THE MORETON REGIONAL ARCHAEOLOGICAL PROJECT (MRAP) STAGE II: AN OUTLINE OF OBJECTIVES AND METHODS

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INTRODUCTION

The Moreton Region Archaeological Project (MRAP) was initiated as a long-term multi-stage regional project which sought to coordinate archaeological investigations being undertaken in S.E. Queensland. Since the project officially began in 1977 (see Hall 1980a), it has been successful in directing and integrating the work of numerous researchers, most of whom were students at the University of Queensland. MRAP is designed as a flexible research program comprised of three areal components (subcoastal zone, coastal zone and offshore island zone) and a number of stages. Stage I sought to identify the archaeological record of the study area and, through excavation and surface collection of materials from selected sites in all zones, develop a regional chronology and to identify patterns and questions relevant to the reconstruction of past settlement-subsistence patterns. This work was satisfactorily completed in 1987 and Stage II research, which essentially concerns the delineation and explanation of perceived changes in the region's archaeological record, has now been initiated. Thus, this paper, after setting the stage with a description of the environment and ethnohistory of the study area, summarizes the results of Stage I research and follows with a discussion of the objectives, methods, questions and approaches relevant to Stage II.

THE MORETON REGION

The Moreton Region is located in the extreme southeast corner of Queensland. It is an inward-draining water catchment with an area of some 21,400 km^2 (Figure 1). Numerous rivers and creeks with their origins in the mountainous country in the south, west, and north, drain coastward through the subcoastal alluvial valleys and coastal lowlands to debouch into Moreton Bay. The region has a relatively moist subtropical climate with two main seasons, summer (13-30^{o} C) and winter (6-25^{o} C) and an average annual rainfall of 885mm. Because the Moreton Region occupies an intermediate latitudinal position between tropical and temperate biotic provinces it exhibits an overlap of plant and animal species common to both (Keast 1981).

For research purposes the study area may be divided into two sub-regions. One is the large subcoastal zone which includes the Brisbane River drainage west of the Beechmont and D'Aguilar Ranges to the escarpment of the Great Dividing Range. Major habitat zones include: the fringing forest/aquatic zone along the watercourses which in winter contains a great variety of potential Aboriginal animal food resources; the eucalypt open forest zone in the valleys and lower mountain slopes, which contains the greatest variety of animal species; and the closed forest zone in the uplands, which offers the fewest potential food species (cf. Lilley 1984).

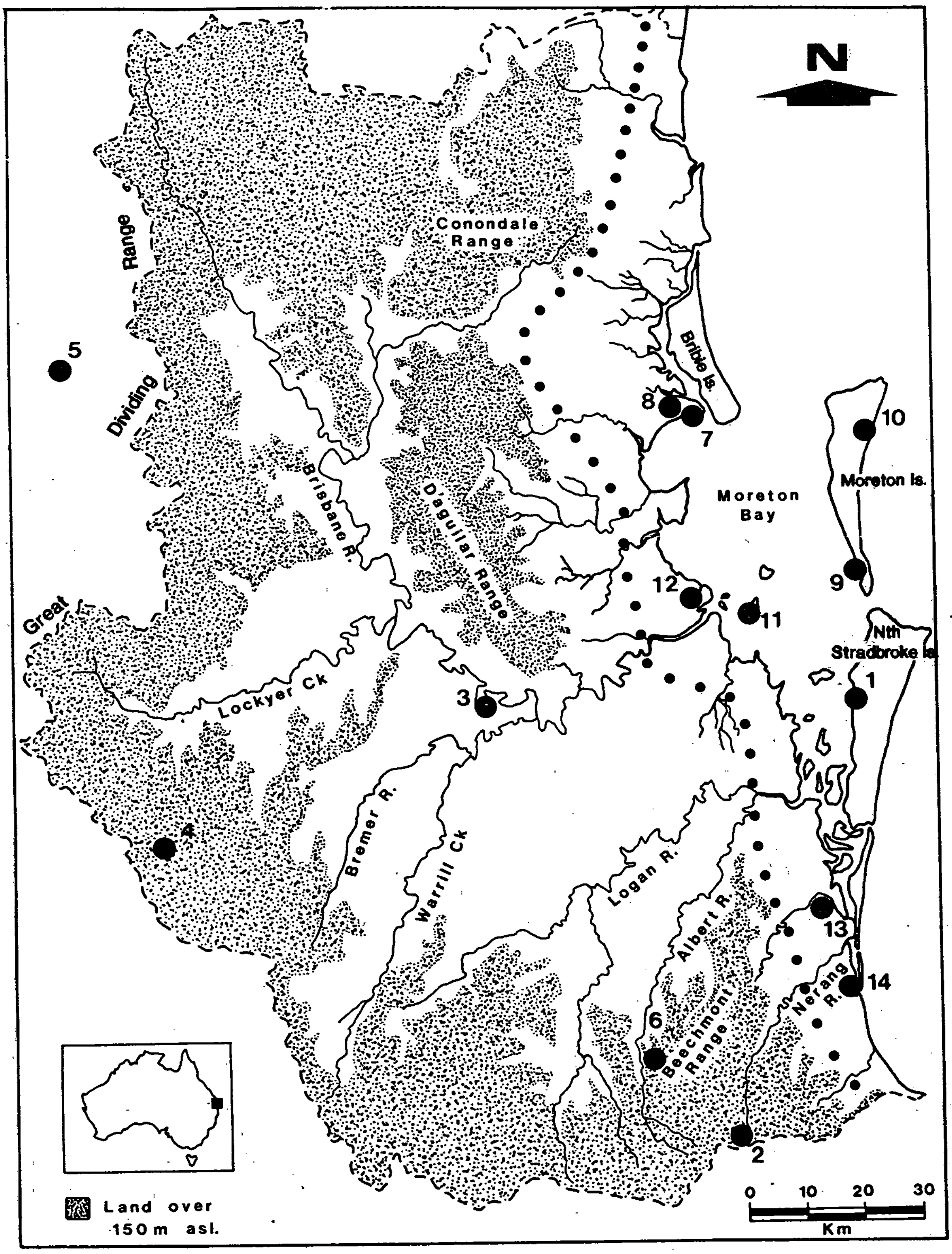

Figure 1. Map of the Moreton Region showing areas and sites mentioned in the text (dotted line indicates subcoastal/coastal zone).

1. Wallen Wallen Creek
2. Bushrangers Shelter
3. Platypus Rockshelter
4. Gatton Shelter
5. Maidenwell Shelter
6. Bishop's Peak
7. Sandstone Point
8. Brown's Road
9. Toulkerrie
10. First Ridge
11. St. Helena
12. Brisbane Airport
13. Hope Island
14. Broadbeach

The other sub-region incorporates Moreton Bay and the coastal lowlands or "Wallum" and includes the offshore islands. The Wallum is an undulating lowland belt with low soil fertility largely below the 30m contour which contains a mosaic of beaches, dunes, estuaries, streams, fringing forests, heaths and dune forests and which provides habitats for a diversity of flora and fauna (Coaldrake 1961). It contains over half of the 60 species of terrestrial land mammals recorded for the Moreton Region, over 40 species of reptiles, some 440 species of birds and over 300 species of fishes (Thomson 1975). The bay also provides habitats for dugong, turtle, numerous kinds of shellfish, crustaceans, and other potential food species.

