

The Aboriginal Prehistory and Archaeology of Royal National Park and Environs: A Review

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Royal National Park and its environs has a rich suite of Aboriginal sites that provide much information about the life and activities of the Aboriginal people who lived in coastal Sydney prior to British colonisation. These archaeological sites include rock engravings, shell middens in rockshelters and open locations, rockshelters with drawings and stencils, as well as grinding grooves. Archaeological excavations in Royal National Park in the 1960s were amongst the earliest in southeastern Australia to provide evidence that the tools and equipment used by Aboriginal people and their way of life had changed over time. The excavations in Royal National Park and southern Sydney, which continue today, provide evidence of the tools and equipment people used in their daily lives, the raw materials they used in manufacturing these items, as well as the animals they hunted, fished and gathered. This article presents a brief review of the contribution that past and recent archaeological excavations have made to our knowledge about the life and activities of Aboriginal people who lived in what is now Royal National Park and southern Sydney prior to British colonisation.

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INTRODUCTION

Royal National Park is in southeastern New South Wales, Australia, with its northern boundary ~25 km south of the Sydney CBD (Fig. 1). The ~15,100 ha area known today as Royal National Park is the north-eastern section of the country of the Dharawal Aboriginal language group. Dharawal country encompasses ocean and estuarine shorelines from Botany Bay to the Shoalhaven River and forested lands as far west as the Georges River and Appin and possibly Camden. Historical accounts and images provide details about the Dharawal way of life in the late 18th–early 19th century, the earliest being the observations of Lieutenant (later Captain) James Cook and Sir Joseph Banks when they explored Kurnell Peninsula during their eight days in Botany Bay in 1770 (Beaglehole 1955, 1963).

The area of interest for this paper – Royal National Park (Royal NP) and southern Sydney (Fig. 1) – is part of the Woronora Plateau, which is rugged dissected sandstone country with freshwater, estuarine and ocean environments. The eastern boundary, fronting the Pacific Ocean, has high sandstone cliffs

interspersed with small sandy beaches and rocky inlets, except where Port Hacking, Botany Bay and the Hacking and Georges Rivers extend inland. Estuarine conditions extend about 28–29 km inland along the Georges and Hacking Rivers to Liverpool and Audley respectively. The area has a highly diverse vegetation including coastal heaths, temperate rainforests, eucalypt forests and woodlands, mangrove forests, and freshwater swamps. These habitats are home to a range of mammals, birds, reptiles and frogs, whilst the ocean and estuarine shorelines provide access to a wide range of fish, marine mammals (e.g., seals, whales) and shellfish. The area thus provided a rich and varied supply of foods for its inhabitants as well as resources for manufacturing their tools and weapons.

During the ~50,000 years of recorded Aboriginal occupation of Australia the coastline has altered with variations in sea-level accompanying long-term climatic changes. Current sea-level was attained about 7,000 years ago. Around 20,000 years ago the sea-level was 120–130 m below its present level with the coastline some 6–15 km east of the current Royal NP–southern Sydney coastline (Attenbrow 2010b:38;

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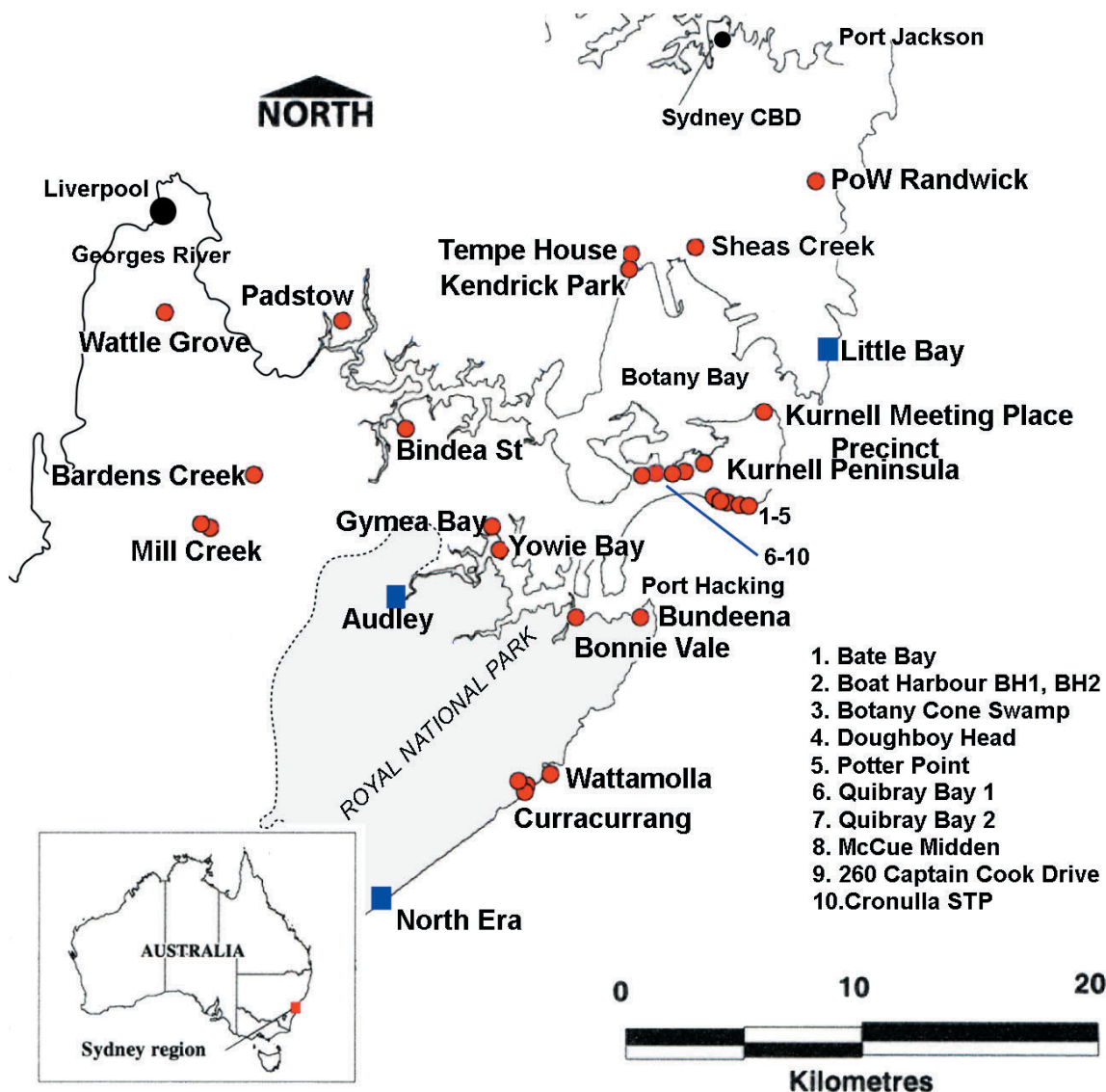


Figure 1. Royal National Park and southern Sydney: Locations of radiometrically dated sites (red circles) and other excavated Aboriginal sites mentioned in text (blue squares).

Haworth et al. 2004). At that time Port Hacking and Botany Bay, and the Hacking and Georges Rivers would have been freshwater valleys. As the sea-level gradually (though not constantly) rose land was inundated and by ~10,000 years ago the ocean waters were entering the freshwater river valleys creating the estuarine habitats of today. The estuarine resources available to the inhabitants of the region thus increased substantially from ~10,000 to ~7,000 years ago.

In examining the archaeology of Royal NP and southern Sydney, my paper focuses on the millennia before the British arrived. I focus particularly on the Aboriginal sites that have been archaeologically

excavated and radiometrically dated (Fig. 1), and the information that these provide about the way of life of the Dharawal and their ancestors. The paper highlights the contribution that these archaeological sites have made to Australian archaeology and prehistory.

ABORIGINAL SITES AND ARCHAEOLOGICAL INVESTIGATIONS IN ROYAL NATIONAL PARK AND SOUTHERN SYDNEY

More than 5,000 Aboriginal sites have been recorded in the Sydney region (Attenbrow 2010b: Plate 12), with more than 650 sites recorded in Royal NP.

