

TORRES STRAIT *BEPOTAIM*: AN OVERVIEW OF ARCHAEOLOGICAL AND ETHNOARCHAEOLOGICAL INVESTIGATIONS AND RESEARCH

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Traditional Torres Strait Islander culture, viewed at European contact, demonstrated levels of maritime resource exploitation, canoe technology and seafaring skills, inter-island trade, and use of horticulture/agriculture to a degree unparalleled elsewhere in Australia. How long this maritime-focused cultural complex has existed in the island archipelago connecting Australia with Papua New Guinea, the onset dates for island occupation in the Holocene, and the cultural impact of the late Holocene 'connectedness' induced by exchange across Torres Strait on adjacent mainlands remain central questions for archaeological enquiry. A retrospective overview of archaeological research and investigations in the Torres Strait region is presented, from early preliminary field investigations in the 1970s through to the emergence of divergent thematic investigations spanning historic and prehistoric periods, underway in the year 2000. Radiocarbon dates from archaeological sites confirm occupation of the islands since 2500 years ago. Moreover, the regional archaeological site chronology for Torres Strait suggests most islands with good water resources supported populations, albeit in some cases seasonally transient ones, after 1,500 BPP. Some aspects of the archaeological chronology, the nature of culture sites and their spatial distribution within islands accord well with recent oral histories, and some ethnographic observations. However, other aspects of the emerging chronology, and in particular similarities in the range and type of sites across the Strait, and patterns between islands, strongly suggest that other facets of archaeological data either do not fit, contradict, or are simply unrecorded in, the ethno-historical sources. In particular, some ethnohistorically derived culture/language/trade groupings may have limited antiquity as seen in the archaeological record. □ *Torres Strait Cultural Complex, Holocene, palaeoenvironments, ethnohistory, North Queensland, chronology.*

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The significance of Torres Strait as a culture area juxtaposed between Australian Aboriginal societies and those of wider Melanesia has attracted the interests of anthropologists, historians, geographers, sociologists and linguists since Alfred Cort Haddon first visited the area in 1888 to study reef ecology, but turned instead to the study of indigenous traditional cultures. The number, physical diversity and unique cultural history of the islands scattered throughout the shallow marine shelf that separates Australia and New Guinea, coupled with the evidence of complex maritime trading cultures, has stimulated multi-disciplinary symposia and investigations (Walker, 1972; Lawrence & Cansfield-Smith, 1991). Recognition of the significance of maritime resources to both contemporary and past traditional Torres Strait Islander life is a theme common to contemporary analyses of marine resource utilisation, rights, conservation

and management (Haines et al., 1986; Johannes & MacFarlane, 1984, 1986, 1991; Mulrennan & Hanssen, 1994; Neitschmann, 1977, 1989), international Treaty arrangements (Department of Foreign Affairs and Trade 1985), responses to proposed major developments (Papua New Guinea Gas Project, 1998), and is consistent with 19th Century historical observations (Allen & Corris, 1977; Macgillivray, 1852; Moore, 1979, 1984).

In this paper, we review the progress made by archaeologists over the last 30 years in attempting to understand the genesis and antiquity of the maritime cultures of the Torres Strait. The review aims to summarise previous research, and provide a baseline from which to understand the questions now driving a new phase of archaeological research. Many archaeological questions are posed by the Melanesian maritime cultures of Torres Strait, situated so close to 2 large culturally

distinctive and diverse mainland regions. Extensive historical and ethnographic sources are available, which, along with the 19th Century European - indigenous contact (as viewed in comparison with much of mainland Australia), make archaeological investigation of the contact and pre-contact periods especially significant in the Torres Strait region. Moreover, the contact period saw indigenous traditional use of maritime resources suddenly placed in conflict and competition with global maritime trade and markets (e.g., the pearl-shell and bêche-de-mer trades).

All these aspects make 'contact archaeology' of Torres Strait, and its archaeological investigation, especially rewarding (e.g. McNiven, 2001). Archaeological research supports many aspects of the picture of traditional Torres Strait culture derived from ethnohistorical sources and indigenous oral traditions. Many types of archaeological site also relate closely to the myths and story places of traditional Torres Strait Islander cosmology (Barham, 1999; Laade, 1971; Lawrie, 1970; McNiven et al., 2000, 2002b; McNiven, Fitzpatrick & Cordell, this volume). However, other archaeological evidence suggests that 19th Century historical observations provide only a partial view of the past. We also attempt to illustrate that issues of Torres Strait Islander cultural identity, resource management, and sustainable development all impinge upon, and may be informed by, studies of the archaeological resource undertaken at the local community level.

We also aim to illustrate the significance of Torres Strait archaeology from wider geographic, chronological and culturally comparative perspectives. Available data suggest an antiquity for maritime culture in Torres Strait of c.2,500 years BP, comparable with many areas of Island Melanesia (Barham, 1999, 2000). This picture is based on a relatively small sample of excavated sites, and predominantly from radiocarbon ages determined from shellfish remains at those sites. New approaches to dating sites, such as the direct dating of rock-art, and the dating of new types of sites including historic ones, are now either underway or in prospect.

The regional chronology for Torres Strait is both theoretically problematic and potentially highly significant for understanding changes in late-Holocene coastal occupation in Papua New Guinea (PNG) and northern and eastern Australia in the late Holocene. Dates of about 2,500 BP from Saibai, and Dauar in the Eastern Islands, provide evidence for the sudden and near-

synchronous appearance of coastal resource-focused midden sites on islands positioned either side of the historically documented linguistic divide between Meriam Mir (Meriam) and Kala Lagaw Ya (Mabuiag) speakers (Shnukal, 1998: 186). These oldest sites are respectively closest to, and most remote from, adjacent mainlands, and in very different ecological environments. Significantly, the dates are also very close in age to the oldest coastal sites dated on the southern coast of PNG west of Moresby (also around 2,500 BP in the Kikori delta) (Barham, 1999, 2000). These oldest archaeological dates from Torres Strait significantly pre-date established ages for the movement of Austronesian-speaking pottery-making populations moving westward towards Torres Strait from the PNG Tip after 1,900 years BP (Bickler, 1997).

Here we review the archaeological site and radiocarbon data available from Torres Strait (Fig. 1) and address several hypotheses which future archaeological programmes in the Torres Strait may now begin to test through acquisition of further data. Amongst the questions posed are:

- whether the islands of Torres Strait were abandoned by humans following flooding of the Torres Strait shelf around 8,500-7,500 BP, only to be re-occupied late in the Holocene?

- whether the early site dates from the Torres Strait Islands at 2,500 BP represent permanent occupation or seasonal visitation from adjacent mainlands, and whether the evidence for occupation of nearly all large islands by c.1,500 BP represents a regional trend towards inter-island movement, seasonal sedentism and cultural regionalisation predicated on the development of outrigger-canoe technology?

- whether the rise of the *Torres Strait Cultural Complex* from c. 2,500 to c. 1,200 BP (Barham, 2000: 227-228, fig. 1) reciprocally interacted with, and in turn stimulated, changes in the pattern of regional cultural development in both coastal Cape York and lowland southern PNG from c.1,500 BP onwards?

- whether some material culture changes observed in late-Holocene coastal archaeological sites in mainland Australia (e.g., the use of shell fish-hooks) were stimulated by the emergence of inter-island trading groups occupying islands in Torres Strait from c.1,500 BP onwards, and whether, therefore, long-standing diffusionist notions of external influences on mainland indigenous Australian culture (McCarthy, 1939-40; Roth, 1908, 1910) warrant critical review and

re-examination in the light of archaeological evidence now available from Torres Strait.

The resolution of these and related questions regarding the *bepotaim* origins of the unique cultural traditions of indigenous Torres Strait Islanders observed at European contact lie in future research. Here we begin by tracing research themes which have stimulated archaeological and anthropological interest in Torres Strait, and which have foundations in the immediate recognition by 19th Century observers that indigenous Torres Strait culture was intrinsically Melanesian. We also critically evaluate the ethnohistorical database, as much of the archaeological research completed in Torres Strait has used historical sources both as theoretical stimulant and as an interpretive reference base for field observations.

ETHNOHISTORICAL SOURCES AND THE HADDON ARCHIVE — INFLUENCES ON ARCHAEOLOGICAL METHODOLOGICAL APPROACHES IN TORRES STRAIT

Alfred Haddon and his colleagues, in a number of publications, most notably the six-volume *Reports of the Cambridge Anthropological Expedition to Torres Straits*, published between 1901 and 1935, provided a detailed corpus of cultural observations for the Torres Strait Islands. The information gathered during two field seasons in 1888 and 1898, subsequently through correspondence, and during his brief visit of 1914, produced an ethnographic baseline study that is unparalleled for any group of indigenous people on the Australian continent. In breadth of documentation and scope, the ethnographic observations and artefact collections made by Haddon are approached elsewhere in Australasia only by the work of W.E. Roth in North Queensland (Moore, 1984: 38). As recent publications commemorating the centenary of the 1898 Expedition have noted (Herle & Philp, 1998; Herle & Rouse, 1998), the work of the expedition participants can be viewed with hindsight as having established methodologies for ethnography and a range of field analytical practices which 'repositioned anthropology as an academic discipline' (Urry, 1982, 1998: 201). The Cambridge Expedition members also stimulated research in areas as diverse as method and theory in anthropology on a global scale (Rouse, 1998), detailed cross-cultural investigations of particular artefacts of cultural significance to maritime insular societies, such as canoes (Haddon & Hornell, 1975), the development of linguistic study in the Pacific (Ray, 1894, 1896, 1899, 1926; Ray & Haddon, 1893, 1897), and innovative approaches in cross-cultural perceptual studies and psychological research

(Kuklick, 1994; Richards, 1998; Rivers, 1898, 1908, 1924, 1926).

However, the legacy of the Haddon archive for further archaeological research in Torres Strait, needs some qualification. First, Haddon's observations were primarily drawn from the study of only 2 of 18 Islander communities, Mer in the Eastern Islands, and Mabuig in the Western Islands (Nakata, 1998: 5). Haddon's observations were therefore drawn from the 2 linguistically distinctive regions of Torres Strait; the Eastern Island Group, where the Papuan language Meriam Mir is spoken, and the Western Group where Kala Lagaw Ya is spoken (Ray, 1899; Ray & Haddon, 1893, 1897; Shukul, 1998) (Barham, 2000: fig. 3). Compilations of artefact collections (e.g., Moore, 1984) and the *Reports* themselves, group data holistically for Torres Strait, emphasising island inter-linkages, trade and social connectivity and the distinctiveness of the Melanesian maritime insular culture of Torres Strait in the mid- to late 19th Century. Less emphasis is given to the known inter-linkages between the Northern and Eastern Island Groups and mainland PNG, and the southwestern and central islands linkages with northern Cape York, although recent anthropological work has revised this picture (e.g., Lawrence, 1994, 1998 for Torres Strait; Eley, 1988; Lawrence, 1991; Matsumoto, 1981 and Schug, 1995 for maritime-focused cultures of the adjacent coastal PNG). As argued elsewhere (Barham, 2000; Golson, 1972; McNiven et al., 2000; Vanderwal, 1973a: 184-188) the origins and antiquity of both the linguistic divide within Torres Strait, and the trading networks across and within Torres Strait utilising double-outrigger canoes, observed in the 19th Century, pose challenging questions for modelling prehistory in the area.

Secondly, as Haddon was well aware, his observations were being made 30-40 years after major demographic and social impacts had taken place among Torres Strait Islander communities, arising first from the *bêche-de-mer* fishing fleets, then from the arrival of pearl shelling fleets and their island-based stations, and finally from the establishment of Church Missions on the islands between 1871 and 1885. Major depopulation had occurred in the islands, and on northern Cape York from the mid-19th Century (Loos, 1982), and the 1875 measles epidemic led to population declines of 30-60% on islands such as Saibai and Mua (Mullins, 1992, 1995: 134-136). For example, on Erub, the indigenous population was reduced to 80 by the measles epidemic, and in 1885 was repopulated by the relocation of Pacific Islanders from Mer, where they had been unwelcome temporary residents (Mullins, 1995: 158-59;

Scott & Mulrennan, 1999). The context of Haddon's observations in 1888 and then in 1898, was therefore one of major recent social and demographic change and conflicting attitudes to traditional life. As Moore (1984: 37) noted, 'by the time Haddon was in the Strait most of the traditional customs, crafts and pursuits had disappeared'.

Haddon's dedication to recording traditional lifestyles over a 40 year period — a process he described as 'the saving of vanishing knowledge' — was itself inspired by a sense of urgency drawn from his observations and assumptions of the imminent disappearance of traditional Torres Strait culture, first made in 1888 (Beckett, 1998: 29-30; Edwards, 1998: 109-110; Haddon, 1897, 1898). To procure traditional artefacts, Haddon often resorted to requesting the manufacture of newly made artefacts in the traditional style from older community members. He also made strenuous efforts to encourage re-enactments of ceremonies (such as the Malu-Bomai cult on Mer) and record them through photography, film and documentation, in what Edwards (1998) has described as 'salvage ethnography'. His interest was stimulated by field observation of the recent destruction of important ritual sites by Pacific Island mission teachers, such as the *zogo* site at Tomog on Mer (Haddon, 1908: 266). There is evidence that by encouraging Islander interest and participation in such cultural retrospection, Haddon was inadvertently challenging the philosophies introduced by both colonial administrators and missionaries, who actively advocated abandonment of traditional culture, over the previous 20 years. For the indigenous Islanders, this may have induced some hesitancy in participating and, ultimately, confusion. On Mer, for example, Edwards (1998: 121) suggested Haddon's re-enactments may have in part been responsible for the 'social and political unrest' described in 1898.

ARCHAEOLOGY AND ETHNOHISTORY: ISSUES AND METHODOLOGICAL REQUIREMENTS FOR THE HISTORIC PERIOD IN TORRES STRAIT. This background discussion has important implications for archaeological methods and theory, and also contemporary issues of cultural resource management in Torres Strait. Firstly, the Haddon collections are biased towards the social, ritual and religious aspects of traditional life. Although Haddon made strenuous efforts to collect traditional raw materials, and the more mundane artefacts of daily life, the artefacts he collected

are largely not those likely to appear in stratified archaeological sites, especially middens.

Secondly, although maps of several islands showing traditional settlement sites and significant traditional localities were prepared by Wilkin for inclusion in the *Reports*, the spatial geography of settlement and subsistence observed by Haddon was one of post-mission settlement, where both indigenous populations and recently arrived Pacific Islanders had regrouped as single communities around the newly built Churches. The mapping of former settlements, camp sites and adjacent reefs for Mabuia (Haddon, 1904: 7, 60; 1935: 21, 57; Harris & Ghaleb, 1987: 5-6, fig. 2; Lawrie, 1970: 82), Mua and Badu (Haddon, 1935: 22; Lawrie, 1970: 18), Erub (Haddon, 1935: 33), Mer (Haddon, 1908: 170-71; Lawrie, 1970: 294), Saibai (Laade, 1971: map 3; Lawrie, 1970: 150) and Boigu (Laade, 1971: map 5) suggests that the abandonment of numerous, previously dispersed, settlements, based on both seasonally and permanently occupied sites, and associated land and reef allocations and divisions, was abrupt. On Mabuia, for example, the present village of Bau, established by the missionaries in the 1870s, involved the coalescence of 5 main villages, 3 on the north coast and 2 on the east coast, and a considerable number of smaller settlements (Harris & Ghaleb, 1987: 5-6). The implications of sudden settlement site abandonment, coupled with in some cases deliberate destruction, re-location or burial and/or obscurement of both former ritual sites, and those still in use at the time Mission teachers arrived (Danaher, 1993: 177-178; Haddon, 1904: 5, 368-369; 1908: 266), have yet to be fully addressed in terms of site visibility, obtrusiveness and selective preservation during contemporary archaeological surveys.

At Pulu Islet, the sacred cave of Augudalkula was infilled to within 1-2 feet of the overhang and Haddon (1904: 368-369) stated that 'the sacred emblems and skulls that it formerly contained have been removed or burnt with kerosene' (McNiven, Fitzpatrick & Cordell, this volume). Likewise, sacred relics of Kwoiam were burned at the instigation of Hakin, a Lifu teacher (Haddon, 1904: 368). Neither have processes of abandonment been considered theoretically in relation to the taphonomy and site formation processes of the upper stratigraphy of archaeological sites so far investigated (although Ghaleb, 1990 addressed this issue empirically at the Gumu site on Mabuia). Equally, the cultural

implications of the process of missionisation on the oral traditions regarding such sites, and the legacy of missionisation on modern indigenous views of site significance, require further research. Most evidence suggests that the effects of late-19th Century missionisation were to repress, rather than dislocate or truncate, traditional knowledge of former culturally significant sites and locales, and oral myths and traditions associated with these locales (e.g., see Danaher, 1993; Laade, 1966, 1968, 1971, 1973; Lawrie, 1970), although physical destruction of many *zogo* sites was commonplace. In the context of contemporary Native Title claims and the re-emergence of Torres Strait cultural identity through indigenous empowerment following the High Court 'Mabo' decision in 1991, new archaeological and cultural heritage programs are underway which reflect and support a re-emergence of independent indigenous cultural appraisal of the *bepotaim* from contemporary perspectives (Carter et al., this volume; David & McNiven, this volume; McNiven, Fitzpatrick & Cordell, this volume; Scott & Mulrennan, 1999).

To understand the diversity of methodological and theoretical themes now emerging for archaeological investigation in Torres Strait, the rapidity and scale of social change that had taken place in the mid-19th Century needs emphasising. Only 40-50 years prior to Haddon's first visit in 1888, accounts from sources such as the Barbara Thompson testimony (Moore, 1979), the journals of John Sweatman (Allen & Corris, 1977), the searches for survivors of the *Charles Eaton* wreck (Brockett, 1836; King, 1837) and nautical reports (Dumont d'Urville, 1987; Jukes, 1847; King, 1834; Macgillivray, 1852; Rutherford, 1834) provide geographically specific snapshots of traditional subsistence and social life for some islands. These observations predate the social, cultural and demographic consequences of both *bêche-de-mer* and pearl-shell fishing. Some of these sources provide details of house construction, food processing and cooking methods and daily subsistence food-gathering and hunting tasks, which form essential baselines for archaeological site interpretation.

An archaeological lacuna exists at present with respect to the period of historical change commencing with the arrival of European commercial fishing fleets. The archaeological sites from this phase of European activity are largely unrecorded. As Mullins (1995: 84) has noted, 'in the late 1860s and 1870s Torres Strait Islanders lived in a confused world with two

cultures. One was their own, the other that of the western Pacific maritime trade. Both were violent'. The scale of disruption was dramatic on an island-by-island basis. On Tudu in 1869, for example, William Banner arrived to set up a *bêche-de-mer* station with 70 Pacific Islanders on board. At that time the resident population comprised 40 Tudu men and their families (Mullins, 1995: 76). This period saw the introduction of firearms to the indigenous populations, as well as regular access to large metal knives, axes and tobacco and the irregular availability of flour and other food staples through trade and/or labour payments. By 1872 permanent land-based *bêche-de-mer* or pearl-shelling stations existed, or had been previously established, on Tudu, Gebar (Gabba), Erub, Dauar and Mer, with 'floating stations' off Poruma (Paremar/Coconut Is.) and Zapkar (Campbell Is.). Torres Strait Islanders were contending with the influx of a workforce of over 500 Pacific Islanders, sometimes poorly disciplined and managed and clashes are documented on Mabuiag and Mer (Mullins, 1995: 78-83)¹.

This complex historic picture continued through to a decade before Haddon's 1888 visit to Torres Strait. The 60-mile colonial maritime boundary established in 1872 left islands in the northern sector of the Torres Strait, and the Eastern Islands such as Mer, well beyond Queensland's jurisdiction until the boundary extension in 1879 (Van de Veur, 1964). In that year, a Saibai population still depleted from the measles epidemic imminently expected raids both from the Kiwai, and Marind-Anim to the west, who had been raiding Boigu in the 1870s (Mullins, 1995: 145; Singe, 1979: 192). Raids from the Marind continued after annexation throughout the 1880s, with major attacks on Saibai in 1882, at Mawata in 1889 (Van Baal, 1966: 696), on Daru in the early 1890s (Mullins, 1995: 147) and in the Morehead River area as late as 1902 (Van Baal, 1966: 697). However, not all Marind visits were by war parties and some Marind trading also took place on Boigu and Saibai (Van Baal, 1966: 699).

In terms of potential historic archaeology European contact was markedly diachronous. Islanders had periodic access to metal from passing ships and wrecks from at least the 1790s (McNiven, 2001). Flinders (1814, II: 292) advised against landing on inhabited islands, which may have kept the islands relatively free of outside contact from 1803 to 1820 (Mullins, 1995: 19) and certainly kept most European

vessels on a narrow navigational track through the treacherous, reef-studded waters of the Strait. Landings for water and barter became relatively common from the 1820s onwards. With improvements in charts through the 1840s, frequent contact was initiated before the advent of *bêche-de-mer* and pearl shelling in the 1860s, and movement of tradestore goods across the Strait northwards to PNG preceded colonial administration (Lawrence, 1998: 14). Breakdown in the traditional trading networks (Lawrence, 1994; Moore, 1978) was similarly varied in space and time. Substantial and violent disruption between the Strait and Cape York area commenced from the 1860s, within the immediate vicinity of the Somerset settlement, established in 1864 (Greer, 1996: 105; 1999: 114; Loos, 1982; Sharp, 1992). Similar effects did not occur on the northern margin of the Strait until 40 years later (Mullins, 1995; Singe, 1979: 194-195), with the decline and then interruption of trade following imposition of customs barriers (MacGregor, 1911: 4; Lawrence, 1998). Relative inaccessibility of the Eastern Islands left Haddon confident that his observations in 1888 and 1898 described traditional conditions 'with a fair degree of accuracy' (Haddon, 1908: xviii-xix). He estimated the last Malu-Bomai ceremony was held on Mer about 1875.

The purpose of this historical review is to preface a paradox that exists methodologically and theoretically within most of the published archaeological investigations so far undertaken in Torres Strait. The richness of the ethnographic and ethnohistorical sources has driven research spanning a wide range of anthropological disciplines (e.g., Arthur, 1998; Beckett, 1963, 1987; Cordell, 1984, 1991; Fitzpatrick-Nietschmann, 1980; Fuary, 1991; Herle & Rouse, 1998; Laade, 1966, 1968, 1971, 1973; Lawrence, 1991, 1994, 1998; Lawrie, 1970; Mullins, 1995; Nakata, 1998; Nietschmann, 1989; Schug, 1998; Sharp, 1992, 1993, 1996; Singe, 1979, 1993). Given the quality and detail of many historical ethnographic sources and viewing the challenge of researching the prehistory of Torres Strait from a contemporary perspective, one might have expected that the first archaeological investigations in Torres Strait would have initially focused on separating historical from prehistoric components. Identifiable tasks would include de-coupling the historic archaeology of Church Mission sites from their pre-mission indigenous settlements; mapping the historic archaeology of *bêche-de-mer* and pearl-shelling stations; identifying other historic

sites, including shipwrecks and onshore burials and matching indigenous sites with European components with historic archival data and events. Quite the reverse took place in the first 25 years of archaeological investigations following Vanderwal's initial archaeological reconnaissance work. Identifying historical archaeological connections is a necessary prerequisite to projecting a realistic pre-contact ethnohistorical picture back in time and contrasting it with the prehistoric archaeological record.

When Vanderwal (1973a) completed the first archaeological reconnaissance of Torres Strait, the rich ethnohistorical record was seen not as the basis for a first stage of historical archaeological study, but a theoretical platform from which to interpret anticipated archaeological data over much longer timescales. In the context of Australian archaeology in the 1970s — where time-depths for Australian indigenous occupation were being rapidly pushed back by tens of thousands of years — Vanderwal's impression of the archaeological sites he located was therefore one of low research potential. He identified a general lack of sites on the islands, and in particular sites were seen as 'not generally of the type within which one might expect a great deal of time depth' (Vanderwal, 1973a: 188). Only sites on Mabuiag and Mer were seen as worthy of excavation. He concluded that time-depths and lithic recovery from most sites in Torres Strait would be insufficient to test the model of the establishment through time of trade networks he had hoped to investigate. Significantly, he noted that the data obtained through excavation would be 'little more than synchronic'. This was a view of synchrony set against a research agenda which saw diachrony relative to known occupation depths of >30,000 years in Australia, and antiquity of horticultural societies north of Torres Strait in PNG perhaps as early as 9,000 years BP (Golson et al., 1967; Golson, 1977, 1989; Golson & Hughes, 1980; Golson & Steensberg, 1985).

Subsequent archaeological investigations have largely followed the methodological approach adopted by Vanderwal, namely of attempting to test higher level theory against the Torres Strait archaeological record, using the ethnohistorical sources as a baseline reference point. Such approaches have included testing models of prehistoric subsistence and trade network origins, both in terms of Torres Strait as a boundary or cline between horticulture to the north and hunter-gatherer subsistence on mainland Australia

(Baldwin, 1976; Barham & Harris, 1985; Harris, 1975, 1976, 1977, 1979, 1995); modelling trade using lithic artefact types and distributions (Vanderwal, 1973a; McNiven, 1998) and also relationships between ethnographic models of coastal exploitation and the archaeological record (Ghaleb, 1990, 1998). Recent research approaches, contrasting behavioural ecology and signalling theory with concepts of reciprocity (Levi-Strauss, 1969) and foraging theory, have focused on the remaining traditional aspects of contemporary food gathering amongst the Meriam of the Eastern Islands (Bird, D.W., 1996; Bird, R.B., 1996; Bird, R.B. & Bird, D.W., 1997; Bird et al., 1995, 2002). These research foci also involve merging and contrasting contemporary aspects of traditional food-gathering procedures with ethnohistorical and archaeological data (Carter, 2001, 2002a; Carter et al., this volume), with particular emphasis on shell-fish, fish and turtle exploitation in relation to prey models, subsistence strategy and coastal maritime subsistence (Bird, R.B. 1999; Bird, D.W. & Bird, R.B., 1997; Bird, R.B. & Bird, D.W., 1997; Bird et al., 2002, this volume; Carter et al., this volume).

This review has 2 specific aims. While attempting to summarise the archaeological evidence so far recovered from Torres Strait, we also seek to illustrate the influence academic context and theoretical agendas have had on the approaches adopted to archaeological site evaluation. In particular, it is argued that the time has come to critically re-examine the value of the ethnographic record, particularly in terms of theoretical and methodological archaeological approaches used to assess site significance. This critique will be developed in a later section. However, at this point 3 research agendas are foreshadowed — each of which methodologically illustrates the limitations imposed on archaeological approaches if the ethnohistorical framework is given primacy as an archaeological reference point.

Posed as questions these are:

- have the archaeological research methodologies so far applied in Torres Strait, especially those utilising the ethnohistorical baseline for contextual interpretation, been capable of defining the archaeological time-depth for human occupation in Torres Strait in the late Pleistocene and Holocene?
- are models of complex trade and subsistence interaction in the 19th Century, derived from historical and ethnohistorical sources, consistent with the known archaeological record? If so, how long, and under what circumstances might these

interactions have prevailed in prehistory?

– does ethnohistorical data provide a basis for explaining the traditional linguistic patterning of Torres Strait and adjacent mainlands, the antiquity of the linguistic pattern, or the cultural origins and provenance of the linguistic groups represented?

A second theoretical factor underlies archaeological approaches so far adopted in Torres Strait. The 150km of largely shallow sea with its 100 or so islands, innumerable islets and partially exposed sandbanks and cays is Australia's closest landlink with southeast Asia via New Guinea and has therefore always been seen as a potential migration point and pathway for cultural traits moving into Australia during the mid- to late-Holocene. The area has also attracted interest as a potential migration pathway for earlier human colonists, when the region formed a wide land-bridge as part of Sahul during the late Pleistocene and early Holocene, prior to transgression of the shallow shelf about 8,500- 7,500 BP (Barham & Harris, 1983). These geographic and 'deep time' temporal aspects have conditioned many previous assessments of Torres Strait prehistory. Haddon (1890: 303) developed a negative view of the archaeological potential of the islands and to some extent this view has, based mainly on issues of site preservation and demonstrated time-depths of mostly less than 1,000 years, persisted (Ghaleb, 1990: 52; Moore, 1979: 15; Mulvaney & Kamminga, 1999: xvii; Vanderwal, 1973a: 176). This paper seeks to address: 1) whether research conducted to date has utilised methodologies appropriate and adequate to seeking longer time-depths for prehistoric occupation, and 2) whether, if a short time-depth for prehistoric Holocene insular occupation in Torres Strait (e.g., of <3,500 years) is substantiated after further sites are dated, this makes the archaeological research agenda emerging from Torres Strait in any way less valuable or significant in terms of Australasian prehistory?

ARCHAEOLOGICAL RESEARCH IN TORRES STRAIT — A CONTEXTUAL VIEW

Archaeological investigations in Torres Strait, are summarised and reviewed in this paper as a background to new phases of archaeological recording commencing throughout the islands. The more recent investigations are both community-led (Camp, Scott, Furphy Pty Ltd, 1994; Carter, 2001, 2002a; Carter et al., this volume; David & McNiven, this volume;

Fitzpatrick et al., 1998; McNiven et al., 2000; McNiven, Fitzpatrick & Cordell, this volume) and also a response to requirements for Environmental Impact Assessments (EIS) to include assessments of indigenous sites of cultural significance in advance of proposed developments. Previous research tended to 'import' theoretical problems and test them against appropriate field archaeological observations, rather than reflect indigenous concerns or issues relating to the extant archaeological record of Torres Strait. The new studies are shifting to a more internal theoretical perspective that can be compared with the broader patterns developed in Australasia. With these caveats in mind, it is still necessary to draw on ethnohistorical sources, environmental data and archaeological evidence from north and south of the islands to reconstruct a preliminary picture of Torres Strait prehistory.

