

This is the author-created version of the following work:

**Lambrides, Ariana B.J., Ditchfield, Kane, Ulm, Sean, and Veth, Peter (2024) A
Moving Feast: Australia's Coastal and Island Archaeological Record. In:
Fitzpatrick, Scott M., and Erlandson, Jon M., (eds.) The Oxford Handbook of
Island and Coastal Archaeology. Oxford University Press, Oxford, UK.**

Access to this file is available from:

<https://researchonline.jcu.edu.au/82378/>

© Oxford University Press

Please refer to the original source for the final version of this work:

<https://doi.org/10.1093/oxfordhb/9780197607770.013.23>

A Moving Feast: Australia's Coastal and Island Archaeological Record

Ariana Lambrides¹, Kane Ditchfield^{2,4}, Sean Ulm¹, Peter Veth^{1,2,3}

¹ARC Centre of Excellence for Australian Biodiversity and Heritage, College of Arts, Society and Education, James Cook University, Cairns, QLD 4870, Australia

²School of Social Sciences, The University of Western Australia, Perth, WA 6009, Australia

³Centre for Rock Art Research and Management, The University of Western Australia, Perth, WA 6009, Australia

⁴Big Island Research, Fremantle, Perth, WA, 6160, Australia

Abstract

Engagement with marine landscapes and their associated coastal resources was crucial in the movement of and sociocultural transformation of people as they moved into Australia during the Pleistocene. While the earliest evidence for Aboriginal interaction with coastlines and islands was likely drowned by postglacial sea level rise, ongoing submerged and terrestrially focused research programs are documenting a rich narrative of coastal occupational resilience, in concert with fluctuating sea levels. Available records for Aboriginal use of coastal environments now extend to an extraordinary 50,000 years ago and more, as people travelled, in some cases, significant distances to continue to engage with these changing ecosystems. By the middle Holocene, archaeological evidence for coastal and island occupation appears to ‘proliferate’ around the continent, which is likely associated with the emergence of *maritime specialist economies*. Across millennia, the Australian coastal archaeological record is unquestioningly complex, variable, and dynamic at the local and regional level. As the largest island continent settled by modern people with maritime capabilities and coastal adaptations, we anticipate that future work will continue to contribute to dialogues about the emergence of island societies globally.

Keywords: islandisation, occupational resilience, marine resources, *maritime specialist economies*, seascapes

Introduction

Australian coastal and island archaeology became internationally and nationally prominent following Jones' (1968, 1979) island biogeography and isolationist narrative, and then later, Bowdler's (1977) argument for the coastal colonization of the continent. While the coastal and inland waterways colonization model has been largely overturned, its focus on the centrality of coasts to the peopling and lifeways of Australia set a theme for Australian archaeological scholarship over subsequent years. Indeed, at the time of Bowdler's writing, relatively little was known about the archaeology of Australia's coasts (but see Bailey 1975; Jones 1968; Lampert 1979; Poiner 1976), and this was especially the case for the western and northern coastlines (e.g., O'Connor and Sullivan 1994). Some four decades later, our understanding of the varied history of human engagement with Australian coasts and coastal resources has been transformed, with current records extending Aboriginal use of these productive habitats to an extraordinary 50,000 years ago and more.

Today, archaeologists working in partnership with Indigenous communities have documented a rich narrative of coastal occupational resilience, in concert with fluctuating sea levels, and the emergence of *maritime specialist economies*. It is apparent that, from the Pleistocene occupation of the northwest coast (e.g., Ditchfield et al. 2018; Morse 1993a; Veth et al. 2017) through to late Holocene sociocultural transformations documented across Torres Strait and the Great Barrier Reef (e.g., Lambrides et al. 2020; McNiven 2021; Ulm 2011), the Australian coastal archaeological record is complex, variable, and dynamic. An ongoing disciplinary challenge has been that signatures of deep-time coastal archaeological records do not uniformly preserve across the continent, reflecting the complex interplay between archaeological, taphonomic, and paleo-environmental contexts at local and regional levels. This combination of factors, embracing different preservative conditions and non-uniform material expressions of past behaviors, ultimately locate the Australian record in a unique position in its ability to contribute to global research agendas and debates including: 1) the cognitive and behavioral abilities of modern humans; 2) the factors that influence occupation of Pleistocene coastal environments; 3) human responses to fluctuating sea levels and landscape change; 4) the role of island ecosystems in the past; and 5) the dynamic interactions between people and marine resources.

This chapter outlines how Australian coastal and island archaeological records can contribute to these global research agendas through a systematic consideration of three central themes: 1) Australian Pleistocene coastal occupation and records documenting human interactions with islandisation; 2) the archaeologically sudden proliferation of coastal records

from the middle Holocene, and the degree to which this a real or taphonomic phenomenon; and 3) an examination of the varied maritime economies that developed around Australia during the terminal Pleistocene and Holocene, but with a particular focus on faunal assemblages and subsistence regimes. Collectively we highlight significant research from the past decade in combination with critical legacy research to provide an update on the current state of research in Australian coastal and island archaeology.

Pleistocene coastal occupation and islandisation

Initial settlement and the southern dispersal route

It is now widely accepted that Sahul (the combined landmass of New Guinea and Australia) was settled by ‘behaviorally modern’ humans sometime before 50,000 to 65,000 years ago (Balme 2013; Balme et al. 2009; Bradshaw et al. 2019; Clarkson et al. 2017; Miller et al. 2016a, 2016b; O’Connell et al. 2018; Smith 2013; Veth et al. 2017) (Figure 1). One important implication of this process is that Sahul’s settlement required a water crossing of up to 120 km. To navigate this crossing, the settling population(s) required significant maritime knowledge and technology (e.g., watercraft and string), demonstrating both a coastal and maritime adaptation (Balme 2013; Balme et al. 2009; Bird et al. 2018, 2019; Birdsell 1977; Bowdler 1977; Chappell 2000; Hiscock 2013; Jones 1979; Kealy, Louys, and O’Connor 2016, 2017; O’Connell and Allen 2012, 2015; O’Connell, Allen, and Hawkes 2010; O’Connor and Chappell 2003; O’Connor and Veth 2000; Szabó and Amesbury 2011). Indeed, since the settling population(s) ultimately arrived from Island Southeast Asia, these people were presumably well-versed in island and coastal lifeways. For example, Kealy, Louys, and O’Connor (2016, 2017) have shown that, due to lower sea levels during the likely chronological settlement windows, islands were not only intervisible between Timor and northern Australia, but also emergent elsewhere in the Wallacean Archipelago. While exposed, these islands likely hosted settlements and served as ‘island hopping stations’ for the first maritime and coastal Australians.

Sahul also sits at the end of the Southern Dispersal Route from Africa, where the evidence for coastal and maritime adaptations associated with *Homo sapiens* is among the earliest in the world outside of Africa (Barker 2013; Leavesley and Allen 1998; O’Connor, Ono, and Clarkson 2011; Veth et al. 2017). However, there is a gap in archaeological evidence for pre-glacial coastal or island occupation between eastern Africa and Southeast Asia, with supporting evidence for the Southern Dispersal Route largely occurring at the beginning and end of the proposed route (Bailey et al. 2015; Bulbeck 2007; Erlandson and

Braje 2015). This surviving and accessible record may indicate that coastal occupation and island use were not important in facilitating human dispersal to Australia until people reached Island Southeast Asia, where terrestrial resources were perhaps preferred when available (O'Connell and Allen 2012, 2015). The 'Southern Dispersal gap' may also be a taphonomic phenomenon. Sea levels have risen significantly since the dispersal of people to Australia and, as a result, most evidence for coastal occupation and island use is likely to be drowned (e.g., Bailey and Milner 2002; Bailey and Flemming 2008; Erlandson 2001). Interestingly, in Australia, direct material evidence for coastal occupation and island use is also minimal until the early to middle Holocene. While there are pockets of evidence (Veth et al. 2017; see below), this lack of evidence has been used by some authors to argue that coastal resources were not important for Aboriginal Australians until more productive coastal regimes associated with middle Holocene sea level stabilization became established (e.g., Beaton 1985; O'Connell and Allen 2012). In contrast, others have recently argued that coasts were likely variously productive throughout the Pleistocene and that most evidence for coastal occupation and island use was drowned via sea level rise (Ditchfield et al. 2022; Ulm 2011).

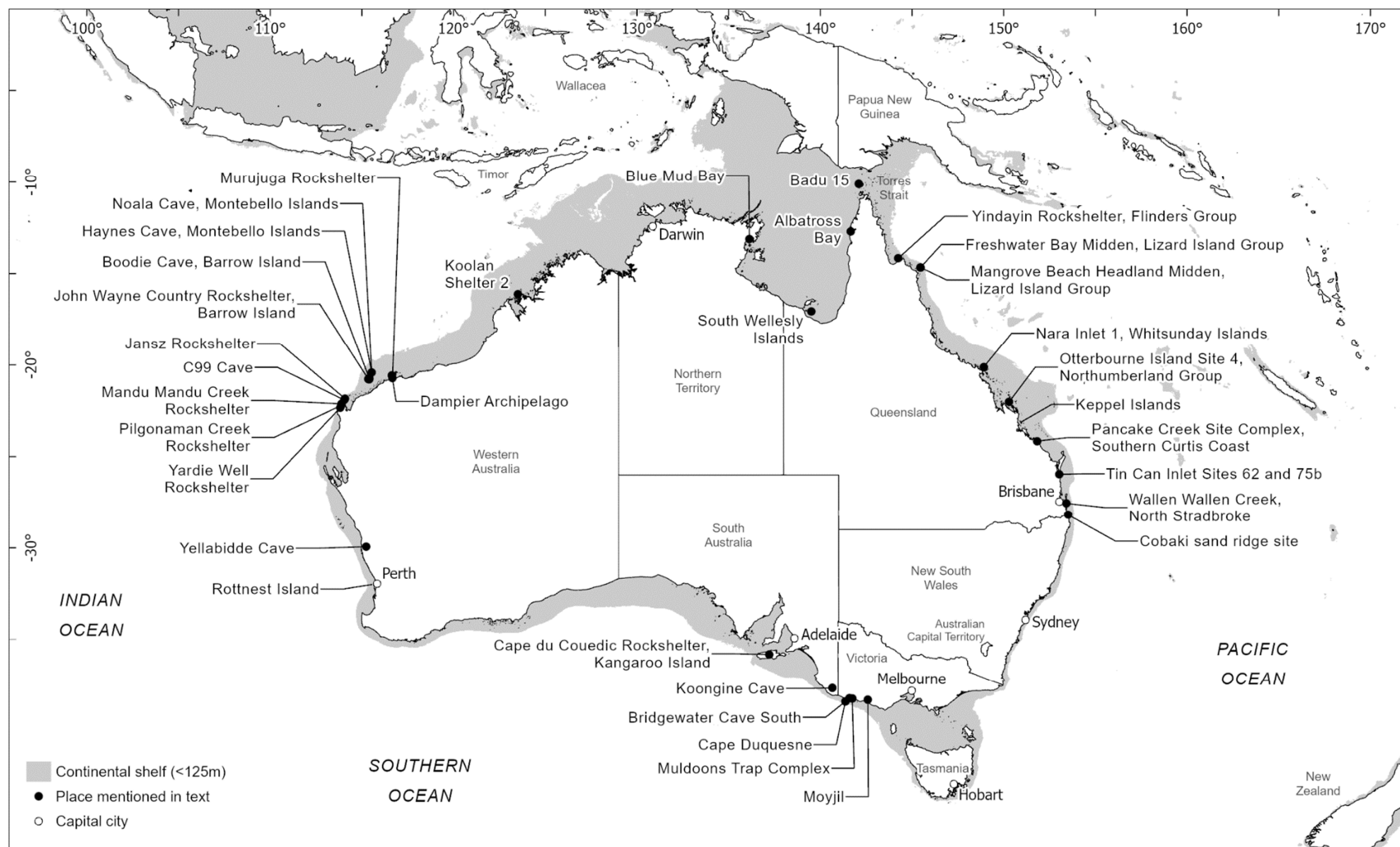


Figure 1. Australia, Wallacea and New Guinea showing the location of places mentioned in text. Bathymetry data derived from GEBCO 2021 Grid (GEBCO Compilation Group 2021).

Given this debate, what is the evidence for Pleistocene coastal occupation in Australia? To date, the most comprehensive evidence for Pleistocene coastal resource use has been reported from sites in northwestern Australia at Cape Range (Mandu Mandu Creek, Pilgonaman Creek, Yardie Well, and Jansz Rockshelters), on the Montebello Islands (Noala Cave), and Barrow Island (Boodie Cave and John Wayne Country Rockshelter) (Ditchfield et al. 2018; Manne and Veth 2015; Morse 1988, 1993b; Przywolnik 2002, 2005; Veth et al. 2007; Veth, Ditchfield, and Hook 2014; Veth et al. 2017). Indeed, recent excavations at Boodie Cave (Barrow Island, northwestern Australia) have revealed the earliest evidence for coastal occupation in the country (Veth et al. 2017) (Figure 2). Boodie Cave contains exceptional archaeological deposits dating from 51,000 cal. BP with the earliest evidence for dietary marine resource use in Australia at 51,000–46,000 cal. BP, from mangrove, mudflat and rocky substrate ecosystems, with complementary assemblages of local arid zone terrestrial fauna (Veth et al. 2017, 25) (Figures 2B and 2C). Tree species identified from charcoal in these early deposits include the ranji bush (*Acacia pyrifolia*) and gums (*Eucalyptus* spp.), indicating that wood collection occurred along watercourses before the Last Glacial Maximum (Veth et al. 2017, 25). The stone artifact assemblage from the 51,000–42,000 cal. BP deposit, is largely manufactured on local limestone but the presence of some artifacts made from non-local stone may suggest links with the Pilbara region some 120–150 km distant (Ditchfield et al. 2018; Ditchfield and Ward 2019). This coastal record continues along the nearby Cape Range coastline from 40,000 cal. BP where there is early evidence for turtle exploitation at Jansz Rockshelter (Przywolnik 2002, 2005) and a 30,000-year-old shell bead necklace from the Mandu Mandu Creek Rockshelter (Balme and Morse 2006; Morse 1993a, 1993b, 179-184).

