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Abstract

The widespread alliance systems of Australian Aboriginal society had an economic and survival value in harsh environments, but in resource-rich areas such as South-east Queensland it is more a question of strategies for increasing regional carrying capacity. Recent archaeological results in the area, with evidence of increases in site numbers and artefact deposition rates and diversification of subsistence resources to include small-bodied species, show the development of new patterns of technology, economy and demography following major environmental changes in the post-Pleistocene period. Widespread changes in Australian prehistory around 4000 years ago may have been triggered in certain key areas such as South-east Queensland.

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The Archaeology of Social Complexity in South-east Queensland

By M. J. MORWOOD[1]

The widespread alliance systems of Australian Aboriginal society had an economic and survival value in harsh environments, but in resource-rich areas such as South-east Queensland it is more a question of strategies for increasing regional carrying capacity. Recent archaeological results in the area, with evidence of increases in site numbers and artefact deposition rates and diversification of subsistence resources to include small-bodied species, show the development of new patterns of technology, economy and demography following major environmental changes in the post-Pleistocene period. Widespread changes in Australian prehistory around 4000 years ago may have been triggered in certain key areas such as South-east Queensland.

A major theme in Australian prehistory is the development of the widespread alliance systems observed in Australian Aboriginal society in the European contact period (e.g. Lourandos 1983; Morwood 1984). These systems, by which widespread groups were linked in complex patterns of material and marital exchange, had obvious economic and survival value, particularly in more marginal areas (e.g. Strehlow 1970). In fact, it has been argued that successful occupation of rainforest, arid and montane areas only occurred late in the Australian prehistoric sequence, after fundamental changes in Aboriginal social relations and mechanisms for exchange of resources, knowledge and genes (e.g. Bowdler 1981; Ross 1981).

This paper is concerned with the question of developments in social complexity in an area with a rich and diverse range of resources, South-east Queensland. Here the question is not one of social adaptations required to survive in a harsh environment, but is concerned with social strategies for effectively increasing the carrying capacity of regional resources.

The paper begins with a brief description of the region followed by an economic interpretation of Aboriginal social complexity and symbolic behaviour. The results of archaeological excavations at a range of sites are presented and then discussed in the context of regional patterns in technological, economic and demographic change.

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THE REGION

South-east Queensland includes the Moreton Region and north to the Burnett River drainage basin at Bundaberg (fig. 1). It is bounded to the south by the Macpherson Range, to the west by the Great Dividing Range and to the east by the Pacific Ocean. Several major geographical units can be distinguished in the region, including the coastal lowlands with abundant marine resources, the subcoastal lowlands and the subcoastal highlands (see Hall 1983; Lilley 1984). South-east Queensland is a transitional zone between the tropical and temperate biotic provinces and exhibits great variability in altitude, aspect, geology, availability of water, and so on, resulting in a marked faunal and floral diversity (e.g. Keast 1981). Rainfall is seasonal, falling mainly in summer (October to March), and also varies with altitude and distance from the coast to a maximum of 1150 mm per annum along parts of the eastern escarpment of the Great Dividing Range (Co-ordinator General 1972, 11–1). In general the area is well watered, although inland areas away from rivers

