*, without any square sails set.

Sources of Information:

-Reynolds, R, 1987, The Indenoona contact site: a preliminary report of an engraving site in the Pilbara region of Western Australia, *Australian Archaeology* 25:80-87.

-Silvester, L., 1998, *Strangers on the shore: Shipwreck survivors and their contact with Aboriginal groups in Western Australia 1628-1956*, Report - Department of Maritime Archaeology, Western Australian Maritime No. 146.
-Paterson, A., 2006, personal communication

Inthanoona (Indenoona) Watercraft Depiction 3:



Interpretative drawing (Ian Warne) and Rock engraving of a steamship at Inthanoona (Photo by A. Paterson)

Location:

The site is located at 32km southeast from Roebourne, at 25km from coast (east Pilbara, WA). More accurately, it is situated at “the northeast end of the granophyre knoll that rises some 20m above a permanent pool on the Jones River” (Reynolds 1987:80)

Depiction Category:

Rock Engraving

Description:

This is a two masts steam ship, where a funnel rejecting smoke, an anchor or mooring line midship, an anchor (?) at the bow, a rudder and rigging are visible. Believed to be SS *Xantho*.

Additional Associated Information:

The site detains a level of significance associated with “the motifs and ... the date of their creation ... predominantly of subjects related to European occupation of the area” (Reynolds 1987:80). The engraving display two type of color on the rock surface, which can be due partly to the physical weathering process and discoloration associated with biological weathering.

Sources of Information:

-Reynolds, R, 1987, The Indenoona contact site: a preliminary report of an engraving site in the Pilbara region of Western Australia, *Australian Archaeology* 25:80-87.

-Silvester, L., 1998, *Strangers on the shore: Shipwreck survivors and their contact with Aboriginal groups in Western Australia 1628-1956*, Report - Department of Maritime Archaeology, Western Australian Maritime No. 146.

-Paterson, A., 2006, personal communication

Inthanoona (Indenoona) Watercraft Depiction 4:

Rock Engraving of a ship at Inthanoona (Photo by A. Paterson)

Location:

The site is located at 32km southeast from Roebourne, at 25km from coast (east Pilbara, WA). More accurately, it is situated at “the northeast end of the granophyre knoll that rises some 20m above a permanent pool on the Jones River” (Reynolds 1987:80)

Depiction Category:

Rock Engraving

Description:

Possibly two masted sailing ship

Additional Associated Information:

The site detains a level of significance associated with “the motifs and ... the date of their creation ... predominantly of subjects related to European occupation of the area” (Reynolds 1987:80). No interpretative drawing available.

Sources of Information:

-Reynolds, R, 1987, The Indenoona contact site: a preliminary report of an engraving site in the Pilbara region of Western Australia, *Australian Archaeology* 25:80-87.

-Silvester, L., 1998, *Strangers on the shore: Shipwreck survivors and their contact with Aboriginal groups in Western Australia 1628-1956*, Report - Department of Maritime Archaeology, Western Australian Maritime No. 146.
-Paterson, A., 2006, personal communication

Inthanoona (Indenoona) Watercraft Depiction 5:



Rock engraving of a sailing ship at Inthanoona (Photo by A. Paterson)

Location:

The site is located at 32km southeast from Roebourne, at 25km from coast (east Pilbara, WA). More accurately, it is situated at “the northeast end of the granophyre knoll that rises some 20m above a permanent pool on the Jones River” (Reynolds 1987:80)

Depiction Category:

Rock Engraving

Description:

Two or three mast square rigged sailing ship

Additional Associated Information:

The site detains a level of significance associated with “the motifs and ... the date of their creation ... predominantly of subjects related to European occupation of the area” (Reynolds 1987:80).

Sources of Information:

-Reynolds, R, 1987, The Indenoona contact site: a preliminary report of an engraving site in the Pilbara region of Western Australia, *Australian Archaeology* 25:80-87.
-Silvester, L., 1998, *Strangers on the shore: Shipwreck survivors and their contact with Aboriginal groups in Western Australia 1628-1956*, Report - Department of Maritime Archaeology, Western Australian Maritime No. 146.
-Paterson, A., 2006, personal communication

Inthanoona (Indenoona) Watercraft Depiction 6:



Rock engraving of a ship at Inthanoona (Photo by A. Paterson)

Location:

The site is located at 32km southeast from Roebourne, at 25km from coast (east Pilbara, WA). More accurately, it is situated at “the northeast end of the granophyre knoll that rises some 20m above a permanent pool on the Jones River” (Reynolds 1987:80)

Depiction Category:

Rock Engraving

Description:

Possibly sailing ship

Additional Associated Information:

The site detains a level of significance associated with “the motifs and ... the date of their creation ... predominantly of subjects related to European occupation of the area” (Reynolds 1987:80). No interpretative drawing available.

Sources of Information:

-Reynolds, R, 1987, The Indenoona contact site: a preliminary report of an engraving site in the Pilbara region of Western Australia, *Australian Archaeology* 25:80-87.