Following a widespread Last Glacial Maximum chronological discontinuity, coastal occupation continues throughout the northwest of Western Australia into the terminal Pleistocene and early Holocene in conjunction with rising sea levels, greater rainfall and expanded mangrove ecosystems (van der Kaars and De Deckker 2002; Van der Kaars, De Deckker, and Gingele 2006). Indeed, a number of coastal sites are newly occupied during this time, including Pilgonaman Creek Rockshelter, Haynes Cave, and John Wayne Country Rockshelter (Ditchfield et al. 2018; Morse 1993a, 1993b; Veth et al. 2017). At Boodie Cave, marine and terrestrial resources continued to be exploited during periods of fluctuating sea levels until site abandonment at 6800 cal. BP, when present sea levels positioned Barrow

Island approximately 60 km offshore from the mainland (Veth, Ward, and Manne 2017; Veth et al. 2017).

The available evidence shows that people occupying the Barrow-Montebello Islands and further south at Cape Range were engaged in a mixed terrestrial-marine subsistence regime, with people exploiting reef, estuarine, and sandy bay habitats as well as the adjacent arid coastal plain (e.g., Ditchfield et al. 2018; Manne and Veth 2015; Przywolnik 2002; Veth et al. 2007, 2017). Examples of targeted resources during the Pleistocene-early Holocene include mollusks (e.g., chiton [*Acanthopleura spinosa*], mud whelk [*Terebralia palustris*]), turtle (Cheloniidae), fish (e.g. parrotfish [Scaridae] and wrasse [Labridae]), mud crab (*Scylla serrata*), wallabies and wallaroos (e.g., common wallaroo [*Osphranter robustus*], spectacled hare-wallaby [*Lagorchestes conspicillatus*], and rufous hare-wallaby [*Lagorchestes hirsutus*]), snakes (e.g., Elapidae), and lizards (e.g., skink [Scincidae], monitor lizards [Varanidae], agamid lizards [Agamidae]). Shifts in the relative abundance of targeted resources have been observed during the Pleistocene-Holocene transition across this region, whereby estuarine and marine taxa are increasingly incorporated alongside a diverse suite of arid plains terrestrial fauna (e.g., Manne and Veth 2015). These findings reflect the expression of well-developed maritime desert economies.

Outside of northwestern Western Australia, evidence for early coastal occupation is largely limited to the terminal Pleistocene and early Holocene. For example, broadly similar trends have been observed at Seton Rockshelter (Kangaroo Island, South Australia) where dated deposits capture an occupation history spanning 20,000–12,000 cal. BP. While most recent studies have focused on the terrestrial faunal records, there is evidence for the incorporation of marine mollusks into subsistence regimes during the Pleistocene-Holocene transition as islandisation was occurring (with isolation at 8900 cal. BP) alongside increases in occupational intensity at the site (Adams, McDowell, and Prideaux 2016; Hope et al. 1977; McDowell et al. 2015). In southwestern Victoria, Richards (2012) has demonstrated early Holocene marine resource use at Cape Duquesne where a variety of coastal shell middens have been dated to 11,600–8600 cal. BP. A large sand ramp is believed to have provided access from the cliff-lines to marine habitats located along a steep continental shelf. Barker (1991, 2004) has also recovered early Holocene evidence for marine resource use at Nara Inlet 1 and Border Island 1, off the Queensland coast in the Whitsunday Islands.

These sites demonstrate occupation from 9000 BP in association with sea level rise as Aboriginal people exploited rocky shore platforms as well as mangrove environments. Other Australian sites provide limited and contested evidence for Pleistocene coastal occupation. For example, at the Moyjil site (western Victoria) the association of a shell bed dating to 125,000–120,000 cal. BP with archaeology is equivocal and strongly contested (Bowler et al. 2018; Sherwood, McNiven, and Laurenson 2018). However, if confirmed, the Moyjil site would have obvious implications, suggesting a much earlier arrival of people on the continent during MIS 5e. Another example, which is not contested, is the Pleistocene occupation of Rottnest Island (lying off the Perth coastline in southwestern Australia), which has some isolated chert artifacts but no associated faunal remains, unless a small fragment of recovered emu (*Dromaius novaehollandiae*) eggshell is taken as evidence of subsistence activities (Dortch and Dortch 2019). While much progress has recently been made toward documenting Pleistocene coastal and island archaeology in northwestern Australia, including recent evidence for drowned intertidal archaeology (Benjamin et al. 2020), equivalent evidence is still extremely limited or absent throughout the rest of Australia. This becomes clear in Table 1, which lists all Australian sites with early evidence for coastal occupation and dietary marine fauna. Clearly, the known record for Australia’s pre-glacial coastal archaeology is clustered in northwest Western Australia while the earliest evidence for coastal occupation (with associated dietary marine fauna) beyond Western Australia is limited to the terminal Pleistocene – early Holocene in other regions with steep profile shelves.

It is also worth noting that evidence for Pleistocene near-coastal site occupation is not universally associated with the use of coastal resources in Australia, and in some cases no coastal subsistence remains have been recovered from sites, or the accumulation agent responsible for site assemblages is unclear. For instance, at Yellabidde Cave (occupation from ~25,500 cal. BP), located in southwestern Australia, terrestrial faunal remains were abundant throughout the sequence, with fish bone and marine mollusks only present from the middle to late Holocene (Monks et al. 2016). A single fragment of mollusk (*Terebralia* sp.) was also recovered from the Holocene deposits (~7800–7600 cal. BP) at the Pleistocene occupied Murujuga Rockshelter (Burrup Peninsula, northwestern Australia) (McDonald et al. 2018), which is consistent with a range of open-air middens on the islands of the Dampier Archipelago with onset dates of occupation from 10,000–4000 years ago (McDonald et al. 2023; Veth et al. 2020). Likewise, at Wallen Wallen Creek (North Stradbroke Island, northeastern Australia) where occupation dates from ~20,000 BP, marine resources only

occur in late Holocene deposits (Neal and Stock 1986). Just ca. 70 km south, at the Cobaki sand ridge site on the northeastern coast of New South Wales, the majority of recovered marine molluscan remains are also from the late Holocene, despite a potential occupation sequence for the area spanning the past ~30,000 years (Robins, Hall, and Stock 2015). In short, near coastal Pleistocene occupation sites are not necessarily littoral in focus, with wetlands, swamps, and freshwater systems providing a focus for such loci.

While Australian Pleistocene records of marine resource interaction are limited in terms of total abundance when compared to available Holocene evidence (see below), it is apparent that these coastal zones remained socially, culturally, and economically prominent over many thousands of years as people travelled and transported, in some cases, significant distances to continue to engage with these rich and dynamic coastal ecosystems across sometimes vast coastal plains (e.g. Balme and O'Connor 2017; Veth et al. 2017).

Table 1. Approximate dates for early coastal occupation in Australia. Dates are earliest ages associated with dietary marine fauna and are rounded to the nearest 100 years with a cut-off at 10,000 cal. BP. Table modified from Ditchfield et al. (2022). WA = Western Australia, VIC = Victoria, SA = South Australia

Site	Approx. Coastal Occupation (cal. BP)	Location	Source
Boodie Cave	48,000	NW WA	Veth et al. (2017)
Jansz Rockshelter	39,100	NW WA	Przywolnik (2002)
C99 Cave	37,500	NW WA	Przywolnik (2002)
Mandu Mandu Creek Rockshelter	36,200	NW WA	Morse (1993b)
John Wayne Country Rockshelter	14,900	NW WA	Ditchfield et al. (2018)
Noala Cave	13,800	NW WA	Veth et al. (2017)
Pilgonaman Creek Rockshelter	13,000	NW WA	Morse (1993b)
Yardie Well Rockshelter	11,500	NW WA	Morse (1993b)
Koolan Shelter 2	11,600	NW WA	O'Connor (1999a)
Bridgewater South Cave	11,500	SW VIC	Lourandos (1983)
Cape Duquesne Middens	11,100	SW VIC	Richards (2012)
Koongine Cave	11,000	SE SA	Bird and Frankel (2001)

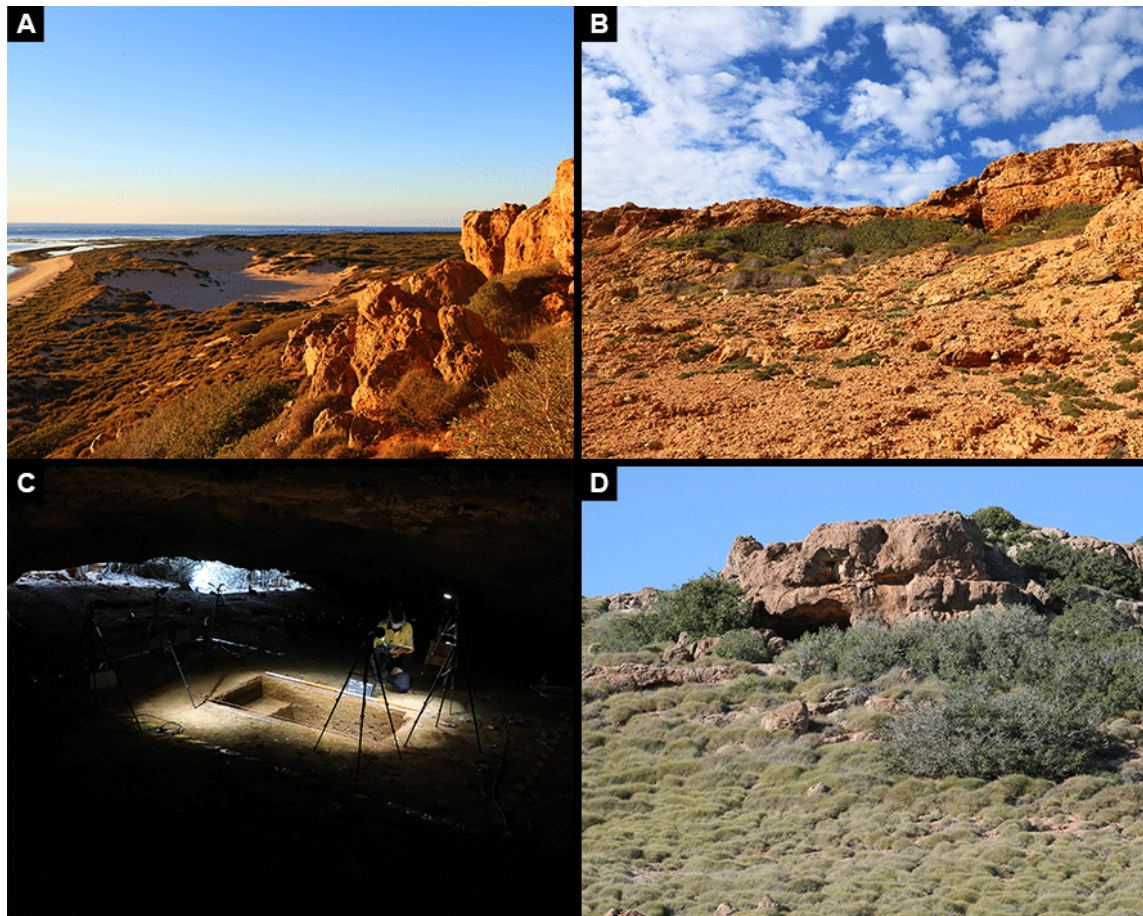


Figure 2. Barrow Island (northwestern Australia) archaeological sites and coastal environments: A) Present-day coastal sandy beach and fossil reef around Barrow Island (Photograph: Kane Ditchfield); B) Boodie Cave, located on Barrow Island’s west coast. Note the fig trees that shelter and obscure the cave entrance (Photograph: Kane Ditchfield); C) Boodie Cave, showing first excavation square in progress (Photograph: Kane Ditchfield); and D) John Wayne Country Rockshelter, located on Barrow Island’s northwest coast (Photograph: Kane Ditchfield).

Pleistocene islandisation

Interestingly, almost none of the data listed in Table 1 refers to island occupation. Indeed, there is very little evidence for island occupation in Australia before the early Holocene, although some sites (e.g., Boodie Cave, John Wayne Country Rockshelter, and Nara Inlet 1) occur on present-day islands and preserve Pleistocene – early Holocene records for occupation throughout the islandisation process. Both Barrow Island and the Whitsunday Islands make excellent case studies, providing us with a unique opportunity to track human interaction with the islandisation process in addition to examining the thresholds for island occupation and abandonment.

For most of the past 50,000 years, Barrow Island was connected to the Australian mainland as a large hill on the northwestern coastal plain. Excavations at Boodie Cave and John Wayne Country Rockshelter demonstrate a combined occupation record from approximately 50,000–6800 cal. BP, at which point the Barrow uplands became insulated through sea level rise and ultimately abandoned until the historic period (e.g., Ditchfield et al. 2018; Veth et al. 2017; Ward et al. 2017). The islandisation of Barrow Island also occurs in the context of a productive paleo-environmental period. This is characterized by increased rainfall, higher river discharge and a significantly expanded range of mangrove ecosystems around the northwestern coastline, all fueled by sea level rise and a temporary southern extension of the Indo-Australian Summer Monsoon (De Deckker, Barrows, and Rogers 2014; Van der Kaars, De Deckker, and Gingele 2006). Over this period, the terminal Pleistocene - early Holocene records at Boodie Cave and John Wayne Country Rockshelter show a number of geoarchaeological, faunal, and lithological trends. Micromorphological analyses show an increasing abundance of beach sand, economic marine shell fragments and mangrove charcoal in the deposits prior to islandisation (Ward et al. 2017). This is corroborated by an exceptionally rich pre-abandonment early Holocene marine/terrestrial faunal assemblage that includes significant quantities of fish, turtle, marine mammal, crab and sea urchin, along with freshwater mollusks and more than 40 species of marine mollusks (Manne and Veth 2015; Veth et al. 2017). The stone artifact assemblages also have attributes consistent with increased occupational intensity (Ditchfield 2018; Ditchfield et al. 2018). Stone raw materials are largely characterized by local limestone but also include non-local igneous and siliceous sedimentary artifacts which may derive from mainland sources, indicating long distance movement to coastal locations despite continued islandisation (Ditchfield and Ward 2019). However, by 6800 cal. BP, despite a clearly productive environment, occupation on Barrow Island effectively ceased.