When Europeans first arrived in the Moreton Region they found complex of Aboriginal societies thriving on the rich food resources of the area, especially those in and around Moreton Bay. Although historical records are patchy and incomplete, they offer sufficient ethnographic data from which to infer general patterns of Aboriginal subsistence (Hall 1982). With respect to the coastal lowlands this literature points to three daily subsistence tasks: fishing (by men), shellfish gathering and fern-root gathering (by women). Terrestrial mammals, reptiles, birds, marine turtles, dugong, honey, grubs, and a diversity of plant foods supplemented this diet (e.g. Petrie 1980; Welsby, in Thomson 1976). Fishing was often done with a scoop net but set nets, weirs, fish traps and spears were also used. Fern root (Blechnum indicum), which was known locally as "Bungwall", was probably a dietary staple (Petrie 1980:92).

In contrast to these coastal people who lived a relatively sedentary life with respect to subsistence and settlement, the subcoastal zone peoples were more mobile and less densely distributed on the landscape (Lilley 1984). They hunted terrestrial animals and aquatic birds, fished in the rivers and foraged for a variety of plant foods. Lilley (1984:27) has argued from historical records that people gathering near major rivers and lakes during the drier winter months in order to avail themselves of the food resources in the fringing forest/aquatic zone and local lowland forests. In the wetter summer months they would disperse across the landscape to hunt and forage in smaller family groups.

Aborigines of the Moreton Region were divided into numerous named societies. Coastal and island groups considered themselves distinct from inland peoples and this division was symbolised by, among other things, the removal of the left little finger of young coastal women (Petrie 1980:57). Population density was quite high in comparison to most parts of Australia, and the total population is estimated to have been over 5,000 (Hall 1982:82-84). Although these peoples were discrete identity-conscious socio-political groups which controlled known bounded territories, they can by no means be considered socially or politically separate. They maintained close links with one another through a complex web of social relationships and historical sources point to continual inter-group social business (e.g. Winterbotham 1957; Petrie 1980; Whalley 1987; see also Morwood 1987). People from different communities often came together for ceremonies and social exchange, the largest and most widely known example being the Bunya Feast, which saw an aggregation of peoples from well outside the Moreton Region every three years or so (Sullivan 1977). Documentation of over 120 Bora Grounds throughout the Moreton Region testifies to a great deal of inter-group social action (Satterthwait and Heather 1987).

The physical environment has not remained static through time and changes in the landscape would have had profound effects upon, plant, animal and human populations. Some 18,000 years ago the coast was probably some 30km east of its present position. Subsequent melting of Pleistocene ice caused a gradual landward transgression of the sea until about 6,000 years ago when this process virtually stopped, forming Moreton Bay and the present coastline (Flood 1981; Hekel et al. 1979).

ARCHAEOLOGICAL RESEARCH IN THE MORETON REGION

MRAP research has documented over 1,000 sites and excavations of some 40 of these have produced evidence of human occupation dating to over 20,000 years ago. Furthermore, research has demonstrated some interesting spatial and temporal variability in the archaeological record (Hall 1987), a summary of which is given below.

The earliest evidence recorded for human occupation in the region was made on North Stradbroke Island. Below a recent shell midden at Wallen Wallen Creek on the island's west coast (Figure 1), a deep deposit was found which demonstrates continuous human occupation for at least the past 20,000 years (Neal and Stock 1986). During the early part of the occupation of this site the island itself was a large dune standing between the valley and a coastal plain to the east and people would have looked out on a Pleistocene pre-Brisbane River valley to the west. As post-glacial seas rose successive human populations would have witnessed that plain diminish and, by 6,000 years ago, their large dune would have been transformed into an island and their river valley into what Europeans later called Moreton Bay.

The stone artefact assemblage from Wallen Wallen Creek shows a loss of high quality manufacturing stone over this period (Neal and Stock 1986:620), presumably through a drowning of or decreased access to quarrying localities by ocean transgression. The site indicates two other major changes, both economic in nature. One involves a change from the hunting of terrestrial and aquatic animals to a more exclusively aquatic coastal subsistence regime. The second change entailed a dramatic increase in the discard of cultural material after about 2,000 bp, suggesting increased exploitation of littoral and marine resources after this time (Neal and Stock 1986:619).

As no other sites have been found which date prior to 6,000 BP. Wallen Wallen Creek must provide, for the present, our framework for the early prehistory of the Moreton Region. However, a number of rockshelter sites in the subcoastal zone have provided evidence for human occupation from the early mid-Holocene (Figure 1). The earliest of these is Bushranger's Cave, located in the rainforest on the eastern Lamington Plateau. Excavation of this site yielded numerous hearths, stone artefacts and animal bones dating from 6,300 years ago to the present (Hall 1986). Faunal remains included a suite of animals which are representative of rainforest edge habitats. Interestingly, there is an abrupt increase in the density of both faunal remains and stone artefacts in the topmost levels, perhaps indicating an increase in site use late in the Holocene. At Gatton Shelter, another subcoastal zone site dating from about 3,800 bp to within the last 1,000 years, Morwood (1986) reports an increase in discard of materials after about 3000 BP. With the exception of stone artefacts (which show discard decrease after ca. 1000 BP) this increased discard and an associated increase in animal species diversity continues into the upper levels of the sequence

(Morwood 1986). Maidenwell Rockshelter in the Bunya Mountains (adjacent to the Moreton Region) dates to 4300 bp and reports low initial artefact discard, an increase at about 1000 bp and a decrease after this time (Morwood 1986). A fourth site, Platypus Rockshelter, which dates from about 5300 BP, also produced chronological changes. These are characterised by a low initial discard of cultural materials between the period ca. 5300-4000 BP followed by in increase after this time until about 2500 years ago, after which discard decreased (Hall and Hiscock 1988a). Two recently excavated rockshelters at Bishop's Peak in the upper reaches of the Albert River Valley (Edmonds 1986) and Brooyar Rockshelter to the north of the Moreton Region near Gympie (McNiven 1988) are both dated to between 2000 and 3000 bp. At Bishop's Peak bone and stone discard appears to increase after about 2000 bp. In sum, four rockshelters excavated in the subcoastal region all date from or just after the time the sea reached its present levels and Moreton Bay was formed and two more show their beginning of human occupations some 2500-3000 years later.

Excavation of sites in the coastal and offshore island zones of the Moreton Region has produced different results to those in the subcoastal zone. Most of these are shell middens or midden complexes and all but two date to within the past 2000 years. As these are too numerous to describe in detail here, comment is restricted to general results from these components.

Recent survey work in the Bribie Island - Toorbul Point area (Figure 1) has found over 70 sites, 12 of which have been excavated. A midden in an Aboriginal campsite at Brown's Road was dated to 2,000 years ago. The site was associated with hundreds of stone artefacts among which were found numerous examples of a type Kamminga (1981) has named Bevelled Pounders. These large wedge-shaped tools have bevelled margins which exhibit microscopic linear striations thought to be the result of plant food processing, perhaps Bungwall (Kamminga 1981; Gillieson and Hall 1982). This fern abounds in the coastal Wallum swamps of Moreton Bay and its geographical distribution coincides well with that for Bevelled Pounders (Hall et al - in press). Recent residue analysis has identified starch grains of this species on at least one Bevelled Pounder (Higgins 1988; Hall et al - in press).