-Silvester, L., 1998, *Strangers on the shore: Shipwreck survivors and their contact with Aboriginal groups in Western Australia 1628-1956*, Report - Department of Maritime Archaeology, Western Australian Maritime No. 146.

-Paterson, A., 2006, personal communication

Inthanoona (Indenoona) Watercraft Depiction 7:

ILLUSTRATION: see Dr Alistair Paterson

Location:

The site is located at 32km southeast from Roebourne, at 25km from coast (east Pilbara, WA). More accurately, it is situated at “the northeast end of the granophyre knoll that rises some 20m above a permanent pool on the Jones River” (Reynolds 1987:80)

Depiction Category:

Rock Engraving

Description:

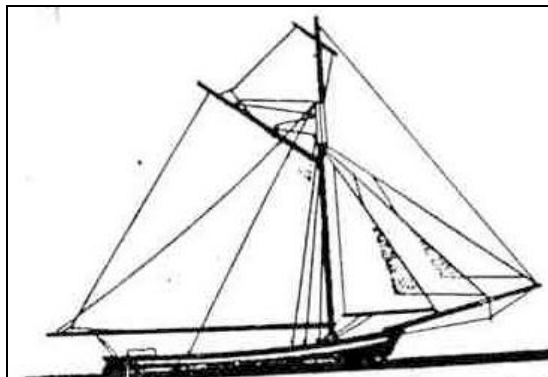
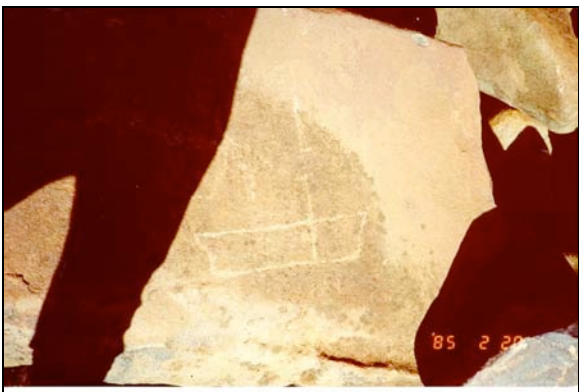
European type vessel

Additional Associated Information:

The site detains a level of significance associated with “the motifs and ... the date of their creation ... predominantly of subjects related to European occupation of the area” (Reynolds 1987:80).

Sources of Information:

- Reynolds, R, 1987, The Indenoona contact site: a preliminary report of an engraving site in the Pilbara region of Western Australia, *Australian Archaeology* 25:80-87.
- Silvester, L., 1998, *Strangers on the shore: Shipwreck survivors and their contact with Aboriginal groups in Western Australia 1628-1956*, Report - Department of Maritime Archaeology, Western Australian Maritime No. 146.
- Paterson, A., 2006, personal communication

Spring Station Watercraft Depiction:

Engraving of a single mast cutter (Photo by A. Paterson) and image a cutter sailing boat

Location:

Near Inthanoona, Pilbara, WA

Depiction Category:

Rock engraving

Description:

Sailing ship which seems to be a single mast cutter

Additional Associated Information:

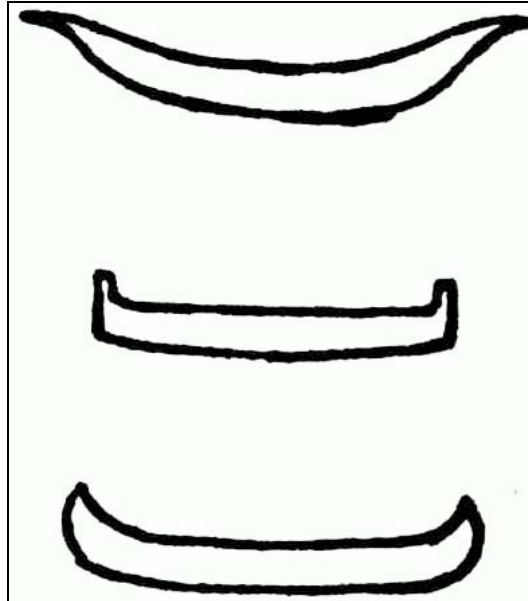
Recorded by Alistair Paterson in 2004

Sources of Information:

-Paterson, A., 2006, personal communication.

1.4 Catalogue of others type of depictions

Kimberley Watercraft Depiction 5:



Interpretative drawing of sand drawings (Crawford 2001:86)

Location:

Exact location unknown, Kimberley region, WA

Depiction Category:

Sand Drawing

Description:

3 canoes

Additional Associated Information:

The drawings were made by Rankin Waranggala, and refer to various types. From top to bottom the origin is different: Malay, Aboriginal (archaic form), Aboriginal (modern form)

Sources of Information:

-Crawford, I., 2001, *We won the victory: aborigines and outsiders on the North West coast of the Kimberley*, Fremantle Arts Centre Press, Fremantle.

