

# Mangahawea Bay Revisited: a reconsideration of the stratigraphy and chronology of site Q05/682, Moturua Island, Bay of Islands, New Zealand

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## ABSTRACT

The Mangahawea Bay Site (Q05/682) on Moturua Island in the Bay of Islands was excavated in 1981. Limited radiocarbon dating suggested occupation in the late thirteenth or early fourteenth century AD, but the site analysis has never been fully reported. New excavations at Mangahawea Bay in 2017 have clarified the stratigraphy and provided a more reliable set of radiocarbon determinations. The site was first occupied for a short period in the early to mid-fourteenth century AD. Following abandonment there is evidence for ongoing, intermittent, activities in the Bay until historic times, but no further occupation at the site. These results provide a foundation for future analysis of the substantial body of excavation material from the 1981 and 2017 excavations.

*Keywords:* New Zealand, Mangahawea, moa

## INTRODUCTION

Site Q05/682 in the New Zealand Archaeological Association Site Recording Scheme (SRS) is located in Mangahawea Bay on Moturua Island (Figure 1). At 136 ha, Moturua Island is the second largest of 144 islands in the Bay of Islands. When the site was recorded in 1980 the island was being managed by the Bay of Islands Maritime and Historic Park. Almost as soon as the site was discovered Park staff raised concerns about the risks posed by erosion and fossicking, and an exploratory excavation was carried out in 1981. The only outcomes from this excavation however,

were a student paper describing the dog remains (Veart n.d.a.) and a latex rubber mould of one of the excavation sections which was displayed at the University of Auckland for several years. Despite the limited formal reporting, unverified information about the age of the site, the content of lower layers, and nature of the stratigraphy has been circulating for decades within the archaeological community.

Apart from 20 ha of privately owned land, Moturua Island is now a Scenic Reserve managed by the Department of Conservation (DOC). In 2015 several boxes containing field notes, photos, drawings and bags of excavated material from the 1981 excavation were returned to the DOC offices in Whangarei. Armed with this information, a new excavation was carried out in January 2017 in partnership with tangata whenua (Ngati Kuta and Patukeha), the University of Otago, DOC, and Heritage New Zealand Pouhere Taonga. The general aim was to contextualise the findings of the earlier investigation and to provide a body of reliable information to contribute to a better understanding of the archaeology of northern New Zealand. The purpose of this paper is to contribute to that aim by settling the key issues surrounding chronology and stratigraphy that have been of long-standing interest to the archaeological community. This will provide a foundation for more detailed analytical work dealing with both the 1981 and 2017 excavation material which will follow. The discussions of the 1981 excavation below are based on the unpublished archive material returned to DOC in 2015. Unfortunately the latex mould was lost in the late 1980s and could not be consulted.