There are two key discussion points that emerge from Barrow Island's islandisation: human resilience and the thresholds for island occupation/abandonment. Occupation of Barrow Island continued in conjunction with sea level rise, suggesting that Aboriginal coastal occupation was resilient despite significant, and nearly continuous, landscape change. Indeed, occupation at Boodie Cave culminated with the highest dietary breadth and occupational intensity for the entire sequence (Veth et al. 2017). Such resilient occupation is likely correlated with the productive terminal Pleistocene – early Holocene environments, which hosted expanded mangrove forests and an increase in freshwater availability. Yet, this was not enough to encourage continued island occupation; once islandisation was complete, so

was occupation. What then, are the key thresholds for island occupation? Why was Barrow Island abandoned?

While this is not the place for an extended discussion, it is possible to suggest two main factors. The first is distance from the mainland coast. Today, Barrow Island is located approximately 60 km from the mainland coast and, once Barrow Island was created, this distance over unprotected waters may have been beyond the capabilities of Aboriginal watercraft which, in the Holocene, is often thought to be more of a nearshore technology (e.g., Jones 1977; King 1827, but see Rowland, Shaw, and Ulm 2021). It is worth considering that, even if watercraft were able to reach Barrow Island, Aboriginal people may still have chosen not to access the island as the mainland coast was equally productive. Other factors in addition to productivity may have influenced decision-making at the time, for instance changes in territorial boundaries post-sea level rise, population reconfiguration, and the need for reciprocal access to country as part of an arid zone adaptation (Veth 1993). Second is water availability and accessibility. While a freshwater lens occurs beneath Barrow Island, its surface expression is brackish and non-potable (Chevron Australia 2014; Faure, Walter, and Grant 2002). Sea level rise may have drowned and/or diluted Barrow Island's accessible water sources making continued occupation untenable.

The Whitsunday Islands represent an interesting contrast to Barrow Island where archaeological records from Nara Inlet 1 show that Aboriginal people continued to occupy the coast throughout post-glacial sea level rise (Barker 1991, 2004). Barker (1991, 2004) suggests that this provides evidence for the resilience of Aboriginal people and productive marine environments in the face of sea level transgression. However, in contrast to Barrow Island, the much shorter distance to access the island (and maintain larger social universes) saw Aboriginal people continue to occupy the Whitsunday Islands following islandisation around 7000 years ago. The Whitsunday record shows that early Holocene occupation was focused on rocky shore mollusks, fringing reef fish, and terrestrial animals like macropods.

There is evidence for continued use of the islands, but from ca. 3000–3500 years ago this may have intensified, as demonstrated by a greater emphasis on marine resources and technology (Barker 2004). This record represents an interesting contrast to Barrow Island since it shows continued use following islandisation, with Barker (2004) arguing for permanent island occupation by the late Holocene. Barker (2004) attributes this change to a regional demographic restructure which clearly increased importance of the Whitsunday Islands to local Aboriginal groups. Combined, the Barrow – Whitsunday records show that numerous factors (e.g., distance to mainland, watercraft technology, water availability, and

regional demography) likely contribute towards continued occupation throughout, and post-islandisation where every island should be considered independently.

The Australian Pleistocene – early Holocene coastal record provides important case studies that provide key baseline data for studying peoples’ interaction with dynamic coastal processes, such as islandisation. There are very few archaeological records which track peoples’ interaction with such substantive Pleistocene landscape changes (but see Des Lauriers 2006; Erlandson et al. 2011; Marean et al. 2007, for some exceptions), which leaves the Australian record in a unique position to contribute towards global dialogues on island use. However, despite this unique facet of the Australian record, island occupation only becomes a feature of the Australian archaeological record from the middle Holocene as evidence for coastal occupation becomes common around Australia (see below).

The Holocene ‘coastal proliferation’

The Australian middle to late Holocene coastal and island archaeological record provides a stark contrast with the Pleistocene record. From the middle Holocene, archaeological evidence for coastal and island occupation unquestionably ‘proliferates’ around Australia (e.g., Rowland, Wright, and Baker 2015; Ulm 2011) in phase with relative sea level stabilization. This has prompted some scholars to variously suggest that Pleistocene coasts were comparatively unproductive due to procumbent profiles and sea level fluctuations, with coastal environments only becoming economically important for Aboriginal people by the middle Holocene when stabilized sea levels underwrote a major increase in coastal productivity (Beaton 1985; Beaton 1995; Hiscock 2015; Mulvaney and Kamminga 1999; Nunn 2020; O’Connell and Allen 2012; Pope and Terrell 2008; Szabó and Amesbury 2011). This scenario provides one explanation for the apparent lack of Australian Pleistocene coastal and island archaeology and the comparative surge in middle to late Holocene records. Others have argued that the northwestern cluster of Pleistocene coastal archaeology is a result of sections of the continental shelf in this area being quite steep, and that in those instances the coast will be relatively resistant to sea level fluctuations (Morse 1988). If the shelf does accommodate marine fauna along a relatively narrow coastal band, these resources can be quickly depleted by initial occupation, with populations then switching focus to interior terrestrial resources (Beaton 1995; O’Connell and Allen 2012).

An alternative perspective sees the Pleistocene coastline (and its resources) as productive and one that facilitated occupation; however, the evidence for both has largely been drowned through post-glacial sea level rise (Barker 2004; Ditchfield et al. 2018;

Erlandson 2012; Morse 1993b; Veth et al. 2017; Ward, Larcombe, and Veth 2015). Building on this perspective and similar international evidence (e.g., Bailey et al. 2015; Bailey et al. 2007; Erlandson and Braje 2015), Ditchfield et al. (2022) have recently assessed both the levels of Pleistocene coastal productivity and whether we should expect evidence for Pleistocene coastal occupation to preserve on present-day coastlines. Based on both archaeological and paleo-environmental data, Ditchfield et al. (2022) concluded that there was a persuasive case for coastal productivity. Offshore paleoenvironmental core data is consistent with high levels of coastal productivity, and more importantly, this is reflected in the regional archaeological records (Ditchfield et al. 2018; Morse 1993b; Przywolnik 2002; Veth et al. 2007; Veth et al. 2017). Ditchfield et al. (2022) argue that coastal occupation was likely widespread around Australia during the Pleistocene, but that most evidence will now be drowned. This is particularly pertinent given multiple studies have shown that dietary marine fauna only tends to be discarded by people within 1 – 2 km of previous paleoshorelines (e.g., Dusseldorp and Langejans 2013; Jerardino 2016; Meehan 1975). Since almost all of these shorelines are now drowned, we should expect to find very little evidence for Pleistocene coastal or island occupation except in rare scenarios with steep bathymetry (e.g., Cape Range, Morse 1993b) or unique preservation conditions (e.g., Murujuga, Benjamin et al. 2020). This debate aside, the fact remains that, from the middle Holocene onwards, coastal and island archaeology becomes increasingly common around the entire Australian coastline. A detailed consideration of the local variability in marine resource use across Australia during the Holocene, as well as an exploration of what has been characterized as a late Holocene emergence of *maritime specialist economies* will further elucidate these broad regional trends.

Holocene maritime economies and coastal resources

Dynamic coastal resource engagement and island occupation throughout the Holocene

Postglacial Holocene changes in sea level around the Australian margin were variable as was the timing and elevation of the Holocene high stand (Dougherty et al. 2019; Lewis et al. 2013; Sloss et al. 2018; Williams et al. 2018). However, most present-day continental islands formed with rising sea levels and, alongside these changes were shifts in coastal occupation patterns. Early commentators suggested that the use of small offshore islands and acquisition of associated marine resources was a late Holocene occurrence, dating from approximately 4000 – 3000 BP onward (e.g., Bowdler 1995; Sim and Wallis 2008). In northeast Australia, for example, records from Otterbourne Island 4 (Shoalwater Bay Islands, McNiven et al.

2014), Nara Inlet 1 (Whitsunday Islands, Barker 2004), Yindayin rockshelter (Flinders Group, Wright 2018), and Badu 15 rockshelter (western Torres Strait, David et al. 2004) suggest both permanent and semi-permanent island-based marine economies were prevalent by the early to middle Holocene. There is evidence for early Holocene coastal resource use in other regions of the continent, such as Western Australia (e.g., Koolan Shelter 2, Koolan Island, west Kimberley coast, O'Connor 1999a), South Australia (e.g., Cape du Couedic Rockshelter, Kangaroo Island, Draper 1991; Langeluddecke 2001), and southwestern Victoria (e.g., Bridgewater South Cave, Lourandos 1983) (see also McDonald and Berry 2017; Veth et al. 2019 for a discussion of early to middle Holocene use of islands in northwestern Australia).

Some of the most comprehensive records for Australian marine resource exploitation are from the middle to late Holocene (e.g., Attenbrow 2010; Bailey 1975; Barker and Lamb 2022; Colley and Jones 1987; Faulkner 2013; Hall 1982; Lambrides et al. 2020; Litster et al. 2020; Lourandos 1997; McNiven 1996; Monks, Sheppard, and Dortch 2015; Richards and Johnston 2004; Sullivan 1982; Ulm 2006; Ulm and Hall 1996; Weisler and McNiven 2016). This pattern has been used to bolster the argument that coastal resource use was ephemeral across Australia prior to the middle Holocene, with the dramatic increase in focused exploitation of marine resources, portrayed as the emergence of *maritime specialist economies* (e.g., Barker 2004; Lourandos 1997; McNiven 1999; Rowland, Shaw, and Ulm 2021; Rowland, Wright, and Baker 2015; Ulm 2011; Walters 1989). These changes in documented occupation patterns have been attributed to a number of factors, including taphonomic bias, increased availability and complexity of marine habitats, wider sociocultural changes, population growth, and/or group fissioning (e.g., Barker 2004; Beaton 1985; Bird 1992; David and Weisler 2006; Haberle and David 2004; Lourandos and Ross 2021; McNiven 1999; McNiven et al. 2008; Memmott et al. 2016; Monks, Sheppard, and Dortch 2015; Rowland and Ulm 2011; Wright 2011).

During the middle to late Holocene we witness the appearance of shell mounds—generally ~0.2 -13+ m in height and dominated by blood cockle (*Tegillarca granosa*)—on the northern coastline of Australia, in Western Australia (e.g., Clune and Harrison 2009; O'Connor 1999b; Veitch 1999), the Northern Territory (e.g., Bourke 2000; Faulkner 2013; Roberts 1994), and Far North Queensland (e.g., Bailey, Chappell, and Cribb 1994; Beaton 1985; Cribb 1996; Emmitt et al. 2020; Morrison 2010). Most mound accumulation ceased over the past ~500–700 years (e.g., Blue Mud Bay region, Northern Territory, Faulkner 2013); however, in the Albatross Bay region of north Queensland (Morrison 2014; Ulm 2011),

mound construction may have continued until the 1800s (but see Holdaway et al. 2017). The construction of these substantial mounds across northern Australia has been attributed to a number of potential factors, including environmental change (i.e., the expansion of sand and mudflat habitats to support the proliferation of *Tegillarca granosa* shell beds), associated economic reconfiguration in response to these emergent ecosystems, the construction of high and dry campsites for extended family use during the wet season, and changes in social organization enacted through social inscription of the landscape as a place for gathering (e.g., Bailey 1977; Bourke et al. 2007; Brockwell et al. 2009; Faulkner 2006, 2008; Morrison 2003).

Coral/stone-walled fish traps are some of the largest engineered structures created by Aboriginal and Torres Strait Islander people (McNiven and Lambrides 2021; Rowland and Ulm 2011). The Muldoons Trap Complex at Lake Condah in southwest Victoria, located 23 km from the coast, is the world's oldest known stone-walled trap dating to 6600 years ago. It was used to harvest short-finned eel (*Anguilla australis*) with a major expansion in building activity from ~800 years ago (McNiven et al. 2012). Most recently, Kreij et al. (2018) used inundation modelling to demonstrate that Kaiadilt Aboriginal stone-walled fish traps of South Wellesley Islands (northeast Australia) have effective working ranges by 3500 years ago (Figure 3A). McNiven and Lambrides (2021, 6) described these engineered structures as “monumental and fixed-in-place expressions of resource extraction and sociality” being “inherent features of inhabited waterscapes” (see also Bradley and McNiven 2019; Jackson 2005; McNiven 2004; Morphy and Morphy 2006; Smith 1983). In some cases, the construction of these major tidal fish traps enhanced the capture and management of marine resources more broadly, not just fish. For instance, Memmott, Robins, and Stock (2008) describe that the Lardil, Yangkaal, and Kaiadilt peoples of the Wellesley Islands (northeast Australia) also used stone-walled traps to access turtles, dugong, crabs, and mollusks. While these examples do not preclude the construction of coral/stone-walled fish traps (or other organic technologies like stake fence weirs) during the Pleistocene, they would likely be submerged further off the coast and require different methodologies to identify them. The available evidence suggests a late Holocene proliferation of these trapping facilities in selected tidal regions of northern Australia.