Rottnest Island Watercraft Depiction:



City of York Painting by J. Cudgely (Photo: WA Museum Collection 8602-41)

Location:

North-West off Fremantle, WA

Depiction Category:

European style painting

Description:

A three-mast wooden ship

Additional Associated Information:

The author of this painting is an Aboriginal artist Johnny Cudgely who received painting lessons from the Governor Bedford of Rottnest Island. The painting depicts the *City of York* being salvaged on the 12 July 1899 on the west coast of Rottnest Island. Cudgely may have been an eyewitness of this incident.

Sources of Information:

-Silvester, L., 1998, *Strangers on the shore: Shipwreck survivors and their contact with Aboriginal groups in Western Australia 1628-1956*, Report - Department of Maritime Archaeology, Western Australian Maritime No. 146.

-Moynihan, J., 1988, *All the news in a flash: Rottnest communication 1829-1979*, Telecom Australian and the Institute of Engineers Australia WA Division, Perth.

2. Preliminary Consideration for a Predictive Model of the Survival Potential of Underwater Depictions

2.1 Starting point and state of the research

The catalogue presented in the previous section attempts to cover the all known or identifiable Aboriginal depictions portraying watercraft in Western Australia. Obviously, the compilation is incomplete, but hopefully it does adequately present the state of the research on this subject by mid 2006. Potentially, other depictions are to be found, to help us understand better the nautical and maritime aspect and point of view of the ancient Aboriginal population. Such expectation can be anticipated more particularly in regions such as the Pilbara or the Kimberley, where recent discoveries are both in need for further analysis and are an encouraging sign concerning future finding within the pictorial wealth of these regions. But there is a point which needs to be highlighted, being the hypothesis focusing on the potential to locate rock art depictions underwater. This position is likely to assist in improving our knowledge of rock art predating the sea level rise and by extension their authors. Dortch (2002:41) has even stated that future discoveries and research on rock art (more particularly engravings) underwater in the Dampier Archipelago and Depuch Island would “confirm a minimally 7000 BP age of rock art in the Pilbara region ... , reinforce the evidence for ancient human coastal position of the continental littoral ... [and] help in creating renewed awareness of the immense aesthetic and heritage significance of the Pilbara Region”.

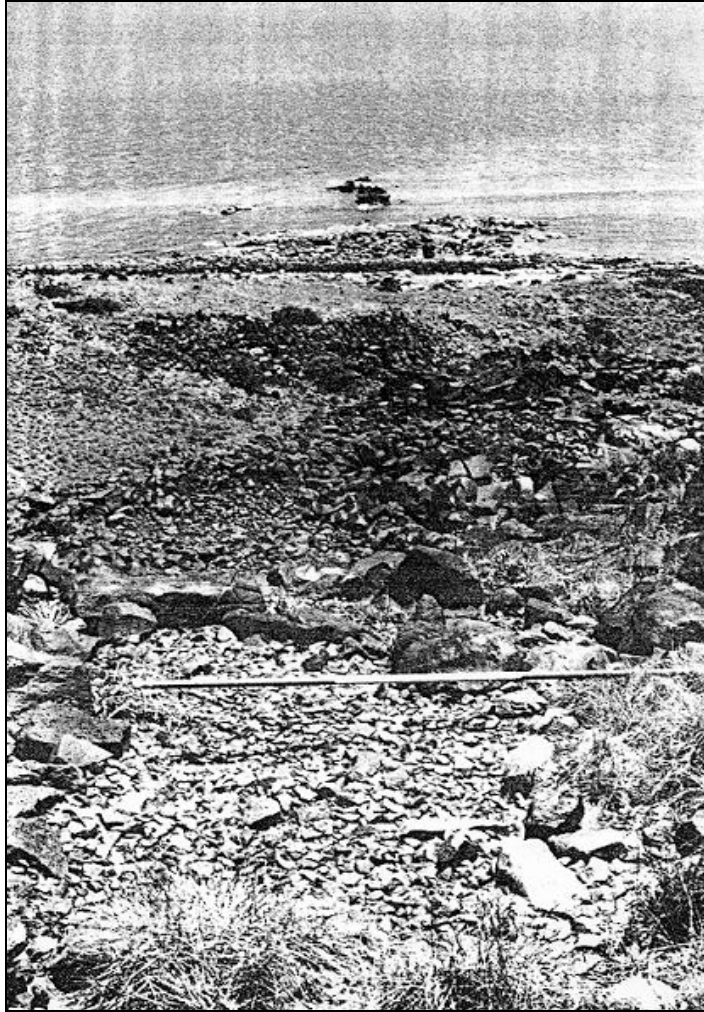
Indigenous submerged studies in Australia have been quite neglected at several levels, as David Nutley (2005a:84) specifies in term of “investigation, conservation and managements of similar land-based sites”. One of the studies, which make the exception to this apparent rule is the research conducted in the Gulf of Carpentaria, by Nick Flemming (1982) where the purpose was to locate prime potential “areas of broad, flat, shelving submerged coast and associated with low energy wave activity” (Nutley 2005b:97). Nutley explains also, that such sites have been and are constantly facing different sort of threats, without being really considered in term of management. Fortunately, there has been a different trend during the last two decades, materialized by an apparent increasing comprehension of the need to develop techniques and predictive models for this type of sites (Nutley 2000). There have been several studies described by Nutley (2005a:84) as “maritime related Indigenous sites on the Australian coast including studies of occupation patterns (Bowdler 1995, Gaughin and Fullagar 1995), fishing technology (Colley 1987, Gerritsen 2001), watercraft construction (Rowland 1995, Bednarik 1998, 2002), and diet (Walters 1989, Attenbrow and Steele 1995)”.