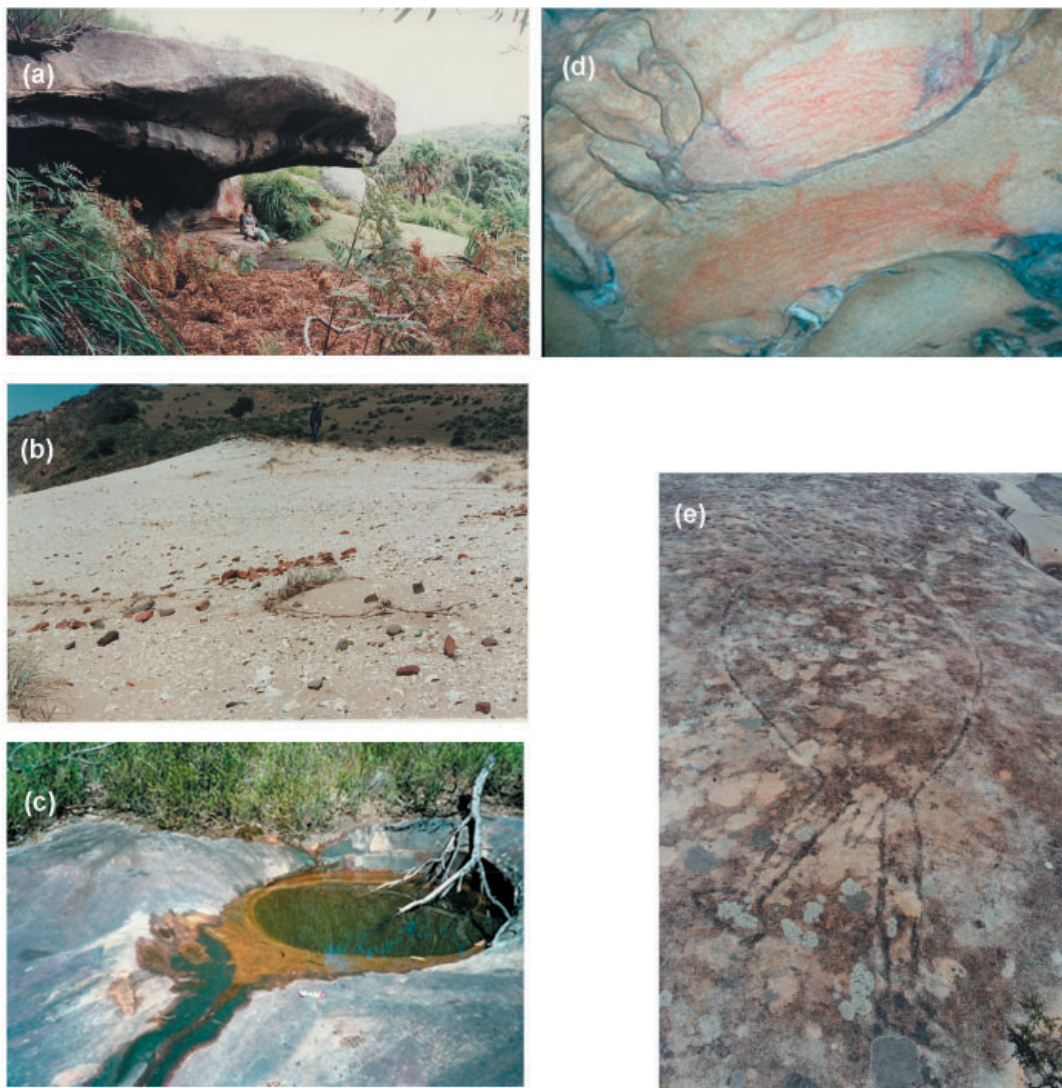


Figure 2. Archaeological sites in Royal National Park. (4a). Curracurrang 1 Rock-shelter with shell midden; (4b) North Era shell midden showing shells and clusters of hearth stones; (4c) Grinding grooves beside rock pool on South-west Arm; (4d) Red pigment fish in rockshelter on South-west Arm; (4e) Engraved anthropomorph at Jibbon, near Bundeena. (Photographs (a), (b) and (e) by Val Attenbrow; (c) and (d) by Illawarra Prehistory Group).

The rich suite of Aboriginal sites in Royal NP and southern Sydney include rock engravings on open rock platforms, shell middens in rockshelters and open locations, drawings, paintings and stencils in rockshelters, as well as grinding grooves along creek lines, beside rock pools and sometimes in shelters (Figs 2a-e). There is a long history of interest in the Aboriginal sites in Royal NP and its environs with the recording and describing of sites, collection of artefacts, and excavations dating back at least to the late 1800s. For example, Bundeena excavations (Harper 1899); north Cronulla stone artefact collections (Etheridge and Whitelegge 1907:234–

36); and rock engravings at Jibbon (*World News*, 7 November 1903 in Attenbrow 2010b:183), Bumborah Point and Frenchmans Bay on Botany Bay (Campbell 1899:6, Plate 3[Fig2]; Mathews and Enright 1895:637, Plate 99[fig 30]). (Note: in following discussions sites in Bundeena and Bonnie Vale have been included as Royal NP.)

Site Recording Fieldwork

While there has been a long history of site recording in Royal NP and southern Sydney, in recent years, the most intense site recording programme

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has been that of the Illawarra Prehistory Group (IPG) (Sefton 1995, 1996, 2002, 2004, 2005, 2007, 2008, 2010, 2011). Their site recording fieldwork in Royal NP over the last 15 years illustrates how the distribution of Aboriginal sites along with their differing sets of archaeological evidence provides much information about people's life and relationships to land, e.g., where they camped and what land and marine resources were used, as well as information from which we can infer social and economic organisation.

Surface Collections

Many surface artefact collections have been made along the southern Sydney coastline (e.g., Etheridge and Whitelegge 1907; Cridland 1924; Doak and Doyle 1927; Rolf 1931a, 1931b; Thorpe 1932; Dickson 1968, 1974a). The Australian Museum houses relatively large collections of stone artefacts from North Era and Garie.

"Some of the earliest and largest surface stone artefact collections come from the sandhills of North Cronulla—Kurnell Peninsula. They were made after a series of heavy storms exposed vast numbers of stone artefacts in the sandhills. The collectors, Etheridge and Whitelegge, described the scene as follows:

A few stone implements were found at Botany Bay and at Kurnell, but there does not appear to be any extensive accumulations at these places. The northern end of Cronulla Beach is extremely rich in stone weapons, chips and flakes. It is covered with many mounds of oyster and other shells, some of which are nearly a hundred feet or so in height. The whole surface in addition to the shells is sprinkled with chips, flakes and weapons, and many of the best found were obtained on or near the base of these oyster mounds. Some distance to the south of the latter there exists a series of extensive flats and hummocks more or less covered with pumice stone. On this ground a large number of implements were found, all of which had evidently been used, but there was an absence of chips or flakes, such as are usually present on the "workshop" grounds." (Etheridge and Whitelegge 1907:235–36)

Dickson's 1960s (1968, 1974a) enormous collection, now held in the Australian Museum, came from a large area of the sand-hills between Kurnell and Cronulla where artefact scatters/concentrations, including knapping floors (workshops), shell concentrations and hearths, became continually exposed over time. Dickson's Kurnell collections include some 8,000 backed artefacts (principally Bondi points) (Dickson 1977:61). There is still much to learn from Dickson's Kurnell surface collections,

only some details, e.g., about the backed artefacts and stone tool technology have been published (e.g., Dickson 1968, 1974a, 1977).

Excavations

While surface collections and site recordings contribute much to answering questions about stone tool distribution patterns and technology, and resource and land use patterns, it is the excavated shell middens and deposits that can tell us about past activities in a chronological framework, and it is these that I focus on in this paper. These archaeological excavations provide evidence for the tools, weapons and equipment that people used in their daily lives, the raw materials they used in manufacturing these items, as well as the animals they hunted and gathered, and how these aspects of people's lives changed over time. Shell and bone tend not to survive in depositional contexts older than ~3,000 years in the Sydney region, and plant remains rarely survive in archaeological sites. This means evidence for plant foods, and tools and equipment made of wood and other plant materials are rarely found, and faunal evidence for diet is restricted to the last ~3,000 years.

One of the earliest documented (and earliest published) excavations in Royal NP/southern Sydney was of a shell midden in a rockshelter in a small cove between Bundeena and Gibbon Beach (Harper 1899). Harper described the shelter floor as containing 'all the edible shell-fish of Port Hacking' and 'an immense number of bones of fish, birds and small marsupials scattered amongst the shell'. The deposit had been disturbed by previous diggers and Harper focussed on describing the skeletal remains of an adult and several children as well as several unusual items that he recovered. Amongst these items were six modified black nerita shells (*Nerita atramentosa*) which are discussed further below.

It was not until the 1960s that most archaeological activity took place in Royal NP, Port Hacking and nearby Kurnell Peninsula and the Georges River. There appears to have been a gap in excavations – or at least in published or reported excavations – in the first half of the 1900s, except for Thorpe's unpublished 1912 excavations in Skeleton Cave (also called Inscription Point; Megaw 1968b) in the Kurnell Meeting Place Precinct. The 1960s excavations were directed by Vincent Megaw with Richard Wright and Peter White of the University of Sydney, and Frank Dickson, and included sites at Curracurrang Cove and Wattamolla (Megaw 1965, 1966, 1967, 1968a, 1974; Megaw and Roberts 1974); Audley (Cox et al. 1968); Boat Harbour BH1 and BH2 (Dickson 1971, 1974a, 1974b); Captain Cooks Landing Place (now called The

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Kurnell Meeting Place Precinct) and Inscription Point (Skeleton Cave) (Megaw 1968b, 1974, 1993); Gymea Bay (Megaw and Wright 1966); and Henry Lawson Drive Padstow (White and Wieneke undated ca 1975; Wieneke and White 1973).