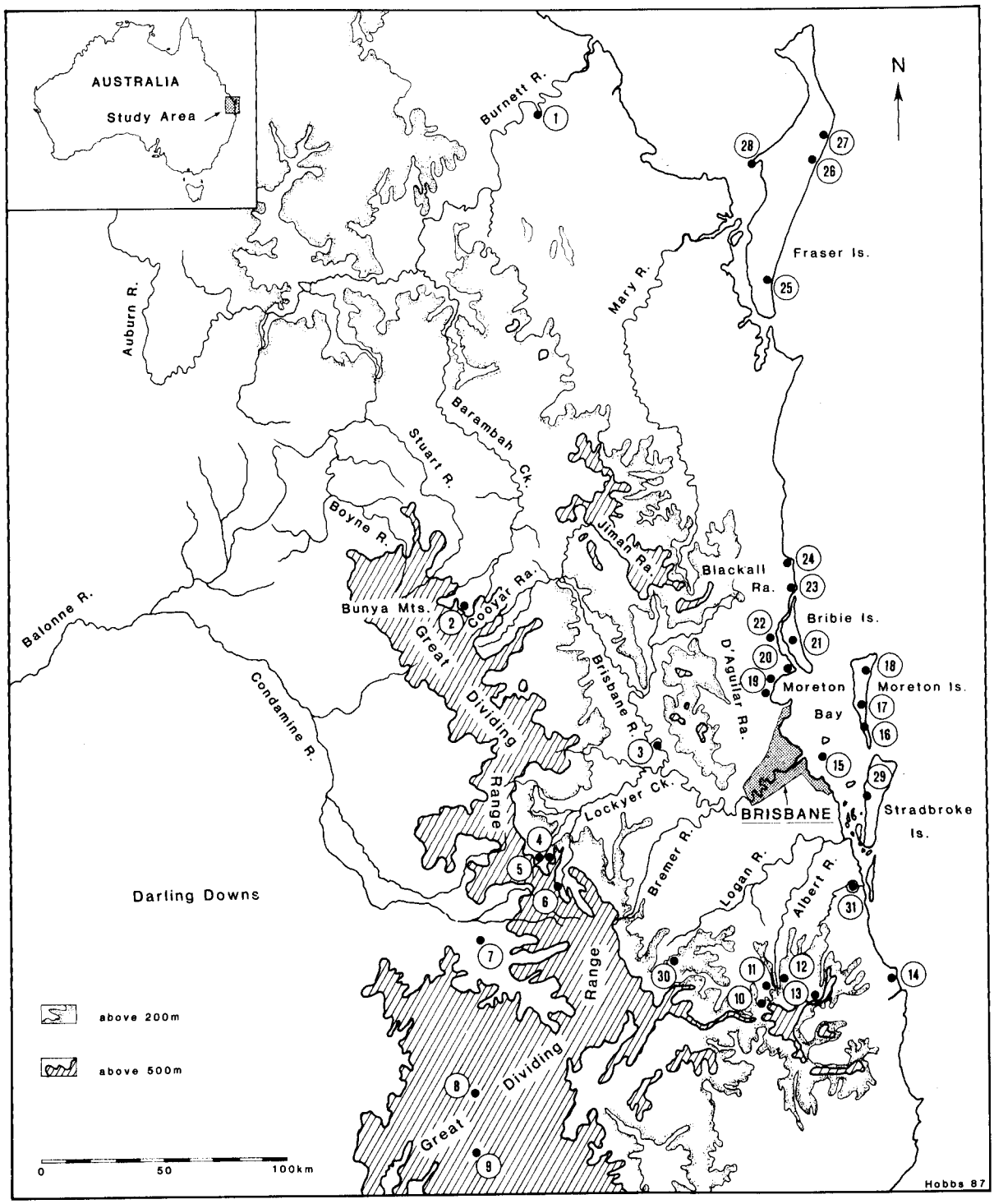

Fig. 1

South-east Queensland showing rock art and dated archaeological sites. 1. Bundaberg engraving site; 2. Maidenwell Shelter; 3. Platypus Shelter; 4. Heifer Creek 1; 5. Heifer Creek 2; 6. Gatton Shelter; 7. Talgai skull; 8. Amiens Shelter; 9. Ballandean Shelter; 10. Neglected Mt.; 11. Hillview; 12. Bishop's Peak; 13. Bushranger's Cave; 14. Broadbeach cemetery; 15. St Helena Midden; 16. Toulkerrie/Little Sandhills; 17. Minner Dint Midden; 18. First Ridge Middens; 19. Deception Bay 1 & 2; 20. Sandstone Point; 21. Bribie Island; 22. Brown's Road; 23. Caloundra Engravings; 24. Pt Cartwright engravings; 25. 217/15; 26. 796/54; 27. 799/54; 28. Moon Point; 29. Wallen wallen; 30. Boonah Shelter; 31. Hope Island Midden

can suffer water stress, particularly in winter. Specific resources are also 'patchy' in distribution as well as seasonal, the best-known examples being the winter runs of sea mullet in Moreton Bay and the triennial, summer crops of bunya nuts in the Bunya Mountains and the Blackall Range.

Within the time span of human occupation, the major environmental change has been the post-Pleistocene marine transgression, which by 6000 bp had resulted in the formation of Moreton Bay by the drowning of the lower Brisbane River Valley (Flood 1980). The formation of Moreton Bay and the relative stability of sea level over the past 6000 years has allowed extensive estuarine and mangrove areas of concentrated biological productivity to develop — by 6240 ± 125 bp (SUA 856) the presence of *Anadara trapezia* beds indicates the formation of intertidal and subtidal mudflats (Flood 1981, 21), while by 4290 ± 90 bp (SUA 2466) seagrass communities had developed sufficiently to support dugong (Neal and Stock 1986, 620), and by association turtle, garfish and prawns (Kirkman 1975). This significantly increased the available marine resource base, particularly after 4–3000 bp when the sea level fell about 1 metre to its present level and promoted development of biologically rich, tidal mudflat-mangrove and estuarine habitats (Kelly and Baker 1984, 164; Hekel *et al.* 1979, 7; Dr Peter Flood, University of New England: pers. comm.). In subcoastal areas the climate became slightly drier between 5000 and 2000 years ago: eucalypt forests increased in extent at the expense of vineforests, and grasslands expanded into woodland areas. After this the conditions ameliorated to those encountered in the European contact period (Lilley 1984, 11; Ross 1984, 81).

Ethnography

Ethnographic evidence indicates that South-east Queensland had a high Aboriginal population density. On the evidence of Simpson, Commissioner for Crown Lands (1842–53), the population of the Moreton district was about 5000, representing a density of about 1 person per 4 km^2 (Simpson 1843, in Langevad 1979; Hall 1982). This figure is certainly an underestimate, as it does not take into account the decimations of smallpox immediately prior to, and after, European settlement (e.g. Curr 1886, 223). The basic socioeconomic and territorial units were families who came together to form 'communities' or 'bands', usually numbering about 40 people (Moran 1894, 413), but within specific territories people dispersed or gathered according to a variety of social and economic factors (Mathew 1910, 128). Linguistically defined 'tribes', comprising a number of local groups who spoke the same language, played a role in many social events, but the size and composition of such larger groupings appears to have been contextual as well as flexible (e.g. Winterbotham 1959, 28; Howitt 1904, 379).

Territorial boundaries were generally known and defended, with some resource zones being apportioned to individual group members (Winterbotham 1959, 39). Ideally the land-owning group was patrilineal and the pattern of residence was patrilocal, but rights were also acquired through the mother, totemic links and residence. In practice this meant that there was potential not only for population movement within but also between group territories. Such a pattern of demographic ebb and flow is well documented in the ethnography. Petrie (1904), Winterbotham (1959) and Mathew (1910) all refer to the constant and extensive movement of people throughout the South-east Queensland region for initiation ceremonies, fights, corrobborees, and so on. The system was maintained and reinforced by a network of contacts, rights and obligations but was underwritten by the spatially and seasonally discrete abundances of particular resources. It is, therefore, not possible to distinguish between purely economically and purely socially motivated population movement.

Although elementary storage techniques were used to extend the geographical and seasonal availability of resource gluts — specifically bunya nuts and sea mullet (Petrie 1904, 23, 72) — it was clearly the flexibility in the dispersal of people across the landscape which maximized the use of localized resource abundances far beyond the capacity of a local group. This must have allowed for a far higher regional population of hunter-gatherers than a relatively 'static' territorial system. In effect, demographic flexibility, and the required alliance infra-structure, functioned as a social, rather than technological, solution to the problem of resource 'patchiness'. However, because the economic activities required to support large gatherings could rapidly deplete local food resources (e.g. Sullivan 1977, 54), these were regularly rotated throughout the region (Lilley 1984, 20–22; Satterthwait 1986, 30) — meaning that large gatherings could only occur within the context of a regional network of alliances and economic reciprocity.

