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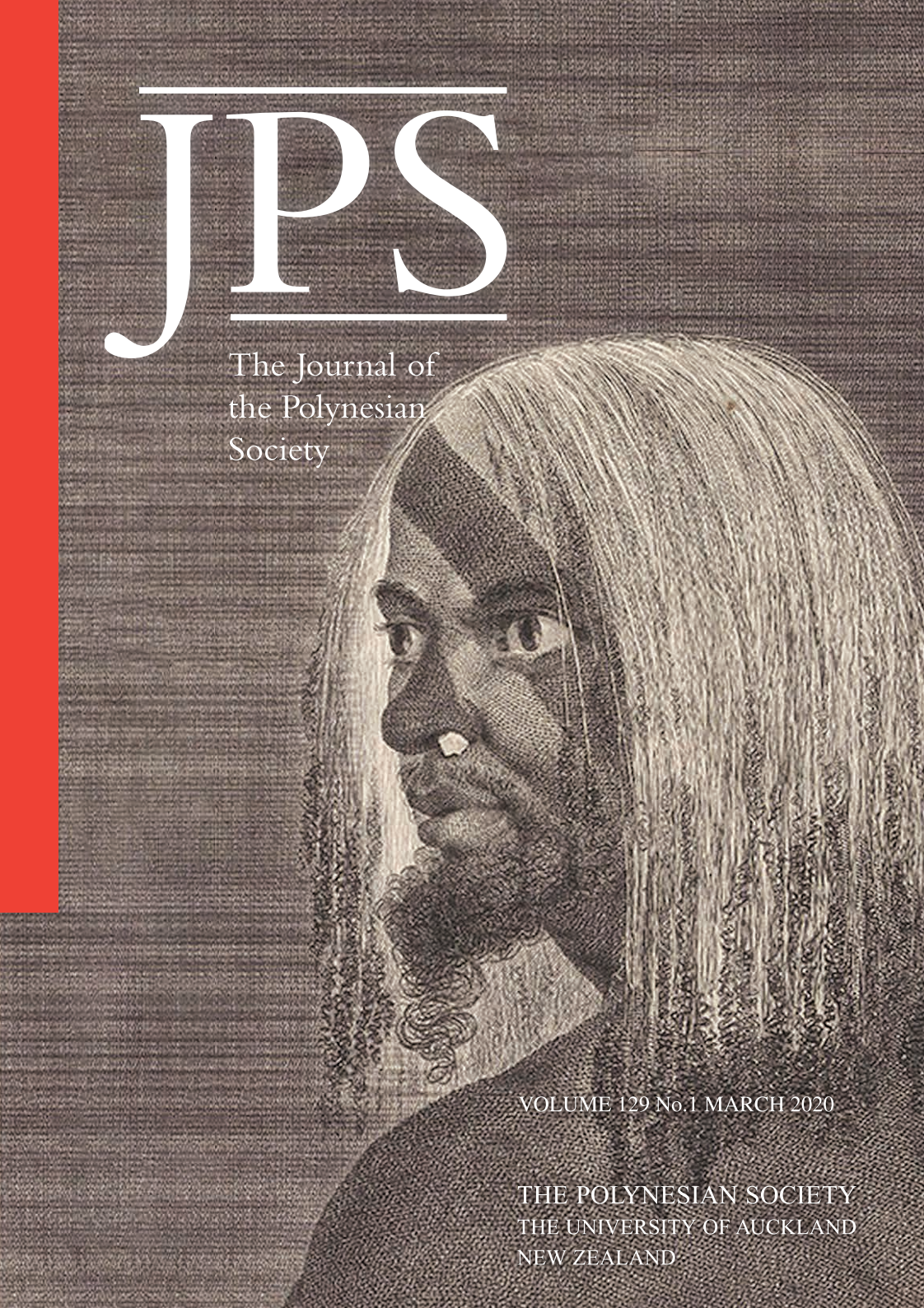

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THE ARCHAEOLOGY OF MĀORI SETTLEMENT AND PĀ ON PŌNUI ISLAND, INNER HAURAKI GULF, AD 1400–1800

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ABSTRACT: This paper describes previously unreported archaeological work on Pōnui Island, New Zealand. Coastal sites date from the end of the fourteenth century AD, and one, S11/20, has evidence for surface structures, cooking, and tool manufacture and use. The harvesting of marine resources and horticulture were involved from the beginning. Earthwork defenses were built at 23 sites between AD 1500 and 1800. At least six of these fortified sites (pā) were later refortified and some were residential. In this study two sites were excavated at Motunau Bay: one was S11/20, an Archaic site previously excavated in the 1950s, and the other was S11/21, a fortified site. Radiocarbon dates are reported from five further undefended coastal sites and from the earthwork defences of 19 pā, which reveal chronological and spatial trends in their construction. On Pōnui the archaeological signature of the fifteenth century was what New Zealand archaeologists typically call early or Archaic, but in the sixteenth century it became Classic. The transition in the settlement evidence appears abrupt; however, the tempo of change more likely varied in material culture and the economy, and possible changes in land tenure and social organisation are suggested.

Keywords: Pōnui Island, Māori, New Zealand archaeology, Hauraki Gulf, pā 'fortified sites', settlement pattern

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There is extensive archaeological evidence of Māori settlement on the islands of the inner Hauraki Gulf and a long history of fieldwork there. This paper describes previously unreported work on Pōnui, which is the easternmost island of the inner gulf 30 km east of Auckland (Fig. 1). Archaeologically the island can be regarded as a discrete sample or microcosm of some of the landscapes of the northeast coast of New Zealand and a suitable place for an island-wide study of changes in the environment, settlement pattern and social organisation that can be compared with other cases of a similar scale elsewhere. The island has rich histories of Māori and European settlement, but this report concerns only the former.

Pōnui is nearly eight km long and up to four km wide. The terrain is hilly with areas of valley and swamp. The east coast is dominated by rocky shores with cliffs and the west coast consists of sandy beaches alternating with low cliffed headlands. It is thought that in the past the island was covered in kauri

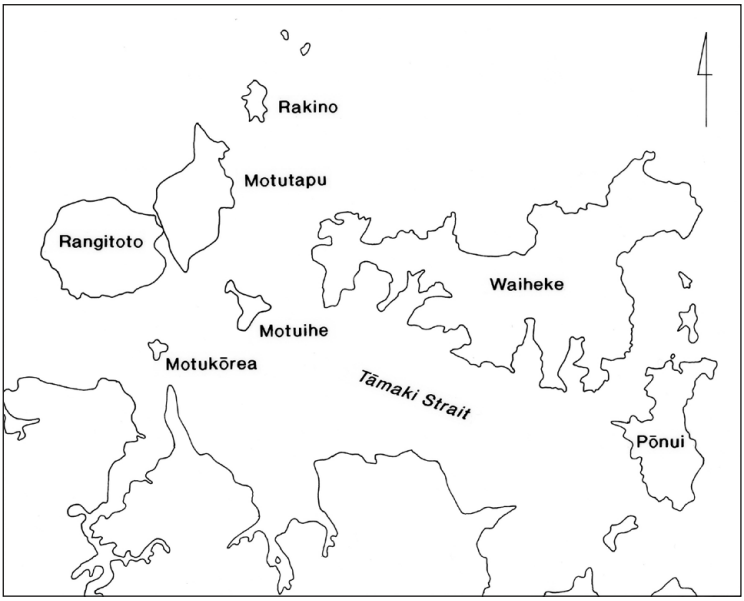

Figure 1. Islands of the inner Hauraki Gulf.

(*Agathis australis*) forest, but today, much of the island is in pasture with some areas in vineyards or regenerating bush.

It is interesting to compare Pōnui with Motutapu, which has been a focus of archaeological study (Davidson 2013; Doherty 1996), as the islands are similar in size and located at opposite ends of Waiheke Island. The field archaeology of Pōnui is better preserved than on Motutapu and the surface features of earthworks more clear. The islands have similar coastal middens and *pā* 'fortified sites', but Pōnui has a little over 100 recorded sites while Motutapu has more than 300 including 12 with defences. The difference in density is due to eruptions of Rangitoto around AD 1400 (Hayward 2019) that created good volcanic soil for gardening on Motutapu, which was substantially cleared of forest in prehistory (Davidson 2013), but it transpires that Pōnui, with poorer yellow-brown earth soils, remained partly forested. However, the two islands had more similar marine resources and access to the wider Hauraki Gulf and mainland.