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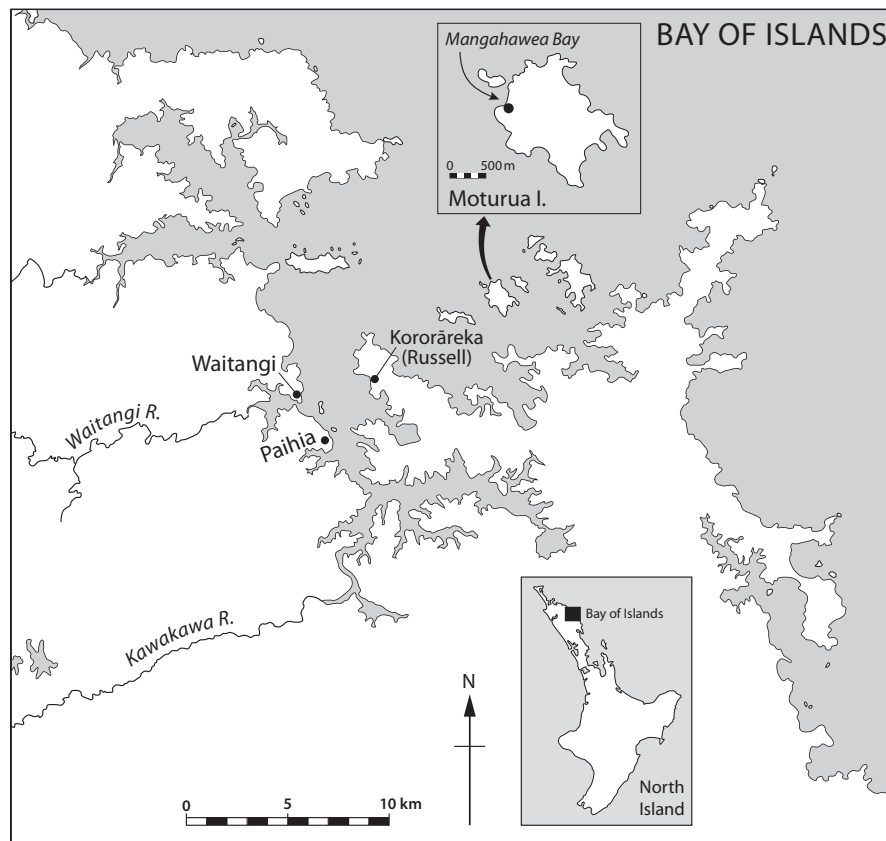


Figure 1. Location of Mangahawea Bay site (Q05/682) on Moturua Island, Bay of Islands

#### SITE DESCRIPTION AND BACKGROUND

The Bay of Islands was climatically and ecologically well suited to early Polynesian and later European settlers with its rich and sheltered inshore waters, mild climate and soils suitable for horticulture. When the early European explorers James Cook and Marion du Fresne visited in the eighteenth century the Bay of Islands was home to a sizeable Māori population (Salmond 1991). Moturua Island is located in the centre of the Bay of Islands and the SRS presently contains records of 28 Māori archaeological sites on the island, including seven pā, three midden sites, six 'Māori horticulture' sites (field systems/gardens) and 12 sites containing pit and/or terrace features. There are an additional four pā located on small offshore islands. Moturua Island is best known for its historical connection to the expedition of the French explorer Marion du Fresne. It was the existence of the detailed records kept by members of du Fresne's expedition during their visit in 1772 that prompted Les Groube, at the time at the University of Otago, to commence systematic archaeological work on the island in 1964–65 (Groube 1966: 108). The results of this work, and in particular a reported date of  $1150 \pm 90$  BP (Gak-820) from supposed agricultural soils in Hahangarua Bay, led to further field investigations in 1968, this time led by Karel Peters of the University of Auckland (Peters 1975). In 1996 Leigh Johnson was employed to undertake

archaeological investigations ahead of the construction of a private dwelling in Opunga Bay, a requirement of an archaeological authority obtained from what was then the New Zealand Historic Places Trust (Johnson 1997). Radiocarbon dates obtained by Groube, Peters and Johnson will be considered further below.

Mangahawea Bay is a sheltered bay surrounded by bush-clad hills located on the west coast of Moturua Island. A flat area of about 3 ha behind a 200 m long beach face is bisected by a seasonal stream. Several pit and terrace complexes lie on the low slopes behind the coastal flat. Site Q05/682 was recorded as an exposure of midden in the true right bank of the stream cutting. Eroded material surface collected in 1980 included bone fragments from moa (*Aves: Dinornithiformes*), seal (*Arctocephalus forsteri*), and dog (*Canis familiaris*); flakes of chert and obsidian, and a Cook Strait limpet (*Cellana denticulata*) shell. The presence of moa bone, and specimens of *C. denticulata* and *A. forsteri* pointed to an early age for the site as all three taxa were believed to have become extinct or locally extirpated within a few hundred years of first colonisation of the north (Rowland 1976; Smith 2005). The 1981 excavation was led by Jan McKay (Bay of Islands Maritime and Historic Park Board) and other team members included Lands and Survey archaeologist John Coster, University of Auckland lecturer Richard Cassels and students David Veart, Mike Taylor and John Mitchell.

