7

EXCAVATION AT THE GREAT MACKEREL ROCKSHELTER

This chapter details the excavation and analysis of the Great Mackerel rockshelter in Ku-ring-gai Chase National Park. A total of 24 person days was spent on the excavation in November 1987. The art was recorded in 1986 for Stage II of the Sydney Basin Rock Art Project (McDonald 1987). Two person days were spent recording the art.

The aims of the excavation were to determine:

1) the nature of the occupation evidence at the site, including its contents and age;

2) whether there were two phases of occupation at the site (as suggested by the art assemblage);

3) whether the art was contemporaneous with the occupation deposit.

Environmental Context

Great Mackerel Beach is on the eastern side of Pittwater, towards the north of West Head in the National Park (Figure 7.1). The Great Mackerel rockshelter is located on the ridgeline south of the beach, 80 metres in elevation above sea level.

The shelter is surrounded by undisturbed dry sclerophyll forest. Dominant tree species include *Angophora costata* (Sydney smooth-gum apple), various Eucalypts and *Casuarina* spp. (She-oaks), and *Banksia serrata* (Old-man Banksia). There is a moderately dense understorey of grasses, *Xanthorrhoea* sp. and bracken fern.

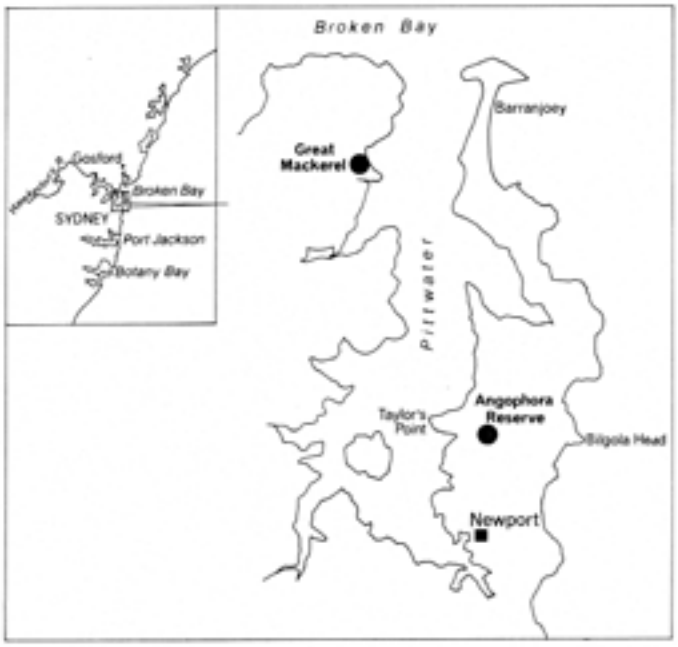


Figure 7.1: Locality Map showing Great Mackerel rockshelter and its context.

The bedrock along the ridge top is of the Hawkesbury Sandstone Formation, while Narrabeen sandstone and shales are exposed further down the slopes. The nearest permanent water source is a creek feeding into the southern end of Great Mackerel Beach. While this is only 150m distant, it is 80m in elevation below the site.

The Site

The Great Mackerel rockshelter measures 10m x 4.5m x 2.5m (Figure 7.6 and Figure 7.7) and has a northerly aspect. The archaeological components of

the site include art (stencils, drawings and paintings) and occupation deposit (shell, stone artefacts, bone and pigment).

The Art

An assemblage of 114 motifs was recorded at the site. Most of these are stencils. There are two artistic phases at the site. The earlier art phase consists of red hand stencils only. The later phase includes white stencilling (hands and other objects), white drawing and painting, and charcoal drawing. The art is in good condition, while fairly faint, and there is limited evidence of exfoliation.

Motif and technical information were recorded at the site (Table 7.1). White is the dominant colour used (66%), followed by red (19%) and black (16%). Stencilling as a technique predominates (82%): drawn motifs represent 16% of the assemblage and painted motifs 3%. Of the twenty non-stencilled (i.e. depictive) motifs the majority (65%) are infilled, with smaller numbers outline only (15%) or outlined and infilled (20%). Three of the depictive motifs have linear infill.

Figure 7.2: The Great Mackerel rockshelter. View from the north-east.

Table 7.1: Art Assemblage: Motif and Technique Information.

Motif	Colour			Technique						
	Red	White	Black	Drawn	Painted	Stencil	Outline	Infill	O/I	Total
Boomerang		2				2				**2**
Shield			3	3					3	**3**
Digging stk		4				4				**4**
Hands	21	58				79				**79**
Feet		3				3				**3**
Hand var.		3				3				**3**
Bird tracks*		2	6	6	2			6	1	**7**
Leaf		2				2				**2**
Twig		1				1				**1**
Unid lines			3	3			3			**3**
Unid solid	1			6	6	1			7	**7**
Total	**22**	**75**	**18**	**18**	**3**	**94**	**3**	**13**	**4**	**114**

*One of these is bichrome (i.e. black and white)

Stencils

The hand stencils were recorded for size, colour and handedness (i.e. left or right). All of the red hand stencils were superimposed beneath the white ones, and were considerably more weathered. Exfoliation has affected the red stencils but pre-dates the later art phase. No surface exfoliation has occurred since the later art phase.

Most (52%) of the twenty-one red hand stencils are left hands, 19% are right hands while 29% are indeterminate. Only 12 of the red hands were complete enough to be fully measured. The average span of these was 14.6cm, while the average length (measured from heel of hand to tip of middle finger) was 16cm. Three of these stencils were children's (<14cm length), six were medium sized (15-18cm length) while the remainder were large (>19cm long).

A majority (71%) of the 58 white hand stencils are also left hands, while 12% are right hands. Only 17% are indeterminate. The higher proportion of measurable white stencils indicates the better preservation of this sample, compared with the red ones. The average span size of the white hand stencils was 14cm while the average length was 16cm. Thirteen of the white stencils (32%) were children's, 19 (46%) were average and 9 (22%) were large. All three of the white foot stencils are fully measurable. These are also children's (one) and babies' (two) sized (16 and 12cm long respectively).

These stencil size ranges indicate the presence of a mixed family group. There was no exclusivity of particular members of the social group at this site. Several white stencil compositions also suggest the presence of a mixed social group - both in terms of the hand sizes used and the association of these with different items of stencilled material culture. Four of the stencil compositions include a baby's hand (10 x 10cm, 11 x 10cm, 11 x 11cm, 9 x 10cm) in direct association with a medium sized hand (a mother's?). Another indicator of women is a composition of stencilled digging sticks. Men are also indicated as participants in this art assemblage. At the western ends of the shelter there is a stencil composition of a large symmetrical boomerang (70cm x 5.5cm max.) held in place by two very large (23cm long) hands. These are clearly men's hands (see discussion in the Mt Yengo excavation report regarding gender differences in hand sizes).

Fifty-two shelter art sites have been recorded in detail in Ku-Ring-Gai Chase (McDonald 1987:15-44). The dominant technique here is stencilling (52%) with the hand being the most common motif (45%). Pigment usage was found to be fairly even (red - 33%; white - 33%; black - 32%). Most of the art shelters in this area contained relatively small assemblages (94% contain <49 motifs). Relatively little superimpositionning or compositional complexity was found. Fish (25%) and kangaroos (21%) dominate the (identifiable) depictive motifs, followed by men (6.8%), boomerangs (6.1%), birds (5.4%) and anthropomorphs, bird tracks and 'others' equally represented (4.7% each).

The Great Mackerel site is unusual in terms of its assemblage size; it's higher than average hand stencil component and the dominance of white pigment. In terms of motif content, the range is relatively restricted, and there is an emphasis on several unusual or uncommon motifs – e.g. bird tracks and stencilled material objects. There are fewer than average unrecognisable motifs. Given the general complexity of the site, this is unusual. Motif clarity - especially in light of the assemblage's general complexity - suggests that the art of the most recently produced phase may be relatively recent in age.

The Deposit

When the art at the site was recorded in 1986, the deposit was described as 'midden - surface scatter of shells (*Anadara, Pyrazus*); potential archaeological deposit; dark grey, greasy; between <3 cm to >20 cm deep.' Around 20 mud whelks (*Pyrazus ebenesis*) were observed lying on the surface beneath the low ceiling at the rear of the shelter. No surface artefacts were seen. The deposit appeared undisturbed and was covered by a carpet of *Casuarina* needles.

Figure 7.3: The Great Mackerel rockshelter. Art assemblage. Faint white hand stencil in varying sizes.

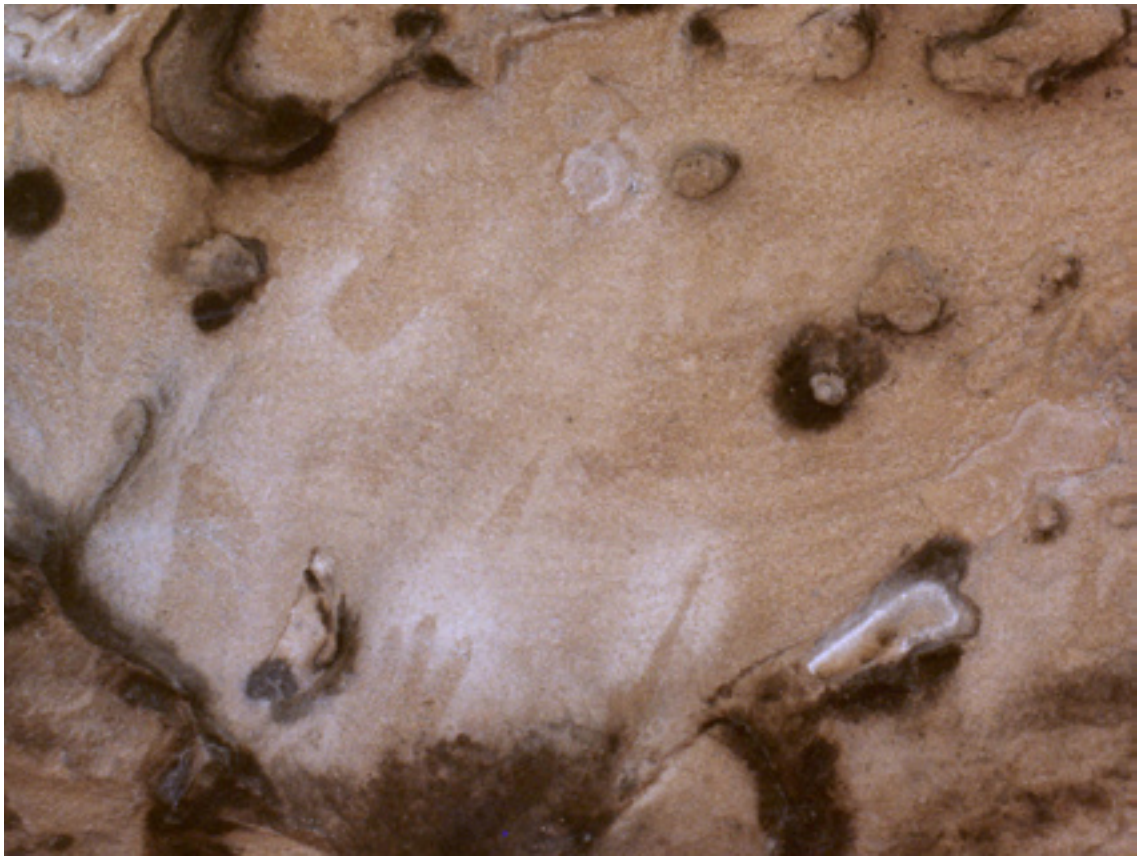


Figure 7.4: The Great Mackerel rockshelter. Stencil composition with feet, hands and digging sticks.