One of the first studies in Australia to be entirely dedicated to an underwater survey of submerged Indigenous site occurred at the Lake Jasper in the southwest of Western Australia by Dr Charles Dortch in 1989. In 2002 Dortch also attempted one of the first underwater surveys of rock art, again in Western Australia at the Dampier Archipelago, Pilbara region. But this type of study stays quite seldom compared to the situation on land, despite of the high degree of significance and potential as well as the need of adequate management for all Aboriginal submerged sites.

The general idea developed in this study is based on the situation that Dortch highlighted about submerged engravings in the Pilbara, which might predate numerous ancient not submerged engravings. In a more maritime related framework such possibility reveals a new path to be explored in order to improve our view on Aboriginal depictions of watercraft and all human behavior. The interest in Dortch's (2002:37) research also lies in its aim to assess the possibility of "finding engravings (petroglyphs) on granophyre rocks outcropping on the sea floor" that may predate sea level rise.

The research area was located in the Dampier archipelago on the northwest coast of the Pilbara region, where thousands of engravings on countless rocks are observable (Vinnicombe 1987, Virili 1977). The Archipelago and the Burrup Peninsula are covered by a rocky terrain, being the result of weathering process of Pre-Cambrian volcanic lavas and young sedimentary deposits (Vinnicombe 1987). After several climatic fluctuations, the layers of sediment have eroded to uncover rocks and boulders. The granophyre is a type of rock well known for its strength, impermeability to water, and its high resistance capacity to chemical weathering (Vinnicombe 1987). An interesting characteristic of this rock lies on their location on sloping shores continuing their path beneath the sea. These islands are what is remaining of the former shoreline after the last inter-glacial melting the ice-caps. Even if the study appeared at this stage not to be conclusive because it "failed to reveal any engravings" (Dortch 2002:37), it has identified favorable circumstances for preservation and rock engraving survival criteria. Dortch explain that the best type of engraving conditions to be conserved is to be "deeply pecked, pounded, scored or abraded engravings ... on vertical rock faces ... [and] outcropping rocks that were quarry sources ... and whose edges and faces have been flaked by stone knappers" (2002:39). Finally, he concluded that "engravings on vertical rocks faces and quarried surfaces on outcrops or boulders of granophyre or other igneous rocks" are the only rock type surfaces likely to have produce better conditions for the preservation of engravings even after millennia.

An understanding of the physical, biological, and human phenomenon acting upon the deterioration of the engravings might be achieved by the establishment of priority strategy through a predictive approach.



Typical type of rocky slope shore in the Burrup Peninsula (Vinnicombe 1987)

2.2 Predictive Model: Impacts, factors and criteria

A predictive model seems to be one solution to methodologically as well as scientifically developing a strategy for locating and examining inundated Aboriginal Australian sites. Repositories of art adjacent and along the coast line of Western Australia, archaeological material are subject to many various factors affecting their state as well as their survival. Moreover, pre or proto-historic submerged archaeological remains are substantially more difficult to locate specially in an underwater environment due to physical, climatic, biological or anthropological influence altering their arrangement, appearance or constitution. Sea life has a major camouflaging effect. Because the range of inundated environments vary so much in their composition as well as in the list of impact affecting the survival of artefacts, sites or in our case rock art; that efficiency in their localization might be enhanced with the assistance of some form of predictive modeling in order to prioritize the search area and expect a higher degree of success.

Even if this tactic incorporates some obvious risks such as the level of accuracy or the lack of guarantee that something will be found simply because we are dealing with predictions which of their own nature “can be good or bad, but are never perfect” (Maarleveld 2003:121). In other words, predictive models are never conclusive and always limited in term of indications. Nevertheless, they are highly adequate “in situations where far-reaching decisions have to be taken on based meagre evidence” (Maarleveld 2003:121).