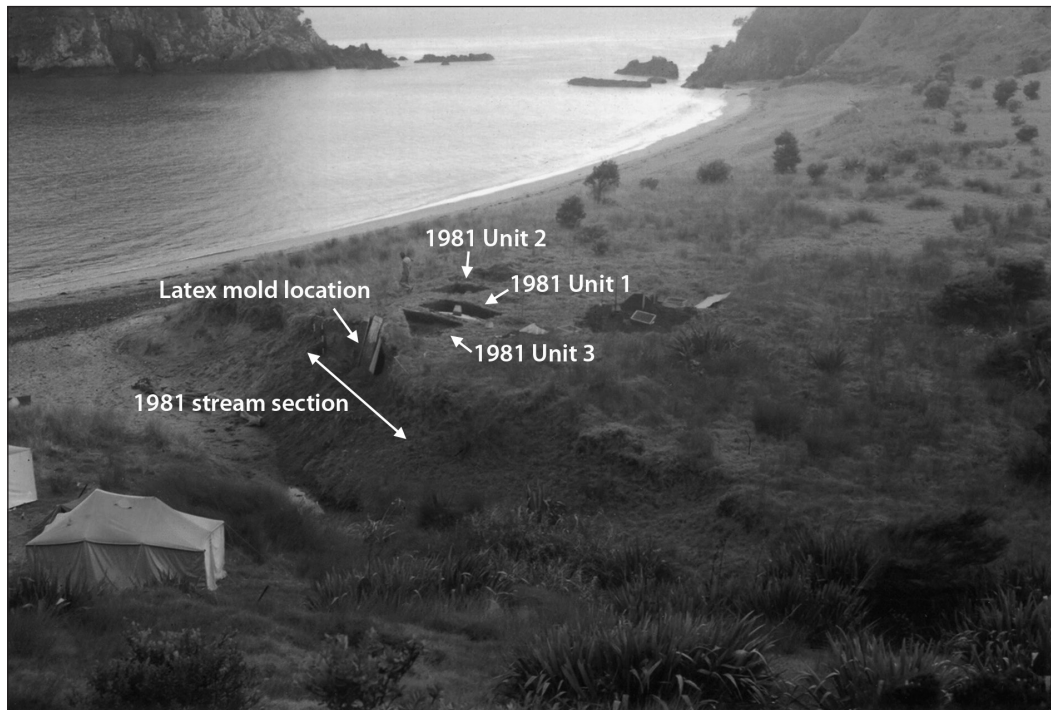


Figure 2. The 1981 excavation showing location of all excavated units

The 1981 excavation team opened three units and cleaned down the face of the stream bank to expose an 11 m long stratigraphic profile (Figure 2). They identified 11 layers (and many sub-layers) and cultural material was reported from at least five of these. The lowest cultural layer contained fire places, midden deposits of fish, mammal and bird bone, plus shellfish. Recovered artefacts included one piece bone fish hooks, lures, obsidian and chert flakes and a shell pendant. Moa bone artefacts and food remains were present and a single oyster shell sample (Wk-22364) produced a calibrated age range (95.4 per cent confidence) suggesting occupation in the late thirteenth or early fourteenth century AD (see below). The upper levels of the site contained fragments of clay tobacco pipes and weathered bottle glass.

Despite the lack of a published record from the 1981 excavation, information about the archaeology of the island has been circulating amongst New Zealand archaeologists for decades. Moturua is widely cited as containing at least one early or 'Archaic' horizon, and a number of other cultural layers that possibly span much of New Zealand's Māori and early European settlement history. Not only was the site potentially a rare surviving example of very early occupation in the Bay of Islands, but stratified sites with multiple, superimposed occupation phases are rare in New Zealand and, as a result, the nature and timing of cultural change at regional levels is poorly resolved (Anderson 2016; Walter *et al.* 2011: 24). In light of recent changes in the interpretation of New Zealand chronology (e.g., Wilmshurst *et al.* 2011), the expectation of encountering multiple, superimposed occupation phases at Mangahawea Bay was seen

by the DOC and Heritage New Zealand regional managers as providing a rare research opportunity. This research potential, and the timely return of the excavation material and paperwork in 2015, prompted the 2017 excavation which addressed both research and management objectives.