Archaeology on Pōnui Island began with excavation of an Archaic site in Motunau Bay (S11/20) under the direction of Vic Fisher of Auckland Museum in 1956–1959, with further limited testing in 1962 (Fisher 1964;

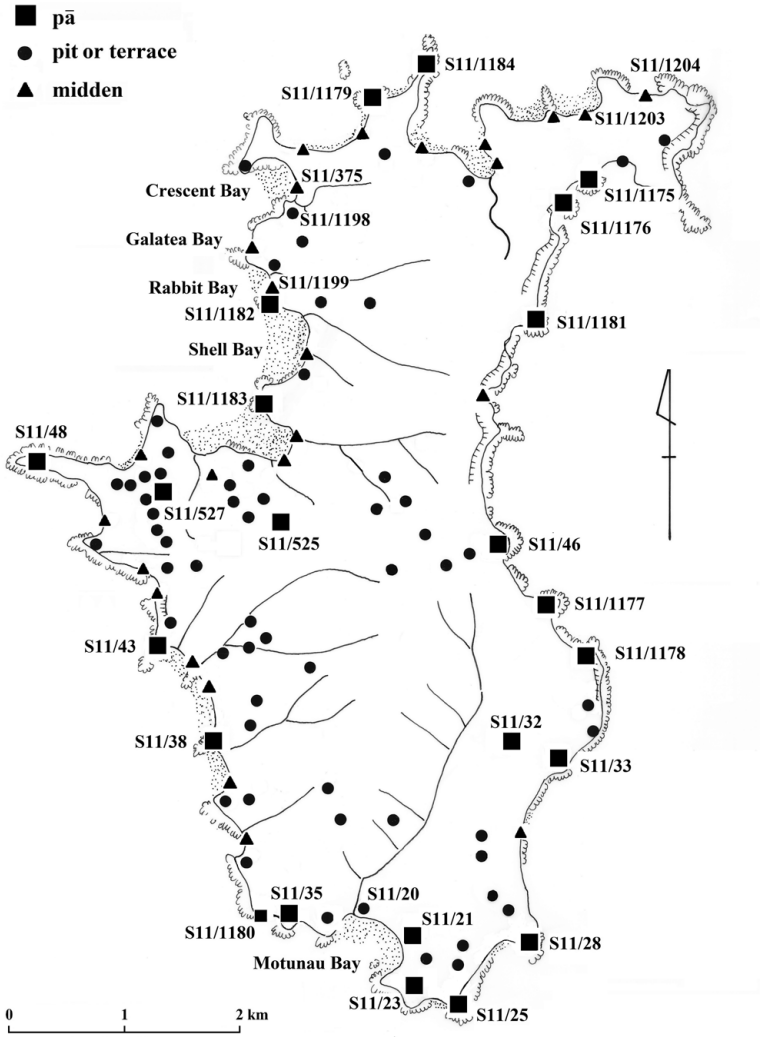

Figure 2. Archaeological sites recorded on Pōnui. Some further sites located in regenerating bush in the south of the islands could remain undiscovered. There are fewer than half as many undefended sites on Pōnui as compared with Motutapu at the other end of Waiheke.

Nicholls 1963, 1964). An archaeological field survey of coastal sites in the south was done by Janet Davidson in 1963 (Davidson 1963), and in 1965 Wilfred Shawcross and John Terrell excavated a late pre-European midden at Galatea Bay (S11/51), which was the basis for an economic analysis that was sophisticated for its time (Shawcross 1968; Terrell 1967). In 1979 Peter Matthews surveyed the central-western part of the island (Matthews 1979), and further survey continued during this project as shown in Figure 2. In 1989 further test excavation at S11/20 was supervised by Simon Best during a University of Auckland field school, and I supervised excavations at an adjacent pā, S11/21. More substantial excavation of S11/20 followed in 1992 supervised by Simon Holdaway. During the early 1990s, with the help of colleagues and students, I mapped 21 pā and excavated radiocarbon samples from their earthwork defences. In 1994 Matthew Schmidt and I collected samples from middens on the west coast of the island for his research on the radiocarbon dating of marine shell (Schmidt 2000), and I later collected dating samples from three further coastal sites. More recently Peter Sheppard used obsidian from University of Auckland excavations of S11/20 for an influential study of portable X-ray fluorescence (Sheppard *et al*. 2011). The outcome of these investigations is that we have an overview of the history of pre-European settlement and an impression of social organisation on Pōnui.

FOREST CLEARANCE AND MĀORI GARDENING ON PŌNUI

Analysis of archaeological charcoal shows that during occupations of the fifteenth century AD much of the island was still under forest, but with the construction of pā from the sixteenth century there was ongoing clearance (see below). However, there are indications—archaeological, botanical and historical—that Pōnui retained patches of forest trees that were not felled until the early European period. During field survey a large number of depressions were observed with the superficial appearance of pre-European *kūmara* 'sweet potato' pits (Fig. 3), which occurred in loose clusters typically of 12 to 15 depressions on steeper south-facing slopes. They were vague in outline, unlike more definite kūmara pits, and were never associated with terraces as genuine kūmara pits often are. Two of these depressions were excavated and found to be natural features. Charcoal carbonised *in situ* in the base of one was identified by R. Wallace as the roots of kauri trees, and there was kauri and bracken fern (*Pteridium esculentum*) in the other. A study by W. England (1990) found the features were the remains of stumps of kauri trees which were felled, not wind-thrown, and the farmer, Peter Chamberlin, confirmed they were holes left by forest trees when stumps were burnt during the establishment of European farming.

Figure 3. Depressions left by former tree stumps on a south-facing slope at Motunau Bay. There were patches of remaining forest at the end of prehistory.

Botanical studies of the vegetation of the inner Hauraki Gulf islands have shown remnants of primary and secondary forest on Waiheke and Pōnui, and a survey of Pōnui suggested that "in the past, kauri forest clad the higher ground" (Brown 1979: 14).

> When considered in relation to the present soil pattern and to early accounts, these indicate an original pohutukawa-taraire-kauri forest pattern in which kauri was associated with the strongly leached and in parts podzolised northern yellow-brown earths of the upper valley walls and ridges. (Atkinson 1959: 29)

This contrasts with the vegetation history of Motutapu (Davidson 2013). A review by Wallace (2012) of charcoal samples from several archaeological sites suggests that "most of the forests on the island were cleared by fire at the time of the Rangitoto eruption and that only limited areas of bush remained in the vicinity of the sites at the time they were occupied" (p. 8). A pollen study from the north of the island by Elliot and Neall (1995) found that the post-eruptive sequence was dominated by bracken fern and mānuka (*Leptospermum scoparium*) and took this as evidence that Māori gardening prevented forest regeneration.

Historical records show that European ships were collecting kauri trees for spars in the Hauraki Gulf from the end of the eighteenth century (Furey 1996: 14). In September 1826 the first New Zealand Company attempted a settlement by immigrants on the barque *Rosanna*, and Captain James Herd, the agent, tried unsuccessfully to purchase Waiheke and the islands at its eastern end (McDonnell 2018). A chart was published in London by J.W. Norie & Co. (Herd 1828) with an inset, "Part of the S.W. side of the Frith [sic] of the Thames in New Zealand surveyed by Captain J Herd, 1826", and a version of this chart was lithographed in Sydney in 1839 (Clint 1839; P. Monin, pers. comm., 2017). The chart shows "cowdie" growing on Pōnui and northwestern Waiheke inland from Man O' War Bay. Only "small cowdie" are shown on the adjacent mainland coast and "no timber here" on the southern shore of the Waitematā Harbour. In February 1827, the year after Herd's visit, the *Astrolabe*, under the command of Dumont d'Urville and piloted by a local Māori, Makara, sailed through the Tāmaki Strait and northwards between Waiheke and Pōnui. D'Urville records: "So we sailed among islands for about two hours; some were lofty and mountainous, covered with magnificent forests, others lower and only covered with more ordinary vegetation" [possibly Motutapu] (d'Urville 1950: 162–63).

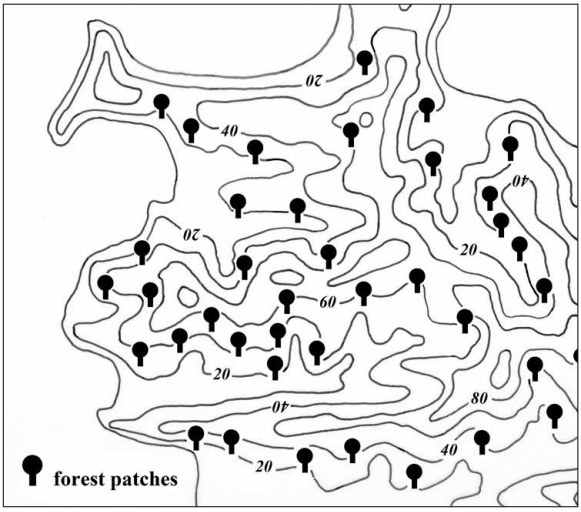

Figure 4. An area in the northwest of Pōnui showing the distribution of forest patches on south-facing and steeper slopes that probably survived into the early European period. Each symbol represents a cluster of depressions resulting from burnt and rotted forest tree stumps.

In 1840 John Logan Campbell saw a large dressed kauri log dragged from the bush by Māori and loaded onto the *Delhi*, which was anchored in Man O' War Bay, and wrote, "in those days Waiheke had many a stately kauri growing on it" (Campbell 1953: 40). Māori labour was used to haul logs from the bush and the channel between Waiheke and Pōnui became a busy waterway (Monin 1992: 95–96). Much of the remaining large timber felled from Pōnui could have gone from around this time, although kauri was still logged from around the highest part of the island at the end of the century (Brown 1979: 5).

At the end of the pre-European period the vegetation of Pōnui was a patchwork of forest, secondary growth and gardens (Fig. 4). The pattern of land clearance and gardening was different from nearby Motutapu and the Auckland isthmus, which had volcanic soils. There had been no wholesale forest clearance by fire. Compared to Motutapu, the vegetation of Pōnui and the lower density of undefended settlements could have been more representative of other coastal regions of the north.

AN ARCHAIC SITE IN MOTUNAU BAY, S11/20

There are at least three early sites on Pōnui (see below), but only one, S11/20, is known in any detail. The site was excavated by V.F. Fisher of Auckland Museum in the years 1956, 1957 and 1959 with further small excavations in 1962 (Nicholls 1963, 1964), and there is a substantial collection of artefacts and faunal remains in Auckland Museum. The site is at the western end of Motunau Bay and extends on both sides of a creek near its mouth. On the eastern side it covers a wide, flat area behind the beach and the occupation deposits are shallow and have been ploughed. On the western bank a deeper and less disturbed shell midden occurs as a strip along the base of a steep hillside. In 1989, during a University of Auckland field school, S. Best supervised the excavation of a 3 × 3 m unit adjacent to the Fisher site, shown as Area A in Figure 5, and a 2 × 1 m unit on a flat on the western side of the stream, Area B. A more substantial excavation, supervised by S. Holdaway, followed in May 1992 (Holdaway and Irwin 1993, 1994) and Areas 1–4 were set out to straddle the Fisher excavation (Fig. 6).