In Torres Strait (northeast Australia), the emergence of large open village sites has been identified during the late Holocene (past ca. 1000 years), and these social transformations are believed to have been underwritten by enhanced engagement with marine resources (including the exploitation of turtle, dugong, mollusks, fish, shark, ray, etc.) and

accompanied by newly conceptualized territorial land- and seascapes (e.g., David and Weisler 2006; McNiven et al. 2008; Wright 2011, 2015). Concomitant with the potential sociocultural restructuring that is visible archaeologically (e.g., shell mound building, stone-walled fish trap construction, the emergence of open village sites, etc.), are significant climatic changes during the late Holocene across much of the continent (e.g., Gliganic et al. 2014). Possible causal connections between these climate changes and the archaeological record are hampered by the lack of paleoenvironmental seasonal records at the local- and/or site-specific level to correlate with these regional climatic signatures. It is worth noting that novel work is being undertaken in Australia to address this gap, for example, the use of archaeological mammal tooth enamel to track Pleistocene–early Holocene environmental change in the northwest on Barrow Island (Skippington, Manne, and Veth 2021) and scleroisotopic studies of seasonality and environment from mollusk shells (Twaddle et al. 2017).

The records of engagement with marine fauna associated with Holocene island and coastal archaeological sites are rich and complex, and as such the focus here is on the molluscan and fish remains only, including a comparison of evidence from the northeast and southwest of Australia. Subtropical southeast Queensland has been described as one of the most comprehensively investigated coastal zones in Australia (McNiven 2006; Smith and McNiven 2019; Ulm and Hall 1996). The region is dominated by estuarine middens (associated with oyster [*Saccostrea* sp.], Hercules club mud whelk [*Pyrazus ebeninus*], and arc cockle [*Anadara trapezia*]) dating from the middle Holocene (~5000 BP onwards), and open surf beach middens (associated with pipi [*Latona deltoidea*]) which occur during the late Holocene only (past ~1000 years) (McNiven 2006; Smith 2016; Smith and McNiven 2019) (Figure 3B). A re-examination of two estuarine midden sites (Sites 62 and 75b) from Tin Can Inlet (south of the Fraser Island [K'gari] World Heritage Area) demonstrated an increased focus on a limited range of molluscan species (particularly *Saccostrea* sp.) over the past 900 years, but particularly the past 200–400 years, with no evidence of engagement with terrestrial fauna or marine vertebrates (e.g., fish, dugongs, turtle, or dolphins). This is a trend observed at other sites across the region (McNiven 1990; Smith and McNiven 2019). An increase in the intensity of site use was tentatively attributed to the formation of the mixed woodland and forest vegetation zones that are associated with the region today, which may have enhanced “the attractiveness of the eastern margins of Tin Can Inlet as a place to establish longer-term residential campsites” (Smith and McNiven 2019, 31).

On the southern Curtis Coast (central Queensland), ~200 km north of Tin Can Inlet, but also on the mainland coast, Ulm (2006) identified evidence for the use of marine resources – particularly mollusks and fish – from 3500 cal. BP (Figure 3C). Specifically, increased localized resource use over the past 1500 years was observed, concomitant with enhanced coastal settlement and engagement with marine resources. Foraging efforts targeted a limited range of predominately estuarine molluscan taxa, with a particular focus on rock oyster (*Saccostrea glomerata*), mud ark (*Anadara trapezia*), and hairy mussel (*Trichomya hirsuta*). Due to the expansion of mangrove habitats over the past 1000 years, there is an increase in the relative abundance of the mangrove associated *S. glomerata* (mangroves provide the major substrate for oysters in this region) through time, compared to the mudflat associated bivalve *A. trapezia*. There was also evidence of people exploiting shallow water estuarine fish species (e.g., whiting [Sillaginidae], flathead [Platycephalidae], and bream [Sparidae]), dugong (*Dugong dugon*), and turtle (Cheloniidae) (see also Lambrides, McNiven, and Ulm 2019). A broad increase in the range of fish and molluscan taxa targeted through time is also reported across the southern Curtis Coast study region potentially linked to enhanced landscape use during the late Holocene (Ulm 2006).

Comparatively, the archaeology of Great Barrier Reef (northeast Australia) offshore island use is more limited when compared to the mainland, but work on the Keppel Islands (Rowland 1982, 1999), Northumberland Group (Border 1999; McNiven et al. 2014), Whitsunday Islands (Barker 2004; Lamb and Barker 2001), Lizard Island Group (Lambrides et al. 2020; Lentfer et al. 2013), and Flinders Group (Beaton 1985; Wright 2018) has provided a rich record of permanent and semi-permanent island-based marine economies dating to the middle to late Holocene. At Mangrove Beach Headland Midden and Freshwater Bay Midden (Lizard Island Group, north Queensland), subsistence remains are dominated by mollusks during the past ca. 4,000 years, with evidence for low, yet consistent exploitation of fish (e.g., parrotfish [Scaridae]), and occasional targeting of turtle and dugong (Lambrides et al. 2020; Lentfer et al. 2013; Mills 1992; Ulm et al. 2019) (Figure 3D). A similar range of mollusk taxa were targeted at both sites through time, but with a particular emphasis on adolescent and adult *Conomurex luhuanus* (strawberry conch) and juvenile *Rochia nilotica* (top shell). This indicates that foraging efforts were focused on intertidal benches, shallow subtidal reef flats, subtidal sandy substrates, and reef slopes. Available archaeological evidence from Lizard Island indicates that Aboriginal occupation from ca. 4000 years ago was periodic, likely short term and perhaps seasonally phased by people with connections to the mainland and elsewhere, with no discernible indication that anthropogenic and/or

environmental factors altered the availability or population structure of key exploited taxa (i.e., mollusks and fish) (Lambrides et al. 2020).

In terms of Holocene Indigenous marine fisheries, Lambrides, McNiven, and Ulm (2019) conducted a meta-analysis of archaeological fish bone evidence from northeast Australia to elucidate spatial and temporal variability in targeted species. Outcomes suggest these were mixed species fisheries, with commonly exploited families such as Sparidae, Sillaginidae, Labridae (wrasse), Mugilidae (mullet) and Scaridae. Yet, there was clear geographic variability in the fish species captured and a broad increase in the range of species targeted through time. It was determined that harvesting decisions were likely mediated by local ecological knowledge and cultural preference for certain species, but broad trends seem to support regional models that suggest an increased reliance on marine resources and expansion in diet breadth during the middle to late Holocene. Archaeological evidence from northeast Australia broadly indicates the long-term sustainable use (or continued availability) of marine resources. This was likely underpinned by flexible foraging strategies to engage with a diverse range of habitats and taxa. Furthermore, these foraging approaches were responsive to ecosystem dynamism and changes in resource availability, a strategy which appears to have supported marine ecosystem resilience over many millennia.

In contrast, southwestern Australia, “has often been regarded as a coastal region without a coastal economy” (Monks 2021, 5; see also Nicholson and Cane 1994; O’Connor and Sullivan 1994). Recent work by Monks (2021), however, has challenged traditional definitions of ‘coastal economies’ (after Beaton 1995), by arguing that marine resources are not required as the year-round focus of subsistence activities when seasonal engagement with these resources can be an equally critical aspect of Aboriginal foraging strategies. It was observed that when the coast came within a day’s walk of many sites in southwest Australia during the early to middle Holocene then marine resources were incorporated into subsistence practices, albeit in low frequencies, but likely as seasonally significant contributions. On the Western Australian south coast, there is a middle to late Holocene focus on estuarine fish and mollusks, with only a limited engagement with terrestrial mammals (Dortch 1999; Dortch, Kendrick, and Morse 1984; Monks 2021). This variability along the southwestern coast, in a similar vein to that which was described for the northeast coast, highlights local and regional diversity in Holocene coastal habitat structures and subsistence regimes across the continent.

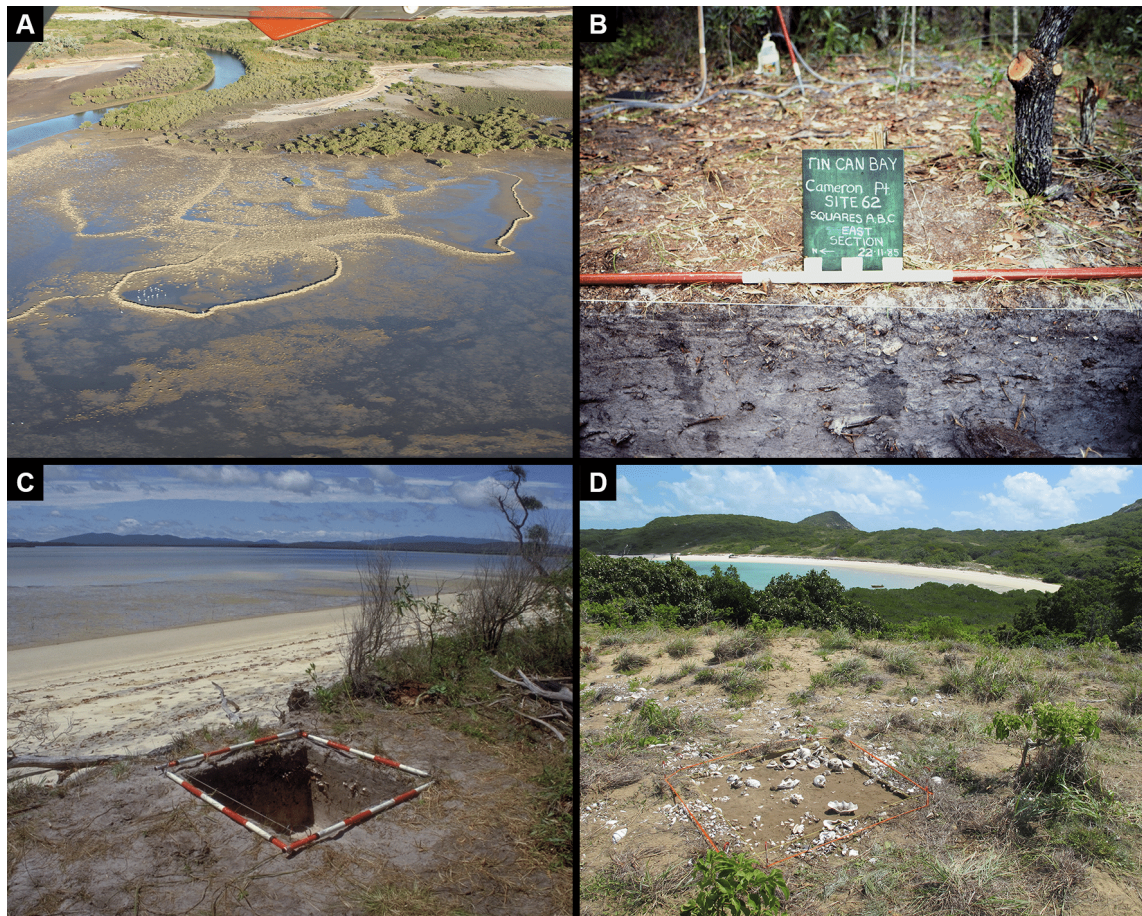


Figure 3. Examples of archaeological sites from northeastern Australia: A) Stone-walled fish trap complex on Bentinck Island, South Wellesley Islands, north Queensland (Photograph: Sean Ulm); B) East section of the Tin Can Inlet (southeast Queensland) Site 62 excavation (Photograph: Ian J. McNiven); C) Completed excavation at Pancake Creek Site Complex, southern Curtis Coast, central Queensland (Photograph: Sean Ulm); and D) Mangrove Beach Headland Midden (Lizard Island, north Queensland), showing excavations in progress (Photograph: Ian J. McNiven).

Late Holocene emergence of maritime specialist economies?

While *maritime specialist economies* in Australia are conceived of as a middle to late Holocene phenomenon (Lourandos 1997; McNiven 2004; Ulm 2011), there is evidence for the exploitation of marine resources to before 42,500 years ago in the northwest, whereby an increased reliance was documented during the Pleistocene-Holocene transition (Veth, Ward, and Manne 2017; Veth et al. 2017). While it is not unreasonable to classify economies that exploit predominately marine fauna as ‘specialist’ (e.g., middle to late Holocene sites in northeast Australia), we argue, as have other authors, this is a narrow definition of marine specialists. For many coastal Aboriginal and Torres Strait Islander people, to be a marine specialist is intrinsically linked to their identity, as McNiven (2004, 329) argues, “marine

specialists see and represent themselves as Saltwater People—an identification spiritually embedded within seascapes rich in cosmological meaning”. Importantly, this does not diminish the significance of marine resource interaction in other regions of the continent (e.g., Holocene sites in the southwest) where coastal resources are a smaller component of subsistence regimes, as ‘dominance’ is a simplistic representation of the complex and temporally dynamic engagement that people had with the coast over millennia. Furthermore, concepts of ‘being’ a *maritime specialist* are imbued with social and spiritual connection to the marine land- and seascape, with these connections enacted through interaction, engagement, and movement of people, and as such likely producing diverse archaeological expressions.

Australian archaeology in a global context: Future directions and research opportunities

Engagement with marine landscapes and associated coastal resources is argued to occupy a prominent role in the dispersion, sociocultural, and biological development of modern peoples (*Homo sapiens*) from the late to middle Pleistocene, but with increased evidence post-dating the last interglacial from ~110,000 BP (e.g., Erlandson and Braje 2015; Faulkner et al. 2021; Marean 2016; Will, Kandel, and Conard 2019). In an Australian context, the earliest evidence for coastal resource use is in the northwest of the continent at Boodie Cave (Barrow Island, Western Australia) where marine mollusks were transported 10-20 km across the Pleistocene coastal plain by 42,500 cal. BP (Manne and Veth 2015; Veth et al. 2017).