The system could not have operated without detailed information on the availability of resources and the

means for disseminating the information. The former depended upon particular groups having detailed knowledge about resources on specific tracts of country, the latter required formalized, 'safe' interaction between widespread groups. There is good evidence that resource availability was closely monitored in sophisticated fashion. For instance, Winterbotham (1959, 55) states that various indicators were used to ensure that foods were obtained when at their best — 'kangaroos were fat when the fern leaf wattle was in flower; possums when the apple tree was in bloom', and so on. Other signs indicated when specific animals were breeding, during which closed-seasons were proclaimed. For example, the flowering of a little mountain plant called *bum:gar* (blue cod) indicated that blue cod were making their nests and fishing for them was prohibited. Some indicators also allowed resource availability to be predicted, permitting economic strategies to be scheduled well in advance (e.g. Lang 1861, 72). Welsby (in Thompson 1967, 87) is most explicit on this point and quotes an Aboriginal informant:

> Don't you see the bush is full of blue mountain parrots everywhere; they are flying about in big flocks. Well every blackfellow knows that means plenty sea mullet. That is the sign for them. Every fish has got his sign, and if the parrots are in small flocks and few in number, then blacks don't take the trouble to make new nets, as we know we are going to have a poor season.

A number of formal and informal mechanisms were used for disseminating the information required for constant adjustments in population distribution. For instance, 'official' messengers could be used to invite and co-ordinate movement of people to fights, feasts and initiation ceremonies (Mathew 1910, 114; Petrie 1904, 38; Winterbotham 1959, 60). Large-scale gatherings also required that interaction between disparate groups be systematic and predictable, and there is ample evidence for many regulatory mechanisms. These ranged from the 'protected' status of messengers to the rules which applied to check and control violence resulting from disputes. In the latter case, grievances over women, trespass and sorcery were settled by fights, in which the number of combatants varied according to the nature of the dispute. Rules were agreed to by each side before combat and if a man were killed or wounded the fight would be stopped at once. This minimized the number of serious injuries or deaths (Rudder 1899, 9; Petrie 1904, 46, 162; Winterbotham 1959, 61, 62).

At social gatherings groups performed 'corrobborees' which incorporated song, dance and display and which were often dramatized re-enactments of actual events. People learnt those of other groups and afterwards would even go a long distance in order to spread the newly acquired repertoire (Petrie 1904, 19, 23). 'Corrobborees' provided a 'safe' medium for competition and status recognition, a role also served by organized games and contests such as wrestling, boomerang throwing, football and skipping (Winterbotham 1959, 67–68).

These were followed by a meeting, at which men would stand up and tell a story or lecture about what had happened in specific parts of the country, so that all could hear (Petrie 1904, 19, 22, 23). At large-scale gatherings such as the bunya 'feasts' in the Blackall Range with 600 to 700 people, this could involve direct information exchange between groups normally separated by up to 450 km (Petrie 1904, 16; Sullivan 1977, 40; fig. 2). In the historic period such meetings were one of the means by which information on European activities was circulated and resistance organized: several sources note that attacks on Europeans often increased in frequency following bunya feasts (Simpton 1842, 5; 1861, 12, in Langevad 1979).

Long distance culture contact resulted in long distance culture change. This is well attested by Calley (1959, 132) who noted that the Waka Waka section system and terminology was being adopted in northern New South Wales directly as a result of contact at bunya feasts. In addition, the exchange of items such as weapons, possum rugs, nets, dillies, shells, and necklaces was a consistent feature of any 'common meeting ground' (Petrie 1904, 56, 59; Winterbotham 1959, 61). This ensured that localized resources (e.g. shells, brigalow spear shafts) and manufactures were distributed throughout the region.

Exchange of women occurred on such occasions on a reciprocal basis and the resulting alliances formed by intermarriage were of fundamental importance in the network of rights and obligations, allowing population movement between territories. The fact that it was 'a general rule' for a *turrwan*, or great man, from one area to exchange a daughter in marriage with a *turrwan* from another area reinforced this system (Petrie 1904, 59–60). As each such man could have up to five or six wives (Simpson 1842, 4 in Langevad 1979), this practice significantly increased the elaboration of social complexity in the region. The regional exchange of marriage partners would also tend to homogenize