Figure 7.5: The Great Mackerel rockshelter, Panel A. Older exfoliated red hand stencils are superimposed by white stencils.

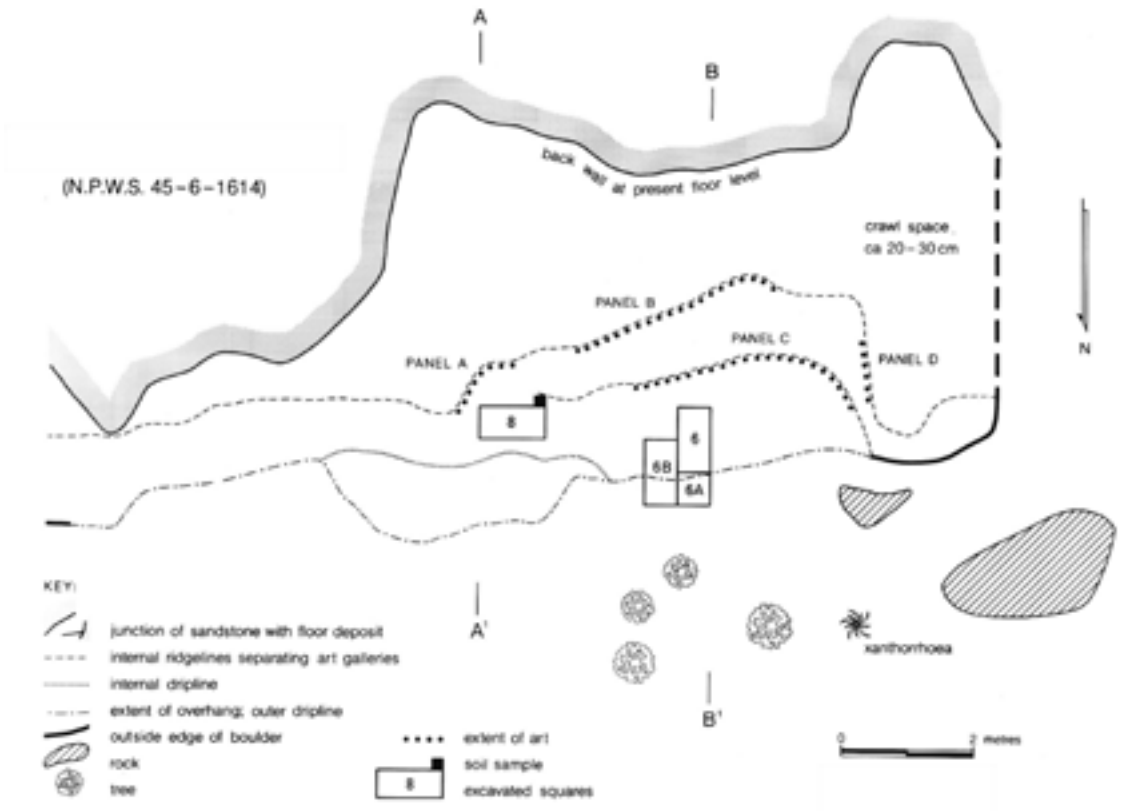


Figure 7.6: The Great Mackerel rockshelter. Site Plan.

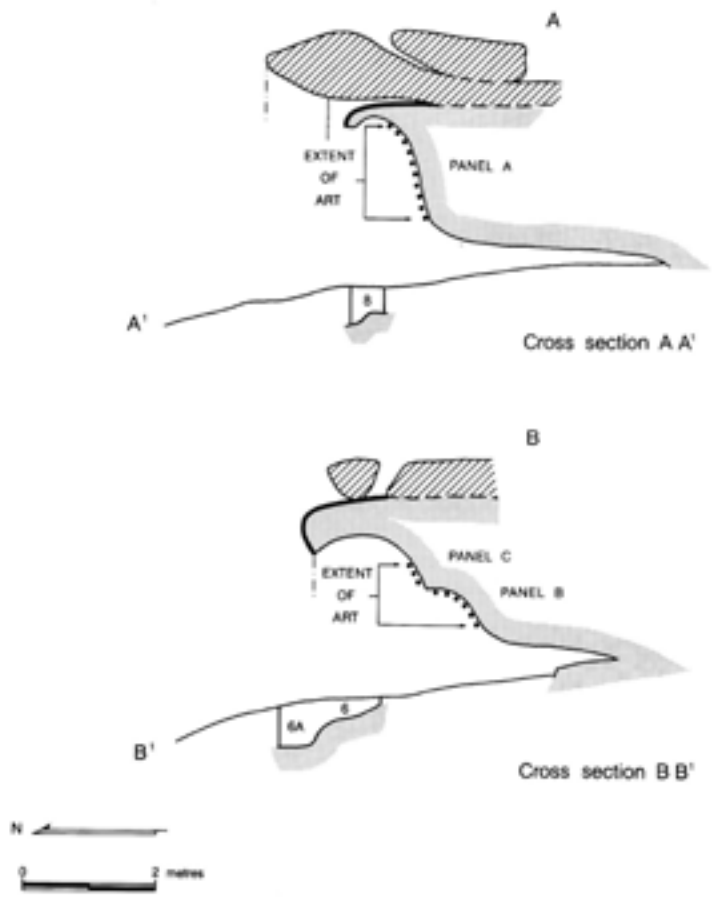


Figure 7.7: The Great Mackerel rockshelter. Cross-sections.

Figure 7.8: Excavating in square 6. Terri Bonhomme and Neville Baker provenancing shell clusters and collecting charcoal samples.

Field methods

The excavation at this site was a test excavation in accordance with a Preliminary Research Permit issued by the National Parks and Wildlife Service, NSW. The floor area was gridded out and the squares aligned to a horizontal datum (Figure 7.6). Excavation squares were selected based on proximity to decorated wall panels and the presence of a relatively flat, protected floor area (Figure 7.7). Initially two 50 cm x 100 cm trenches were excavated (Squares 6 and 8). Square 6 was extended with a 50cm x 50cm pit (6A) and another 50cm x 100cm trench (6B). A total of 1.75 sq metres was investigated.

Excavation in Squares 6 and 8 commenced initially in 2cm and then 5cm spits (Figure 7.11). In the basal layers of the squares the spits became deeper. This was done to allow for the contraction in area which resulted from the presence of roof-fall (sq 6) and the unevenness of bedrock (sq 8).

In Squares 6A and 6B, excavation was by 5cm and 10cm spits, or by stratigraphic units. These squares were excavated with the aim of increasing the sample for analysis. Excavated spit depths are shown in Figure 7.11. All deposit was dry sieved through nested 5mm and 2.5mm sieves on site. Unsorted residue from the 2.5mm sieves was bagged and retained for later sorting and analysis in the lab.

Results

Cultural Material

A total of 1,032.75 kg of deposit was excavated from the site. From this, slightly less than 6 kg of cultural material (Table 7.2) and 111.5 kg of roof-fall were obtained. There is a relatively even distribution of cultural material across the four squares, with the highest density of material being in square 6 and the lowest in square 8 (Table 7.3).

Table 7.2: Proportions of shell, bone, artefacts, charcoal and pigment in cultural material (all squares).

Cultural component	Total (g)	*%f*
Shell	4,369.5	*74.2*
Stone artefacts	886.3	*15.0*
Charcoal	620.8	*10.4*
Bone	21.2	*0.3*
Pigment	0.5	*0.0*
Total	5,898.3	*99.9*

Table 7.3: Distribution of Cultural Material by Square. Weights in grams.

Cultural component	6	6A	6B	8
Shell	1,322.2	1,193.1	952.7	901.4
Artefacts	153.1	178.2	423.4	131.6
Charcoal	137.9	134.2	303.7	45.0
Bone	8.6	0.8	9.5	2.3
Pigment	0.4	-	0.1	-
Total	1,622.2	1,506.3	1,689.4	1,080.3
Wt excavated deposit (kg)	132.0	251.9	330.9	251.9
Density = kg cult material/kg deposit	1.2	0.6	0.5	0.4

By weight, the predominant archaeological component of the deposit was shell, followed by artefacts, charcoal, bone and pigment. Shell and bone are present only in the upper levels (with very few lithic artefacts). Stone artefacts predominated in the lower levels (with a total absence of shell and bone). The nature of this dichotomy is discussed below.

Stratigraphy

Five stratigraphic layers were identified at the site (Figure 7.12) based on soil colour and texture. The presence/absence of midden deposit was a large factor in determining the nature of the deposit.

The Layers identified were as follows:

1. Surface leaf litter, *Casuarina* needles and loose grey, silty sand. Some shell. 10YR 3/3. pH = 8.5.

2. Black, greasy loam with high shell and charcoal content: the midden layer proper. 10YR 2/1. pH = 8.5.

3. Grey/brown loose sandy loam with high roof-fall content. Some fragmentary shell decreasing with depth. 10YR 3/1. pH = 7.

4. Mottled grey/brown loamy sand. No shell: very little charcoal. 10YR 5/2 - 5/3. pH = 5.

5. Loose yellow/brown sandy loam. Large quartz pebbles; extant roots. Decomposing roof-fall. Increasing clay fraction. Colour grading from 10YR 6/4 - 6/6 to 10YR 4/2 - 5/3. pH = 5.5 - 6.

Figure 7.9: The Great Mackerel rockshelter. Squares 6, 6A and 6B at the completion of excavation. View to the western baulk from the east-north-east.