In Area A the site was shallow, around 40 cm deep. The two upper layers had been disturbed by cultivation and contain European materials. Layer C was a compact, dark, greasy layer equivalent to the main cultural deposit found by Fisher. At the interface of layers B and C were lines of buried topsoil inverted by ploughing or disking. In Layer C there was evidence for former surface structures and activities including cooking and tool manufacture and use. Intact features included postholes, ovens and two oval-ended kūmara storage pits (Nicholls 1964, fig. 2). The skull of a beached whale was found in Test 20 and had been used for extraction of bone, which could have attracted early settlement. All items in the 1992 excavation were recorded with an

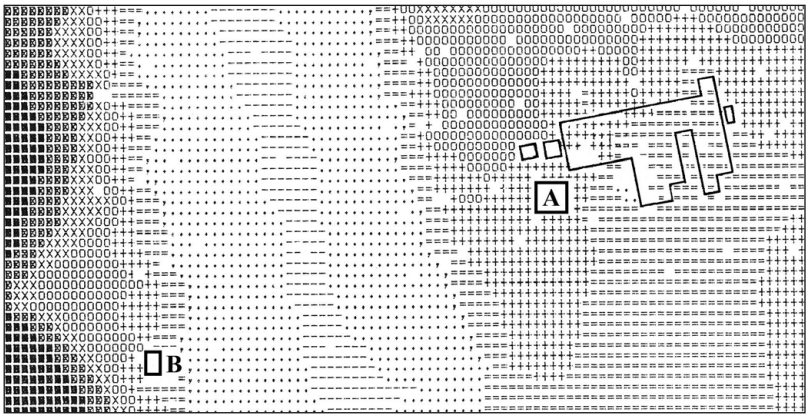

Figure 5. The 1989 test units A and B are shown in relation to the approximate location of the Fisher excavation. The estimated location and the level of the original beach surface were based on a series of 46 spade holes spaced at 6 m intervals by Simon Best.

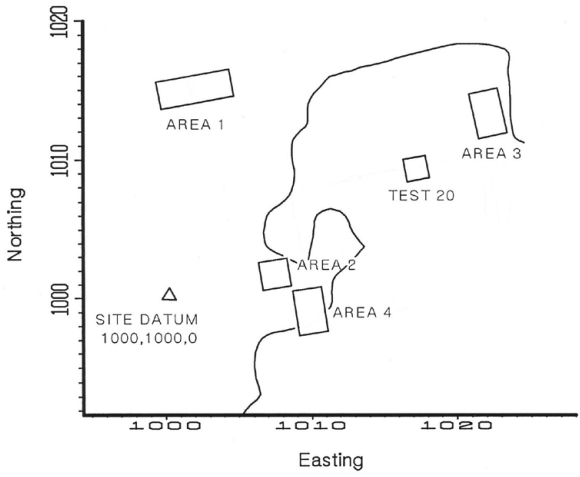

Figure 6. The 1992 excavation unit locations. Areas 2, 3 and 4 straddled the Fisher excavation and several smaller test units in the vicinity were excavated by Simon Best and students (Holdaway and Irwin 1964). Test 20 intercepted the north side of Fisher's backfill, and test units 25 and 28, adjacent to Area 2, intercepted the southern backfill. A resistivity survey of both sides of the creek was carried out in 1992 by Peter Sheppard.

electronic theodolite, and coherent spatial distributions of stone flakes and bones were found (Holdaway and Irwin 1994). Area B on the western bank was deeper and less disturbed, and the deposit consisted mainly of distinct bands of concentrated shell (Fig. 7). One can note a change from rocky-shore to soft-shore shellfish species in this fifteenth-century AD deposit.

Palaeoenvironmental data conformed to the pattern of the New Zealand settlement period. Analysis of charcoal excavated 1989–1994 suggested that forest extended virtually to the shore when the site was first occupied. There was minimal human impact on the coastal broadleaf forest on the flat behind the beach or on the kauri/broadleaf forest on the steep slopes to the west of the stream (Wallace n.d.). The site contained moa bone fishhooks and a small amount of bone from tuatara (*Sphenodon guntheri*), and bird bones identified by T. Worthy included species that later went extinct, including the black swan (*Cygnus atratus*), New Zealand merganser (*Mergus australis*) and

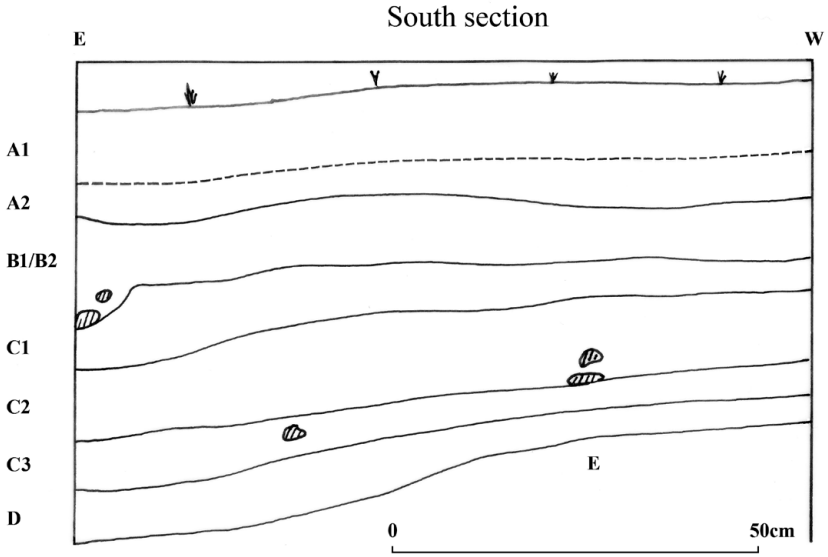

Figure 7. Area B was a 2 x 1 m test unit on the west bank of the stream. Layer A was black topsoil with crushed shell and stones and Layer B was brown sand and shell. Layer C comprised bands of concentrated shell midden in a greasy black sand matrix, with fish bone and cooking stones. Pipi (*Paphies australis*) and cockle (*Austrovenus stutchburyi*) were predominant. Layer D was dense mussel (*Perna canaliculus*) shell and Layer E was the sterile surface of the former beach.

North Island snipe (*Coenocorypha barrierensis*) (T. Worthy, pers. comm., 2011). The archaeological evidence indicates a substantial fishing, hunting and horticultural camp of a group of mobile and maritime people.

Fisher's artefact and faunal collections at Auckland Museum were inspected in addition to the University of Auckland finds, and the spatial data recorded by total station in 1992 survives digitally. Flaked stone analysed by S. Holdaway included a technological study of the obsidian (Holdaway n.d.), faunal remains were identified by M. Taylor, and P. Sheppard identified sources for 565 obsidian flakes that indicated source preferences and patterns of interaction during the settlement phase of the inner Hauraki Gulf (Sheppard *et al.* 2011).

Radiocarbon dates from S11/20 have been reported by Schmidt (2000) and Sheppard *et al.* (2011) from samples collected on both sides of the creek (Fig. 8). In 1989 single dates were obtained from the base of Layer C in Area A (NZ 7764) and from Layer D in Area B (NZ 7765), and these suggest occupation of the site from the end of the fourteenth century AD. Four marine shell samples (Wk 3578–Wk 3591) collected in 1994 from a one-metre test unit adjacent to Area B on the west bank (Schmidt 2000: 56) suggest occupation in the fifteenth century, as does a second charcoal date (Wk 2806) collected during the 1992 excavation (from Feature 3.2).

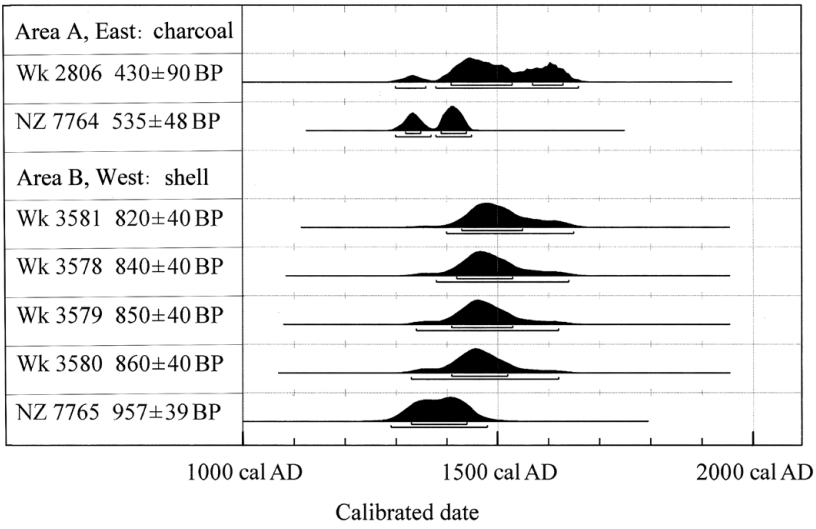

Figure 8. OxCal calibrated radiocarbon dates from S11/20. Marine shell dates are corrected with a Delta R of –7 ± 45.

RADIOCARBON DATES FROM OTHER UNDEFENDED COASTAL SITES ON PŌNUI

In 1994 M. Schmidt, in company with G. Irwin, T. Ladefoged and R. Wallace, recorded exposed sections and collected samples for dating from three midden sites on the west coast of the island at Shell Bay, Rabbit Bay and Crescent Bay, S11/1202, S11/1199 and S11/375 respectively (Schmidt 2000: 55–60). The site in Shell Bay was a mixed natural/cultural deposit and is not considered further, and ^{14}C dates for the other sites are shown in Figure 9. Subsequently, I collected further samples from a pit and terrace site at Crescent Bay, S11/1198, and two coastal middens in the northeast of the island, S11/1203 and 1204 (Fig. 2). The results show there were substantial sites on western and northern beaches of Pōnui from the late fourteenth century AD, and these continued into the pā period, as detailed below.