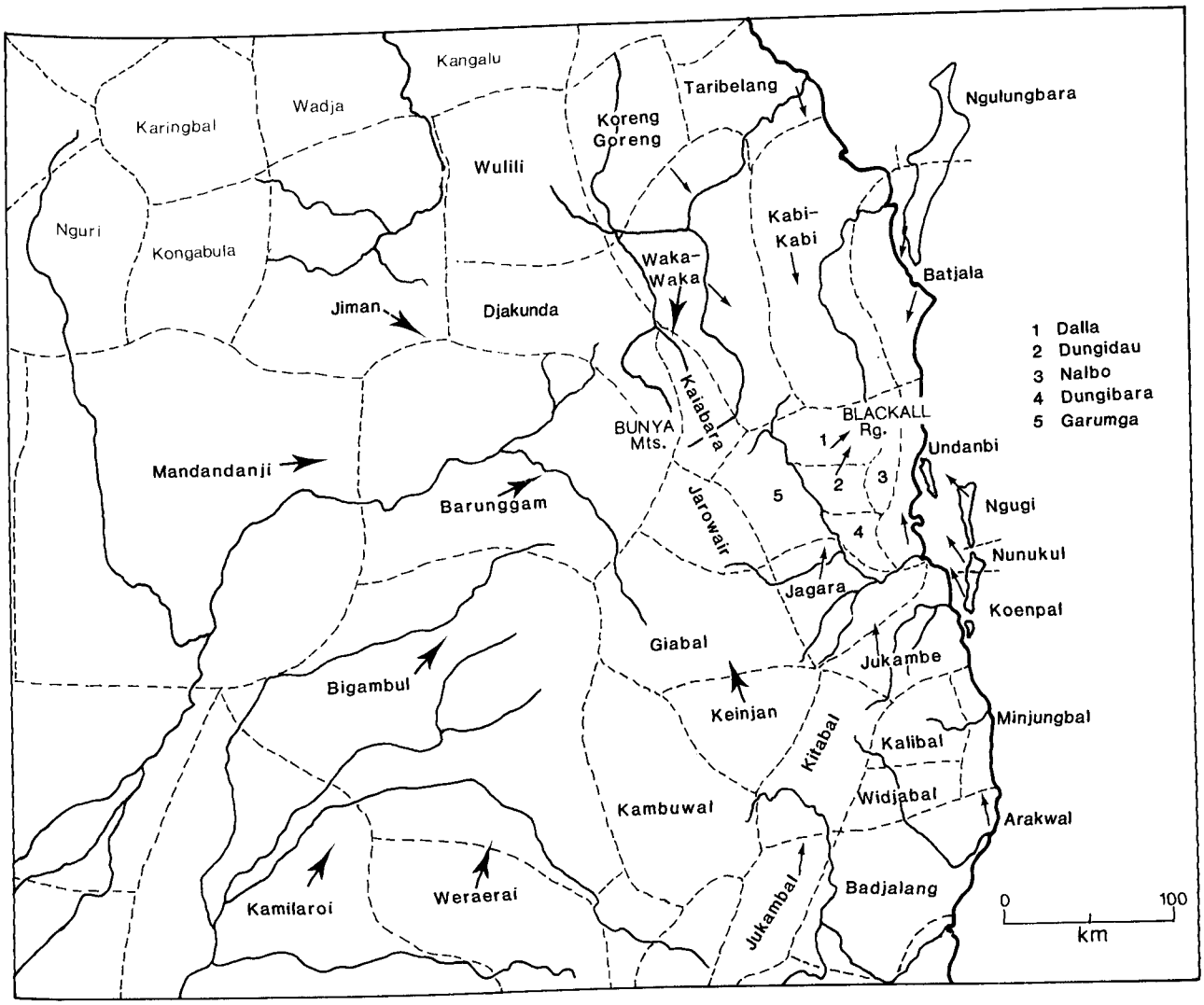

Fig. 2

The known movement of Aboriginal groups to the bunya feasts in South-east Queensland. Movement to Bunya Mts ( ), Movement to Blackall Rg. (↑). After Tindale (1974) and Sullivan (1977)

population characteristics, a situation which may not have prevailed during the Pleistocene (e.g. Brown 1982, 306; Thorne 1976). Some corrobborees were reported to have been 'lewd in the extreme' and associated with the relaxation of sexual restrictions (Mathew 1899, 104). Such close encounters between widely dispersed groups must have had a similar homogenizing effect.

At every stage, relations between Aboriginal groups in South-east Queensland were established, maintained and reinforced by symbolic means for encoding social information about group and status similarities and differences. Examples include the use of body painting and scarring, the design and orientation of bora rings, rock art, designs on weapons and carved trees, the removal of the left little finger of 'coastal' women, and the emphasis upon dialectic differences for group identity (e.g. Eades 1982; Howitt in Etheridge 1918, 89; Lang 1861, 367; Morwood and Fillery 1976, 100–04; Petrie 1904, 21, 38, 48; Sutcliffe 1972, 6; Winterbotham 1959, 59, 71). In fact, there is sufficient evidence to indicate that the use of multi-media, symbolic paraphernalia, which could be distinctive or shared

depending on context, was not just a decorative embellishment of the system, but an integral part of Aboriginal social complexity in South-east Queensland (cf. Morphy 1977, 1; Munn 1973).

In the early European contact period the most frequently noted symbolic behaviour, used as a system of social communication, was stylistic, particularly decoration of the body with paintings and scars. In the majority of cases such ornamentation was said to indicate 'tribal' affiliation (e.g. Petrie 1904, 21, 38, 48). The choice of designs, though, appears to have depended on context, as Winterbotham (1959, 71) notes:

> Also the painting for a big tribal show would be a full dress — an official pattern, so to speak — different from and much more particular than for a small camp show, in which each man might be patterned differently. In the big show each man would be dressed alike with their tribal patterns showing.

Similar 'tribal' designs were used on shields, boomerangs and carved trees marking burials (e.g. Lang 1861, 367). Although these designs were geometric, they were iconically motivated and had territorial as well as political reference. For instance, the Dal:a and Nalba local groups, who were firm allies and shared the same range, both used the 'fern' design because they lived in mountain country, while the closely affiliated Waka Waka and Bujibara tribes shared the 'bunya tree' design because their territories included extensive groves of this tree (Winterbotham 1959, 59). Body decoration could also denote special status, as in the case of messengers used to invite other groups to fights, and so on. As symbols of their authority, messengers also bore message sticks with incised patterns which appear to have been mnemonic as well as status markers (Winterbotham 1959, 60).

Patterns of body scars were a similar means for affirming and defining group identity and in the case of males these were also status markers — young men who had been through formal initiation ceremonies would have their noses pierced and bodies decorated with 'tribal' scars. Scars were also acquired during formalized duels and were a mark of individual prowess (Petrie 1904, 47).

Initiation ceremonies and corrobborees could involve production and display of a variety of art objects, including figures carved on trees and on the ground, as well as bark and clay effigies of kangaroos, humans and 'other creatures' (Howitt in Etheridge 1918, 89; Petrie 1904, 49; Winterbotham 1959). These objects were used to communicate and reinforce other symbolic media. Figures displayed at initiations were of restricted access, while those used in corrobborees were 'public'; as were the figures of kangaroos, emus and other designs painted onto possum skin rugs or scraped onto the bark sides of huts (Winterbotham 1959, 42).

Overall, the ethnography of style in South-east Queensland is sufficient to indicate that the system incorporated both iconic and non-iconic (geometric) components, and that both 'public' and 'restricted' art was produced in a variety of circumstances. The main roles of art appear to have been: simple decoration; defining political, social and territorial groups and intergroup relations; marking status and social differentiation; and reinforcing other communicative media.