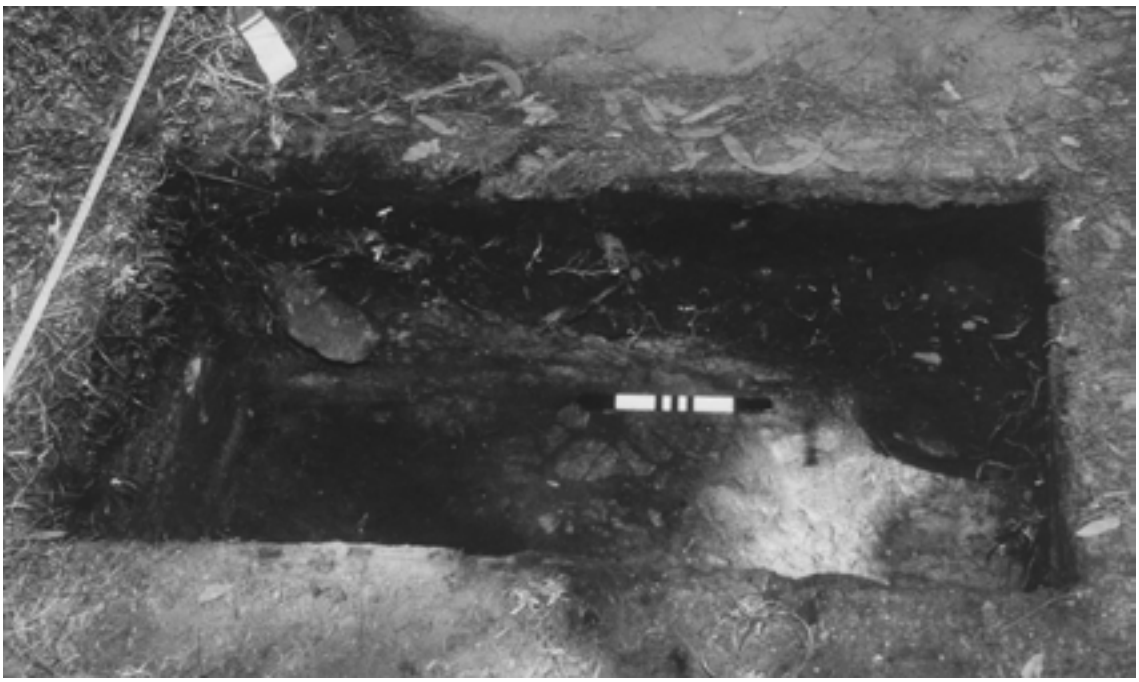


Figure 7.10: The Great Mackerel rockshelter. Square 8 excavated to bedrock. View of southern baulk.

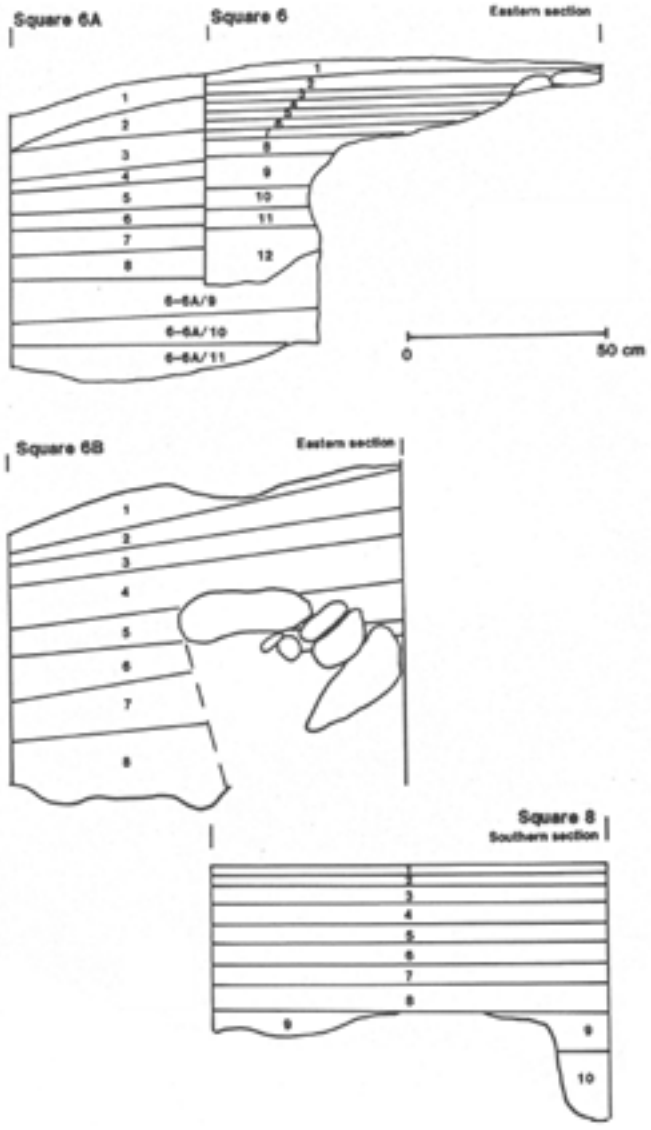


Figure 7.11: Excavated spits, Squares 6 and 8.

An intact hearth was identified in Squares 6 and 6B (10YR 4/2 - 5/2; pH = 8.5). In square 6B a slight variation was observed at the interface between Layers 3 and 4:

> 4a. Lighter grey interface. Same texture as 4 but more homogeneous in colour - 10YR 4/1. pH = 4.5 - 5.

In square 8 a variation to Layer 5 was identified:

> 5a. Light grey/white sandy deposit. pH = 6.

These Layers are depicted in the section drawings (Figure 7.12).

There are two major cultural strata at the site - the midden layer (Layers 1 - 3) and the underlying stone artefact layer (Layers 4 and 5). These can be subdivided on the basis of colour and textural differences resulting from site and soil formation processes. The increase in the acidity of the deposit with depth may account for the decrease in shell content in the lower layers – and certainly the alkalinity of the midden deposit results from the high number of shells and ashy deposit. There are major differences between the two layers in the number, size and type of stone artefacts which cannot be explained by taphonomy or differential preservation. The differences between the two cultural layers are discussed. Due to the relatively small sample sizes, the square 6 spits (6, 6A and 6B) were amalgamated for chronological analysis. Several of the square 8 spits were also amalgamated for comparability with those of Square 6 (Figure 7.11, Table 7.4).

Table 7.4: Correlation of excavated spits (Squares 6, 6A, 6B and 8), analytical units and stratigraphic layers.

Analytical Unit	Square				Stratigraphic Layer
	6	6A	6B	8	
I	1,2	1	1	1,2	1
II	3,4,5	2	2	3	2
III	6,7,8	3	3	4	2
IV	9	4,5	4	5,6	3
V	10, 11	6	5	7	3
VI	12	7,8	6	8	4
VII	*	9	7	9	4
VIII	*	10,11	8	10	5

* Squares 6, 6A excavated together from and below 6-6A/9

Dates

Five charcoal samples were submitted for dating to the ANU Radiocarbon Lab. These have been counted and the following age determinations obtained (Table 7.5; Figure 7.12).

Four samples (ANU- 6370-6373) were collected from square 6: the fifth was from square 6B. All counts but that made on ANU-6373 were from provenanced charcoal samples.

It is considered that ANU-6373 is anomalous. In light of the undisturbed stratigraphy it is considered either, that:

- there has been contamination by recent ground water seepage beneath the large slab of roof-fall in square 6; or;
- the fact that this sample was collected during sieving has resulted in this being contaminated.

The anomalous date is excluded from discussions as it is not considered a realistic indication of age.

Sample ANU-6615 addresses the earliest occupation at the site. Only very small quantities of charcoal and other cultural material occurred below this sample. This date is interpreted as indicating the initial, archaeologically visible, occupation of the shelter. The deposit below this level may represent a very sparse initial occupation of the shelter. As the deposit at this depth is largely decomposing bedrock is could also be the result of soil formation processes and the downwards treadage of sparse early material.

Table 7.5: Radiocarbon dates, depth below surface and association with stratigraphic layers.

No.	Lab No.	Field Number	Depth below surface	Stratigraphic Layer	Age Determination
1.	ANU-6370	6/3/2	6 cm	2	220 + 120 BP
2.	ANU-6371	6/6/1	12 cm	2	480 + 90 BP
3.	ANU-6372	6/9/1	22 cm	3	560 + 160 BP
4.	ANU-6373	6/12	44 cm	4	90 + 2.1%M
5.	ANU-6615	6B/6/1	51 cm	4	3,670 + 150 BP

An age-depth diagram indicates major differences in deposition rates between the midden layer and earlier occupation layer (Figure 7.13). The deposition rate for the basal 20cm has been calculated by extrapolating backwards. This appears to have accumulated over c. 2,000 years. The next c.30cm appears to have accrued over more than 2,500 years. The most likely interpretation is of a sporadic occupation extending over an extremely long time period. This is supported by the relatively low artefact densities (increasing later) throughout.

The age determinations for the site indicate that the midden layer is recent. Shell deposition commenced around 560±160 BP. Midden accumulated at an extremely rapid rate compared with the lower layers. More than half of the deposition during this midden period occurred before 480±90 BP. The site appears to have been most intensively used around 500 years ago. It was, however, probably in sporadic use until European contact. The use of fishhooks is dated to 220±120 BP which accords well with ethnographic accounts and current archaeological data. There are no well substantiated dates for this artefact type predating 840±160 BP (Wattamolla WL/-). Several sandstone fish-hook files have been found in layers dating to much older than this (1,930 ± 80 BP: Curracurrang 2CU5/-; 1,970 ± 80 BP: Currarong 1) but their interpretation is problematic in the absence of better supporting functional evidence.

Artefact accumulation rates (Figure 7.14) also show that the midden period represented the most intensive occupation at the shelter. Analytical units II and III had the highest rates of cultural material accumulation; units III and IV had the highest stone artefact accumulation rates.

Table 7.6: Age depth calculations. Number of artefacts accumulating per 100 year (refer Figure 7.14).

Analytical Unit	Number of Artefacts	Wt Cultural Material (g)	Number of Years	Artefact/100years	Deposit(g)/ 100 years
I	6	362.75	180	3.3	201.5
II	16	1411.55	150	10.7	941.0
III	59	1651.85	180	32.8	917.7
IV	142	1421.3	450	31.6	315.8
V	114	254.4	1,000	11.4	25.4
VI	101	245.8	1,230	8.2	20.0
VII	60	242.9	1,050	5.7	23.1
VIII	23	36.7	1,000	2.3	3.7

Shell

The 29 shellfish species found at the site represent the range of species readily available on the diverse western shores of Pittwater. This shoreline provides a variety of littoral and sub-littoral

conditions as a result of the proximity of the estuarine, calm waters of Pittwater and the open sea pounding in through the mouth of Broken Bay. Pittwater contains a number of sandy beaches, interspersed with rocky platformed headlands. The species identified at the site, and the habitats from which they derive, are listed (Table 7.7).

Five shell fish-hooks were recovered during the excavation. These have been made from the small turban shell (*Turbo undulata*) and several pre-forms or blanks were located as well as the complete and broken ones (Figure 7.18).

Proportions of Shellfish Species

Both weights and minimum numbers of shells were counted in order to assess the relative importance of different species. Combined excavation spits/analytical units (Table 7.4) from Squares 6, 6A and 6B are described in these analyses as Square 6 (Table 7.8).

