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MOLLUSCS AND FISH IN THE ROCK ART OF THE COAST, ESTUARY AND HINTERLAND OF THE WORONORA PLATEAU, N.S.W.

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Abstract. This paper examines the distribution of rock art depictions of marine creatures, eels and other estuarine and freshwater fish, in the shelters and open sites on the Woronora Plateau, south of Sydney, New South Wales, Australia. Eels and other fish are distinctive art motifs throughout the area and are located adjacent to inland rivers as well as the coast and the coastal estuaries. Shells have a restricted distribution on the archaeological deposits in the area and are an indication of the short-term foraging range. The fish in the art are indicative of the importance of this fauna to the Aboriginal people of the study area. In the coastal and estuarine hinterland motifs reflecting fish of the sea and estuary are of greater significance than eels. In the rugged elevated plateau to the south of the study area, however, the reverse is the case. In this southern region the importance of the rivers, creeks and swamps as a source of eels for Aboriginal people cannot be underestimated. Anomalies in the distribution of art techniques in the depiction of marine, estuarine and freshwater fauna are described. The art is a flawed resource as its significance to the Aboriginal people is unknown. It is not necessarily simply a reflection of diet, as it may reflect Aboriginal routes connecting the west, through the rugged study area, to the eastern coast. However it certainly represents the significance of fish to the people who lived and travelled through the study area.

Introduction

The study area is located on the thickly vegetated Woronora Plateau of the Sydney Basin (Fig.1). The plateau is formed of the gently dipping Hawkesbury sandstone, which, in the northeast of the study area extends to sea level, while in the southwest it rises to an altitude of over 600 m. The study area is located within three drainage basins. From north to south these are the Hacking River catchment, Georges River catchment (including the Woronora River, Waratah Rivulet and O'Hare's Creek) and Nepean River catchment (including the Cataract, Cordeaux, Avon and Nepean River). The rivers basically drain to the north from the Illawarra Escarpment before flowing east to the sea. Only the Hacking River reaches the sea within the study area (Fig. 2). Rivers in the south of the study area are deeply incised and flow through narrow gorges.

As mentioned, the Hawkesbury sandstone extends to the coastline in the north but,

further south, a coastal plain has developed with small eastward flowing creeks draining from the steep escarpment. The northern

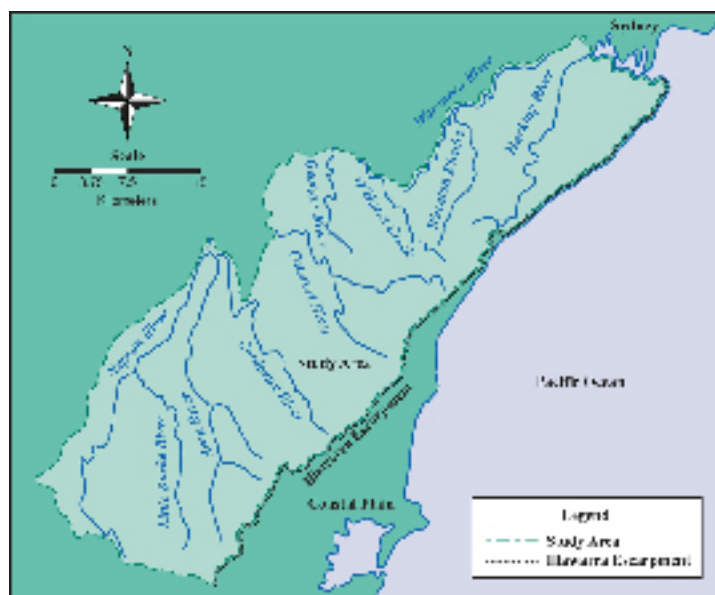


Figure 1. Map of the study area.