The 1960s excavations were principally part of a regional research project funded by the Australian Institute of Aboriginal Studies (Megaw 1965:202; 1966:4, 9) though some (such as Gymea Bay and Henry Lawson Drive) were undertaken to record/salvage sites that had been disturbed by urban activities (Megaw and Wright 1966:23; White and Wieneke undated ca 1975). All of these sites in Royal National Park and its environs are along the ocean and estuarine shorelines.

Megaw's excavations at Curracurrang 1 and Captain Cooks Landing Place (The Kurnell Meeting Place Precinct) were not written up or published in any detailed form. However, Megaw's publications (e.g., 1965, 1966, 1968a, 1968b, 1974) indicate the richness of these sites in terms of their stone and shell artefacts and faunal assemblages.

Since the 1990s, several sites have been excavated along the coast in Royal NP and southern Sydney, mainly in the context of consulting projects prior to developments that threaten heritage sites, especially sand mining, housing and government infrastructure projects; for example at: Bate Bay (Brayshaw et al. 1992); Bonnie Vale, RNP (AMBS 2007); Bundeena Loftus Street (Mary Dallas Consulting 2008); Bundeena UC (Irish 2007; Mary Dallas Consulting 2004); Cronulla STP (Dallas et al. 2001); Gymea GYB/1 (Koettig 1998); Kurnell Meeting Place Precinct (Irish 2010); Little Bay (Godden Mackay Logan 2009); McCue Midden (Mary Dallas Consulting 2005); 260 Captain Cook Drive (Jo McDonald CHM 2008), Prince of Wales Hospital, Randwick (Godden Mackay Logan and Austral Archaeology 1997); Tempe House, Discovery Point (Jo McDonald CHM Pty Ltd 2005).

In addition, previously excavated materials have been re-analysed, e.g., the flaked stone assemblage from Henry Lawson Drive, Padstow (Hiscock 2003) and faunal remains from The Kurnell Meeting Place Precinct (Tsoulos 2007; Godfree 1995 in Tsoulos 2007:107-109). Further analyses are continuing on the excavated materials from the Meeting Place Precinct and Inscription Point, and additional samples are being radiocarbon-dated by Diana Tsoulos with a 2011 AIATSIS grant (Tsoulos pers.comm.).

RESEARCH ISSUES ADDRESSED BY ARCHAEOLOGICAL INVESTIGATIONS

The archaeological work undertaken over the past 100 years has contributed much information about the way of life of the people who lived in Royal NP and southern Sydney in the recent and distant past. These contributions, some of which are outlined below, provide evidence for the diet of these coastal communities, the tool-kits and technology they used to procure food and to make tools and weapons, as well as the procurement of stone materials and exchange networks, and the identification of other small items that were part of the material culture of the coastal communities of the Sydney region. The excavations provide evidence for the sequence of changes that took place, particularly during the Holocene (the last 11,000-10,000 years), in stone tools, and for introduction of shell fishhooks. In addition, excavations along Captain Cooks Drive (Mary Dallas Consulting 2005) reveal, albeit over a relatively small area, the probable original structure of deflated sites in other parts of the sandhills and their stratigraphic relationship to each other, as well as the location of the late 18th century shoreline inside Botany Bay which varies greatly from that of today.

Radiocarbon ages

Aboriginal occupation has been radiometrically dated back to at least 50,000 years ago in other parts of New South Wales and Australia. Along the NSW coast the earliest Aboriginal sites excavated to date are much younger with dates of 23,000–26,000 cal BP and 19,000–22,000 cal BP at Burrill Lake and Bass Point respectively (Lampert 1971; Bowdler 1976).

Within Royal NP and southern Sydney 29 excavated sites have radiometric dates (Figs 1 and 3, see Appendix). Curracurrang 1 is the earliest radiocarbon-dated site in Royal NP with the base of the cultural deposits dated to 8,000–9,000 years old when calibrated to calendar years. Other dated sites in Royal NP are less than 3,000 years old.

Including the southern Sydney area, there is a greater spread of dates with earlier sites at Tempe House (10,000–11,000 years old) and Prince of Wales Hospital (7,000–9,000 years old); but overall most ages are still less than 3,000 years old (Fig. 3a). The stratigraphic provenance of the radiocarbon date for Doughboy Head is problematic (Mary Dallas Consulting 2002; Smith et al. 1990:5, 118–119, Table 13) and is thus excluded from Figure 3. Figure 3a includes all the radiometric dates that I am aware

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of at the time of writing (71); many sites have more than one date, with Curracurrang 1 having 14 dates. Figure 3b indicates how many sites are estimated to have been occupied in each millennium.

Many people interpret graphs such as these in terms of population change, especially population increase. However, interpreting such graphs is difficult as sites are excavated and radiocarbon dates obtained for a variety of reasons. In addition, many dates represent short-term events (e.g., the hearths at the Prince of Wales Hospital, the butchered dugong bones Sheas Creek and others noted as ST in the

Appendix). For large area open sites it is often not known whether the dates obtained reflect all periods of the site's occupation and include its earliest occupation. It is also probable that dates obtained for sites excavated in the future may well change the configuration of the graphs substantially.

Thus, the dates that are included in these graphs cannot be taken as a representative sample reflecting regional trends in such aspects as land use and demography. In particular, neither of these graphs can be said to reflect demographic changes. They do, however, along with site distribution maps such

as Figure 1, provide impressions of what parts of the country are currently known to be occupied in different periods of time. As such they indicate gaps in our knowledge and provide the basis for future research questions about Aboriginal occupation of the region. For example, it is unlikely, given the radiocarbon age of other sites in Australia and other parts of New South Wales, that the earliest sites have been found in Royal NP and southern Sydney. Most excavated sites in Royal NP and its environs are along the ocean and estuarine shorelines.

Radiocarbon ages are known for only four non-coastal/hinterland sites (see Appendix). Only three open campsites (i.e., non-midden sites comprising stone artefacts only) have been excavated; two coastal and one hinterland – Gynea GYB/1, Loftus Street, and Mill Creek 14 respectively), and only the last two of these have been radiocarbon-dated. Before valid scenarios of changes over time in land and resource use patterns can be produced, more sites in non-coastal/hinterland areas need to be excavated and radiocarbon-dated.

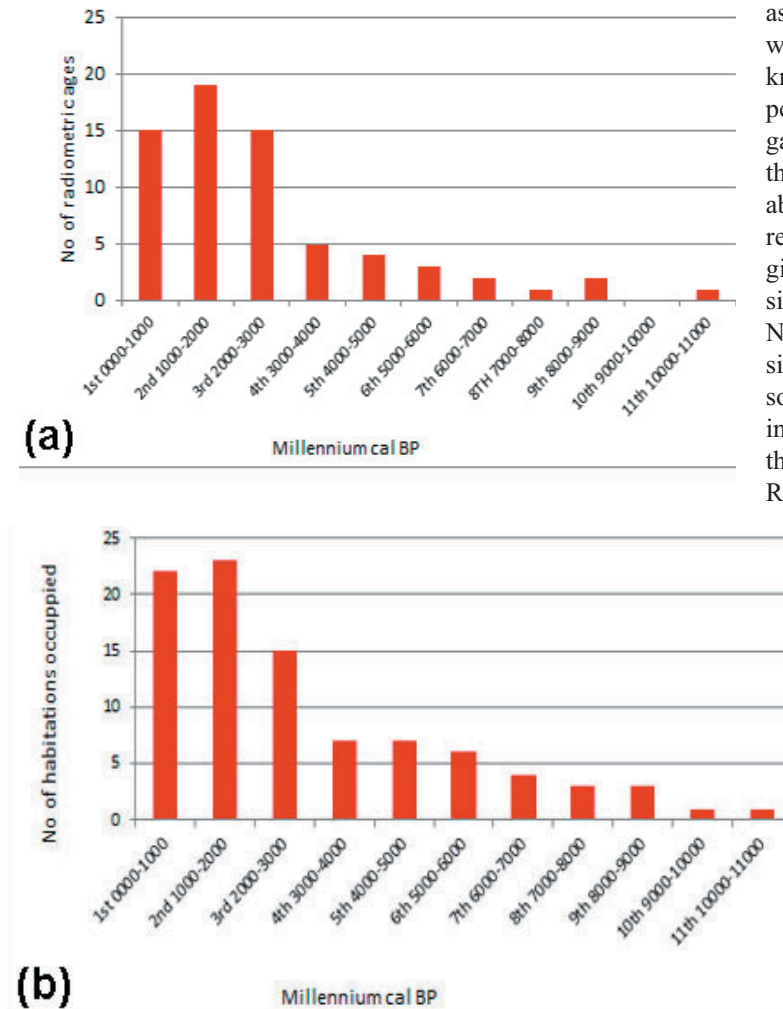


Figure 3. Radiometric dates from Aboriginal sites in Royal National Park and southern Sydney. (4a) Number of radiometric dates (cal BP) in each millennium (N=61, excluding 4 'modern' and 1 problematic). (4b) Number of habitation sites estimated to have been occupied in each millennium (N=29 sites). This is a cumulative graph assuming that once a stratified site was first occupied it continued to be occupied at least some time in each millennium, unless sterile layers are present to indicate otherwise; short-term sites are counted only in the known millennium of occupation.