The Sydney Rock Oyster (*Crassostrea*), the limpet (*Cellana*), the hairy mussel (*Trichomya*) and the black periwinkle (*Nerita*) dominate in the comparison of minimum numbers (Table 7.8). These species all derive from rock platforms although some of the *Crassostrea* appear to have been attached to mangroves. In square 6 these account for over 82% of the edible species, while in square 8 they account for more than 84%. The weights for these four dominant species, however, reveal a different picture – these represent only 32.5% (sq 6) and 57.5% (sq 8) of the shell present (Table 7.9). This is due to the differing shell rugosities: the hairy mussel and limpet are very thin, light shells, while the rock oyster and black periwinkle are medium weight shells. Conversely, shells such as *Cabestana* and *Thais orbita* are much larger and heavier, and this results in their far greater presence when considering weight and dietary estimates.

Table 7.7: Shell species identified at the Great Mackerel site (Names from Dakin 1980).

Latin Name	Common Name	Edible Size	Estuary	Mangrove	Rock Platform
Anadara trapezia	Sydney Cockle	X	X		
Pyrazus ebeninus	Sydney Whelk	X	X		
Velacumantis	Small whelk	X	X		
Crassostrea commercialis	Rock Oyster	X	X	X	
Ostrea	Mud oyster	X	X	X	
Chama fibula	Spiny oyster	X	X		
Trichomya hirsuta	Hairy mussel	X	X		
Cellana	Limpet	X			X
Cabestana spenglerei	Spengler's triton	X			X
Thais orbita	Cartrut	X			X
Nerita atramentosa	Black periwinkle	X			X
Turbo torquata	Large turban shell	X			X
Turbo undulata	Small turban shell	X			X
Haliotis	Abalone	X			X
Australocochlea	Periwinkle	X			X
Bembicium		X	X		
Bittium			X		X
Thalotia comtessi			X		X
Placophora	Chiton	X			X
Scutus	Elephant snail	X			X
Pecten fumatus	Cockle	X	X	X	
Tapes waitlingi	Tapestry cockle	X	X	X	
Littorini unifasci	Oyster borer		X	X	
Morula marginalba	Maroon oyster borer		X	X	X
Agnewia triton	Oyster borer		X	X	X
Cardium racketti	Common cockle	X	X		Beach
Stomatella sp					X
Chamaesipho col'a	Barnacle				X

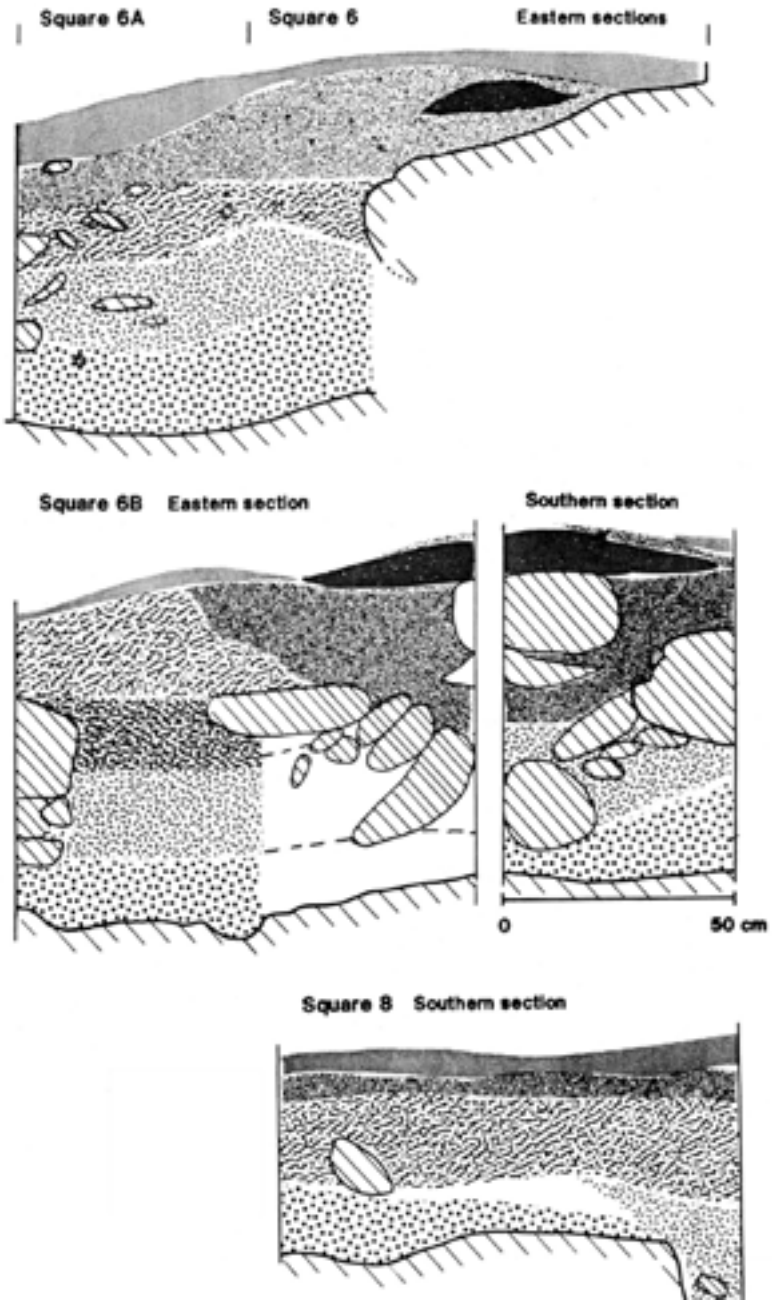


Figure 7.12: Stratigraphic sections, Squares 6 and 8.

The majority of shell was collected from rock platforms. Muddy estuarine species (*Anadara, Pyrazus, Velacumantis, Ostrea, Bembicium*) accounted for only 11% of the species present. The only identified species which has been collected from an open sandy beach is *Cardium racketti* (the common cockle).

This data suggests that the majority of shellfish collection probably took place below the site, on the rocky platforms on the point at the southern end of Great Mackerel Beach. Today, the nearest muddy estuarine conditions occur at the Basin, over 1.5 km south of the site. In prehistoric times, however, the creek flowing into Great Mackerel and the adjacent flat area behind the beach (where holiday houses have now been built) may well have provided suitable conditions for these estuarine species.

Given the local proximity of a suitable resource and the climb up to the site, it would seem unlikely that shellfish collection took place any further afield. Indeed, it is interesting to speculate upon the reasons which resulted in the collected food been carried up such a steep incline.

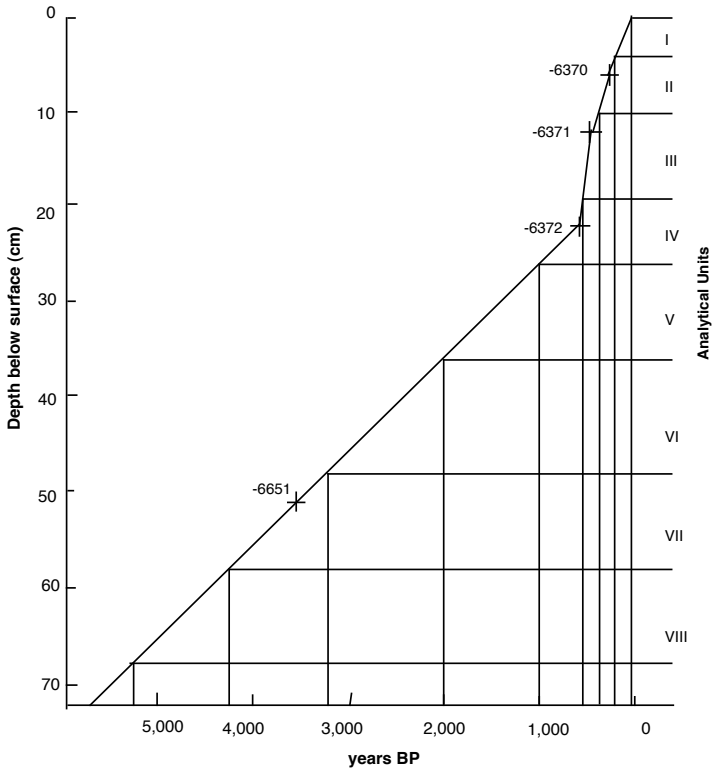


Figure 7.13: Age depth curve based on square 6 spit depths. Dates plotted using ANU lab numbers.

Temporal Variation in Shellfish Exploitation

Dates obtained for the site indicate that the midden layer was produced in a recent relatively restricted time period - between c.560 and c.220 years ago. Because of this, a finer than usual degree of temporal change can be analysed: in many sites, a 340 year time-depth is archaeologically 'invisible'. The environmental and social conditions in the Sydney Region are considered to have been constant during the last 1,000 years, allowing very specific questions to be asked.

What sort of site usage does the deposit represent? Was it a few meals evenly spaced over several hundred years; or alternatively, a more intensive usage for a small period, perhaps interspersed with sporadic use at other times? Does the site represent a base camp focus (Meehan 1982) or is it more likely an occasionally used dinner time camp (albeit some distance from the resource)?

Shell material occurs only in Units I-IV in square 6, while in square 8 some shell also occurs in Units VI and VII (Table 7.9 to Table 7.13). Different taphonomic processes in the two areas of the site are thought to have contributed to this. The general trends in the two squares do appear to be slightly different and these will be discussed separately.

In square 6, the major increase in shell quantities commences in unit IV, peaks in spit III and, to a lesser extent, spit II and then diminishes in spit I. Percentage change in MNI gives a slightly different picture to that achieved by weight, with the former giving a more definite peak in unit III:

Unit	I	II	III	IV	V	VI	VII	VIII
% MNI	6.7	30.3	43.3	16.2	3.5			
%weight	7.3	33.7	34.9	21.3	2.6	0.0		

While the differences between the results achieved by the different methods are minimal, these can be explained in several ways:

1) differential preservation of shells with depth, i.e., the good preservation of shell in spit II has meant that a high number of individuals were identifiable, even though the weight of these shells was not appreciably higher than found in spit IV;

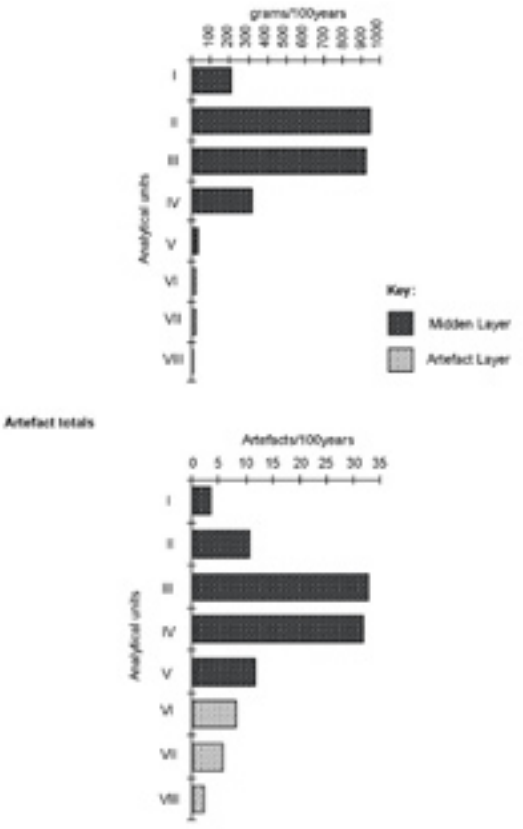


Figure 7.14: Artefact and cultural material accumulation rates per 100 years calculated on basis of age depth curve. Cultural material weights in grams (Figure 7.13).