Rabbit Bay S11/1199

There is a rich and stratified site on a raised beach terrace near the southern end of Rabbit Bay (Fig. 2). An excavation unit of 2 × 1 m reached 1 m deep and exposed four cultural layers. The lowest layer, D, contained charcoal indicative of forest (Wallace n.d.) and abundant fishbone, including conspicuously large head parts of snapper (*Pagrus auratus*) and fish scales in a clean and sandy matrix. Shellfish identified were large pipi (*Paphies australis*) and cockle (*Austrovenus stutchburyi*), together with green-lipped mussel (*Perna canaliculus*) and rock oyster (*Crassostrea glomerata*). The radiocarbon dates are currently the oldest from the island (Fig. 9) and this site would repay further investigation.

Crescent Bay S11/375

A beach midden extends on both sides of the creek in the south of Crescent Bay. The eroded section on the southern side shows a clearly stratified deposit with upper and lower layers of concentrated midden separated by a largely sterile layer of material slumping from higher ground behind. The lower layer contained a small Duff 1A adze, a small stone chisel, a bird bone awl and obsidian (Schmidt 2000: 55). Samples for dating were taken from Layers B and D. The charcoal signature from Layer D indicated forest and the dates are fifteenth century. Layer B represents a late occupation and forest clearance (Fig. 9).

Also, from the top of the headland at the south of Crescent Bay a dating sample was taken from a small, undefended site, S11/1198, with four terraces and two pits. The sample came from an exposure of shell midden on the eroded western side and the site is contemporary with sixteenth-century pā (see below).

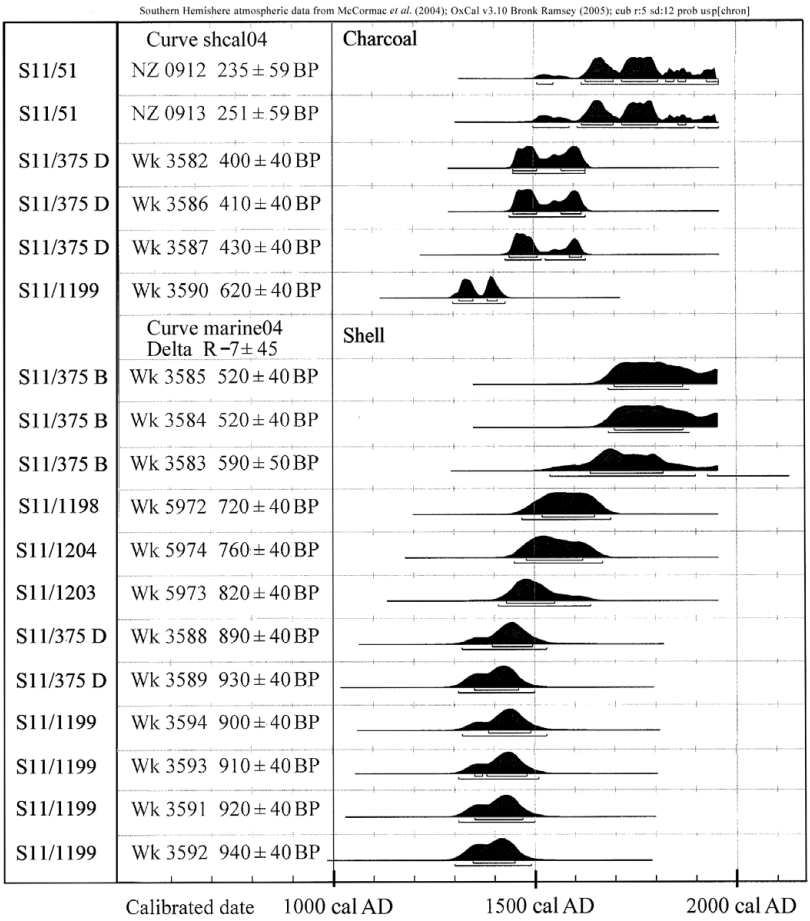

Figure 9. Substantial midden sites on western and northern beaches of Pōnui date from the late fourteenth and fifteenth centuries AD and continued into the pā period. Calibration by OxCal.

Galatea Bay S11/51
This is the next bay north of Rabbit Bay, and a site in a very similar setting was excavated in 1965 by Shawcross (1968) and Terrell (1967). However, the site is much younger with dates from Layer B of 251 ± 59 BP (NZ 0913) and Layer C of 235 ± 59 (NZ 0912). The midden contained predominantly the remains of snapper, pipi and cockle, and the analysis provides information about the marine diet and economy of the seventeenth and eighteenth centuries. Shawcross made an estimate of the human population size and also considered the site might be a seasonal camp. This theory makes a close fit with ethnohistorical research by Agnes Sullivan for the period around AD 1800, which showed that much of the population of the Tāmaki isthmus, including the large settlement of Mokoia on the Tāmaki River, dispersed to small summer camps around the Waitematā Harbour and the inner Hauraki Gulf (Sullivan n.d.).

North Coast
Samples were taken from middens at two beaches at the northeast corner of the island. S11/1203 was exposed at a creek mouth in Oleander Bay and S11/1204 was a concentrated midden eroding from the front of a beach terrace some 1.5–2.0 m high. S11/1203 probably preceded pā construction and S11/1204 was contemporary with it.

THE PĀ OF PŌNUI

The appearance of fortified sites (pā) in New Zealand was by definition a monumental change in Māori settlement patterns. Many perennial questions about them are unresolved, and Pōnui provides a case study. At a general level pā provide evidence for stress in the economy and the social environment. They were diverse in form and function. They protected people from surprise attack, defended food stores in a seasonal economy, protected access to resources and represented places of identity for local groups. More than 7,000 have been recorded and many excavated, but relatively few of the radiocarbon dates from pā came from the actual defences, so it is not known when or where the first ones were built, or the tempo of their subsequent spread (Irwin 2013). There are many theories about these questions but there is still a lack of field data to scrutinise them.

There are 23 fortified sites on Pōnui (Fig. 2). Our interest was not only in individual sites but also in the history and role of pā in the wider landscape. Most are transverse-ditch forms on coastal headlands. Most are of medium size; the smallest is simply two terraces defended by a ditch (S11/1180). There are two ring-ditch forms, S11/21 and S11/527, and one other site, S11/525, with pits, terraces, houses and scarps, but no obvious ditch. Our approach to

Pōnui pā was to map them, to excavate one to examine its features, and then to date the defences of as many of the others as possible to get some sense of their chronological spread and distribution on the island, which could then be compared with other regions.

EXCAVATION OF S11/21

This is a ring-ditch pā on a low hill behind the eastern end of Motunau Bay. I supervised the excavation of five areas in 1989 (Fig. 10). Areas 1 and 5 were trenches cut across the ditches and banks on the eastern and southern sides, Areas 2 and 3 were houses on terraces and Area 4 was an area of pits on terraces. Stratigraphic horizon markers showed that two houses and some pits were contemporary with the defences. Charcoal samples from excavation areas were dominated by bracken and kānuka (*Kunzea robusta*) and indicated that the local vegetation at the time the site was occupied consisted mainly of bracken and tall scrub, with the only common large tree being pōhutukawa (*Metrosideros excelsa*). Clearly there was no forest in the immediate vicinity (Wallace n.d.).

The Defences at S11/21

The defences of S11/21 were fairly typical of those of the wider island. The natural soil profile consisted of topsoil, weathered subsoil and a basement layer of clay into which a ditch was dug and the spoil raised into an inner bank (Fig. 11). The bank fill was mixed with seams of cultural material, mostly close in age to its construction, and there was inverted topsoil at the base of the bank. In Area 1 a trench 8 m long was widened to 4 m to find the palisade line, and samples for dating were taken from the bank fill. In Area 5 the trench was 12 m long and the defence was similar to Area 1 except that at some time after the ditch was first dug a layer of debris accumulated in the bottom, and an additional outer bank was added to the northern and eastern sides of the pā. Three shell samples for ^{14}C dating were taken from under the inner bank, from the inner bank fill, and from under the outer bank, and radiocarbon dates give an age for the earthwork defences as cal AD 1540–1690 at 68%.