#### AIMS AND METHODS

The research goal of the 2017 investigation was to obtain high quality information on the stratigraphy and chronology of the site in order to provide context for the material excavated in 1981 and to inform future management options. Once the age and stratigraphy of the site has been resolved, the longer term goal of the team is to carry out a thorough analysis of all excavated materials (including from the 1981 season) to contribute to an understanding of settlement and culture change in northern New Zealand. This paper reports on the stratigraphy and radiocarbon dating.

Excavation was carried out according to natural stratigraphy, although within each layer deposits were removed in arbitrary spits. Excavated deposits were placed into 3.2 mm screens and wet sieved on site. Artefacts spotted in the sieves were removed and bagged separately. The remaining bulk residues containing faunal and some artefactual material were bagged and transported for further analysis to the Otago Archaeology Laboratories (OAL) at the University of Otago. Unsieved bulk samples of deposits were also collected from each layer and many of the features, and sent to the OAL for further specialised study as required. Photographs and stratigraphic drawings were made of all

sections, and plan drawings were made at relevant levels. A photographic record was made of the excavation progress. All excavation units, test pits, features and major finds were mapped using a Leica Robotic Total Station. A plane table and alidade was used to create a working plan of the site which was updated daily. New Zealand Transverse Mercator 2000 (NZTM2000) co-ordinates were obtained for site datums and other fixed points using a handheld Trimble Differential GPS unit.

To understand the 1981 excavation in relation to a general site stratigraphy, all the 1981 excavation units were relocated using variable sized test pit excavations and by probing with a 6 mm steel probe. An 8 m section of the northern stream bank was cleaned down and the stratigraphy photographed and drawn. This was compared to the 1981 stream-bank section. One of the 1981 units (1981 Unit 1) was emptied of back fill and all sections were redrawn, and a new excavation area (2017 Area 2) was opened adjacent to the stream bank to further investigate a large feature identified in the stream-bank section (see below). While Area 2 was originally intended as a 2 × 2 m excavation, a

1 × 0.5 m baulk was left unexcavated because of a shortage of time. During the course of the excavation further test excavations, including five 0.25 × 0.25 m ‘field test holes’ (FTHs), were opened to determine the likely spatial extent of cultural deposits.

Sampling for suitable radiocarbon material began in the field with the collection of bulk samples from key features and stratigraphic units. These samples were either floated for botanical remains in the field or removed in bulk to the OAL for flotation. From this material, samples of carbonised wood from short-lived species or components (twigs) were selected for dating and submitted to the Waikato Radiocarbon Laboratory for Accelerator Mass Spectrometry (AMS) analysis.

## RESULTS

All three of the 1981 excavation units (Units MNO 25–26, PQR, MNO 22–24) were successfully relocated in 2017 (Figure 3). In Figure 3 these are relabelled as ‘1981 Unit 1’, ‘1981 Unit 2’, and ‘1981 Unit 3’ respectively. Comparing photo-