2) different individual shell weights;

3) that this is too small a time scale to meaningfully subdivide.

Table 7.8: Estimated Number of Individuals (MNI) in Squares 6 and 8.

Species	Square 6	Square 8
Anadara	16	5
Pyrazus	18	-
Velacumantis	39	3
Cellana	167	78
Trichomya	115	9
Crassostrea	326	58
Ostrea	14	7
Cabestana	11	12
Thais orbita	20	2
Nerita	87	57
Turbo torquata	-	4
Turbo undulata	11	-
Bembicium	6	2
Bittium	-	1
Chiton	-	1
Haliotis	-	-
Australocochlea	6	2
Scutus	1	-
Other*	10	4
Total	848	245
Total edible	846	240

*includes *Tapes waitlingi, Chama fibula, Thalotia comtessi, Stomatella, Pecten fumatus, Littorini unifasci, Cardium racketti, Morula marginalba.*

A combination of the first two explanations seems most likely in this case. Recognisable and consistent trends are observable throughout the midden layer. During the 340 years of the site being used as an eating place there are several changes in the dominance of shellfish species. This may indicate either a change in preference of resource zone, or perhaps changing (i.e. declining/increasing) supply.

Size

Most of the minor species remain fairly constant throughout time. This probably indicates that these species were either;

- sparsely (or distantly) distributed,
- relatively undesirable, or,
- species which were not collected and carried away from the resource to be eaten.

Table 7.9: Weight (in g.) of shellfish species in Squares 6 and 8.

Species	Square 6	Square 8
Anadara	139.3	77.2
Pyrazus	270.8	2.5
Velacumantis	93.5	6.9
Cellana	277.5	108.2
Trichomya	207.8	29.8
Crassostrea	897.6	220.2
Ostrea	56.1	35.8
Cabestana	373.0	80.5
Thais orbita	627.5	39.1
Nerita	215.6	157.9
Turbo torquata	-	19.8
Turbo undulata	52.5	-
Bembicium	4.6	1.3
Bittium	-	0.1
Chiton	3.9	5.8
Haliotis	30.1	14.0
Australocochlea	3.8	11.9
Scutus	14.6	-
Other*	40.0	11.8
Unid. fragments	158.9	78.0
Total	3468.1	901.4

*includes *Tapes waitlingi, Chama fibula, Thalotia comtessi, Stomatella, Pecten fumatus, Littorini unifasci, Cardium racketti, Morula marginalba.*

These species include all the muddy estuarine species (*Anadara, Pyrazus, Velacumantis* etc.) as well as many rock platform species (*Cabestana, Thais orbita,* the turban shells, *Australocochlea, Haliotis, Scutus,* Chiton etc.). These species do occur throughout the midden, and indeed in many other middens in the Sydney area and thus the first explanation is probably the appropriate one. Local abundance of the predominant species explains the preference shown in the Great Mackerel midden.

There is a change over time in the proportions of the dominant species. This is most marked in square 6 where *Crassostrea* declines with time and the other three species fluctuate (Table 7.9, Figure 7.15). There appears to be an inverse relationship between *Trichomya* and *Nerita* - while one is present in high proportions, the other is present in lower proportions and vice versa. Conversely, *Nerita* remains fairly constantly around 10% of the shellfish collected, while *Cellana* and *Trichomya* are present much less consistently. This perhaps indicates that *Nerita* was more consistently available (in smaller quantities), while the other species were more sporadic and/or less reliable. Individual meals may well be represented by clusters of same shell species and slight variations on these.

In Square 8 the pattern of shell increase indicates a similar trend although the percentage figures for MNI and weights are slightly different, with the MNI indicating more definite peaks (cf. Table 7.10, Table 7.12).

Here the initial increase occurs deeper in the deposit (units IV and V) and there is a decrease earlier in the sequence, in unit II. This disparity is likely to be taphonomic, square 8 being located in a more exposed part of the shelter and more affected by external soils deposition. Otherwise, the pattern seen in units III - VI (Square 8) is very similar to that of units I - V (Square 6). The small sample sizes (i.e. low shell numbers and weights) in the upper and lower units are acknowledged and the significance of trends is restricted to the units with larger sample sizes (units II-IV; Square 6: units III - V; Square 8).

Spit	I	II	III	IV	V	VI	VII	VIII
% MNI	*4.1*	*1.6*	*11.8*	*36.3*	*40.0*	*6.1*		
% Weight	*6.8*	*3.0*	*18.4*	*33.8*	*31.3*	*6.3*	*0.4*	

In square 8 the *Crassostrea* declines through time - even in the peak of the midden layer. None of the trends exhibited by the other three dominant species are the same in square 8: *Nerita* is co-dominant with *Cellana* during the peak of the midden layer, while *Trichomya* only increases in the sparse upper layer (units I and II).

Comparing the peak layers within the midden - units IV and V (Square 8) and units II and III (Square 6) further emphasises the dissimilarity of the two squares. The dominant species in square 6 is *Crassostrea* while in square 8 it is *Cellana*. In square 6 the dominance of rock oyster declines,

Table 7.10: Square 6; Minimum numbers: change through time by analytical unit.

Spit	I	II	III	IV	V	VI	VII	VIII
Anadara	4	4	4	4				
Pyrazus		5	10	3				
Velacumantis	2	11	20	6				
Cellana	22	66	57	15	7			
Trichomya	10	78	25	2				
Crassostrea	1	55	171	80	19			
Ostrea	1	6	4	3				
Cabestana	2	3	5	1				
Thais orbita	4	9	2	4	1			
Nerita	7	11	52	14	3			
Turbo torquata								
Turbo undulata		1	6	4				
Bembicium	1	2	3					
Chiton								
Haliotis								
Australocochlea	2	1	3					
Scutus		1	1					
Other	1	4	4	1				
Total	57	257	367	137	30	0	0	0
Total edible	56	257	366	137	30	0	0	0

Table 7.11: Square 8. Minimum numbers: Change through time by analytical unit.

	Analytical Units							
Species	I	II	III	IV	V	VI	VII	VIII
Anadara		1	2	1	1			
Pyrazus								
Velacumantis	2			1				
Cellana	1		2	32	38	5		
Trichomya	3	1	2	1	1	1		
Crassostrea	1	1	14	9	27	6		
Ostrea	1	1	1	2	2			
Cabestana				12				
Thais orbita					2			
Nerita	1		5	28	21	2		
Turbo torquata			1	1	2			
Bembicium	1				1			
Chiton				1				
Australocochlea				1	1			
Other			2		2	1		
Total	10	4	29	89	98	15	0	0
Total edible	9	4	28	89	96	14	0	0

while hairy mussel and limpet increases dramatically. In square 8, the limpet remains dominant while rock oysters decline and black periwinkles increase. Hairy mussel is present in only small quantities in square 8.

There are several possible interpretations for these intra-site differences - temporal, spatial and sampling. As the sequence in square 8 has not been dated the first of these possibilities is not immediately testable (although suitable charcoal samples were collected from this square). Given the distance between the two squares, a spatial explanation is also highly likely. The discard from a single meal (or depositional event) would not be distributed over the full extent of the site, except, perhaps, where there was the clearing of larger material, or some other post-depositional or taphonomic processes. There certainly didn't appear to be any evidence for clearing activity at the site - large and small shells were distributed fairly regularly across the site, and in several instances the remnants of a single meal (particularly limpets) were found stacked inside each other.

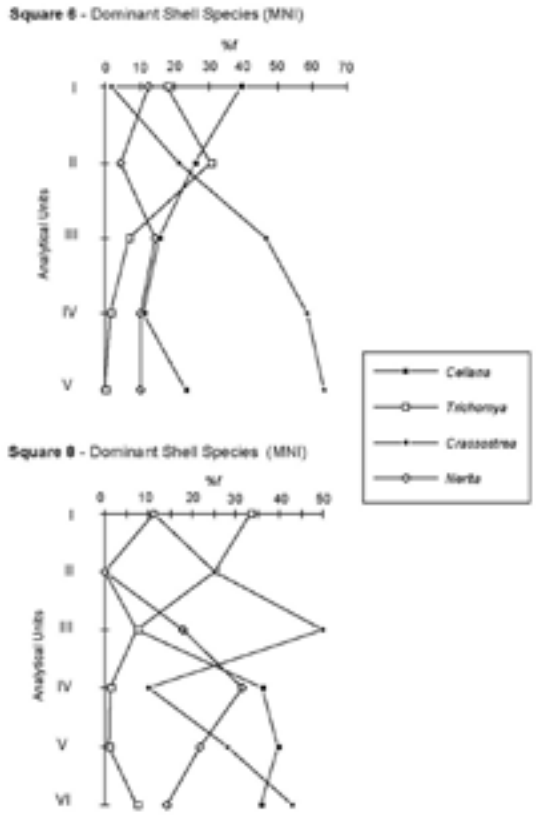


Figure 7.15: Trends in dominant shellfish species throughout the midden layer. Squares 6 and 8.

Table 7.12: Square 6. Shellfish species and other cultural material; change over time by analytical unit. Weight in grams except where indicated.

	Analytical Units							
Species	I	II	III	IV	V	VI	VII	VIII
Anadara	31.3	29.2	41.3	37.4	0.1			
Pyrazus	2.7	83.5	112.1	72.5				
Velacumantis	2.8	31.0	45.6	14.1				
Cellana	35.6	121.3	90.3	17.6	12.7			
Trichomya	14.5	139.7	49.2	4.3	0.1			
Crassostrea	27.6	280.0	390.6	156.1	43.3			
Ostrea	6.0	35.5	6.5	8.1				
Cabestana	39.5	136.7	149.8	47.0				
Thais orbita	38.6	165.5	116.1	299.4	7.9			
Nerita	19.1	40.9	113.1	28.0	14.5			
Turbo undulata	1.8	25.4	14.9	10.4				
Bembicium	0.3	2.5	1.8					
Chiton	0.5	1.1	1.7	0.6				
Haliotis	6.4	17.1	3.7	2.9				
Australocochlea	0.5	2.2	0.4	0.7				
Scutus	1.2	3.0	9.1	1.3				
Other	2.0	17.9	16.2	3.9				
Unid frags	24.9	36.8	47.8	35.4	13.5	0.5		
Fishhooks	0.2	0.8						
Total shell	255.5	1,170.1	1,210.2	739.7	92.1	0.5	0	0
Artefacts	2.5	8.8	41.4	275.4	103.1	144.0	144.5	34.0
Charcoal	32.8	179.1	200.2	116.2	18.6	14.4	3.4	1.2
Bone	4.5	11.9	0.9					
Pigment	0.1	0.4						
Total	295.4	1370.3	1452.7	1131.3	213.8	158.9	147.9	35.2
Deposit (kg)	74.75	80.75	83.75	107.0	84.5	92.35	59.75	86.75

The different material in the two squares may indicate that different people or parts of the social group ate in separate areas of the site (square 8 is on the periphery of the midden, and near the outer edge of the sheltered area). Difference in sample sizes from the two areas (both in terms of areas excavated and number of shells retrieved) is another potential cause of the variability. Indeed, Squares 6A and 6B were excavated to increase the sample size for analysis. The trends demonstrated by analytical square 6 are considered to be more reliable.