The Houses at S11/21

Two houses were excavated on terraces dug into the natural clay at the back and levelled with fill at the front (Fig. 12). The rear house walls were set back into the base of the scarps behind and the back corners were visible from the surface. The front walls and porches faced outwards onto the terrace. The houses were wide in relation to their length and were roughly square in plan including the area of the porch. Drains ran around the backs and sides

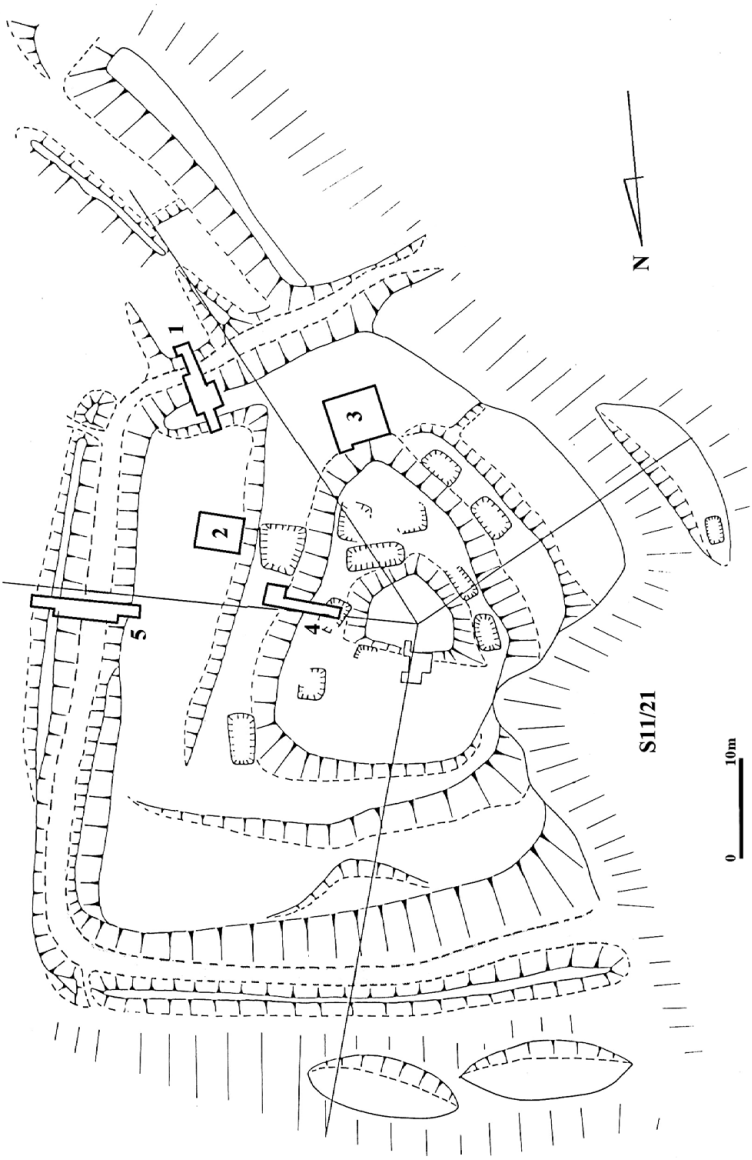

Figure 10. A plan of the ring-ditch pā S11/21 showing areas of excavation, 1–5. An outer bank was built soon after the inner bank and ditch.

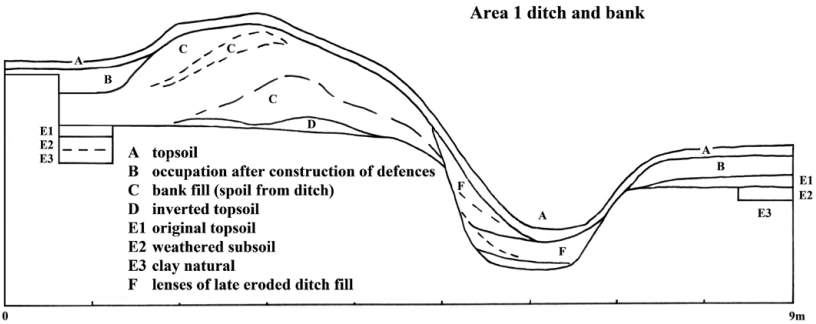

Figure 11. A cross-section of the ditch and bank in Area 1, S11/21 is fairly typical of transverse-ditch pā on the island, and samples for radiocarbon dating were taken from the fill of raised banks. When first constructed banks were higher and ditches deeper than today, but earthworks of pā are unstable and when abandoned the banks erode and ditches fill.

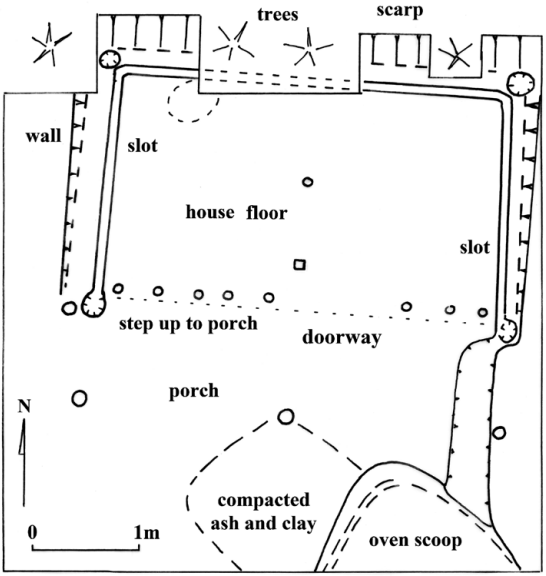

Figure 12. The plan of the house excavated in Area 3 at S11/21.

of both houses and led outside beyond the porches. The front walls had doorways and there were low steps up to the porches, which had evidence for activities associated with the houses. These were substantial dwellings with stout walls and internal drains and the inhabitants would have been sheltered in all seasons.

Both houses were built to the same plan, but the Area 3 house was larger at 4 m^2, and the smaller was 3 m^2. The external drain of the larger house went out on the left-hand side (looking outwards) while that of the smaller ran out the right side. Similar houses with surface evidence of their walls being set against the base of scarps were excavated at four undefended sites on Motutapu; at R10/496, 497 and 557 (Irwin *et al.* 1996) houses had their sides parallel to the scarp, but the house at R10/494 was more or less square in shape and had the back and one side set into the steep slope behind (Ladefoged and Wallace 2010). These houses may have been a distinctive form in the inner Hauraki Gulf.

OTHER EXAMPLES OF RESIDENTIAL PĀ

I visited the pā of Pōnui on many occasions and found the surface features of most to be well preserved. Many had coherent spatial layouts with distinct areas for defence, storage and habitation (Fig. 13). All of them had terraces suitable for occupation except S11/527, which was filled with pits, and S11/1181, which was very small and the terraces of which lay outside the defences. Some sites had the same surface evidence as the houses excavated at S11/21 with their corners set back into the base of scarps. It follows that many Pōnui pā could have been residential at times and accommodated a number of households. Kennedy (1969) made the same point for the Bay of Islands of 1772 on the basis of ethnohistoric evidence. There are different opinions about the extent to which pā were residential (Phillips and Campbell 2004), and houses are still elusive features of New Zealand archaeology.

A STRATEGY FOR DATING PĀ IN A LANDSCAPE CONTEXT

Explaining the origins and spread of pā in New Zealand are perennial questions, and such questions require the dating of many pā. Our strategy for investigating pā chronology took account of the following propositions (Irwin 2013):

- At particular times pā were completely surrounded by a defensive perimeter with few exceptions. Therefore earthwork fortifications were more than symbolic. Without doubt some pā were symbols of identity and *mana* (often glossed as ‘power, status’), but all of them defended against attack. (In this regard the lateral terraces on volcanic cones are not considered as essentially defensive.)

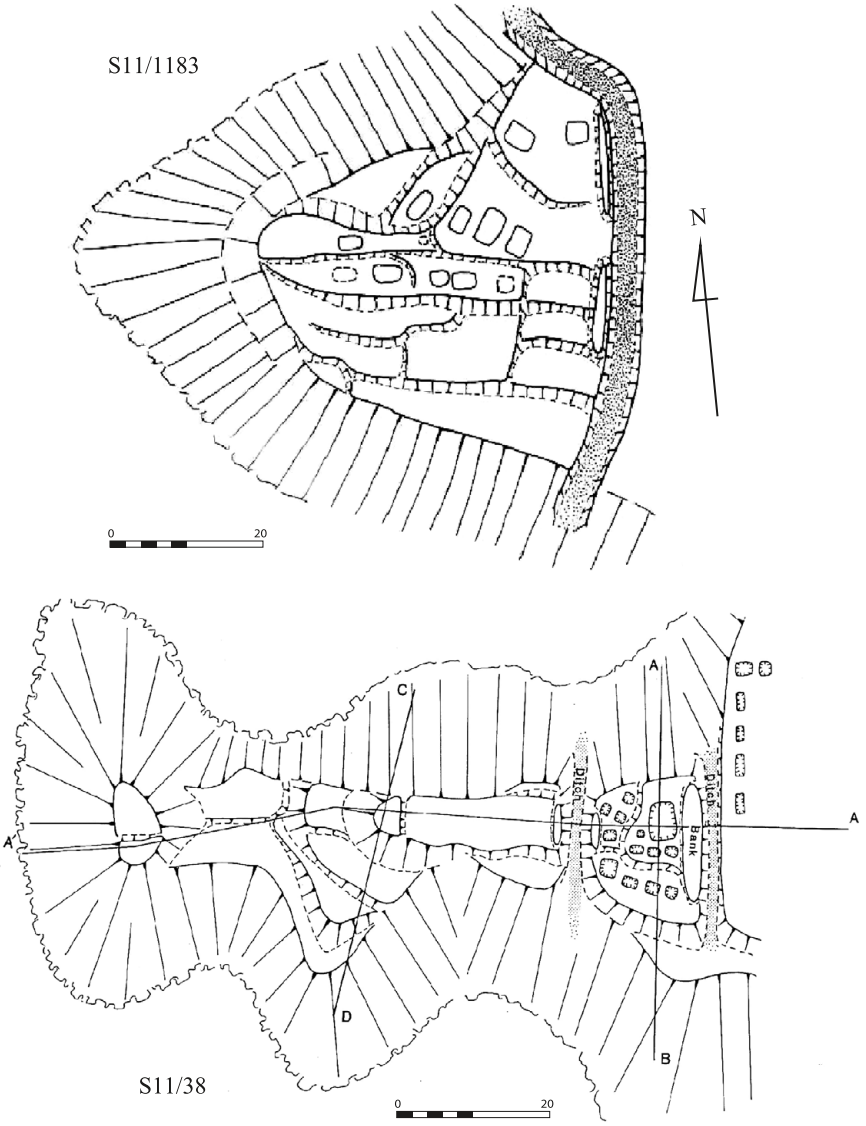

Figure 13. Many Pōnui pā had coherent spatial layouts with distinct areas for defence, habitation and storage. Several had surface evidence for distinctive house structures.