Stone tools – change over time in tool-kits

Curracurrang 1 was one of the earliest sites in New South Wales to reveal a stratified sequence of stone artefact assemblages which showed changes occurred over time in the stone tools people made and used. Prior to the excavations

at Curracurrang, stratified stone artefact assemblages were found during excavations at Lapstone Creek just west of the Nepean River and at Capertee on the western side of the Blue Mountains. On the basis of the stratified assemblages at these two sites, F.D. McCarthy (1963) proposed a three-phase sequence of stone tool assemblages which he called the Eastern Regional Sequence.

The excavations by Megaw and his colleagues in Royal National Park and Port Hacking confirmed that a three-phase sequence extended to coastal contexts, though there were regional variations (Megaw 1965:204; 1974:35–37). Archaeological work on the NSW south coast (Bowdler 1976; Lampert 1971), Blue Mountains (Stockton and Holland 1974), and north coast (McBryde 1974) also showed such sequences existed over a wide area of southeastern Australia but again with regional variations. The sequence of changes included: the mid-Holocene appearance of backed artefacts and their demise in most regions 1,500–1,000 years ago; the appearance of ground-edged implements 4,000–3,500 years ago and their increase in number ca 1,500 years ago; and changes in raw materials including an increased use of quartz and a decrease in fine grained materials such as silcrete and tuff in the last one or two millennia. However, more detailed analyses are required of the Curracurrang 1 stone assemblages to clarify the nature and chronology of the foregoing changes at this important site.

These changes over time in the introduction and abundance of various stone tools and the use of stone materials may have been associated with shifts in long-term environmental/climate conditions (Attenbrow et al. 2009) and/or were likely accompanied by changes in social behaviour – e.g., changes in social networks and exchange systems between neighbouring and distant communities of other language groups (Grave et al. 2012), and religious belief systems.

Fishing and fishhooks

Fishing was one of the most common activities described in the historical accounts, paintings and drawings. There was a division of labour in fishing activities along the NSW central and south coasts; women used hook and line with shell fish-hooks from canoes, whereas the men used multi-pronged spears from canoes and rock platforms (Fig. 4, note woman carrying hook and line and man holding a multi-pronged fishing spear).

Many shell fishhooks have been recovered from excavated sites in Royal NP and southern Sydney, e.g., Wattamolla, and particularly The Kurnell Meeting Place Precinct where some 200 completed

and partially complete hooks were found (Megaw 1993:44). Most of the shell fishhooks at the Kurnell Meeting Place Precinct were found in one area (Square BB4), and, as it was the women who made and used the shell fishhooks, this suggests this may have been a women's work area. All identified fishhooks in the Sydney region are made of shell. After microscopic examination, use-wear specialist Richard Fullagar considered the 'stone fishhook' from Curracurrang 7 (Tracey 1974:23, 18) to be a natural piece of stone (Attenbrow 2010b:87).

In addition to the shell fishhooks, small stone files are found at many sites, e.g., Curracurrang 2, Quibray Bay, and Boat Harbour. They are considered to have been used in making shell fishhooks, as they have the same geographical and chronological distribution as the shell fishhooks which appear in southeastern NSW archaeological sites ca 1,000 years ago (Attenbrow 2010a). However, use-wear and residue studies indicate they were also used for other purposes, such as bone-working (Attenbrow et al. 1998; Kononenko 2009). Two stone files at Curracurrang 2 were initially reported as being in levels dating to 1930±80



Figure 4. A Family of New South Wales, by William Blake (engraver) from a sketch by Governor King, in Hunter 1793, opposite page 414. (Reproduced courtesy Australian Museum Research Library).

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BP (Glover 1974:14, 17, Table 2, Figure 12, 14), but subsequent reassessment of the location of the stone files and the dated charcoal sample, throws doubt on there being any association between the files and charcoal sample and it is not possible to establish their age (Attenbrow et al. 1998:136).

Evidence for movement of objects, raw materials, shells and/or people

Even at the time Etheridge and Whitelegge (1907) were describing the amazing stone artefact assemblages revealed by the storms along the Sydney coastline, they reported 'It is quite clear that the siliceous material was derived in a great measure from the surrounding Hawkesbury Sandstone, but the others were probably obtained from distant sources'.

In addition to being an indicator of chronological change in technology, ground-edged hatchets also provide evidence for the movement of goods and/or people, especially hatchets made of volcanic rocks that can be traced as coming from sources that are geographically limited in availability. Amongst the artefacts excavated from Curracurrang I was a hatchet made of a rock called tinguaita, an unusual rock known to crop-out along the south coast only in the Minnamurra area – some 60 km away (Branagan and Megaw 1969:14–15). Another ground-edged implement found at Botany Bay (AM Reg. No E.57826) was shown during a recent pilot study using non-destructive pXRF technology (Grave et al. 2012) to be made of basalt probably from a source near Mangrove Mountain in the NSW Central Coast (~80 km distant). Results such these indicate the distances that raw materials or objects were moved and over which exchange systems and social networks extended. The pilot study by Grave et al. is being expanded to include a substantially larger sample of hatchets from a wider region of southeast Australia, including southern Sydney, in a study now supported by the Australian Research Council.

During their fieldwork, the IPG listed the shellfish species observed at the sites they recorded. From their site recordings, they (Sefton 2002:46, 2004:42, Fig.16, 2011:48–49, Fig. 15) identified variations in the distribution of estuarine shells (Sydney cockle *Anadara trapezia*) and shells from exposed open coast environments (small turban *Subnivalia undulata*, triton *Cabestana spengleri*, cartrut *Thais orbita*, limpet *Cellana tramoserica* and chiton [unidentified]) which were on the surface of shelter floor deposits in unexcavated sites in the western half of the Park (Fig. 5). In the south of the Park, people carried coastal shellfish (e.g., small turbans) from the ocean shoreline up to 6 km inland to the upper non-estuarine reaches

of the Hacking River above Audley. In the north, people focussed their shellfishing along the estuaries, but they transported estuarine shells up to 11 km away from the estuarine shorelines. This patterning shows that people moved between the coast, estuaries and forested lands. Interestingly, the species of shell that was carried furthest was the estuarine Sydney cockle, a shell which historically was described as being used as a tool (Attenbrow 2010b:119), suggesting it may have been carried for practical purposes as much as for food.

Faunal remains – subsistence/diet

The 1960s Royal NP and Kurnell excavation reports provide only brief lists of identified marine and land fauna (Glover 1974:Table 7; Megaw 1965:203, 1967:283-84, 1968a:326, 1968b:17-18; Megaw and Roberts 1974:Table 4), but even so they indicate that the statements made by some First Fleet journalists that the local inhabitants 'lived by fish alone' were mistaken. Marine mammal bones, e.g., Fur seal *Arctocephalus* sp. and whale bone, were also reported, as well as unidentified crustacea.

Subsequent lists of marine and land fauna, which come from recently excavated Kurnell sites (e.g., Brayshaw et al. 1992:Table 4.1.1; Dallas et al. 2001:21-26, Tables 4.3-4.6; Mary Dallas Consulting 2005:134-40, Tables 5.14-5.17; Irish 2010:48-56) and re-analysis of the 1960s excavated Kurnell assemblages (Tsoulos 2007; Godfree 1995 in Tsoulos 2007) provide much fuller and more comprehensive lists.