The Pleistocene record of marine resource acquisition in Australia is unquestionably sparse when examined alongside the more abundant records dating to the Holocene (e.g., Lambrides, McNiven, and Ulm 2019; Smith 2016; Ulm 2011). While this may be unsurprising given the earliest records of Aboriginal engagement with the coastline were likely drowned by postglacial sea level rise, we note recent submerged and intertidal archaeological finds (Benjamin et al. 2020) and the significant potential of these initiatives to elucidate our understanding of drowned cultural landscapes (e.g., Benjamin and Ulm 2021; Leach et al. 2021; McCarthy et al. 2022; Veth et al. 2020; Wiseman et al. 2021). Terrestrially focused research programs targeting remanent Pleistocene coastal landscapes continue to transform our understanding of the prominent role these potentially productive coastal zones had during the earliest periods of Aboriginal occupation of Australia (e.g., Ditchfield et al. 2018, 2022; Morse 1993b; Przywolnik 2002; Veth, Ditchfield, and Hook 2014; Veth, Ward, and Manne 2017). During the late Holocene in northeast Australia, there is abundant

evidence for sociocultural elaboration (e.g., shell mound building, stone-walled fish trap construction, the emergence of open village sites, etc.), likely associated with the emergence of *maritime specialist economies* across the region (e.g., David and Weisler 2006; McNiven and Lambrides 2021; Morrison 2014; Rowland and Ulm 2011; Ulm 2011).

It is apparent that the Australian coastal and island archaeological record is well positioned to contribute to global dialogues. Major themes discussed in this paper included: 1) Pleistocene coastal productivity; 2) human interaction with fluctuating sea levels and islandisation; 3) the Holocene proliferation of coastal records with the emergence of specialized maritime economies; and 4) the influence of people on long-term resource sustainability. Each of these are key to global dialogues (e.g., Bailey et al. 2007; Ditchfield et al. 2022; Erlandson and Braje 2015; Faulkner et al. 2021; Fitzpatrick and Erlandson 2018; Giovas 2016; Jazwa, Kennett, and Hanson 2012; Lambrides and Weisler 2016; Nunn et al. 2022; O'Connor et al. 2019; O'Connor, Ono, and Clarkson 2011; Shaw et al. 2020). The fact that Australia's coastal record has a 50,000-year time depth provides a rare opportunity to investigate a near-continuous record for the evolution of human occupation on dynamic coastal landscapes over millennia. This allows the Australian archaeological record to provide benchmark data on the specific themes outlined above, and especially for the numerous southern hemisphere countries where such coastal time-depth is rare or simply not available. Beyond the past, the Australian record of human interaction with rising sea levels can inform on current debates and future actions in response to changing climate (e.g., Sloss et al. 2018; Williams et al. 2015). This chapter has shown that Aboriginal people have successfully adapted to fluctuating sea levels and dramatic coastal changes on many occasions across the Pleistocene and Holocene. For example, we have briefly examined the thresholds for island occupation/abandonment in the context of rising sea levels. Islandisation is likely to be an important process if sea levels continue to rise in the future (e.g., Erlandson 2012; Rowland and Ulm 2012). Our summary review has indicated some key factors that influence continued island occupation or abandonment including distance to the mainland, the capabilities of watercraft, water availability, and sociocultural reorganization.

However, looking to the future, there are a number of important challenges and opportunities facing Australian coastal and island archaeologists. Rowland, Shaw, and Ulm (2021) recently identified several gaps yet to be addressed, and below we present, and build on these recommendations:

- There is a need to define the extent and nature of Pleistocene coastlines and their potential for human use;
- We need to clarify when coastal resources were first widely used across the continent;
- It should be determined whether a time lag exists between colonization of Australia and the establishment of coastal economies;
- We should expand survey areas to take in more unexplored regions (e.g., few Great Barrier Reef offshore islands have been extensively surveyed);
- Legacy collections should be re-examined from important sites that were excavated and dated many decades ago to establish new comparative chronologies (e.g., Jansz Rockshelter and C99 Cave; Przywolnik 2002); and
- In addition to establishing local and site-level paleoenvironmental data (e.g., using sclerochronology and stable isotope analysis) there should be a program to produce high-resolution seasonal-resolution records from which to consider landscape change and use.

Research efforts in northwest and northeast Australia over the past decade have reshaped the continental narrative of the dynamic role marine resources played across the Pleistocene – Holocene transition, and through to the recent past. Furthermore, these dedicated research programs have demonstrated that archaeological signatures of coastal landscape use, islandisation, resilient occupation, and emergent maritime economies are not singular or uniform, but rather locally and regionally diverse across space and time (e.g. Balme et al. 2019; Ditchfield et al. 2018; Faulkner 2013; Lambrides, McNiven, and Ulm 2019; Litster et al. 2020; Manne and Veth 2015; McNiven et al. 2014; Monks 2021; Rosendahl et al. 2014; Rowland, Wright, and Baker 2015; Ulm 2011). These Australian records have implications for our understanding of the broader role coasts and islands have played in the dispersion and sociocultural development of people over millennia. With ongoing research efforts across much of the Australian coastline, we anticipate that in another decade, through the application of new technologies and novel research questions, we will see further transformations in our understanding of this unique continent. As the largest island continent unquestionably settled by modern people with maritime capabilities and tropical coastal adaptations, we predict that the Australian records will continue to engage with, and amplify, narratives about the emergence of island societies globally.

Acknowledgements

This research was supported by an Australian Research Council Discovery Project (project number DP130100802) administered by the University of Western Australia, the Australian Research Council Centre of Excellence for Australian Biodiversity and Heritage (project number CE170100015), and an Australian Research Council Discovery Early Career Award to AL (project number DE210101087). We thank Matthew Harris (Harris Illustration) for preparing the figures and Ian J. McNiven for contributing Figures 3B and 3D.

References

- Adams, S. J., M. C. McDowell, and G. J. Prideaux. 2016. Understanding accumulation bias in the ecological interpretation of archaeological and paleontological sites on Kangaroo Island, South Australia. *Journal of Archaeological Science: Reports* 7:715-729.
- Attenbrow, V. 2010. Aboriginal fishing in Port Jackson, and the introduction of shell fish-hooks to coastal New South Wales, Australia. In *Prehistoric hunter-gatherers of the Baikal Region, Siberia: Bioarchaeological studies of past lifeways*, ed. A. Weber, 51-86. Philadelphia: University of Pennsylvania Press.
- Bailey, G. 1977. Shell mounds, shell middens and raised beaches in the Cape York Peninsula. *Mankind* 11:132-43.
- Bailey, G., J. Chappell, and R. Cribb. 1994. The origin of *Anadara* shell mounds at Weipa, north Queensland, Australia. *Archaeology in Oceania* 29 (2):69-80.
- Bailey, G., M. Devès, R. H. Inglis, M. G. Meredith-Williams, G. Momber, D. Sakellariou, A. Sinclair, G. Rousakis, S. Al Ghamdi, and A. Alsharekh. 2015. Blue Arabia: Palaeolithic and underwater survey in SW Saudi Arabia and the role of coasts in Pleistocene dispersals. *Quaternary International* 382:42-57.
- Bailey, G., and N. Milner. 2002. Coastal hunter-gatherers and social evolution: Marginal or central? *Before Farming: The Archaeology of Old World Hunter-Gatherers* 3-4 (1):1-15.
- Bailey, G. N. 1975. The role of molluscs in coastal economies: The results of midden analysis in Australia. *Journal of Archaeological Science* 2 (1):45-62.
- Bailey, G. N., and N. C. Flemming. 2008. Archaeology of the continental shelf: Marine resources, submerged landscapes and underwater archaeology. *Quaternary Science Reviews* 27 (23-24):2153-2165.
- Bailey, G. N., N. C. Flemming, G. C. King, K. Lambeck, G. Momber, L. J. Moran, A. Al-Sharekh, and C. Vita-Finzi. 2007. Coastlines, submerged landscapes, and human evolution: The Red Sea Basin and the Farasan Islands. *The Journal of Island and Coastal Archaeology* 2 (2):127-160.
- Balme, J. 2013. Of boats and string: The maritime colonisation of Australia. *Quaternary International* 285:68-75.

- Balme, J., I. Davidson, J. McDonald, N. Stern, and P. Veth. 2009. Symbolic behaviour and the peopling of the southern arc route to Australia. *Quaternary International* 202 (1-2):59-68.
- Balme, J., and K. Morse. 2006. Shell beads and social behaviour in Pleistocene Australia. *Antiquity* 80 (310):799-811.
- Balme, J., and S. O'Connor. 2017. Traditions and change in scaphopod shell beads in northern Australia from the Pleistocene to the recent past. In *Not just for show: The archaeology of beads, beadwork and personal ornaments*, ed. D. Bar Yosef, A. Choyke and C. Bonsall, 1-18. Oxford: Oxbow Books.
- Balme, J., S. O'Connor, T. Maloney, D. Vannieuwenhuyse, K. Aplin, and I. A. Dilkes-Hall. 2019. Long-term occupation on the edge of the desert: Riwi Cave in the southern Kimberley, Western Australia. *Archaeology in Oceania* 54 (1):35-52.
- Barker, B. 1991. Nara Inlet 1: Coastal resource use and the Holocene marine transgression in the Whitsunday Islands, central Queensland. *Archaeology in Oceania* 26 (3):102-109.
- Barker, B. 2004. *The sea people: Late Holocene maritime specialisation in the Whitsunday Islands, central Queensland*. Terra Australis 20. Canberra: Pandanus Books, Australian National University.
- Barker, B., and L. Lamb. 2022. Wunjunga midden: Late Holocene change, site preservation and open midden sites on the Central Queensland Coast. *Australian Archaeology* 88 (3):318-327.
- Barker, G. 2013. The Niah Caves and the prehistory of Island Southeast Asia: Research themes. In *Rainforest foraging and farming in Island Southeast Asia: The archaeology of the Niah Caves, Sarawak*, ed. B. Barker, 90-107. Cambridge: McDonald Institute for Archaeological Research.
- Beaton, J. M. 1985. Evidence for a coastal occupation time-lag at Princess Charlotte Bay (North Queensland) and implications for coastal colonization and population growth theories for Aboriginal Australia. *Archaeology in Oceania* 20 (1):1-20.
- Beaton, J. M. 1995. The transition on the coastal fringe of Greater Australia. *Antiquity* 69 (265):798-806.
- Benjamin, J., M. O'Leary, J. McDonald, C. Wiseman, J. McCarthy, E. Beckett, P. Morrison, F. Stankiewicz, J. Leach, J. Hacker, et al. 2020. Aboriginal artefacts on the continental shelf reveal ancient drowned cultural landscapes in northwest Australia. *PLOS ONE* 15 (7):e0233912.
- Benjamin, J., and S. Ulm. 2021. The big flood: Responding to sea-level rise and the inundated continental shelf. In *The Oxford handbook of the archaeology of Indigenous Australia and New Guinea*, ed. I.J. McNiven and B. David. Oxford: Oxford University Press.
- Bird, C. F., and D. Frankel. 2001. Excavations at Koongine Cave: Lithics and land-use in the Terminal Pleistocene and Holocene of South Australia. *Proceedings of the Prehistoric Society* 67:49-83.
- Bird, M. I., R. J. Beaman, S. A. Condie, A. Cooper, S. Ulm, and P. Veth. 2018. Palaeogeography and voyage modeling indicates early human colonization of Australia was likely from Timor-Roti. *Quaternary Science Reviews* 191:431-439.

- Bird, M. I., S. A. Condie, S. O'Connor, D. O'Grady, C. Reepmeyer, S. Ulm, M. Zega, F. Saltr , and C. J. Bradshaw. 2019. Early human settlement of Sahul was not an accident. *Scientific Reports* 9 (1):1-10.
- Bird, M. K. 1992. The impact of tropical cyclones on the archaeological record: An Australian example. *Archaeology in Oceania* 27 (2):75-86.
- Birdsell, J. B. 1977. The recalibration of a paradigm for the first peopling of Greater Australia. In *Sunda and Sahul: Prehistoric studies in Southeast Asia, Melanesia, and Australia*, ed. J. Allen, J. Golson and R. Jones, 113-167. London: Academic Press.
- Border, A. 1999. Aboriginal settlement of offshore islands in the Southern Great Barrier Reef Province, central Queensland. In *Australian coastal archaeology*, ed. J. Hall and I.J. McNiven, 129-139. Research Papers in Archaeology and Natural History 31. Canberra: Archaeology and Natural History Publications, Research School of Pacific and Asian Studies, Australian National University.
- Bourke, P. 2000. Late Holocene Indigenous economies of the tropical Australian coast: An archaeological study of the Darwin region. Unpublished PhD thesis, Northern Territory University.
- Bourke, P., S. Brockwell, P. Faulkner, and B. Meehan. 2007. Climate variability in the mid to late Holocene Arnhem Land Region, North Australia: Archaeological archives of environmental and cultural change. *Archaeology in Oceania* 42 (3):91-101.
- Bowdler, S. 1977. The coastal colonisation of Australia. In *Sunda and Sahul: Prehistoric studies in Southeast Asia, Melanesia, and Australia*, ed. J. Allen, J. Golson and R. Jones. London: Academic Press.
- Bowdler, S. 1995. Offshore islands and maritime explorations in Australian prehistory. *Antiquity* 69 (266):945-958.
- Bowler, J. M., D. M. Price, J. E. Sherwood, and S. P. Carey. 2018. The Moyjil site, south-west Victoria, Australia: Fire and environment in a 120,000-year coastal midden—Nature or people? *Proceedings of the Royal Society of Victoria* 130 (2):71-93.
- Bradley, J., and I. J. McNiven. 2019. "Why those old fellas stopped using them?": Socio-religious and socio-political dimensions of stone-walled tidal fish trap use and dis-use amongst the Yanyuwa of northern Australia. *The Journal of Island and Coastal Archaeology* 14 (3):337-355.
- Bradshaw, C. J., S. Ulm, A. N. Williams, M. I. Bird, R. G. Roberts, Z. Jacobs, F. Laviano, L. S. Weyrich, T. Friedrich, and K. Norman. 2019. Minimum founding populations for the first peopling of Sahul. *Nature Ecology & Evolution* 3 (7):1057-1063.
- Brockwell, S., P. Faulkner, P. Bourke, A. Clarke, C. Crassweller, D. Guse, B. Meehan, and R. Sim. 2009. Radiocarbon dates from the Top End: A cultural chronology for the Northern Territory coastal plains. *Australian Aboriginal Studies* 1:54-76.
- Bulbeck, D. 2007. Where river meets sea: A parsimonious model for *Homo sapiens* colonization of the Indian Ocean rim and Sahul. *Current Anthropology* 48 (2):315-321.
- Chappell, J. 2000. Late Pleistocene seabeds of western Pacific maritime cultures and the importance of chronology. In *East of Wallace's Line: Studies of past and present maritime societies in the Indo-Pacific region*, ed. S. O'Connor and P. Veth, 77-98. Rotterdam: A. A. Balkema.