Although, as noted above, most research in Torres Strait has used ethnohistorical sources to develop specific regional theoretical perspectives (e.g., trade, origins of horticulture/agriculture), the 19th Century accounts also provide specific references to localities, activities and structures likely to be preserved in the archaeological record or which can assist at a generic level in the taphonomic interpretation of archaeological site contexts, once located. Examples include descriptions, including early photographs, of house and hut structures (Brockett, 1836: 24-55, facing p.12; Gill, 1876: 207, 212; Haddon, 1912: 93-119, figs 136-147, pls 19, 20; Jukes, 1847: 140-141, 155-156, 161-163, 172; Macgillivray, 1852, II: 35; Mullins, 1995: 114-115), methods of food processing (Allen & Corris, 1977: 27; Jukes, 1847: 41; Moore, 1979: 178-179), preparation of corpses and burial (Allen & Corris, 1977: 42-43; Brockett, 1836: 27; Gill, 1876; Cannon, 1885; Edge-Partington, 1969, II: iv, 94; Hamlyn-Harris, 1912; Jukes, 1847: 137, 150; Murray, 1876: 451-452; Moseley, 1879: 363), the collection of rainwater using shells (Allen & Corris, 1977: 27; Haddon, 1912: pl. 3), and the construction of wells (Haddon, 1912: 151; Jukes, 1847: 164-165), fish traps (Allen & Corris, 1977: 25-26; Jukes, 1847: 181) and stone cairns on ridges used as turtle and dugong look-outs (Macgillivray, 1852, II: 22; Moore, 1979: 87-89, 272-273). There are also references to human diseases (e.g., Allen & Corris, 1977: 42), potentially identifiable through trauma on human skeletal material if found in archaeological contexts, using modern forensic techniques. Haddon also recorded, mapped and photographed traditional sites (e.g., Haddon,

1908: pl. 1, figs 1-4), particularly shrines such as the sacred *Tomog zogo* and *Au Kosker Zogo* sites on Mer (Haddon, 1908: 261-266, pl. 23, figs 3-4; fig. 50; Edwards, 1998: 117-119, pl. 5.6). Haddon also provided photographs and plan layouts of the ceremonial shell-shrine at Dam, near Las, on Mer (Haddon, 1908: 303-305, fig. 69, pl. 19, fig. 3) where the arrangement of stones represented a geography of the relationship of Mer to the other eastern and central islands. Other 19th Century descriptions are also sufficiently detailed to give clear impressions of the archaeological site contexts likely to form stratigraphically, providing models for linking 19th Century systemic contexts with archaeological context formation (Schiffer, 1987). For example, Moseley in Thomson & Murray (1885, I: 536, pl. 22) described a Gudang encampment on Cape York as follows:

Their camp consisted of an irregularly oval space concealed in the bushes, at some distance from one of the paths through the forest. In the centre were low heaps of wood ashes with fire-sticks smouldering on them. All around was a shallow groove or depression, caused partly by the constant lying and sitting of the blacks in it, partly by the gradual accumulation of ashes inside, and the casting of these and other refuse immediately outside it. On the outer edge of this groove or form were stuck up at an angle large leaves of a Fan Palm here and there so as to form a shelter, and under the shelter of these the blacks huddled together at night to sleep.

Most archaeological investigations in Torres Strait have involved excavation of small test pits 1-2m², focusing on stratigraphy and preliminary radiocarbon dating. Often radiocarbon dating has focused on establishing basal dates for initial site use. Selection of sites for recording and/or excavation has been almost exclusively based on high surface site visibility and/or obtrusiveness (McManamon, 1984), knowledge of local informants or observations of archaeological stratigraphy in eroding natural sections. One exception, marking the start of a brief period of archaeological impact assessment in advance of infrastructure developments (e.g., Neal, 1989; Hatte, 1996; Horsfall, 1987a, b, 1988), was a rescue excavation completed in Saibai Village at the request of the community in 1984 (Harris et al., 1985: 34-35; Barham & Smith, 1987). This investigation recorded midden stratigraphy exposed during drainage installation adjacent to the local village store. Excavation revealed dense shell and bone deposits, dating to 410±80 BP at the base, and a large wooden post structure, intruding into, and post-dating, the main midden accumulation.

Detailed analyses of archaeological assemblages are so far only published for sites on Mua and Naghi (Harris et al., 1985; Rowland, 1985), at Woam on Saibai (Barham & Harris, 1985), from sites on Mer and Dauar (Bird et al., 2002; Carter 2001, 2002a; Carter et al., this volume) and from sites at Gumu on Mabuig (Ghaleb, 1990, 1998). Mapping in plan of large-scale archaeological sites and features, *in tandem* with excavations, has only been completed at Gumu on Mabuig (Harris & Ghaleb, 1987: fig. 4; Ghaleb, 1990) and at the *kod* site on Pulu (McNiven et al., 2002b). Archaeological surveys resulting from development assessments also provide mapped data on archaeological features (e.g., Neal, 1989) but such work also induces a spatial bias, by virtue of the specific nature and siting requirements of proposed developments (e.g., telecommunication towers, radar installations and power stations).

These extended introductory remarks serve 3 purposes. First, to indicate that the present state of understanding of Torres Strait prehistory relies on methodologies and approaches that yield considerable bias and distortion, arising from the objectives of the investigators, and also the choice of site types targeted. With few exceptions, present day settlements have not been investigated in terms of underlying stratigraphy, even where they are known to overlap spatially with pre-European sites (e.g., on Mer, Saibai, Mua, and possibly Boigu, Erub and Mabuig). Likewise, the archaeological investigation of historic sites, such as pearling stations and early mission sites is at a preliminary stage (McPhee, this volume). Secondly, although archaeological investigation has been partial, there is considerable scope in Torres Strait for integrating oral evidence for locales and sites of mythical and traditional significance (e.g., Lawrie, 1970; Laade, 1971) with archaeological survey and investigation (Harris et al., 1985; Ghaleb, 1990; David & McNiven, this volume). Thirdly, it is possible to anticipate that through the combined application of ethnohistorical, oral testimonial and historic archival data driven by increased community participation in archaeological survey and site management, that there will be considerable scope, and increased demand for, detailed investigations of site formation processes and assemblage taphonomy on a scale so far not conducted in Torres Strait or adjacent mainland coasts. The preliminary stages of these processes were initiated by the review completed in 1998 (Fitzpatrick et al., 1998) and the results and

emergent management and conservation issues raised by that review are discussed elsewhere (McNiven, Fitzpatrick & Cordell, this volume).

RECOGNITION, AND SEPARATION OF, HISTORIC AND PREHISTORIC ARCHAEOLOGICAL SITES: RESOLVING THE *BEPOTAIM/PASTAIM* TRANSITION. Future archaeological investigations in Torres Strait are likely to require careful separation of post-European (historic) components, from contact period and immediate pre-contact archaeology. As noted above, early contact between Europeans and indigenous Torres Strait Islanders was diachronous and phased (McNiven, 2001; Mullins, 1995). This contrasts with views of present day Torres Strait Islanders for whom the arrival of members of the London Missionary Society at Erub in 1871 marks the point separating the 'time before' (pre-Christian) from the 'time after', and is an important reference point in both indigenous and non-indigenous views of Torres Strait history (Mosby, 2000: 17). For Torres Strait Islanders *bepotaim* (*bipotaim*) refers to the period before the coming of the missionaries in 1871 and *pastaim* to the past before living memory, but after people accepted Christianity (Mullins, 1995: 9). Contemporary indigenous views of cultural heritage, art and identity also strongly reflect a bipartite Torres Strait history of *bepotaim* and *pastaim* (Mosby & Robinson, 2000; Shnukal, 1991), although as noted by Mosby (2000: 27), non-Islander theories of origins of Torres Strait Islanders and Torres Strait Islander views of their own history, expressed as myths and legends, need not be diametrically opposed to one another. This principle is already being utilised in new approaches to management and protection of cultural heritage sites and archaeological research projects (McNiven, David et al., this volume; McNiven, Fitzpatrick & Cordell, this volume; and David & McNiven, this volume).

As noted by Beckett (1998: 34), the Torres Strait Islanders were certainly in contact with outsiders by the early 17th Century. The islands from Crab Island (Cape York) northwards to Mabuig appear on the route charted for the *Duyfken* in March 1606 (Delaney, 1990: 49), and the crew probably sighted, if not visited, Booby Island (Coleman, n.d., 1991). The exact track of the voyage made by Torres from Vanuatu in June 1606, via the south coast of PNG and Torres Strait into the Arafura Sea, remains a matter of some contention (Arousseau, 1973; Hilder, 1980;

Ingleton, 1980). Hilder (1980) provides evidence which would suggest contact with Islanders may have occurred, and Wilson (1988:10-11) re-asserted that the voyage involved violent confrontation in the Central Islands of Torres Strait, and the abduction of women. Torres Strait has been suggested as a route by which 17th Century glass beads of European origin arrived at Kulupuari on the Kikori River of the western Gulf (Rhoads, 1980, II, appendix 12: A76-A80), either via Moluccan traders, or early Dutch voyagers who may have anchored for some time off Murulag in 1756. Swadling (1996: 154-156) suggested the glass beads indicate the extent of the trading activities of the Seram Laut, who may have introduced iron, sweet potatoes, tobacco and knowledge of documents and books (including the Malay word *buku*) to the Wassi Kusa River area of the Trans-Fly coast, between 1650 and 1790 AD. There is no firm evidence for Macassan trepang-collection as far east as Torres Strait (Swadling, 1996: 157) and Macknight (1969, 1976: 36) argued that Torres Strait lay beyond the normal voyaging range of the Macassarese and Bugis. Others have suggested there are indications Indonesian vessels were in the Torres Strait area (Beckett, 1998; Coleman, n.d., 1991; Laba, 1996; Rhoads, 1980; Singe, 1979: 16; Wagner, 1996). Archaeological field methodologies applied in Torres Strait have yet to approach the complex problems of discerning evidence for the intermittent contact likely to have taken place before the major changes to social structure and subsistence which commenced in the 1860s with the advent of *bêche-de-mer* and then pearl-shell fishing. Resolving the *bepotaim-pastaim* transition is a future task that will involve detailed historical archaeological research, and resolving the last millennia of *bepotaim* has yet to commence. The latter task will certainly require refinement of dating approaches (e.g., the use of AMS radiocarbon methods) and also improved stratigraphic theory and interpretive models (Barham, 1995; Barham & Macphail, 1995; Schiffer, 1987).

While it may be true that insufficient archaeological evidence has been found in the region to determine a clear portrayal of life during the prehistoric period in Torres Strait (Wilson, 1988: 2), a substantial amount of reconnaissance and site recording has been completed, and a very wide range of site types identified (McNiven, Fitzpatrick & Cordell, this volume). Only in a very restricted sense, of a proven long antiquity of occupation, can the statement 'little

demonstrated prehistory exists' for the Torres Strait Islands (Mulvaney & Kamminga, 1999: xvii) be justified. Rather, as this review seeks to demonstrate, a prehistory of the Torres Strait is emerging which is comparable chronologically with Melanesian occupation in adjacent coastal areas of southern PNG and many island groups in other parts of the Pacific (e.g., see Anderson & Clark (1999) for first occupation in Fiji; Burley et al. (1999) for Tonga; and Spriggs & Anderson (1993) for East Polynesia). Moreover, it is leading to the formulation of new research questions, which reach well outside the shibboleth of measuring significance of prehistory in terms of depth of antiquity alone. Before addressing these issues, existing and emerging data is reviewed.

ARCHAEOLOGICAL RESEARCH — A SUMMARY OF RESULTS AND ARCHIVED DATA

There is no collated archive documenting the precise areas surveyed for archaeological sites in Torres Strait, a situation aggravated by the fact that in the case of some sites, only an often imprecise geographic location is provided (McNiven, Fitzpatrick & Cordell, this volume). In this review we therefore focus on the main sites investigated within Torres Strait, those described in published or available unpublished reports (Fig. 1).

FIRST SITE SURVEYS AND EXCAVATIONS (1970s). Beckett (1963) published a brief account of rock-art sites in Torres Strait, which included reference to painted figurative designs, rock engravings (on Mer), and painted designs associated with human burials (on Mua). However, archaeological excavation only began in 1971 when David Moore investigated a number of sites located in areas identified ethnographically to have been occupied by the Kaurareg (of Murulag) and the Gudang (of Cape York) (Moore, 1974, 1978, 1979). Several sites were excavated on Murulag (Prince of Wales Island) and the adjacent mainland coast at Evans Bay, near Cape York. These included a site at Port Lihou, on Murulag, which revealed earth ovens and burnt cooking stones, molluscs from both mangrove and intertidal sandflat habitats, bone fragments, sharp-edged chunks of local volcanic tuff and lumps of pumice exhibiting rubbed and flattened facets. Charcoal from the site gave a radiocarbon date of around 600 years BP (Table 1). A site at Evans Bay on mainland Cape York yielded shell, prolific charcoal and quartz flakes and part of an edge-ground diorite axehead.

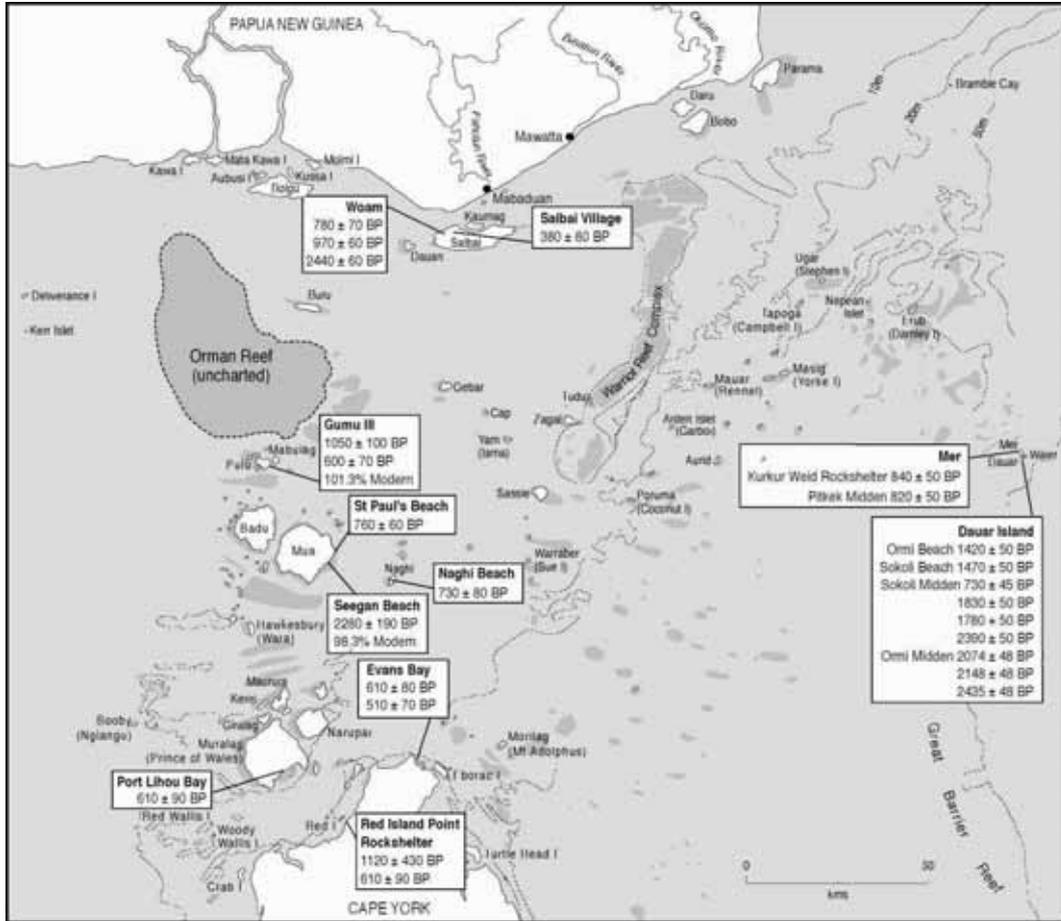


FIG. 1. Locations of archaeological excavations in Torres Strait, with maximum age estimates for occupation on each island indicated, together with age ranges for individual sites where available. Ages are presented as uncalibrated Conventional Radiocarbon Ages. ORE corrections of -450 ± 35 BP have been applied to shell dates (Gillespie & Polach, 1979; Bowman, 1985), with the exception of those from the Ormi Midden, which are unmodified from Carter (2002b). Full data are presented at Table 1A-C.

Charcoal from this site also gave a date of around 600 years BP. A rock shelter at Red Island Point on the Australian mainland produced flaked stone artefacts and very fragmented bone and shell and an older radiocarbon date on charcoal, with a large standard deviation (1120 ± 430 BP) (Table 1) (Moore, 1974: 64, 158; 1979: 13-15).

Moore interpreted the cultural material from the excavations as assemblages broadly comparable to 19th Century ethnographic accounts of subsistence, and in particular, the detailed account of life with the Kaurareg from 1844-1848, obtained from the Barbara Thompson testimony. The radiocarbon dates were used to

suggest little change in coastal environments or subsistence patterns during the preceding 700-800 years. The vertical distribution of stone flakes, blades and amorphous stone within the sites led Moore to hypothesise that occupation had been most intensive during the century before European settlement in Australia and also 600-700 years ago (Moore, 1979: 14-15).

In 1972, Vanderwal undertook a 6 month survey of the principal islands in Torres Strait with the primary aim of outlining the pattern of prehistoric trade relationships at the inter-island and trans-Strait scales. Secondary objectives focused on the origin, antiquity and development

of cultural differences between the Eastern and Western Island groups (Vanderwal, 1973a).

Surface occupational evidence was found on the majority of islands visited by Vanderwal, but only 2 sites were considered worthy of excavation. On Pulu Islet off Mabuig in the Western Island Group, a *kod* ceremonial site with rock-art was test excavated (Haddon, 1904: 3-5, 22, pls 1, 2, 21). Rock art recorded in the vicinity of the *kod* included figurative designs of *muri* dancers, birds such as the cassowary, spoon-bill and curlew, a crayfish, and hand stencils made by spitting charcoal (Haddon, 1904: 4). On rocks beyond the *kod*, painted *muri* figures illustrated use of a Papuan drum, together with depictions of a waterspout. Human skulls (from head-hunting) were formerly held upslope of the ceremonial area in a cave known as Augudalkula, but mission teachers extensively damaged this site, and the skulls were absent when Vanderwal visited in 1972. Traditional ceremonies involved use of designated specific areas such as cooking and also dressing for ceremonies (confined to individual clefts and overhangs within the rocks adjacent to the site) (Haddon, 1904: 3). Deposits excavated by Vanderwal (1973a) contained bone, shell, flaked stone and large quantities of unmodified quartz and perforated shell artefacts. Sterile stratigraphy was encountered at 45cm depth. No attempt was made to date the deposit. Ghaleb (1990) re-affirmed the spatial preservation and ethnohistorical significance of this important site. Further mapping, excavation, assemblage analysis and radiocarbon dating are being completed from Pulu (David & McNiven, this volume; McNiven et al., 2002b).

Vanderwal also excavated several small pits in occupational debris on Dauan and identified a lithic quarry site on the western side of the island (Vanderwal, 1973a: 182) and anthropomorphic figurative rock-art, including a depiction of a Dogai spirit figure (Lawrie, 1970: 145-46; Teske, 1990). On Mer (Murray Island), in the Eastern Island Group, Vanderwal recorded a series of long linear ridges with large amounts of shell and bone food refuse on the surface, though he did not excavate them (Vanderwal, 1973a: 183). A ridge of this type has been excavated on Dauar, and yielded a deep stratigraphy and critical radiocarbon chronology for Torres Strait prehistory (Carter 2001, 2002a; Carter et al., this volume). Vanderwal's survey also identified both pre-contact middens up to a metre deep, the site of a former pearl-shell station site on Gebar, and remains of historic buildings on Mt. Adolphus

Island (Vanderwal, 1973a). However, Vanderwal (1973a) remarkably made no mention of the state of preservation of the numerous shrine sites illustrated by Haddon, either on Mer (Haddon, 1908: pls 1, 3, 4, 19) or on Dauar (Haddon, 1908: pl. V). The current preservation status of these highly obtrusive site types represents a major resource management issue both where these sites were documented by Haddon, and on islands where no baseline exists for their state of preservation.

Most of the surface sites recorded by Moore and Vanderwal contained metal, glass and china, indicating post-European contact ages. Vanderwal's initial research objectives, of establishing prehistoric trade networks through lithic artefact analysis, could therefore not be met from the sites he investigated. However, he did recognise that the sites he had located would be useful in disclosing past local resource availability and subsistence use, particularly in relation to the ethnohistorically observed differential dependence on horticulture between the Western Island and Eastern Island Groups. Both Moore and Vanderwal noted the possible influence of contemporary erosion and sedimentation on the visibility and long-term survival of archaeological sites (Vanderwal, 1973a: 187; Moore, 1979: 15). Nevertheless, Vanderwal continued to see Torres Strait as a horticultural frontier zone², and considered it was important to determine why horticultural practices did not become more important in the islands, and why these practices did not penetrate into mainland Australia (Vanderwal, 1973a: 187).

MAJOR RESEARCH PROJECTS (1980-2000). David Harris, pursuing his long-term interest in the global origins of agricultural systems, first turned his attention to the Torres Strait in the 1970s. He combined ecological, ethnobotanical and historical research to try to determine what factors led to, and maintained, the observed variations in dependence upon horticulture, marine hunting and foraging across Torres Strait (Harris, 1975, 1977, 1979). Specifically, Harris hoped to elucidate the traditional patterns of plant-food procurement among Australian Aborigines, Torres Strait Islanders and coastal Papuans (Harris, 1977: 423). In 1974, Harris noted that archaeological sites on Dauan, Mabuig and in particular the newly-identified inter-swamp canals on Saibai had the potential to address these issues (Harris, 1975, 1976).

TABLE 1A. Radiocarbon dates from archaeological sites in the Torres Strait area — far north Cape York and Western Island Group. * PDB = assumed value

Site location	Site type	Depth dated (cm)	Material dated	Site Code	Conventional ¹⁴ C Age years BP	Delta ¹³ C/ ¹² C ratio ‰ wrt PDB	ORE Corrected ¹⁴ C Age years BP	Lab code	Sources
Evans Bay, Cape York	Midden. Shell, prolific charcoal, quartz flakes, edge ground diorite axe-head (depth of deposit 0-40cm)	30-40	Charcoal	EB/1	610±80	Not known	N/A	ANU - 1366	Moore (1979)
Evans Bay, Cape York	Charcoal rich horizon (60-65cm)	60-65	Charcoal	EB/3	510±70	Not known	N/A	ANU - 1367	Moore (1974)
Red Island Point, Cape York	Rock Shelter. Flaked stone artefacts, fragmented bone and shell (25-60cm)	35-40	Charcoal	Not known	1120±430	Not known	N/A	ANU - 1365	Moore (1979)
Murulag, (Prince of Wales Island) Port Lihou Bay	Midden. Earth ovens burnt cooking stones, shell, bone and charcoal (depth of deposit, 0-40cm)	25-35	Charcoal	PW/2	610±90	Not Known	N/A	ANU - 1364	Moore (1979)
Mua Island, Bera Hill	Eroding surface shell scatter adjacent to rock-art site	surface	Shell – <i>Anadara antiquata</i>	Sample code MOA 10	500±80	0.0±2*	Modern	ANU - 2912	Barham (1981; 2002: fig. 9)
Mua Island, St Pauls Beach, Midden 04	Midden. Thin shell and charcoal horizon overlain by wind blown sand	12	Charcoal	MOA84/ mid 04/SQL/Q DSW/layer 2.0-12	760±60 (770±70)	-25.66	N/A	Beta - 13482	Barham (unpubl. data; 2000: fig. 9)
Mua Island, Long Beach, (Seegan)	Midden, overlain by wind-blown sand (Lower of two charcoal rich sand layers). Associated with <i>Mesodesma striata</i> and fish bone	50-52	Charcoal	LB/A 50-52	Modern (98.3%±0.9% of contemporary 1950 activity)	24.0±2	N/A	ANU - 3025	Rowland (1984a; 1985)
Mua Island, Long Beach, (Seegan)	Charcoal - rich horizon, associated with quartz pebbles interpreted as manuports. Date on Pandanus wood charcoal	50-60	Charcoal	LB/JP2 50-60	2280±190 (2320±190)	-27.5	N/A	Beta - 26902	Barham (Unpubl. field notes; Barham, 2000: fig. 9)
Naghi Island	Midden, within beach sands, shell, charcoal in thin beds, with charcoal sealed by reef derived beach sand. Context interpreted as a hearth - pit feature	65-67	Charcoal	NB/A 65-67	730±80	-24±2	N/A	ANU - 3026	Rowland (1984a; 1985)
Mabuiag Island	At base of light brown stained sterile soil (lower midden soil underlying midden) at upper contact with sterile beach sand. Midden above contains bone, stone and shell material	42cm depth within midden above at 0-18cm	Charcoal fragments	Gumu III – Test Pit 7	1050±100	Not known	N/A	Beta - 21386	Ghaleb (1990: 220 & fig. 21)
Mabuiag Island	Within dark brown midden deposit with abundant bone, shell and stone, from test-pit on platform-ridge of Gumu III mound	35cm depth within midden layer	Single charcoal fragment (1.8g)	Gumu III – north-east quadrant of central pit (Square M)	600±70	Not known	N/A	Beta - 21385	Ghaleb (1990: 221)
Mabuiag Island	Within midden deposit which contains abundant bone, shell and stone, from test-pit on platform ridge of Gumu III mound	From 30-40cm depth	Small dispersed charcoal fragments (2.175g)	Gumu III – southwest quadrant of central pit (Square M)	101.3%±1.6% Modern	Not known	N/A	Beta - 21384	Ghaleb (1990: 221)

TABLE 1B. Radiocarbon dates from archaeological sites in the Torres Strait area — Top Western Island Group.
¹ Apparent radiocarbon age prior to normalisation to – 25‰ wrt PDB using measured Delta ¹³C/¹²C ratio.

Site location	Site type	Depth dated (cm)	Material dated	Site Code	Conventional ¹⁴ C Age years BP	Delta ¹³ C/ ¹² C ratio ‰ wrt PDB	ORE Corrected ¹⁴ C Age years BP	Lab code	Sources
Saibai Island, Woam	Midden. Underlying relict mound-and-ditch system. Undisturbed basal context of bone, shell, charcoal, and flaked quartz debitage	55-60	Charcoal	SAB/MID81/01/55-60 [Bag A]	780±70	Not determined	N/A	Beta - 3614	Barham & Harris (1985)
Saibai Island, Woam	Midden. Underlying relict mound-and-ditch system. Undisturbed basal unit of bone, shell, charcoal, and flaked quartz debitage	55-60 (same context as Beta-3614)	Shell – <i>Anadara antiquata</i>	SAB/MID81/01/A 55	2890±60 (2540±60)	-4.11	2440±60	Beta - 6885	Barham & Harris (1985)
Saibai Island, Woam	Midden. Underlying relict mound-and-ditch system. Undisturbed basal unit of bone, shell, charcoal, and flaked quartz debitage	55-60	Shell – <i>Anadara antiquata</i>	SAB/MID81/01/B 55	1420±60 (1080±60)	-4.30	970±60	Beta - 6934	Barham & Harris (1985)
Saibai Island, 1984 Midden excavation, Saibai Village Store	Midden. Dense shell, bone with diorite flaked stone and quartz flakes	50-55	Charcoal	SAB/MID/84/01/50-55	380±80 (410±80)	-27.09	N/A	Beta - 13481	Barham (1999; 2000: fig. 9)

Using 19th Century records for the Western Islands, Harris (1979) suggested that evidence of horticultural specialisation would be clearest, and probably earliest, on the three small islands of Naghi, Mabuiag and Dauan. His initial research identified the need for both diachronous and synchronic testing of the ethnohistorical data using archaeological approaches. This developed into a broad archaeological and palaeoenvironmental investigation of prehistoric subsistence and settlement in the Western and Top Western (Northern) Island Groups. The objectives of what became the Torres Strait Research Project, based at University College London (UCL) and in collaboration with A.J. Barham, S. Budworth, B. Ghaleb, L. Head, S. Colley and A.C. Stevenson, were to establish a regional chronology of Holocene sea level and coastal dynamics and then to reconstruct palaeoenvironmental settings at local scales (Barham, 1983; Barham & Harris, 1987; Harris et al., 1985) appropriate to modelling both horticultural and coastal resource aspects of the archaeological record. It was anticipated

that palaeoenvironmental reconstructions for late Holocene coasts known to have been inhabited, would both calibrate the palaeo-resource environments available for past occupants of the islands and test the hypotheses advanced by Moore and Vanderwal that coastal geomorphic responses might be responsible for the short archaeological time-depths (of <1,000 years BP) then identified. At the very local scale of archaeological sites identified on Mua and Saibai, where swamps existed close to radiocarbon dated archaeological sites, a combination of palynological, lithostratigraphic and modern ecological mapping approaches were used to model mid- to late-Holocene coastal change (Barham, 1983; Barham & Harris, 1987; Barham et al., 1987; Harris et al., 1985; Budworth, 1986; Budworth & Barham, 1987; Head & Barham, 1987). These reconstructions provided spatial and temporal contexts for the analysis of archaeological and ethnographic data (Barham, 1981, 1999; Barham & Harris, 1983, 1985, 1987; Harris et al., 1985).

TABLE 1C. Radiocarbon dates from archaeological sites in the Torres Strait area — Eastern Islands Group.