- Pā often had long and complicated sequences of occupation, but we can date fortification events and extrapolate age horizontally through single-period defences. Multiple defences can be dated independently and overlapping ones can be excavated at points of intersection.
- In most Pōnui pā spoil taken from ditches was used to build banks. Datable material sealed in banks is likely to be close in age to their construction, so we focused on dating banks.
- Dating defences does not inform us about what was being defended, and it is recognised that this strategy usually overlooks the archaeological evidence from the interior of pā.
- The area of defences provides a measure of the scale of a community at the time of construction, which can be compared with other sites.

At the time of the fieldwork 21 pā were known on Pōnui and two more have been found since (S11/1178 and S11/1180). Only 30 ^{14}C dates were available, and it was understood that to spread them wide was to stretch the data thin and increase the risk of error. In the event, three dates were taken from one site (S11/21), two dates from each of seven sites, and one date only from another 13. The dated materials were identified charcoal or marine shell (pipi and cockle).

Field notes will be archived in the University of Auckland Library and the sampling of S11/35 and S11/38 can be taken as typical of the others (Fig. 14). At S11/35, I, along with a supervisor and three students, made six test excavations in and near the inner and outer earthwork defences over two days and samples were taken from two 0.80 m x 0.80 m units which were 1.35 m and 1.0 m deep respectively. At S11/38 samples were taken from four test units, also over two days. At both sites there was evidence for occupation earlier and later than the fortification events, but it was the latter we endeavoured to sample.

However, the archaeological situation was complex and issues inevitably arose.

- At site S11/48 the excavation unit went right through the bank, and the charcoal sample (Wk 2803) was taken from buried topsoil sealed underneath. This produced a date of cal AD 1220–1440 at 95%, which pre-dates the defences and could possibly relate to a fire dating from the time of first settlement. A second sample (NZ 8082) later dated the bank more accurately.
- A shell sample from the bank at S11/1179 (NZ 8091) produced a date of cal AD 1020–1230 at 95% and was plausibly old shell from the beach below the pā used for bank fill, but a second sample (Wk 7970) later allowed for a correction.

Figure 14. A photograph of Richard Jennings in a pit 1.0 m wide and 1.70 m deep excavated into a raised bank at S11/1176.

- By error, samples were taken from ditch fill at three sites, and all post-dated the defences. Two of the dates were <250 BP, from S11/23 (Wk 2797) and S11/43 (Wk 2802), and the third was 270±80 BP from S11/32 (Wk 2798). Another date from S11/1182 (NZ 8087) had an uncertain provenance and was also <250 BP. Later on, second samples were taken satisfactorily from the banks of two of these sites, S11/43 (Wk 7971) and S11/1182 (Wk 7972). In retrospect these were useful mistakes because the late dates showed continuing occupation at the sites concerned.
- A further problem was that six samples of identified charcoal were small and the results had standard errors exceeding 50 years. However, the estimated ages conform to the general pattern of the other samples.
- Dates for the younger pā, in particular, are ambiguous because of the vagaries of the radiocarbon calibration curve.

Dates for the construction of defensive banks of Pōnui pā are shown in Figure 15, which includes 24 radiocarbon dates from 19 sites. The results are interesting and support conclusions that can be tested by further fieldwork. It appears that a significant number of pā were fortified soon after AD 1500, during the sixteenth and early seventeenth centuries. If pā were first built somewhere in New Zealand around AD 1500 (Schmidt 1996), which is still an open question, then there was no appreciable delay before they reached Pōnui. And they continued to be built, rebuilt and occupied later on, as

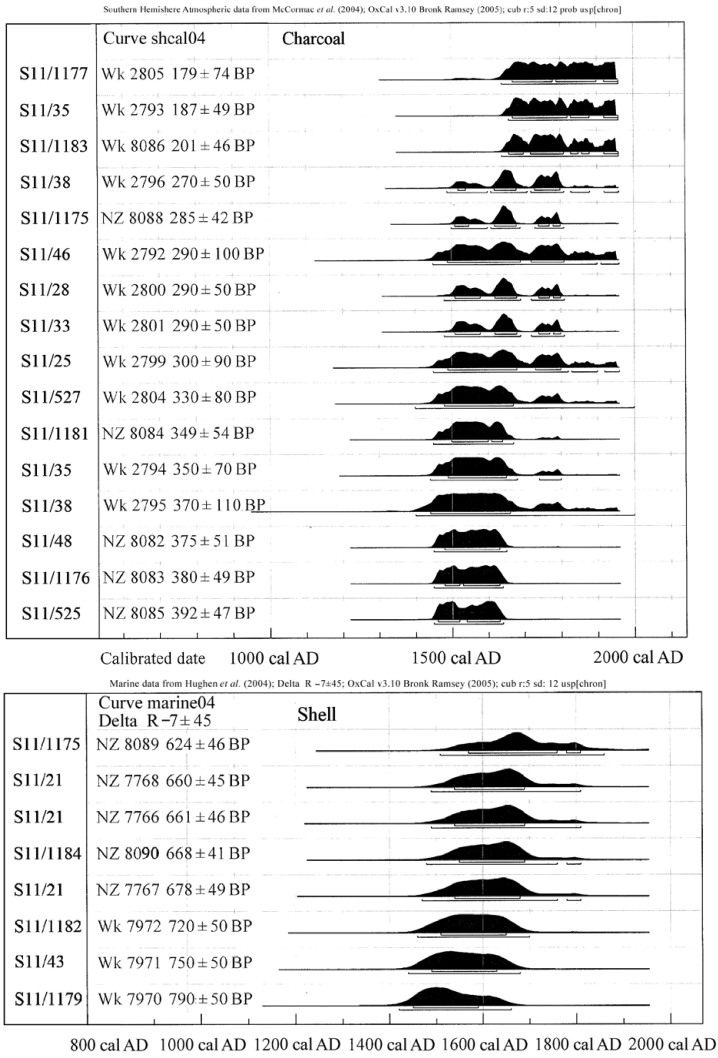

Figure 15. Radiocarbon dates for the construction of the earthwork defences of Pōnui pā. A significant number were first fortified from around AD 1500 during the sixteenth and early seventeenth centuries, and pā continued to be built and rebuilt later. The figure shows the results of 24 ^{14}C dates from 19 sites. One site has three dates (S11/21), three other sites have two dates (S11/35, S11/38 and S11/1175), and 15 have one date each. Omitted from the figure are two dates which preceded the building of earthworks and four dates that post-dated them (above). Six of the charcoal dates shown have excessive standard errors.

Davidson found from the excavation of the pā at Station Bay, Motutapu, which was periodically occupied over a period of up to three centuries, with the final occupation probably close to the end of the eighteenth century or early in the nineteenth century (Davidson 2013: 18).

The dating of individual sites on Pōnui is hardly robust, but when considered as the dating of a set of fortifications in the wider landscape a useful picture emerges. The archaeological landscape allows the possibility of a social landscape of a number of contemporary groups of *whānau* 'extended family' size who were neighbours and kin, and who at times resided in defended coastal settlements. And it is interesting to compare the Pōnui case with episodes of fortification in other regions.

There are six pā on the island with double ditches and banks, and most of the outer banks were more eroded and the ditches shallower than the inner ones. In two cases there are dates that inform on their relative ages. At sites S11/35 and 38 the inner ditches and banks were younger, and the suggestion is that these sites were not expanding but that smaller areas were more strongly defended as required. At S11/28 a date from the inner bank was 290 ± 50 (Wk 2800); however, the outer bank was not dated, but could be expected to be older on this basis.

Spatial and Chronological Patterns of Defence Construction

There are also spatial trends in the order of construction of earthwork defences (Fig. 16). The rank order of radiocarbon dates is by no means statistically assured, but it is clear that defences were first built during the sixteenth and early seventeenth centuries AD along the west coast and on the northeast coast, near beaches. Specifically, the eight earliest radiocarbon dates on charcoal samples and the three earliest dates on shell reported in Figure 15 came from pā on the west coast and in the northeast near Bryants Bay. The next four charcoal dates (Fig. 15) came from pā along the rocky east coast of the Firth of Thames, plausibly built during the later seventeenth century (sites S11/33, S11/28, S11/46 and S11/1175), and two further sites appeared in the west (S11/21 and S11/1184). After around AD 1700, the remaining sites were defended.

The early pā were selected for defensible situations near beaches with ready access to soft-shore shellfish and convenient landing places for canoes, where they could find shelter from gales (the worst of which came from the northeast), and where they could be stored on shore close below pā for protection from raiding parties. The density of western sites influenced the location of the later seventeenth century sites along the higher, rocky and more exposed east coast of the island, where there were no sheltered canoe landing places. After around AD 1700 there is little patterning in the relative order of radiocarbon dates; however, these included new earthworks at S11/1177 and S11/1183, secondary defences added to earlier sites and continuing occupation of several pā.