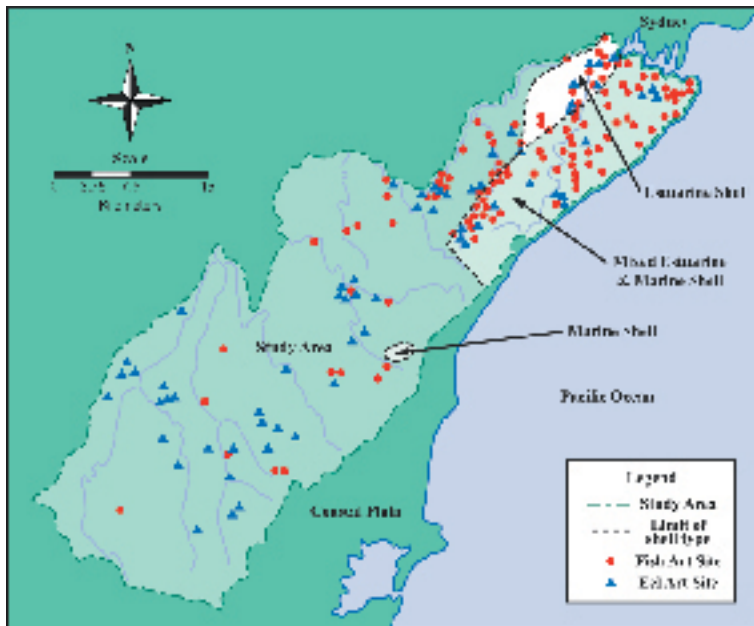


Figure 2. Distribution of estuarine and coastal shell, 'fish' motifs and 'eel' motifs in the rock art of the study area.



Figure 3. Petroglyph pavement with 'fish' and 'kangaroo'.



Figure 4. Charcoal drawings of 'eels'.

limit of the study area is the southern shores of the major Port Hacking estuary. Along the coastline there are various small estuaries and the estuarine Lake Illawarra. To the south the coastal plain extends for 10 km to the east of the study area.

The numerous cliff lines throughout the study area have many sandstone overhangs suitable for occupation and the depiction of imagery, mainly pictograms, while open horizontal outcrops have areas suitable for petroglyphs (Fig. 3).

At the time of contact the study area was home to the Dharawal linguistic group who were subdivided into two tribal groups. The Tharawal occupied the study area from Port Hacking to the ridgeline separating the Georges River catchment from the Nepean catchment. The Nepean catchment, the southern section of the study area, was occupied by the Wodi Wodi (Sefton 1988: 21).

There are frequent references to Aborigines from Botany Bay being present on the coastal plain at Wollongong and people from the coast travelling inland west of the study area (Sefton 1988: 26, Figs 9, 171, App. 2).

Rock art

The Illawarra Prehistory Group has been surveying the Woronora Plateau for 40 years (Figs 1 and 2). To date approximately 700 km² of rugged sandstone has been surveyed, which includes Royal National Park, Heathcote National Park, Dharawal State Conservation Area and the Metropolitan Water catchment Area. The vast majority of the study area is totally undeveloped. To date the survey has identified over 3100 archaeological sites, including over 2100 shelters with evidence of use, either surface artefacts or rock art.

The art occurs as red or yellow ochre, white pipe clay, black charcoal and polychrome drawings; red or yellow or white paintings; or red or white stencils. These pictograms are present in 1336 shelters while the petroglyphs occur on 160 horizontal sandstone outcrop sites. Overall charcoal drawing is the most common art technique, while 190 red ochre drawings and 511 petroglyphs have been identified. The distributions of these art techniques are not uniform throughout the study area. Approximately 50% of the charcoal drawings (Fig. 4) are in such poor condition that they cannot be interpreted. Similarly, 74% of red ochre drawings (Fig. 5) were classified as indeterminate. In contrast, the majority of

Motif type	Woronora Plateau	
	Number	Percentage
'Kangaroo'	1024	30.6
'Frontal human'	883	26.4
'Fish'	188	5.6
'Eel'	98	2.9
'Bird'	211	6.3
'Echidna'	51	1.5
'Snake'	88	2.6
'Lizard'	51	1.5
'Possum'	45	1.3
'Profile human'	215	6.4
'Zoomorph'	5	0.1
'Bat'	28	0.8
'Material object'	13	0.4
'Symbol'	273	8.2
'Human track'	19	0.6
'Faunal track'	52	1.6
'Tortoise'	14	0.4
'Grubs'	72	2.2
Other	14	0.4
TOTAL	3344	99.8

Table 1. Charcoal motifs recorded in the study area on the Woronora Plateau (prior to 2008) excluding indeterminates.