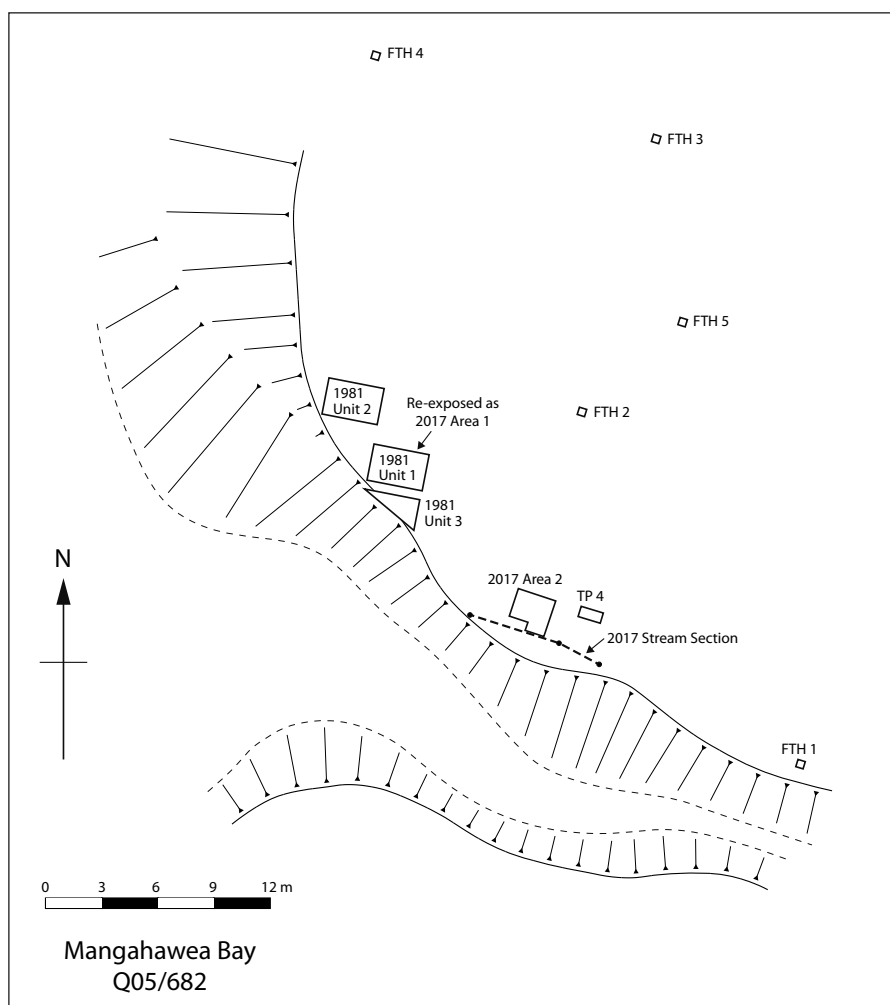


Figure 3. Location of the 1981 and 2017 excavation units. Test Pits 1–3 were opened in 2017 to locate the 1981 excavation units and thus overlap those units and are not shown on the plan. FTH units are 25 × 25 cm ‘field test holes’.

graphs from 1981 and the present day it appears that only minor geomorphological change has occurred in the last 36 years; approximately 1 m of the stream edge has eroded and there has been up to 3 m of slumping along the beach front (compare Figure 2 and Figure 5).

## Stratigraphy

The stream-bank section from 1981 has been redrawn and presented as Figure 4. The figure and the accompanying description in Table 1 is based on the original drawing made by Richard Cassels, with reference to field photographs and notes. In Cassels' drawings the cultural materials are spread through Layers 2 through 5 while the lower six layers (Layers 6 through 11) are interpreted as natural bands of coastal sediments.

In 2017 an 8 m section of the stream-bank was cleaned down as close as possible to where the 1981 section had been located. The results are shown in Figure 6 (see also Figure 3). Of particular note is the presence in section of Feature 1 that is interpreted here as a large oven feature dug down from 2017 Layer 2.

The 1981 and 2017 teams described the stratigraphy differently (especially in the way they differentiated layers from sub-layers) but it is apparent on close reading of the 1981 figure legends and notes that the two teams made very similar basic observations (Table 2). In the stream-bank sections the first occupation of the site is represented by cultural materials deposited in a matrix of coarse sand and pebbles (2017, Layer 2) deposited over bands of naturally deposited beach sands (2017, Layers 3 and 4). Following site abandonment, more beach sands were deposited over the earlier living surface (2017, Layer 1). The Layer 1 sands accumulated over a lengthy period of time as evidenced by their banded nature. Although there is no sign of a second occupation surface in the stream bank profile, an undated lens of shell midden was recorded in 1981 Area 1 (Layer 1b) that is separated from the early period of occupation by sterile white-to-grey wind-blown beach sand deposits (Figure 7). This was also observed as a lens in the south bank of 1981 Area 2 (Figure 8). Flaked stone including obsidian was found in that midden layer, and some historic phase artefacts were mixed into the upper levels of Layer 1 in the stream-bank section.