Table 7.13: Great Mackerel Square 8. Shellfish species and other cultural components per analytical unit. Weights in grams except where indicated.

	Analytical Units							
Species	I	II	III	IV	V	VI	VII	VIII
Anadara	11.3	7.1	30.0	23.3	4.2	1.3		
Pyrazus	0.3	0.4		1.8				
Velacumantis	5.6		0.8	0.5				
Cellana	0.9		9.5	50.4	42.2	5.0	0.2	
Trichomya	3.2	2.9	15.6	4.3	1.5	2.3		
Crassostrea	3.6	2.9	30.0	61.0	97.3	25.4		
Ostrea		3.4	7.0	18.5	6.9			
Cabestana	6.4	3.6	20.6	25.9	20.0	3.2	0.8	
Thais orbita	7.5	3.2	4.2	3.1	21.1			
Nerita	2.4	0.2	16.7	74.5	57.7	5.3	1.1	
Turbo torquata	3.9		4.2	3.7	8.0			
Turbo undulata				0.3				
Bembicium	0.6				0.7			
Chiton			0.8	5.0				
Haliotis	1.1		7.1		3.7	2.1		
Australocochlea				0.4	5.3	5.8	0.4	
Other			4.8	4.6	1.5	1.0		
Unid frags	14.4	3.4	14.8	27.6	11.7	5.2	0.9	
Total shell	61.2	27.1	166.1	304.9	282.1	56.6	3.4	
Artefacts	0.8		17.8	46.6	32.7	25.0	8.7	1.5
Charcoal	5.0	13.1	14.8	5.7	6.4			
Bone	0.3		0.5	0.2	1.3			
Pigment								
Total	67.3	40.2	199.2	357.4	322.5	81.6	12.1	1.5
Deposit (kg)	24.8	25.3	43.5	39.3	41.3	31.75	21.5	23.5

Table 7.14: Squares 6 and 8. Dominant shell species - peak midden units.

	Square 6	%f	Square 8	%f
Cellana	123	19.7	70	37.8
Trichomya	103	16.5	2	1.1
Crassostrea	226	36.3	36	19.5
Nerita	63	10.1	49	26.5
Total edible	623	(82.6%)	185	(84.9%)

The Bone

Faunal material was found in the midden layer in all excavated squares (Table 7.11 and Table 7.13). It occurred only in very small quantities (total weight 19.6 grams). While several different genera were recognisable - identification to species level was mostly impossible. Fish (bones, vertebrae, spines, two otoliths and one scale), small unidentifiable macropod (fragments), small reptile and bird bones were recovered. The fish was a Snapper (*Chrisophrys auratus*) identified by comparison with Snapper bones/otoliths at Angophora Reserve (Wood 1992). The fish bones appear to represent a single individual. The two otoliths are identical in size; one is from the right and the other from the left side. The reptile recovered was probably a smallish skink.

The presence of bone coincides with higher densities of shell and those spits where greater shellfish variety occurs. From the (small) sizes of the animals present and species of shell involved this may indicate a generalised dependence on a wide range of food resources and resource zones - both in littoral and on the forested ridgetop.

All the food represented by the deposit may have been collected by women, and the site may have been used for food consumption almost exclusively by women – based on ethnohistoric sources (Bowdler 1976, Collins 1798[1975], Phillip 1789[1970], Worgan 1788) and ethnographic analogy (Hiatt 1965, Meehan 1982). Fishhooks were also reported in Sydney region to be women's fishing apparel, and the presence of fishhooks in the deposit supports an interpretation of the site as one used mainly by women. This proposition is discussed further below.

Dietary Estimates

A calculation of the energy content of the excavated food remains informs us about the dietary significance of the deposit. Energy content is calculated using a figure of 30% as a proportion of the total weight of shellfish which was meat - and 65 kcal/100g meat weight (Shawcross 1967). Meehan's figures for these same calculations are 21% (flesh/shell weight) and 80 kcal/100g (Meehan 1982:143). From the site's excavated shell total (4,370g) between 1,000g (following Shawcross) and 918g (following Meehan) of shellfish meat could have been expected. An average daily calorific requirement of 2,200 kcals/day is taken as representing the number of kilocalories each member of a family group requires per day (Bailey 1975; Meehan 1982; Shawcross 1967; Wood 1989). The meat weight from the excavated squares would have provided a total of between 852 kilocalories (Shawcross) and 734 kilocalories (Meehan): insufficient (alone) to support one person for a single day.

The (largely unspeciated) faunal remains at the site were one small snapper (say 0.3 kg live weight; 60% edible; 13,070 kcal/edible kg), a small macropod (say 1.1 kg live weight; 75% edible; 20,700 kcal/edible kg) and a small lizard (say 0.1 kg live weight; 70% edible; 525 kcal/edible kg). These three individuals provided as much as 19,500 kcals (based on figures calculated in Wood 1989:76-83, following Meehan 1982:147). The faunal remains, as insignificant as they seem (weight wise) in the cultural deposit may have contributed more than 26 times as many kcals as the shellfish remains present. These findings concur with previous archaeological analyses [Wood's (1989) findings at the Angophora Reserve site and Bailey's (1975) results from NSW north coast middens]. They are also predictable in light of Meehan's ethnographic data which indicates that shellfish contributed between 0.3% and 14% of the daily calories available for each person (Meehan 1982: 144).

Extrapolating on the basis of the total floor area at the site (i.e. approx 44 sq m) - sheltered and with depth and headroom - and the percentage of the deposit excavated (1.75 sq m = 4.0%), the projected total weight of shell at the site is in the order of 108.6 kg, while the potential edible meat weight from fish and land animals would be in the order of 34 kg. From this much shell, between 32.6 kg/22.8 kg (Shawcross/Meehan) of shellfish meat would have derived. This amount of shellfish meat would have provided between 21,190 and 18,240 kilocalories: sufficient for an adult living only on shellfish for a total of slightly more than nine days. From the projected meat weight from fish and land animals a calculated 628,983 kcal would have been provided; sufficient for a single person for 285 days. A family group of four (two adults, two children), then, could have been supported by the estimated dietary remains at the site for approximately 73 days (2.4 months).

Given that the economic remains at the site would not represent all food consumed in any one day (based on our understanding of hunter gatherer foraging patterns), the fact that we do not know how much shellfish meat was eaten by women as they collected, and the fact that we do not know which other sites in the locality were being used at the same time and were complementary to the Great Mackerel site, such calculations are relatively meaningless. However, the food remains

at the site can be interpreted as small scale. The dietary remains at the Angophora Reserve site on the opposite site of Pittwater (McDonald 1992a) were found to represent the intake of 'one person [eating] continuously for 6,303 days (17 years). Alternatively it would take 1,260 days (3.5 years) for a family group of five to consume the amount of energy represented' (Wood 1989: 82). These calculations certainly place the site in perspective, in terms of its relative importance as an eating place.

Stone Artefacts

A total of 511 stone artefacts were recovered from the site. The majority of these, particularly in the upper layers, are undistinguished, split quartz pebbles. Bipolar was the predominant technique used here. No backed or ground implements were present amongst the assemblage. Only thirteen artefacts (2.5%) were found to have evidence of retouch and/or usewear (R/U).

Raw Material

Quartz was the dominant raw material accounting for 55% of the total artefact assemblage. Silicified tuff is the next most important (14.7%) with quartzite, chert, silcrete and volcanic being common (<10%). The remaining materials present are quite rare (<1%). These include fine grained basic (FGB), fine-grained-siliceous (FGS), siltstone and 'other' (Table 7.15).

Table 7.15: Great Mackerel, all squares. Raw materials and artefact totals.

Material	6	6A	6B	8	TOTAL	%
Quartz	32	92	105	52	281	*55.0*
Silicified Tuff	6	16	41	12	75	*14.7*
Quartzite	5	6	27	8	46	*9.0*
Chert	5		24	3	32	*6.3*
Silcrete		11	12	1	24	*4.7*
Volcanic	8	7	11	3	29	*5.7*
FGB	1			1	2	*0.4*
Siltstone	1		3		4	*0.8*
FGS	1				1	*0.2*
Other	3	3	8	3	17	*3.3*
Total	62	135	231	83	511	*(100.1)*
%	*12.1*	*26.4*	*45.2*	*16.2*	*(99.9)*	

Size

The vast majority of the assemblage (96.5%) was <3cm long (maximum dimension). Of these, 13.5% were <1cm long. Very few artefacts (14 - 0.2%) were between 3-5 cm long, while one only was >5cm in length.

Artefact Types

The assemblage consisted primarily (90.8%) of debitage. Thirteen artefacts had evidence of retouch/usewear (R/U) and the 34 artefacts were identified as cores. No diagnostic artefact types were located in the assemblage. All pieces with R/U consisted of modified flakes (38.5%) or flaked pieces (61.5%).

The absence of backed blades may well be a sampling issue. This artefact type usually represents between 0.2-0.9% of shelter site assemblage (Attenbrow 1987, McDonald 1994) and 0.2-3% of open site assemblages (JMcD CHM 2005a). Given these usual proportions, the expected number of backed blades at Great Mackerel would be between 0.3 and 1.5 in the midden layer and 0.6 and 2.9 in the artefact layer. The absence of this diagnostic artefact type cannot necessarily be

used to characterise nor to infer the age of this assemblage. Similarly, little interpretative value should be put on their absence (e.g. in terms of gender specific tool use).

Almost all (94%) of the cores retrieved were quartz and the majority of these (62.5%) were bipolar. The other two cores were quartzite bipolars. There were eight quartz multi-platformed cores, and four quartz single-platformed cores.