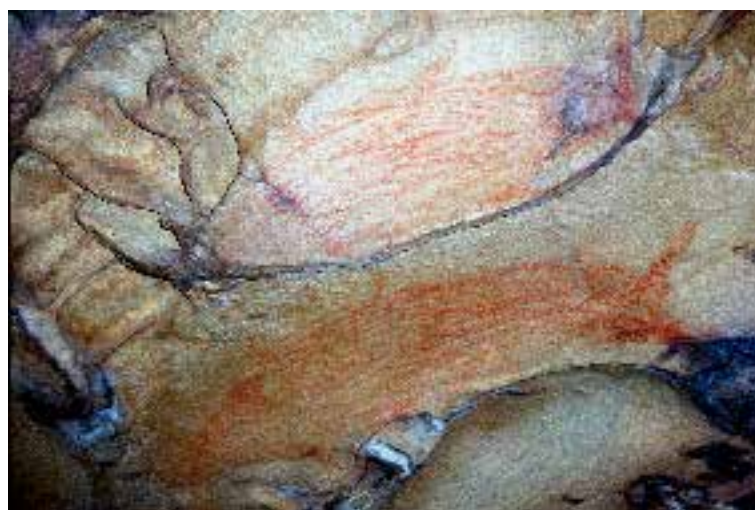


Figure 5. Red ochre drawings of 'fish'.



Figure 6. Petroglyph of 'fish'.

petroglyphs (Fig. 6) can be identified to type. Of 3344 charcoal drawings, 31% were classified as 'kangaroos' (Table 1), however the class includes all land mammals except possum and bat as it proved very difficult, if not impossible, to accurately ascribe species to the majority of figures in this class.

This paper, however, is about the distribution of eels and other fish. While eels are actually a class of fish, my grouping of 'fish' includes potentially fish, whales, seals, sharks, dolphins and anything else which swims in the rivers, estuaries and sea in the study area. Eels are excluded in this case as, in the Aboriginal art of the study area, they have a distinctly different shape and appeared to have a contrasting distribution to other fish species (Figs 7 and 8). It is, however, difficult to identify 'fish' species from the art. Some, such as whales, dolphins, stingrays, sharks and killer whales, are obvious, but the remaining are difficult for specialists to identify (Ron West, pers. com. 2010; Dallyn Birrell, pers. com. 2010).

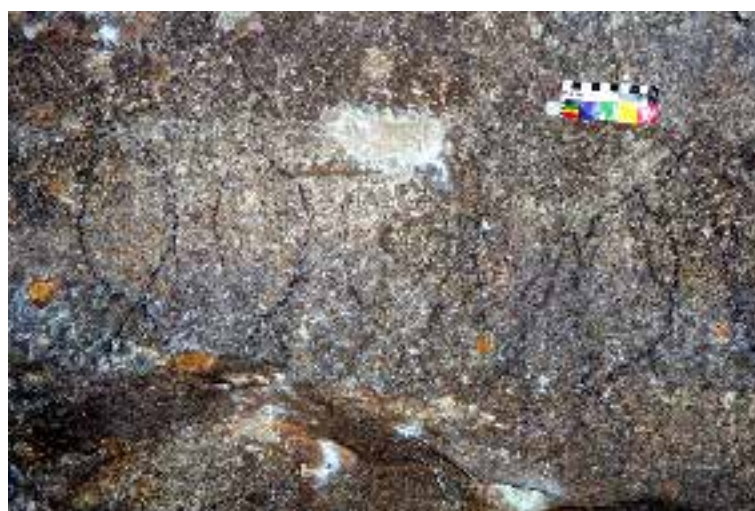


Figure 7. 'Fish' motifs

'Fish' represents 5.6% of the 'identifiable' charcoal drawings in the study area and 'eels' represent 2.9% of the charcoal drawings (Table 1). By comparison, of the identifiable red ochre drawings, 'fish' represent 12.9% (n=24) and 'eels' 5.8% (n=11). Of the petroglyphs 'fish' represent 19.8% (n=101) and 'eels' represent 0.4% (n=2). Thus this paper is about a minor component of the art of the Woronora



Figure 8. 'Eel' motifs.