Site location	Site type	Depth dated (cm)	Material dated	Site Code	Conventional ¹⁴ C Age years BP	Delta ¹³ C/ ¹² C ratio ‰ wrt PDB	ORE Corrected ¹⁴ C Age years BP (-450±35 on marine shell samples)	Lab code	Sources
Dauar Island – Ormi Beach section	Shell (midden) within eroding colluvial section at beach margin	Not established	Shell – <i>Lambis lambis</i>	Southern Beach section	1870±50	1.4±0.2	1420±50 BP	Wk-6096	Carter (2001); Carter et al. (this volume)
Dauar Island – Sokoli Beach section	Shell (midden) within eroding colluvial section at beach margin	Not established	Shell – <i>Strombus luhuanus</i>	Northern beach section	1920±50	2.0±0.2	1470±50 BP	Wk-6098	Carter (2001); Carter et al. (this volume)
Dauar Island – Ormi Sq 1	Shell midden Upper archaeological deposit	c.15	Shell – <i>Lambis lambis</i>	Stratigraphic Unit 1	2074±48	1.4±0.2	See Δ R correction and calibration in Carter, 2002	Wk-10161	Carter (2002a: table 1), 2002b
Dauar Island – Ormi Sq 1	Shell midden Unit with pottery sherds	c.40	Shell – <i>Lambis lambis</i>	Stratigraphic Unit 4	2370±50	1.4±0.2	See Δ R correction and calibration in Carter, 2002	Wk-8885	Carter (2002a: table 1), 2002b
Dauar Island – Ormi Sq 1	Shell midden Middle archaeological deposit	c.99	Shell – <i>Lambis lambis</i>	Stratigraphic Unit 6	2148±48	1.4±0.2	See Δ R correction and calibration in Carter, 2002	Wk-10162	Carter (2002a: table 1), 2002b
Dauar Island – Ormi Sq 1	Shell midden Unit with pottery sherd	c.110	Charcoal	Stratigraphic Unit 8	2050±80	-25.7±0.2	N/A	Wk-8917	Carter (2002a: table 1)
Dauar Island – Ormi Sq 1	Shell midden Lower archaeological deposit	c.178	Shell – <i>Lambis lambis</i>	Stratigraphic Unit 12	2435±48	1.5±0.2	See Δ R correction and calibration in Carter, 2002	Wk-10163	Carter (2002a: table 1), 2002b
Dauar Island – Ormi Sq 1	Shell midden Basal unit	c.210	Shell – <i>Conus</i> sp.	Stratigraphic Unit 13	2840±60	2.3±0.2	See Δ R correction and calibration in Carter, 2002	Wk-8918	Carter (2002a: table 1), 2002b
Dauar Island – Sokoli midden excavation	Shell midden	c.33 (Depth of pottery sherd in excavation)	Shell – <i>Strombus luhuanus</i>	Sokoli Sq SE (1,21)	1180±45	2.8±0.2	730±45	Wk-7444	Carter (2002a: table 1); Carter et al. (this volume)
Dauar Island – Sokoli midden excavation	Shell midden	c.70 (Depth of carved bone artefact in excavation)	Shell – <i>Strombus luhuanus</i>	Sokoli Sq SE (1,21)	2280±50	2.6±0.2	1830±50	Wk-7480	Carter (2002: table 1); Carter et al. (this volume)
Dauar Island – Sokoli midden excavation	Shell midden	c.125	Shell – <i>Strombus luhuanus</i>	Sokoli Sq SE	1951±43	2.5±0.2	See Δ R correction and calibration in Carter, 2002	Wk-10164	Carter (2002a: table 1), 2002b
Dauar Island – Sokoli midden excavation	Shell midden	c.170	Shell – <i>Strombus luhuanus</i>	Sokoli Sq SE (1,21)	2044±51	2.4±0.2	See Δ R correction and calibration in Carter, 2002	Wk-10165	Carter (2002a: table 1, 2002b)
Dauar Island – Sokoli midden excavation	Shell midden	c.195 (dense shell unit)	Shell – <i>Strombus luhuanus</i>	Sokoli Sq SE (1,21)	2230±50	2.8±0.2	1780±50	Wk-7481	Carter (2002: table 1); Carter et al. (this volume)
Dauar Island – Sokoli midden excavation	Shell midden	c.235 (basal shell sample)	Shell – <i>Strombus luhuanus</i>	Sokoli Sq SE (1,21)	2840±50	2.3±0.2	2390±50	Wk-7445	Carter (2002: table 1); Carter et al. (this volume)
Mer Island – Rockshelter Kurkur Weid excavation	Basal shell sample from rockshelter excavation	135	Shell – <i>Strombus luhuanus</i>	Square Sq SE (1,2.7)	1290±50	2.8±0.2	840±50	Wk-6749	Carter (2001); Carter et al. (this volume)
Mer Island – Pitkek midden in colluvial stratigraphy	Basal shell sample from midden stratigraphy at base of slope	80-85	Shell – <i>Lambis lambis</i>	No reference	1270±50	3.1±0.2	820±50	Wk-6750	Carter (2001); Carter et al. (this volume)

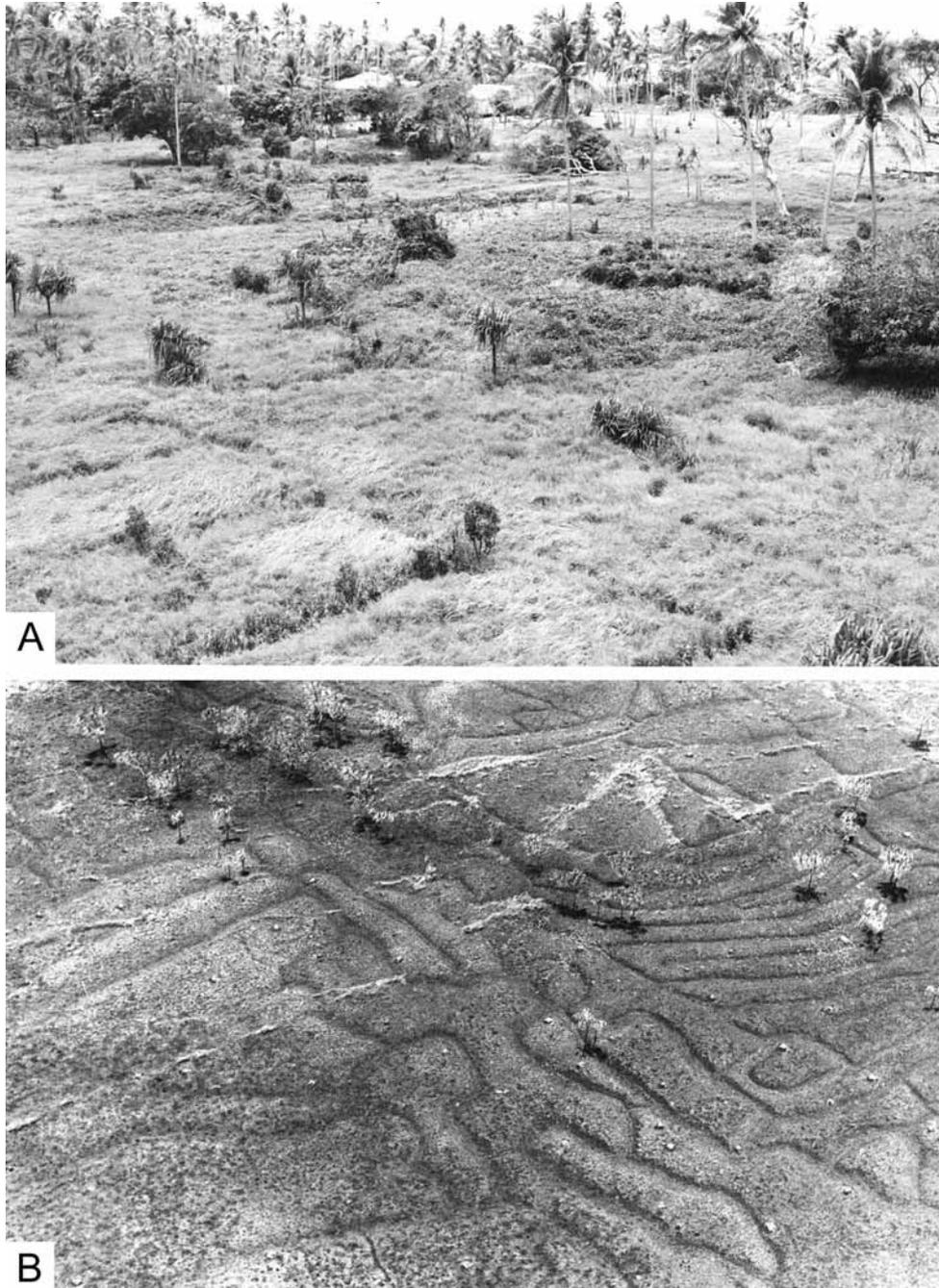


FIG. 2. A, Mound-and-ditch garden located in a swamp area, immediately landwards of beach ridge at St Paul's Village, Mua Island, showing a few mounds still in use (1983), set within a regular grid system layout. B, Low level aerial oblique photograph of an abandoned irregular nested curvilinear mound-and-ditch system near to Mag on Saibai (photo taken in 1980 after grass burning).

In 1980-1981, surface shell scatters, rock shelter burials, rock-art sites and fish traps were recorded on Badu, Mua, Murulag, Naghi, Gebar and Saibai. Shell middens were test excavated on Mua and Saibai, and garden and mound-and-ditch systems were excavated at Waidoro on the PNG mainland (Barham, 1981; Barham & Harris 1983, 1985; Harris & Laba, 1982). In 1981-1982, Barham & Harris located further rock-art sites, fish traps and adjacent middens on the north coast of Mua, and a number of thin well-stratified midden deposits in eroding beach/dune systems on the east coast of Mua at Seegan Beach and on Naghi.

In 1984, the UCL team conducted surveys on Murulag and Mabuiag (and adjacent islets of Pulu, Widul and Redfruit), further surveys and excavations on Saibai (midden) and Murulag (coastal rockshelter), and further excavations of 2 middens on the east coast of Mua (Harris et al., 1985). In 1985, the team concentrated the final phase of their field research on Mabuiag (and the adjacent islets of Sarabar, Aipus and Pururai) and on Saibai with detailed survey and excavations taking place at the old village site of Gumu on Mabuiag (Barham & Harris, 1987; Ghaleb, 1990, 1998). Artefacts recorded during the initial surface surveys at Gumu included fragmented and perforated shell artefacts, bifacially altered cobble flakes, vein quartz cores, and basalt and rhyolite flakes. A fragment of obsidian was also recorded (Harris & Ghaleb 1987: table 2). These reconnaissance surveys led to a final intensive phase of archaeological work on Mabuiag, conducted by Barbara Ghaleb, which tackled methodological issues of relating archaeological remains to 1) the historical information provided by the Haddon expedition; and 2) oral testimony obtained from present day Mabuiag Islanders. This work aimed to integrate the results of earlier surveys on Mabuiag with the historical and ethnographic information available for that island, as an interpretive reconstruction of pre-European settlement and resource use on the island (Barham & Harris, 1987: 101). The work by Ghaleb is further discussed below.

Barham & Harris identified relict agricultural field systems, some of which had only recently ceased being used in 1985, of rectilinear mound-and-ditch type on Mua (behind St Paul's village – see Barham & Harris, 1987: pl. 7a), at a variety of sites on Mabuiag and on Badu close to the present village. On these islands the mound-and-ditch systems were all located close to post-Mission settlements, and are of regular grid layout (Fig.

2A). Smaller scale gardening areas, along with linear stone arrangements and small stone cairns, were identified on Naghi, Gebar and Mabuiag. Much greater areas of former mound-and-ditch cultivation, taking the form of extensive field systems, were located on Saibai, both adjacent to, and at considerable distances from, the modern village (Fig. 2B). On Saibai, mound-and-ditch agriculture appeared to have been practiced in tandem with water management techniques, including the construction of large earth-rimmed wells (Fig. 3A), inter-swamp canals used as dug-out canoe routes (Harris & Laba, 1982; Barham & Harris, 1985; Barham, 1999: 73) and linear raised earth causeways across swamps (Fig. 3B).

On Saibai, several trial excavations through abandoned mounds yielded no buried soil horizons or other reliably stratified materials suitable for radiometric dating (Barham & Harris, 1985: 257). However, the perimeter of a large mound-and-ditch area at Woam on Saibai had been constructed over, and disturbed, a well-stratified shell and bone midden. This provided an opportunity to obtain a maximum age for the overlying mound-and-ditch system (Barham, 1981: 18). A metre square pit revealed 3 stratigraphic units (Barham & Harris, 1985: 261-264). The undisturbed basal unit of the Woam midden yielded 14 marine molluscan taxa dominated by the gastropod *kapap* (*Terebralia sulcata*) and the upper-tidal mangrove bivalve *akul* (*Geloina coaxans* syn: *Polymesoda coaxans*) as well as bones of dugong (*Dugong dugon*), numerous fragments of turtle carapace, fish bone and crab remains, fired clay pebbles, quartz flakes and charcoal. Charcoal from the basal unit produced a date of around 800 years BP, and 2 valves of *Anadara antiquata* dated to around 1,000 BP and 2,500 BP (Table 1). All 3 dates were from within the same stratigraphic unit, and the 2 shell samples were randomly selected from a batch (all of which were examined in thin-section and checked by X-ray diffraction for recrystallisation). The inconsistency in the older shell date (with an otherwise acceptable relationship between shell and charcoal ages dates once a correction for ocean reservoir effect (ORE) was applied) is discussed in detail elsewhere (Barham & Harris, 1985: 264, appendix 1). Irrespective of whether ORE corrections were applied to the shell samples (e.g., Bowman, 1985; Ulm, 2002) the earlier date of 2540±60 BP (or 2890±60 BP when adjusted for delta ¹³C, but with no correction for ORE) remains the oldest radiocarbon age obtained from an excavated archaeological context in Torres Strait. This estimate of the maximum known age of regional



A

FIG. 3. A, Large coconut-fringed well, at Mag on Saibai photographed with late dry season water level in 1981 (see also Barham & Harris, 1985; Barham, 1999). B, Linear earth causeway constructed across the swamp, linking higher grassland areas adjacent to the site at Woam (Barham & Harris, 1985), with lithified higher beachrock ridges west of the area where Saibai Village is situated. (Photo 1981).



B

occupation in the Torres Strait Islands has been confirmed by basal radiocarbon ages (also of c.2,800 BP with no correction for $\delta^{13}C$) from the Sokoli and Ormi sites on Dauar (Carter 2001, 2002a; Carter et al., this volume).

Similar mound-and-ditch systems to those on Saibai were also located and mapped south of the village of Waidoro in the Western Province of PNG some 20km NE of Saibai (Barham & Harris, 1985: 267-271). At Waidoro, some of these relict field areas had been overgrown by secondary woodland. Similar relict field systems have been reported from locations in the adjacent swampy lowlands of New Guinea (Harris & Laba, 1982; Hitchcock, 1996; Swadling, 1983). Haddon (1894: 68) also made reference to the settled agricultural tribes of Kiwai Island, east of Saibai, who 'drain their gardens by ditches 4 yards apart'. None of these areas have been investigated archaeologically and it is not known when they, or the mounds at Waidoro, were first constructed (Harris, 1995: 850).

Rowland (1984a, 1985) carried out test excavations on Mua and Naghi Islands in 1981. At Seegan Beach on the east coast of Mua, Rowland attempted to test Moore's hypothesis that earlier archaeological sites might be found inland of present beaches, within embayments where coastal progradation had occurred since the mid-Holocene. Occupational material was located only on the frontal ridges during the transect of excavations. However, a geological test pit subsequently located charcoal (identified as *Pandanus* sp.) at a depth of 50-60cm associated with quartz pebble manuports, but with no other archaeological material (Barham, unpubl. data). As the charcoal and large quartz pebbles were stratified within aeolian sands, which overlay beach sands, the charcoal date of 2280 ± 190 BP (Table 1) probably reflects human occupation. The ridge immediately inland of the present beach contained an upper occupation deposit of low shell density, composed predominantly of valves of the shellfish *Anadara antiquata*. A lower layer contained mostly valves of *Mesodesma striata*, bone and charcoal in a highly organic sandy matrix. The majority of bone was fish and turtle that could not be identified to species or to family level. However, the presence of tusk-fish (*Choerodon* sp.), parrot fish (*Scarus* sp.), trevally (*Caranx* sp.), and the mangrove monitor (*Varanus indicus*) were noted (Rowland, 1984a, 1985). Charcoal from a test pit produced a radiocarbon date of Modern (Table 1). Thus, within this beach system, only partial support could be found for Moore's hypothesis

regarding the effects of coastal progradation on archaeological site preservation. Other midden sites in beach stratigraphy north of Seegan, and from an eroding scatter on Bera Hill (Barham, 1981, 2000 and unpubl. data) produced dates of 770 ± 70 BP on charcoal, and 500 ± 80 BP on shell, respectively (Table 1).

On Naghi, a test pit adjacent to the main truncated beach face revealed 2 occupation lenses, the lower of which had been cut through by a fire pit (Rowland, 1984a, 1985). Charcoal from this fire pit produced a date of c.700 years BP (Table 1). The excavated sites on Mua and Naghi did not contain typologically distinctive stone artefacts, though quartz microflakes were found in the deposits at Naghi Beach, and in middens adjacent to St Paul's community on Mua.

During 1984-1988, Ghaleb (1990, 1998) investigated selected sites on Mabuiag. Survey on Mabuiag in 1984 revealed midden deposits, fish traps, relict field systems, stone-edged trackways and circles, shell arrangements and pictographs (Harris et al., 1985: 44-50; Harris & Ghaleb 1987: 5-35; Ghaleb, 1990) and also sites on the offshore islands of Redfruit, Widul, and Pulu.

The initial surveys of Mabuiag by the UCL team revealed discontinuous midden scatters of bone, shell and stone and also discrete circular or ovoid mounds, 1.0-1.5m in diameter, some bordered by large stones. Fish traps of semi-circular or rectangular shape, and stone-edged trackways, rectangles and circles associated with areas of 'old villages' were also recorded. Other sites included linear and circular stone arrangements, sometimes with associated shell and animal effigies, ditches separating rectangular areas that were formerly cultivated, and surface arrangements of large shells. Rock art designs were painted on large granitic boulders and consisted of human, animal and geometric motifs. Other sites investigated included the area on Pulu Islet said by Haddon to have been the 'national' ceremonial ground or *kod* for the clans of Mabuiag and Badu (Ghaleb, 1990: 160) — this is the area investigated by Vanderwal (1973a) and systematically mapped and excavated by McNiven et al. (2002b).

Ghaleb (1990) investigated Gumu, the most important of the old villages covering an area of 2 hectares at the southern end of the most extensive lowland on Mabuiag. The survey, excavations and subsequent analyses of midden assemblages represent the most intensive archaeological

investigations within a targeted area so far completed in Torres Strait. The 1:1000 map produced for the Gumu area (Harris & Ghaleb, 1987: fig. 4), along with the recent work at the *kod* site complex on Pulu (McNiven et al., 2002b), remain the only large-scale, systematic archaeological survey maps of 'traditional' sites for Torres Strait. At Gumu, shell mounds and scatters were the most common site type, many with bone (dugong), angular chunks of stone and shell. Surface features also included the discrete circular or ovoid mounds noted above, larger linear rectangular midden accumulations and discontinuous surface shell scatters. In all, 95 mounds and 7 linear and rectangular features were mapped during ground survey. Other site types identified included relict agricultural mounds, stone-bounded pathways, wells and circular stone arrangements (Ghaleb, 1990: 185). Fifty-nine shellfish species were identified, but only 7 were found on 50% of the mounds. Fish bone was infrequent being found on only 12% of the mounds. One fragment of a ground stone axe and a few small shell axe/adzes were found along with much modified shell (Ghaleb, 1990: 187-195).

A series of test pits was excavated at Gumu and radiocarbon dates obtained. An uncalibrated radiocarbon age of 1050 ± 100 BP obtained at a depth of 42cm, may predate the midden deposit marginally. From one of the 5 pits excavated along the platform ridge transect at Gumu III, a date of 600 ± 70 BP was obtained at a depth of 35cm. From the same square at a depth of 30-40cm below the surface, a collection of charcoal fragments produced a date of Modern (Ghaleb, 1990: 220-221) (Table 1).

Ghaleb (1990: 224) concluded that the surface survey of Gumu indicated that dugong and diverse shellfish species were the dominant midden assemblage components, together with some fish and marine turtle. Angular pieces of local bedrock (mixed sedimentary pyroclastics) were ubiquitous across the midden features, and fragments of vein quartz were found on 49% of the mounds investigated (Ghaleb, 1990: 207). Artefacts were made of various types of shell (usually ground or perforated), including three shell adzes, and fragments of stone (primarily from small cobbles of vein quartz and larger cobbles of rhyolite and granite). Most lithic assemblage material was local in origin, and probably represented opportunistic use of locally available rocks. Three flakes of basalt and one fragment of obsidian were not thought to be of local origin, but to have derived from exchange

between Islander communities. No attempt was made to source the obsidian. Historic components included a clay pipe stem manufactured in Glasgow and dating to between c.1863-1910 and fragments of glass and metal (Ghaleb, 1990:196).

Ghaleb also demonstrated direct links between archaeological site evidence surviving in the mid-1980s, and sites described and photographed within the Haddon ethnography. She re-located the *kod* site on Pulu including the exact locations shown by Haddon for the 5 clan fireplaces (Haddon, 1904: 4, pl. 1, fig. 1; Ghaleb, 1990: pl. 5), and also the *adil* standing stone elements from the *Wiwai* turtle shrine at Gumu (the *Wiwai* stone having been formerly removed to outside the steps of the Anglican Church on Mabuia) (Ghaleb, 1990: 174-179, pls 9,11). Her work therefore demonstrated the level of detailed matching that is possible for some important traditional ritual locales, sites and site components recorded ethnographically, and modern surviving archaeological features in Torres Strait. Similar approaches, using early site photographs from the Haddon reports, would have considerable potential on Mer, Dauar, Yam and Erub.

In 1985, Coleman (n.d.) visited Booby Island and conducted a preliminary archaeological survey. He reported rock-art depicting canoes, outriggers, human figures, and marine species such as fish and crayfish, European graffiti, and occupation deposits in four cave sites: Post Office, Pouri-Pouri, Mystery Man, and Fern Caves (for a map showing cave locations, see Nicholson, 1996). The oldest graffiti from European sailing vessels that could be discerned was in Post Office Cave and dated to 1849 (Delaney, 1990), although Cook landed there in 1770. In at least one cave the entire floor had been turned over by treasure hunters. Coleman interpreted a painting of a boat in Fern Cave as an Indonesian *prau*. In 1990, a further Queensland Museum expedition to the island was made, and Richard Robins undertook test excavations in Adze and Fern Caves. At both sites the deposits proved sterile. However, three stone adzes were recovered from the surface of Adze Cave. In a crevice in a cave near the waterline, called Pot Hole Cave, small fragments of at least two, hand-thrown, poorly fired vessels made from coarse earthenware were located. One features a flat base, the other a rough decorative motif on the rim in the form of widely spaced short oblique lines, probably executed with the fingernail (Coleman, 1991: 3; Cox & Watchman, 2000; Richard Robins, Queensland Museum, pers.

comm. 1999). Cox & Watchman (2000) analysed a sherd from the carinated bowl rim, noting that the description of the pot as a crude vessel was incorrect (this appearance was due to interior and exterior spalling during unsuccessful firing) and that the bowl was formed from a very coarse paste, possibly utilising unmodified natural iron-rich sedimentary clays³.

Local historian John Singe recorded a number of sites on islands in the Waiben (Thursday Island) group including fish traps on Palilag (Goode Island); burial sites and rock-art on Keriri (Hammond Island) and Murulag (Prince of Wales Island) in his capacity as an Honorary Warden with the then Archaeology Branch of the Queensland Government (1980-1983). He has suggested (pers. comm. 1983) that at many of the sites in this group the pictographs are comparable with designs at sites on other islands, for example Lady Hill (Mua) and on Mabuia, Naghi and Dauan (Barham, 1981; Beckett, 1963; Ghaleb, 1990; Lawrie, 1970) and can also be tentatively linked to myths and totems previously described from oral testimonies (Haddon, 1890; Lawrie, 1970) (for a detailed overview of Torres Strait rock-art, see McNiven & David, this volume).

In response to a number of proposed developments in the region several archaeological consultancy evaluations and surveys have been completed. In 1987-88, Horsfall (1987a, 1987b, 1988) undertook archaeological surveys of areas of Thursday and Horn Islands. Four sites were located on Horn Island (Horsfall, 1987a: 6, 1987b: 3). Cribb (1994) and Hatte (1996) surveyed areas of Thursday Island and Warraber and Hammond Islands, respectively. These surveys failed to locate prehistoric sites. Neal (1989), however, recorded a wide range of sites on Mabuia and Yam Islands in 1988. Five sites were recorded on Mabuia, representing a number of stone arrangements including stone cairns, and circular, curvilinear and linear stone arrangements. Semicircular stone arrangements were also encountered. The stone arrangements depicting three-dimensional crocodile and turtle forms, described by Neal (1989) are the same type of site, and in one case may be the same site, as the turtle stone arrangements recorded by Harris & Ghaleb in 1985 (Harris & Ghaleb, 1987: pl. 5). Neal (1989: 4) speculated that some non-figurative stone arrangements might be evidence of water management and/or erosion control associated with horticultural systems, although their location on a ridgeline, might equally suggest they are marine hunting lookouts or

boundary markers, as recorded by Moore (1979: 153, 272-273) on Murulag. On Yam Island, four sites were located. Again, as on Mabuia, complexes of interlinked linear, curvilinear, circular, semicircular stone arrangements, and stone cairns were located, associated with former garden areas on hillslopes. Confirmation of the boundary-marking role of some of these structures has come from Fuary (1991: 211), who reported that on Yam Island fallow gardens on slopes are demarcated by stones. The survey completed by Neal on Yam suggests that this island should be added to the list of 'high islands' on which both figurative totemic stone arrangements, and functional stone boundary lines and cairns are known, associated spatially with areas of former horticulture.

It is now important to recognise that a distinctive aspect of many sites recorded within Torres Strait is the evidence for combined ritual, functional and subsistence components located within individual sites and/or site complexes. Ghaleb (1990), for example, recorded archaeological contexts within which individual stone boulders and in one case, coral, are located within former activity areas. These manuports correspond with similar stones collected by Haddon (e.g., see Moore, 1984: pls 66-68 for *wiwar* and *tik* stones), normally comprising highly water-rounded granite cobbles and boulders, which are described ethnographically as having been used in garden magic, yam increase and garden protection (from thieves). A significant feature (in relation to previous discussions of horticulture in the Strait) is that almost all of the manuports of this type collected by Haddon were obtained on Mer in the Eastern Islands in 1898 (Moore, 1984: 90-91). Observations by Haddon & Ghaleb suggest similar use of stones across the linguistic 'boundary' in the Western Islands. This points to a degree of commonality of ritual and totemic belief, also intimately related to subsistence activity, which might suggest more similarities than differences between Eastern and Western Island groups than has hitherto been suggested for the prehistoric period.

Vanderwal (1973a) recorded stone lines on Mabuia, but not the animal effigy forms, and recorded none of the sites identified by Neal (1989) on Yam, only noting occupation deposits on foreshores and stating 'the only item of archaeological interest was the series of grooved rocks' identified by Haddon (1935: 76, pl. 1) as axe grinding sites (Lawrence, 1994: fig. 50). Given that these site types on Yam and Mabuia

are relatively obtrusive, these additions to archival data illustrate both the partial nature of recording previously undertaken in the Strait, and also the inherent methodological bias in some earlier work.

Torres Strait Islanders and non-indigenous residents of the area have also contributed to the known archaeology of Torres Strait. The Environmental Protection Agency holds a number of site records made by Singe, as noted above, for Waiben (Thursday Island), Palilag (Goode Island), Keriri (Hammond Island) and Murulag (Prince of Wales Island). Peter Smith and Jason Sailor (then Department of Community Services, Bamaga) and George Passi (then Department of Community Services, Thursday Island) recorded additional sites. More recently, in 1994, the Darnley Island (Erub) Community Council undertook a project to determine the location and condition of sites of significance to the Erub people (Camp, Scott, Furphy Pty Ltd, 1994).

The new phase of archaeological work on Mer and Dauar (Bird et al., 2002; Carter, 2001, 2002a; Carter et al., this volume) has been initiated at the request and with the support of the Mer Community Council. This project has already resulted in 3 excavations in 1998-2000, 1 in a small cave on Mer and 2 on stratified middens on Mer and Dauar. Radiocarbon dates from these sites (Carter, 2001, 2002a: table 1) are the first radiocarbon dates for archaeological sites in the Eastern Islands and confirm estimates of c.2,500 BP for occupation in Torres Strait, previously obtained from the Western Islands. In 2000, a detailed excavation was undertaken by Melissa Carter at Ormi, on Dauar, which replicated the age-depth for occupation at the Sokoli site and retrieved further pottery sherds from stratified midden contexts. Carter (2001, 2002a: 7-8, 2002b; Carter et al., this volume) discussed these important results.

Fitzpatrick et al. (1998) utilised published and unpublished reports from previous research in Torres Strait in compiling the first overview of cultural heritage sites in Torres Strait in the Culture Site Documentation Project (CSDP). That literature survey, its results and management implications are discussed in McNiven et al. (this volume). The initiative also foreshadowed a new approach to cultural heritage research and management in Torres Strait — one that focuses on a broader concept of cultural sites and on the

major role of Torres Strait Islanders in controlling and managing that heritage.

That important review has led to a second major programme of research led by Ian McNiven and Bruno David (Monash University) focusing on contact archaeology and sites with greater time-depth, along a N-S transect from Dauan (Top Western Group) southwards to Murulag (Western Group). McNiven also initiated archaeological research in the Central Islands, with an initial focus on the contact archaeology of the sandy cay of Tudu (McNiven & Feldman, 2003). These new investigations are operating in tandem with new indigenous community interest in *bepotaim* sites in Torres Strait (David & McNiven, this volume).

SITE TYPES, FEATURES AND PLACES (LOCALES) IN PAST TORRES STRAIT CULTURAL LANDSCAPES

Archaeological work completed since 1971 is now sufficient for some generalisations to be made regarding the archaeology of Torres Strait. However, given the methodological diversity and theoretical perspectives that have so far driven the major investigations undertaken, the database is certainly partial, and some systematic bias is present in the observations made. Constraints and bias within these data will now be reviewed.

The archaeological work so far completed has revealed a large range of site types. These are summarised in detail by McNiven et al. (this volume: appendix, table 1) where 621 known and potential archaeological sites are identified, divisible into 21 site type categories. Here we focus on the nature of the site types, the relationship between known site types and ethnohistorical sources, and the information archaeological sites offer regarding past human occupation of the islands.

Some sites, such as stratified middens, surface shell scatters, stone fish traps, excavated wells, relict horticultural areas and mound-and-ditch agricultural field systems, and some small stone cairns and stone arrangements relate to subsistence activities and methods of land division or demarcation related to subsistence activities and social organisation. These sites are generally poorly recorded either ethnographically and ethnohistorically as specific individual sites, or in terms of records relating to their function and the activities they represent. For example, there are virtually no historical accounts providing detail regarding shellfish collection and discard

activities, despite the ubiquitous nature of the archaeological evidence for this activity. Likewise, the very considerable areas of former mound-and-ditch cultivation on Saibai went unrecorded by Haddon (1901) although his informants told him the Saibai-laig were agriculturalists (Haddon, 1912, 148). There are no historical observations regarding the mode of construction of mound-and-ditch fields on Saibai, or the systems of operation or cultivars grown, despite several accounts for the island (D'Albertis, 1880; Chalmers & Gill, 1885: 11-12; Gill, 1876; Moresby, 1876: 133; Strachan, 1888). Other archaeological sites, such as cave, rockshelter and open mounded burials, shell arrangements, figurative three-dimensional stone arrangements, painted rock-art, rock engravings (on Mer), and some site attributes and components of shell and bone mounds, and probably some small shell scatters, relate to cultural/ritual activities. These sites are only slightly recorded better in ethnohistoric accounts, but folk tales, myths and story places (Danaher, 1993; Laade, 1971; Lawrie, 1970; Teske, 1987c, 1988, 1990) are often referable to sites either specifically, or at a generic level (e.g., on Dauan, Saibai, Mabuiaig, Erub and Mer).