According to Maarleveld at a general level, some prerequisites such as the analysis of quantitative and/or qualitative data based on the higher density of favorable criteria by using statistical extrapolation, and the “reconstitution of successive geographical developments” (2003:122) are unavoidable regarding the assessment of the potential archaeological wealth of a particular landscape. He even suggested the combination of this reconstruction with behavioural and cultural modeling of past communities. The more a situation is environmentally complex, more these basis studies are essential. Nutley (2000:35) stated that in the case of investigating inundated archaeological sites the methodology (s) employed “need to categorize site type in term of environmental factors and in term of specific types of cultural remains. The combinations of these factors will determine probabilities of site survival, distribution and condition of artifact”.

Due to the brief nature of the present study, fieldwork has not been conducted, and the emphasis here is purely on a desktop analysis in order to instigate some reflections, hypotheses, and theoretical model specifically directed towards submerged rock art identification, preservation, and management. Before such a plan can be implemented, it is necessary to build on Dortch’s (2002) study and to extend the cultural and natural character influencing the probability of surviving archaeological signature.

The relevant criteria identified by Dortch as a first step for any underwater prehistoric survey, is the assessment of the types of cultural signatures which are likely to be identifiable. This obviously integrates the knowledge of the local or at least regional geological and tectonic history, where environment actions have inundated, destroyed, substantially eroded or submerged under sediments numerous of prehistoric sites. In the case of rock art (paintings and engravings), the reason lies in the localization and identification of sites categories, or on other words where is located and what is the type of rock which is more likely to have been able to conserve this type of archaeological remains? We saw Dortch’s answer earlier. In the Dampier Archipelago case study the location of rock engravings is also subject to other types of impacts such as ‘the accumulation of marine growth [and] inorganic encrustations’ (2002:39), leaving only the vertical surfaces of rocks for suitable locations. In term of identification the principle is to deal with the structural composition of the rocks and concentrate the endeavours towards the more robust type(s) of stone in the selected area.

It has been highlighted before that a ‘driver’ for the production of terrestrial rock art is the vicinity of a known and recorded ‘encountering area’ between Aboriginal people and foreigner. This art then is a way to express and document an unusual event. Attention then turns to another type of factor which is driven by anthropogenic agents. Thus, one of the criteria within this realm of considerations is the location of a contact area, but could include also mythical Aboriginal stories, ritual area or al sort of manifestations encompassing a rock

art performance. More generally, this theme incorporates the participation and involvement of an obvious and greatly informative body, namely the Aboriginal society. Practically, as Nutley (2000:35) has emphasized, "there is a need for a concerted effort to ensure that such groups are involved in the planning, and implementation of such projects and that employment prospects for such people should be explored".

In an earlier study concerning the erosion of submerged prehistoric sites due to high energy water flow (together with the weathering process of sand acting as an abrasive on the rock surface), Dortch (1998) shed light on another important factor to take into consideration. Indeed, during the rise of the sea level, sites would have been subject to erosion after being submerged by turbulent seas (Dortch, 1998). Thus constant exposure to successive and repetitive dry and wet periods, as well as strong turbulence, wave action, tropical cyclones and tidal surge is a major negative influence. Afterwards, the survival chances of these sites were diminished facing the continued total submersion (Dortch 2002). Dortch also suggests some conditions where deposit might be preserved underwater. Indurated or strongly cemented terrestrial sediment like calcareous flowstone (Dortch 1998) appearing for instance at the cave site of Devil's Lair in Western Australia (Dortch 1979:Fig.4a, Dortch and Merrilees 1973:Plate.IIA, Fig.5) appear to have the potential to resist marines erosion, and may have covered and preserved rock art.

All this lead towards a focus on another important factor which should be more often closely regarded in this type of study, namely deterioration and conservation agents, processes and impacts. Unfortunately, there seems to have a lack of research or a very limited number of related studies to compare to in this very specific discipline which the conservation of rock art underwater. Nonetheless, several case studies approach the subject and can be used comparatively.

Rosenfeld (1985:18) asserts that in term of rock art preservation as a first step "an assessment of the dynamics of the physical and chemical processes at the rock surface". Most of the research on rock art deterioration has been targeting the understanding of the process involved, but few have been concentrating on the time scales involved (Rosenfeld 1985). The two main factors acting for the decay of rock art are either affecting the stability of the rock surface or of the pigment layer. The salt might mask by deposition the rock art, damaging the structure of the pigmentation, or also causing flaking on the rock surface. The moisture can be seen as an important agent impacting through various manifestations (such as the multiplication of the algae and fungi's or micro-organism) the intensification of the weathering. Even if once submerged moisture and salt might not act in the same manner, these procedures would have been working before the sea level rise. In addition, bush fires are likely to have caused exfoliation.

More specifically, the weathering of engravings is principally operating by formation of a stable patina resulting in the tendency for engravings to display similar colour and texture than the rock (Rosenfeld 1985) thus becoming invisible. Soleilhavoup (1981) has seen in the type of technique of carving (such as the use of percussion) a substantial increase of the susceptibility of the rock surface to porosity. For the rock paintings, their durability "depends on the properties of the pigment and the bonding of the pigment to the rock"

(Rosenfeld 1985:48). In fact, due mainly to the rotation of wetting and drying on the rock surface the paintings are more likely to be easily removed, by phenomenon such as the evaporation being characterized by an increase in the level of biological activities at the rock surface (such as stone borers, Pearson 1987) during the wet season (McLeod et al 1995).