These lists indicate that the local inhabitants of this area ate of a wide variety of fish and land animals (Tables 1 and 2). The dominant shellfish species included rock oyster *Saccostrea glomerata*, mud oyster *Ostrea angasi*, large turban *Turbo torquata*, small turban *Subnivalia undulata*, hairy mussel *Trichomya hirsuta*, edible mussel *Mytilus edulis planulatus*, Sydney cockle, black nerita *Nerita atramentosa*, colourful limpets *Cellana tramoserica*, Cartrut *Thais orbita*, Spenglers triton *Cabestana spengleri*, and Hercules whelk *Pyrazus ebeninus*, depending on the shell midden's environmental context (i.e., whether ocean or estuarine). Fish bone assemblages were dominated by snapper *Pagrus auratus* and bream *Acanthopagrus australis* (Sparidae), with blue groper/wrasse (Labridae) leatherjackets (Monacanthidae), flatheads (Platycephalidae) and catfishes (Plotosidae) common. Garfish (Hemiramphidae) were tentatively identified at Inscription Point by Megaw (1968b:17), but subsequent re-analysis by Diana Tsoulos (pers. com.) has not identified them at this site and they have not been identified at any other coastal Sydney

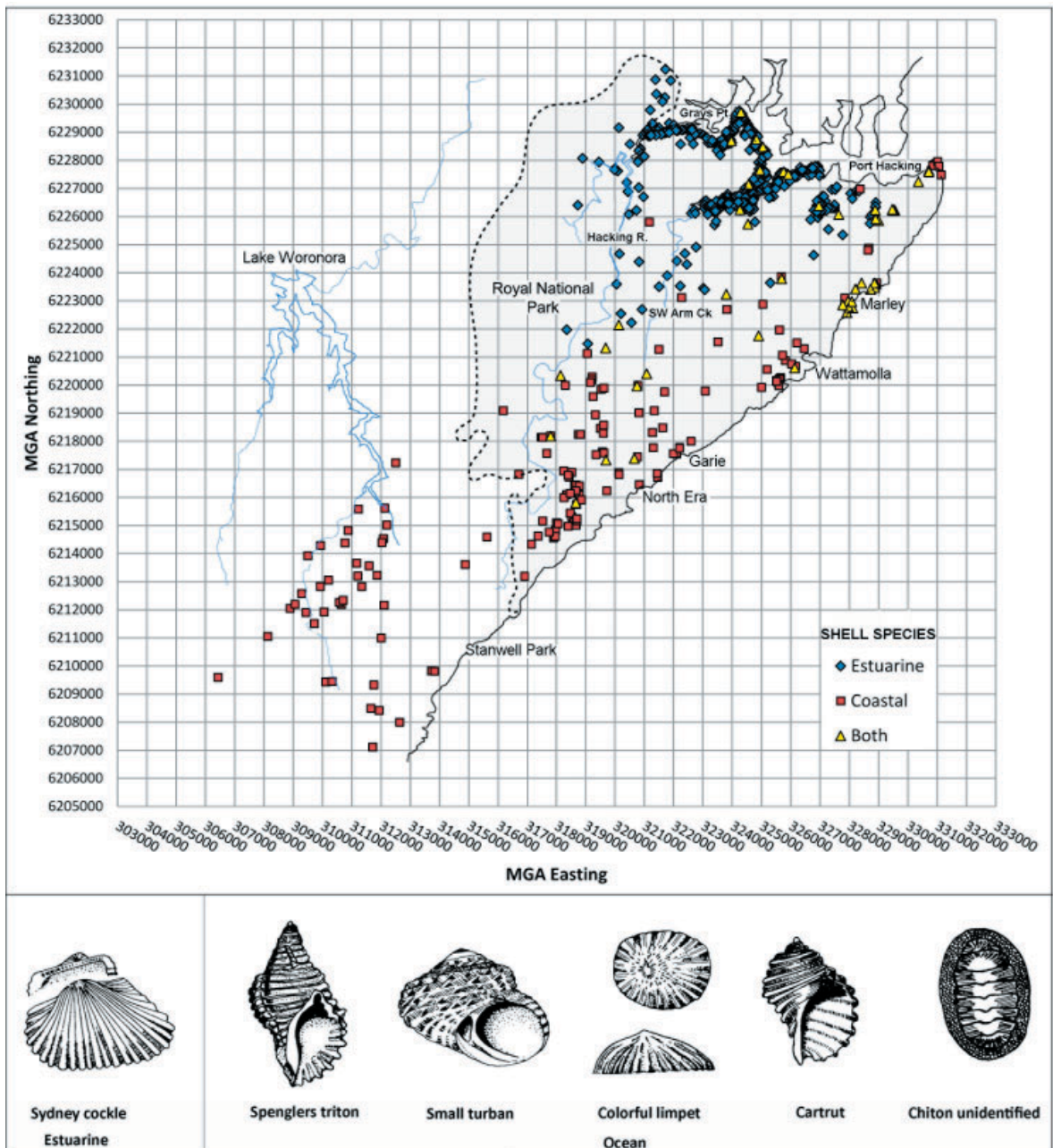


Figure 5. Distribution of Royal National Park sites that have coastal and estuarine shell, recorded by Illawarra Prehistory Group to 2011. Map provided by and reproduced with permission of Bruce Scurr of the Illawarra Prehistory Group. Line drawings of shells from Child 1969.

site (Colley and Attenbrow 2012). Land animals included kangaroo *Macropus* sp, wallaby *Wallabia bicolor*, possum, potoroo *Potorous tridactylus* and bandicoots *Isodon macrourus*. Current analyses being undertaken during Tsoulos' current AIATSIIS-funded project will enable more complete descriptions of the animals caught.

Body ornaments, rattles, musical instruments or fishing lures?

Amongst the items of interest that William Harper found during his 1890s excavation of the Bundeena rockshelter were six black nerita shells (*Nerita atramentosa*), each with a small square hole cut into their back (Fig. 6(a[i and ii])); a kangaroo fibula 9¾ inches (24 cm) long, well-polished with

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Family	Taxa	Common name	Royal Nat'l Park			Kurnell Peninsula				
			Curraurang 2	Wattamolla WL and WB	Bundeena UC Midden	The Meeting Place Precinct	McCue Midden	Cronulla STP	260 Captain Cook Drive	Bates Bay BHW
Anguillidae	Unidentified	Eel unidentified					♦			
Arripidae	<i>Arripus trutta</i>	Eastern Australian Salmon				♦				
Arripidae	<i>Arripus</i> sp.	Australian Salmon				♦				
Balistidae	Unidentified	Triggerfishes [1]								♦
Carangidae	<i>Pseudocaranx dentex</i>	Silver or White Trevally				♦				
Carangidae	Unidentified	Travelly				♦				
Cheilodactylidae	<i>Nemadactylus</i> spp.	Morwong/Jackass			♦					
Cheilodactylidae	Unidentified	Morwongs				♦				
Diodontidae	Unidentified	Porcupinefishes				♦			♦	
Elasmobranch	<i>Carcharias taurus</i>	Greynurse Shark				♦	♦			
Elasmobranch	<i>Heterodontus portusjacksoni</i>	Port Jackson Shark				♦				
Elasmobranch	Unidentified	Shark/Ray/Skate				♦	♦			
Elasmobranch	Unidentified	Shark			♦		♦			
Kyphosidae [2]	<i>Girella</i> sp.	Luderick/Blackfish			♦	♦	♦			♦[2]
Kyphosidae	<i>Girella, Kyphosus or Scorpis</i>	Drummers				♦			♦	
Labridae	<i>Achoerodus viridis</i>	Eastern Blue Groper	♦[3]	♦[3]			♦			
Labridae	Unidentified	Wrasse, Blue Groper				♦			♦	
Labridae	Labrid unident	Parrotfish/Wrasse				♦				♦
Labridae	<i>Pseudolabrus gymnogenis</i>	Crimson-banded Wrasse	♦							
Labridae	<i>Pseudolabrus</i> sp.	Wrasse		♦	♦		♦	♦		
Monacanthidae	Monacanthid unidentified	Leatherjacket	♦[4]	♦[4]		♦	♦	♦	♦	
Moridae	Unidentified	Morid cods				♦				
Platycephalidae	Platycephalid unidentified	Flathead				♦	♦	♦	♦	
Plotosidae	Unidentified	Catfishes				♦			♦	
Pomatomidae	<i>Pomatomus saltatrix</i>	Tailor				♦				
Rajiformes	Unidentified	Stingrays				♦				
Sciaenidae	<i>Argyrosomus japonicus</i>	Mulloway/Jewfish				♦	♦[5]			
Scorpaenidae	Unidentified	Scorpionfishes				♦				
Serranidae	<i>Acanthistius</i> sp.	Wirrah				♦				
Serranidae	<i>Epinephelus</i> sp.	Rock Cod				♦			♦	
Serranidae	Unidentified	Rockcods, Seaperches				♦				
Sillaginidae	<i>Sillago ciliata</i>	Sand Whiting				♦			♦	♦
Sillaginidae	<i>Sillago</i> sp.	Whiting				♦			♦	
Sparidae	<i>Acanthopagrus australis</i>	Yellowfin Bream				♦		♦	♦	
Sparidae	<i>Acanthopagrus</i> sp.	Bream	♦[6]		♦		♦			♦[6]
Sparidae	<i>Pagrus auratus</i>	Snapper		♦	♦	♦	♦	♦	♦	♦[7]
Sparidae	<i>Rhabdosargus sarba</i>	Tarwhine				♦	♦	♦	♦	
Sparidae	Unidentified	Unidentified			♦		♦	♦	♦	

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some modifications, which he considered to be a 'nose bone', but acknowledged it may have been a 'netting needle' or a 'death bone or pointer', concluding with the option that such objects may have been at times put to several different uses and this object 'may have once been useful as well as ornamental' (Harper 1899:329–32).