At Sandstone Point, only a few kilometres from Brown's Road, is a large complex of Aboriginal middens distributed both on the foreshore and the crests of a series of beach ridges formed as the shoreline retreated during the past 6,000 years (Flood 1981). Haglund's 1972 foreshore excavation yielded a date of some 700 years (Crooks 1982) but recent work has revealed a continuous occupation over the past 2,000 years (Nolan 1986). These deposits have also yielded numerous Bevelled Pounders. The food remains primarily include shellfish and fish with the occasional terrestrial mammal. The evidence suggests an Aboriginal subsistence based upon marine and littoral resources, such as that recorded historically, throughout its history of human occupation (Nolan 1986; Hall et al 1987). A dramatic increase in fish bone discard, coupled with a significant rise in taxa diversity after about 800 BP led Walters (1987) to argue that the historically recorded Aboriginal fishery was fully developed by this time. Nolan (1987) notes the interesting juxtaposition of this midden with a fish trap and Bora Ground and suggests, on the basis of historical reports, that this area represents a place for large gatherings of Aborigines for social-ceremonial purposes.

Only two sites in the coastal component are dated earlier than 2,000 years ago. One was discovered at the New Brisbane Airport complex during the excavation of a large floodway (Hall and Lilley 1987). Analysis of the excavated evidence indicated not only that people were living on the coast some 4,000 years ago but also that they were camping on a sea shore several kilometers inland of the present one. Furthermore, recent analysis indicates that they were fishing and gathering shellfish at this time. Current thinking holds that either the sea level in Moreton Bay was higher than at present some 4, 000 years ago (Flood 1980, 1984; Hall and Lilley 1987) or perhaps that infilling sediments have moved the shoreline seaward, especially with respect to the mainland coast (cf. Hughes and Sullivan 1981). At the Sanctuary Cove development on Hope Island, Gold Coast, excavations also demonstrate coastal occupation and resource exploitation (shellfish) 4,350 years ago (Walters et al 1987). Whether one argues for sea level change or for bay infilling, the result is the same - a seaward shift in shoreline. Thus, this recent evidence suggests a good reason why sites earlier than about 2000 BP have not been found on the coast; prior to this time the coast was further inland and archaeologists have been looking in the wrong place (see Hall and Lilley 1987).

Archaeological work on Moreton Island has yielded over 200 midden sites (Morwood 1975; Robins 1984a), 15 of which have been excavated (Hall 1980b, 1984; Hall and Lilley 1988; Robins 1984b). Faunal remains from these sites generally suggest a littoral and marine subsistence regime. The sites of Toulkerrie on the southwestern coast and Minner Dint on the central east coast, offer evidence that pandanus fruit may also have been an important food (Hall 1980b, 1984). The earliest human occupation of some 1,600 years is documented at the site of One Tree near Toulkerrie (Hall 1982:91). Robins (1984b) dated a site at First Ridge near Blue Lagoon at 1,150 years and two other sites date to within the past 500 years. Hall and Robins (1984) inferred from this evidence that, while people may have been living on Moreton Island prior to the formation of Moreton Bay, they probably left the island for economic reasons about the time of its formation, not to return for some 4,000 years. Subsequent dating of five more sites in the northern part of the island support this hypothesis (Lilley and Hall 1988). Although the Wallen Wallen Creek data from North Stradbroke Island and new evidence of shifted mainland shorelines in the mid-Holocene (see below) tend to question this model, it is still considered viable until proven otherwise. Reasons include the fact that the southern end of North Stradbroke Island, which forms the eastern part of the Moreton Bay "wedge" (Figure 1), is very close to the mainland and is easily accessible especially during lowest tides. Furthermore, Stradbroke was only a true island between 6000 and 4000 BP, after which it virtually became a peninsula until the last century when it became divided by the sea into two islands (Kelly and Baker 1984). Stradbroke Island is therefore not a typical offshore island. Finally, until the the question of the cause of mid-Holocene shoreline movement in the bay has been resolved, it will not be known to what degree it influenced the archaeological record of the bay islands.

This argument for a late Holocene exploitation of the offshore islands in Moreton Bay is also supported by Alfredson (1983, 1984) who excavated a large midden on St. Helena Island which documents human occupation from at least 1,800 bp to the present. She also notes a change in faunal remains from bats and fish to the addition of shellfish at about 1,000 years ago. This is attributed to a shift in human resource exploitation, people initially making seasonal forays to the island for bats (primarily) but, when silting processes favored the growth of shellfish populations and shortened the distance between the island and mainland, people began to make more regular trips and longer camps there (Alfredson 1983).

EXPLAINING THE EVIDENCE

The evidence from MRAP and related research summarized above has permitted the construction of a cultural chronology for the Moreton Region which includes some interesting variability both from zone to zone and through time. One major goal of MRAP is to explain this spatial and temporal variability in terms of in human behaviour within the context of current debate in Australian archaeology concerning Holocene cultural change. It is considered that detailed analyses on a regional scale may eventually allow viable explanations as to when and how the complex of Aboriginal societies found historically in the region came into being. At present however, apart from a general inferred synopsis of cultural change offered by Hall (1987), only Morwood (1987) has framed such an explanatory model for this region. Because we hold that Morwood's model does not provide the best "fit" with the archaeological facts we provide below a brief outline of his argument and counter with a simpler alternative which we feel better explains the archaeological record as it stands at present.

The Morwood "Complexity" Model

Following a recent theme in Australian archaeology which focuses on the development of widespread Aboriginal alliance systems (e.g. Lourandos 1983; Morwood 1984), Morwood (1987) argues for an increase in Aboriginal social complexity in S.E. Queensland during the Holocene. He also maintains that, unlike other parts of Australia where social complexity developed as adaptations to "harsh environments", this social change occurred in S.E. Queensland in order to increase "the carrying capacity of regional resources" in a "an area with a rich and diverse range of resources" (Morwood 1987:337).

Drawing heavily from the ethnohistorical literature which demonstrates a relatively high population density and a complex of named Aboriginal groups held together by a strong alliance network, Morwood develops a two-phase model for S.E. Queensland prehistory. Prior to 6000 BP the model holds that the region was sparsely populated and that people intermittently occupied "optimal" resource zones (Morwood 1987:343). Gatherings of different groups would have been held less frequently and would have been in "response to localized resource abundances" (1987:343) such as the summer Bunya nut "glut". Although people may have used coastal resources (i.e. littoral-marine) these would not have been as rich due to low littoral productivity. After 6000 BP, when rising seas had formed Moreton Bay and the Islands, Morwood holds that the development of highly productive estuarine and mangrove areas permitted an acceleration of population increase, most notably after ca. 4500 BP. After that time the development of "social and demographic mechanisms which increased the effective carrying capacity of regional resources" (1987:343) triggered further population increases, the combination of which resulted in the picture of Aboriginal society as witnessed historically.

Morwood (1987:343) posits three criteria by which these population increases may be measured archaeologically: increases in site formation rates, increases in the "occupational intensity at sites" and "more intensive economic exploitation as indicated by the use of new habitats, resource types, extractive technologies and management strategies". He points to the post-4500 BP archaeological record as indicating an growth in site numbers which is "logarithmic" rather than as "linear" (1987:343) from which he infers population increase at and after this time. Morwood also posits three archaeological criteria as indicators of "social and demographic complexity" which include increases in sites relating to "symbolic activities" such as ceremonial grounds and art, the appearance of "exotic materials and technologies" in sites and reduction in occupational intensity at sites which he sees as reflecting status differentiation and limited "access to knowledge" (Morwood 1987:343).