In some regards, this introduces the deterioration due to the long term process of climate and micro-climate. Light, temperature, humidity variations daily and seasonally are both affecting the state of preservation of rock art. These cycles, sequence the stress of the pigment bonding properties resulting in exfoliation (McLeod, 1991 and 1997).

Examples occurring terrestrially are quite rare. But there are exceptions such as the case of the Cosquer cave along the French Mediterranean coast, near Marseilles. The cave covered with a lot of Paleolithic paintings is half submerged, showing "in the upper part of the cave, rock art well preserved" (Collina-Girard 1996:6), which is not the situation on the lower part even though some engravings could still be visible underwater. In South Korea, the Bangudae petroglyphs from Ulsan are endangered. The carvings were made on a cliff made of sedimentary rocks, and which is submerged during eight months of the year because of the action of a dam. The study undertaken in this context by Fitzner et al (2004:504), had focused on the "evaluation and scientific rating of the weathering damage on the Bangudae petroglyphs, the petrographical characterization of the rocks, a risk prognosis and the deduction of information on need and urgency of preservation measures", because unfortunately the engravings are being deeply affected by the water.

Another case, again in France seems to provide some hope under very specific conditions. The prehistoric rock art discovered in 1991 in the d'Arcy Cave (Yonne, France), was, after some difficulty, identifiable due to a superficial deposit of calcite on top of the pigment. The mechanical controlled abrasion of the surface enabled the thickness of calcite where the infra-red photography revealed tracks of pigments, in this case charcoal (Baffier et al 1999). So in some regards, the surface of the rock continued to grow over the rock art, acting as an ideal fixating agent. The scientific scope of this intervention concerned the discovery of unknown rock art, the pictorial technique, the stylistic knowledge, and the relative chronology.

2.3 Expected situation, further necessities and recommendations

At first sight, the situation might seem a bit hard and maybe desperate but, some hope is permitted. In deed, the d'Arcy Cave provides hope, together with the Cosquer cave and the Bangdulae petroglyphs, with goal to scientifically increase the research and knowledge of rock depiction underwater. Obviously, there is a lack of baseline studies to build upon effectively, but this condition requires in Australia the development of some sort of first step methodology for the identification of "broad, flat, shelving submerged coast and associated low energy wave activity" (Nutley 2005b:97), as well as an assessment and management of these sites (Nutley 2000).

The scope of the possible intervention is wide and can encompass activities such as the creation of a register of inundated sites, the development of an investigation methodology, of policies and management procedures and of public access to information (Nutley 2002). In addition to these suggestions, Nutley (2002) has highlighted areas of research objectives programs such as the different effects of inundation, baseline data on the cultural, chemical and biological criteria deteriorating and protecting the survival of cultural remains, conservation work and strategies, training for different level of involvement in the study of human activity residues.

As we have seen there are some very specific circumstances where the preservation of prehistoric submerged sites among which is rock art, can be found favorable. Actually, it is more a succession of conditions where the integrity of the site seems not to be completely erased.

Another very useful, criteria to take into consideration would be the creation for a selected area of a list of the locations which have been impacted by human destructive activities. This type of information would enhance substantially the potential realm of investigation once on the field, eliminating the region with lower degree of probability for the emergence of archaeological signature. In this search for suitable accurate location, attempting to localize all not surveyed caves would potentially bring more data in. Thus now that the general natural components being able to impact the discovery of prehistoric submerged sites, are starting to be identified, it is necessary to move toward a localization of area where the greater combination of these favorable factors emerge.

Finally, a recent development in GIS technology has been able to create high-level technology in computer based analysis through the development of an amazing tool called Arc GIS 9 software. This instrument as a GIS device has the potentiality to use, study and analyze the relationship between sites and its geographical context (landscape archaeology), spatial predictive model for site location, or remote sensing imagery interpretation.

For the case of Western Australia, if all these necessities would be implemented, the identification of sites would be more visible. But this type of study needs a lot of systematically oriented preliminary researches to provide comparative data enabling improvement and assessment and management as well as awareness. An important and organized move towards that direction on the study of submerged prehistoric sites is still waited at a wider scale.

3. Depuch Island: Considerations for a case study

3.1 Starting situation

Depuch Island known as Womalantha by Aboriginal people lies between Port Hedland and Roebourne along the coast of the Pilbara in Western Australia. Depuch Island is part of the territory of the Ngaluma tribe (Worms 1951). Originally hunter-gathers focused also on fishing, the tribe is “virtually extinct today” (McCarthy 1961:123), after the occupation of the country by white settlers from 1864, smallpox, and the gold rush leading the practice of engravings vanish slowly.