The absence of cores in the other raw materials - particularly silicified tuff - suggests that knapping of these other material did not occur on site. Again, the low sample size for the assemblage generally makes such conclusions tenuous. Figures from Mangrove Creek show that between 0.5-1.% is the normal expected number for hand held cores (only one site – Loggers shelter - had a higher percentage frequency - 3%: Attenbrow 1987). Thus at Great Mackerel, given that there were 75 silicified tuff artefacts, the expected frequency of cores here would have been 0.3-0.75 (or 2.25 if at Loggers). More recent investigations of Pre-Bondaian assemblages on the Cumberland Plain – these dominated by silicified tuff assemblages – indicate that core represent only c.1% of overall assemblages. This is taken as evidence for different procurement strategies operating, and different gearing up strategies. Again, the low core numbers retrieved from the lower level is likely to be a sampling issue.

The 13 artefacts with evidence of retouch and/or usewear, represent too small a sample to meaningfully analyse in detail (Table 7.16). Most of these artefacts occurred in the units with the highest artefact frequencies. Quartz was not the most used material (contrary to general assemblage proportions). Silicified tuff and siltstone were the most used material, followed by silcrete, volcanic and chert (Figure 7.16). Only one quartz artefact had R/U.

Most of the R/U consisted of fine scalar flaking, although heavy and notched edges were also observed. Most (61.5%) retouched pieces were on flaked pieces, the others were modified flakes. Most (77%) of these were in the 1-3cm size category, the remainder were in the 3-5cm category.

Five artefacts were observed to have macroscopic residues present (these have not been analysed in more detail). Four of these were otherwise unmodified quartz artefacts, and one was a (macroscopically) unmodified silicified tuff piece. The high proportion of quartz present in the assemblage, but the apparent low rates for use of this material, combined with the presence of residues on what appear to be otherwise unmodified quartz pieces is suggestive of this material being used for tasks which leave no forms of macroscopic usewear evidence. The proliferation of quartz bipolar in later ERS assemblages has in part been attributed to the shattering qualities of quartz (Hiscock 1986). The generally low rates of use for this material have, however, been extensively documented (Attenbrow 2004, McDonald 1985b, McDonald *et al.* 1994). A possible explanation for this pattern is the use of this raw material to process plants (see below).

Table 7.16: Artefacts with Retouch/usewear. Raw Material and vertical distribution.

Analytical Unit	Quartz	Silcrete	Silicified Tuff	Volcanic	Siltstone	Chert
I						
II						
III						
IV			1	1	2	
V						1
VI	1	2	1	1		1
VII			1		1	
VIII						
Total	1	2	3	2	3	2

Change through time

As with the shell material, the excavated spits from all squares were amalgamated into analytical units for the purposes of investigating changes through time. Data from Squares 6, 6A and 6B

were grouped here as 'Square 6'. Because of the relatively small number of artefacts, change over time was analysed in terms of stratigraphic phases: the midden and the artefact layers. Changes in raw material, artefact size and type were analysed (Table 7.17).

There are twice as many artefacts in the lower layer as in the midden layer. Given that the vast majority of the identifiable cultural material is located in the midden layer, this variation is considered important. It is notable, however, that the artefact accumulation rates (Figure 7.14) are actually higher in the Midden Layer than in the Artefact Layer.

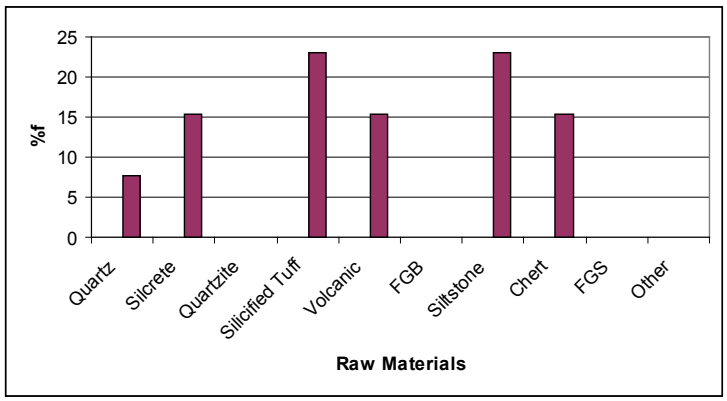


Figure 7.16: Great Mackerel: Artefact with retouch/usewear. Raw material preferences.

Quartz predominates in both layers, accounting for over 50% of each assemblage. The major differences in raw material usage over time are the decrease in usage of Silicified Tuff and silcrete in the midden layer with the increase in usage of chert, and to a lesser extent, siltstone.

The proportions of artefacts with R/U are notably higher in the artefact layer (61.5%) than in the midden layer (Table 7.17). Given sample sizes little can be said on patterns identified in this artefact class. The constriction in the range of raw material used in the midden layer may result from the smaller assemblage.

The assemblage's characteristics (an absence of backed and ground artefact types and the preponderance of quartz and the bipolar technique) suggest it could (in the absence of dates) either be classified as late Bondaian and less than 1,500 years old or early Bondaian in age (between 3,500 and 5,000 years old). In fact, the age determinations received *are* Early and Late Bondaian in age.

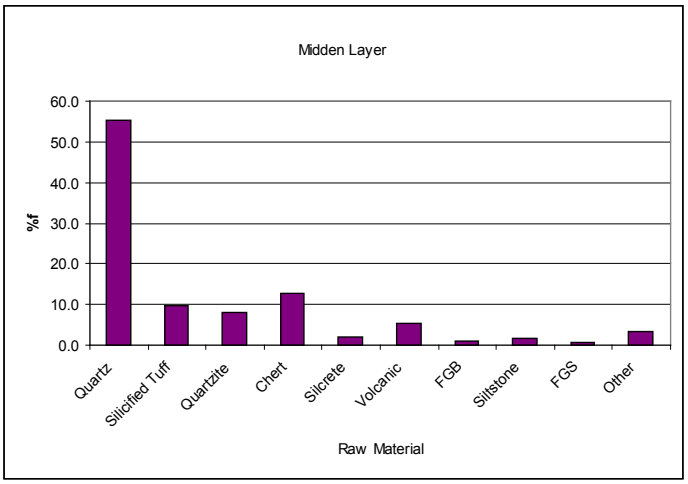
The minor changes in raw material preference over time suggest some technological changes are being demonstrated. Similar trends have been demonstrated in larger shelter assemblages [e.g. Loggers, Mussel etc. (Attenbrow 2004); UDM and Mt Yengo (this volume); Cherrybrook (McDonald 1985b); Angophora Reserve (McDonald 1992a)]. The relative absence of stone tools in the midden layer suggests that stone working was not a major activity at the site in its later phase of use (cf. Angophora Reserve). This may relate to the availability of raw material resources (i.e. through trade access: Kohen 1986), or to a preference for shell and bone tools (as suggested by the ethnohistoric literature).

Table 7.17: Squares 6. Changes in Raw Material, per cultural layer.

Material	Midden layer	*%*	Artefact layer	*%*
Quartz	93	*55.7*	136	*52.1*
Silicified Tuff	14	*8.4*	49	*18.8*
Quartzite	15	*9.0*	23	*8.8*
Chert	22	*13.2*	7	*2.7*
Silcrete	3	*1.8*	20	*7.7*
Volcanic	9	*5.4*	17	*6.5*
FGB	1	*0.6*	-	
Siltstone	3	*1.8*	1	*0.4*
FGS	1	*0.6*	-	
Other	6	*3.6*	8	*3.1*
Total	167	*100.1*	261	*100.1*
%	39.0		61.0	

Table 7.18: Square 8. Changes in Raw Material, per cultural layer.

Material	Midden layer	%	Artefact layer	%
Quartz	10	*52.6*	42	*65.6*
Silicified Tuff	4	*21.0*	8	*12.5*
Quartzite	-	-	8	*12.5*
Chert	2	*10.5*	1	*1.6*
Silcrete	1	*5.3*	-	-
Volcanic	1	*5.3*	2	*3.1*
FGB	1	*5.3*	-	-
Siltstone	-	-		-
FGS	-	-		-
Other	-	-	3	*4.7*
Total	19	*100.0*	64	*100.0*
%	22.9		77.1	



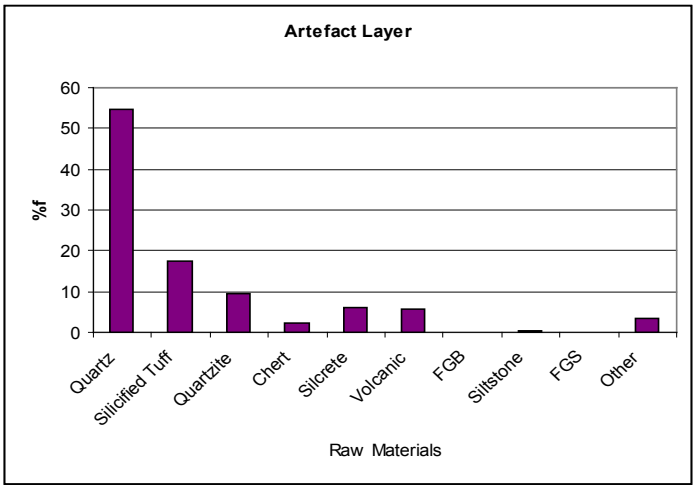


Figure 7.17: Raw Material proportions in the Midden and Artefact Layers. Combined squares.

Shell Artefacts

Five shell fish-hooks were recovered from the midden layer in Square 6 (two from spit 6/3, one each from spits 6/1, 6A/1 and 6A/2). These were made from the small turban shell (*Turbo undulata*). Several pre-forms or blanks were located as well as the complete and broken ones (see Figure 7.18). This artefact type is well known both from ethnohistoric references (e.g. Tench 1793, Collins 1798) and the archaeological literature (e.g. Bowdler 1976, Lampert 1971a, Megaw (ed.) 1974 and Clegg 1979).

As well as these relatively well known artefact types, seven shell scrapers were also recovered from the deposit. These consisted of *Anadara* and *Tapes waitlingi s*pecimens with usewear along their distal margins (see Figure 7.19). All shell artefacts derived from the upper spits of the midden and were found only in Square 6 (Table 7.19).

Figure 7.18: The Great Mackerel rockshelter. Excavated fishhooks (finished) from Squares 6 and 6A. Examples shown front and back (from left to right) from spits 6/3, 6A/2, 6/3 and 6/1.