Distinctions between subsistence and ritual sites blur rapidly in Torres Strait given the known significance of 'increase' ritual, social prestige and totemism in both the exploitation of turtle and dugong, and various aspects of garden protection, yam increase, love magic and the seasonal timings of plant cultivation and marine hunting (McNiven & Feldman, 2003; Moore, 1984). On the evidence available, simple definitions of sites as 'middens' or 'camp-sites' become somewhat cumbersome and unsatisfactory when the combined results of ethnohistorical research and archaeological fieldwork are meshed. Conversely, while there are frequent ethnohistoric references to specific activity areas such as the *kod* meeting sites and in some cases to the plan layout of these former sites (e.g., at Tudu – Haddon, 1904: 208-209, pl. 13, fig. 2 for reconstruction), and similarly illustrations and photographs of houses and huts (Haddon, 1912: 93-119, figs 136-147, pls 19, 20), no archaeological excavations have revealed buried site layouts, post-hole or floor plan features. Given that Torres Strait is the only part of Australia where horticulture-based sedentism operated, the absence of attention to possible stratified evidence of village site and house site layouts, particularly as described ethnographically for pile

dwelling on Saibai (Haddon, 1912: pl. 20, figs 1, 2) and village sites with 'bee-hive' round houses on Mer in the Eastern Islands (Haddon, 1912: 101-102, pl. 20, fig. 3; Jukes, 1847: I, 197, 245), is a remarkable feature of the present archaeological archive for Torres Strait. Further sites reflect particular aspects of lithic technology, such as axe-grinding grooves in stone slabs on Yam (Haddon, 1935: 76, pls 1, 2; Lawrence, 1994: 338) and Saibai (Barham, unpubl. data), and the quarry sites initially visited by Lampert on Dauan in 1966, and then reported by Vanderwal (1973a).

Finally, a large number of natural landforms, landscape features and traditional locales on all islands are deeply meshed in Torres Strait indigenous culture as myths, and narratives relating to cultural origins and the cosmology of *bepotaim* (Lawrie, 1970; Laade, 1971; Wirz, 1932) and therefore represent very important elements of the cultural heritage landscape. Historical sources describing such locales have been used to delimit a considerable number of 'potential archaeological sites' in the CSDP survey (Fitzpatrick et al., 1998; McNiven et al., this volume). Classic examples include the boulder sites such as *Daparau Kula* (the stone that fell from the sky), and *Kangan Gul* (Kang's canoe) that has rock-art — on Dauan (Laade, 1971: 77-79, fig. 5, table 8a) and the Pulu Islet sites (Ghaleb, 1990; McNiven et al., 2000, 2002b). Further sites of this type occur without documented narratives (e.g., the boulder site overlooking Saveka Point, Mua, where a distinctive landform also has rock-art including a figurative image with the distinctive ears and tail of the 'dogai spirit') (Barham, 1981) (Fig. 4). Very large numbers of individual rock outcrops and distinctive boulders are associated either with historical or genealogically referable events (*gida*) or legends involving supernatural beings (*adi*) (Laade, 1971: xviii-xxi; Lawrie, 1970; Wirz, 1932). The *adi*-myths frequently involve human beings with special forms and events, or beings who change from human to animal form, where the outcomes or events within the myths are linked with oddly shaped rock formations in the contemporary landscape. Where both myths and tales have been well recorded there appears to be a strong correlation between culturally significant sites referable to legends, and rock-art sites, former *kod* sites, some surviving surface shell and stone arrangements and skull ossuaries.

Here we anticipate that, as discussed for cultural resource management at Cape York (Greer, 1996,

1999; Ross & McDonald, 1996: 99-100), traditional stories and beliefs form a vital part in contextualising archaeological sites in Torres Strait, both in the systemic context of past cultural landscapes, and from the perspective of contemporary cultural heritage management concerns of indigenous people. As such, the category of 'sites' as landforms associated with traditional beliefs, and cultural landscapes more broadly, are likely to merit greater attention in future than they have received hitherto. In Torres Strait, where the 'landscape' and 'seascape' merge into a continuum of terrain utilised both in terms of belief, ownership and past subsistence, story places located nearshore, intertidally, and offshore all potentially form integrated elements of the archaeological record. Examples include functional sites, such as fish traps and their origin with mythical constructors (Barham, 1981), and clam 'gardens' located on intertidal reefal surfaces which serve both to demarcate territory, operate as food stores and function as foci for story-places (Laade, 1973).

As yet, a significant number of 19th Century historic sites, such as pearling-stations (Ganter, 1994) and burials, and associated temporary settlements, are largely unrecorded through field archaeology, as are large numbers of former indigenous village sites, known from ethno-historical sources and mapping (David & McNiven, this volume; McPhee, this volume). A wider range of site types is likely to be recognised as further surveys are undertaken.

Additionally, both disturbance to natural vegetation patterns, and the intra- and inter-island distributions of plants known to have been utilised traditionally — e.g. coconut, various species of bamboo, the Indian Almond (*Terminalia catappa*) — remain to be fully utilised in modelling former land-use patterns on the Torres Strait Islands, especially for the historic period. Coconut and bamboo groves appear to be particularly useful in defining former gardening places (e.g., on Gebar, Naghi, Mabuiag, Saibai and Mua). Many individual species clearly demarcate former settlements, ritual activity areas, seasonally occupied garden areas (e.g., on Saibai), or re-growth ecologies consistent with former anthropic firing regimes (Barham & Smith, 1987). Late 19th and early 20th Century gardening areas are known to be identifiable on the ground through vegetation survey, where detailed surveys have been undertaken, such as around Moa Peak, Bulbul and Gerain on Mua (Budworth, 1986; Budworth & Barham, 1987: 57).

ARCHAEOLOGICAL SITE VISIBILITY, PRESERVATION AND CHRONOLOGY

Much of the archaeological literature on Torres Strait prehistory has applied deductive reasoning to the question of the likely antiquity of human occupation in the area, based on very limited data from Torres Strait, and inferences drawn from the known prehistory of adjacent mainland areas (e.g., Golson, 1972; Moore, 1979). Models of prehistoric human occupation, and the cognate complex issues of the relationships between the Quaternary history of the area, particularly the existence of Torres Strait as a land bridge during Pleistocene low sea-level and the nature of the onset of Holocene insular conditions, continue to focus attention (Golson, 2001; Gosden & Head, 1999) and will be re-examined in later sections. There is also some confusion in the literature regarding the possible past interplay between geomorphological processes and both archaeological site preservation and chronology. Here we attempt to first clarify the issues by examining qualitative aspects of the archaeological record.

ARCHAEOLOGICAL SITE SURVEYS — METHODOLOGICAL ISSUES. Despite locally intensive phases of reconnaissance, the level of surface archaeological survey coverage remains partial in Torres Strait. Highest coverage relates to Mabuiag, and adjacent islets, the north and east coast of Mua, the western half of Saibai, and Erub, Mer and Dauar. Specific areas of Yam and Horn Islands have also been surveyed in advance of proposed development. Few of the islands known to be occupied at the time of European contact, either permanently or seasonally, have been comprehensively surveyed and many other islands and islets known to have been traditionally visited have never been surveyed at all.

Much archaeological reconnaissance (e.g., Barham, 1981; Barham & Harris, 1987; Ghaleb, 1990) has been deliberately skewed to more intensive investigation of the coastal margins, and related low-lying seasonal swamp areas and areas of seasonal alluvial accumulation located behind prograded beach-dune complexes (e.g., Seegan Beach on Mua, the east coast of Naghi, and the Gumu area on Mabuiag). This pattern reflects funded research agendas focused on aspects of prehistoric coastal resource exploitation. While other sites have been recorded opportunistically on the much larger Western Islands (e.g., rock-art sites and niche secondary burials around the Moa Peak upland — Barham, 1981), very large parts of the wooded upland



FIG. 4. A, An isolated weathered granite boulder perched on bedrock on the ridge overlooking Saveka Point on Mua (viewed to the NW) on which a variety of figurative paintings occur on the southwest face. (Photo 1981). B, One of the figurative designs on the Saveka Point boulder, showing large ears and a 'tail' of the type described ethnohistorically for 'Dogai' spirits (Barham, 1981). (Photo August 1980).



hills, open savanna plains and interior water-course margins of Murulag, Mua and Badu remain archaeologically unknown (but current research on Mua and Badu is revealing numerous sites – see David & McNiven, this volume). The same applies to much of eastern and southern

Saibai and southern Boigu, and the higher densely vegetated parts of much smaller islands (e.g., Naghi, Gebar and Dauar). Even small islands with less vegetation cover, such as Dauan, present considerable logistical problems for full survey, arising from the rugged boulder-strewn topography. The task of adequately surveying these areas is substantial. High-resolution aerial photography, and low-level aerial reconnaissance, locates some sites and locales marked by distinctive vegetation associations, and also large-scale obtrusive features such as extensive areas of mound-and-ditch systems (Barham, 1981; Barham & Harris, 1985; Neal, 1989; Rowland 1984a). Fish traps can also be identified from the air (Barham, 2000, unpubl. data; Ghaleb, 1990) if flights are timed to coincide with still water conditions and/or low tides (Fig. 5).

An example of the use of aerial photographic approaches is reproduced in Fig. 6 (from Barham, 2000). The distribution of intertidal stone-built fish traps around the coast of Ugar (Stephens Island) is shown, in relation to the distribution of mangrove and intertidal sedimentation in April 1977. Low-level aerial photographic runs are required to map features at this scale, but coverage flown for economic infrastructure planning is often adequate for preliminary mapping. In this example, only limited records exist for Ugar in the archaeological site archive, and the onshore midden site record and chronology relating to the fishtraps has not been investigated. The fishtraps are known, however, from ethnohistorical sources and documented folk tales (Haddon, 1935: 152, 205; Lawrie,

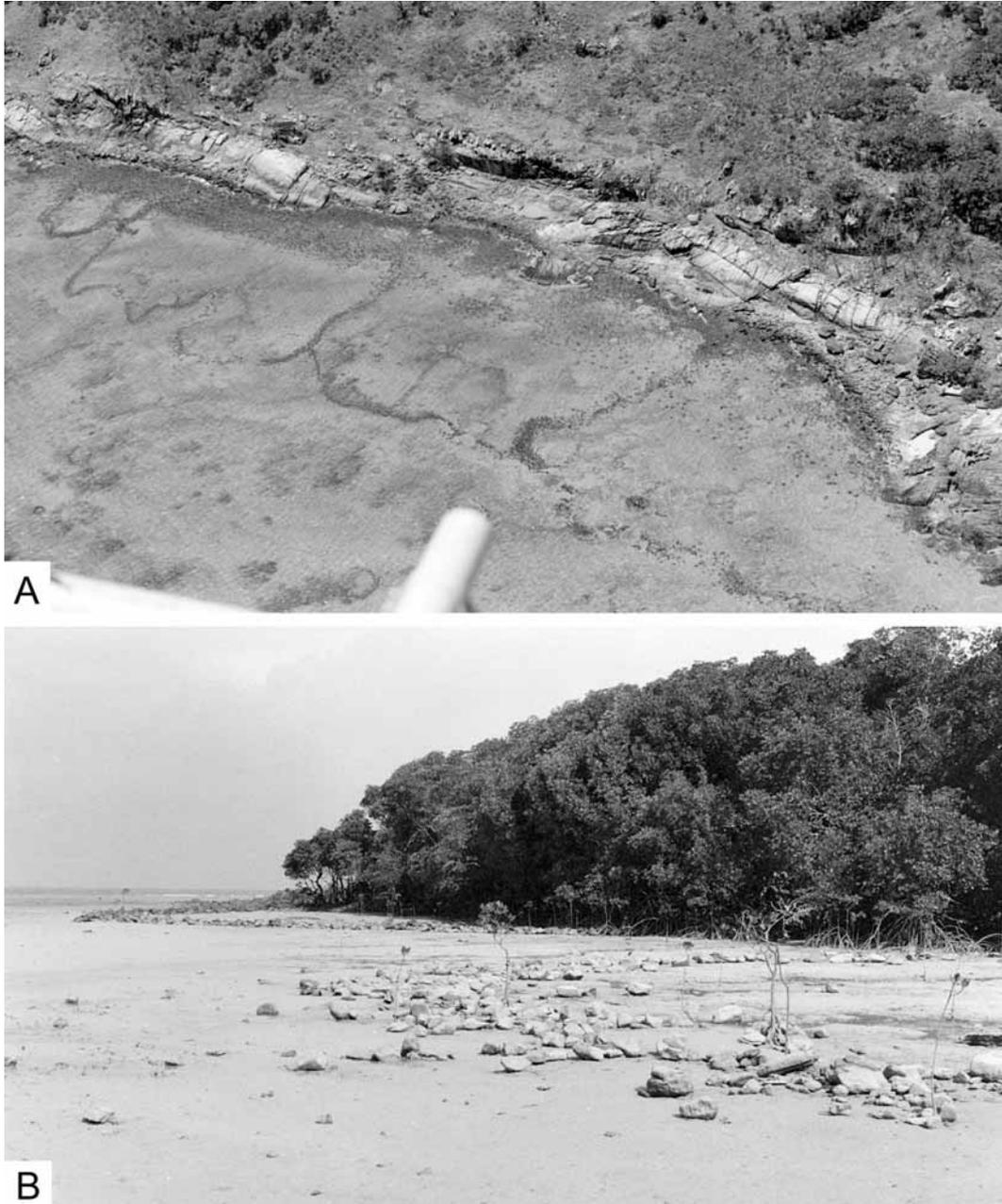


FIG. 5. A, Complex of stone-walled fish traps located on the Met Hill fringing reef, north-east coast of Mua Island. Note degraded nature of walls resulting from NW monsoon storm waves. View from low level aerial oblique, with fish traps submerged by MHWN tide. (Photo January 1982). B, Two stone-built fish traps at Eet Point (part of a complex of three) at the south end of Seegan Beach, Mua Island. Fish traps exposed during MLWS tide and 1) showing overgrowth of landward wall ends of one trap by mangrove, and 2) differential destruction of stone arrangement closest to shoreface and higher tidal datum by SE storm waves. (Photo August 1980).

1970: 274, 276). Other site types reported for the island, but not investigated, include wells (Lawrie, 1970), stone and shell arrangements, *zogo* stone sites, and skull burials (Teske, 1987a). Thus, high-resolution aerial photography, coupled with recorded traditional story places, and local knowledge would provide a firm baseline for future ground survey and recording.

On both large and small islands most other site types cannot be directly located except through ground survey, although rock outcrops more likely to be associated with rock-art and secondary burials can be identified from the air for subsequent ground survey, often even in densely wooded uplands. Vegetation obscures sites considerably, both in areas of *Melaleuca* scrubland and woodland, areas of mixed woodland on hills, and beach-dune grassland. Highest surface archaeological recording and visibility, even for very recent large obtrusive historic sites (such as the former airstrip constructed during Wolfram mining south of Moa Peak on Mua in the 1950s) is highly conditional on seasonal grassland dieback and/or firing. The high level of surface recording achieved in the 2-hectare coastal lowland area at Gumu (Harris & Ghaleb, 1987), for example, required grassland clearance by firing prior to survey. Equally, even on hilly areas on smaller islands, such as Yam and Mabuig, substantial numbers of new sites and site types have been located when intensive purposive survey has been conducted (e.g., compare Neal (1989) for Yam and Harris & Ghaleb (1987) and Ghaleb (1990) for Mabuig, with Vanderwal's (1973a) survey records).

Geomorphological factors have influenced both the number and types of archaeological sites recorded in Torres Strait and the spatial location of sites so far selected for archaeological excavation and dating. Many archaeological sequences have been located through observations of eroding sections on shorelines — e.g., east coast of Mua and Naghi (Harris et al., 1985; Rowland, 1984a, 1985); Dauan (Vanderwal, 1973a) and Mer (Bird

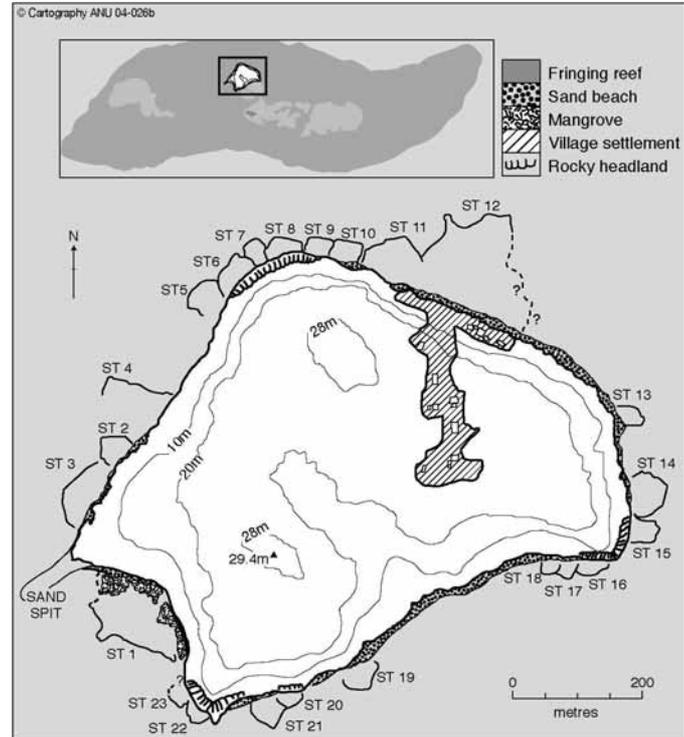


FIG. 6. Stephens Island (Ugar), Eastern Torres Strait Islands, showing fish traps surrounding majority of coastline, relationship of landward wall ends to bedrock outcrops, and absence of traps only along sections of shoreline where rock would be difficult to obtain locally.

et al., 2002; Carter, 2001, 2002a; Carter et al., this volume). Erosion of hill slopes has enhanced site visibility of midden scatters and burials (Barham, 1981), but conversely reduces the significance of such sites in terms of archaeological contextual reliability (Fig. 7). In the coastal zone, fish traps for example, are more visible where reef-flats have remained clear of mangrove vegetation colonisation and intertidal sediment accumulation (e.g., Gerain, Usar and Eet Point on Mua, and possibly on Yam). Wave action has reworked the wall stones of fishtraps at some sites, making them less clear from aerial reconnaissance, such as on Mer (Singe, 1979), Mabuig (Harris et al., 1985: 47) and Mua (Fig. 5).

Other geomorphological processes also reduce site visibility. Aeolian sand deposition landwards of the shoreface on beach sequences infilling embayments is one example. On prograded sand beach sequences exposed to southeast winds in the dry season (e.g., at Seegan and St Paul's on

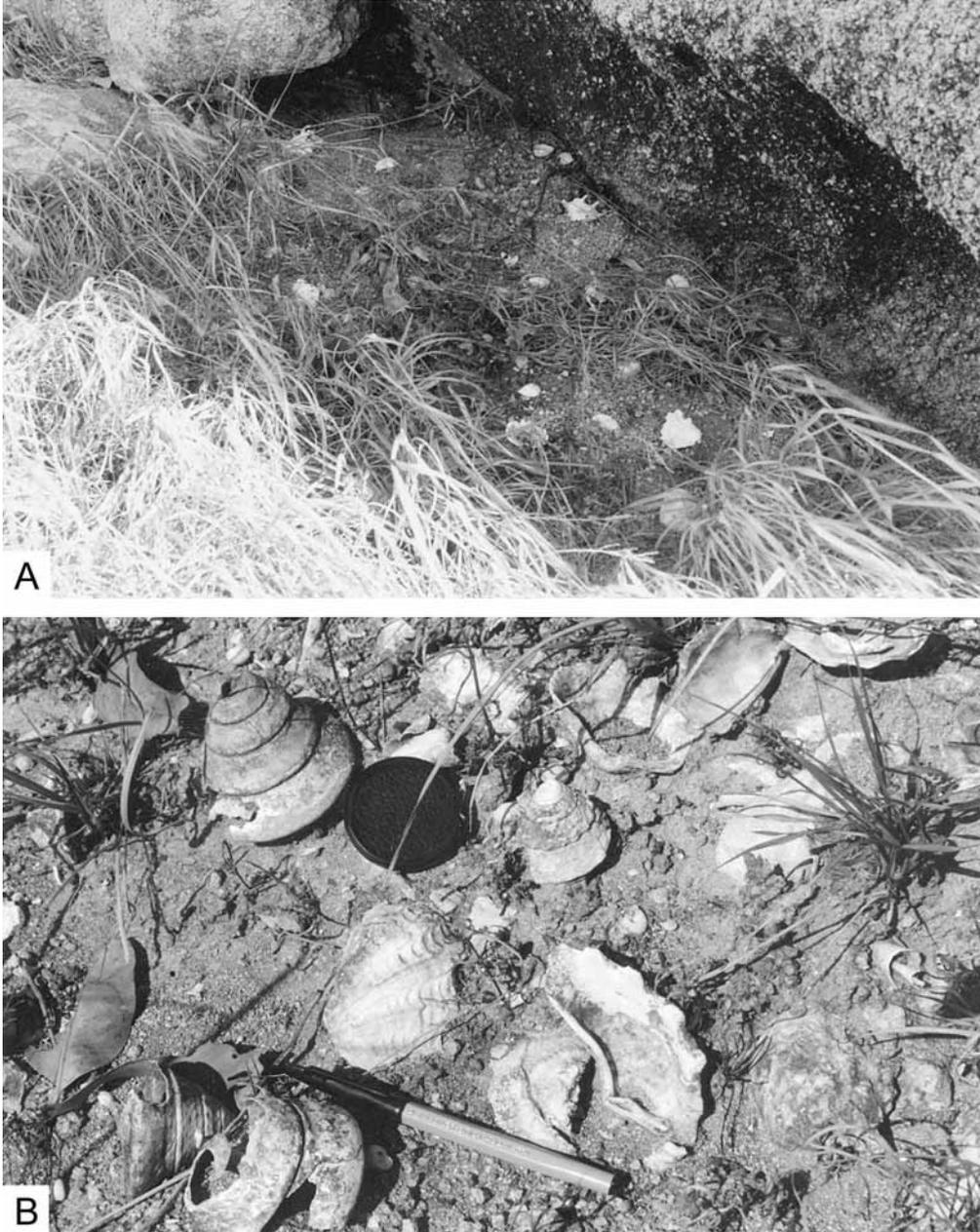


FIG. 7. A, Shallow shell scatter exposed and reworked by focused wet season wash and overland flow moving downslope around a boulder site with rock-art on Naghi. The shell scatter predominantly comprises reefal taxa (e.g., *Lambis lambis* and *Tridacna crocea*) along with a possible shell artefact (worked fragment of *Geloina* (syn. *Polymesoda*) *coaxans*) and cylindrical coral fragments (Barham unpubl. data). (Photo September 1981). B, Erosional disturbance from wet season rainsplash and surface runoff causing minor rilling and substantial reworking and concatenation of a formerly shallow stratified shell midden assemblage, Saveka Point, Mua. Note also differential weathering and breakage of shell following firing (during late dry season grass burns). (Photo September 1980).



FIG. 8. Charcoal-rich upper soil profile, buried by subsequent onshore landward aeolian shoreface sand deflation during the dry season (SE trades) with sparse shell midden and stone artefacts stratified within the soil profile. St Paul's Beach, Mua. (Photo January 1982).

Mua), deflation from the beachface has led to landward accumulation of fine sand sheets overlying occupation horizons (Fig. 8). Such processes assist the preservation of recent sites, leading to the development of stratified sequences, but significantly reduce the probability of locating such sites through surface survey.

ASSEMBLAGE COMPOSITION AND CONTEXT PRESERVATION IN EXCAVATED SITES. Most excavated sites (Fig. 1) exhibit assemblages of bone, lithics, shell and charcoal, with glass and post-European contact elements in upper parts of the stratigraphy. The excavated stratigraphy normally comprises matrix-supported sediment units (i.e., the cultural components are dispersed within a finer sediment matrix which volumetrically dominates the stratigraphy). The only sites excavated where cultural material comprises most of the stratigraphy by volume are the Woam site on Saibai, some levels of the midden sites at Ormi and Sokoli on Dauar (Carter, 2001, 2002; Carter et al., this volume) and ritual dugong bone mounds on Pulu and Tudu (McNiven & Feldman, 2003). In the 5 rockshelters so far examined

(Carter et al., this volume; Coleman, 1991; Harris et al., 1985; Moore, 1974, 1979; but see also David & McNiven, this volume) preservation does not appear to be markedly different from well-stratified midden deposits of similar age in prograded beach sequences. Many excavated open sites exhibit moderate bioturbation by modern roots and invertebrates within the upper 20-40cm (e.g., Woam on Saibai; Pitkek on Mer).

Stone artefacts. Lithic components normally represent <10% by weight of the archaeological assemblages. Few formal stone artefact implement types have been recovered from excavations on the islands that would allow comparison with either mainland Australia or New Guinea. The lithic artefact components identified archaeologically from Torres Strait are those reported by Vanderwal (1973a), Harris & Ghaleb (1987: 23-24); Ghaleb (1990); Coleman (1991); McNiven (1998) and Moore (1974, 1979). These are supplemented by lithic material in museum collections (Lawrence, 1994: 338-340; Moore, 1984; McNiven, 1998). Flaked tools include those identified by Vanderwal (1973a: 180) at Pulu Islet, on Gebar, Dauan, Saibai and Dauar and Mer. These artefacts include varieties of

porphyritic microgranite and finer grained igneous rocks. Flakes found in the Eastern Islands were thought to have been imported from the Western Islands (Vanderwal, 1973a: 184). Local raw materials appear to have been frequently used for general processing activities, particularly water-rounded cobbles for pounding food, skins, and fibres (Haddon, 1912: 123, fig. 154), vein quartz and pebbles of pumice and coral (used for grinding), although ethnographic records of the use of unmodified stone are rare (Vanderwal, 1973a: 173; see Moseley, 1879: 357 for an example). Quartz flakes are described ethnographically as having been used for scarification of the skin, and medicinal blood letting (Haddon, 1912: 15, 125) and for sharpening the edges of *akul* shell artefacts, and bamboo knives (*upi*). Prestige lithic artefacts such as war clubs and stone adzes have been located infrequently, and as fragments, in excavations (e.g. Vanderwal, 1973a: fig. 2i). The larger stone axes and club heads are composed of many lithologies ranging from fine-grained closely textured igneous rocks such as basaltic andesite (Stephenson, 1986 cited in Lawrence, 1994: 340) to white granite (Haddon, 1912: 192). One complete adze was located on Gebar by Vanderwal (1973a: 181, fig. 2j) and corresponds in form with those recorded ethnographically and in museums (Lawrence, 1994: appendix F). A further 3 stone adzes are known from Adze Cave on Booby Island (Coleman, 1991: 3). Archaeological evidence for quarry sites and manufacturing sources for lithic artefacts is based primarily on petrological identifications of artefacts in museum collections (McNiven, 1998; McNiven & von Gnielinski, this volume; McNiven, von Gnielinski & Quinnell, this volume) or ethnographic records (Landtman, 1927: 33-4, 45; Thomson, 1933, 1939: 82) with the one significant exception of the Konakan site on Yam. At Konakan, Haddon (1935: 76) thought the grooved surfaces of the rock blocks must have been used either for stone axe grinding (if not manufacture) or the production of stone club heads. As yet, there are no excavated sites where lithic artefact analysis has been conducted on material from well-dated and well-stratified sequences, although such data will soon become available from the Sokoli site on Mer (Carter, in prep.), various sites on Pulu Islet (McNiven, pers. comm. 2003) and Badu (David, pers. comm. 2003). Where ground-stone lithic artefacts have been excavated they have been fragmentary (Ghaleb, 1990: 195; Moore, 1979: 14; Vanderwal, 1973a: fig. 2i). Unmodified

quartz fragments and quartz cores, flakes and micro-debitage are recorded from excavations on Saibai, Mabuiag (Ghaleb, 1990: fig. 19a), Pulu Islet (Vanderwal, 1973a: 180; McNiven pers. comm. 2003), Mua (Barham & Harris, 1987; Harris et al., 1985: table 3; David, pers. comm. 2003) and Badu (David, pers. comm. 2003) and from Evans Bay on Cape York (Moore, 1979: 14). Quartz flakes also occur as highly visible isolated finds eroding from clayland at swamp edges on Saibai (Fig. 9) — where the absence of bedrock other than coral limestone means that lithic artefactual material must have been imported from adjacent islands with bedrock outcrops such as Dauan, or the PNG mainland (Barham & Harris, 1985; Barham & Smith, 1987).

Shell artefacts. Shell artefacts, again mostly fragmentary, exhibiting both worked perforations and edge-grinding on *Anadara* sp., *Conus* sp., *Pinctada* sp., *Hippopus* sp. and *Tridacna* sp. are reported from excavated contexts on Mabuiag (Ghaleb, 1990: figs 14, 16-18). Artefacts made from *Hippopus hippopus* were interpreted as shell adzes, and others as body ornaments. The items reported are consistent with shell artefacts in the Haddon archive (Moore, 1984). Ghaleb's identification of 3 shell artefacts as adzes is significant. The 'adze' artefacts are morphologically robust, small (7 and 9cm long) and similar to 'axes' made from *Tridacna* sp. recorded by Haddon (1912). Ghaleb (1990: figs 18b, c, g) also recorded worked artefacts made from *Pinctada* sp. She ascribed no function to these artefacts, but although small (maximum length 9cm), they would, if hafted, more closely resemble the shell hoes (*wedérémoa* of the Kiwai) known to have been used by coastal Papuans for clearing land for gardens and digging prior to planting (Landtman, 1927: 66-67, fig. 51d, 1933: 23). Haddon collected shell hoes and 'axes' provenanced to the Eastern Islands (Haddon, 1912: 126, figs 159, 160; Moore, 1984: 63, 99) and Western Islands (Haddon, 1935: 302) made from the lip of *Tridacna* sp., but curiously took the view that Torres Strait Islanders had not adopted the use of the shell 'axe' (Haddon 1912: 144). Lawrence (1994: 338) argued that Torres Strait Islanders who regularly practised horticulture used the shell hoe, but Vanderwal (1973a: 174) did not make this connection, and regarded artefacts depicted by Haddon (1935) and Edge-Partington (1969) as probably made 'as a replacement for stone axes'.