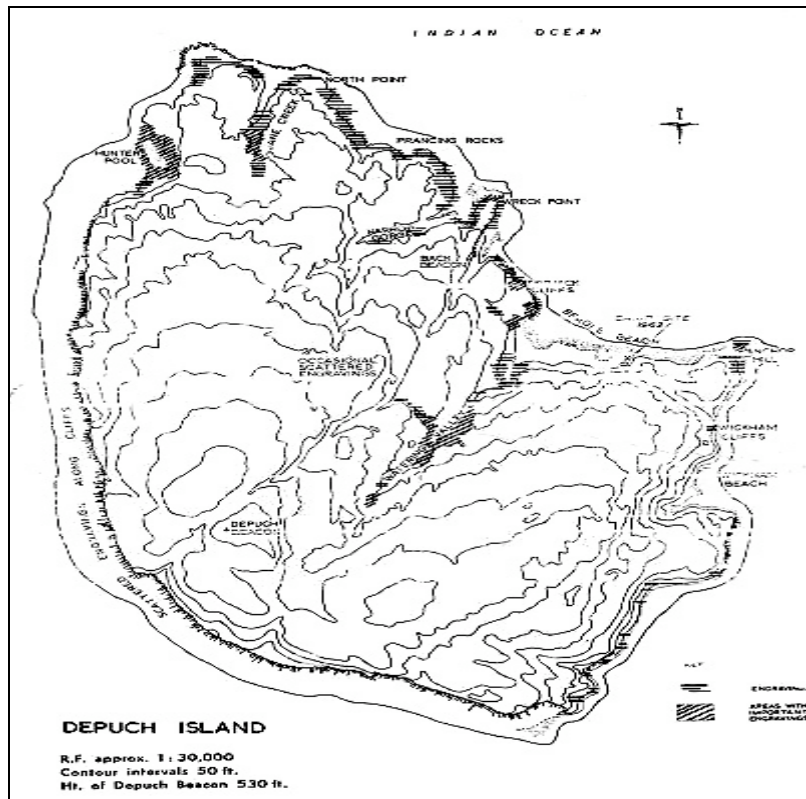
The island belongs to the Forestier’s Archipelago, from which it is the largest island. It received its name from the French expedition led by Nicolas Baudin in 1801 after Louis Depuch, mineralogist of the expedition, who died in 1803. Ronsard (also from the same mission) spent a little while there, where he identified the basalt structure of the island, and found signs of fireplaces and newly worked pieces of basalt but no encounter with natives (McCarthy 1961). Later, the H.M.S *Beagle* led by Wickham (1842) stopped in Depuch Island seeking drinking water. He portrayed the island as a pile of reddish colored rocks of eight miles in circumference and 514 feet high. Wickham assumed that because of the absence of watercraft, the natives would have crossed the channel from the mainland through sandbanks (which is currently not possible anymore). The reason invoked for this was the perception of Depuch as a place of good condition for turtles and fish, or where natives were performing ritual drawings on rock surface (McCarthy 1961). The place seems also to be known for its fresh water reserves available in small pools along the rocky shore particularly around Anchor Hill (Petri and Schulz 1951), providing good environmental conditions for temporary settlement. Finally Depuch island “was declared a sanctuary in 1958 for the protection of the engravings and fauna” (McCarthy 1961:121).

The extreme wealth of engravings due to its quantity and variety has been recognized as impressive by many visitors (Crawford 1964). Even if the great majority of these rock art manifestations have been identified as being ritually orientated (Berndt 1964) as “notable expression of the totemic view of the natives’ world” (McCarthy 1961:146), they can still be seen as “a record of the thoughts, beliefs, and legends of the people who once visited and lived on the Island” (Crawford 1964:24). The sacred and spiritual essence of the engravings from Depuch Island lies on their relation to natural species being depicted in order to ensure their abundance, the representation of ancestral and mythical beings, and the implementation of initiation ceremonies (Berndt 1964).

One of the questions which is attached to this engravings, is how a tribe known for its small population can have produce such a great quantity of engravings. The answer of Berndt (1964) resides in the sacred characteristic of these visits where duplication and repetition of engravings designs were carried out. This point seems to be put in perspectives and detain more sense when McCarthy (1961:145) suggests how “it is possible that Depuch Island supplanted Port Hedland as a ceremonial place associated with rock engravings”.