It is possible to examine Morwood's argument at a number of levels; however, for the purposes of this paper we point to just three facts which serve to question the viability of his model. These concern site numbers through time, intensity of site use and the dating of sites relating to ceremony and large gatherings. First, we question the logic of directly equating increases in site numbers with population - especially in this case where dated sites represent a sample of only about 0.004% of the known sites in the region. Further, even if we allowed that such data may roughly correlate with population, Figure 2 adequately demonstrates that while the number of dated sites in this region does increase through time, that increase is gradual rather than logarithmic in nature prior to about 1000 BP. Certainly the evidence can not be found to support Morwood's argument for a dramatic increase in site numbers after about 4,500 BP (or, consequently, an increase in population). The number of dated subcoastal zone sites increases at a gradual rate (from 1 to 5) throughout the Holocene while the coastal/island zone record exhibits a doubling of sites about every 1000 years until after ca. 1000 BP when the record shows a three-fold increase. The reader is cautioned here that this apparently dramatic increase may simply be the result of preservation factors plus the fact that the all are located on or near a shoreline which is itself only late Holocene in age (see Hall and Lilley 1987).

The second criticism involves the concept of "occupation intensity" which is currently not sufficiently well defined or understood to permit reliable statements about "intensity of site use" (cf. Hiscock 1981). There are numerous factors which may account for perceived changes in cultural discard rates in sites. Such factors include inter alia the frequency and duration of occupation, the number of individuals using a site, the kinds of activities carried out, the differential use of space in sites and the relative preservation of material. For example, temporal variability in cultural discard rates at Platypus Rockshelter may be most parsimoniously explained with reference to geomorphic agencies which affected the available space for human occupation (Hall and Hiscock 1988). In short, before attempting to derive higher-order explanations such as intensity of site use one should first examine other possibilities.

Morwood (1987:346) uses the evidence from the Sandstone Point locality as archaeological documentation of for the the development of social complexity on a regional scale. The increase in fish bone discard coupled with a statistically significant shift towards taxa diversity at the Sandstone Point Site after ca. 800 BP may well signal a change towards a more intensive production of fish related to large gatherings of people (Walters 1987; Nolan 1987). We also agree that the close juxtaposition of this midden complex to both a fish trap and a Bora Ring is unlikely to be fortuitous. However, as this is the only site in a large region which yields such evidence we caution the use of generalization to include the entire region and argue that other possible scenarios might be posited to explain such perceived change without invoking dramatic shifts in social complexity. Furthermore, on the Sandstone Point evidence, even if such changes did occur, they date to within the past 1000 years rather than before as Morwood's model maintains.

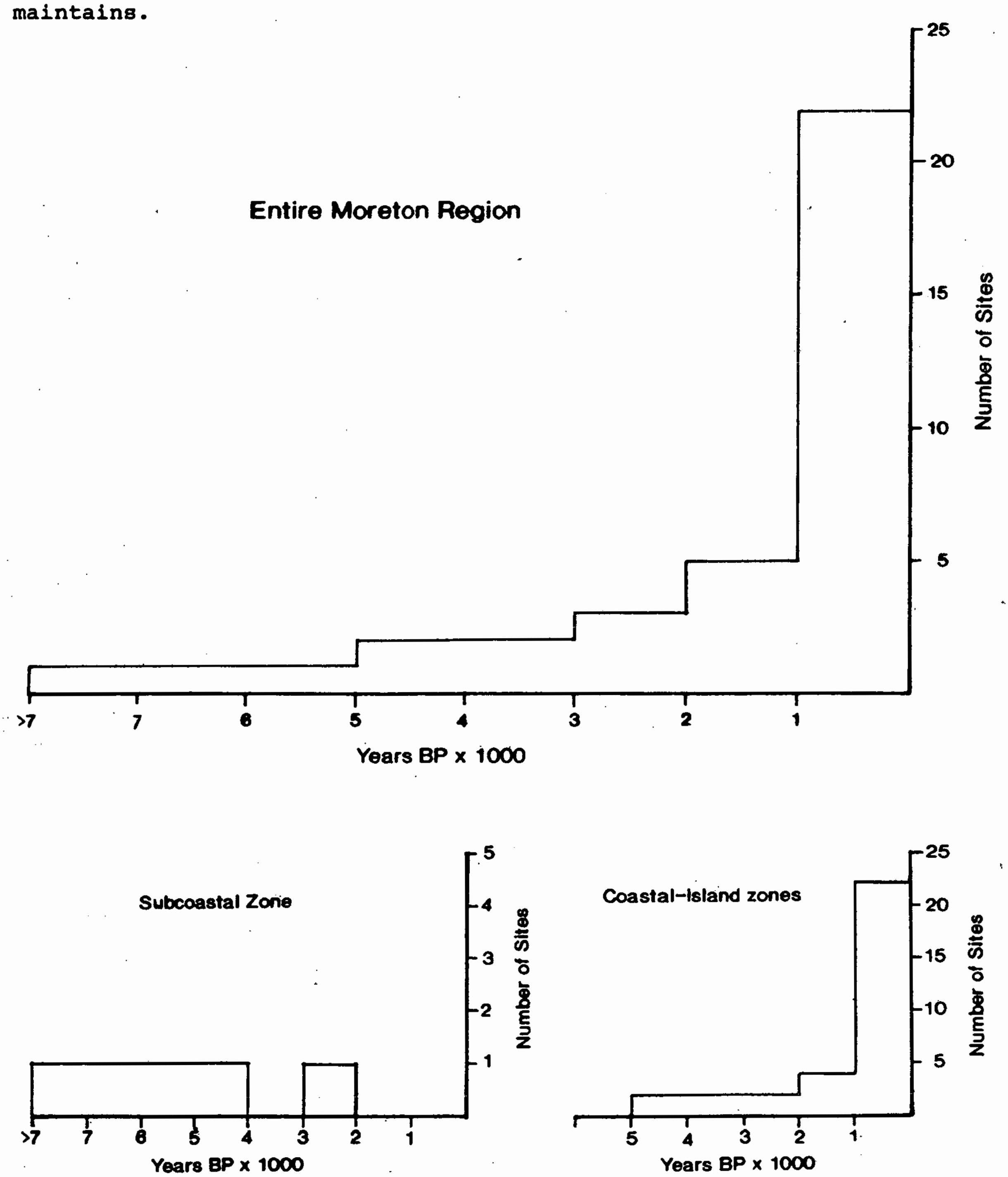

Figure 2. Temporal rates at which sites are established in the Moreton Region based on currently dated sites.

Our third point is much more basic and concerns the equation in the Morwood model which has changes towards social and demographic complexity mirrored by increases in sites relating to symbolic activities (art sites, bora grounds and the like) and to the introduction of exotic technologies and materials (e.g. fish traps). Rather than belabour this issue we simply point to the fact that at present there is no way that such sites may be dated. For example, we simply do not know how long the fish trap or Bora Ground at Sandstone Point may have been in use. Similarly, the Aboriginal paintings at Gatton and Bishop's Peak may just as well relate to the earliest as the latest occupation deposit at these sites (or perhaps neither). In short, it can not be logically argued that such phenomena increase in the late Holocene (Morwood 1987) when we currently have no idea of their age.