Winterbotham (1959, 60) provides the only detailed information on use of rock art: message sticks used to invite people to a fight were carefully kept and placed in a cave. Subsequently, if any people were killed in the fight, nicks would be made in the wall of the cave. There is also ethnographic data on the cultural context of the Bundaberg engraving site: at the turn of the century Aboriginal women used rockholes at the site to bath children, while people used to colour the engravings when they 'painted themselves' (Sutcliffe 1972, 6). This implies a 'public' function for the art, although information about the significance of the engravings may have been restricted (Eades 1982).

The evidence of Tryon (1884, 50) on rock art function is more circumstantial. He noted the similarity between motifs at the Gatton engraving site and those used in body scarring and weapon decoration, and suggested that the engravings were conventional symbols for the 'totems of several tribes or groups of tribes'. It is significant that totems 'belonged' to specific tribes, that each totem had its own special place for performing increased ceremonies, which were of restricted access, and that ceremonies for increase or rain could involve a range of symbolic activities and media, including putting cuts on a sacred stone or smearing moss and dust on trees (Winterbotham 1959, 80, 81).

The ethnographic evidence for the production and use of rock art in South-east Queensland ranges from flimsy to dubious but, in general terms, it was clearly another element in the complex of symbolic/stylistic behaviour by which economic and social activities were controlled. Such sites concerned with symbolic activities have yielded information relevant to changes in demographic and social complexity.

A MODEL FOR SOUTH-EAST QUEENSLAND PREHISTORY

It is clear that the high population density ethnographically observed in South-east Queensland was made possible by the rich resource base and that differences in the seasonal availability of inland and coastal resource gluts promoted demographic flexibility (fig. 3). Important components of the necessary resource framework were post-Pleistocene developments, resulting from the formation of Moreton Bay. There are a number of implications.

Prior to 6000 bp the region probably had a low population density with intermittent and sparse occupation of optimal zones. Population gatherings in response to localized resource abundances would have been of limited scope and there would have been minimal opportunity for systematic interaction between small, mobile groups. Although there may have been human exploitation of coastal resources, conditions during times of fluctuating sea levels do not appear to have been conducive to high, littoral productivity (see Beaton (1985, 12–18) for a detailed discussion of this point). Although South-east Queensland has an occupational sequence extending well into the Pleistocene, this period will be of low archaeological visibility.

The formation of Moreton Bay combined with the relative stability of sea level over the past 6000 years has allowed extensive estuarine and mangrove areas of concentrated biological productivity to develop. This provided scope for an accelerating increase in population in the region, especially after 4000 bp. It is suggested that population increases were initially triggered by the expanded resource base but that later increases resulted from the development of social and demographic mechanisms which increased the effective carrying capacity of regional resources.

Archaeological criteria for population increases could include:

i. Increases in the rate of site formation (e.g. Ross 1985)
ii. Increases in occupational intensity at sites (e.g. Hughes and Lampert 1982)
iii. More intensive economic exploitation as indicated by use of new habitats, resource types, extractive technologies and management strategies (e.g. Lourandos 1983, 1985, 391).

Archaeological criteria for the development of social and demographic complexity could include:

i. Increases in the number of sites concerned with symbolic activities (e.g. art sites, bora rings)
ii. Changes in site content (e.g. the appearance of exotic materials and technologies)
iii. Increased status differences and restrictions on access to knowledge and specific localities, as reflected in a reduction in occupational intensity at some sites (cf. Winterbotham 1959, 80, 81), or developments in technological and organizational complexity (e.g. Satterthwait 1986, 26, 27, 35).

In the following section archaeological evidence from South-east Queensland will be assessed. Several sites strategically located at important nodes in the network of social and economic ties that characterized Aboriginal life in the region also have evidence for a range of symbolic activities. These document changes in the nature and intensity of social interaction, particularly in the context of evidence for economic, technological and demographic change (cf. Conkey 1978, 1980; Gamble 1982).

The data

The 'occupational' spans of twenty-five dated sites in South-east Queensland suggest a low-intensity occupation of the region during the Pleistocene and early Holocene, and a mid-Holocene increase in site numbers especially after 4000 bp (fig. 4). Given that the Wallen Wallen and Talgai sites indicate widespread occupation of the region during the late Pleistocene (Neal and Stock 1986; Oakley *et al.* 1975), the lack of 'early' cultural material from sites in a number of key resource zones (e.g. Maidenwell Shelter in the Bunya Mountains) must reflect problems in sampling low intensity/density use of these zones at this time.

The growth of site numbers over time from 4500 bp (5000 BP) appears to be of logarithmic rather than linear type, and provides a general measure of population increase (e.g. Ross 1985; Hughes and Lampert 1982). This increase occurs in all major environmental zones and post-dates the stabilization of sea level by 1500 years. Certainly, the evidence does not suggest that a sizable population of coastal dwellers was 'pushed back' to the present coastline by the last marine transgression. The use of more inaccessible areas such as St Helena and Moreton Islands over the past 2500 years suggests a continuing expansion of resource base from mid-Holocene times, possibly involving technological developments in the ability to make water crossings (cf. Beaton 1985, 18).