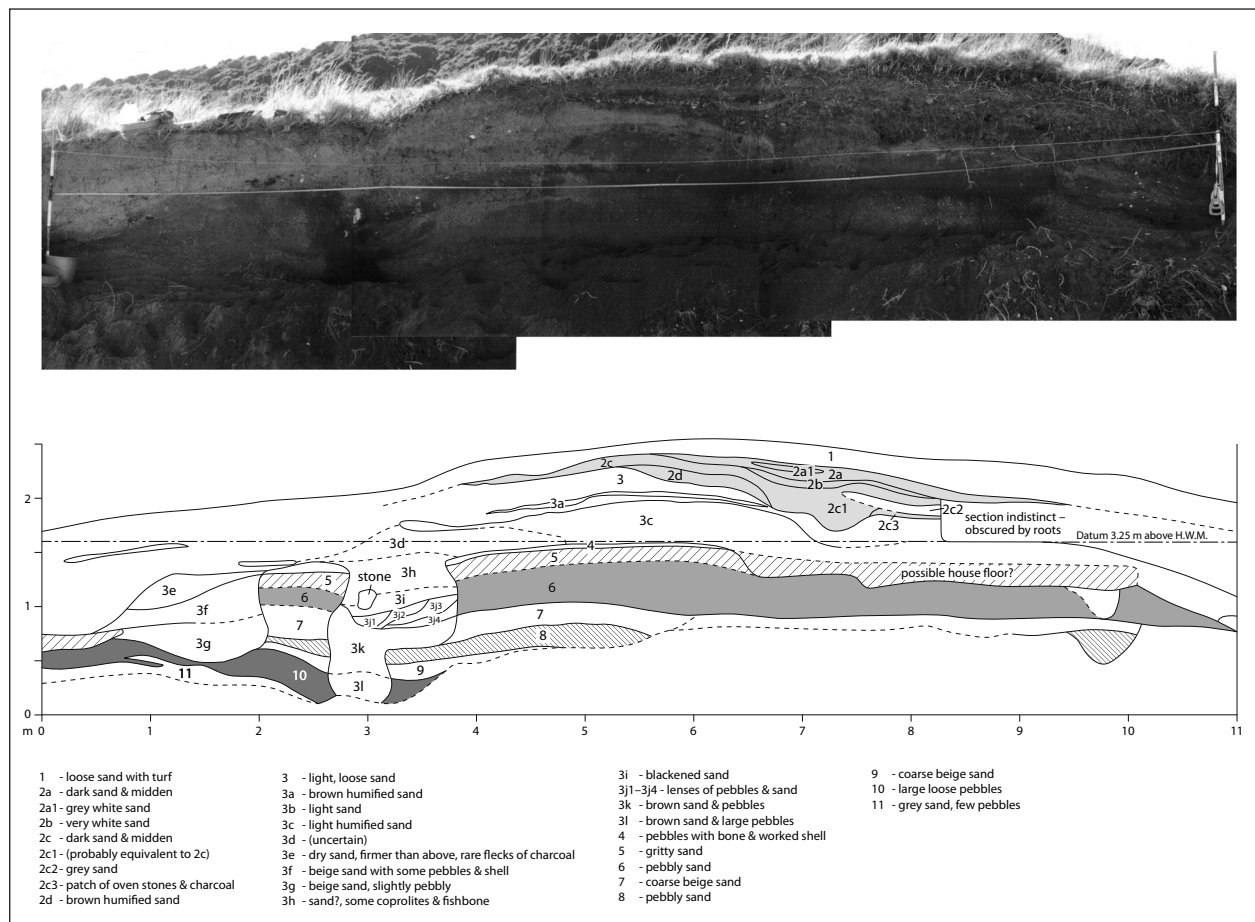


Figure 4. Stream-bank section 1981; reconstructed from historic photographs and a drawing by Richard Cassels. We have kept the original labels and layer descriptions although there are some contradictions which the 1981 team would no doubt have resolved before publication.