The distinction between shell 'axe/adzes' (made from *Tridacna/Hippopus* spp. into robust



FIG. 9. A, Area of eroding clayland adjacent to saline mudflats, where former dry land surfaces are eroding as a consequence of long-term changes in swamp dynamics (Barham, 1999). Archaeological material is eroding from these former landsurfaces, which are of unknown Quaternary age. (Photo September 1985). B, Detail of quartz flake artefacts eroding from the former clayland surfaces at swamp edge margins on northern Saibai. All lithic resource material would be imported to Saibai, as the islands comprises mostly Quaternary fine-grain alluvial and estuarine facies, with rare outcrops of reefal limestone and laterite/ferricrete. (Photo September 1985).

compact artefacts) and shell ‘hoes’ (normally made from thinner curving segments of the outer wall of the shell of *Melo diadema*) is important. As Ghaleb (1990: 205) noted, the shell artefactual evidence from Gumu may be consistent with the adjacent field morphological evidence for garden mounds, and could provide artefactual evidence for horticultural practice in the Western Islands. Examples of the generally good agreement between other shell artefacts recorded and collected ethnohistorically in the Haddon archive, and those observed in surface contexts or excavations in the Western Islands (Barham, unpubl. data; Harris & Ghaleb, 1987) are shown in Table 2. Many smaller shell taxa were used for both body decoration and domestic scraping and cutting tasks (Vanderwal, 1973a: 173-4). As further excavations are completed the archaeological recognition of shell artefacts is likely to increase. Clearly, further research into the morphology, edge-damage and use-wear characteristics of shell artefacts variously assigned to ‘axe’, ‘adze’ and ‘hoe’ categories, both in museum ethnographic collections, and recovered from archaeological contexts, is important, as some of the more robust artefacts may have been used for either canoe construction/repair and tree clearance, while others appear to represent potentially significant archaeological markers of scrub clearance and/or agricultural and gardening activity.

Large shells of *Melo* sp., *Trochus* sp., *Syrinx* sp. and *Cassia* sp., are common components of surface assemblages, both at open sites, often as shell arrangements and also associated with rock niche secondary burials and rockshelter sites, such as on Naghi, Gebar and Mua (Barham, 1981, unpubl. data). For example, an 18cm long valve of *Melo diadema*, from a rockshelter/cave site on Mua, had the interior spiral whorl removed by chipping, and evidence of heat contact on the exterior dorsal surface (Barham, 1981: 12). This directly matches shell artefacts described and illustrated by Haddon (1912: 123, fig. 152) and held in museum collections (Lawrence, 1994: fig. 49, appendix F) (e.g. Fig. 10). Large shell artefacts, such as the *bu* (*Syrinx* sp.) shells, and the use of large shells as both cooking vessels, water containers, canoe bailers and as components of arrangements at ritual sites, provide some of the clearest direct links between surviving archaeological assemblages, and ethnohistorical and ethnographic records. The general pattern of shell artefacts preserving preferentially reflects their ubiquity, generally lower prestige value when compared with



FIG. 10. *Melo diadema* shell chipped to remove central spire: a multifunctional shell artefact type frequently identified and illustrated in ethnohistorical accounts. This example was photographed on a rock surface adjacent to a rockshelter site on Gebar. (Photo September 1980).

ground-stone artefacts, and probable differential removal from sites during the historic period. Since people on the Torres Strait Islands relied primarily on shell and wood and plant fibres for domestic utensils (Edge-Partington, 1969; Moore, 1984, 1989; Lawrence 1994: 338, appendix F) and wood artefacts do not generally survive either through surface discard, or in shallow stratified contexts, this pattern is likely to be ubiquitous across all site types and categories in the islands.

Ceramics. Ceramics have generally not been viewed as a traditional indigenous component of Torres Strait material culture, and Haddon (1901: 118) was adamant that no pottery was made in Torres Strait. However, Vanderwal (1973a: 187, citing McFarlane, 1874: 3) noted that New Guinea earthenware pots were observed at Poruma (Coconut Island) in the late 19th Century. Also mission teachers on Erub (Darnley Island) are reported to have passed earthenware

vessels, again reportedly of New Guinea origin, to Sir William Macleay as gifts in 1875 (MacMillan, 1957: 115). Investigations of caves on Booby Island (Ngiangu), a small rocky island located in the western approaches to the channels frequently used as an anchorage by 19th Century shipping, have reported crude low-temperature fired earthenware sherds 'representing the majority remains of at least two small pottery vessels' (Coleman, 1991: 3; Cox & Watchman, 2000). Significantly, pottery sherds are now reported from well-stratified and radiocarbon dated excavated contexts on Dauar in the Eastern Islands (Carter 2001, 2002a and b; Carter et al., this volume) and on Pulu in the Western Islands (David & McNiven, this volume). The quantity of pottery recovered from Torres Strait sites is still small. On present evidence, some earthenware vessels were certainly imported into Torres Strait, probably as prestige exchange goods originating from production in the Port Moresby area, as part of 19th Century exchange systems, possibly via the Motu *hiri* trips into the Gulf of Papua (Barton, 1910; Rhoads, 1994: 53; Vanderwal, 1973a: 187). This recent process may have repeated a pattern of episodic inward trading of pottery from PNG, which on the new evidence from Dauar and Mer, may have had short-lived episodic precursors beginning about 2,000 years ago.

The ceramic analytical data (Carter, 2002b; Cox & Watchman, 2000) are insufficient to confirm whether sherds found in Torres Strait might originate from around Port Moresby, from more distant sources traded via the Papuan Gulf (Bickler, 1997), or perhaps, since the 17th Century, from further afield westwards (e.g., for comparisons with earthenware known from Macassan sites in northern Australia, MacKnight, 1969, 1976: 78-81, pl. 28). However, the new data from the Eastern and Western Islands may be able to address important issues regarding much earlier trade connections, possible links between the origins of horticulture and earlier ceramic-making populations on the PNG mainland and hypothesised 'Austronesian-backwash' influences on Torres Strait Island prehistory.

Subsistence remains. Where excavated midden shell species assemblages have been analysed (Barham & Harris, 1995; Bird et al., 2002; Ghaleb, 1990; Rowland, 1984a, 1985; Carter et al., this volume) they have consistently indicated prehistoric exploitation of taxa available from immediately adjacent nearshore intertidal environments (i.e., local intertidal microniches

produce the dominant taxa in the assemblage, largely irrespective of average meat weight per individual or minimum number estimates). For example, the Woam midden on Saibai has the local mangrove molluscs *Polymesoda coaxans* (Syn. *Geloina coaxans*) and *Terebralia sulcata* as dominant taxa, while on sandy beaches on Mua the much smaller *Mesodesma striata* dominates many assemblages numerically. On Mer and Dauar, reef species such as *Strombus* sp., *Lambis* sp., *Trochus* sp. and smaller rocky foreshore neritic taxa are common in excavated sites (Carter et al., this volume; Bird et al., 2002). The significant exception to past mollusc exploitation reflecting modern littoral ecological availability is the ubiquity of *Anadara antiquata* in middens on Mua, where modern intertidal sand-flats no longer support the species. This is unlikely to reflect a change in prehistoric to recent subsistence collection, or past over-predation by human populations, as *A. antiquata* thrives on well-fluxed intertidal reef-flats with sandy substrates, but is known to be highly susceptible to reduced salinity and also changes in nutrient availability (Amesbury et al., 1996; Cernohorsky, 1972: 215-216; Spennemann, 1987). The many sites containing food debris, and the generally good preservation of both shell and bone, both in sandy deposits, and more water-retentive sediments such as the clay-silt matrices of sites excavated on Saibai, offer opportunities for reconstruction of local subsistence patterns and technologies, and of past dietary adaptations to local micro-environments.

Preservation of remains. Generally all archaeological contexts that have been excavated (i.e., stratified open midden sites, shell and bone mounds, and rockshelters) have yielded well preserved material, including charcoal (some identifiable), fish bone (Ghaleb, 1990), crab carapace, chiton exoskeletons, and bones of turtle, dugong, bird and reptile (Rowland, 1985) and a very wide range of molluscan taxa, including thin-walled fragile taxa such as ellobiids (Barham & Harris, 1985). Rowland (1985: 130) raised the possibility that the absence of organic remains in the lower occupation layers of a site at Seegan Beach on Mua might reflect decay due to high rainfall and temperatures. However, most assemblages analysed show no signs of selective weathering with depth, and where radiocarbon ages are available, there are no signs of progressive loss, or increased *in situ* weathering of bone and shell, through time. Thus, most sites suggest constraints on selective

TABLE 2. Artefacts catalogued and described by Moore (1984) with attribute similarities to those recorded during fieldwork in the Western Islands of Torres Strait from sites on Mua, Naghi, Gebar, Saibai and Murulag (Torres Strait Research Project 1980-85 and Barham, unpublished data).

Artefact Type	Collection Number	Running Number in Moore (1984)	Details in archive	Use as described by Moore (1984)
Shell artefacts				
<i>Akul</i> shell bivalve (<i>Polymesoda coaxans</i> syn: <i>Geloina coaxans</i>)	Z.9747	18	Mabuiag 1898. Stated to have been imported from Bađu or Mua, but common on muddy shore of Papua	Knife or ladle -cutting or scraping implement
Cowrie shell decoration on woven armband	Z.9555	61	unclear / misnamed in text	?
<i>Melo</i> sp. shell	Z.9531	234	Large <i>Melo amphora</i> shell with upper edges chipped. L.29cm, W.19cm, D.13cm. Mer 1898. Also Z.9532. <i>Ezer</i>	Cooking, heating and storing water
<i>Bu</i> shell (<i>Syrinx</i> sp.) with woven strap	Z.9533	235	Giant conch shell with handle of coconut fibre looped around points of shell. Mer 1898.	Water container - for carrying and storing. Conch shell - <i>maber</i>
<i>Melo</i> sp. shell with interior spiral removed and infill of sediment (very similar to those recorded on Mua)	Z.7903	237	Two <i>Melo</i> sp. shells, one large and one small, containing red ochre. L. 8.8-20cm. Mer 1898. Also Z.7931	Shell for mixing ochre. Stated to have been used when painting the <i>biro-biro zoge</i> of the <i>naror zogo</i> during the <i>bubarup</i> ceremony.
Shells	Z.7972	249	Three valves of <i>Asaphis deflorata</i> , stated to have been stored in houses for cutting purposes. Mer 1898.	Shell for cutting: <i>kaip</i>
Cowrie shells on armband	Z.9561	332	Armband, coconut leaf and shell. <i>Put</i> Mer 1898.	Obtained from Pasi. Worn by men on ceremonial occasions.
Cowrie shells on belt	Z.7801	345	Belt with sown on cowrie shells. Palm leaf and shell. <i>Pet wak</i> . Mer 1898. Also others in collection.	Worn by men on ceremonial occasions.
Cowrie shells on belt	Z.9543	344	Belt, palm leaf with shell. <i>Pet wak</i> . Narrow belt of woven palm-leaf with double row of cowrie shells sown on. Mer 1898	Worn by men on ceremonial occasions.
<i>Bu</i> shell with stone	Z.9583	542	Shell and stone used in yam magic. <i>lewer kep zogo</i> . Large <i>Syrinx</i> sp. shell called <i>nar</i> (canoe) containing water-worn pebble of dark grey heavy stone, representing 'yam seed'. Mer 1898	Kept in yam gardens to make good harvests.
<i>Melo</i> sp. shell with interior spiral removed	Z.9933	639	Large <i>Melo diadema</i> shell, chipped round outer edge, known as <i>bu</i> (W.) and <i>ezer</i> (E.) Torres Strait 1898?	For cooking and carrying and storing water. Also 84+154, (1888) Z.7935 (1898?) PR.II.60, 1888
Stone Artefacts				
Unworked stone object	Z.8088	539	Oval granite pebble, possibly partly hammer-dressed. Mer 1898?	<i>lewer kep</i> . stone used in magic for yam increase.
Unworked stone object	Z.9581	540	Water-worn pebble of dark grey dolerite. Stated to have been imported, obtained from Ano of Wednesday. Mer 1898.	Placed in yam garden to promote growth
Unworked stone object	Z.8110	545	Natural pebble of grey granite. Stone used in garden magic. <i>wiwar</i> . Mer 1898.	To protect gardens by bringing sickness to thieves.
Unworked stone object	Z.8089	544	Natural stone of heavy grey granite, slightly ovoid in shape. <i>wiwar</i> . Mer 1898?	To protect gardens by bringing sickness to thieves.
Unworked stone object	Z.9589	547	Half of large hammer-dressed pebble of reddish igneous rock foreign to Mer. Traces of red ochre. Mer 1898	To protect gardens by bringing sickness to thieves.
Carved stone object	Z.9939	509	Human head, stone, <i>zole</i> . Large chunk of spongy red lava, slightly modified to resemble human face. Mer 1898.	Placed in garden to protect crop.
Carved stone object	Z.9575	504	Human figure, stone, <i>bager</i> . Figure of pregnant female crudely carved from lava. Mer 1898.	Placed by fire to keep it alight when people absent.
Carved stone object	Z.9572	501	Human figure, stone, <i>bager</i> . Figure of pregnant female seated, carved in lava. Various features picked out in red and white ochre. Mer 1898.	Placed by fire to keep it alight when people absent.

preservation are greatest during discard, and prior to stratigraphic burial (when fire, biodegradation, and local weathering and erosional processes are

maximised). Once the systemic surface discard assemblage (sensu Schiffer, 1987) becomes incorporated into a subsurface sedimentary

archaeological context most sites show good preservation.

In contrast, preservation of surface assemblages in island interior areas is much poorer, particularly in the typically highly weathered stony regolith of the larger high Western Islands. Surface shell is degraded through grassland firing (Barham, 1981) and bone located in secondary niche burials is often softened and friable, and prone to disturbance from feral pigs (e.g., on islands such as Mua, Badu and Murulag). Many surface scatters on hillslopes are contextually reworked through rainwash, bioturbation and regolith instability (Fig. 7). Poor preservation is related to low net sedimentation rates rather than due to any intrinsic difference between interior and coast in terms of microenvironments.

Therefore, throughout Torres Strait, it is the speed at which archaeological materials become incorporated into stratigraphy (i.e., the inverse of residence time on the surface) that largely determines preservation condition for organic assemblage components. Optimal preservation conditions are therefore coupled to sites where net sedimentation rates are fast (Barham, 1995). Such conditions pertain at sites where either spatially focused discard (e.g., Woam midden), sealing through natural sedimentation such as shoreface progradation, colluvial deposition at slope bases or aeolian back-beach sedimentation (e.g., Pitkek midden on Mer; Seegan Beach middens on Mua), combinations of burial by human activity (e.g., gardening over previous activity areas as at Sokoli on Mer) or direct import of sediments to the site (e.g., upper stratigraphy of Kurkur Weid rockshelter on Mer) have occurred (Carter 2001, 2002a; Carter et al., this volume).

RADIOCARBON DATES AND THE EMERGENT REGIONAL CHRONOLOGY. A total of 32 radiocarbon dates were available from archaeological sites in Torres Strait when this review was compiled (Table 1). Of these, 14 were run on charcoal and the remainder on either the bivalve *Anadara antiquata*, or, in the case of sites on Mer and Dauar (Carter, 2001, 2002a: table 1), the marine gastropods, *Strombus luhuanus* and *Lambis lambis*. A single date is available for dugong bone (McNiven & Feldman, 2003: 184), but no dates have yet been run on turtle bone despite the fact that it is commonly well-preserved and has yielded reliable dates elsewhere (Dye, 1989). Most dates derive from

basal contexts and represent estimates of earliest occupation. Information is available on only 2 sites for which multiple assays have been obtained vertically through a stratified sequence — the 2.4m deep sequence at Sokoli and the 2.1m deep sequence at Ormi, both on Dauar (Carter, 2001, 2002a: table 1, 2002b; Carter et al., this volume). One site, at Woam on Saibai, has multiple dates from a single basal context (Barham & Harris 1985: 264, appendix 1).

The grouped uncalibrated age-estimates (with no correction of shell samples for ocean reservoir effect) range in age from modern to nearly 3,000 BP (the oldest being the dates for the sites of Sokoli and Ormi on Dauar and Woam on Saibai). Most sites are of shallow depth, with basal contexts lying 30-70cm below the surface (Barham, 2000: fig. 8). There is a consequent poor relationship between depth and age for grouped site data from Torres Strait. Samples from depths of 40-60cm have produced radiocarbon ages across the full time range of known Holocene occupation of the islands. Moreover, some surface assemblages and samples at 40-50cm depth have produced radiocarbon ages of modern (Barham, 2000: fig. 8). This has the important implication for cultural resource management, that neither assemblage composition, nor stratigraphic depth, should be used as *a priori* criteria for estimating site age.

Debate still surrounds the appropriate correction that should be applied to the apparent radiocarbon ages run on marine shell samples from estuarine and nearshore tropical waters (Bowman, 1985; Dye, 1994; Gillespie & Polach, 1979; Ulm, 2002; Ulm & Hall, 1996; Ulm & Reid, 2000: 11). The problem is that radiocarbon (^{14}C) is depleted in the ocean relative to the atmosphere. This produces an apparent age in contemporary marine organisms, which Gillespie & Polach (1979) estimated at -450 ± 35 years, and which Bowman (1985) verified for northwestern Australia. While it is well-established that the amount of sea-surface ^{14}C oceanic depletion varies geographically as regional differences, denoted as ΔR values, from a global surface water mean of 400 years (MacFadgen & Manning, 1990), recent research has shown evidence for temporal variation in marine reservoir ages in shell material. This reflects variation in the amount of ^{14}C depletion in ocean water bodies at specific geographic locations through the Holocene (Kennett et al., 1997). Rhodes (1980: 218-219) verified a correction of close to the Gillespie & Polach (1979) value, using museum samples taken off Mapoon in the

Gulf of Carpentaria, immediately south of Torres Strait. Accordingly, we have applied an ORE correction value of -450 ± 35 years to all dates on marine shell (Table 1)⁴.

A further cautionary note is justified with respect to the reporting and interpretation of the shell sample ages from Torres Strait. ¹⁴C counts from marine shell samples are normalised by laboratories relative to a standard value of -25 ‰ to facilitate direct comparison of ages reported with assays of terrestrial material. ¹³C/¹²C ratios have been measured for a range of neighbouring sessile bivalve species on a single reef-flat in southern Torres Strait (Fry et al., 1983: table 3) and showed a range of ¹³C/¹²C values from -8.4 ‰ (*Anadara antiquata*) to -15.6 ‰ (*Isognomon isognomon*), reflecting mollusc feeding characteristics. ¹³C/¹²C values of -4.11 and -4.33 ‰ for *Anadara antiquata* from Torres Strait archaeological shell samples have been previously reported (Barham & Harris, 1985: 274-276), which were interpreted as reflecting isotopic conditions in the live environment of the mollusc. These data suggest that local differences exist in the stable isotopic composition of intertidal mollusca within Torres Strait, both between and within species, reflecting metabolic pathways relating to feeding substrates (Fry et al., 1983), as well as local water isotopic composition and salinity (Ulm, 2002). Where laboratories have applied a standard assumed value for shell ¹³C/¹²C (e.g., some ANU-laboratory dates in the Torres Strait group age sample) there is therefore some incomparability in the effect normalisation will have on the reported apparent radiocarbon age.

The significance of these issues to Torres Strait prehistory is that application (or not) of the ocean reservoir effect (ORE) correction of -450 ± 35 years has a significant effect on both the known maximum time depth for occupation of the islands during the Holocene, and the clustering of grouped data through time. The collated age-estimates are shown for shell samples both in uncorrected and corrected form (Table 1) together with charcoal dates.

The Torres Strait regional radiocarbon chronology, and site-age trends in relation to the emergence of a late-Holocene *Torres Strait Cultural Complex* (*sensu* Barham, 1999) have been presented within the context of a regional model elsewhere (Barham, 2000). Here the main trends are again reviewed, which have altered little with the addition of further radiocarbon

dates from the Eastern Islands (Carter, 2002a, 2002b). Without shell corrections, the statistical data show some intervals of time when short periods of 'non-occupation' might be inferred between data points plotted at 2 standard deviations. However, once ORE shell corrections are applied, the maximum known age of occupation reduces to c.2,500 BP, and the distribution of individual site age determinations cluster, to remove all but very short intervals when no occupation can be statistically demonstrated in Torres Strait between present and 2,500 BP. As most dates are from basal contexts (i.e., date first occupation at the sampled sites), we assume that further dating of overlying stratigraphy would infill any apparent statistical gaps in occupation in the period present to 2,500 BP⁵. There is also some evidence for higher frequency of basal site ages within the period 550 BP to 850 BP. This overlaps the period originally suggested by Moore (1979) as a period of initial intensive occupation at 600-700 BP.

Other aspects of the grouped site radiocarbon age-estimates are interesting. Although published radiocarbon dates are available for only 2 rockshelter sites (Red Island Point on Cape York and Kurkar Weid on Mer) there is, as yet, no indication that rockshelter sites are yielding older basal site ages. The oldest dated sites from the Strait are all from open site contexts, where either the underlying geological chronostratigraphy is pre-Holocene (Woam on Saibai) or represents stratigraphy formed in relation to early phases of mid- to late-Holocene coastal progradation (Sokoli on Dauar and Seegan Beach on Mua). Sites located in island interior surface locations (e.g., Bera Hill, Mua), where archaeological material is superimposed unconformably on pre-Holocene regolith and bedrock, have produced generally young ages within the interval 500-1,500 years BP. As some of these sites are spatially associated with rock-art sites and ceremonial *kod* sites, this invites testing the hypothesis that the rock-art dates to the last 1,500 years, through application of direct dating methods on either pigments or veneers (Watchman & Jones, 1998), should suitable sites be located. Alternatively, as has been recently suggested for the art site of Kabadul Kula on Dauan (McNiven et al., 2002a: 71-72), spalled fragments of painted rock stratigraphically associated with charcoal in sediments accumulated at the base of rock panels may provide minimum ages for the rock-art. Elsewhere in Australia, dating rock-art back to

>30,000 BP has been successfully accomplished in this way (O'Connor & Fankhauser, 2001).

Geographically, there is a tentative suggestion that older sites are predominantly in the Top Western and Eastern Island Groups, but this is based on only a very small number of dated sites. A significant proportion of the older sites are located either within the larger wet season leeward coastal embayments (Seegan on Mua and Gumu on Mabuiag) in the Western Islands, or within smaller sheltered locations on otherwise rocky coastlines (e.g., Sokoli on Dauar). This numerical high incidence of sites in relatively sheltered bays with prograded beach sequences may reflect sites selected for safe landfall in double-outrigger canoes. Again these present data invite further testing.

Several sites have produced markedly different radiocarbon ages when multiple samples have been dated either from within single contexts (Woam on Saibai) or within shallow profiles (Gumu III on Mabuiag). This may reflect site-formational processes (e.g., treadage and turnover during accumulation) or post-depositional mixing (e.g., through bioturbation/ leaching). In the case of Gumu, the modern date was from charcoal. Anderson & Clark (1999: 33, 36-37) report charcoal dates run on small fragmented samples which have frequently returned much younger dates than shell within which the charcoal was stratified, and also note the vulnerability of the lower earliest levels of Lapita sites to the incorporation of shell derived from underlying older beach ridges. This suggests close attention should be paid to selection of substrates for dating sites in Torres Strait in the future, especially at sites where downward passage of fine charcoal may have taken place post-depositionally through interstitial voids within shelly matrices, or via former plant root systems, and also where earliest occupational evidence overlies naturally shell-bearing beach sands (e.g., at sites on the coast of Naghi and at Ormi and Sokoli on Dauar).

ARCHAEOLOGICAL STRATIGRAPHIC CONTEXTS IN TORRES STRAIT, PRELIMINARY MODELS OF SITE FORMATION PROCESSES AND THE 'SHORT CHRONOLOGY' PROBLEM. Radiocarbon dates from archaeological sites in Torres Strait Islands suggest no significant Holocene occupation earlier than about 2,500 BP. This is broadly consistent with the age ranges for coastal midden sites on Cape York Peninsula (Bailey,

1977, 1994; Bailey et al., 1994; Wright, 1971:135), from further south on the Queensland coast (e.g., Kelly, 1982; Ulm & Reid, 2000) and in particular the maximum ages of coastal sites along the southern PNG coast (see Barham, 1999: 76-80; Bulmer, 1975, 1979; Frankel & Rhoads, 1994; Rhoads, 1980, 1994; Bickler, 1997: 151-152). Indeed, the oldest site for some considerable distance north and east of Torres Strait is the Samoa site, near Kikori, where the maximum age of 2430±370 BP (Rhoads, 1980, 1983) is remarkably similar to the site stratigraphy and oldest date recorded for Torres Strait on Saibai.

The broad span of ages and tentative evidence of increased new site occupation from after c.1,500 BP to c.800 BP, is also similar to the modal age of sites at Weipa (Bailey, 1999; Bailey et al., 1994), Princess Charlotte Bay (Beaton, 1981, 1985) and in particular to the time period of increased occupation of offshore islands (Rowland, 1996). A trend towards coastal and adjacent insular occupation can even be traced into coastal New South Wales where there is a shift to exploitation of offshore islands within the last 1,000 years (Sullivan, 1982). However, whether or not this is 'real' archaeological time-depth or the product of differential site preservation remains unresolved (Rowland, 1989).

On the basis of date data gathered so far in Torres Strait, two significant conclusions can be drawn. First, up until the Western Torres Strait Cultural History Project (David & McNiven, this volume), no archaeological survey approach has yet systematically investigated the stratigraphic contexts in which Pleistocene and early Holocene archaeological evidence is most likely to be located. Theoretical approaches, surface surveys and site visibility have focused archaeological investigations predominantly on chronostratigraphy of mid- to late-Holocene age. On data gathered so far, Holocene human occupation minimally post-dates the commencement of geological construction of beach accretionary and mangrove environments at c.3,500-3,000 BP by 500 years, and more typically 1500 years (Barham, 1999, 2000). Therefore, we provisionally interpret the onset of insular occupation in Torres Strait at 2,500 BP as a cultural phenomenon rather than an artefact of geomorphological process.

However, given the considerable attention that has been given previously to these issues, the two emerging alternative hypotheses regarding the apparent late-Holocene occupation record will

now be further examined. These are broadly: 1) geomorphological and/or palaeoenvironmental factors are significant determinants of the apparent late-Holocene occupation chronology; and/or 2) the emerging chronology reflects cultural phenomena.

THE EMERGENT CHRONOLOGY AND HYPOTHESES REGARDING PLEISTOCENE AND HOLOCENE OCCUPATION OF TORRES STRAIT

Hypothetical reconstructions of Torres Strait prehistory have been outlined by Golson (1972), Vanderwal (1973a: 184-189), Moore (1979: 308-312), Barham & Harris (1983), Ghaleb (1990) and Mulvaney & Kamminga (1999). Barham (2000) produced a detailed regional model for the late-Holocene onset and development of maritime-focused island occupation and adoption of horticulture, viewing this as the emergence of a *Torres Strait Cultural Complex*. Harris (1977, 1979) stressed the potential of the Western Torres Strait islands for elucidating some more general questions in prehistory, and here we extend that approach to the Torres Strait regional archaeological record. In general, past investigations of the prehistory of Torres Strait have focused on 1 or more of 3 key themes: 1) the origins, antiquity of occupation and potential archaeological chronology in Torres Strait, 2) the significance of evidence for prehistoric horticulture in the Torres Strait region, and 3) aspects of the complex inter-island and trans-Strait trading systems described at the time of European contact. The remainder of this paper re-examines each of these three themes in turn.

This section aims to address the first thematic question, namely, have archaeological methodologies so far applied in Torres Strait, particularly those framing research questions around an ethnohistorical baseline for contextual interpretation, been capable of defining the archaeological time-depth for human occupation in Torres Strait in the late Pleistocene and Holocene?

Geomorphological processes along the coastlines of the islands have been widely canvassed as possible reasons for the relatively recent Holocene age of archaeological sites in Torres Strait. Most archaeological researchers in Torres Strait have made mention of the impact of coastal erosion on occupation sites particularly shell middens. Vanderwal (1973a: 176) suggested that on Badu the lack of sites with definite signs of occupation may be due to the exposure of the

coast to southeast trade winds, and wave energy during the northwest monsoon, both of which he regarded as erosive processes. Vanderwal (1973a: 176) added that sites might also have been destroyed or covered by inward beach migration. In this connection, he also recorded that the <1m deep occupation deposit on the northwest side of Gebar had been sectioned by tidal wash. Harris et al. (1985: 7) recorded how a wet season creek had truncated a midden located immediately south of St Paul's Village on the east coast of Mua. South of this site, Rowland (1985: 124) observed similar wet season coastal erosion to middens.

The covering of sites with sediments is also a process that has featured significantly in discussions of the preservation and visibility of archaeological sites across Torres Strait. More broadly, the complex interactions between coastal sedimentary dynamics and the forcing functions of local topography, relative sea level and climatic factors, on the local temporal phasing of sedimentation and coastal archaeological site preservation are widely debated topics for the Holocene archaeological record on the Australian coastline (Rowland, 1989, 1999a, b; Barker, 1999; Beaton, 1995; Fullagar et al., 1999; O'Connor, 1999). Here we attempt to restrict discussion to the present archaeological data from Torres Strait, and local evidence for environmental change in the late Holocene. Moore (1979:15) noted that due to soil erosion from the old volcanic hill systems and consolidation by mangroves and other flora, the coast in many places has been slowly extending so that earlier camp sites are likely farther inland concealed by soil cover and plant growth. Beach progradation and the slow build up of mangrove shoreline sediments is also discussed by Barham & Harris (1983: 535-536), who recorded that on Naghi the shoreface has moved seaward 150m in the last 3,700 years.