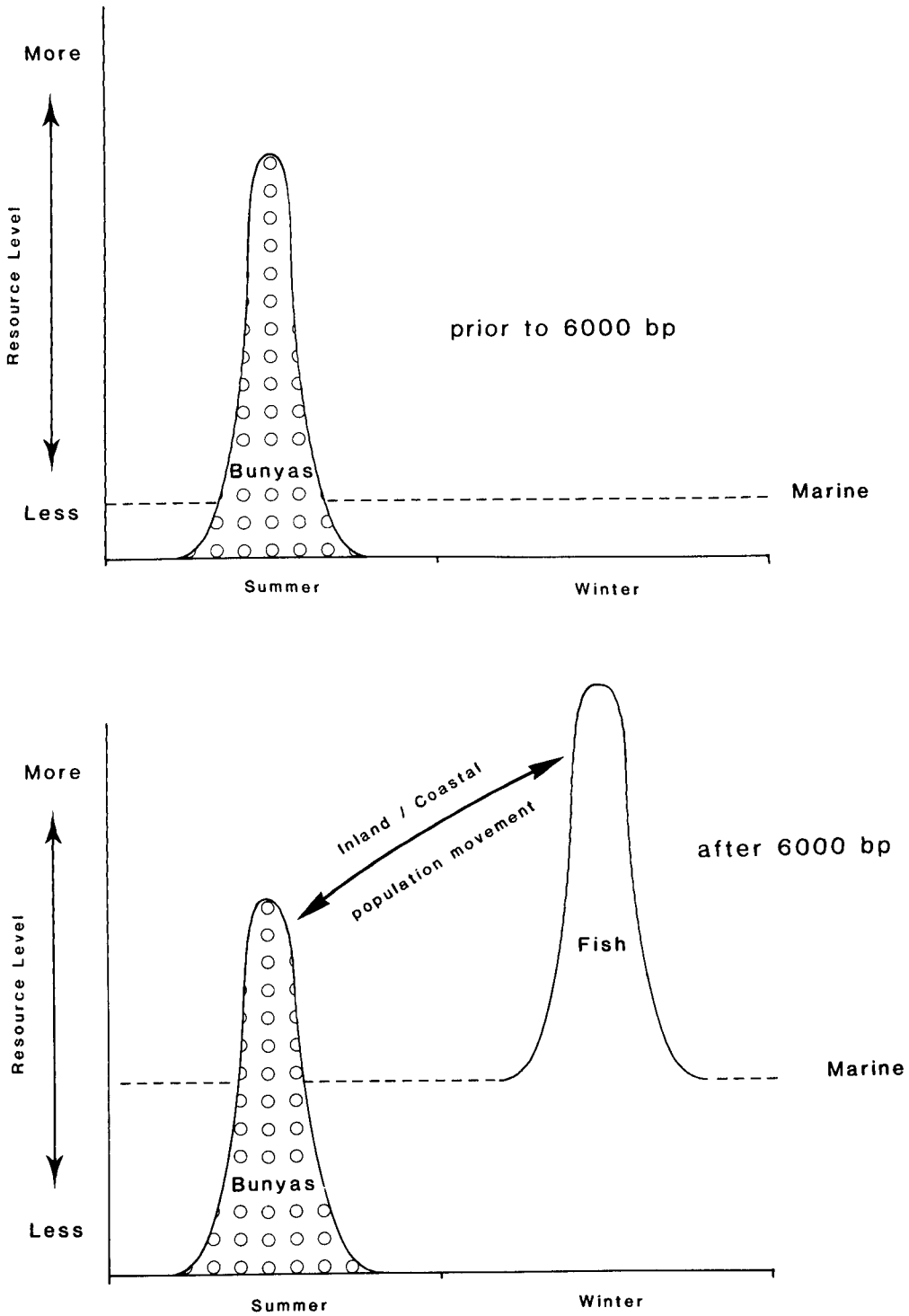

Fig. 3

The seasonal distribution of bunya nuts and marine foods in South-east Queensland before and after 6000 BP. The recent period is distinguished by the bimodal distribution of two geographically and seasonally 'patchy' resources. The significant increase in level of marine resources assumes that appropriate 'capture' technologies were available or developed (e.g. netting)