- Chevron Australia 2014. Gorgon gas development and Jansz feed gas pipeline. Terrestrial and Subterranean Baseline State and Environmental Impact Report. Available at: <<https://www.chevronaustralia.com/docs/default-source/default-document-library/gorgon-emp-terrestrial-and-subterranean-baseline-state-and-environmental-impact-report.pdf>>.
- Clarkson, C., Z. Jacobs, B. Marwick, R. Fullagar, L. Wallis, M. Smith, R. G. Roberts, E. Hayes, K. Lowe, X. Carah, et al. 2017. Human occupation of northern Australia by 65,000 years ago. *Nature* 547 (7663):306-310.
- Clune, G., and R. Harrison. 2009. Coastal shell middens of the Abydos coastal plain, Western Australia. *Archaeology in Oceania* 44 (S1):70-80.
- Colley, S. M., and R. Jones. 1987. New fish bone data from Rocky Cape, north west Tasmania. *Archaeology in Oceania* 22 (2):67-71.
- Cribb, R. 1996. Shell mounds, domiculture and ecosystem manipulation on western Cape York Peninsula. In *Archaeology of northern Australia: Regional perspectives*, ed. P. Hiscock and P. Veth, 150-174. Tempus 4. St Lucia: Anthropology Museum, The University of Queensland.
- David, B., I. McNiven, R. Mitchell, M. Orr, S. Haberle, L. Brady, and J. Crouch. 2004. Badu 15 and the Papuan-Austronesian settlement of Torres Strait. *Archaeology in Oceania* 39 (2):65-78.
- David, B., and M. Weisler. 2006. Kurturnaiwak (Badu) and the archaeology of villages in Torres Strait. *Australian Archaeology* 63 (1):21-34.
- De Deckker, P., T. T. Barrows, and J. Rogers. 2014. Land–sea correlations in the Australian region: Post-glacial onset of the monsoon in northwestern Western Australia. *Quaternary Science Reviews* 105:181-194.
- Des Lauriers, M. R. 2006. Terminal Pleistocene and early Holocene occupations of Isla de Cedros, Baja California, México. *The Journal of Island and Coastal Archaeology* 1 (2):255-270.
- Ditchfield, K., 2018. Pleistocene – Holocene coastal mobility patterns in the Carnarvon Bioregion, North-Western Australia. Unpublished PhD thesis, University of Western Australia.
- Ditchfield, K., T. Manne, F. Hook, I. Ward, and P. Veth. 2018. Coastal occupation before the “Big Swamp”: Results from excavations at John Wayne Country Rockshelter on Barrow Island. *Archaeology in Oceania* 53 (3):163-178.
- Ditchfield, K., S. Ulm, T. Manne, H. Farr, D. O’Grady and P. Veth 2022. Framing Australian Pleistocene coastal occupation and archaeology. *Quaternary Science Reviews* 293:107706.
- Ditchfield, K., and I. Ward. 2019. Local lithic landscapes and local source complexity: Developing a new database for geological sourcing of archaeological stone artefacts in North-Western Australia. *Journal of Archaeological Science: Reports* 24:539-555.
- Dortch, C. 1999. Archaeological assessment of Aboriginal estuarine fishing on the Southern Ocean coast of Western Australia. In *Australian coastal archaeology*, ed. J. Hall and I.J. McNiven, 25-35. Research Papers in Archaeology and Natural History 31. Canberra: Archaeology and Natural History Publications, Research School of Pacific and Asian Studies, Australian National University.

- Dortch, C. E., G. W. Kendrick, and K. Morse. 1984. Aboriginal mollusc exploitation in southwestern Australia. *Archaeology in Oceania* 19 (3):81-104.
- Dortch, J., and C. Dortch. 2019. Late Quaternary Aboriginal hunter-gatherer occupation of the Greater Swan Region, south-western Australia. *Australian Archaeology* 85 (1):15-29.
- Dougherty, A. J., Z. A. Thomas, C. Fogwill, A. Hogg, J. Palmer, E. Rainsley, A. N. Williams, S. Ulm, K. Rogers, B. G. Jones, et al. 2019. Redating the earliest evidence of the mid-Holocene relative sea-level highstand in Australia and implications for global sea-level rise. *PLOS ONE* 14 (7):e0218430.
- Draper, N. 1991. Cape du Couedic rockshelter and the Aboriginal archaeology of Kangaroo Island, South Australia. Unpublished PhD thesis, The University of New Mexico.
- Dusseldorp, G., and G. Langejans. 2013. Carry that weight: Coastal foraging and transport of marine resources during the South African Middle Stone Age. *Southern African Humanities* 25 (1):105-135.
- Emmitt, J., K. Allely, B. Davies, E. Hoffman, and S. J. Holdaway. 2020. Preliminary archaeological survey and remote-sensing of shell mounds at Kwokkunum, Albatross Bay, Cape York Peninsula, Australia. *Queensland Archaeological Research* 23:9-24.
- Erlandson, J. M. 2001. The archaeology of aquatic adaptations: Paradigms for a new millennium. *Journal of Archaeological Research* 9 (4):287-350.
- Erlandson, J. M. 2012. As the world warms: Rising seas, coastal archaeology, and the erosion of maritime history. *Journal of Coastal Conservation* 16 (2):137-142.
- Erlandson, J. M., and T. J. Braje. 2015. Coasting out of Africa: The potential of mangrove forests and marine habitats to facilitate human coastal expansion via the Southern Dispersal Route. *Quaternary International* 382:31-41.
- Erlandson, J. M., T. C. Rick, T. J. Braje, M. Caspersen, B. Culleton, B. Fulfroost, T. Garcia, D. A. Guthrie, N. Jew, D. J. Kennett, M. L. Moss, L. Reeder, C. Skinner, J. Watts, and L. Willis. 2011. Paleoindian seafaring, maritime technologies, and coastal foraging on California's Channel Islands. *Science* 331 (6021):1181-1185.
- Faulkner, P. 2006. The ebb and flow: An archaeological investigation of Late Holocene economic variability on the coastal margin of Blue Mud Bay, Northeast Australia. Unpublished PhD thesis, Australian National University.
- Faulkner, P. 2008. Patterns of chronological variability in occupation on the coastal margin of Blue Mud Bay. *Archaeology in Oceania* 43 (2):81-88.
- Faulkner, P. 2013. *Life on the margins: An archaeological investigation of late Holocene economic variability, Blue Mud Bay, Northern Australia*. Terra Australis 38. Canberra: ANU Press.
- Faulkner, P., J. M. Miller, E. M. Quintana Morales, A. Crowther, C. Shipton, E. Ndiema, N. Boivin, and M. D. Petraglia. 2021. 67,000 years of coastal engagement at Panga ya Saidi, eastern Africa. *PLOS ONE* 16 (8):e0256761.
- Faure, H., R. C. Walter, and D. R. Grant. 2002. The coastal oasis: Ice age springs on emerged continental shelves. *Global and Planetary Change* 33 (1):47-56.
- Fitzpatrick, S. M., and J. M. Erlandson. 2018. Island archaeology, model systems, the Anthropocene, and how the past informs the future. *The Journal of Island and Coastal Archaeology* 13 (2):283-299.

- GEBCO Compilation Group 2021. GEBCO 2021 Grid. Available at: <10.5285/c6612cbe-50b3-0cff-e053-6c86abc09f8f>.
- Giovas, C. M. 2016. Though she be but little: Resource resilience, Amerindian foraging, and long-term adaptive strategies in the Grenadines, West Indies. *The Journal of Island and Coastal Archaeology* 11 (2):238-263.
- Glignani, L. A., T. J. Cohen, J.-H. May, J. D. Jansen, G. C. Nanson, A. Dosseto, J. R. Larsen, and M. Aubert. 2014. Late-Holocene climatic variability indicated by three natural archives in arid southern Australia. *The Holocene* 24 (1):104-117.
- Haberle, S. G., and B. David. 2004. Climates of change: Human dimensions of Holocene environmental change in low latitudes of the PEPH transect. *Quaternary International* 118:165-179.
- Hall, J. 1982. Sitting on the crop of the bay: An historical and archaeological sketch of Aboriginal settlement and subsistence in Moreton Bay, southeast Queensland. In *Coastal Archaeology in Eastern Australia*, ed. S. Bowdler, 79-95. Canberra: Department of Prehistory, Research School of Pacific Studies, The Australian National University.
- Hiscock, P. 2013. The human colonisation of Australia. In *The encyclopaedia of global migration*, ed. I. Ness, 1-6. New Jersey: Blackwell Publishing.
- Hiscock, P. 2015. The Pleistocene colonization and occupation of Australia. In *The Cambridge world history: Volume 1, Introducing world history to 10,000 BCE*, ed. D. Christian, 433-460. Cambridge: Cambridge University Press.
- Holdaway, S. J., P. C. Fanning, F. Petchey, K. Allely, J. I. Shiner, and G. Bailey. 2017. Temporal variability in shell mound formation at Albatross Bay, northern Australia. *PLOS ONE* 12 (8):e0183863.
- Hope, J., R. Lampert, E. Edmondson, M. Smith, and G. Van Tets. 1977. Late Pleistocene faunal remains from Seton rock shelter, Kangaroo Island, South Australia. *Journal of Biogeography* 4:363-385.
- Jackson, S. 2005. Indigenous values and water resource management: A case study from the Northern Territory. *Australasian Journal of Environmental Management* 12 (3):136-146.
- Jazwa, C., D. Kennett, and D. Hanson. 2012. Late Holocene subsistence change and marine productivity on western Santa Rosa Island, Alta California. *California Archaeology* 4 (1):69-98.
- Jerardino, A. 2016. Shell density as proxy for reconstructing prehistoric aquatic resource exploitation, perspectives from southern Africa. *Journal of Archaeological Science: Reports* 6:637-644.
- Jones, R. 1968. The geographical background to the arrival of man in Australia and Tasmania. *Archaeology and Physical Anthropology in Oceania* 3 (3):186-215.
- Jones, R. 1977. Man as an element of a continental fauna: The case of the sundering of the Bassian bridge. In *Sunda and Sahul: Prehistoric studies in Southeast Asia, Melanesia and Australia*, ed. J. Allen, J. Golson and R. Jones, 317-386. London: Academic Press.
- Jones, R. 1979. The fifth continent: Problems concerning the human colonization of Australia. *Annual Review of Anthropology* 8 (1):445-466.

- Kealy, S., J. Louys, and S. O'Connor. 2016. Islands under the sea: A review of early modern human dispersal routes and migration hypotheses through Wallacea. *The Journal of Island and Coastal Archaeology* 11 (3):364-384.
- Kealy, S., J. Louys, and S. O'Connor. 2017. Reconstructing palaeogeography and inter-island visibility in the Wallacean Archipelago during the likely period of Sahul colonization, 65–45 000 years ago. *Archaeological Prospection* 24 (3):259-272.
- King, P. 1827. *Narrative of a survey of the inter-tropical and western coasts of Australia, performed between the years 1818 and 1822*. Vols 1–2. London: John Murray
- Kreij, A., J. Scriffignano, D. Rosendahl, and S. Ulm. 2018. Aboriginal stone-walled intertidal fishtrap morphology, function and chronology investigated with high-resolution close-range unmanned aerial vehicle photogrammetry. *Journal of Archaeological Science* 96:148-161.
- Lamb, L., and B. Barker. 2001. Evidence for early Holocene change in the Whitsunday Islands: A new radiocarbon determination from Nara Inlet 1. *Australian Archaeology* 53:42-43.
- Lambrides, A. B. J., I. J. McNiven, S. Aird, K. Lowe, P. Moss, C. Rowe, C. Harris, C. Maclaurin, S. Slater, K. Carroll, M. H. Cedar, F. Petchey, C. Reepmeyer, M. Harris, J. Charlie, E. McGreen, P. Baru, and S. Ulm. 2020. Changing use of Lizard Island over the past 4000 years and implications for understanding Indigenous offshore island use on the Great Barrier Reef. *Queensland Archaeological Research* 23:43-109.
- Lambrides, A. B. J., I. J. McNiven, and S. Ulm. 2019. Meta-analysis of Queensland's coastal Indigenous fisheries: Examining the archaeological evidence for geographic and temporal patterning. *Journal of Archaeological Science: Reports* 28:102057.
- Lambrides, A. B. J., and M. I. Weisler. 2016. Pacific Islands ichthyoarchaeology: Implications for the development of prehistoric fishing studies and global sustainability. *Journal of Archaeological Research* 24 (3):275-324.
- Lampert, R. 1979. The great Kartan mystery. Unpublished PhD thesis, Department of Prehistory, The Australian National University.
- Langeluddecke, C. 2001. The small faunal taphonomy and zooarchaeology of Cape du Couedic Rockshelter, Kangaroo Island, South Australia. Unpublished B.Arch (Hons) thesis, Department of Archaeology, Flinders University.
- Leach, J., C. Wiseman, M. O'Leary, J. McDonald, J. McCarthy, P. Morrison, P. Jeffries, J. Hacker, S. Ulm, and G. Bailey. 2021. The integrated cultural landscape of North Gidley Island: Coastal, intertidal and nearshore archaeology in Murujuga (Dampier Archipelago), Western Australia. *Australian Archaeology* 87 (3):251-267.
- Leavesley, M., and J. Allen. 1998. Dates, disturbance and artefact distributions: Another analysis of Buang Merabak, a Pleistocene site on New Ireland, Papua New Guinea. *Archaeology in Oceania* 33 (2):63-82.
- Lentfer, C. J., M. W. Felgate, R. A. Mills, and J. Specht. 2013. Human history and palaeoenvironmental change at Site 17, Freshwater Beach, Lizard Island, northeast Queensland, Australia. *Queensland Archaeological Research* 16:141-164.
- Lewis, S. E., C. R. Sloss, C. V. Murray-Wallace, C. D. Woodroffe, and S. G. Smithers. 2013. Post-glacial sea-level changes around the Australian margin: A review. *Quaternary Science Reviews* 74:115-138.