These issues have more relevance to archaeological site visibility and obscurity during modern ground survey than issues of context preservation over time. While recognising that most beaches within embayments exhibit erosional tendencies (which currently enhances visibility of the remaining elements of the sites at the shoreface, and represents a major cultural heritage management issue), the clear evidence for the preservation of beaches dating to 3,000-4,000 BP, and major areas where sediments have prograded and infilled embayments subsequently, suggests chronostratigraphic

contexts do exist in which archaeology could be preserved from periods earlier than 2,500 BP. Thus, on both empirical and theoretical levels, we reject the notion that geomorphological processes are responsible for the absence of archaeological sites prior to 2,500 BP. We do not exclude the possibility of significant lagged effects on coastal resource availability resulting from emplacement of Holocene relative sea levels, or possible environmental/climatic effects on the survival, visibility, form and assemblage content of coastal archaeological sites at surface (Rowland, 1999a, b). However, in Torres Strait, we see no reason to think the apparent absence of sites prior to 2,500 years followed by a pattern of relative site abundance and diversity in the last 1,500 years reflects environmental factors.

This leaves the problem of the adequacy of previous surveys, and the issue of whether sampling for dating purposes has been biased towards more recent visible site contexts. Existing survey information is inadequate to exclude the possibility of earlier Holocene human occupation (e.g., 6,500-2,500 BP). Certainly there is a bias in the present grouped radiocarbon dates to sites which have been investigated because they were highly visible at surface. Only Seegan Beach, Mua has produced archaeological material where the context had no archaeological expression at ground surface. The possibility, however, that the emerging chronology illustrates a real arrival of island colonists around 2,500 BP needs addressing. Here we cautiously favour such a hypothesis, and will elaborate the reasons in subsequent sections.

GEOLOGICAL AND STRATIGRAPHIC CONTEXTS OF POSSIBLE PLEISTOCENE AND EARLY HOLOCENE HUMAN OCCUPATION. The high islands of Torres Strait exhibit 2 broad categories of stratigraphic context in which archaeological sites can form and then preserve, irrespective of the geological age and nature of the bedrock. In island interiors, slope deposits are normally thin and skeletal, largely winnowed of fine sediments and bedrock outcrops are common. Soils are shallow and stony overlying moderately weathered saprolite (Pain in Von Gnielinski et al., 1998). In the Western Islands, soils and landforms represent the polygenetic outcome of weathering since the Tertiary (Willmott et al., 1973). For much of the Pleistocene the present topography of the islands would have represented low ridges and hills forming the highest parts of a drainage divide

aligned along the structural basement of the Cape York-Oriomo Ridge. During repetitive low sea level stands during the Pleistocene the islands would have been located in the upper tributaries of extensive drainage systems draining westwards into the Arafura Sea, and eastwards into the Coral Sea (Harris et al., 1993, 1996; Maxwell, 1968). The general palaeogeography has been discussed elsewhere (Barham & Harris, 1983; Jennings, 1972) and will not be re-examined here.

To conceptualise palaeogeography in relation to possible archaeological site preservation for the Pleistocene and early Holocene, the rocky islands of Torres Strait have to be visualised as high ridge points located either in the extreme upper headwaters of large low gradient valley systems (the low eustatic Pleistocene sea level condition), or as small high islands with marine action re-activating slope processes on exposed coastlines and activating accretionary coastal sedimentation within sheltered embayments around their margins (the high Pleistocene eustatic sea level and mid- to late-Holocene condition). In both conditions, the interior areas of the present high islands would be subject to net sediment erosion. Late-Pleistocene human occupants, or migrants utilising the low sea level land bridge, would be far more likely to have crossed the plain following lower water courses, or travelled along the low sea level coastlines marked by the outer edge of the Great Barrier Reef to the east, and shorelines westwards of palaeo-Lake Carpentaria (Torgersen et al., 1983, 1988), than travelled the ridge line through Torres Strait.

Thus, the occurrence of late Pleistocene and early Holocene sites on the 'palaeo-hills' which the present islands represent is unlikely on palaeogeographical grounds. Even if open sites existed in the past, their survival in island interiors is unlikely given the geomorphological conditions prevailing in these areas over the last 70,000 years, except as isolated and dispersed lithic scatters. Large cave sites, or rockshelters in the low hilly uplands which the present islands constituted during low sea level, might have attracted occupants, and preserve older stratigraphy, but to date no such sites have been located, or systematically sought through ground surveys (cf., David & McNiven, this volume). Thus, on geomorphological criteria, and recognising the bias in archaeological surveys so far conducted towards terrain which is chronostratigraphically of late-Holocene age, we conclude that the

absence of evidence of late Pleistocene and early Holocene human occupation is unsurprising.

GEOLOGICAL AND STRATIGRAPHIC CONTEXTS FOR MID- TO LATE-HOLOCENE OCCUPATION OF THE TORRES STRAIT ISLANDS. The emplacement of shallow marine environments around the islands between c.8,500 and 6,500 yrs BP instigated a complex set of geomorphic responses at island shorelines. Most islands exhibit evidence for initially high-energy conditions along shorelines, probably dating to this period. Subsequently, reef growth, inshore embayment infilling and shallowing led to nearshore zones led to various styles of progradation on lower energy coastlines (Barham & Harris, 1983: figs 2, 3; Barham, 1999, 2000; Woodroffe et al., 2000). This development of a 'fringing apron' of coral reef and coastal accretionary sediment lagged behind stabilisation of sea-level at its eustatic maximum at c.6,500 years BP, by typically 2000-3000 years. Where dated, sand beach embayments and mangroves exhibit significant progradational development commencing between 3,500 and 3,000 yrs BP (Barham, 1999, 2000: fig. 12, table 1, unpubl. data; Barham & Harris, 1983).

Therefore, while archaeological material of considerable age range could be present in island interiors, irrespective of archaeological age, it is likely to be stratified near surface, in an active attritional environment for contextually meaningful preservation of all but larger lithic artefact components. This is particularly true of the larger higher Western Islands. Potential for late-Pleistocene and early Holocene stratified site preservation is largely restricted to the upper stratigraphy of some larger colluvial fans, localised quartzose sand dunes of presumed late-Pleistocene age (e.g., on Badu) and the unconformities located at the landward edge of, or beneath, the stratigraphic architectures of prograded coastal sequences as they onlap older pedostratigraphies. Earlier Holocene topographies are either on-lapped by accretionary coastal sequences, or overlain by thin alluvial sequences formed behind accretionary coastal barriers (e.g., small swamp systems on the east coasts of Badu and Mua).

The potential for preservation of open sites in well-stratified sequences is, therefore, largely limited to the Holocene accretionary coastal margins of the high Western Islands, or on older surfaces where weathering has not yet removed evidence (e.g., clayland surfaces on Saibai).

These areas are also those most investigated, both for reasons of site visibility and theoretical approach.

In the Eastern Islands, similar palaeo-environmental conditions have prevailed during the Holocene, but the softer and younger volcanic bedrocks have produced thicker soil and sediment sequences in the interior areas of Mer and Dauar. Sediments on slopes also retain a finer silt-clay matrix. The chronostratigraphic situation differs from the high Western Islands in that interior areas are underlain by bedrock of Quaternary age, and therefore no development of deep Tertiary weathering phenomena has taken place. Weathering of weakly lithified clastic lavas has locally produced true caves, particularly close to shorelines. The relatively steep slopes of former volcanic cones, and associated steeply dipping ash beds aid the generation of colluvium. Colluvial sediments are more commonly found either interstratified with, or overlying, late Holocene coastal and archaeological stratigraphy on Mer and Dauar (see Carter et al., this volume) than is the case on other islands in Torres Strait. This allows for the formation of deeper sequences of archaeological stratigraphy, in the narrow strip of land at the base of slopes and immediately overlying earliest preserved Holocene beach deposits (e.g., at Sokoli and Ormi – see Carter, 2002a; Carter et al., this volume).

The small coral sand cays and mangrove colonised coral reef platforms of the central islands, such as Warraber, Sassie, Zegey and Masig, developed only once coral reef platforms, and in particular sub-tidal coral architectures, stabilised sufficiently to 1) generate cay-forming sediments and 2) store reef-derived sediments in upper- and supra-tidal datums. This process, where sediments have been radiocarbon dated (Barham & Harris, 1983; Barham, 2000; Woodroffe et al., 2000), parallels the onset of embayment accretion in the Western Islands dated to around 4,000 years BP or later (Barham, 2000: fig. 12). Thus, the mid-Holocene geography of Torres Strait lacked most of the island cays and mangrove islets on platform reefs presently located between the Eastern Islands and higher bedrock-cored islands such as Yam to the west, although actively growing reefs were quickly present near surface after 6,000 BP (Woodroffe et al., 2000). Many of these 'cay' islands formed important intermediary points in ethnographically documented trade-networks (e.g., Moore, 1978; Lawrence, 1994). Therefore,

the prehistoric time-depth of occupation and trading through these 'cay' islands is limited by geological and geomorphological factors to a maximum age of <2,000 years.

In summary, the Holocene chronostratigraphic development of coastal landforms and terrain appears to present significant *local* controls on the nature of archaeological site formation, preservation, chronology and visibility on all island coastlines in Torres Strait. However, geomorphological factors do not appear to explain the absence of occupational evidence for the period c.5,000-2,500 yrs BP at the regional scale (Barham, 2000: figs 12, 14). Future approaches to archaeological site investigations through excavation, and assessments of site fragility and management of the cultural resource are likely to benefit from geoarchaeological interpretive approaches, especially if applied at local scales to issues of coastal instability and/or erosion. Both archaeological chronologies and the bio-assemblage characteristics of individual coastal midden sites are likely to reflect late-Holocene geomorphological process characteristics, and their lithostratigraphic consequences, operating locally. For example, within individual embayments geological structures, geomorphology, fetch and nearshore sedimentary regimes appear to be key determinants of the marine littoral ecologies which became available in the mid-Holocene and which were subsequently exploited and discarded as organic skeletal remains within middens. Regional modelling of palaeogeography and palaeoenvironments (Barham & Harris, 1983) is less useful for interpreting individual archaeological site stratigraphies than local reconstructions (such as modelled for swamp environments in the vicinity of the Woam site on Saibai – Barham, 1999).

MODELS OF CULTURAL ORIGINS AND THE APPARENT LATE-HOLOCENE ANTIQUITY OF OCCUPATION IN TORRES STRAIT. Prior to the 1970s, discussion on the origins of the Torres Strait Islanders was of major interest and drew mainly on local myths and legends, and on theories deduced from evidence of land bridges and changing sea levels. Haddon (1935) examined problems of origins, and although lacking a chronology, outlined a sequence of population dispersal to explain cultural, genetic and linguistic traits he observed. Haddon (1921; 1935: 275-278, 410-414) posited that Torres Strait was not settled by the original 'Negrito-Papuan' stock thought to have been the

first settlers of Australia and PNG. Haddon saw the Western Islands being populated by an 'ancient stock' perhaps emanating from northwestern Australia, when the Torres Strait-Arafura Shelf were linked during low sea level (Barham & Harris, 1983; Torgersen et al., 1988). Rising sea levels saw the creation of the insular geography of the present Strait. At this stage (which would now be broadly defined as no earlier than the early mid-Holocene) Haddon argued that both Western and Eastern Islands were colonised by peoples from southwest of the Fly River mouth on the PNG mainland. A final movement of population, from the Fly River mouth (i.e. the now well-recognised Kiwai-speaking out-movement – Barham, 1999, fig. 4; 2000; Landtman, 1927; Lawrence, 1994, 1998) was also essential to Haddon's model. Irrespective of chronological uncertainty, Haddon (1890, 1907, 1921, 1935) was in no doubt that culture contact in the later periods had predominantly been from PNG southwards. Finally, Haddon (1935: 410) presciently identified the considerable problems inherent in the observation that the 'Australian' language of the western Islanders (Kala Lagaw Ya) extended geographically northwards to the PNG coast, when he wrote that this suggested 'an ancient ethnic movement which requires further investigation'⁶. The 19th Century observations of the spatial pattern of 'traditional' linguistic boundaries across Torres Strait continue to pose challenges to models of island colonisation and occupation when accommodation with archaeological data and chronologies is attempted (Barham, 1999, 2000; Golson, 1972; Shnukal, 1998: 196-198).

When Golson (1972) reviewed the evidence for land connections and PNG-Australian prehistory across Torres Strait, a new regional chronological framework was radiocarbon-based and emergent, although there were still no radiocarbon dates from archaeological sites in Torres Strait. Excavations across mainland Australia and the PNG Highlands in particular indicated to Golson that 'man has been in Australia for upwards of 25,000 years' (1972: 375). Issues relating to timing and mechanisms responsible for Holocene human colonisation of archipelagoes off mainland Australia were also beginning a major theoretical development (Golson 1972: 381-382; Jones, 1968, 1976). As Golson then saw it, 'it was a virtual certainty' that hunter-gatherer populations occupied the Torres Strait shelf prior to sea-level rise, where, at

around 6,500 years BP, the only watercraft available were variants of the bark canoe (Golson, 1972: 382). He went on to suggest that while hunter-gather populations would have 'survived' marine transgression on larger islands, this would not have been the case in the small Eastern Islands. He then constructed a theoretical model that involved 'a little or no opposition' principle to explain the later geographic distribution of horticulture in particular, and the Papuan language more generally. Evidence for horticulture, as seen in the 19th Century, reflected later in-migrations of coastal Papuan speaking populations probably with pigs, double-outriggers and 'horticultural economies on which a viable population could be based' (Golson, 1972: 384). A final in-migration or phase of cultural contact was firmly placed within the last 2-3,000 years BP and involved the arrival of Austronesian speakers on the adjacent PNG coast where superior single-outrigger canoe technology replaced the double-outrigger. By implication, Golson (1972) placed Torres Strait and northern Cape York at the outer expansionary limit of the (earlier) double-outrigger canoe technology and certainly at the margins of later Austronesian-speaking influence along the PNG coast.

Moore (1979: 308-313) likewise hypothesised that the culture history of the Strait began when people who inhabited lands that became the Torres Strait, following sea level rise at 6,500 years ago, may have been stranded on the newly formed Western Islands. Linguistic evidence suggested to Moore that these refugees or subsequent colonisers were Aboriginal. Based on linguistic evidence and local legend it was argued that a 'Trans-Fly' overlay of Papuan speakers subsequently occurred in the Top Western Islands. Linguistic evidence then suggested a further cultural overlay, probably associated with horticulture and outrigger canoes to the Western and Top Western Islands. Papuan migrants also moved south into the Central Islands and ended up speaking Kala Lagaw Ya. Finally, Fly River Papuans migrated south to the Eastern Islands.

Harris (1995) re-visited these issues and re-posed the possible relevance of Austronesian influences on horticulture, co-associated with the pig and dog, and patterns of horticultural adoption in Torres Strait. Barham (1999, 2000) drew attention to the problems associated with linking 'Austronesian' backwash hypotheses and evidence for horticulture associated with 'founding populations' in Torres Strait. These are

first, the absence of linguistic evidence for direct Austronesian language influence. Secondly, the fact that the earliest dates for Holocene occupation are on Torres Strait islands (Saibai and Mer/Dauar) which appear to have been highly dependent on horticulture. These are also islands where horticulture might reasonably be argued to be a pre-requisite for sedentism/permanent occupation. Thirdly, the absence of direct evidence for any 'hunter-gatherer occupation' on any island, large or small, pre-dating 2,500 BP. There appears to be little evidence supporting the views of Golson (1972) and Moore (1979) for populations surviving Torres Strait shelf transgression, and providing opposition when later horticulturalists arrived⁷.

Returning to the broader prehistoric questions of possible hunter-gatherer 'survivors', what factors might explain the absence of evidence for remnant isolated human populations from the Torres Strait land bridge of 8-9,000 BP sitting out the mid-Holocene on the larger islands of Torres Strait, waiting to 'confront' horticulturalists from PNG?

Aboriginal people were in Australia by at least 40,000 years BP and possibly as early as 45-65,000 years BP (Balme, 2000; O'Connor & Chappell, 2003; Simpson & Grün, 1998; Roberts et al., 1998; Thorne et al., 1999; Turney & Bird, 2002; Turney et al., 2001). Melanesian occupation of the PNG mainland and offshore islands is well established as greater than 35,000 BP (Barham, 1999: 71, fig. 1; Gorecki, 1993; Groube et al., 1986; Pavlides, 1999; O'Connor & Chappell, 2003; Wickler, 2001). Thus, people were present in Australia, New Guinea and in the islands of Melanesia during the Pleistocene when the Sahul shelf was exposed by eustatic lowering of the sea level and the 2 continents were united as Greater Australia. This is exactly as envisaged by Golson (1972), but for nearly double the timescale (50ka rather than 25ka) known in 1972. From 70,000 BP to c.8500 BP, the present Torres Strait would therefore have provided a landbridge for the north-south movement of people. However, it may not have been a very attractive landbridge as the limited evidence available suggests that relatively arid conditions prevailed (Barham & Harris, 1983: 543-545). Coastal habitats would have been located many hundreds of kilometres west, and in a relatively static position at the outer Great Barrier Reef edge, 150-200km east of the present longitudinal axis of the Strait. Coastal fluvial and freshwater swamp environments may have existed and

provided resources which were suitable for human exploitation, but subsequent rises in sea-level have obliterated or obscured evidence of these habitats. Although not yet investigated in any detail, the presence of Lake Carpentaria and its environs to the west (Torgersen et al., 1983, 1988) may have been more of an attraction until at least 10,000 years ago (Stephens & Head, 1995). Whether populations existed in the low uplands of the Torres Strait divide during low sea level periods when Golson (2001) models a culture area across the Sahul Shelf remains entirely speculative, and the extent to which transgression of the shelf had implications for local populations, as well as the cultures of peoples north and south (Golson, 2001: 185-186; Gosden & Head, 1999), is likewise unknown.

If people occupied the Sahul Shelf during the late Pleistocene and early Holocene in the vicinity of the drainage divide of what was to become Torres Strait, the evidence is now difficult to locate. A population inhabiting the shelf at this time would have faced major environmental changes between 12,000-8,500 BP as the sea level rose and flooded the Sahul shelf. The rapid rise in sea level from -18m to present levels 8,500-6,500 years ago must have disrupted biotic communities and favoured taxa able to respond quickly to sudden spatial changes of habitat (Barham & Harris, 1983: 546). Since Holocene sea level rise resulted in a 97% reduction in land area, the new coastlines and indeed the distribution of islands presented a fundamentally new set of environmental conditions. Whether people became stranded on the islands, were ill equipped to deal with the novel insularity and migrated back to adjacent mainlands, or simply abandoned the new maritime environment around 8,500-6,500 BP remains conjectural. This is one of the issues now being addressed by the Western Torres Strait Cultural History Project (David & McNiven, this volume).

Some hypothetical models advanced for the initial Holocene occupation of the Torres Strait region appear less tenable now that a regional chronology is emerging both from Torres Strait and mainland PNG and adjacent island groups to the north and west. For example, Golson (1972) proposed that the coastal peoples of PNG might have had double outrigger canoes as early as 5,000-6,000 years ago, thus potentially enabling them to colonise the islands. There is little direct evidence to support conjectures regarding the antiquity of canoe types, but it would seem

unlikely that either single or double outrigger canoes were available in Torres Strait earlier than the well-documented Austronesian expansions along the northern coasts of PNG, where double-outriggers are the assumed critical artefact (Anderson, 2000; Barham, 2000).

On the Australian side of Torres Strait, bark canoes of various types were probably available from 6,000 years BP or earlier. Jones (1976) suggested 13 km as a crucial limiting distance for return journeys by most bark canoes and this would have limited Australian Aboriginal people to reaching the islands of the Murulag group. However, greater distances were attained in many situations (Rowland, 1984b, 1987, 1995). Historical sources (Roth, 1908, 1910; Haddon & Hornell, 1975) suggest that a variety of canoe types were in use in the islands in the 19th Century, including the large, double outrigger war canoes that frequently made inter-island voyages of over 40 km. The extent to which these canoe types were used in the past is unknown.

A model of relatively late-Holocene island colonisation has some appeal when archaeological dates are compared with traditions on the PNG coast of lighter skinned 'Pacific Man' coming from the east and marrying local women (Laade, 1968). This may relate to the arrival of Austronesian-speaking people from Island Melanesia, arriving in the Port Moresby region around 1,900 BP (Allen, 1972, 1977a, 1977b: 391; Bickler, 1997: 151-152; Bulmer, 1975, 1979; Vanderwal, 1973b: 234-237). Movement of people from this region into Torres Strait within the last 2,000 years would be compatible with some of the existing ethnographic, historical and archaeological evidence (see also Harris, 1995: 853). However, three difficulties exist with positing initial late-Holocene island colonisation of Torres Strait as part of the general Early Ceramic Period on the southern PNG coast, either related to the well established westward dispersion of speakers of Papuan Tip languages (Lilley, 1999: 32), or more generally to late Austronesian expansion (Harris, 1995). These are: 1) the earliest dates for Torres Strait predate earliest dates for the Early Ceramic Period sites by minimally 500 years; 2) there is very limited evidence for Austronesian influence on languages of either the Fly Delta region, southern coast of the Western Province, or Torres Strait; and 3) there is no evidence yet that first occupation of the islands was by cultural groups with ceramics. In fact, the oldest Torres Strait radiocarbon dates are chronologically more

similar to dates from pre-ceramic levels at Kukuba Cave near Yule Island (Vanderwal, 1973b) and at Ouloubomotu and Rupo in the Papuan Gulf, dating to between 2,500 and 2,000 BP (Bickler, 1997: 152; Rhoads, 1980). Bickler (1997: 152) has further suggested that the modern non-Austronesian (NAN) speakers of the coastline west of Yule Island may represent the western boundary of the Early Ceramic Period migration episode.

Most recently, Mulvaney & Kamminga (1999) have argued that sustained occupation of the islands occurred no earlier than about 4,000 years ago. Present data from Torres Strait provide no support for this proposition. Barham (2000) has argued that sustained occupation of the smaller Torres Strait Islands without the availability of outrigger canoe technology would be difficult. As recently proposed (Barham, 1999: 76; 2000), occupation, as distinct from occasional visitation from adjacent mainlands, appears to equate chronologically with age-depths of post-Austronesian occupation of Island Melanesia during the Holocene, and in particular to the established modal age-depths of coastal occupation in northern Cape York and southern PNG of predominantly 2,500 years BP or less. This chronology for Torres Strait would be equivalent to the post-Lapita or later prehistoric periods as defined by Spriggs (1993) for the wider Melanesian context (Barham, 1999). However, present data suggest first occupation of the Torres Strait islands commenced prior to the Early Ceramic Period, by NAN-speaking populations without ceramics (Barham, 2000).

This view, of course, does not preclude subsequent intermittent contact between Torres Strait and ceramic source areas in the Yule Island and Port Moresby areas, across the Gulf of Papua, in the period 1,800-900 cal BP when there was a continuous influx of Yule Island pottery into the Papuan Gulf area (Bickler, 1997: 159) or infrequent movements of ceramics, and possibly obsidian, into Torres Strait, via the coastal Gulf area. Indeed, as Lilley (1999: 32) has recently suggested, the linguistic evidence provided by Ross (1998) for later Massim (AN-speaking) intrusions into the Port Moresby area, may relate to the significant shifts in the archaeological (especially ceramic) records of the south PNG coast dating to c.1,200-1,000 BP (Irwin, 1985). By extension, future data may support links between the ceramic 'hiccup' at 1,200 BP on the PNG coast and evidence for increasing numbers of sites, and in particular agricultural activity in

the Trans-Fly, Fly Delta and Torres Strait islands around this time. While this is speculation on present data, recent excavation radiocarbon dates from the Eastern Islands (Carter, 2001, 2002a: 7-8, 2002b; Carter et al., this volume) provide further support for models which place the development of the Torres Strait Cultural Complex (Barham, 1999, 2000: 227-228, fig. 1) as originating in linkage with the later Holocene estuarine and coastal populations in the Papuan Gulf.

Archaeological evidence from the Torres Strait is as yet insufficient either to confirm or to refute the various hypothetical models that can be constructed concerning the area's prehistory. As more data become available, an emphasis on points of origin, antiquity and socio-economic organisation of the early colonisers of the Torres Strait will remain important in reconstructing a regional prehistory. Thus far, much of the prehistoric modelling and field enquiry in the Torres Strait has been motivated and directed by a unique 19th Century ethnographic picture rather than the field archaeological evidence (e.g., Harris, 1977, 1979; Moore, 1979; Vanderwal, 1973a). In future it will be important to consider whether the two pictures of 'material cultures' correspond. Previous archaeological investigations have tended to confirm aspects of the ethnography at a variety of levels but have not always added greatly to our knowledge of economic and social adaptations to the varied island environments over time. Archaeological surveys have located a wide range of site types including shell middens, rock shelters, burial sites, rock-art, fish traps and open surface shell scatters, some of which can be directly linked to activities, localities and sites described ethnographically. At the broadest level, archaeology has confirmed the primacy of a marine based economy in the Torres Strait Islands complemented in many areas by a varying dependence on horticultural plants and cultivation practices.

DISCUSSION

The present demonstrated chronology suggests closer affinities between early sites in Torres Strait and early aceramic sites in the Papuan Gulf and its hinterland within the river catchments west of the Purari River, than areas further eastwards. We posed a question earlier regarding the antiquity of linguistic patterning within the Torres Strait, and adjacent mainlands. Here we note that while ethnographic data does little more than confirm the presence of local customs

within the main linguistic areas of Meriam Mer and Kala Lagaw Ya, archaeological data suggest that 2 key aspects of linguistic evidence may be of considerable significance. First, that the ancestors of the Kiwai people are viewed as the carriers of the Trans-New Guinea Phylum languages, and that they superimposed linguistic elements of these Phylum languages on the non-Trans-New Guinea Phylum languages of the Trans-Fly area (Lawrence, 1994: 252).

Secondly, Kiwai languages extend from Mabaduan to the Gulf Province, and Kiwaian languages show strong affinities with languages located in the Upper Fly River headwaters (Lawrence, 1991a, b; Wurm, 1973: 252) which suggested to Wurm that original Kiwai speakers migrated down the Fly and into the Fly delta and Trans-Fly areas. Wurm suggested this migration took place no more than 3,000-4,000 years ago (Wurm, 1973: 255; Wurm et al., 1975; Ross, 1994). Wurm (1972) also suggested that the Gizra language (of the Mabaduan/Pahoturi River area) and Meriam Mir split from a common proto-language. While the origin of the northward spread of Proto-Paman loan words northwards across Torres Strait remains problematic, we note here that Laade (1971) argued that the Saibai language (Kalaw Kawaw Ya) might be the older form of Kala Lagaw Ya, that Saibai and Boigu were settled before the other Western Islands, and that people from the northern islands then settled Mabuag, and from there Badu.

There has been general agreement that Papuan influences outweigh Australian (Proto-Paman) influences on Kala Lagaw Ya. Also, that there are negligible influences of Proto-Paman languages on Meriam Mer. Therefore, we tentatively suggest here that some aspects of both archaeological and linguistic evidence indicate evidence for late-Holocene colonisation of the Torres Strait Islands with geographic links to the Trans-Fly and Fly River delta area. However, we also note the need for caution. Busse (1991) has commented on both the cultural and linguistic similarities between the Boazi and Zimakani speakers of the Lake Murray–Middle Fly area and the languages and culture of the Marind. More radically, Voorhoeve (1982) used linguistic data from the North Moluccas (North Halmaheran – NH) languages to suggest that Austronesian (AN) loan words existed that pointed to a possible source in the Central Papuan (CP) languages of the southeast PNG coast. Perhaps significantly, both Kiwai and Eleman languages (Trans-New

Guinea Phylum) included AN loan words. This suggested the possibility of west-east traffic of coastal voyagers via Torres Strait by AN language speakers (Voorhoeve, 1982: 230), presumably post-dating the development of westward expansion of Papuan Tip languages (i.e., almost certainly within the last 2,000 years on archaeological evidence).

Some cultivars, such as tobacco and sweet potatoes, and with them words such as *sukuba/sikupa/sugub* (tobacco) and *turik/tooree/turika* (knife/iron) are thought to have been traded into both Torres Strait and the PNG coastal area and Fly Delta as far west as the Purari River and Elema speakers by the Seram Laut of eastern Indonesia (Swadling, 1996: 155-165). Swadling dates this trade contact to between 1645 and 1790 AD, and explains the absence of evidence of contact on Cape York to the Seram Laut's specific interest in *damar* (resin) available from the Trans-Fly area. Whether this supposed late phase of contact with the Moluccas is sufficient to explain the occurrence of other AN loan words awaits further linguistic investigation.

The balance of data suggest occupation in both Torres Strait, and the adjacent riverine catchments of the Lake Murray/Middle Fly, Trans-Fly (i.e., Mai Kussa, Binaturi and Oriomo Rivers) and Fly Delta areas significantly earlier than the westward expansion of the Papuan Tip language speakers (and ceramic and obsidian carriers) commencing c.2,000 BP. There is also tentative evidence from both archaeological and linguistic sources that within the last two millennia Torres Strait may have been subject to influences from both the west and east, via medium to long distance voyaging along the southern PNG coast. With this in mind we now turn to the two remaining themes of antiquity of horticulture and inter-island trade.

ARCHAEOLOGICAL SITE EVIDENCE FOR HORTICULTURE IN TORRES STRAIT AND THE ISSUE OF AGRICULTURAL ANTIQUITY. As the archaeological database has increased, three main site categories of archaeological features indicative of former cultivation on the Torres Strait islands have emerged. These are: 1) constructed mound-and-ditch arrangements; 2) linear and curved linear mounds; and 3) complexes of stone arrangements and stone cairns. Two further types of evidence, vegetation patterns suggesting human influence (and in particular coconut and bamboo groves), and soils may be mentioned, but these categories of data

are insufficiently researched to add to any discussion on the antiquity of horticulture in the islands. The observed properties of the three types of archaeological feature evidence are summarised in Table 3.

Harris (1989: 16-23) defines agriculture in terms of the presence of evidence for both the propagation and cultivation of domesticated plants (cultivars), and notes that some agro-ecosystems, particularly horticultural types, incorporate wild and 'weedy' species in the domestic economy (see Harris, 1995: 848-849). Here, in the general absence of direct archaeobotanical evidence for the plants cultivated (cf., Carter, 2002a), but utilising evidence of field features identified, we use the terms agriculture/horticulture presumptively, assuming that the field archaeological features identified would have involved use of plant cultivars, and follow Harris (1995: 850) in associating agriculture/horticulture with root crops raised on mound-and-ditched fields, tree crops grown in house gardens, and village groves.