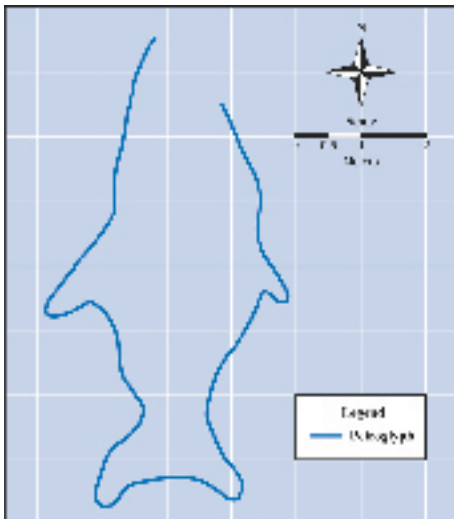


Figure 9. 'Fish' which may represent a whale in the southern section of the hinterland.

Plateau.

Multivariate (correspondence) analysis of the charcoal motifs (16 variables) in 612 shelters has demonstrated spatial variation in motifs whereby there is a gradual south-westerly decline in the depiction of 'kangaroos', 'echidnas' (spiny ant eaters) and 'fish' relative to an increase in the depiction of frontal 'human' figures and 'eels' (Sefton 1992).

Art techniques are not uniform throughout the study area. There is a decline in petroglyph sites such that

there are only six petroglyph sites known in the Nepean catchment while in the north of the study area over 100 have been recorded. Similarly, adjacent to the coast and the Hacking Estuary charcoal drawings represent 36% of the art, counted by motif, while red ochre drawings represent 10% of the shelter art. In the Woronora River and Cataract River catchments charcoal art represents 78% and red drawing 4% of the shelter art (Sefton 1988: 86).

'Fish' motifs are present in 137 sites and 'eels' in 81 sites. 'Fish' and 'eels' are together in 14 sites. Charcoal drawings of 'fish' are present in 83 sites and 'eels' in 67 sites. In red ochre, 'fish' are present in 15 sites and 'eels' in four sites, while there are 29 sites with 'fish' petroglyphs and two sites with 'eel' petroglyphs. This imbalance in the technique used to portray fish and eels is partly attributable to the imbalance in the techniques used in the study area.

Fish and molluscs

The historical records of the Sydney and South Coast areas have frequent references to the exploitation of marine and estuarine resources by the Aboriginal people (Attenbrow 2002: 66; Organ 1990: 12–15, 19).

Archaeological excavations on the coast and around Sydney Harbour identified 35 different fish species. In addition marine mammals (whales, seals and dugong), sharks, sting rays, crustaceans and marine reptiles have been identified in other archaeological excavations (Attenbrow 2002: 65–69). There are also frequent references to the collection of coastal and estuarine molluscs and shell middens around the coast and estuarine shores (Attenbrow 2002: 51).

By contrast there are few historical references to the exploitation of inland fresh water fish and eels. Collins observed that fish, eels and platypus were eaten west of Sydney on the Hawkesbury/Nepean River in 1798 and, in 1802, Barralier observed enormous numbers of eels, fish and shellfish caught and collected in the Nepean River swamps (Attenbrow 2002: 69).

Similarly the archaeological evidence of the exploitation of freshwater resources is not plentiful. An excavation at Shaw's Creek had freshwater mussel shell, while a small amount of freshwater fish and crustaceans were recovered from the excavation of another sandstone rockshelter at Upper Mangrove Creek northwest of Sydney (Attenbrow 2002: 69).

McMah (1965) analysed the petroglyphs of the Sydney Basin, including the Woronora Plateau. She demonstrated the heterogeneity of the repertoire and the effect of environment on the subjects. Fish, which included eels, were depicted throughout the entire area where petroglyphs were present, but the percentage of fish relative to the other motifs were much more frequent in the coastal areas than the inland (74% vs 13%).