However, it is the black nerita shells that have been the focus of recent discussions. Some 100 years after William Harper interpreted the modified black nerita shells in the Bundeena rockshelter as parts of a necklace, Paul Irish recovered several black nerita shells similarly modified from another midden at Bundeena (Fig. 6a[iii]; Irish 2007) and again at the Kurnell Meeting Place Precinct during salvage excavations in re-opening Cooks Stream (Fig. A[iv]; Irish 2010:83). Microscopic examination of these shells and experimental work by Nina Kononenko (2009) confirmed that the shells were definitely humanly modified (probably cut with a stone knife) and that the modification was highly unlikely to have been for food extraction purposes. Thus Irish (2007) proposed they were some form of personal adornment.

In 2009 three black nerita shells and a *Bembicium* sp. shell, found in auger samples from a shell midden at Little Bay, showed signs of possible modification and it was proposed that they may have had a similar function to those from Bundeena (Godden Mackay Logan 2009:60–61). Subsequently Farquharson and Brown (2010) hypothesised that rather than being from a necklace the modified black nerita could have been part of a musical instrument called a systrum. As support for their suggestion, Farquharson and Brown referred to an engraving at Allambie Heights (Fig. 6b) which was interpreted by W.D. Campbell (1899:Plate 12) as a systrum, 'a shell-jingling musical instrument that was used as an accompaniment to the beating together of sticks'. Another engraving at Wheeler Heights (Fig. 6b) comprising 18 small circles forming a loop was also interpreted as a systrum by Campbell (1899:22–23, Plate 10) though Stanbury

and Clegg (1996:39, Fig.23) refer to it as 'an underwater rattle used to attract marine animals'. Another interpretation of the shells is that they may be from a children's rattle (pers.com. Oliver Brown 2011), perhaps similar to those collected by Walter Roth in Northern Queensland in 1899 (Kahn 2003:58–59).

Whatever their use, these small items provide valuable insights and stimulate our thoughts about the range of objects people used and the activities they participated in.

SUMMARY AND CONCLUSIONS

Many hundreds of Aboriginal sites have been recorded in Royal NP but artefact collections and archaeological excavations have been undertaken at relatively few sites within the Park. The earliest published excavations were undertaken in the 1890s at Bundeena. Much later in the 1960s a major archaeological programme excavated several sites within the Park at Curracurrang and Wattamolla, and also in the Kurnell Meeting Place Precinct in Kamay-Botany Bay NP. Recent archaeological work, which has been focussed to the north and north-west of the Park, has been undertaken on sites being impacted by a variety of developments, in contrast to the earlier fieldwork which was undertaken for academic research. However, the archaeological work undertaken, from earliest to most recent, provides much information about the Dharawal inhabitants of this area prior to British colonisation.

The earliest occupation of an Aboriginal site excavated in Royal NP dates to around 8,000–9,000 years ago and in southern Sydney the site at Tempe House dates back to 10,000–11,000 years before present. These radiocarbon ages are much more recent than the earliest dates for occupation of Australia ca 50,000 years ago, or even the NSW south coast where occupation levels dating back to 23,000–26,000 cal BP and 19,000–22,000 cal BP were revealed at Burrill Lake and Bass Point respectively (Lampert

Table 1 (preceding page). Identified fishes from selected excavated Aboriginal archaeological sites in Royal National Park and southern Sydney. Scientific names according to Hutchins and Swainston 1986 and The Australian Museum Ichthyology Fish database. ♦ present at site. Sources: Brayshaw et al. 1992: Table 4.1.1; Dallas et al. 2001:21–26, Tables 4.3–4.6; Glover 1974: Table 7; Irish 2010:48–56; Table 4.6; Jo McDonald CHM 2008: Table 50; Megaw and Roberts 1974:Table 4; Mary Dallas Consulting 2004:Tables 6.6 to 6.10; Mary Dallas Consulting 2005:134–40, Table 5.13; Tsoulos 2007:Table 5.4. ([1] common name for Balistidae listed as leatherjacket in Brayshaw et al.1992); ; [2] Girellidae now renamed Kyphosidae; [3] Listed as *A. gouldii* blue groper in Megaw and Roberts 1974 and Glover 1974; [4] listed as Aluteridae leatherjackets in Megaw and Roberts 1974, Glover 1974; [5] listed as *S. antarctica* in Mary Dallas Consulting 2005; [6] listed as *Mylio* sp. in Glover 1974 and Brayshaw et al 1992; [7] listed as *Chrysophrys auratus*.

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Table 2. Identified land and marine mammals, reptiles and birds from selected excavated Aboriginal sites in Royal National Park and southern Sydney. Sources: Brayshaw et al. 1992:Table 4.1.1; Dallas et al. 2001:21-26, Tables 4.3-4.6; Glover 1974:Table 7; Irish 2010:48-56; Table 4.6; Jo McDonald CHM 2008:Table 50; Megaw and Roberts 1974:Table 4; Mary Dallas Consulting 2004:Table 6.6 to 6.10; Mary Dallas Consulting 2005:134-40, Tables 5.14-5.17; Tsoulos 2007:Tables 5.8 and 5.9.

Family	Taxa	Common name	Royal NP			Kurnell Peninsula				
			Curraurrang 2	Wattamolla and WB	Bundena UC Midden	The Meeting Place Precinct [CCLP]	McCue Midden	Cronulla STP	260 Captain Cook Drive	Bates Bay BHW
LAND MAMMALS										
Canidae	<i>Canis lupus dingo</i>	Dingo		◆			◆	◆		◆? dog, poss dingo
Dasyuridae	<i>Antechinus flavipes</i>	Yellow-footed Antechinus						◆		
Dasyuridae	<i>Antechinus stuartii</i>	Brown Antechinus				◆				
Dasyuridae	<i>Antechinus sp.</i>	Antechinus				◆				
Dasyuridae	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll				◆				
Dasyuridae	Dasyuridae sp.	Marsupial mouse			◆					
Dasyuridae	Dasyurid unidentified	Marsupial mouse						◆		
Dasyuridae	<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale								
Macropodidae	<i>Macropus giganteus</i>	Eastern Grey Kangaroo				◆				◆ or <i>E. robustus</i>
Macropodidae	<i>Macropus robustus</i>	Euro/Wallaroo								◆ or <i>E. giganteus</i>
Macropodidae	<i>Macropus rufogriseus</i>	Red-necked Wallaby						◆		
Macropodidae	<i>Macropus sp.</i>	Kangaroos						◆		
Macropodidae	<i>Petrogale penicillata</i>	Brush-tailed Rock Wallaby							◆	
Macropodidae	<i>Thylogale thetis</i>	Red-necked Pademelon								◆
Macropodidae	<i>Wallabia bicolor</i>	Swamp Wallaby								◆
Macropodidae	Macropodid unidentified	e.g., kangaroo, wallaby		◆						◆

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Table 2
continued

Family	Taxa	Common name	Royal NP				Kurnell Peninsula				
			Curraurang 2	Wattamolla WL and WB	Bundena UC Midden	The Meeting Place Precinct [CCLP]	McCue Midden	Cronulla STP	260 Captain Cook Drive	Bates Bay BHW	
INTRODUCED SPECIES											
	<i>Bos taurus</i>	Cow				◆					
	<i>Mus</i> sp.	House mouse				◆					◆
	<i>Oryctolagus cuniculus</i>	Rabbit				◆					
	<i>Ovis aries</i>	Sheep				◆					
REPTILES: LIZARDS AND SNAKES											
Agamidae		Dragon lizard				◆					◆
Ophidia		Snake				◆					
Pygopodidae		Snake		◆							
Scincidae		Large skink				◆					
Varanidae	<i>Varanus</i> sp.	Goanna		◆		◆					◆
		Lizard unidentified							◆		
		Reptile unidentified snake							◆		
		Reptile unidentified									
BIRDS											
	<i>Puffinus tenuirostris</i>	Short-tailed shearwater, Muttonbird		◆							
	<i>Puffinus</i> sp.	Shearwater, Muttonbird	◆								
		Petrel ?		◆							
	Bird, probably <i>Pterodromamacroptera</i>	Muttonbirds									◆
		Birds unidentified		◆		◆				◆	
FROGS											
	Amphibians	Unidentified frogs			◆						◆