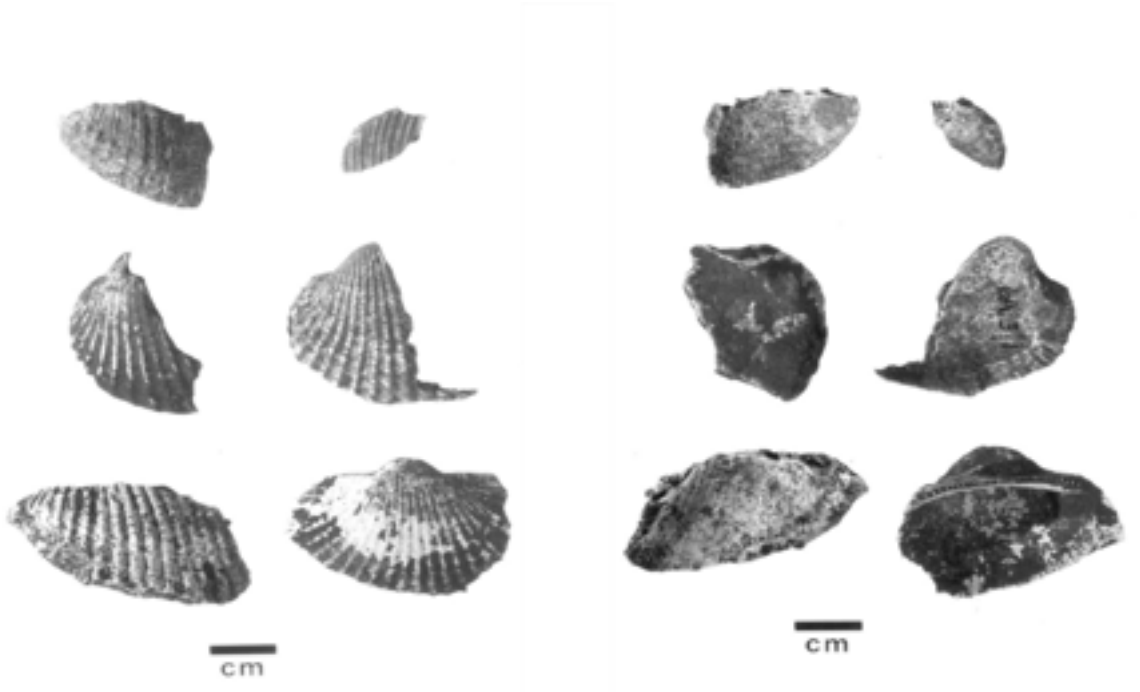


Figure 7.19: Great Mackerel shell scrapers. Examples shown front and back (from left to right, top to bottom) from spits 6B/2, 6A/1, 6B/1 and 6A/3, 6B/2 and 6B/1.

Table 7.19 Great Mackerel, Square 6. Distribution of shell artefacts.

Archaeological Unit	Square		
	6	6A	6B
I	H	HS	2S
II	-	H	2S
III	2H 2B	S	-
IV	S	-	-

H = Hook B= Fishhook Blank S = Scraper

Table 7.20: Great Mackerel. Distribution of pipeclay throughout the archaeological sequence (weight in grams).

Archaeological Layer	Square			
	6	6A	6B	8
Midden	0.4	-	0.1	-
Artefact	-	-	-	-

The Pigment

A very small quantity (0.5g) of white pipeclay was located in the excavated deposit (Table 7.20). The pipeclay is very fine grained and of good quality. All fragments are small and there is no evidence of faceting - probably due to their small size. It is unlikely that the pipeclay was used for drawing at the site, since there are no striations on this material. Given the extensive use of white pigment in the art assemblage it is likely that these fragments are evidence of pipeclay preparation for stencilling. As this material does not derive naturally from the shelter's ceiling or surrounds, it has been included in the analysis of the site's cultural material.

Also found at the site was a quantity (130g) of red/brown roof-fall (sandstone and ironstone) which produces a stain when rubbed on paper. This is of particularly poor quality as far as ochres are concerned, being very sandy and gritty. This material is not considered ideal pigment nor is it considered likely that this was used to produce art at the site. It is not faceted (either from direct contact with the wall or during pigment preparation). This material is not the same colour as any of the art i.e. it is a dark brown compared to the (red) stencils recorded at the site. Because of these factors, this material has not been included in the analysis.

The pigment found in the deposit was inconclusive in substantiating the contemporaneity of two separate art phases with the two separate occupation phases at the site. While white pigment was only found in the midden layer (and not below Unit II, Square 6's; Unit V, Square 8), there was an absence of red pigment in the deposit.

White pipeclay is not considered to survive well in archaeological, especially acidic, deposits (Morwood 1979). It could, therefore, have been present in the lower layers but not survived the processes of time. Secondly, the absence of red pigment means that there can be no correlation of the red art at the shelter with either component of the occupation deposit. The following interpretations of this result are possible. Either:

1) the red stencilling predates (or possibly correlates with) the earliest occupation evidence in the shelter, while the phase characterised by white stencils coincides with the midden layer; or,

2) the white stencilling phase took place throughout the entire usage of the shelter as an occupation site; or,

3) it is not possible to correlate the art with the occupation evidence, since the presence of pigment in the deposit is sparse and all the materials employed in the production of the art are not represented in the deposit.

While explanations 2) and 3) are not refuted by the site's evidence, explanation 1 is the preferred option.

Discussion and Interpretation

Discussion here is restricted primarily to the specific aims of the excavation. Further discussion of the site and the interpretations of its evidence have been made elsewhere (McDonald 1992b).

As stated above the aims of the excavation were threefold. These were, to determine:

1) the nature of the occupation evidence at the site;

2) if (as suggested by the art) there were two phases of occupation at the site; and,

3) whether the art was contemporaneous with the occupation deposit.

All three aims have been addressed by this report, the third albeit inconclusively.

Two phases of occupation were identified at the site, an early Bondaian phase with no shell (dating from around 3,670 ± 150 BP [ANU-6615]) overlain by a late Bondaian midden layer, dating to the last 600 years [ANU-6373, ANU-6370].

The earlier occupation layer contained stone artefacts only. These were fairly sparsely distributed, mainly undiagnostic quartz and silicified tuff debitage. While little knapping of artefacts appears to have occurred at the site at this time (no cores), stone tools appear to have been used for a variety of tasks. The more recent layer contained shell material, faunal remains, stone artefacts, white pipeclay and shell fish hooks and scrapers. By weight, shell was the predominant cultural component (74%), followed by stone artefacts (15%), charcoal (10%) and pipeclay and faunal material (<1%).

Slightly less than 4.5kg of shell was retrieved from the deposit, yielding a minimum number of 1,093 individual shells. Most of these shells (1,086: 99.4%) were of edible size and species. A total of 29 molluscan species were identified from the assemblage. Six of these were considered to be inedible largely due to their minute size (four varieties of oyster borer, plus worm tubes and barnacles). These species amongst the assemblage reflects the parasitic nature of these smaller species and shellfish collection techniques rather than dietary preference.

Dominant molluscan species at the site include *Crassostrea, Trichomya, Nerita*, and *Cellana. Cabestana, Thais* and *Anadara* are also relatively common. The range of shellfish present at the site reflects the range of species readily available on the rock platforms, beaches and estuarine conditions along the north western shore of Pittwater.

A very small amount of bone (19.6g) was recovered from the site. This included a single Snapper, a small unidentified macropod and a small lizard. Estimates of dietary contributions indicate that these faunal remains while insignificant weight-wise, would have provided more than 25 times the calories of the excavated shellfish remains.

A minute quantity of pigment (white pipeclay) was recovered from the midden layer. This could be interpreted as indicating that the most recent phase of art at the site (predominantly white stencilling) coincided with the most recent occupation – in the last 600 years. While there are problems in firmly correlating the two occupation phases with the two phases of art, the contemporaneity of the midden layer with the more recent art assemblage is posited. The cultural remains in the midden layer, in particular the fishhooks, shellfish, fish and small land animals is interpreted as indicating the presence of women at the site. The more recent art phase also suggests the presence of women. This art assemblage includes stencil compositions of women's and baby's (sized) hands and digging sticks.

The older occupation layer represents sporadic use of the shelter and may well indicate a different pattern of land use. This earlier occupation post-dates the sea-level rise (between7-5,000 BP) and the environment during all phases of the site's occupation can be considered comparable. The absence of organic remains in the deeper deposits is inconclusive but would appear to relate to the acidity of these layers – in the absence of midden deposit. Differences between the stone

artefacts in the two phases, however, are quite clear. Possibly this site was first used as a shelter by men, while hunting on the ridge tops. It is tempting to correlate this earlier occupation which comprises only stone tools with the older phase of art at the site, which consists mainly of very large (men's?) red hand stencils.

But what does the more recent use of the shelter represent? What type of site is suggested by the archaeological remains and the art? How does this site 'fit' into our understanding of prehistoric Sydney at European contact?

The most intensive period of occupation at the shelter took place between 220 and 480 years ago. The archaeological evidence, including calculations of the dietary significance of the shellfish and faunal remains, indicate that the site was probably neither a dinner time camp nor (*per se*) a home base camp (following Meehan's 1982 definitions). While being aware of the archaeological isolation of the Great Mackerel site, it is possible to test Meehan's definitions in a limited fashion. The site is too far from the shellfish collection area and permanent water, and contains the remains of too many species (shellfish and other), for it to be a dinnertime camp. On the other hand, it is too small (physically) to accommodate a territorial group. The occupation deposit does contain a wide range of species in relatively sparse quantities, which could support its identification as a home base. The dietary remains and dates indicate a total of 285 person days of occupation over a period of 340 years. While it is recognised that the food remains present would not represent evidence for the entire daily consumption, the site contains significantly less food debris (both variety and quantities) than the Angophora Reserve Shelter. While the two are not comparable (temporally), the differences in occupation evidence are clear. The Angophora Reserve site has been interpreted as a home base camp (McDonald 1992a; Wood 1989).

The archaeological evidence from the Great Mackerel site does suggest a semi-permanent site for a smaller group. It could represent the base camp for a family group - or a foraging group - over a longer period of time. It could also have been a regular dinnertime camp during times of inclement weather. The fact that no ethnohistoric observations were made with regard to the function of art, or about its production means that this site's function cannot be distinguished on the basis of it being decorated. This research has shown that 65% of occupation shelters in the Sydney region also have art, and that the presence of art need not necessarily imply a non-domestic function. Indeed, in the Ku-ring-gai area most of the shelter art sites are located at the bases of cliffs and hillslopes, adjacent to the maritime resources and the primary resource zones where all members of the local group are likely to have spent most of their time (McDonald 1991).

There is some evidence in the Great Mackerel art for a mixed group (not just women) being present during the more recent art's production; viz. the stencil composition of boomerang held to the wall by a pair of large men's hands. This evidence supports either model: of a shelter for the gatherers during the day, or a base camp for a family group. Ethnographic work (cf. Meehan 1982, 1988) and ethnohistoric references from Sydney both indicate that shellfish collecting parties comprised women, children and sometimes old men 'the Midshipmen met with a very old man and woman and two small children; they were close to the waterside where several more were in their canoes gathering shellfish ' (Beaglehole 1768-71[1955]: 309). Meehan identifies that foraging groups often comprised men, women and children equally as commonly as groups which contained just women and children (23.7% each). The men in these groups were said to be 'usually middle aged or elderly, whose failing eye sight and declining agility prevented them from successfully pursuing normal male hunting activities' (Meehan 1988: 173).

Whatever the function of the site, two forms of archaeological evidence, art and occupation deposit, indicate the presence of women occupants. It is on this basis that the contemporaneity of the most recent art and midden layers is concluded.