The location and intensity of pre-contact agricultural/horticultural activity, now identified archaeologically on the ground, only partially matches the pattern predicted from ethnographic accounts (Harris, 1979). Harris (1975, 1976, 1977) researched only the Western Islands during fieldwork. While stating that agriculture was 'relatively more important' in the smaller and more remote Central and Eastern islands (Harris, 1995: 850), Harris did not explicitly incorporate evidence from these islands in his early models, or subsequently. The pattern of field evidence for horticulture now emerging in Torres Strait shows two main features.

First, evidence for stone cairns and arrangements, particularly walls, boundary markers and stone-lined pathways⁸, associated with former garden areas through local oral testimony, appear to be relatively ubiquitous features of the smaller high islands known to have been occupied prior to European contact (e.g., Mabuig, Naghi, Gebar, Yam, Erub, Mer and Dauar). On these islands the stone features are commonly located in areas where present vegetation is also consistent with former mixed swidden cultivation, purposive management of plants such as bamboo, and elements of arboriculture. Some features such as small stone cairns and stone-lined pathways, appear to be common to both Eastern and Western Island Groups (Table 3). There are no sites where either excavation or dating has been attempted on what we term here

'lower slope garden areas'. However, viewed purely on archaeological data, the distinctions made ethnohistorically between the Eastern Islanders as intensively horticultural, and Western Islanders as being only marginally horticultural, appear difficult to reconcile with new survey data and material culture evidence from Mabuig (Harris & Ghaleb, 1987; Ghaleb, 1990) and Yam (Neal, 1989; Teske, 1987b), and shell hoe artefactual evidence (Moore, 1989: 16).

Secondly, once extensive areas of mound-and-ditch field systems are considered, the evidence for prehistoric agriculture/horticulture, and the geographic pattern, shifts considerably. Use of these systems remains unrecorded from the Eastern Islands, and is restricted to Saibai, Boigu and less clearly Dauan (Barham, 1999; Barham & Harris, 1985; Department of Aboriginal and Islander Affairs, 1990; Gibuma, 1991; Teske, 1988, 1990) and adjacent areas of lowland PNG (Barham, 1999; Harris & Laba, 1982; Hitchcock, 1996; Swadling, 1983), together with local areas close to post-Missionary contact settlements on Badu and Mua (near St Paul's Mission) (Neal, 1989; Rowland, 1984a, 1985) and on Mabuig (Harris & Ghaleb, 1987; Ghaleb, 1990, 1998). At a simple level this pattern is consistent with the geographic distribution of areas of lowland extensive enough to reward cultivation, but where wet season flooding by either fresh or brackish waters represents a problem that might be mediated by 'raised beds' separated by ditches. This physiographic situation is absent around the shorelines of Mer, Dauar, Erub and Ugar. Viewed broadly, the large field systems on Saibai and Boigu have correlates elsewhere throughout the lowlands of the Western Province of PNG and West Papua and occur where there are common myths regarding the origins of cultivation and introduction of cultivars (Barham, 1999; Laba, 1996; Wagner, 1996). In West Papua, Van Baal (1966: 19) commented on the general paucity of information regarding gardening for both the coastal and inland Marind, but then added that in 'swampy lowland garden-making is not to be made light of. Garden-beds have to be raised to a height of about a yard above ground-level, because they are constructed in places where the soil is richest, that is in the low-lying parts which are flooded early in the west monsoon.' The long and narrow mound beds were named *yavun* (meaning canoe), reflecting the way the mounds stood proud of the floodwaters (Van Baal, 1966: 19).

TABLE 3. Archaeological evidence for horticulture in Torres Strait. Site morphological types and associated features as currently recorded.

	Typical morphology	Relationship to topography	Ethnographic references	Known Island locations
Constructed mound-and-ditch field systems	Typically cover wide areas as integrated field systems, either as semi-grid patterns, or as irregular curved, rectangular and circular mounds separated by narrow ditches. Typical mound crest to ditch relief of <0.5m. No linkages of ditch systems to adjacent areas of saline and brackish water incursion.	Exclusively located in low-lying flat areas prone to flooding, either a) in back-beach areas where wet season streams debouch water from island interior and both water and sediment accumulate behind blocking prograded sand beach ridges (e.g. Badu adjacent to airstrip), St Paul's Mua, southwest area behind present village; or b) on flat clayland and sandy siltlands lying above and marginal to wet season flooding tracts (both mangrove and brackish freshwater systems in northern Torres Strait Islands and adjacent Papuan coastline.	None in Torres Strait. See Swadling (1983) and references therein.	Saibai (Barham, 1999; Barham & Harris, 1985); Badu (Rowland, 1984); St Paul's Mua (Barham & Harris, 1987). Also Boigu & Mabuig (Hitchcock, unpubl. aerial photographic data); Waidoro (Harris & Laba, 1982).
Linear and curvilinear raised mounds	Observed as single large mounds, or in small groups of parallel mounds, normally 15-30m in length, 3-6m wide and variably curved or rectangular depending on contour. Observed as extensively mulched and planted with bananas and yams on Saibai prior to construction of airstrip. Normally linear, with long axis orientated downslope, but also observed as rectangular on flatter ground in contemporary use on Boigu (Harris, 1977: fig. 13).	Normally located either at base of slopes marginal to lower flat land (e.g. Dauan, Dauar at Sokoli) i.e. areas of former colluvial sediment accumulation, with potential groundwater seepage feed from hinterland on level areas where either sand or silt-clay sediments lie above local maximum flooding datums (e.g. behind Saibai village prior to airstrip construction).	MacGillivray (1852)	Saibai (Harris, 1975); Dauan (Harris, 1977); Boigu (Harris, 1977).
Stone arrangements and stone cairns	Variable arrangements of stone-lined pathways, stone banks/low walls, small individual stone piles typically <1m high and 1-2m in diameter.	Located on lower slopes of hills, and areas of colluvial sediment accumulation at slope bases, often with thin soils lying over bedrock, and close to wet seasonal lines of overland flow from slope above.	MacGillivray (1852)	Dauar & Naghi (Barham, unpubl. data); Mabuig & Yam (Neal, 1989); Mabuig (Ghaleb, 1990).

There is scant evidence to link the smaller-scale variants of mound-and-ditch relict fields on Badu, Mua and Mabuig (Fig. 2A) to these areas, either chronologically or culturally. Given the widespread evidence for cultural change documented as driven by the arrival of mission teachers (most of whom came from Pacific Islands where agriculture was practised), we suggest interpretive caution is required. There is evidence that mission activity stimulated timber extraction and de-forestation on Mer (Haddon, 1912: 146).

We suggest that some ethnohistorical and archaeological evidence for horticulture, and in particular, some smaller areas of raised bed mound-and-ditch field systems on Mua, Badu and Mabuig, may be very recent in origin and represent an imported Pacific Island technological overlay on the prehistoric picture, reflecting both social and subsistence requirements stimulated by missionisation, and agglomeration of previously dispersed populations

into single settlements in the period 1870-1920. For example, some features adjacent to St Paul's Mission settlement on Mua, were constructed by the missionary Schomberg in the 1920s (Schomberg n.d.). Consideration of the agricultural practices employed by Pacific Islanders in their homelands may assist in the interpretation of these systems as either indigenous or imported (Barrau, 1955, 1956).

Morphological similarity of garden mound construction is an inadequate basis for assuming either chronological congruence, or, necessarily similar cropping techniques or cultivars. However, the mound-and-ditch lowland field systems on Saibai and Boigu need to be re-examined with reference to similar field systems in the neighbouring lowlands of New Guinea, and other documented forms of past wetland management involving agriculture (e.g., in West Papua on Kolopom Island – Serpenti, 1965). These widespread systems along the PNG coast have been inadequately addressed. Such

systems were far more widespread than previously assumed by Harris & Laba (1982), based on a very large corpus of existing ethnographic records of such systems collected over a century (Hitchcock, 1996; Swadling, 1983).

Moreover, within the Trans-Fly there are ancillary lines of evidence suggesting both that the area may have been a recipient of introduced cultivars (e.g., Yen, 1995: 837), both on the status of breadfruit amongst the Keraki and the restricted distribution of cultivated Kava (*Piper methysticum*) within PNG to the Western Province and adjacent lowland West Papua (Lebot, 1995). In northern Torres Strait and the adjacent Trans-Fly coast, ethnography suggests root crops of traditional taro-yam complexes (Yen, 1995) were the principal starch providers, supplemented by bananas and latterly sweet potato. How and when these agrosystems developed, particularly alongside use of palm sago (*Metroxylon sago*) as a principle starch staple in riverine wetlands in the same geographic areas (e.g., Ohtsuka, 1977: fig. 1 for sago using areas in the Binaturi and Oriomo River catchments inland of Daru; Rhoads, 1980; Yen, 1995: 836-837) pose important questions regarding previous models of origins, and chronology, of plant domestication during the Holocene in coastal lowland PNG (Golson, 1989; Gosden, 1995; Groube, 1993; Yen, 1995) and across Torres Strait.

On Saibai, the interior location of the very extensive mound-and-ditch systems, up to 15km away from the single late 19th Century post-mission settlement, apparently precluded their sighting by early European visitors (Barham & Harris, 1985: 259). Written and oral sources confirm earliest field construction dates to minimally 400 BP based on genealogical evidence and folk history (Barham, 1999; Laba, 1996; Wagner, 1996). On the basis of the spatial distribution and extent of the relic field systems on Saibai, their co-association with named locales known to be pre-contact in age (Laade, 1971), and limited archaeological dating, it seems certain that these systems are genuinely prehistoric in age.

Direct evidence for the antiquity of the mound-and-ditch agricultural field systems on Saibai is now two-fold. Initially, the only evidence for their age came from the radiocarbon dates at the Woam site, where the edge of a mound-and-ditch system stratigraphically overlay and disturbed the underlying shell and bone midden stratigraphy. This provided a maximum date for the overlying fields of < 800 years BP at that site

(Barham, 1999: 79; Barham & Harris, 1985). Subsequent detailed palaeoecological modelling of the stratigraphic infill of adjacent swamps has shown that the swamps changed from mangrove intertidal systems to brackish sedge swamps at c.3,500-3,000 BP. This represented an autecological shift related to sediment infilling of a pre-existing incised landscape morphology, Holocene sea-level emplacement and progradation of mangrove at the coast. However, the swamp stratigraphic records show reactivation of sediment input into the swamps, with a later phase of sedimentation derived from the adjacent clayland surfaces, after a long period of non-deposition. This accelerated sediment input dates to c.1,200 BP (Barham, 1999: fig. 17), and is interpreted as reflecting significant disturbance of the interior areas of the island through combinations of clearance, mound-and-ditch construction or maintenance of agricultural field systems.

The only other dating control on the antiquity of horticulture in Torres Strait comes from the excavations at Ormi (Dauar), and also at Sokoli (Dauar) where an abandoned linear crescentic horticultural mound overlies midden stratigraphy where the upper levels of midden stratigraphy date (as at Woam on Saibai) to <c.800 BP (Carter, 2002a). Preliminary phytolith and starch-grain identifications indicate the possibility of yam and sweet potato species, as well as banana, preserved within deep stratigraphy at both sites. However, the identifications are tentative (e.g., the starch grains of possible sweet potato could equally be the very common tropical coastal tuber *Ipomea pes-capra*). Likewise, the *Dioscorea* evidence would not discriminate varieties, and crucially 'wild' versus 'cultivated' types (Harris, 1995). Carter (2002a: 8) emphasised that the data are preliminary, and that further identification and analyses of the excavated archaeobotanical material from Dauar are required. The present data only support the possibility of microfossil evidence linked to horticulture preserved at depth, potentially dating to between 2,600-700 cal BP (Carter, 2002a: 6-7).⁹

There are 3 broad categories of archaeological field evidence (Table 3) relating to the antiquity of horticulture in Torres Strait. Of these, two distinct types of horticultural mound morphology have provided stratigraphic opportunities for radiocarbon dating. On Saibai and Dauar, where combinations of horticultural morphological evidence and other earlier bone/shell midden evidence for occupation are dated, the least

conservative age-estimates for commencement of mound-based horticulture suggests it post-dates first evidence for Holocene human occupation on these islands by 1,400-1,800 years.

How are these data to be interpreted in the light of previous discussions and speculations regarding the antiquity of agriculture/horticulture in Torres Strait? Probably any further interpretation is premature based on 3 sets of data from 2 islands. As Neal (1989: 23) noted, 'detailed examination of the mechanisms and structures of the horticultural systems of the Torres Strait ... remains to be resolved through future archaeological investigation'. However, 2 aspects of the data are worth noting. First, the earliest dates for island occupation are almost exactly identical in age (c.2,800 BP, uncorrected for ORE) and come from geographically and linguistically disparate and ecologically dissimilar parts of Torres Strait (Saibai and Dauar). For both Saibai and Dauar cultural connectivity to the PNG mainland is well demonstrated ethnohistorically, and viewed pre-historically, voyaging to and from both islands would be as easy to the PNG coast, as any other land area capable of supporting permanent populations. Secondly, both islands appear to suggest agriculture/horticulture post-dates first Holocene occupation by some considerable margin, but combine to suggest the swamp chronostratigraphic estimate of c.1,200 BP from Saibai (Barham 1999), is a reasonable first-order estimate for initiation of significant and sustained horticultural practice across Northern and Eastern Torres Strait Island groups as a whole.

Torres Strait has long been seen as a significant divide or boundary between hunter-gatherer Australia and agricultural New Guinea. As outlined above, Golson (1972: 389) saw part of the explanation within the pattern of geographic and ecological diversity across the Torres Strait archipelago, where indigenous hunter-gatherer populations would be variably equipped to resist contact with, or the inward-movement of, external horticulturalist populations from PNG. This view was a variant of more general models pre-supposing that Aboriginal Australians did not accept agriculture due to their inherent conservatism (e.g., McCarthy, 1957). Moore (1974, 1979) saw the issue from the perspective of the Western Islands, and the Barbara Thompson testimony for the Murulag group in particular, and like Harris (1974, 1977, 1979) relied heavily on ethnohistorical observations to model adoption/non-adoption of more or less

intensive horticultural methods, operating alongside demonstrably non-horticultural plant use (e.g. widespread yam-gathering), and ubiquitous maritime gathering, hunting and occasional reef-flat gardening, as practiced with clams. The theoretical views and models developed of Harris (1974, 1977, 1979) and Moore (1979) all hinge to varying extents on the veracity that can be attached to 19th Century historical accounts, and the geographic and observational validity in terms of the 'sampling' in space and time that historical sources represent, in particular those made by government expeditionary voyagers and missionaries. Harris (1979) devised a sophisticated model that linked intensified food production as gardening, to observed island areas and modelled populations (i.e. a population pressure/intensity relationship), mediated through inter-island trade. However, the primary data were significantly skewed to observations made on smaller high islands as the evidence for geographic specialisation. The topographic elements of the model became invalid as soon as the extensive nature of mound-and-ditch field systems was established by aerial reconnaissance and fieldwork in 1980 (Barham, 1980, 1999; Harris & Laba, 1982; Barham & Harris, 1985). Widespread mound-and-ditch field systems on Saibai clearly relate to a pre-mission sedentary geography across the island. These extensive systems, and those on the PNG mainland (Harris & Laba, 1982; Barham & Harris, 1985) in fact further support the notion of strong population density relationships in the observed patterns of horticultural adoption, but fit less well in the trade-horticulture elements of the earlier models (Harris, 1977, 1979) until trade links are more explicitly articulated around data from the PNG coast (e.g., Lawrence, 1994).

Harris (1995) noted a substantial lack of data regarding the chronology of agriculture in the New Guinea lowlands, although there is increasing evidence for late Pleistocene/early Holocene human settlement and the selective exploitation of wild food plants, especially tree 'crops', on the north coast and in the Melanesian islands to the east (Harris, 1995: 851). Yen (1995) similarly remarked on the apparently recent (late Holocene) emergence of sago exploitation in the few areas where archaeological data are available (Rhoads, 1980). The investigation of the antiquity of agriculture in the lowlands may be — as Harris (1995) argues — severely hampered by the scale of Holocene sedimentation, coastal and estuarine progradation and sea level rise, which

may have buried and drowned many settlement sites. However, in the case of sago exploitation, clearly late-Holocene coastal and riverine changes are ecologically coupled with the scope for, and scale of, sago use in the last 2,000 years as documented by Rhoads (1980). Harris (1995: 851) argues that the absence of any indication of early to mid-Holocene settlement in the PNG lowlands is striking. However, it is certainly the case in the Fly Delta and Trans-Fly that the archaeological record is biased substantially to the identification of midden-mounds and garden/field systems that mainly appear in association with sedentism around nucleated settlements. Therefore, it is not so much the absence of settlements, but the absence of sites that represent (pre-agricultural) pre-cursors to settlement in the lowlands that really poses the major barrier to our understanding of the development of agriculture in lowland southern PNG. Earlier sites are known, such as the lower stratigraphy of rockshelter/cave sites at Rupo and Ouloubomoto (where pig bone occurred in pre-ceramic phase levels in both sites) thought to date prior to 2,000 BP (Rhoads, 1980), but archaeobotanical evidence regarding plant use from these sites is minimal.

Harris (1995: 851-853) suggested the lowland field cultivation of the staple root and tuber crops of today, whether by dryland or wetland techniques, may be recent, and post date the eastward spread of Austronesian languages after about 3,500 years ago, and speculates that the introduction of the pig and other domesticates, as part of an agricultural 'package' may be involved in the process. He therefore implicitly co-associated the development of lowland coastal agriculture with post-Austronesian influences on the south coast. Given that most of the limited evidence for Austronesian-driven back-migration westwards from the PNG Tip is based on occurrence of obsidian and ceramics, and that this movement commenced at 1,900 cal BP (Bickler, 1997), such a model implies that Torres Strait has potentially acted as a barrier to the diffusion of agriculture from PNG into Australia only within the last 2,000 years.

While we agree with Harris that agriculture in parts of Highland New Guinea may represent a long, autonomous, history of cultivation and agricultural evolution in (part at least of) the New Guinea Highlands, which benefited at intervals from the addition of crops introduced from southeast Asia (Harris, 1995: 851), we feel that there is no basis to co-associate the evidence of

agricultural origins in the Trans-Fly/northern Torres Strait with either Austronesian expansion, or back migration. Evidence from Saibai, Dauar, and in the Kikori area (Rhoads, 1980) suggests populations were occupying lowland coastal, insular and riverine areas by 2,500-2,000 years BP. The use of sago may date to earliest occupation in the Kikori area (and speculatively earlier—Yen, 1995), and therefore would pre-date the Early Ceramic Period (Rhoads, 1980). The Kikori area lies well beyond the western limit of known Austronesian linguistic influence. In Torres Strait, best estimates for early agriculture date to more recently than c. 1,200 BP. Therefore, on this part of the southern coast of PNG, there appears to be evidence for use of sago significantly earlier than the likely time of Austronesian influence or evidence for agriculture significantly later (e.g., the extensive field systems on Saibai). There is no evidence for a coincidence between agricultural expansion and introduction of plant cultivars or animal domesticates, dating to e.g. 1,900-1,500 cal BP. There is increasing evidence that over the last 1,000 years at least, a variety of different carbohydrate staples were utilised by communities within the Torres Strait islands and adjacent PNG coast. Field cropping of yam-taro-banana may have operated alongside, and involved trading with, adjacent communities focused on the production of sago, or indeed, for parts of southern Torres Strait, the wet season exploitation of *biyu* (mangrove pod of *Bruguiera gymnorrhiza*). This co-synchronous adoption of differing approaches to procuring carbohydrate staples would be consistent with Allen's (1977a: 393) hypothesis that southeastern PNG coastal systems, site locations and settlements became more eco-specific after 1000 AD.

Harris (1995) argued that present evidence does not support a model of an (expansive) agricultural frontier resisted by the Aboriginal hunter-gatherers of mainland Australia during the Holocene, existing across Torres Strait. Moreover, he argued that neither does it appear likely, although direct evidence is almost entirely lacking, that agriculture has a great antiquity either in the Torres Strait Islands or in the PNG lowlands to the north. It follows that the Aboriginal populations of northern Australia neither actively rejected agriculture, nor that they were culturally indisposed to it (Harris, 1995: 852) (but see also Golson, 2001; Gosden & Head, 1999). This is consistent with Harris's view that agricultural systems based on seed crops, particularly if they

also incorporate pulses and/or domestic livestock as well as cereals, and thus provide a well balanced dietary 'package' that is self-sufficient, have an inherent tendency to expand, whereas root-crop (vegeticultural) systems, which provide mainly carbohydrate and are usually associated with fishing and/or hunting as the main means of obtaining protein and fat, are ecologically more stable and tend to remain localised. Since Torres Strait came into existence some 6,000 years ago, in Harris's (1995: 854) view it has functioned neither as a barrier to, nor as a bridge for, the transmission of agriculture into Australia.

This is arguable at the scale of the Holocene, but fails to provide a full explanation for events in Torres Strait over the last 500-1,000 years. First, it is well established that trade in sago, and knowledge of sago processing, prevailed in Torres Strait at the time of European contact, and that sago locally grew in the Eastern Islands (Macgillivray, 1852). Secondly, the ethno-historically-based trade models that Harris (1977, 1979) utilised suggest major movements across the Strait, and intermittent contact down the eastern coast of Cape York as far as Lloyd Bay by Torres Strait Islanders. Therefore, the consensus position that Torres Strait has been a zone of contact between agricultural and non-agricultural populations remains unchanged, but present data suggest this situation may have prevailed for at least 800 years. Simply reducing the timescale for the 'confrontation' of agriculture with non-agriculture does not explain away the complex issues raised.

The radiocarbon age-estimates from Torres Strait begin to suggest a different chronology, and possibly a different emphasis on the genesis of, and linkage between, trade and horticulture. Using present evidence, we can find no basis to argue for a significantly different start-point in intensive horticultural practice between the Top Western and Eastern Torres Strait Islands. All evidence suggests importation of horticultural practices and cultivars from sources on the adjacent PNG mainland. However, the present dating evidence does not support an antiquity for horticulture in Torres Strait with origins lying in the late consequences of Austronesian dispersal, at least via the extreme southeastern part of the PNG coast (Harris, 1995). Moreover, we can find little archaeological evidence to support a model directly linking small island trade nodes to intensity of horticultural practice (Harris, 1979). Instead, once data from Mer, Dauar, Erub, Ugar, Gebar and Yam are considered, in addition to the

evidence used by Harris for Mabuia, Naghi and Dauan, the archaeological pattern appears to be one of intensity of horticultural practice correlating inversely with area of land available for cultivation. This seems applicable to all small high islands, irrespective of their position in the 19th Century trade networks, or relative to the east-west linguistic division within Torres Strait. Furthermore, it appears that local topography, soils and availability of fertile areas of water-fed wet season swamps were largely responsible for the garden morphological characteristics of horticultural practice, irrespective of island geographic position in the Torres Strait. On low-lying flat areas prone to flooding raised mound-and-ditch systems were constructed, whereas on high islands with variable colluvial and alluvial fan deposits, and local back-beach swamps, run-off characteristics probably motivated decisions regarding optimal strategies for garden plot construction, either aiming at sediment retention, run-off control, and/or large mound mulching.

This raises an alternative hypothesis, namely that the apparent cline in horticultural practice through the Strait and into Cape York, as described and modelled from ethnohistorical data, is instead a function of the chronology of an inward migration of more intensive agricultural practice to Torres Strait from PNG, commencing after c.1,200 BP, and in particular, the following 3 factors. First, the relative recency of large-scale agricultural practices within the Torres Strait islands (and probably also northwards in population source areas in lowland coastal PNG), where intensification would be a function of regional population dynamics during the last 1,200 years. The origins of both population increase, and increasingly labour-intensive methods of plant cropping, may represent an exogenous influence derived from demographic changes either eastwards along the southern coast of PNG, or equally conceivably, in the Trans-Fly and catchment areas of the Fly, Kikori and Purari Rivers, commencing some time after 1,200 BP. There is considerable evidence that the dominance of the Kiwai in the 19th Century canoe trade network in the northern Strait is very recent in origin (Lawrence, 1998), and here we speculate that Kiwai immigration from the Fly estuary into vacated coastal areas between Saibai and Daru in the 19th Century, provides a socio-economic template for understanding earlier patterns of southerly migration, and possibly colonisation, of the Northern and

Eastern Torres Strait island groups, including the introduction of horticulture.

Secondly, we suggest that the maximum age estimate of c.2,500 BP for first occupation of the islands would suggest that first colonisers of previously unoccupied islands were maritime in focus (Barham, 2000), but are more likely than not to have had access to some cultivars, and would have operated a mixed subsistence mode supplementing hunting/fishing activities with both wild plant food collecting, and local small-scale swidden cultivation. This would be a similar situation to that previously suggested for coastal sites for the SE PNG coast during the proposed period of Austronesian back migration from 2,000-1,000 BP (Allen, 1977a: 391). As both the number of Torres Strait islands which were occupied increased, and then the carrying capacities of smaller islands were approached, local variants of intensification would have emerged, consequent upon topographic, soil and in particular water-availability characteristics of individual islands. However, a further force acting to promote the local differentiations is also likely to be stimulation of trade, and the need to maintain and promote trade links (Barham, 2000). Therefore, we would see the later prehistoric differential pattern of intensive horticulture on high islands as representing a response to carrying capacities being approached. Inter-island trade would be a consequence of this process, rather than a precursor to it, as in the Harris (1979) model. Thirdly, we would argue that on the larger Western high islands such as Badu and Mua, the initial subsistence patterns of earliest colonists persisted (i.e., hunting/fishing mostly supplemented by wild plant collecting and small-scale swidden horticulture together with elements of arboriculture), precisely because the population carrying capacities of these islands were never reached.

Finally, a coincident factor in producing the ethnographically observed cline in intensity of horticulture through Torres Strait relates to the phased 19th Century impact of colonial and industrial impacts on traditional subsistence. Within the 60-mile colonial jurisdiction established in 1872, introduced disease, physical violence between indigenous and European populations, and the effects of indigenous labour shifts into employment with fishing fleets and the rise of store-based purchase of food staples occurred significantly earlier than on the northern islands of Saibai, Boigu and Dauan, and in the Eastern Islands (Lawrence, 1998; Mullins,

1995). Therefore, ethnographic observations may have recorded a pattern of reliance on horticulture more attributable to the differential survival (by 1870-90) of traditional practices, rather than a picture reflecting true pre-European patterns through the islands. That certainly is the most parsimonious interpretation of archaeological evidence for horticulture emerging from islands such as Naghi and Gebar, known to have been depopulated in the mid- to late 19th Century.

ARCHAEOLOGICAL EVIDENCE FOR TRADE AND SOCIAL CONNECTIVITY ACROSS TORRES STRAIT IN PREHISTORY. Earlier we posed a thematic question regarding the relationship between ethnographic and archaeological evidence for trade. The issue was whether the present models of complex trade and subsistence interaction in the 19th Century (e.g., Lawrence, 1994, 1998), derived exclusively from historical and ethnohistorical (i.e., non-archaeological) sources, were consistent with the archaeological record so far established? If so, how long, and under what circumstances, might these interactions have prevailed in prehistory? We now attempt to address these questions utilising current data.

Vanderwal (1973a: 185) suggested that 'considering the resources of the Islands, and those of adjacent Australia and New Guinea, it seems almost inevitable that trade relationships would have been established' among the islands. Mulvaney & Kamminga (1999: 261-263) emphasised the trading nature of Torres Strait Islander life in the early historic period stating 'virtually no direct cultural link existed between Australia and New Guinea in early historic times. All social contact and exchanges from either landmass was with and via the Torres Strait Islanders'. However, despite the wealth of ethnographic/historical information on trade across Torres Strait (Harris, 1979, 1995; Lawrence, 1991a, 1994, 1998; Moore, 1978) few archaeological insights into either trans-Strait prehistoric trade or inter-island social interaction have been made. The situation has advanced little since White (1971: 187) asserted that the historical trading patterns were 'the end of a long tradition'. Direct insights from archaeological contexts and assemblages are limited to 1) the movement of stone artefacts and unmodified lithic raw materials across the Top Western and northern Central Island groups and the PNG mainland, and between the Western and Eastern Island

groups, 2) limited evidence for movements of shell, 3) the occurrence of isolated ceramic finds on Mer, Dauar, Pulu and Booby Islands, and 4) evidence of imported European items dating to the 19th Century (e.g., the pipe stem originating in Glasgow, found in a stratified context on Mabuiaig).

With respect to trade and inter-island movements of lithics, for example, potential sources for artefacts on Saibai are the nearby PNG coast at Mabaduan, and the islands of Dauan and/or Gebar to the south (Barham & Harris, 1987: 94-95). An exotic adze on Gebar may also have come from mainland PNG, while adzes found on the PNG mainland may have come from Dauan (Vanderwal, 1973a: 181-182). A single flake of obsidian found on Mabuiaig (Barham & Harris, 1987: 19; Ghaleb, 1990) may also have come from PNG. For Mer in the far east, Vanderwal (1973a: 184-185) suggested that the most likely source for stone artefacts is the Western Islands.

McNiven (1998) provided a significant insight into lithic trade relationships (see also McNiven & von Gnielinski, this volume). He noted that historical records generally identify the PNG mainland as the main source of Torres Strait stone-headed clubs (*gabagaba*), a view that has persisted, despite the contradictory fact that the PNG lowlands are essentially devoid of suitable stone sources. McNiven found that preliminary raw material assessments of the petrology of ethnographic and archaeological *gabagaba* in museums indicate that local Torres Strait stone was more significant than previously thought. He partly attributed the persistence of the view that stone was imported to Torres Strait from PNG, to diffusionist assumptions that superior cultural items, such as stone clubs, must have moved from the so-called advanced Papuan to less developed Torres Strait Islander cultural technologies. However, McNiven also argued that *gabagaba* had an important ceremonial role in exchanges between hostile groups aimed at cementing social alliances.