Deriving an Alternative Model

With only these three caveats in mind we feel that the Morwood "complexity" model as outlined is not viable and would argue for an alternative one developed by Hall (in prep.) which is more consistent with our current knowledge of the archaeological record. This model is relatively conservative in nature and is constructed on the basis of a number of propositions.

1. The Aboriginal lifeway in the Moreton Region can be categorized as a hunting-fishing-gathering one both past and present.

2. Increases in the number of sites through time may not necessarily represent concomitant increases in population but may, among other things, reflect changes in human settlement and subsistence regimes.

3. Temporal changes in stone artefacts do not necessarily represent drastic technological changes. A stone-working technology has existed in this region for over 20,000 years and the changes in this technology may not necessarily represent major innovations but may simply signify changes in the manner and direction in which this technology was employed.

4. The animals and plants exploited for subsistence will have changed little through time. What may have changed is the relative importance of particular species or groups of species to particular groups relative to particular environments.

5. The coastal-inland divisions and other societal divisions indicated by the alliance networks seen historically in this region as well as in other parts of Australia need not have been recent in origin.

6. The social-ceremonial system recorded historically in this region may be deeply rooted in the past; it may not represent a recent phenomenon. Any changes taking place may be influenced by "intensification" processes but these may simply represent accretions and adjustments to an older theme - they were possibly changes in degree rather than kind.

In setting out these propositions we do not a priori reject the possibility of extensive alterations to social and economic structures in the late Holocene. Rather, our view is that such change may have taken place, but it must be demonstrated by reference to the archaeological record.

An Alternative Model

With these propositions in mind we now posit an alternative model which we feel most parsimoniously explains the changes perceived in the archaeological record of the Moreton Region noted above.

Pre-6000 BP: Before Moreton Bay was formed people lived a Hunting-Fishing-Gathering lifeway in the region, exploiting the resources of coasts, estuaries and hinterlands (rivers, creeks, open forests etc.). They may have been lower in population than the peoples in later Holocene times. The Wallen Wallen Creek site demonstrates that people were in the region from at least 20,000 BP. Although no faunal material is available from Wallen Wallen Creek for this period, we argue for a consistency in hunting and fishing based on faunal suites found in subcoastal zone rockshelters. These demonstrate that the animals being procured did not change significantly throughout the Holocene. Although there is no evidence for fishing at coastal sites before 4000 BP, fish bones have been found in basal deposits at Platypus Rockshelter and Bushrangers Cave suggesting that fishing was a common element of the subsistence regime from at least the basal Holocene and probably long before. The lack of pre-6000 BP dates for sites in the current subcoastal zone leads to an inference that people may not have exploited the resources of this area - especially the rainforests - until after Moreton Bay was formed. As sea level rose these peoples adjusted to a changing environment simply by shifting resource procurement and settlement strategies according to requirements at the time.

6000-2500 BP: The landward displacement of Moreton Region peoples caused by rising Pleistocene seas ended by about 6000 BP. It is also argued that people left the smaller bay islands as they were formed (prior to 6000 BP) due to a paucity of resources. Adjustments noted above included the opening up or annexing of territory to the west which may have been previously unoccupied - or at least seldom exploited. In this connection it is noteworthy that, in general, the earliest dated rockshelters are closer to the present coast than the latest ones. In brief, people began to move into areas of rainforest and this move may have included the employment of a firing regime which influenced both the decline of rainforest and increase of open eucalypt forest. By 2500 BP people were occupying most of the subcoastal zone.

2500 - 1000 BP: The previous system continues but people also begin to expand out into the bay islands. In short, there was still a some land left for expansion into hitherto unexploited areas. After people expanded into the subcoastal zone they began to make use of relatively distant Moreton Bay island resources at about 2500 BP as witnessed at St. Helena Island and (perhaps 1000 years later) Moreton Island. Stradbroke Island represents a different case because it was a peninsula for much of the Holocene and, even during its true island stage (6000 to 4000 BP - Kelly 1984) it was probably more readily accessible from the mainland (Bribie Island's proximity to the mainland also permitted ready access). One possible explanation for this move is that slow intrinsic population increase since 6000 BP may have begun to put pressure on food resources.

1000 - Present: This expansion of peoples is thought to have filled up the available land defined by the study area. It eventually may have resulted in an increase in the number of groups and an expanded network of such groups across the entire region. For example, groups who had previously begun to exploit islands such as Moreton Island in an intermittent manner had by this period established permanent populations there. While it is not possible to state whether or not the coastal-inland societal divisions noted historically were in place during the early Holocene, they were clearly operating late in this period. We support the argument by Walters (1978) that the Sandstone Point site (and the more recent Toulkerrie site on Moreton Island) represents more intensive fishing by people on Moreton Bay than there is evidence for during earlier times. The occurrence of Bevelled Pounders in coastal mainland sites after ca. 1500 BP may also point to specialization or intensification of fernroot production. However, there is no evidence that convinces us that dramatic shifts in social complexity accompanied such specialization. In summary, we will go so far as to support a position which holds that the socio-political system as witnessed historically was probably well established during this period; however, it may have been operating for much longer.

This model contains two main elements of change, one explicit, the other implicit, both of which warrant at least brief discussion here. The explicit element, based on the spatial distribution of dated sites, has people adjusting to rising sea levels by annexing unexploited or little exploited country, first to the west, then to the east (islands). It is a parsimonious explanation of general changes perceived in the archaeological record which we feel best fits with that record. The implied element is one of increases not only in numbers of people per se but also increases in the number of discrete socio-political groups within the area. At present, until more detailed and comprehensive efforts at modelling are attempted, it is useful to speculatively view this as a gradual fissioning of groups as population grew and people moved into new territory. Because historical records demonstrate that the region contained numerous named groups with marked territories (including some 120 Bora Grounds throughout the region - see Satterthwait and Heather 1987) and that for some of those areas we have no continuous archaeological record, we argue that if these groups were in place during the Pleistocene we should have picked up some archaeological traces of them. That we have not provides a compelling argument in favour not only of their movement into those areas during the Holocene, but also that a number new groups formed during that period. Furthermore, their common linguistic affinity would argue for their development from populations previously occupying the Moreton Region.

At present testable implications for this notion may be profitably sought in the areas of biology and linguistics. If it may be assumed that large cemeteries reflect post-mortem practices of particular groups, then one might assess the relative biological/genetic exclusivity of particular populations/groups (see Pardoe 1988). Sites such as the Broadbeach Burial Ground, which dates from about 1200 BP to the present (Haglund 1976), may represent such particular named groups and offer a way to assess the formation of socio-political entities across the landscape and time. The field of linguistics also offers potential independent data in this connection. For example, recent preliminary work on the languages of the Moreton Region suggests that the Gnugi people of Moreton Island have diverged linguistically from adjacent groups and may have begun such divergence perhaps as much as 1000 years ago (R. Dixon, Australian National University - pers. comm. 1988). This suggestion certainly accords with the archaeological picture.