As it has been expressed earlier, Dortch (2002) put the accent on the potential of Depuch Island to detain a paramount wealth in term of submerged petroglyphs like the one in the Dampier Archipelago and Burrup Peninsula, even

though it still needs to be discovered. As he points out, “the study rationale is that submerged continental shelves are as much parts of given prehistoric landscapes as those of adjacent mainland areas and offshore islands” (Dortch 2002:37). Such similitude can be drawn because the environmental and artistic conditions occurring in both locations are quite comparable. Indeed the geological situation is quite similar where Dampier and the Burrup are covered with mainly reddish-colored igneous rocks (Dortch 2002) and Depuch Island appeared for Stokes (1846:167) as “large columnar blocks of the greenstone of which the island is composed, present as the sun falls on their iron rusty surface, an appearance as if the sides of the valley were lined with red warriors”. In fact, all the rocks of the island are displaying an orange brown layer on the surface, with just underneath a yellow one “before the greenish grey of the unaltered rock” (Crawford 1964:44). Moreover, both environments are the support surface of an extremely vast collection of rock engravings “offering genuine opportunities for identifying ancient Aboriginal sites on the seabed” (Dortch 2002:37). Now, only opportunities are missing before to start the research process.



Map of Depuch Island

3.2 State of the research and expectation

The engravings have been slightly studied, mainly around 40 years ago, but the wide scope of the studies allow having a fairly good indicative description about several problematic providing a better understanding of these pictorial manifestations. Chronologically, the first scientific research implemented on Depuch Island specifically about rock engravings have been conducted by the German anthropologists, H. Petri, A. Lommel and D. Fox in 1938-39 to record carvings around the shore of Anchor Hill specifying that this form of art should have “belonged to a ‘saltwater’ tribe” (McCarthy 1961:123). A intriguing aspect of this study seems to be manifested in the localization of what they interpret as a stone cairn for navigation at this exact spot. The provenance of this information or assumption would require verification because of its potential to elude or cancel some tracks and suggest new one.

Technically, the rock engravings are most of the time pecked by hammering, damaging the rock surface with the edge of another portable and harder rock (Crawford 1964). Stylistically, the depictions present are divided between figures represented only by their outlines and others where the entire surface of the representation is abraded. Their disparities subsist also in term of subject, process (involving the use of shell for the outline before the hammering phase) size and probably time consumption to their completion distinguishing more sharply those two categories (Crawford 1964). McCarthy (1961) identified the sporadic but effective usage of the shape of the rock to illustrate the contours of a body.

Providing an accurate or even a relative date for these engravings would be risky since no stable and definite methodology has been established to do so. Nevertheless, Crawford (1964:46) asserted that “they were made over an extensive period even into the present century”. This reflection obviously leads to the question of the stylistic sequence to relatively indicate a date period for groups of engravings.

McCarthy has developed a methodology for the study of superimposition of engravings in order to isolate stylistic changes (Crawford 1964). He subdivided the various types of engravings in Depuch Island as naturalistic outline figures, geometric motifs and intaglio figures. Unfortunately, the hypothesis revealed itself as inconclusive, due to undifferentiable (new word) combinations. Similarly, Crawford (1964) creates a chrono-typology based on the rate of weathering being related to a range of colors, which ended up appearing clearly not constant in almost all areas of investigation.

Finally, McCarthy (1961) evoked very briefly some considerations on the state of preservation of the rock engravings of Depuch Island. He identified a tremendous variation within the engravings ranging from those so weathered that a side light is necessary to distinguish them, to the specimen being perfectly preserved. He also has been able to locate and to discriminate the situation where the engravings were the best preserved, being “those engraved in the thick, patinated layer on the surface of the boulders on the sides and tops of the ridges and hills” (McCarthy 1961:147).

We have seen how analogous the situations are between the Dampier Archipelago and Depuch Island on a level of localizing and establishing potential priorities of research area to concentrate the endeavors for targeting places of

higher chance to see something emerging in our search for the presence of underwater Aboriginal depictions. So basically, after the identification of a series of criteria that needed to understand the process in order to reply efficiently, a research strategy is in need to lead properly the search in these two areas of great potential.

Conclusion:

Three major aspects of the realm of the submerged rock art have been addressed in this study. First, it has been put together a catalogue of the Aboriginal depictions of watercraft located in Western Australia. Secondly, the emphasis has been centered over an overview, an identification and some recommendations about the question of predictive modeling of the survival potential of underwater depictions. Finally, the case of Depuch Island has been considered as an ideal location to implement further work about submerged rock art.

Line of strength of the study is that even if the range of depiction which would have survived the rise of the sea level is substantially low, by understanding more accurately the process acting upon them, it becomes more feasible to locate potential surviving examples. But the chance of such a discovery rely on the effect of long term action and natural processes for which the realm of conservation do not possess comparative ongoing data for a submerged environment to be able to assess the preferable and adequate physical and biological circumstances for optimal preservation.

Nevertheless, this discipline is constantly evolving. The task would require some preliminary tested guidance to lead the localization of research priorities, in order to apply systematic survey. This could result in increasing the chance to identify and locate concentration of submerged rock art potentially which some of them would predate most of their land counterpart, and maybe showing instance of ancient floating watercraft. Additionally, the case of the cave d'Arcy in France provides some hope in the identification of very specific condition of preservation of almost lost tracks. Basically, the more this subject would be the center of attention of researchers, the more our understanding of this pictorial manifestations will be increase to implement appropriate management policies.

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