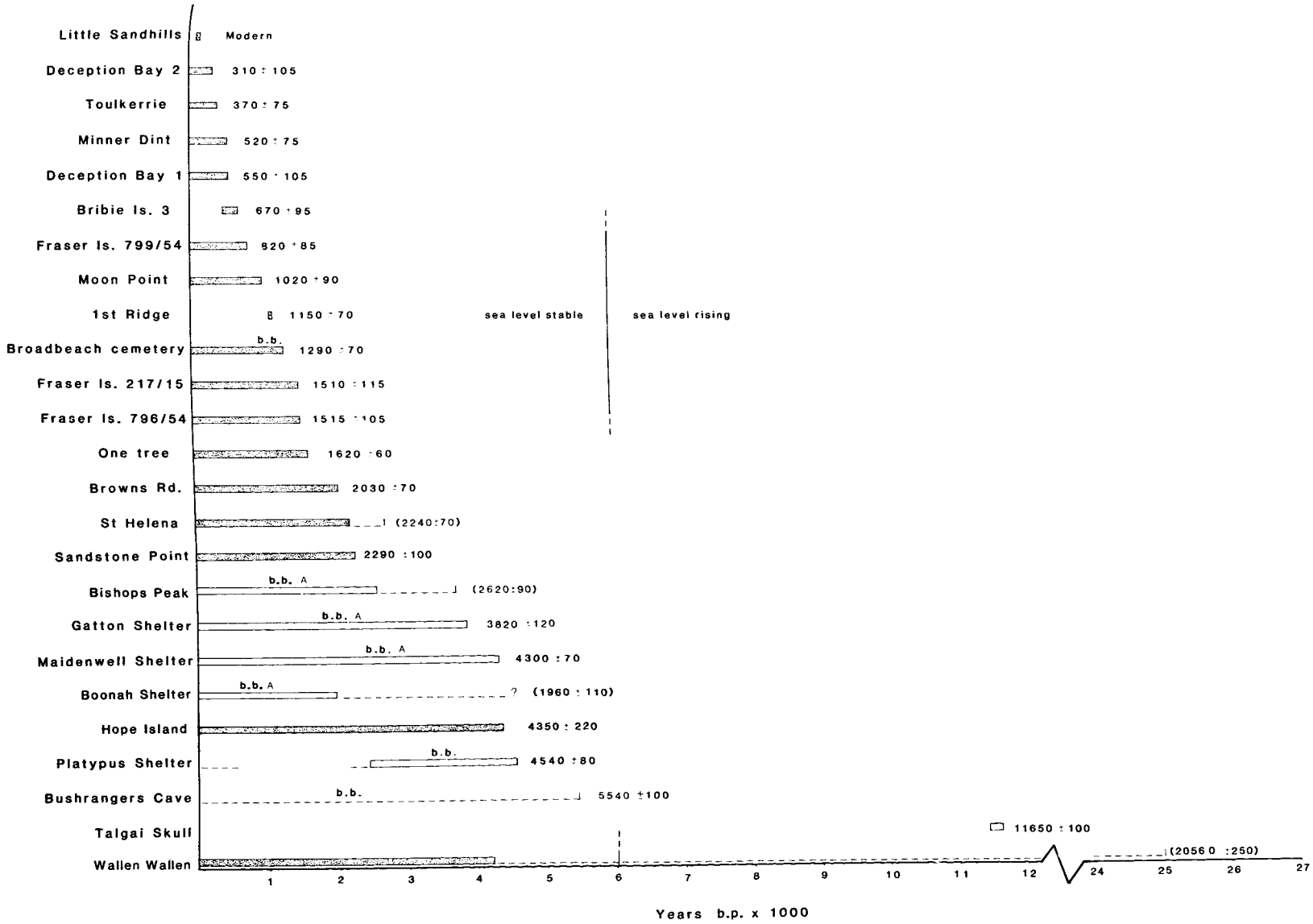

Fig. 4

Occupation sequences for 25 excavated sites in South-east Queensland based on conventional radiocarbon ages (Alfredson 1983, 83; Edmonds 1986, 55; Haglund 1976; Hall 1982, 88; 1984, 67; 1986, 94; Kelly 1982; Morwood 1986; Oakley *et al.* 1975). Dates in brackets are not from the basal deposits, which are dated by extrapolation. Broken lines indicate low artefact deposition rates (b.b. = backed blades present, A = Rock art present, shaded = exploitation of marine resources)

The accelerating increase in site numbers in Southeast Queensland has clear implications for increases in social complexity. For instance, Maidenwell, Gatton and Bishop's Peak rock art sites were first utilized at 4000 ± 300 bp right at the point of inflection in the site frequency curve, and associated with the appearance of new technologies and artefact types of diverse origin (cf. Morwood 1984, 369). It seems that more people were interacting more intensively and in new ways. Archaeological evidence from the Sandstone Point middens also suggests that large ceremonial gatherings, of the type witnessed in the area during historic times, only commenced in the last 1000 years (Nolan 1986, 98).

This interpretation of general changes in site distribution is borne out by the patterns of economic change within specific sites, both in coastal and hinterland areas. For instance, at the Wallen Wallen site on Stradbroke Island occupation first occurred prior to 21,000 bp, but faunal preservation only occurs from about 4300 bp when there is an associated increase in stone artefact deposition rates (Neale and Stock 1986, 618–21). In the lowermost midden, there is emphasis upon larger terrestrial and aquatic vertebrate fauna such as dugong, pademelon and python. It is not until later in the Wallen Wallen sequence that an exclusively coastal economy appears based on fish and shellfish with limited dugong hunting. The occurrence of dugong in the basal levels of the Wallen Wallen midden and shellfish in the basal levels of the Hope Island midden (Dr Peter Lauer, University of Queensland: pers. comm.) indicates that biologically productive, estuarine environments had developed and were being exploited by 4300 bp in some sections of Moreton Bay. However, intensive and specialized use of marine foods did not occur until much later.

Evidence for later developments in exploitation of marine resources is provided by the Sandstone Point midden complex located on a series of prograded beach ridges near Bribie Island on the northern side of Moreton Bay (Nolan 1986). These are of particular interest because they are located close to an Aboriginal, stone wall fishtrap (Walters 1985) and 5 km from the Toorbul Point bora ground. Nique and Harstenstein (1841, 27) record that this bora ground was used for initiation of young men and also observed a gathering of about 2000 Aboriginal men, women and children at a nearby fighting ground. The general Sandstone Point area was clearly a focal point for large-scale ceremonial gatherings and has material evidence for some of the intensive economic activities required to support these.

Although the oldest date so far obtained (2290 ± 100 bp (Beta 15810/B) from the base of Sandstone Point 4) is unlikely to signal earliest use of the area, there are still significant economic trends apparent, especially the notable increase in the density of fish and shellfish over the last 800–1000 years (Nolan 1986, 99). The earliest evidence for fish exploitation dates to between 1500 and 1200 bp, when the basal levels of Sandstone Point 2-B include only four taxa (yellowfin bream, mullet, whiting, garfish) with no clear taxon dominance. However, between 1000 and 800 bp there is a dramatic increase in fish discard rate and diversity (yellowfin bream, mullet, whiting, garfish, tarawhine, catfish, black spinefoot, flathead, pilchard, hardyhead) with garfish dominance. Only five terrestrial mammals were identified from the excavations (*Thylogale stigmatica*, *Rattus fuscipes*, *Petaurus norfolcensis*, *Pteropus poliocephalus*). Combined with evidence for increased fish bone fragmentation, suggestive of more trampling over the past 1000 years, the faunal assemblage from Sandstone Point documents a specialized and increasingly intensive exploitation of marine resources (Nolan 1986, 65–71). Furthermore, the density of fish remains at Sandstone Point 1-A (possibly 90,000 specimens per cubic metre) greatly exceeds that encountered at other coastal middens in the Moreton region and seems to reflect the large-scale gatherings ethnographically observed in the area, as well as construction of the stone wall fishtrap (Nolan 1986, 98; Walters 1985, 43). If so, then developments in the intensity of marine exploitation over the past 1000 years at Sandstone Point suggest parallel developements in the intensity and scale of social gatherings in the region.

An inland version of the same trend is apparent at Gatton Shelter, a rock engraving site located on a tributary of the Lockyer Creek–Brisbane River system in the foothills of the Great Divide which here separate the extensive blacksoil plains of the Darling Downs from those of the Lockyer Valley (fig. 1). The site lies on the southern side of Rocky Scrub Creek gorge which forms a natural access route connecting the Moreton region with the Darling Downs. This route is known to have been used by Aboriginal groups on their way to the Bunya Mountains as late as the 1840s (Tew 1979, 45; Tryon 1884, 45).