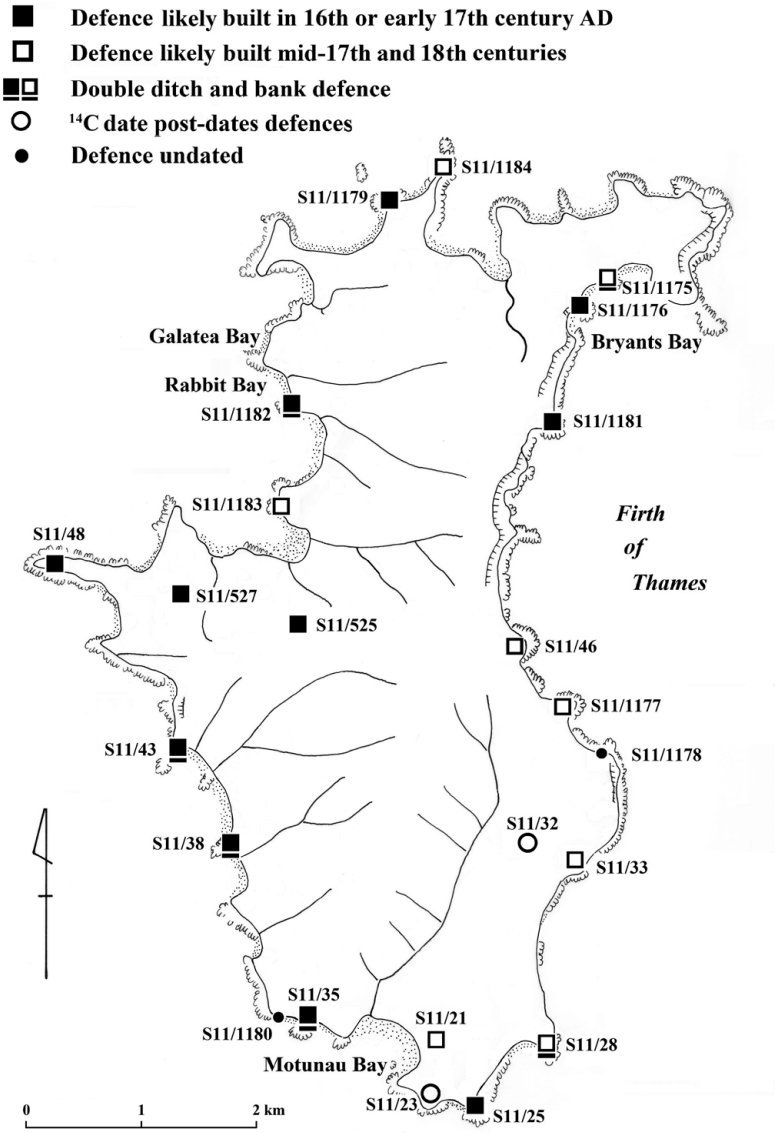

Figure 16. Pā of Pōnui Island.

DISCUSSION

The foregoing information allows for a fairly detailed chronology of Māori settlement and land use on Pōnui. The island was settled from the end of the fourteenth century AD, and from the beginning it involved the harvesting of marine resources and horticulture. The archaeological signature of coastal sites of the fifteenth century was early, or Archaic, and the evidence relates to other early sites on Motutapu (Davidson 1978), and Torpedo Bay and Long Bay on Auckland's North Shore (Campbell *et al*. 2018). With the appearance of pā in the sixteenth century the archaeological signature became Classic. The transition in the settlement evidence appears to be abrupt; however, the tempo of change could have varied in material culture and the economy (Anderson 2016). The charcoal evidence suggests forest near the early sites and clearance for the earthwork defences (Wallace n.d.), but many small patches of forest remained at the end of the Māori period.

Between AD 1500 and 1800 23 pā were built, six refortified with earthworks, and the number of refurbishments of timber palisades was additional but unknown. All of them were close to gardening land and to patches of forest, and it does not require measurement to show that they generally stood apart in the landscape. The dating is not precise but it appears that the density of pā in the sixteenth century AD was as great as in the eighteenth, so the fortification of the island was not gradual and incremental through time. Some pā were already occupied when they were first defended and some continued to be occupied at times long afterwards. It is reasonable to suppose that each site was associated with a social group that resided at times in the vicinity, and the density of sites makes it likely that a number were occupied contemporaneously.

The settlement pattern of Pōnui evidently passed through a stress threshold in the early fifteenth century when the island was quickly fortified. However, fortification occurred at different times elsewhere. At Pōuto in the north Kaipara, 12 pā defences were dated in much the same way as on Pōnui, but many were significantly later (Irwin 1985), and on Urupukapuka Island in the Bay of Islands fortifications date from around AD 1650 (McCoy and Ladefoged 2019).

All of the Pōnui pā were of moderate size (which begs the question of the size distribution of pā, which is unknown), and the largest of them, S11/1184, was not heavily defended. In other words none of the fortifications of Pōnui acted as a stronghold for a regional population in the inner Hauraki Gulf when it came under threat of external attack. On Pōnui and at Pōuto the context of fortification was mainly local involving stress among neighbours and kin, and defence against canoe-borne marauders from further afield. However, in the later pre-European period larger-scale polities developed and episodes

of external pressure with the threat of hostile takeover led to more integrated regional defence and the construction of large strategic pā. Pōnui, at that time, was part of a wider polity in the inner Hauraki Gulf, and such strongholds are known on Waiheke as well as on the Tāmaki Isthmus during the late pre-European period and early in the Musket Wars (Crosby 2012; Irwin 2013).

Pā of different forms were contemporary on Pōnui as in Pōuto. All the transverse-ditch ones were on coastal headlands except S11/32, which is on a narrow descending ridge, and the two ring-ditch ones were inland. In these two regions the distribution of pā types is topographical rather than chronological. Groube (1970) thought terraced pā were earlier than ring-ditch ones, and it is interesting that the Pōnui site with the earliest date, S11/525, is a substantial one with pits, terraces and houses on a high knoll apparently defended only by scarps. It was recorded by Matthews (1979) as a "possible pā", but could be a simple early one. In the absence of a bank the sample for dating was taken from a house drain.

I am of the view that pā on Pōnui were often residential, which was also suggested for the coastal Bay of Islands of AD 1772 (Kennedy 1969). Houses with walls and drains set into the base of scarps were excavated at S11/21, and there are surface indications of more houses on other Pōnui pā. Houses of the same basic form have been excavated at four undefended sites on Motutapu (see above).

The building of fortifications implies group leadership, and the size of forts can be used as a proxy for the scale of the communities who built them (Buist 1964). However, in Māori society in AD 1800 the presence of pā in the landscape did not invoke discrete territories of local groups. Bilateral kinship allowed a flexible system of multiple rights to settle land; individual rights to use resources overlapped on the ground and mobility was high (Anderson 1998; Ballara 1998; Phillips 2000). Social changes suggested for late pre-European history were a shift from *hapū* 'sub-tribe' to the multi-hapū community as an operational unit (Anderson 2009; Ballara 1998), and Sissons (1988) suggested a reordering of northern society in the eighteenth century on the basis of a change in the structure of traditions. Allen (1996: 670) concluded that the search for archaeological sites representing a hierarchy of social groups such as whānau, hapū and *iwi* 'tribe' should be abandoned. At Pōuto the archaeological evidence suggested the scale of social relations was fluid among late contemporary pā, and centres of action and influence ebbed and flowed (Irwin 1985: 109).

However, during the early migration period, and for some time afterwards, kinship and residence could have been more directly associated in New Zealand, as in tropical Eastern Polynesia, although not necessarily in central places like Wairau Bar (Walter *et al*. 2017). Land tenure could have become more fragmented through time in the relatively immense and unconstrained

landscapes of New Zealand. On Pōnui the pā of AD 1600 could have controlled territories more mutually exclusive than those reported in AD 1800, given their distribution in the landscape. The suggestion is that there could have been significant changes in land tenure and social organisation during a Māori Middle Age (Anderson 2016).

Comparing Pōnui with Motutapu, the two islands had similar coastal midden sites and pā, but there were more than twice as many undefended sites on Motutapu, which had volcanic soil and easier terrain; the latter island was cleared of forest and gardening and habitation sites were spread across the landscape. Such sites are not conspicuous on Pōnui where patches of kauri forest remained in places unsuitable for gardening, yet horticulture was significant, as shown by very large kūmara storage pits on both pā and undefended sites. Motutapu was more like the volcanic landscapes of Auckland than Pōnui, which could partly explain why Tāmaki Makarau was so contested, while Pōnui could have been more typical of the northeastern coast of the North Island than Tāmaki or Motutapu.

* * *

Although a great deal is known about individual pā, it is difficult to generalise about them. Most of the radiocarbon dates from pā are not from the defensive features and so little is known about the origins and spread of fortifications as a cultural or historical process. Recent research into wiggle-match dating of palisade posts has potential for wetland sites (Hogg *et al*. 2017), but other dating methods will be necessary for the dry. It is possible that knowledge of fortification came with migrants from Eastern Polynesia in the fourteenth century AD. Given that pā were built in numbers on Pōnui from early in the sixteenth century, our current knowledge of the age of earthwork fortifications does not preclude them from dating from late in the fifteenth century elsewhere in the North Island, and perhaps even before.

We have a general understanding of why pā developed and were built in large numbers, and various theories invoke climatic variation, increasing population, competition for horticultural land and the late emergence of competitive regional polities. But the effective and actual causes will vary in different parts of the country at different times and will involve the actions of individuals and contingent events, as shown by the Pōnui Island case in comparison to other areas. Further studies of pā in selected landscapes would throw more light on pre-European Māori settlement and society. However, ultimately, only part of this history will be accessible archaeologically, and much of the story will come from tribal history and *whakapapa* ‘genealogy’, as shown by McBurney (2010) for the inner Hauraki Gulf.

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REFERENCES

Allen, Harry, 1996. Horde and hapū: The reification of kinship and residence in prehistoric Aboriginal and Māori settlement organisation. In J. Davidson, G. Irwin, B. Leach, A. Pawley and D. Brown (eds), *Oceanic Culture History: Essays in Honour of Roger Green*. Dunedin: New Zealand Journal of Archaeology, pp. 657–74.

Anderson, Atholl, 1998. *The Welcome of Strangers: An Ethnohistory of Southern Maori A.D. 1650–1850*. Dunedin: Otago University Press with Dunedin City Council.

——2009. Origins, settlement and society of pre-European South Polynesia. In G. Byrnes (ed.), *The New Oxford History of New Zealand*. Melbourne: Oxford University Press, pp. 21–46.