- Litster, M., A. Barham, J. Meyer, T. R. Maloney, C. Shipton, S. Fallon, R. C. Willan, and S. O'Connor. 2020. Late Holocene coastal land-use, site formation and site survival: Insights from five middens at Cape Leveque and Lombadina, Dampier Peninsula, Kimberley, Australia. *Australian Archaeology* 86 (2):118-136.
- Lourandos, H. 1983. Intensification: A late Pleistocene-Holocene archaeological sequence from southwestern Victoria. *Archaeology in Oceania* 18 (2):81-94.
- Lourandos, H. 1997. *Continent of hunter-gatherers: New perspectives in Australian prehistory*. Cambridge: Cambridge University Press.
- Lourandos, H., and A. Ross. 2021. Persistence of complexity: Continuation of intensification, population change, and sociostructural change in current debates in Australia archaeology. In *The Oxford handbook of the archaeology of Indigenous Australia and New Guinea*, ed. I.J. McNiven and B. David. Oxford: Oxford University Press.
- Manne, T., and P. M. Veth. 2015. Late Pleistocene and early Holocene exploitation of estuarine communities in northwestern Australia. *Quaternary International* 385:112-123.
- Marean, C. W. 2016. The transition to foraging for dense and predictable resources and its impact on the evolution of modern humans. *Philosophical Transactions of the Royal Society B: Biological Sciences* 371 (1698):20150239.
- Marean, C. W., M. Bar-Matthews, J. Bernatchez, E. Fisher, P. Goldberg, A. I. Herries, Z. Jacobs, A. Jerardino, P. Karkanas, and T. Minichillo. 2007. Early human use of marine resources and pigment in South Africa during the Middle Pleistocene. *Nature* 449 (7164):905-908.
- McCarthy, J., C. Wiseman, K. Woo, D. Steinberg, M. O'Leary, D. Wesley, L. M. Brady, S. Ulm, and J. Benjamin. 2022. Beneath the Top End: A regional assessment of submerged archaeological potential in the Northern Territory, Australia. *Australian Archaeology* 88:65-83.
- McDonald, J., and M. Berry. 2017. Murujuga, Northwestern Australia: When arid hunter-gatherers became coastal foragers. *The Journal of Island and Coastal Archaeology* 12 (1):24-43.
- McDonald, J., K. Mulvaney, A. Paterson, and P. Veth, eds. 2023. *Murujuga: Dynamics of the Dreaming. The results of excavations and systematic rock art and stone feature recording*. CRAR+M Monograph 2. Perth: UWA Press.
- McDonald, J., W. Reynen, K. Ditchfield, J. Dortch, M. Leopold, B. Stephenson, T. Whitley, I. Ward, and P. Veth. 2018. Murujuga Rockshelter: First evidence for Pleistocene occupation on the Burrup Peninsula. *Quaternary Science Reviews* 193:266-287.
- McDowell, M. C., G. J. Prideaux, K. Walshe, F. Bertuch, and G. E. Jacobsen. 2015. Re-evaluating the Late Quaternary fossil mammal assemblage of Seton Rockshelter, Kangaroo Island, South Australia, including the evidence for late-surviving megafauna. *Journal of Quaternary Science* 30 (4):355-364.
- McNiven, I. 2004. Saltwater people: Spiritscapes, maritime rituals and the archaeology of Australian indigenous seascapes. *World Archaeology* 35 (3):329-349.
- McNiven, I. J. 1990. Prehistoric Aboriginal settlement and subsistence in the Cooloolo Region, coastal southeast Queensland. Unpublished PhD thesis, Department of Anthropology and Sociology, The University of Queensland.

- McNiven, I. J. 1996. Mid- to Late Holocene shell deposits at Hibbs Bay, southwest Tasmania: Implications for Aboriginal occupation and marine resource exploitation. In *Report of the southern forests archaeological project: Site descriptions, stratigraphies and chronologies*, ed. J. Allen, 219-247. Bundoora: School of Archaeology, La Trobe University.
- McNiven, I. J. 1999. Fissioning and regionalisation: The social dimensions of changes in Aboriginal use of the Great Sandy Region, southeast Queensland. In *Australian coastal archaeology*, ed. J. Hall and I.J. McNiven, 157-168. Research Papers in Archaeology and Natural History 31. Canberra: Archaeology and Natural History Publications, Research School of Pacific and Asian Studies, Australian National University.
- McNiven, I. J. 2006. Late moves on *Donax*: Aboriginal marine specialisation in southeast Queensland over the last 6000 years. In *An archaeological life: Papers in honour of Jay Hall*, ed. S. Ulm and I. Lilley, 109-124. Brisbane: Aboriginal and Torres Strait Islander Studies Unit, The University of Queensland.
- McNiven, I. J. 2021. Coral Sea cultural interaction sphere. In *The Oxford handbook of the archaeology of Indigenous Australia and New Guinea*, ed. I.J. McNiven and B. David. Oxford: Oxford University Press.
- McNiven, I. J., J. Crouch, T. Richards, N. Dolby, and G. Jacobsen. 2012. Dating Aboriginal stone-walled fishtraps at Lake Condah, southeast Australia. *Journal of Archaeological Science* 39 (2):268-286.
- McNiven, I. J., J. Crouch, M. I. Weisler, N. Kemp, M. Lucía Clayton, J. Stanisic, M. Orr, L. Brady, S. Hocknull, and W. Boles. 2008. Tigershark Rockshelter (Baidamau Mudh): Seascape and settlement reconfigurations on the sacred islet of Pulu, Western Zenadh Kes (Torres Strait). *Australian Archaeology* 66:15-32.
- McNiven, I. J., N. De Maria, M. Weisler, and T. Lewis. 2014. Darumbal voyaging: Intensifying use of central Queensland's Shoalwater Bay islands over the past 5000 years. *Archaeology in Oceania* 49 (1):2-42.
- McNiven, I. J., and A. B. J. Lambrides. 2021. Stone-walled fish traps of Australia and New Guinea as expressions of enhanced sociality. In *The Oxford handbook of the archaeology of Indigenous Australia and New Guinea*, ed. I.J. McNiven and B. David. Oxford: Oxford University Press.
- Meehan, B. F. 1975. *Shell bed to shell midden*. Canberra: Australian Institute of Aboriginal Studies.
- Memmott, P., R. Robins, and E. Stock. 2008. What exactly is a fish trap?: Methodological issues for the study of Aboriginal intertidal rock wall fish traps. In *Comparative island archaeologies*, ed. J. Connolly and M. Campbell, 73-96. Oxford: British International Series. Archaeopress.
- Memmott, P., E. Round, D. Rosendahl, and S. Ulm. 2016. Fission, fusion and syncretism: Linguistic and environmental changes amongst the Tangkic people of the southern Gulf of Carpentaria, northern Australia. In *Land and language in Cape York Peninsula and the Gulf Country*, ed. J-C. Verstraete and D. Hafner, 105-136. Philadelphia: John Benjamins Publishing Company.

- Miller, G., J. Magee, M. Smith, N. Spooner, A. Baynes, S. Lehman, M. Fogel, H. Johnston, D. Williams, and P. Clark. 2016a. Human predation contributed to the extinction of the Australian megafaunal bird *Genyornis newtoni* ~ 47 ka. *Nature Communications* 7 (1):1-7.
- Miller, G., M. L. Fogel, J. W. Magee, and M. K. Gagan. 2016b. Disentangling the impacts of climate and human colonization on the flora and fauna of the Australian arid zone over the past 100 ka using stable isotopes in avian eggshell. *Quaternary Science Reviews* 151:27-57.
- Mills, R. A. 1992. Aboriginal occupation of Lizard Island. Unpublished MA thesis, Department of Archaeology, University of Sydney.
- Monks, C. 2021. The role of terrestrial, estuarine, and marine foods in dynamic Holocene environments and adaptive coastal economies in Southwestern Australia. *Quaternary International* 597:5-23.
- Monks, C., J. Dortch, G. Jacobsen, and A. Baynes. 2016. Pleistocene occupation of Yellabidde Cave in the northern Swan Coastal Plain, southwestern Australia. *Australian Archaeology* 82 (3):275-279.
- Monks, C., B. Sheppard, and J. Dortch. 2015. Mid-Holocene exploitation of marine molluscs in the lower Mid West, Western Australia. *Australian Archaeology* 80 (1):99-103.
- Morphy, H., and F. Morphy. 2006. Tasting the waters: Discriminating identities in the waters of Blue Mud Bay. *Journal of Material Culture* 11 (1-2):67-85.
- Morrison, M. 2003. Old boundaries and new horizons: The Weipa shell mounds reconsidered. *Archaeology in Oceania* 38 (1):1-8.
- Morrison, M. 2010. The shell mounds of Albatross Bay: An archaeological investigation of late Holocene production strategies near Weipa, north eastern Australia. Unpublished PhD thesis, Department of Archaeology, Flinders University.
- Morrison, M. 2014. Chronological trends in late Holocene shell mound construction across northern Australia: Insights from Albatross Bay, Cape York Peninsula. *Australian Archaeology* 79 (1):1-13.
- Morse, K. 1988. Mandu Mandu creek rockshelter: Pleistocene human coastal occupation of North West Cape, Western Australia. *Archaeology in Oceania* 23 (3):81-88.
- Morse, K. 1993a. Shell beads from Mandu Mandu Creek rock-shelter, Cape Range Peninsula, Western Australia, dated before 30,000 BP. *Antiquity* 67 (257):877-883.
- Morse, K. 1993b. West side story: Towards a prehistory of the Cape Range Peninsula, Western Australia. Unpublished PhD thesis, Centre for Archaeology, University of Western Australia.
- Mulvaney, J., and J. Kamminga. 1999. *Prehistory of Australia*. Washington, D.C.: Smithsonian Institution Press.
- Neal, R., and E. Stock. 1986. Pleistocene occupation in the south-east Queensland coastal region. *Nature* 323 (6089):618.
- Nicholson, A., and S. Cane. 1994. Pre-European coastal settlement and use of the sea. *Australian Archaeology* 39 (1):108-117.
- Nunn, P. 2020. In anticipation of extirpation: How ancient peoples rationalized and responded to postglacial sea level rise. *Environmental Humanities* 12 (1):113-131.

- Nunn, P. D., A. Creach, W. R. Gehrels, S. L. Bradley, I. Armit, P. Stéphan, F. Sturt, and A. Baltzer. 2021. Observations of postglacial sea-level rise in northwest European traditions. *Geoarchaeology* 37 (4):577-593.
- O'Connell, J. F., and J. Allen. 2012. The restaurant at the end of the universe: Modelling the colonisation of Sahul. *Australian Archaeology* 74 (1):5-31.
- O'Connell, J. F., and J. Allen. 2015. The process, biotic impact, and global implications of the human colonization of Sahul about 47,000 years ago. *Journal of Archaeological Science* 56:73-84.
- O'Connell, J. F., J. Allen, and K. Hawkes. 2010. Pleistocene Sahul and the origins of seafaring. In *The global origins and development of seafaring*, ed. A. J. Anderson, J. H. Barrett and K.V. Boyle, 57-68. Cambridge: McDonald Institute of Archaeological Research.
- O'Connell, J. F., J. Allen, M. A. Williams, A. N. Williams, C. S. Turney, N. A. Spooner, J. Kamminga, G. Brown, and A. Cooper. 2018. When did *Homo sapiens* first reach Southeast Asia and Sahul? *Proceedings of the National Academy of Sciences* 115 (34):8482-8490.
- O'Connor, S. 1999a. *30,000 Years of Aboriginal occupation: Kimberley, north west Australia*. Canberra: Terra Australis 14. Canberra: Department of Archaeology and Natural History and Centre for Archaeological Research, The Australian National University.
- O'Connor, S. 1999b. A diversity of coastal economies: Shell mounds in the Kimberley region in the Holocene. In *Australian coastal archaeology*, ed. J. Hall and I.J. McNiven, 37-50. Research Papers in Archaeology and Natural History 31. Canberra: Archaeology and Natural History Publications, Research School of Pacific and Asian Studies, Australian National University.
- O'Connor, S., and J. Chappell. 2003. Colonisation and coastal subsistence in Australia and Papua New Guinea: Different timing, different modes? In *Pacific archaeology: Assessments and prospects. Proceedings of the international conference for the 50th Anniversary of the first Lapita excavation*, ed. C. Sand, 15-32. New Caledonia: Cahiers de l'Archéologie.
- O'Connor, S., Mahirta, S. Kealy, C. Boulanger, T. Maloney, S. Hawkins, M. C. Langley, H. A. Kaharudin, Y. Suniarti, and M. Husni. 2019. Kisar and the archaeology of small islands in the Wallacean Archipelago. *The Journal of Island and Coastal Archaeology* 14 (2):198-225.
- O'Connor, S., and M. Sullivan. 1994. Distinguishing middens and cheniers: A case study from the southern Kimberley, WA. *Archaeology in Oceania* 29 (1):16-28.
- O'Connor, S., and P. Veth. 2000. The world's first mariners: Savannah dwellers in an island continent. In *East of Wallace's Line: Studies of past and present maritime societies in the Indo-Pacific region*, ed. S. O'Connor and P. Veth, 99-137. Rotterdam: A. A. Balkema.
- O'Connor, S., R. Ono, and C. Clarkson. 2011. Pelagic fishing at 42,000 years before the present and the maritime skills of modern humans. *Science* 334 (6059):1117-1121.
- O'Connor, S., and M. Sullivan. 1994. Coastal archaeology in Australia: Developments and new directions. *Australian Archaeology* 39 (1):87-96.