These interesting considerations aside, we emphasize that much more analysis of the archaeological record is required before such model testing may be fruitfully undertaken. The small sample of excavated and dated sites, with respect to the region's abundant record, is a major problem to be overcome. Another important issue is that of assessing the variability in site use both through time and across the region. MRAP - Stage II has been designed to deal with both of these issues.

MRAP STAGE II: OBJECTIVES AND METHODS

Now that MRAP - Stage I has achieved its aims, Stage II has been designed to pursue more complicated but more interesting objectives. In order to better explain the changes in the archaeological record of the Moreton Region it is considered both necessary and profitable to undertake a systematic study of the stone artefact component of that record. The impetus for this approach comes from two directions. Firstly, stone is the most common component of archaeological assemblages in the study area (not to mention the rest of Australia). It constitutes an appropriate data base by which we may compare most archaeological sites. Furthermore, stone artefacts retain many attributes indicative of their mode of manufacture and use. Consequently stone artefacts may provide the most powerful and reliable medium with which to link the archaeological record with higher level theories about prehistoric human behaviour.

Secondly, like many Australian archaeologists, we are interested in the dispersal of peoples across this vast land and the concomitant cultural and biological changes which resulted in the diversity of Aboriginal cultures and languages found here by Europeans. The world archaeological community is at present seriously engaged in the question of hunter-gatherer classification, in defining the concept of cultural complexity and in the development of models explaining how hunter-gatherer populations change from relatively simple to relatively complex systems (e.g. Wenke 1981; Renfrew and Shennan 1982; Price and Brown 1985). In Australia this issue has often taken the form of a debate concerning whether or not perceived changes in the archaeological record, such as increases in site numbers per area and discard rates of cultural material in sites, reflect cultural change generated by social mechanisms, the physical environment or intrinsic population increase (cf. Hughes and Lampert 1982; Beaton 1983, 1985; Lourandos 1983, 1984; Ross 1985). For example, Lourandos (1983, 1985) argued that late Holocene changes in the archaeological record of southwestern Victoria may be explained by an economic intensification process which is socially based whereas Beaton (1983) countered that such changes may be explained simply in terms of increased population levels rather than economic growth. Resolution of this issue awaits more sophisticated analyses of the archaeological record in order to link it with such hypotheses. One possible approach to the problem is through the technological analysis of stone artefacts.

In a recent study of the stone technology in the Hunter River Valley, Hiscock (1986) attempted to quantify these perceived changes in the archaeological of Holocene. He demonstrated that there is no universal and continuing increase in site numbers or in discard rates within sites in the mid-late Holocene and that the picture is far more complex than previously thought. He also suggested that discard rates may be explained in terms of shifts in settlement, technology, or resource procurement and use (Hiscock 1986:47). One of the most important implications of this study is that once the stone-working system is characterised by analysis of material from stratified and dated sites, the results may be used to age surface sites containing stone artefacts. In short, identify the elements of the system(s) and one has a key to unlocking the chronology of surface material.

As a consequence of the above, the aims of MRAP - Stage II incorporate a technological approach to a number of questions generated by MRAP - Stage I, and especially the four following.

1. Does the observed gradual increase in the number of dated sites and concomitant changes in discard rates of cultural material in the late Holocene record of the study area point to population increase, "intensification", shifts in settlement and resource procurement strategies, technological changes, differential preservation or a combination of these factors?

2. Can stone artefact raw material distributions in the study area provide information about settlement, demographic, and resource procurement patterns in the late Pleistocene - early Holocene?

3. If technological changes are identifiable in the archaeological record of the study area, can these aid in the relative dating of the hundreds of surface artefact scatters recorded for the region?

4. Can the study of stone artefact residues and use-wear provide an independent test of the hypothesis that the historically described Moreton Bay subsistence economy which relied heavily on fishing and fern-root gathering developed in the late Holocene?

In order to answer these and other questions relating to change we will direct the work of MRAP Stage II, through the analysis of stone artefact assemblages of the region, to focus on three main targets as follows.

1. A detailed analysis of selected stone artefact assemblages from sites representative of the study area will be undertaken in order to characterize the technological system(s) present.

2. An investigation will be conducted into the distribution of raw materials represented in these stone assemblages as well as the distribution of raw material sources in order establish correlations between the two with a view to reconstructing past stone procurement and settlement systems.

3. Use-wear and residue studies will be carried out on particular classes of stone artefacts in order to infer function and establish links to particular shifts in human behaviour.

The pursuit of these objectives lead us to briefly discuss two related issues: the selection of sites for investigation and the analytic treatment of radiocarbon estimations.

Site selection

In line with the objectives advanced above, MRAP-Stage II begins by focussing on dated and/or stratified sites with sizable stone artefact assemblages. Hiscock (1988) argues that environmental and archaeological characteristics of the subcoastal zone make it suited to the description of chronological changes in stoneworking technology. For this reason we have initially concentrated our technological analysis on the analysis of rockshelters excavated in the subcoastal zone. Two such sites, Platypus Rockshelter and Bushrangers Cave are dealt with in this volume (Hiscock and Hall 1988a, 1988b), A later phase of work will shift emphasis to open or non-stratified sites in the region.

Radiocarbon calibration

In our investigations of archaeological sites in the subcoastal zone we have chosen to use only calibrated (calendrical) dates. Radiocarbon age estimates are not indications of the calendar age of the dated samples because of natural variations in the ^{14}C concentration in the atmosphere. The calendar age of a radiocarbon date can be derived by reference to a calibration curve, which is a plot of the radiocarbon dates of successively older tree-ring samples (Pearson 1987). Such curves show that during the last 3000 years radiocarbon and calendar years differ only slightly, but that prior to 3000 years BP radiocarbon techniques noticeably underestimate the calendrical age of a sample. For example, between samples dated to 3,000 years bp and 5,000 years bp by radiocarbon techniques there are approximately 2,650 calendar years. This distinction between radiocarbon years and calendar years makes little difference to assessments of the relative chronology and contemporaneity of events in the archaeological record, but it is of paramount importance for any discussion of the rate of change. Since the issues investigated in this project involve estimations of the rate of change it was decided to calibrate radiocarbon ages and to employ calendar dates in all calculations.

The following procedures were used to derive calibrated dates:

1. Thirty years was subtracted from the radiocarbon date to correct for systematic differences between ^{14}C concentrations in the southern hemisphere, where the charcoal samples were obtained, and the northern hemisphere, where the calibration curves were established (Pearson and Stuiver 1986:841; Stuiver and Becker 1986:864).

2. The corrected date was calibrated using the CALIB computer program (rev. 2.1) (Stuiver and Reimer 1986). No laboratory error multiplier was employed. The calibration curve selected was based on the bi-decal atmospheric record, sufficient for all radiocarbon dates back to approximately 8,100 years bp.

These procedures were used to calibrate radiocarbon dates from all rockshelters excavated in the subcoastal zone of southeast Queensland (Table 1). Two characteristics of the calibrated dates in this table are noteworthy. Firstly, calibration provides a calendrical age for the C14 age estimate, and a range of possible dates reflecting the inherent uncertainties of both the radiocarbon and calibration techniques. Calibrated ranges can be calculated using the single standard deviation quoted with the radiocarbon date (one sigma) or two standard deviations (two sigma). The two sigma age range is generally recommended (e.g. Pearson 1987:103). Although the true date of a sample probably lies within the calibrated age range, it is not necessarily possible to treat the age range as a normal curve, in which the mid-point has the highest probability of being correct (Pearson 1987:103). Thus, while we will employ the calibrated age as a reasonable indication of the antiquity of a sample, it is necessary to take into account the possibility that the true date may be anywhere within the calculated age range.