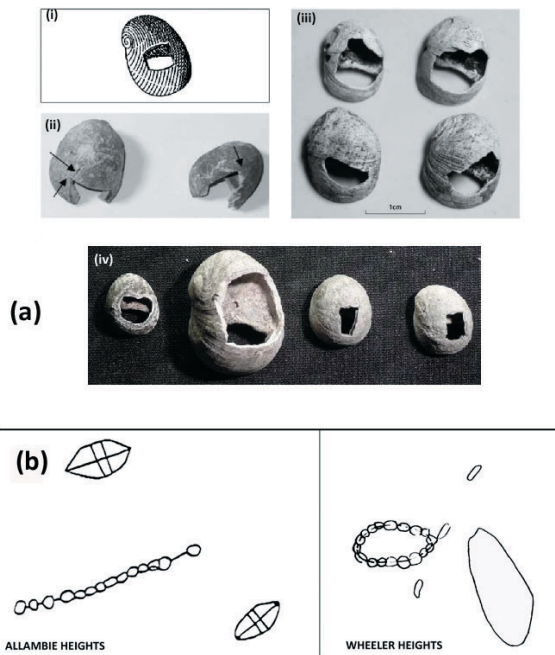


Figure 6: (a) Modified *Nerita atramentosa* shell from: (i) and (ii) Bundeena Beach excavations (WR Harper 1899; Australian Museum Registration No E.08582); (iii) Bundeena UC Midden (Paul Irish 2007:Fig. 2); (iv) Cooks Stream, Kurnell (Irish 2010:Fig. 4.30). (b) Engraved figures interpreted by W.D. Campbell as a systrum at Allambie Heights with two shields; and at Wheeler Heights with footprints and unknown figure (reproduced from Campbell 1899: Plates 10 and 12; no scales provided).

1971; Bowdler 1976). No doubt in those earlier times people were occupying the country that is now Royal NP and southern Sydney, and so sites older than 10,000–11,000 year old may one day be found when further sites are excavated in these areas.

This brief review has been able to report only some of the results of archaeological work in Royal NP and southern Sydney. However, it shows how archaeological data gathered from this area provides evidence about many aspects of Aboriginal life in the past: the foods eaten – the species of fish, shellfish and land animals; the tools and weapons used and the way the tool-kit changed over time with the introduction of backed artefacts, ground-edges hatchets and shell fishhooks at different times during the Holocene, and the recent decline in production of backed artefacts; and the raw materials used in manufacturing their tools and the sources from which such materials were gained.

Thus, the results of archaeological investigations

in Royal NP and southern Sydney have contributed and will continue to make valuable contributions to our knowledge about the way of life and the changes that took place in the lives and behaviour of Aboriginal people in southeastern Australia in the near recent and distant past. To date, however, most archaeological work has concentrated along the coast and estuaries and a programme of excavations in stratified datable sites in the western non-coastal areas of Royal NP and southern Sydney would shed much light on how Dharawal people lived and behaved when in the northern hinterland parts of their country.

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APPENDIX

Radiometric ages listed according to sub-regions within Royal National Park and southern Sydney (ST=short-term event). Except where noted, radiocarbon age estimates are based on 2 sigma radiocarbon age calibrations using Calib 5.0.1; for charcoal samples [ch] the Southern Hemisphere atmospheric option; and shell samples [sh] the marine option at $\Delta R = -39 \pm 11$ 14C years (AINSE 2009:7; Ulm 2006); and calibration datasets: Hughen et al. 2004; McCormac et al. 2004.

Site name	Sample provenance	Material	Dating method	Conventional age	Standard Deviation	Lab No	Cal BP age [2sigma greatest relative area]	Cal BP Median Probability	Publication, Report and Comments
ROYAL NATIONAL PARK									
Bonnie Vale	Square 206E 845N, Spit 6	sh	C14	887	30	Wk-19344	481-607 [1.00]	528	AMBS Consulting 2007:42.
Bundeena, Loftus St	C15/1/4 (Sample 1)	ch	C14	3,643	32	Wk-22761	3,869-4,011 [0.80]	3,958	Mary Dallas Consulting 2008:44-46, Table 4.3, Appendix 5
	C15/1/4 (Sample 2)	ch	C14	3,662	53	Wk-22762	3,848-4,099 [0.95]	3,991	
	H15/1/3	ch	C14	4,563	33	Wk-22763	5,054-5,188 [0.53] 5259-5322 [0.40]	5,181	
Bundeena UCCC	H15/1/4	ch	C14	4,151	32	Wk-22764	4,574-4,773 [0.80]	4,695	Mary Dallas Consulting 2004; Addendum 2004; Irish 2007:46
	Square 1, spit 7; lowest midden in shelter	sh	C14	1,034	35	Wk-15437	552-699 [1.00]	640	
Curraurrang 1	Square 2, spit 6; basal midden on talus below shelter	sh	C14	2,024	36	Wk-15436	1,524-1,741 [1.00]	1,635	Megaw 1965:203, 1968a:Table 2, 1974:Table 1 Megaw 1965:203, 1968a:Table 2
	Cutting 15, layer Ma	ch	C14	Modern <200		GaK-462	n/a		
	Cutting 15, layer Mb	sh	C14	Modern <230		GaK-483	n/a		

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Site name	Sample provenance	Material	Dating method	Conventional age	Standard Deviation	Lab No	Cal BP age [2sigma] [greatest relative area]	Cal BP Median Probability	Publication, Report and Comments
ROYAL NATIONAL PARK									
	Cutting 7E, level 2, upper midden	ch	C14	Modern <250		GaK-897	n/a		Megaw 1968a:Table 2
	Cutting 7, level 4	ch	C14	840	90	Gak-689	630-912 [0.94]	729	Megaw 1968a:Table 2, 1974:Table 1
	Baulk 4-7a/b (11-15)	ch	C14	1,430	90	GaK-894	1,068-1,418 [0.97]	1,289	Megaw 1968a:Table 2
	Cutting 10-15B	ch	C14	1,580	130	GaK-481	1,177-1,717 [1.00]	1,438	Megaw 1965:203, 1968a:Table 2
	Cutting 16, level 4, hearth	ch	C14	2,110	90	GaK-896	1,823-2,208 [0.94]	2,030	Meg
	Level 10 B/L	ch	C14	2,150	180	I-1135	1,613-2,494 [0.99]	2,079	Megaw 1965:203, 1968a:Table 2
	Cutting 7S, level 6	ch	C14	2,230	80	GaK-895	1,988-2,345 [0.99]	2,177	Megaw 1968a:Table 2
	Cutting 4, level 6	ch	C14	2,360	90	GaK-688	2,111-2,547 [0.89]		Megaw 1968a:Table 2, 1974:Table 1
	Cutting 10, level L	ch	C14	2,500	400	GaK-393b	1,560-3,443 [1.00]	2,324	Megaw 1965:203, 1968a:Table 2
	Cutting 5, level La	ch	C14	3,880	150	GaK-394a	3,827-4,629 [0.98]	4,224	Megaw 1965:203, 1968a:Table 2

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	Cutting 5, level Lb	ch	C14	3,000	120	GaK-394b	2,841-3,380 [0.98]	3,109	Megaw 1965:203, 1968a:Table 2, 1974:35
	Cutting 15L, basal occupation	ch	C14	7,450	180	GaK-482	7,916-8,550 [0.98]	8,207	Megaw 1965:203, 1968a:Table 2, 1974:35
Curraurrang 2	Layer 3, middle of black sand	ch	c14	1,930	80	GaK-898	1,606-1,995 [1.00]	1,808	Glover 1974:14,17, Fig. 11
Curraurrang 7	Basal date	ch	C14	1,050	100	ANU-0179	724-1,096 [0.97]	907	Tracey 1974:25, Megaw 1974:36, Table 1,
Wattamolla WL	Pit A1, shelly midden, strata 1	ch	C14	560	130	ANU-0176	303-691 [0.99]	531	Megaw and Roberts 1974:4; Megaw 1974:Table 1
	Cutting G1 (shell less) strata 2	ch	C14	840	160	ANU-0177	509-990 [0.99]	744	
	Cutting D4 bottom/ex. strata 3	ch	C14	1,900	115	ANU-0178	1,518-2,061 [0.99]	1,773	
KURNELL PENINSULA									
Bate Bay Site BHW	Square B1, spit 4	ch	C14	2010	150	SUA-3009	1,561-2,208 [0.95]	1,910	C14 ages reported to author by Brayshaw (pers.comm.) after Brayshaw et al. 1992 was written.
	Square B1, spit 7	ch	C14	830	210	SUA-3010	447-1,173 [0.99]	746	
	Square B2, spit 5	ch	AMS	2402	88	NZA-2323	2,287-2,620 [0.69]	2,407	
	Square C2, spit 1	ch	C14	Modern		SUA-3011	n/a	n/a	
	Square C2, spit 6	ch	C14	1,400	110	SUA-3012	1,049-1,420 [0.94]	1,250	
	Boat Harbour BH1	Spit 1, top of midden layer	ch	C14	470	60	ANU-0896	429-547 [0.73]	