In a more recent study of the Nepean River catchment, which forms the southern section of the study area, Dibden (2011) studied the synchronic and temporal differences in the rock art. The art was considered as an embodiment of an idea or quality or to provide a spirit with a visible form. She identified eels as being depicted in all graphic periods of the production of the art (Dibden 2011: 163, 220, 223, 227). She includes eels with other animals which are widely distributed over geographic space and in the art have a formal arrangement with respect to natural features of the rockshelter and their depiction in movement as having a narrative quality. She suggests that

the eel motif animates the earth and the nature of its inscription and distribution suggests a deep connection and relatedness between people across the Upper Nepean. Eel motifs, and others, suggest their function in the depiction of stories and narration relating to the land

and water ways (2011: 268).

On the other hand, only 12 fish are depicted in the most recent art phase (Dibden 2011: 235, 239). In the absence of archaeological data the art phases are not specifically dated.

The study area includes three major resource zones, coastal, estuarine and hinterland (Fig. 1). As mentioned previously, the south-western region is far more rugged with deeply incised, steep-sided valleys. There are no observations of the use of river resources in the study area and little archaeological evidence apart from the art. Unfortunately, we also do not know the significance of the rock art. Dibden (2011: 264, 268) has suggested that it may have a far more complex meaning than a simple reflection of diet. The imagery may have an abstract meaning. It may reflect routes connecting the west, through the rugged study area, to the culinary delights which wait ahead on the eastern coast. The art, however, most certainly indicates that fish and eels held a particular significance for the people who lived and travelled through the study area.

Molluscs

Anadara trapezia (Sydney cockle) were used as the diagnostic shell for estuarine source on middens and a mixture of rock platform species were used for coastal. As well as a food source, shell, including *Anadara* sp., was used by the Aborigines for ornamental or utilitarian purposes (Attenbrow 2002: 118–119).

Estuarine and coastal shell is present for a distance of 7 km from the coast and Hacking River. However, coastal shell is present on middens up to 12 km from the coast (Fig. 2). This may reflect transportation by canoe. Further south, coastal shell is present for a distance of 7 km inland in the Woronora River hinterland. Also present in the shelters of the Woronora River are samples of freshwater mussel.

The short-term foraging distance of 7 km (Sefton 1988: 138–145) is reflected in the distribution of shell. The Aboriginal people travelled from the coastline to the Hacking River estuary and vice versa. They also travelled from the coastline to the headwaters of the Hacking and Woronora Rivers, O'Hare's Creek, and the Cataract catchment carrying molluscs. *Anadara* sp., which is an estuarine species, has been found in small numbers in the Cordeaux catchment west of Lake Illawarra (Attenbrow 2002: 118–119).

Otherwise, shell is mainly indicative of diet (Attenbrow 2002: 66–68). Depictions of 'eels' and 'fish' on the walls of the shelters and on horizontal sandstone outcrops occur close to the shell deposits. Elsewhere in the Sydney Basin the archaeological deposits in shelters, where shell is abundant adjacent to the coast and estuary, contain fish remains. The rock art in these shelters certainly depict fauna of significance to people in that locality and includes no doubt items of diet. Fresh water pipi is present in shelters above Waratah Rivulet, the main eastern tributary of the Woronora River. One of these shelters features 'eels' depictions.

Eels

Eels are present in all of the rivers, creeks and swamps throughout the study area (Beumer 1996: 40). 'Eels' in the art of the Woronora Plateau have a wider distribution than 'fish' and are well represented in the rugged south of the study area (Fig. 1). In the south, where the deep gorges occur, shelters on the lower slopes generally do not have art or other archaeological evidence, but depictions of 'eels' are found in rock art shelters on the upper valley slopes and near the ridge tops. The exceptional region, however, is the ridge top area above the extremely narrow and deep gorge area of the Nepean and Little Burke Rivers, where 'eels' are not represented, although other rock art is present.

In the north of the study area 'eels' are represented in art adjacent to the Hacking River, the Woronora River and O'Hare's Creek, the major tributary of the Georges River. The presence of 'eels' in the rock art of the study area located adjacent to the major rivers and creeks suggests that the art represents dietary eels. The rivers and creeks of the study area were exploited for eels, excepting the rugged deep gorges of the Nepean and Little Burke Rivers. While 'eels' are present in all the rock art techniques used in the study area, there are only two examples in petroglyphs, both of which occur in the Hacking catchment in the north of the study area.