Secondly, because at some points on the calibration curves there are a series of wiggles which cause some radiocarbon dates to intersect this curve an more than one point, multiple calibrated ages are the result. It is important to note that in such cases of multiple intersects all calibrated ages are equally probable.

Table 1. Calibration of radiocarbon dates from rockshelters in the Moreton Region

C14 age (years bp)	Lab. no.	Calibrated age (years BP)	Calibrated range one sigma	Calibrated range two sigma
Platypus Rockshelter				
560±60	Beta 3076	541	516-628	500-660
2420±90	I 11094	2356	2341-2709	2200-2749
2480±70	Beta 3075	2479#	2354-2719	2339-2749
3850±170	SUA 1502	4237	3979-4508	3726-4819
4540±80	Beta 3074	5305	4991-5305	4873-5446
Bushrangers Cave				
2090±90	Beta 18897	2045	1928-2141	1830-2319
4720±100	Beta 4851	5360*	5299-5576	5055-5649
5540±100	Beta 4852	6304	6197-6409	5998-6529
Bishop's Peak Rockshelter				
1420±60	Beta 16298	1299	1281-1341	1191-1400
2620±90	Beta 16299	2748	2557-2778	2359-2869
Maidenwell Shelter				
1210±100	SUA 1915	1070	980-1260	930-1300
4300±70	Beta 6924	4858	4731-4872	4578-4989
Gatton Shelter				
1090±70	Beta 5897	965	929-1056	796-1141
3030±90	Beta 5898	3212	3048-3350	2939-3399
3820±120	Beta 15811	4194@	3988-4409	3839-4526

= One of three calibrated dates (2701, 2658, 2479).
* = One of four calibrated dates (5450, 5360, 5331, 5299).
@ = One of three calibrated dates (4222, 4194, 4154).

NB. The dates given above are those closest to the midpoint of the calibrated ranges.

CONCLUSION

We have argued that now that MRAP - Stage I has provided an archaeological foundation, the Moreton Region offers an excellent arena within which to conduct an inquiry into the causes of perceived change in the archaeological record there, especially for the Holocene Period. We also hold that a focus on stone artefacts is an appropriate one for such inquiry and that detailed investigation into past stone-working technologies of the study area should aid in clarifying problems associated with current explanations of such change in the wider Australian context.

ACKNOWLEDGMENTS

The Department of Anthropology and Sociology, University of Queensland, the Australian Research Grants Scheme (Grant No. A17915024 -MRAP Stage I) and the Archaeology Branch, Department of Community Services provided research funds without which this paper could not have been written.

REFERENCES CITED

Alfredson, G. 1983 St. Helena Island: a changing pattern of exploitation? **Australian Archaeology** 17:79-86.

Alfredson, G. 1984 The Aboriginal use of St. Helena Island - the archaeological evidence. In **Focus on Stradbroke**, R.J. Coleman, J. Covacevich and P. Davie (eds), pp.1-8. Brisbane: Boolarong Publications.

Beaton, J. M. 1983 Does intensification account for changes in the Australian Holocene archaeological record? **Archaeology in Oceania** 18(1):94-97.

Beaton, J. M. 1985 Evidence for a coastal occupation time-lag at Princess Charlotte Bay (north Queensland) and implications for coastal colonization and population growth theories for Aboriginal Australia. **Archaeology in Oceania** 20:1-20.

Coaldrake, J. E. 1961 The ecosystem of the coastal lowlands ("Wallum") of southeastern Queensland. **CSIRO Bulletin** 283.

Crooks, J. 1982 Report of three excavations at Bribie Passage, Moreton Bay, southeast Queensland. Unpublished B.A. Hons. thesis, University of Queensland.

Edmonds, V. 1986 Subtropical rainforest: archaeological evidence of Aboriginal use in the Border Ranges, southeast Queensland. Unpublished Master of Letters Thesis, University of New England.

Flood, P. G. 1981 Carbon dates from the coastal plains of Deception Bay, southeastern Queensland. **Queensland Government Mining Journal** 81:19-23.

Flood, P. G. 1984 A review of Holocene sea level data, southeastern Queensland. In **Focus on Stradbroke**, R.J. Coleman, J. Covacevich and P. Davie (eds), pp.127-131. Brisbane: Boolarong Publications.

Gillieson, D.S. and J. Hall 1982 Bevelling Bungwall bashers: a use-wear study from southeast Queensland. **Australian Archaeology** 14:43-61.

Haglund, L. 1976 **An Archaeological Analysis of the Broadbeach Aboriginal Burial Ground.** University of Queensland Press.

Hall, J. 1980a Archaeology at the University of Queensland: a brief outline. **Australian Archaeology** 10:79-85.

Hall, J. 1980b Minner Dint: A Recent Aboriginal Midden on Moreton Island, Southeastern Queensland. **Occasional Papers in Anthropology** 10:94-112, Anthropology Museum, University of Queensland.

Hall, J. 1982 Sitting on the Crop of the Bay: An historical and archaeological sketch of Aboriginal settlement and subsistence in Moreton Bay, southeast Queensland. In S. Bowdler, (ed), **Coastal Archaeology in Eastern Australia**, pp.79-95. Dept. of Prehistory, Research School of Pacific Studies, A.N.U.

Hall, J. 1984 Exploratory excavation at Toulkerrie Midden (LB:B75), Moreton Island, S.E. Queensland. **Queensland Archaeological Research** 1:61-84.

Hall, J. 1986 Exploratory excavation at Bushrangers Cave (Site LA:A11), a 6000-year-old campsite in Southeast Queensland: preliminary results. **Australian Archaeology** 22:88-103.

Hall, J. 1987 A short prehistory of the Moreton Region. In R. Fisher (ed), **Brisbane: Aboriginal, Alien, Ethnic**, Chapter 2, pp. 14-22. Brisbane History Group Papers 5. History Dept., Queensland University.

Hall, J. (in prep) Social complexity in S.E. Queensland: Let's look at the archaeological record.

Hall, J., S. Higgins, and R. Fullagar (in press) Plant residues on stone tools: a case for fernroot processing in S.E. Queensland via starch grain analysis. In, W. Beck, L. Head and A. Clarke (eds), **Plants in Australian Archaeology**. To appear in **Tempus**, Volume 1. University of Queensland Anthropology Museum.

Hall, J. and I. Lilley 1987 Excavation at the New Brisbane Airport Site (LB:C69): evidence for early mid-Holocene coastal occupation in Moreton Bay, S.E. Queensland. **Queensland Archaeological Research** 4:54-79.

Hall, J. and R. P. Robins 1984 A working model of Moreton Island prehistory. **Queensland Archaeological Research** 1:85-84.

Hall, J., I. Walters and A. Nolan 1987 **The Sandstone Point Archaeological Project: Stage 1**. Report to the Minister, Department of Community Services, Brisbane. 72pp. Department of Anthropology & Sociology, University of Queensland.