ABORIGINAL PREHISTORY AND ARCHAEOLOGY

Site name	Sample provenance	Material	Dating method	Conventional age	Standard Deviation	Lab No	Cal BP age 2sigma [greatest relative area]	Cal BP Median Probability	Publication, Report and Comments
	Base of midden/earliest occupation [poss spit 10]	ch	C14	1,930	70	ANU-0895	1,687-1,953 [0.92]	1,809	Dickson 1974b:17-18; 1974a:47 reports date as 1950±100
Botany Cone Swamps BCSS, Boat Harbour	Charcoal from insitu hearth exposed in dune blow out (ST)	ch	C14	1,520	90	SUA-2857	1,233-1,551 [0.98]	1,374	Smith et al. 1990:121, 123, Table 13; sparse scatter of fragmented shell and stone artefacts
The Meeting Place Precinct (Captain Cooks Landing Place BB4/-, Kurnell, Botany Bay	BB4/F, 85-90cm, base of upper midden, layer 7 Site location B, BB4/F, lower midden (above bedrock)	ch	C14	360	110	ANU-0722	239-540 [0.82]	366	Megaw 1974:36, Table 1
Cronulla STP1, Captain Cook Drive, Kurnell Peninsula	Midden D, trench SB3/1, from a dark circular feature with charcoal Trench SB2/4	ch sh	C14 C14	3,240 2,880	70 60	Wk-8845 Wk-8844	3,241-3,577 [0.99] 2,489-2,827 [1.00]	3,411 2,693	Dallas et al. 2001, Appendix 2
260 Captain Cook Drive, Kurnell Peninsula	Square A3/2/C3/Bulk Square A3/2/C4/1 Square A3/2/C2/2	sh sh sh	C14 C14 C14	2,262 2,216 2,165	38 37 37	Wk-23797 Wk-23798 Wk-23796	1,811-2,027 [1.00] 1,751-1,971 [1.00] 1,694-1,901 [1.00]	1,913 1,861 1,802	Jo McDonald CHM 2008:37-38, Appendix 3

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Doughboy Head 1, DH1, Kurnell Peninsula	Adjacent to a 'creek' line	ch	C14	12,190	110	Beta-36920	13,786-14,526 [0.99]	14,066	Smith et al. 1990:5, 118-119, Table 13. Mary Dallas Consulting (2002: Table 2.2) says 'problematic date due to inadequate collection procedure'
McCue Midden, Kurnell Peninsula, Botany Bay	Transect A, Square 110, Unit 02, Bulk; top of midden	ch	C14	760	40	Beta-165769	631-726 [0.80]	664	Mary Dallas Consulting 2005: Table 5.2
	Transect A, Square 110, Unit 05, Bulk	ch	C14	770	40	Beta-165770	634-729 [0.87]	671	
	A101/2/2; Transect A, Square 101, Unit 2, Spit 2	ch	C14	1,670	40	Beta-165768	1,402-1,609 [1]	1,495	
	Transect A, Square 110, Unit 8, bulk, base of midden	ch	C14	1,840	40	Beta-165771	1,595-1,822 [0.98]	1,708	
	Transect A, Square 22A, Unit 5, bulk	ch	C14	200	50	Beta-165767	131-301 [0.67]	174	
	Transect B, Square TT2, Unit 2, Spit 2	ch	C14	930	40	Beta-165772	727-909 [1.00]	793	
Potter Point, Kurnell Peninsula	Peat overlaying a pebble tool (ST)	peat	C14	5,620	70	ANU-0402	6,262-6,498 [0.96]	6,360	Dickson 1974a:46. The only information Dickson provided is 'from material collected during my own investigations at Potter Point, Kurnell ... on the high ground'; but see Mary Dallas Consulting 2002: Table 2.2

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Site name	Sample provenance	Material	Dating method	Conventional age	Standard Deviation	Lab No	Cal BP age 2sigma[greatest relative area]	Cal BP Median Probability	Publication, Report and Comments
Quibray Bay QB1, Botany Bay	Skeletal remains in shell midden (ST)	human bone	C14	2,210	360	ANU-0261	1,327-2,970 [0.99]	2,164	Dickson 1974a:47
Quibray Bay QB2, Botany Bay	Shell from top of shell midden buried beneath sand (ST)	sh	C14	4,130	111	SUA-0518	3,917-4,535 [1.00]	4,243	Roy and Crawford 1981:204, Table 1 (cited as 3680±111 BP)
PORT HACKING and SOUTHERN SYDNEY COAST									
Bindea Street, Bonnet Bay	Ph4/Tb/spit 14, unit D	ch	C14	2,340	100	Beta-005787	2,038-2,543 [0.92]	2,292	Attenbrow and Conyers 1983:23
Gynea Bay, Port Hacking GY	Earliest occupation	ch	C14	1,220	55	NSW-06	961-1,185 [0.94]	1,086	Megaw 1965:206; Megaw and Wright 1966:26-28, 43
Henry Lawson Drive, Padstow	Level III at base of midden inside shelter	ch	C14	870	95	SUA-0059	635-927 [0.97]	756	White and Wieneke c.1975, 7,17
	Level III-sub 55 cm deep outside shelter	ch	C14	5,240	100	SUA-0060	5,710-6,208 [0.99]	5,951	
Kendrick Park Midden, Marrickville	Midden 'top' at present	sh	C14	3,901	53	Wk-11291	3,767-4,090 [1.00]	3,930	AMBS 2003:18; Upper part of midden probably removed post- contact, so early date at top does not represent abandonment
	Midden base	shell	C14	4,328	50	Wk-11004	4,374-4,696 [1.00]	4,510	

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Prince of Wales Hospital, Randwick	Charcoal adhering to hearthstone, Feature 203	ch	C14	7,860	50	Beta-87211	8,428-8,727[0.99]	8,582	Godden Mackay and Austral Archaeology 1997:25-26
	Hearthstone, Feature 203 (ST)	hearthstone	TL	5,200	400	not provided	not necessary		
		hearthstone	TL	8,400	800	not provided	not necessary		
Sheas Creek, Alexandria	Dugong bone in estuarine creek sediments (ST)	bone marine	C14	5,520	70	Wk-8616	6,145-6,541 [see comment]	6,300	Haworth et al. 2004:46, 50-51, Table 1; calBP age adjusted for marine residence time
Discovery Point, Tempe	Charcoal pit feature Locus 2	ch	C14	9,376	61	Wk-16167	10,366-10,694[0.93]	10,522	Jo McDonald CHM 2005:56
Yowie Bay WA/-	WA/18M	ch	C14	2,230	70	ANU-0308	2,001-2,336 [1.00]	2,181	Poiner 1974:29; Poiner states site abandoned and not occupied in first millennium BP
	WA/18B	ch	C14	2,500	85	ANU-0307	2,345-2,735 [1.00]	2,575	
	WA/6B (basal)	ch	C14	2,670	85	ANU-0175	2,451-2,884 [0.96]	2,717	
HINTERLAND TO ROYAL NP and SOUTHERN SYDNEY									
Bardens Creek 9	Square A3, spit 2	ch	C14	1,630	90	SUA-1746	1,303-1,630 [0.96]	1,471	Attenbrow and Negelevich 1984:143. Occupation evidence extends below C14 dated level

ABORIGINAL PREHISTORY AND ARCHAEOLOGY

Site name	Sample provenance	Material	Dating method	Conventional age	Standard Deviation	Lab No	Cal BP age 2sigma[greatest relative area]	Cal BP Median Probability	Publication, Report and Comments
HINTERLAND TO ROYAL NP and SOUTHERN SYDNEY									
Mill Creek M11, Menai	Shelter A, square 1, spit 3	ch	C14	520	50	SUA-2255	451-560 [0.97]	518	Revised dates in Koettig 1990:24
	Shelter A, square 1, spit 5	ch	C14	1,450	50	SUA-2256	1,239-1,396 [0.97]	1,311	
	Shelter A, square 1, spit 9	ch	C14	2,110	50	SUA-2257	1,891-2,148 [1.00]	2,022	
	Shelter A, square 2, spit 3	ch	C14	980	50	SUA-2258	742-929 [1.00]	847	Koettig 1990:24
	Shelter A, square 2, spit 9,	ch	C14	2,690	50	SUA-2259	2,698-2,867 [0.92]	2,759	
Mill Creek M14, Menai	Square E9/ spit 3 (hearth)	ch	C14	2,160	80	Beta-27197	1,918-2,313 [0.98]	2,088	Koettig 1990:16, 27
Wattle Grove 3-2	Trench 5 (hearth; ST)	ch	C14	1,580	60	Beta-120747	1,307-1,532 [1.00]	1,418	White 1997[1998] Lab Report