- Poiner, G. 1976. The process of the year among Aborigines of the central and south coast of New South Wales. *Archaeology and Physical Anthropology in Oceania* 11 (3):186-206.
- Pope, K. O., and J. E. Terrell. 2008. Environmental setting of human migrations in the circum-Pacific region. *Journal of Biogeography* 35 (1):1-21.
- Przywolnik, K. 2002. Patterns of occupation in Cape Range Peninsula (WA) over the last 36,000 years. Unpublished PhD thesis, Centre for Archaeology, University of Western Australia.
- Przywolnik, K. 2005. Long-term transitions in hunter-gatherers of coastal Northwestern Australia. In *Desert peoples: Archaeological perspectives*, ed. P.M. Veth, M. Smith and P. Hiscock, 177-205. Oxford: Blackwell Publishers.
- Richards, T. 2012. An early-Holocene Aboriginal coastal landscape at Cape Duquesne, southwest Victoria, Australia. In *Peopled landscapes: Archaeological and biogeographic approaches to landscapes*, ed. S. Haberle and B. David, 65-102. Terra Australis 34. Canberra: ANU E Press.
- Richards, T., and R. Johnston. 2004. Chronology and evolution of an Aboriginal landscape at Cape Bridgewater, south west Victoria. *The Artefact* 27:97-112.
- Roberts, A. 1994. Cultural landmarks: The Milingimbi mounds. In *Archaeology in the North: Proceedings of the 1993 Australian Archaeological Association conference*, ed. M. Sullivan, S. Brockwell and A. Webb, 176-187. Darwin: The North Australian Research Unit, The Australian National University.
- Robins, R., J. Hall, and E. Stock. 2015. Geoarchaeology and the archaeological record in the coastal Moreton Region, Queensland, Australia. *Quaternary International* 385:191-205.
- Rosendahl, D., S. Ulm, H. Tomkins, L. Wallis, and P. Memmott. 2014. Late Holocene changes in shellfishing behaviors from the Gulf of Carpentaria, northern Australia. *The Journal of Island and Coastal Archaeology* 9 (2):253-267.
- Rowland, M. J. 1982. Keppel Islands marine specialists: An adaptation to the Southern Barrier Reef Province. In *Coastal archaeology in eastern Australia*, ed. S. Bowdler, 114-120. Canberra: Department of Prehistory, Research School of Pacific Studies, Australian National University.
- Rowland, M. J. 1999. The Keppel Islands – “A 3000 year” event revisited. In *Australian coastal archaeology*, ed. J. Hall and I.J. McNiven, 141-151. Research Papers in Archaeology and Natural History 31. Canberra: Archaeology and Natural History Publications, Research School of Pacific and Asian Studies, Australian National University.
- Rowland, M. J., B. Shaw, and S. Ulm. 2021. Maritime coastal and island societies of Australia and New Guinea. In *The Oxford handbook of the archaeology of Indigenous Australia and New Guinea*, ed. I.J. McNiven and B. David. Oxford: Oxford University Press.
- Rowland, M. J., and S. Ulm. 2011. Indigenous fish traps and weirs of Queensland. *Queensland Archaeological Research* 14:1-58.

- Rowland, M. J., and S. Ulm. 2012. Key issues in the conservation of the Australian coastal archaeological record: Natural and human impacts. *Journal of Coastal Conservation* 16 (2):159-171.
- Rowland, M. J., S. Wright, and R. Baker. 2015. The timing and use of offshore islands in the Great Barrier Reef Marine Province, Queensland. *Quaternary International* 385:154-165.
- Shaw, B., S. Coxe, V. Kewibu, J. Haro, E. Hull, and S. Hawkins. 2020. 2500-year cultural sequence in the Massim region of eastern Papua New Guinea reflects adaptive strategies to small islands and changing climate regimes since Lapita settlement. *The Holocene* 30 (7):1075-1090.
- Sherwood, J. E., I. J. McNiven, and L. Laurenson. 2018. The Moyjil site, south-west Victoria, Australia: Shells as evidence of the deposit's origin. *Proceedings of the Royal Society of Victoria* 130 (2):50-70.
- Sim, R., and L. Wallis. 2008. Northern Australian offshore island use during the Holocene: The archaeology of Vanderlin island, Sir Edward Pellew Group, Gulf of Carpentaria. *Australian Archaeology* 67 (1):95-106.
- Skippington, J., T. Manne, and P. Veth. 2021. Isotopic indications of Late Pleistocene and Holocene paleoenvironmental changes at Boodie Cave archaeological site, Barrow Island, Western Australia. *Molecules* 26 (9):2582.
- Sloss, C. R., L. Nothdurft, Q. Hua, S. G. O'Connor, P. T. Moss, D. Rosendahl, L. M. Petherick, R. A. Nanson, L. L. Mackenzie, A. Sternes, G. E. Jacobsen, and S. Ulm. 2018. Holocene sea-level change and coastal landscape evolution in the southern Gulf of Carpentaria, Australia. *The Holocene* 28 (9):1411-1430.
- Smith, A. D. T. 2016. Archaeological expressions of Holocene cultural and environmental change in coastal southeast Queensland. Unpublished PhD thesis, School of Social Science, The University of Queensland.
- Smith, M. 1983. Joules from pools: Social and techno-economic aspects of Bardi fish traps. In *Archaeology at ANZAAS 1983*, ed. M. Smith, 29-45. Perth: Western Australian Museum.
- Smith, M. 2013. *The archaeology of Australia's deserts*. Cambridge: Cambridge University Press.
- Smith, T., and I. J. McNiven. 2019. Aboriginal marine subsistence foraging flexibility in a dynamic estuarine environment: The late development of Tin Can Inlet (southeast Queensland) middens revisited. *Queensland Archaeological Research* 22:1-38.
- Sullivan, M. 1982. Exploitation of offshore islands along the New South Wales coastline. *Australian Archaeology* 15 (1):8-19.
- Szabó, K., and J. R. Amesbury. 2011. Molluscs in a world of islands: The use of shellfish as a food resource in the tropical island Asia-Pacific region. *Quaternary International* 239 (1):8-18.
- Twaddle, R. W., C. M. Wurster, M. I. Bird, and S. Ulm. 2017. Complexities in the palaeoenvironmental and archaeological interpretation of isotopic analyses of the Mud Shell *Geloina erosa* (Lightfoot, 1786). *Journal of Archaeological Science: Reports* 12:613-624.

- Ulm, S. 2006. *Coastal themes: An archaeology of the Southern Curtis Coast, Queensland*. Terra Australis 24. Canberra: ANU E Press.
- Ulm, S. 2011. Coastal foragers on southern shores: Marine resource use in northeast Australia since the late Pleistocene. In *Trekking the shore: Changing coastlines and the antiquity of coastal settlement*, ed. N.F. Bucho, J.A. Haws and L.G. Davis, 441-461. New York: Springer.
- Ulm, S., and J. Hall. 1996. Radiocarbon and cultural chronologies in southeast Queensland prehistory. In *Australian Archaeology '95: Proceedings of the 1995 Australian Archaeological Association annual conference*, ed. S. Ulm, I. Lilley and A. Ross, 45-62. St Lucia: Anthropology Museum, University of Queensland.
- Ulm, S., I. J. McNiven, S. Aird, and A. B. J. Lambrides. 2019. Sustainable harvesting of *Conomurex luhuanus* and *Rochia nilotica* by Indigenous Australians on the Great Barrier Reef over the past 2000 years. *Journal of Archaeological Science: Reports* 28:102017.
- van der Kaars, S., and P. De Deckker. 2002. A Late Quaternary pollen record from deep-sea core Fr10/95, GC17 offshore Cape Range Peninsula, northwestern Western Australia. *Review of Palaeobotany and Palynology* 120 (1-2):17-39.
- Van der Kaars, S., P. De Deckker, and F. X. Gingele. 2006. A 100 000-year record of annual and seasonal rainfall and temperature for northwestern Australia based on a pollen record obtained offshore. *Journal of Quaternary Science: Published for the Quaternary Research Association* 21 (8):879-889.
- Veitch, B. 1999. What happened in the Mid-Holocene? Archaeological evidence for change from the Mitchell Plateau, northwest Kimberley, Western Australia. Unpublished PhD thesis, Centre for Archaeology, Department of Anthropology, The University of Western Australia.
- Veth, P. 1993. *Islands in the interior: The dynamics of prehistoric adaptations within the arid zone of Australia*. Ann Arbor: International Monographs in Prehistory.
- Veth, P., K. Aplin, L. Wallis, T. Manne, T. Pulsford, E. White, and A. Chappell. 2007. *The archaeology of Montebello Islands, north-west Australia: Late Quaternary foragers on an arid coastline*. Oxford: Archaeopress.
- Veth, P., K. Ditchfield, M. Bateman, S. Ouzman, M. Benoit, A. P. Motta, D. Lewis, S. Harper, and B. A. Corporation. 2019. Minjiwarra: Archaeological evidence of human occupation of Australia's northern Kimberley by 50,000 BP. *Australian Archaeology* 85 (2):115-125.
- Veth, P., K. Ditchfield, and F. Hook. 2014. Maritime deserts of the Australian northwest. *Australian Archaeology* 79 (1):156-166.
- Veth, P., J. McDonald, I. Ward, M. O'Leary, E. Beckett, J. Benjamin, S. Ulm, J. Hacker, P. J. Ross, and G. Bailey. 2020. A strategy for assessing continuity in terrestrial and maritime landscapes from Murujuga (Dampier Archipelago), North West Shelf, Australia. *The Journal of Island and Coastal Archaeology* 15 (4):477-503.
- Veth, P., I. Ward, and T. Manne. 2017. Coastal feasts: A Pleistocene antiquity for resource abundance in the maritime deserts of north west Australia? *The Journal of Island and Coastal Archaeology* 12 (1):8-23.

- Veth, P., I. Ward, T. Manne, S. Ulm, K. Ditchfield, J. Dortch, F. Hook, F. Petchey, A. Hogg, D. Questiaux, et al. 2017. Early human occupation of a maritime desert, Barrow Island, North-West Australia. *Quaternary Science Reviews* 168:19-29.
- Walters, I. 1989. Intensified fishery production at Moreton Bay, southeast Queensland, in the late Holocene. *Antiquity* 63:215-224.
- Ward, I., P. Larcombe, and P. Veth. 2015. A new model for coastal resource productivity and sea-level change: The role of physical sedimentary processes in assessing the archaeological potential of submerged landscapes from the northwest Australian continental shelf. *Geoarchaeology* 30 (1):19-31.
- Ward, I., P. Veth, L. Prossor, T. Denham, K. Ditchfield, T. Manne, P. Kendrick, C. Byrne, F. Hook, and U. Troitzsch. 2017. 50,000 years of archaeological site stratigraphy and micromorphology in Boodie Cave, Barrow Island, Western Australia. *Journal of Archaeological Science: Reports* 15:344-369.
- Weisler, M. I., and I. J. McNiven. 2016. Four thousand years of western Torres Strait fishing in the Pacific-wide context. *Journal of Archaeological Science: Reports* 7:764-774.
- Will, M., A. W. Kandel, and N. J. Conard. 2019. Midden or molehill: The role of coastal adaptations in human evolution and dispersal. *Journal of World Prehistory* 32 (1):33-72.
- Williams, A. N., S. Ulm, T. Sapienza, S. Lewis, and C. S. M. Turney. 2018. Sea-level change and demography during the last glacial termination and early Holocene across the Australian continent. *Quaternary Science Reviews* 182:144-154.
- Williams, A. N., P. Veth, W. Steffen, S. Ulm, C. S. Turney, J. M. Reeves, S. J. Phipps, and M. Smith. 2015. A continental narrative: Human settlement patterns and Australian climate change over the last 35,000 years. *Quaternary Science Reviews* 123:91-112.
- Wiseman, C., M. O'Leary, J. Hacker, F. Stankiewicz, J. McCarthy, E. Beckett, J. Leach, P. Baggaley, C. Collins, S. Ulm, J. McDonald, and J. Benjamin. 2021. A multi-scalar approach to marine survey and underwater archaeological site prospection in Murujuga, Western Australia. *Quaternary International* 584:152-170.
- Wright, D. 2011. Mid Holocene maritime economy in the western Torres Strait. *Archaeology in Oceania* 46 (1):23-27.
- Wright, D. 2015. *The archaeology of community emergence and development on Mabuyag, western Torres Strait*. British Archaeological Reports International Series S27544. Oxford: Archaeopress.
- Wright, M. 2018. Rocky Shores, mud, and mangroves: An assessment of economic intensification at the Yindayin Rockshelter, Stanley Island. Unpublished BA (Hons) thesis, Department of Archaeology, The University of Sydney.