Gatton shelter contains a well preserved and diverse faunal assemblage which is overwhelmingly human food refuse with minimal input from other agencies (Morwood 1986). Economic trends evident during the 3800 year sequence include an early emphasis on large

and medium-sized macropods such as *Macropus dorsalis* and *Thylogale* sp., with more recent diversification to include harvesting of smaller species such as bandicoot (*Isoodon macrourus*, *I. obesulus*, *Perameles nasuta*), glider (*Petaurus* sp., *Petauroides volans*), possum (*Trichosurus vulpecula*, *Pseudocheirus peregrinus*), koala (*Phascolarctos cinereus*) and goanna (*Varanus* sp.).

Changes in faunal composition at Gatton Shelter also have implications for developments in patterns of habitat exploitation (Edgar 1985, 34). In the earliest levels there was emphasis upon exploitation of two species from ecotonal areas between wet sclerophyll forest and rainforest (i.e. *M. dorsalis* and *Thylogale* sp.): both animals travel along well-defined pathways on a regular, predictable basis. Other macropods from open forest habitats were taken but the small numbers indicate less systematic, opportunistic predation. Subsequently, the faunal resource base was expanded to include Peramelids and animals characteristic of canopy and hollow tree locations in dry and wet sclerophyll forests (e.g. aboreals, goannas, pythons).

The late increases in faunal diversity at Gatton Shelter show a broadening of the resource base, with more intensive exploitation of wider habitat and species ranges. At the same time increased rates of faunal, charcoal and sediment deposition indicate more intensive use of the site (Morwood 1986, 117). These trends are associated with a reduction in stone artefact densities, range of knapping debris, and number of stone artefact types, and some of these have implications for changes in hunting strategies: the last 1000 years of the Gatton (and Maidenwell) shelter sequence are marked by the loss of backed blades and small chips with adhering resin which appear to have served a specialized extractive function as 'barbs' in spears (cf. McBryde 1976, 57, 58). *If* changes in the artefactual and faunal sequences are functionally related, then general changes in the technology of predation are indicated. These possibly involved a change in emphasis from 'individual pursuit strategies' (ambush, tracking, stalking), in which both spears and macropods featured prominently, to use of both individual pursuit and co-operative hunting strategies and nets. Certainly many of the species represented which occupy dense undergrowth scrub are most readily captured in communal drives using hunting nets, and Petrie (1904, 86) notes that this was the method used by Aborigines in the general Brisbane area for hunting wallabies, kangaroo rats, 'paddymelons' and bandicoots. He adds that 'kangaroos' were also netted but could be stalked and speared, while goannas, possums, koalas, gliders and 'sugar-bags' were located, then cut out of hollow trees.

Economic diversification to emphasize use of abundant, small-bodied species at Gatton, Sandstone Point and Wallen Wallen, and the development of appropriate extractive technologies and techniques, imply periodic resource stress (cf. Hayden 1981, 523) — by historic times high population densities and social demands on production seem to have been the principal factors involved (above). Increased emphasis late in the regional sequence upon use of communal extractive techniques, such as large drives, nets and stone wall fish traps, also has implications for organizational complexity and resource management (see Satterthwait 1986). For instance, nets were major items of capital expenditure involving large investments in time and labour for collection of materials, producing cord and weaving, but combined with co-operative drives, they were also one of the means for generating the surpluses required for large gatherings (Petrie 1904, 16) — such drives could yield 'hundreds of wallabies' (Hooper 1944, 102). Where information is available, the authority to command sustained labour and direct co-operative hunting/fishing appears to have been vested in senior men using religious sanctions based on differential access to religious knowledge (cf. Altman 1983, 69; Thompson 1949, 17–18).

These major economic and technological trends apparent in South-east Queensland from mid-Holocene times are regional manifestations of more general patterns of change and need to be considered in this context. In all regions of mainland Australia which have been investigated archaeologically, there was an accelerating increase in site numbers from about 4300 bp (e.g. Attenbrow 1982; Morwood 1984; Ross 1985). This is associated with an increase in artefact discard rates at sites with long occupational sequences; the dissemination of technologies and artefact types of apparently diverse origin, such as backed blades, points and edge-ground axes (Morwood 1984, 369); the first evidence for labour intensive economic activities of the type used to support large ceremonial gatherings — specifically large-scale processing of cycads (Beaton 1982) and grinding of grass seeds (Smith 1986); and widespread changes in art systems (Morwood 1984; Rosenfeld *et al.* 1981, 34). Overall, major changes in population density and the scale and intensity of social interaction throughout Australia are indicated.

More recently, between 1000 and 2500 years ago, depending on the area, a range of economic and technological changes occurred which may reflect the passing of further thresholds in population growth and social demands on production systems (Beaton 1983; Lourandos 1983, 1985). These included continuing increases in rate of site formation; changes in the pattern of use of sites, as reflected in increased or decreased rates of stone artefact discard; and logistic/stylistic developments, as signalled by the loss of backed blades in many areas (Attenbrow 1982, 74; Hiscock 1986, 45–48; Jones 1985, 296; Morwood 1984, 359). Regional differences in the specific nature and timing of these changes indicate the regionally specific nature of more intensive extractive systems.

In conclusion, the available evidence indicates that significant demographic and social changes occurred in South-east Queensland from mid-Holocene times. These were contemporaneous with marked changes in post-Pleistocene resource levels and character. The increased population potential resulted not only from the development of new maritime resources in Moreton Bay but also from the now complementary nature of seasonal food abundances. The occurrence of inland, summer bunya crops and coastal, winter fish runs must have promoted the development of finely-honed, demographic flexibility and the required reciprocity network. Such developments would have led to continuing increases in carrying capacity, while increases in population would have led to an increased potential for the development of more complex patterns of exchange, and so on.

If this scenario is correct, then these social changes, involving more effective use of available resources, would have diffused into adjacent areas, even where there was no quantitative Holocene increase in resource base. It is possible that the social, demographic and technological changes which swept through mainland Australia *c.* 4000 bp were triggered in 'key' areas by the post-Pleistocene emergence of new resources *and resource configurations*. South-east Queensland is likely to have been such a key area.

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