Fish

A wide variety of marine fish are common adjacent to the beaches and rocky shorelines of the coast and estuarine fish are present in the estuaries. In the hinterland fish are generally available throughout the study area. Bass is present to only 600 m above sea level, while Macquarie perch extend upstream of the bass. Both grow to over one kilogram in weight (Harris and Rowland 1996: 154, 156) and sizeable gudgeons are also present (Larson and Hoese 1996: 200–219).

Fish are present in all the art techniques used in the study area and are commonly represented in the rock art of the north of the study area. Not surprisingly they are present in the rock art throughout the easterly Hacking Catchment in the hinterland, along the estuary and on the coastline. There is also a high concentration of shelters with 'fish' images along the Woronora River and Waratah Rivulet, which drain from the escarpment and a major ridgeline west of the Hacking River (Fig. 1).

There are few 'fish', however, depicted further south in the high rugged southern study area of the Avon and Nepean Rivers. Those that are depicted are generally located on the upper slopes above the major rivers rather than along ridgelines. However, among the 'fish' depicted in the southern section of the study area are two images on major ridgelines on the north and south drainage of the Cordeaux River that we see as whales (Fig. 9). One depiction is a petroglyph and the other a charcoal drawing. These indicate connection between the coast and the hinterland.



Figure 10. 'Fish' which may represent 'bass/perch' or 'gudgeon' in the hinterland.

Elsewhere the fish shapes (Fig. 10) found in the hinterland of the study area may represent two fish types (bass/perch or gudgeon), which are present in the rivers (Dallyn Birrell, pers. comm. 2010).

Variations in the rock art techniques

Dibden (2011: 239) identified two major graphic phases in the Nepean catchment on the basis of technique superimposition, shelter morphology and location. The earlier phase was red ochre drawing and the later phase was charcoal drawing.

The art techniques used to portray 'fish' and 'eel' motifs varies across the study area. In the Nepean catchment 'fish' are only drawn in charcoal. Only five sites in the Georges River catchment have red ochre depictions of 'fish' while in the Hacking catchment ten sites have red ochre 'fish'. If the presence of only charcoal fish in the Nepean Catchment is temporal then this suggests a late exploitation in the final art phase of the deep river valleys for fish. By contrast the red ochre 'fish' of the Georges River catchment and the Hacking catchment may indicate an earlier period of fish exploitation.

Petroglyphs are mainly located in the north of the study area and decline in numbers to the south, though they are frequent on the Woronora River. Depictions of 'fish' as petroglyphs (19.8%) are restricted to the Hacking catchment (apart from the large Cordeaux River 'whale' mentioned above).

Only two petroglyphs of 'eels' have been identified in the Hacking catchment and the coastline. Perhaps the relationship of petroglyphs to 'fish' and not 'eels' suggests an association more with the marine environment rather than the hinterland, but this remains to be explored.

Conclusion

The presence of 'fish' and 'eels' in the art of the study area is indicative of the importance of this fauna to the Dharawal-speaking people of the study area.

Supporting McMahon's thesis (1965), images of 'fish' were more common near the coast and those of 'eels' within the hinterland. This then suggests that fish of the sea and estuary were of particular significance to the Tharawal people, while in the southern rugged lands of the Wodi Wodi people eels were of greater significance. In the southern area then, the importance of the rivers, creeks and swamps as a source of eels cannot be overestimated. The temporal significance of the colour variation used to portray 'fish' and 'eels' present in the study area have yet to be fully explored.

Acknowledgments

Without the voluntary systematic survey and recording of the Illawarra Prehistory Group over forty three years, little would be known about the rock art and archaeological sites of the Woronora Plateau. I would like to acknowledge the tireless efforts from so many people over so many years. Others have contributed to this paper: Melanie Thomson and Ashleigh Pritchard of BIOSIS Research Pty Limited assisted with GIS of the shell, fish and eel sites, Lloyd Sefton prepared the figures, and Ron West and Dal Birrell provided references and applied their knowledge of fish to the 'fish' images. Special thanks to R. G. 'ben' Gunn for his patient editorial efforts.

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