——2016. The making of the Māori middle ages. *Journal of New Zealand Studies* 23: 2–18.

Atkinson, I.A.E., 1959. Forest vegetation of the inner islands of the Hauraki Gulf. *Proceedings of the New Zealand Ecological Society* 7: 29–33.

Ballara, Angela, 1998. *Iwi: The Dynamics of Māori Tribal Organisation from c. 1769 to c. 1945*. Wellington: Victoria University Press.

Bronk Ramsey, Christopher, 2005. OxCal Program v3.10. Available at: https://c14.arch.ox.ac.uk/oxcal3/oxcal.htm#author

Brown, E.A., 1979. Vegetation and flora of Ponui Island, Hauraki Gulf, New Zealand. *Tane* 25: 5–16.

Buist, Alistair, 1964. *Archaeology in North Taranaki, New Zealand*. New Zealand Archaeological Association Monograph 3. Wellington.

Campbell, John Logan, 1953. *Poenamo*. Auckland: Whitcombe and Tombs.

Campbell, Matthew, Mica Plowman, Emma Brooks, Andrew Cruikshank, Louise Furey, Mark Horrocks, Marianne Turner, Rod Wallace and Richard Walter, 2018. *The Torpedo Bay Excavations.* Vol. 1, *The Pre-European Maori Site HPA Authority (2009/275)*. Report to Heritage New Zealand Pouhere Taonga and the New Zealand Defence Force.

Clint, R., 1839. Part of the SW side of the Frith [*sic*] of Thames, New Zealand. [Hydrographic chart of the Tāmaki Strait (Prince Regent's Inlet) and surrounding land.] Sydney: R. Clint Lithographer.

Crosby, Ron, 2012. *The Musket Wars*. Auckland: Libro International.

Davidson, Janet, 1963. Site survey: Ponui Island. *New Zealand Archaeological Newsletter* 6: 36–46.

——1978. The prehistory of Motutapu Island, New Zealand: Five centuries of Polynesian occupation in a changing landscape. *Journal of the Polynesian Society* 87 (4): 327–37.

——2013. Archaeological excavations at the Station Bay pā, Motutapu Island, inner Hauraki Gulf, New Zealand. *Tuhinga* 24: 5–47.

Doherty, Moira, 1996. Motutapu Revisited. MA research essay, Department of Anthropology, University of Auckland.

d'Urville, Jules Dumont, 1950. *New Zealand 1826–1827: From the French of Dumont d'Urville; An English Translation of the* Voyage de l'Astrolabe *in New Zealand Waters with an Introductory Essay by Olive Wright*. Wellington: Wingfield Press, 1950.

Elliot, M. and V. Neall, 1995. A twelve hundred year history of deforestation and a new age for the Rangitoto ash from Motutapu Island, Hauraki Gulf, New Zealand. Geological Society Annual Conference 1995, Programme Abstracts. Geological Society of New Zealand Miscellaneous Publication, 81A: 106.

England, Wayne, 1990. Defining Ponui Pits. Department of Anthropology, University of Auckland.

Fisher, Victor, 1964. A note on archaeological work at Ponui Island. *Records of the Auckland Institute and Museum* 6 (1): 21–22.

Furey, Louise, 1996. *Oruarangi: The Archaeology and Material Culture of a Hauraki Pā.* Bulletin of the Auckland Institute and Museum 17. Auckland.

Groube, Lesley, 1970. The origins and development of earthwork fortifications in the Pacific. In R.C. Green and M. Kelly (eds), *Studies in Oceanic Culture History*, Vol. 1. Honolulu: Bishop Museum, pp. 133–64.

Hayward, Bruce, 2019. *Volcanoes of Auckland: A Field Guide*. Auckland: Auckland University Press.

Herd, James, 1828. A chart of part of New South Wales, Van Diemens Land, New Zealand and adjacent islands, with principal harbours. 1 July. London: J.W. Norie & Co. G263.2/30, held at Hydrographic Office, Taunton. Inset: Part of the S.W. side of the Frith [*sic*] of the Thames in New Zealand surveyed by Captain J. Herd, 1827.

Hogg, Allen, Warren Gumbley, Gretel Boswijk, Fiona Petchey, John Southon, Atholl Anderson, Tom Roa and Lloyd Donaldson, 2017. The first accurate and precise calendar dating of New Zealand Māori pā, using Otāhau Pā as a case study. *Journal of Archaeological Science* 12: 124–33.

Holdaway, Simon, n.d. Lithic Analysis and Obsidian from N43/1, Ponui Island. Department of Anthropology, University of Auckland.

Holdaway, Simon and Geoffrey Irwin, 1993. Electronic recording systems used during the excavation of S11/20, Ponui Island, Hauraki Gulf. *Archaeology in New Zealand* 36: 27–37.

——1994. Computer based recording systems at S11/20, Ponui Island, Auckland, New Zealand. In I. Johnson (ed.), *Methods in the Mountains*. Sydney: UISPP Commission, pp. 21–25.

Hughen, K.A., M.G.L. Baillie, E. Bard, A. Bayliss, J.W. Beck, C. Bertrand, P.G. Blackwell *et al*., 2004. *Radiocarbon* 46: 1059–86.

Irwin, Geoffrey, 1985. *Land, Pā and Polity: A Study Based on the Maori Fortifications of Pouto*. New Zealand Archaeological Association Monograph 15. Auckland.

——2013. Wetland archaeology and the study of late Māori settlement patterns and social organisation in northern New Zealand. *Journal of the Polynesian Society* 122 (4): 311–32.

Irwin, Geoffrey, Thegn Ladefoged and Rod Wallace, 1996. Archaeological fieldwork in the inner Hauraki Gulf. *Archaeology in New Zealand* 39: 254–63.

Kennedy, Jean, 1969. *Settlement in the South-east Bay of Islands, 1772: A Study in Text-Aided Field Archaeology*. Studies in Prehistoric Anthropology 3. Dunedin: Anthropology Department, University of Otago.

Ladefoged, Thegn and Rod Wallace, 2010. Excavation of undefended site R10/494 on Motutapu Island, New Zealand. *Archaeology in New Zealand* 53: 170–84.

Matthews, Peter, 1979. Archaeological site survey on Ponui Island in the Hauraki Gulf. *Tane* 25: 23–33.

McBurney, Peter, 2010. Traditional History Overview of the Mahurangi and Gulf Islands Districts. Research report commissioned by the Mahurangi and Gulf Islands Collective Committee in association with the Crown Forestry Rental Trust, Wai 1040 A36, Te Paparahi o Te Raki (Northland) Inquiry.

McCormac, F.G., A.G. Hogg, P.G. Blackwell, C.E. Buck, T.F.G. Higham and P.J. Reimer, 2004. SHCal04 Southern Hemisphere Calibration 0-1000 cal BP. Radiocarbon 46: 1087–92.

McCoy, Mark D. and Thegn N. Ladefoged, 2019. In pursuit of Māori warfare: New archaeological research on conflict in pre-European contact New Zealand. *Journal of Anthropological Archaeology* 56: 101113.

McDonnell, Hilda, 2018. *Captain Herd and the New Zealand Company Settlers in the Barque* Rosanna *1825–1827*. Lower Hutt, NZ: Vera Publications.

Monin, Paul, 1992. *Waiheke Island: A History*. Palmerston North, NZ: Dunmore Press.

Nicholls, Molly, 1963. A preliminary report of excavations on Ponui Island. *New Zealand Archaeological Association Newsletter* 6: 19–24.

——1964. Excavations on Ponui Island. *Records of the Auckland Institute and Museum* 6: 23–38.

Phillips, Caroline, 2000. *Waihou Journeys: The Archaeology of 400 Years of Maori Settlement*. Auckland: University of Auckland Press.

Phillips, Caroline and Matthew Campbell, 2004. From settlement patterns to interdisciplinary landscapes in New Zealand. In L. Furey and S. Holdaway (eds), *Change Through Time: 50 Years of New Zealand Archaeology*. New Zealand Archaeological Association Monograph 26, pp. 55–84. Auckland.

Schmidt, Matthew, 1996. The commencement of pa construction in New Zealand prehistory. *Journal of the Polynesian Society* 105 (4): 441–60.

——2000. Radiocarbon dating New Zealand prehistory using marine shell. British Archaeological Reports. Oxford: BAR Publishing.

Shawcross, Wilfred, 1968. An investigation of prehistoric diet and economy on a coastal site at Galatea Bay, New Zealand. *Proceedings of the Prehistoric Society* 33: 107–31.

Sheppard, Peter, Geoffrey Irwin, Sam Lin and Cameron McCaffrey, 2011. Characterisation of New Zealand obsidian using PXRF. *Journal of Archaeological Science* 38: 45–56.

Sissons, Jeff, 1988. Rethinking tribal origins. *Journal of the Polynesian Society* 97 (2): 199–204.

Sullivan, Agnes, n.d. Maori gardening in Tamaki before 1840. Draft PhD thesis, Department of Anthropology, University of Auckland.

Terrell, John, 1967. Galatea Bay—The excavation of a beach-stream midden site on Ponui Island in the Hauraki Gulf, New Zealand. *Transactions of the Royal Society of New Zealand*, *General* 2 (3): 31–70.

Wallace, Rod, 2012. A Preliminary Report on Charcoal from Sites on Motutapu Island. Department of Anthropology, University of Auckland.

——n.d. Report on Test Pits in the Archaic Site (N43/1) Motunau Bay, Ponui Island: Charcoal Identifications and Vegetation History. Department of Anthropology, University of Auckland.

Walter, Richard, Hallie Buckley, Chris Jacomb and Elizabeth Matisoo-Smith, 2017. Mass migration and the Polynesian settlement of New Zealand. *Journal of World Prehistory* 30: 351–76.

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