There is also evidence that Torres Strait Islanders obtained stone while voyaging down the coast of Cape York as far as Sir Charles Hardy and Forbes Islands (Haddon, 1935: 88) and that Quoin Island off the Pascoe River was visited to obtain stone for axes (Thomson, 1939: 82). As Lawrence (1994: 339) suggested, southerly excursions for turtle and dugong hunting may well have offered opportunities for obtaining stone, and Laade (1973: 159) similarly referred

to trade in stone from as far south as Lizard Island off Cape York, via the central Torres Strait islands, to Mer. On Mer and Dauar, white stones known as *nigir baker* were imported and had special ceremonial significance (Laade, 1973: 159). Finally, although McNiven (1998) has argued that PNG sources have been over-emphasised, the possibility of trade in polished stone axes (Lawrence, 1994: 338-339, appendix F) down the Fly River (Haddon, 1898: 221), from sources inland of the PNG lowlands should not be excluded, as the Owen Stanley Ranges have been suggested as sources for stone adzes known from Papuan Gulf sites both prior to the Early Ceramic Period, and during the last 2,000 years (Bickler, 1997: 152; Rhoads, 1980; Rhoads & Mackenzie, 1991; see also McNiven, von Gnielinski & Quinnell, this volume).

A range of both natural unmodified stones and lithic artefacts were traded between Torres Strait islands, given the occurrence of granite artefacts in the Eastern Islands (Haddon, 1912: 192; Laade, 1973), as well as exotic lithologies occurring as magic stones and recorded as manuports cemented into beachrock on Mer (Mayer, 1918: 7; Carter et al., this volume). On Saibai, Boigu and sand cays of the Central Islands, all lithic artefacts (or source material for lithic artefact manufacture) would have been imported either by trade, collection or raiding from other islands, or adjacent coasts. Some unmodified stones may have been retrieved from ships ballast, rather than traded, in the historic period. Archaeological data offer little to supplement ethnographic accounts of these lithic trade movements (McNiven, 1998). Further extensive research is required (Lawrence, 1994: 338), in particular seeking sites where 1) evidence of core reduction, flaking and relationships with quarry sites and/or grinding sites can be demonstrated; and 2) where stratified sequences containing lithic artefacts can be dated. Almost all evidence for lithic use and manufacture is non-stratigraphic and lacking any chronological linkage into the emerging occupation history of Torres Strait.

Shell was also traded, or transported, but again ethnohistoric evidence (e.g., Laade, 1973) outweighs archaeological data. Species such as *Geloina (Polymesoda) coaxans (akul)* — known to have been an all purpose cutting and scraping tool (Moore 1979: 282) — have been noted in association with rock niche secondary burial sites on small islands such as Naghi (Barham, unpubl. data), where mangroves supporting the taxa are

not present today and probably were not present in the past.

The ceramic evidence and possible links to trade are frugal. The ceramic vessels on Booby Island imply exogenous contact, if not trade (Coleman, 1991), although these may be of recent European origin (Richard Robins, pers. comm., 1999). The discovery of an earthenware rim-fragment at Sokoli on Dauar from stratigraphy dating to older than 730±45 yrs BP (but < 1830±50 BP) (Carter, 2001, 2002a; Carter et al. this volume, fig. 4, table 3) and 3 further sherds from the site of Ormi, apparently dating to a short depositional interval between 2,000-1,800 BP (Carter 2002b: 75) are potentially of much greater significance, both to issues of Torres Strait island colonisation and past linkages to the PNG mainland. Most of the coastline immediately north of Torres Strait, in the Gizra-Bine speaking areas of the Western Province, is traditionally aceramic (Laba, pers. comm., 1999), as was the lower catchment and delta areas of the Fly River (Haddon, 1894: 85) and Marind territory of West Papua (Van Baal, 1966: 23). There is negative evidence that Torres Strait was aceramic in later prehistory, in the form of a complete absence of reference to ceramic vessels in Torres Strait folk tales (e.g., Laade, 1971; Lawrie, 1970), and in ethnographic collections from the area (Edge-Partington, 1969; Haddon, 1894; Moore, 1984). However, there is evidence for ceramics from sites such as Samoa, near Kikori, dating to around the time of first Holocene occupation of Torres Strait, and later ceramic traditions (dating to <450 years BP) are known from sites such as Kinomere and Popo between Port Moresby and the Kikori River (Frankel & Rhoads, 1994) (see Barham, 1999: 76-78, fig. 5). Thus, on very sparse evidence, there may be the suggestion of earlier contact with ceramic traditions in PNG, perhaps associated with Early Period ceramic coastal sites (Allen, 1972, 1977a; Irwin, 1985; Rhoads, 1980; Vanderwal, 1973b), or more probably, the phase of importation of Yule Island pottery into the Papuan Gulf area from 1,800-800 cal BP (Bickler, 1997: 159), followed by a disappearance of contact with ceramic areas on the PNG coast by c. 800 BP.

Indirect evidence for social interaction within, across and more tentatively, beyond Torres Strait is provided by rock-art styles, designs and figurative images depicted in a wide variety of panels, mostly on distinctive landforms across Torres Strait (Barham, 2000; McNiven & David, this volume). John Singe pioneered the recording

of new sites onto Queensland State Archaeological Branch records in the Western Islands in the 1970s and quickly recognised likely thematic associations between rock-art panels on different islands, for example, rock-art sites on Mua, Keriri and Murulag. Singe also posited strong links between figurative designs depicted in rock-art and the ethnohistorically described clan totems, myths and legends of the Western and Central Islands.

At the regional scale, Cole & David (1992) reviewed published data and suggested that many aspects of western Torres Strait rock-art styles point towards PNG. They also, unsurprisingly from a geographic perspective, argued that the petroglyphs of the Eastern Islands had no correlates with petroglyphs on Cape York Peninsula and might be matched with 'decorated monoliths' described for PNG. Lawrie (1970: 143-147) made the important connection (through oral narrative recording) that some specific art on Dauan might in fact not be indigenously produced, but instead were depictions made by raiding parties from Kiwai Island (the Kupamul). Some of the Booby Island paintings have also been seen to have affinities with Papuan art (Coleman, n.d.), and one faint depiction of a sailing ship in Fern Cave was interpreted as either a Bugi or Macassan vessel (Coleman, n.d). It was conjectured that this might be evidence for maritime contact with either Asian or European voyagers prior to the 18th Century, and Coleman (n.d., 1991) has generally viewed intermittent contact with vessels trading out of the Moluccas prior to European entry into the East Indies as a strong possibility (Coleman, n.d, 1991). Thus, some rock-art images may point to even more extensive pre-European contacts in the region and possible links between rock-art and folk stories in lowland PNG relating to later prehistoric/early historic Indonesian traders (Laba, 1996; Wagner, 1996).

Those interpretations of Papuan affinity¹⁰, of course, engage with the long-standing views of Haddon, regarding cultural interactions, and in part are not independent of his earlier observations and views. This is because interpretation of specific motifs or figurative designs utilises heavily the available historical sources with in-built theoretical perspectives regarding geographic distributions, totems and associations — e.g., see the use of Haddon archives by Barham (1981) and the interpretations of the Kabadul Kula boulder on Dauan by McNiven et al. (2002a). Without both the observations and

material culture collections of Haddon and others (e.g. Edge-Partington, 1969) such interpretation lacks a reference framework. Conversely, finding independent archaeological criteria for testing inter-island social linkages suggested within the rock-art is difficult. Very few of the intra-regional linkages and inter-island cultural or totemic associations suggested by interpretation of rock-art appear at variance with regional patterns of movement, social allegiance, inter-island trade and voyaging established from other data (e.g. Lawrence, 1994).

Here we note 3 specific aspects of Torres Strait painted rock-art. First, there is a high incidence of anthropomorphic and zoomorphic images, some of which have direct connections to mythical creatures, referred to in oral myths and legends, such as the *dogai*. Haddon (1904) documented *dogai* images and myths as she-spirits of the Western Islands characterised by enlarged ears and a tail instead of legs. Haddon was informed 'by Mabuia natives of the existence in New Guinea of tailed men, who had to make a hole in the ground in order to sit down' (Haddon, 1904: 353). Red-painted images of such figures have been recorded on Mua (Barham, 1981: 12-13; 2000: 278-279, fig. 11b-f). Laade (1971: table 2a) and Lawrie (1970) record a *dogai* painting on Dauan (for a detailed discussion of the Dauan *dogai* painting, see McNiven, David et al., this volume). Although possibly coincidental, we note here the high frequency of similar images of both 'lizard-like' anthropomorphic figures, and specifically anthropomorphs with 'tails' recorded from a variety of areas in highland PNG (e.g., in the Chimbu Valley – Wilde, 1975: 14-17, fig. 4). Other similarities include the common use of chevrons, unfilled diamonds, body triangles and unfilled crescent motifs (for examples from Mua, see Barham, 1981, 2000: 277-279).

Secondly, rock-art sites in the Western Islands appear to be commonly associated with unusual landforms (e.g., the 'stone that fell from the sky' at Keriri and the *kod* site on Pulu Islet (Haddon, 1904: 4, 22, pl. 2; McNiven et al., 2000) which appear similar to sites on eastern and southern Mua (Barham, 1981: 12-14; Beckett, 1963), Naghi (Barham, unpubl. data) and also on Dauan (Laade, 1971: tables 2a, 8a). Common strands appear to link *augad* (clan) sites, naturally distinctive bedrock outcrops or boulders as *kula* (rock), rock-art, and secondary burials/ossuaries throughout the western part of Torres Strait. At such sites there are also strongly Papuan stylistic elements depicted, but also Papuan motifs and

artefacts (e.g., a bow at one site in eastern Mua – Barham, 2000: fig. 11c) and sun-ray type motifs, recorded by Barham (1981) and Beckett (1963), who described them as a 'clump of coconuts radiating from a base'. Thirdly, we note the possible wider connections and routeways that may have led to these conjunctions of culture, art form and style. These include the spatial distribution of decorative art styles depicted by Haddon, which he correlated with cultural artefactual attributes such as the distribution of the double outrigger canoe with oblong mat sails (Haddon, 1900) and house forms; sociocultural structure and beliefs such as south coast initiation ceremonies and totemism (Haddon, 1921); and to which can be added the Sida/Sido/Sosom myths (Barham, 1999: 75, fig. 4; Laade, 1971; Laba, 1996; Van Baal, 1966; Wagner, 1972, 1996), which are common to both the northern Torres Strait islands and the PNG coast between the Bensbach and the Purari rivers.

Dating rock-art in Torres Strait, and thus linking these possible stylistic affinities, with chronological evidence from stratified midden sites, would clearly represent a major forward step towards investigating cultural, and possibly even linguistic, origins in Torres Strait. In this regard the technical advances being applied (McNiven et al., 2000) to recover faded images are of considerable importance, as are the dividends likely from further identification of relative stratification of one rock-art image superimposed on another, as demonstrated for the Kabadul stone on Dauan (see McNiven et al. 2002a). At present, many figurative attributes of the identified rock-art link to either marine animals, both single-hull and outrigger canoes and related maritime images, often with parallels in clan (*augad*) totems. Also, many rock-art panels form part of larger areas of site complexes that include stone-built fish traps, shell middens and skull burial sites (see Fig. 11 for examples of spatially adjacent fish-traps and rock-art panels depicting boats on north Mua). These co-associations would suggest the maritime focus evident for much marine hunting and food gathering, is mirrored in rock-art (Barham, 2000: 277), and thus, by ethnographic analogy, into a prehistoric maritime cosmology comparable with that recorded historically (Laade, 1971; Lawrie, 1970; Sharp, 1993).

Finally, we note again that some aspects of linguistic evidence (Wurm, 1972) have pointed towards both the upper Fly and beyond to the north coast of New Guinea for elements of Torres

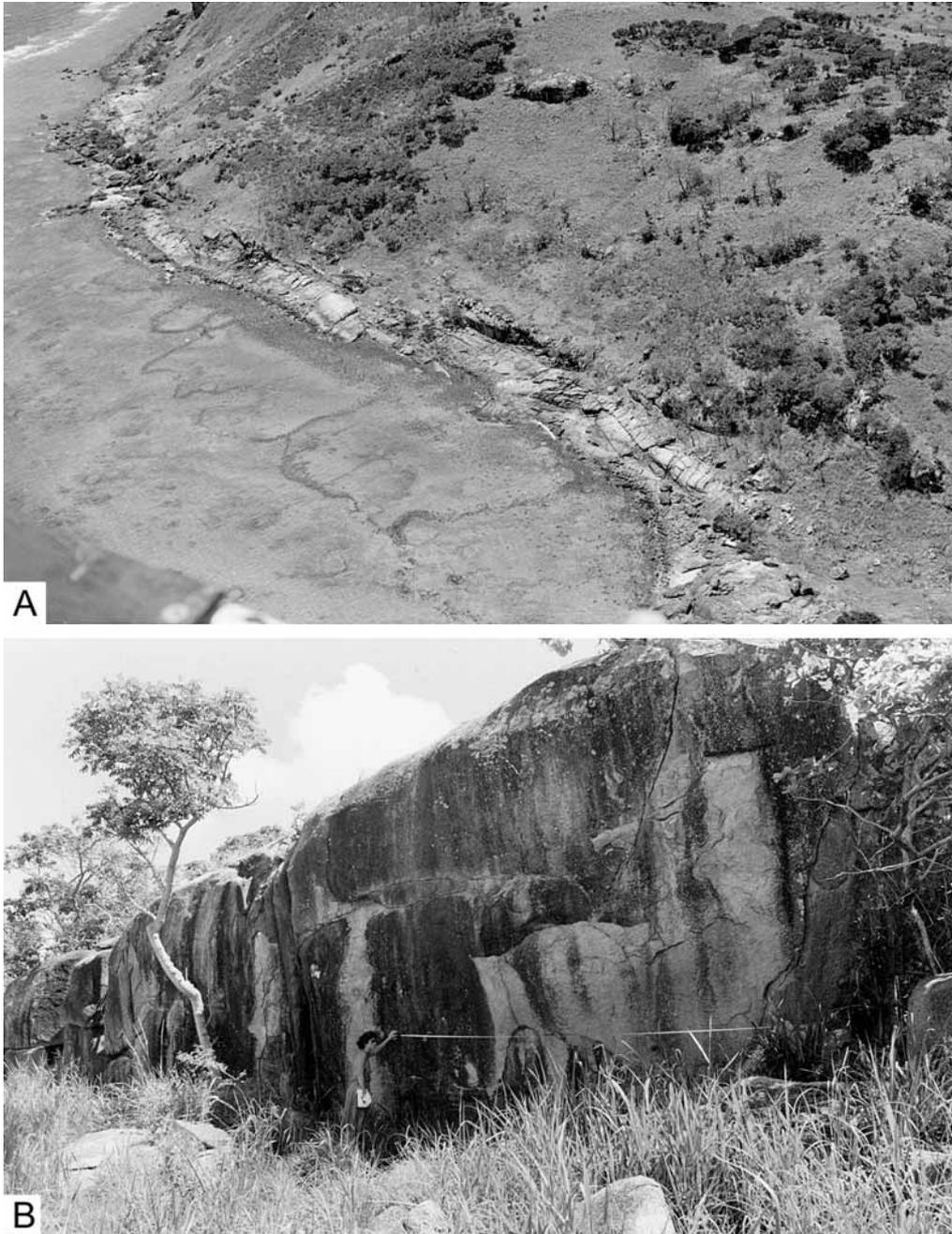


FIG. 11. A, The north-facing slope of Met Hill, Mua showing the close spatial proximity of multiple stone fish traps on the reef-flat, and a large bedrock outcrop providing a near vertical rock panel (top centre) on which rock-art depictions are preserved, including images of outrigger canoes. (Photo January 1982). B, Detail of the large rock-art panel on the slopes of Met Hill, which extends over 12.5m on a SE-NW orientation and variably 4.1-5.6m vertically. Shell scatters (*Tectus* sp. and *Anadara* sp. occur adjacent and downslope of the panel, on which depictions of outrigger canoes and other images are preserved (Barham, unpubl. data). (Photo December 1981).

Strait languages. Here we suggest the combined ethnohistorical, linguistic and field archaeological evidence now points to prehistoric connectivity between the Western and Top Western and Eastern Island Groups, and both adjacent lowland coastal PNG, and the interior areas defined by the courses of the lower Fly, Strickland, Bamu and Kikori Rivers, along which Haddon (1921) mapped kava tracks. Colonisation of the Torres Strait islands by migrants who had moved to the southern PNG coast from inland, via these rivers, commencing with a change from estuarine subsistence in the Fly Delta to fully insular maritime occupation of the Northern and Eastern Torres Strait islands around 2,500 BP (Barham, 2000: 299-300), could explain the apparent failure of Early Period (ceramic) migrants to move into areas west of the Purari River approximately 500-700 years later. As Lilley (1999: 31) suggested, 'both Lapita potters and dispersing Papuan Tip speakers seem to have focussed on contact amongst themselves rather than with bioculturally unrelated groups'. Pre-existing NAN-speaking sea-going populations located in the Trans-Fly coast, Fly delta, and Top Western and Eastern Torres Strait islands would present exactly such a 'bioculturally' distinct group, and barrier, to the westward expanding AN-speaking groups who appear to have migrated no further than the Purari River delta in the period 1,900 BP onwards.

CONCLUSION

Some archaeologists who have worked in Torres Strait have been disappointed by the limited antiquity of sites so far excavated, though most have stressed this is not irrevocable proof that people were absent from the area in the Pleistocene and early Holocene — a view with which we concur given the limited investigation of terrain likely to preserve such site evidence (e.g., large rockshelters adjacent to permanent water in the interior of large islands such as Murulag, Badu and Mua). However, it is now becoming clearer that while the vagaries of preservation and previous investigative procedures account for some bias in archaeological data regarding the known distribution of archaeological sites in space and time, a chronology is emerging which is largely consistent with the archaeological record of southern PNG and coastal North Queensland. Estimates of c.2,500 BP for earliest Holocene occupation of the islands, and c.1,200 BP for the emergence of extensive horticulture re-focus attention on the

significance of Torres Strait as a prehistoric route and cultural contact zone between mainland Australia and PNG, emerging only in the late-Holocene.

It is important to confirm the chronology by improving the size and quality of the sample of radiometric dates from this area and in particular to apply modern AMS dating to both known stratified sites and recently developed dating techniques to previously undateable site types such as painted rock-art. Archaeological site data point towards a significant Melanesian influence, and possible origin, for many features of the subsistence, social and cultural traits exhibited by Torres Strait maritime trading cultures at the time of European contact.

Absence of archaeological evidence for mid-Holocene human populations 'stranded' by marine transgression of the shelf, coupled with evidence of no occupation on shorelines dating to 3,500-3,000 BP, which were ecologically comparable with shorelines occupied 1,000-1,500 years later, suggests that the Torres Strait islands were either unoccupied or not continuously occupied during c.6,500-2,500 BP. Coastal ecosystems and habitats essential to successful occupation and subsistence on the islands, such as mangrove, nearshore reefs, and beach littorals, were all present for several thousand years prior to first human exploitation at c.2,500 BP (Barham, 2000). After 2,500 BP there is evidence of continuous insular occupation and flexible exploitation of a wide range of coastal and nearshore resources and habitats. The close correspondence of earliest dates from Saibai, Dauar and adjacent coastal PNG suggest that Torres Strait may have started to act as a route for the southwards transfer of maritime and coastal subsistence technologies, following the arrival of founding Melanesian populations, possibly equipped with the double-outrigger canoe, some time around 2,500 BP. The earliest archaeological sites so far identified in Torres Strait were occupied by marine hunters and coastal gatherers, capable of obtaining dugong and turtle and exploiting a wide range of coastal resources, but there are no data as yet to confirm extensive mound-and-ditch agricultural activity until after c.1,200 BP.

The demonstration of a late Holocene 'opening' of Torres Strait as an emerging route for the cultural transmission of maritime technology southwards into coastal northeastern Australia has significant implications for previous

interpretations of the apparent onset of intensive coastal exploitation on the eastern seaboard of Australia. Beaton (1985: 18) argued that use of islands in Princess Charlotte Bay had to 'await the introduction of double-outrigger canoe of Papua-Melanesian origin' and Rowland (1987) drew attention to a wide range of maritime technologies such as fishing techniques, harpoons and outrigger canoe attachments which strongly suggested cultural influences on the Queensland coast emanating from the north via Torres Strait (but see O'Connor, 1992: 58; Barker, 1989, 1991). Despite very little research having been undertaken in these regions, a date of c.2,500-2,000 BP for such 'first passage' of fish hook and double-outrigger technology southwards now appears to be supportable. There is an urgent need to expand knowledge regarding archaeological sites in Torres Strait, in the context of these research issues and to better position existing archaeological data within the known cultural landscapes of the islands during both the historic, and immediate prehistoric periods.

The present archaeological chronology offers considerable potential for analysing the patterns and processes of local and regional subsistence adaptation to the varied physical environments of the Strait. This can be accomplished at the intra- and inter-island scale. Stratigraphic dating and provenancing of stone and shell artefacts may yet assist reconstruction of prehistoric trade routes and voyaging. While the prehistoric value of the ethnographic record is partial, one of the unique features of Torres Strait prehistory is the rich baseline of primary ethnographic data, which permits comparison with and testing against, historic archaeological material. These records offer challenging opportunities to extend our knowledge of the processes by which material culture becomes transformed into archaeological assemblages, and to expand on, and identify bias in the methods of collecting ethnohistoric data and description of material culture of Torres Strait completed in the 19th Century.

The potential for studies seeking to identify surviving site evidence of ethnohistorically documented sites, or those identified through oral traditions, is far-reaching in Torres Strait. Most of the landscape, at least for the more densely populated smaller islands, is a culturally constructed landscape, where both natural landforms and vegetation record cultural history, and prehistory. Much of the terrain and specific locales are richly imbued with traditional meaning and formerly complex social structures

and arrangements, such as clan groupings, genealogy and territorial aspects of land division, use and ownership. In this sense the Torres Strait islands are cultural landscapes (*sensu* Tilley, 1994), where oral histories, ethnohistorical sources and the emergent archaeological record can be combined to a degree that is rare for the pre-European contact and historic periods in Melanesia and Australasia.

We conclude that, somewhat ironically, the archaeological value of the archives of Haddon and his co-workers, and the ethnohistorical and ethnographic resources more generally available for Torres Strait, lies in the limited time-depth that they document. It is increasingly clear that archaeological approaches have only recently engaged in a critical debate regarding the extent to which material culture evidence as preserved in a landscape forms an adequate basis for interpreting or modelling past human behaviour and cultural change. Some proponents of post-modernist enquiry have gone so far as to argue that it is astonishing how slow archaeologists have been to abandon a reliance on scientific approaches (Bender, 1999). Here we suggest that it is precisely in areas such as Torres Strait, that more meaningful archaeology, inclusive of scientific approaches, can be best practiced. Through synthesis of oral histories with ethnohistorical sources, and then linkage of archaeological sites with historical events and folk memories, the historic elements of the archaeological record can be isolated, and then prehistoric residual elements of social organisations and social landscapes identified. A process of gradual separation of the multilayered construct that is the archaeological landscape record can then be approached. This process will necessarily involve scientific approaches to the dating, conservation and interpretation of the archaeological record, and benefit from perceptual, mythical and traditional interpretive aspects of Torres Strait culture as still remembered and retained within present Islander communities.

In Torres Strait, the conjunction of high quality historical documentation, *in tandem* with a re-invigoration of indigenous participation and control of decision-making regarding cultural heritage management, provides a template for new holistic approaches to comprehending the archaeological record. The process, however, will be iterative, for the key to understanding archaeological site structures, site taphonomy and assemblages, lies in the successful articulation, preservation and retention of traditional

knowledge. That traditional knowledge can be fostered and enhanced, through re-linking folk memories and tradition, around the focal points presented by the historic and prehistoric sites remaining in the modern island landscapes of Torres Strait.

We therefore anticipate that the degree to which the 'deep time' issues of early occupation of Torres Strait, cultural origins and the emergence of horticulture will be further resolved, lies, as Haddon anticipated, in the 'saving of vanishing knowledge'. However, that process now lies in an area which Haddon did not anticipate, which is the degree to which issues such as the conservation and management of archaeological sites in Torres Strait, may provide the context and impetus around which remaining indigenous traditional knowledge can focus and from which renewed Torres Strait Islander involvement in determining how successfully the *bepotaim* of Torres Strait can be understood.

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ENDNOTES

1. Little archaeological work has so far been conducted on historic site locations, either through site mapping, or examination of stratified contexts (for major exceptions, see Grimwade, this volume; Kyuhara, 1977; Illidge et al., this volume; McPhee, this volume). Similarly few stratified recent deposits from traditional indigenous settlements have been systematically investigated, where 'contact' may be recorded by 'marker artefacts' such as metal, glass or other contemporary artefacts such as coins and clay pipes, or through rock-art depictions of European vessels, artefacts or other cultural influences. However, (Ghaleb, 1990:196) reported a clay pipe stem recovered from Gumu on Mabuia Island that has been provenanced to manufacture in Glasgow, Scotland between c.1863 and 1910. McNiven excavated a dugong bone mound ritual site on Tudu containing an extensive historical artefact assemblage dating to the early 20th Century (McNiven & Feldman, 2003; see McNiven, 2001 for a detailed outline of a project investigating contact trade relationships in Torres Strait).
2. For critical discussion of the wider implications of the quasi-obsessive research emphasis on Torres Strait as horticultural frontier or boundary, prevalent throughout the 1970s and 1980s, see Gosden & Head (1999).
3. Cox & Watchman (2000) considered that provenance to a source on the Central Papuan Coast was unlikely, as the pottery clay was free of shell (i.e. not tempered with beach sand). They noted that inclusions included white feldspar, grey quartz, quartzite and red-brown weathered fine-grained volcanic clasts and that the analysis showed a high chloride level.
4. In applying this correction we recognise potential uncertainties relating to local ΔR values (Ulm, 2002) that may pertain particularly to shellfish collected intertidally for food, and then dated from middens. Moreover, we feel the application of either calibrations of radiocarbon ages to calendar years

- (Stuiver & Reimer, 1993; Stuiver et al., 1998), or more precise regional corrections involving ΔR values (Stuiver & Braziunas, 1993), as applied in the Pacific (Anderson & Clark, 1999), is unwarranted and premature in this review, given other uncertainties in the grouped site data and the small sample size of radiocarbon dates from Torres Strait. We consider it unproven that, for example, the ΔR value of 11 ± 5 , as recently applied by Carter (2002b) to shell dates from Dauar, is necessarily appropriate to past and present nearshore water bodies in Torres Strait, and certainly not to the isotopic carbonate composition of reefal gastropods in outer shelf waters close to the Great Barrier Reef (Fry et al., 1983).
5. Where such detailed data are available, at 2 sites on Dauar (Carter, 2001, 2002a, 2002b), there is no evidence for significant periods of non-occupation of the island after the founding age of c. 2500 BP if i) radiocarbon dates from the 2 closely adjacent sites are combined and ii) protocols of applying 2 standard deviations are made.
 6. As Wurm (1972: 361) later wrote of the same phenomenon 'it seems reasonable to presume that the Australian linguistic influence upon languages of the Trans-Fly area constitutes a tail-end of the spread of Common Australian northwards beyond the Australian continent'.
 7. As argued elsewhere (Barham, 2000), the archaeological data are consistent with a model of most Torres Strait islands having no permanent human populations until around 2500 BP, followed by frequent and intense visitations by maritime hunting, resource-gathering peoples originally from Papua. These maritime groups, then gradually developed into either more mobile specialist marine hunters/gatherers operating from Torres Strait islands, or where conditions permitted, became more specialist sedentary horticulturalists retaining significant marine hunting and trading capabilities. Within the last 1200 years, these specialist scheduling opportunities had led to inter-island specialisations in resource procurement, with many initial inter-group specialisations now differentiating clan sub-groups within more sedentary populations.
 8. Not all stone arrangements on Torres Strait islands reflect horticulture/agriculture. For example, totemic figurative stone arrangements, 'turtle lookouts' and other mound or cairn stone arrangements are known from many islands. On Booby Island, where any indigenous horticultural link can probably be excluded, Captain P.P. King reported piles of stones on the island summit in 1820, and recent surveys report both stone lined pathways, edging and cairns constructed by the families of lighthouse keepers (Coleman, 1991: 4). However, Coleman (1991) considered some of the cairns to be pre-European and also reported 2 intact stone circular structures, and the remnant of a third, where the largest is 2.5m in diameter with a wall height of 0.7m. Structures similar to these have been reported elsewhere in northern Australia on very small offshore islands, such as High Clifty Island in the Kimberley (O'Connor, 1999: 113-117). Although excavations and surveys on High Clifty demonstrated the absence of European artefacts associated with the structures, they may be associated with indigenous ritual, European castaways and/or Macassan trepanners. In Torres Strait, there are insufficient detailed surveys to do more than note the difficulty of dating or interpreting similar structures at the present time. Bruno David (pers. comm. 2003) has recently excavated ritual stone structures in the Western Islands, as did Ghaleb (1990) on Mabuiag.
 9. Moreover, at both sites on Dauar the excavated stratigraphic contexts are highly permeable coastal sands, with significant void space at depth in shelly contexts, and significant penetration to depth by modern roots. These are situations in which direct assessment of downward percolation by modern microfossils (pollen, phytoliths, starch-grains) is needed, and where the possible contribution of microfossils from contemporary or very recent gardening activity would need to be methodologically excluded, before inferences regarding prehistoric activity and ages for 'horticulture' can be securely made from the microfossil assemblages extracted from subsurface deposits. As noted recently elsewhere in relation to agricultural soils and Polynesian introduction of gourds (Horrocks et al., 2002), the differentiation/ separation of post-European 'contaminant' cultivar microfossils within prehistoric soil contexts is difficult. In Torres Strait, the land surfaces of all sites so far identified as possible early 'agriculture/ horticulture' sites (on Saibai, Boigu, Mer and Dauar) have also functioned either as, or closely adjacent to, recent (post-European contact) gardening sites, and data regarding soil mixing/percolation processes are minimal. Clearly, specific research designs designed to control these variables will form a pre-requisite to any secure validation of radiocarbon-dated evidence for agriculture/horticulture based on microfossil bioassemblages from soil contexts.
 10. It should be emphasised that not all sites show Papuan affinity. For example, rock-art panels at Frenchman's Cave on Murulug show distinctly Australian Aboriginal affinity (Harris et al., 1985: 38-40, pl. 4a, 4b) and are markedly different to those panels, also recorded by Singe, on the north coast of Murulug.