Hekel, H., W.T. Ward, M. Jones and D. E. Searle 1979 Geological development of northern Moreton Bay. In A. Bailey and N. C. Stevens (eds), **Northern Moreton Bay Symposium**, pp.7-18. Royal Society of Queensland: Brisbane.

Higgins, S. 1988 Differentiation of starch grains for archaeometry. In, **Archaeometry: Australasian Studies 1988**, J. R. Prescott (ed), pp.140-152. Department of Physics and Mathematical Physics, University of Adelaide.

Hiscock, P. 1985 The need for a taphonomic perspective in stone artefact analysis. **Queensland Archaeological Research** 2:82-97.

Hiscock, P. 1986 Technological change in the Hunter River Valley and the interpretation of late Holocene changes in Australia. **Archaeology in Oceania** 21(1):40-50.

Hiscock, P. 1988 Developing a relative dating system for the Moreton Region: an assessment of prospects for for a technological approach. **Queensland Archaeological Research** - this issue.

Hiscock, P. and J. Hall 1988a Platypus Rockshelter (KB:A70), S.E. Queensland: chronological changes in site use. **Queensland Archaeological Research** -this issue.

Hiscock, P. and J. Hall 1988b Technological change at Bushrangers Cave (LA:A11), southeast Queensland. **Queensland Archaeological Research** - this issue.

Hughes, P. J. and R. J. Lampert 1982 Prehistoric cultural change in coastal New South Wales. In S. Bowdler (ed), **Coastal Archaeology in Eastern Australia**, pp.16-28. Department of Prehistory, Australian National University.

Hughes, P. J. and M. E. Sullivan 1981 Aboriginal burning and late Holocene geomorphic events in eastern NSW. **Search** 12:277-278.

Kamminga, J. 1981 The Bevelled Pounder: an Aboriginal stone tool type from southeast Queensland. **Royal Society of Queensland Proceedings** 92:31-35.

Kelly, R. A. and J. Baker 1984 Geological development of North and South Stradbroke Islands and surrounds. In. R. J. Coleman, J. Covacevich and P. Davie (eds), **Focus on Stradbroke**, pp.156-165. Brisbane: Boolarong Publications.

Keast, A. (ed.) 1981 **Ecological Biogeography of Australia**. Boston: W. Junk.

Lilley, I. 1984 Late Holocene subsistence and settlement in subcoastal southeast Queensland. **Queensland Archaeological Research** 1:8-32.

Lilley I. A. and H. J. Hall 1988 An archaeological assessment of northeastern Moreton Island. **University of Queensland Archaeological Services Unit (UQASU)** Report 126. Department of Anthropology and Sociology.

Lourandos, H. 1983 Intensification: a late Pleistocene-Holocene archaeological sequence from southwestern Victoria. **Archaeology in Oceania** 18(2):81-97.

Lourandos, H. 1984 Changing perspectives in Australian prehistory: a reply to Beaton. **Archaeology in Oceania** 19:29-33.

Lourandos, H. 1985 Intensification and Australian prehistory. In T.D. Price and J. A. Brown (eds), **Prehistoric Hunter-Gatherers: The Emergence of Cultural Complexity**, pp. 383-413. New York: Academic Press.

McNiven, I. 1988 Brooyar Rockshelter: a late Holocene seasonal hunting camp from southeast Queensland. **Queensland Archaeological Research** -this issue.

Morwood, M.J. 1975 Moreton Island archaeological survey - preliminary report. Unpublished ms., on file at Archaeology Branch, Dept. of Community Services, Brisbane.

Morwood, M. J. 1986 The archaeology of art: excavations at Gatton and Maidenwell Rockshelters, S.E. Queensland. **Queensland Archaeological Research** 3:88-132.

Morwood, M. J. 1987 The archaeology of social complexity in south-east Queensland. **Proceedings of the Prehistoric Society** 53:337-350.

Neal, R. and E. Stock 1986 Pleistocene occupation in the southeast Queensland coastal region. **Nature** 323:618-721.

Nolan, A. 1986 Sandstone Point: temporal and spatial patterns of Aboriginal site use at a midden complex, southeast Queensland. Unpublished B.A. Hons. Thesis, University of Queensland.

Pardoe, C. 1988 The cemetery as a symbol. The distribution of prehistoric Aboriginal burial grounds in southeastern Australia. **Archaeology in Oceania** 23(1):16.

Pearson, G. W. 1987 How to cope with calibration. **Antiquity** 61:98-103.

Pearson, G. W. and M. Stuiver 1986 High precision calibration of the radiocarbon time scale, 500-2500 BC. **Radiocarbon** 28(No 2B):839-862).

Petrie, C. C. 1980 **Tom Petrie's Reminiscences of Early Queensland.** Currey O'Neil: Windsor, Victoria.

Price, T.D. and J.A. Brown (eds) 1985 **Prehistoric Hunter-Gatherers: The Emergence of Cultural Complexity.** New York:Academic Press.

Renfrew, C. and S. Shennan (eds) 1982 **Ranking, Resource and Exchange: Aspects of the Archaeology of Early European Society.** Cambridge University Press.

Robins, R. P. 1984a The Results of a preliminary archaeological survey of Moreton Island. **Queensland Archaeological Research.** 1:33-50.

Robins R. P. 1984b The Excavation of Three Archaeological Sites on Moreton Island: First Ridge and the Little Sandhills. **Queensland Archaeological Research** 1:51-60.

Ross, A. 1985 Archaeological evidence for population change in the middle to late Holocene in southeastern Australia. **Archaeology in Oceania** 20:81-89.

Satterthwait, L. and A. Heather 1987 Determinants of earthen circle site location in the Moreton Region, southeast Queensland. **Queensland Archaeological Research** 4:5-53.

Stuiver, M. and B. Becker 1986 High-precision decadal calibration of the radiocarbon time scale, AD 1950-2500 BC **Radiocarbon** 28(No.2B):863-910.

Stuiver, M. and P. J. Reimer 1986 A computer program for radiocarbon age calibration. **Radiocarbon** 28(No.2B):1022-1030.

Sullivan, H. 1977 Aboriginal gatherings in south-east Queensland. Unpublished B.A. Honours thesis, Australian National University, Canberra.

Thomson, A. K. (Ed.) 1967 **The collected works of Thomas Welsby.** Vol. 1. Brisbane: Jacaranda Press.

Thomson, J. M. 1975 A place for fishes. **Royal Society of Queensland Proceedings** 86:25-27.

Walters, I. N. 1987 Another kettle cf fish: the prehistoric Moreton Bay fishery. Unpub. PH.D. thesis, University of Queensland.

Walters, I. N., A. Nolan, P. Lauer, G. Dillon and M. Laird. 1987 Hope Island: salvage excavation of a Kombumerri site. **Queensland Archaeological Research** 4:80-95.

Wenke, R.J. 1981 Explaining the evolution of cultural complexity: a review. In M. B. Schiffer (ed), **Advances in Archaeological Method and Theory** 4:79-127. New York: Academic press.

Whalley, P. 1987 An introduction to the Aboriginal social history of Moreton Bay, south-east Queensland from 1799 to 1830. Unpublished B.A. Hons. Thesis, University of Queensland.

Winterbotham, L. P. 1957 Some native customs and beliefs of the Jinibara and neighboring tribes on the Brisbane and Stanley Rivers, Queensland. Unpublished Ms., Fryer Library, University of Queensland.