Table 1. Stratigraphy of the 1981 stream-bank section (Figure 5) based on Richard Cassels' drawings and field notes.

Layer	Description
Layer 1	Loose white-grey sand with a shallow but well developed turf horizon
Layer 2	A series of lenses of white and dark sand some of which contain bands of midden, flecks of charcoal and fire cracked rock. A number of artefacts were also recovered from this layer including moa bone fishhook tabs
Layer 3	A predominantly grey sand matrix with many lenses of darker sand, white sand, pebbles. Sparse cultural material is scattered through the various lenses but there is no actual living surface represented
Layer 4	Pebble layer with charcoal. Contains midden, fire-cracked rocks and artefacts
Layer 5	Brown gritty charcoal stained sand with inclusions of midden, fire-cracked rocks and artefacts
Layer 6	Pebbly sand
Layer 7	Coarse sand
Layer 8	Pebbly sand
Layer 9	Coarse beige sand
Layer 10	Large pebbles loosely packed
Layer 11	Grey sand, a few pebbles



Figure 5. Photograph showing the 2017 excavation

The two other units that were excavated in 2017 confirmed the general stratigraphic profile inferred from the stream bank profile and described in Table 2.

#### Radiocarbon dating

A single date from a rock oyster shell sample (*Saccostrea commercialis*) was submitted from the 1981 excavations.

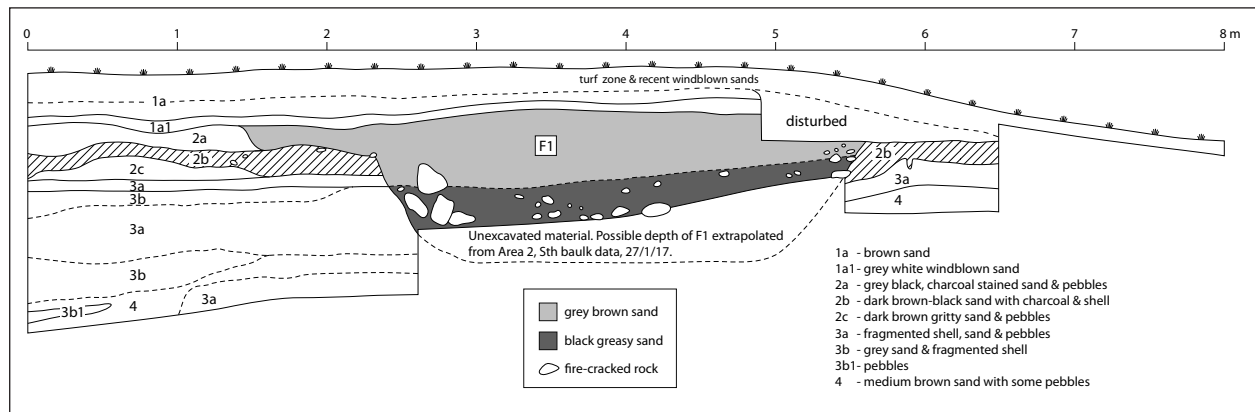


Figure 6. Profile of the 0–8 m stretch of the 2017 Stream-Bank Section.

Table 2. Stratigraphy of the 2017 stream-bank section (Figure 6) with a comparison to the 1981 section.

Layer	Description	Equivalent to 1981 Layer
Layer 1	Loose white-grey sand with a well-developed turf zone. Cultural material including charcoal, dog coprolites, artefacts and fragments of fire cracked rock are found at very low densities within the layer. There is no evidence of a living surface and the early artefacts are likely to have been displaced upward from Layer 2.	The bands of sand comprising Layer 1 (2017) are equivalent to the banded layers making up Layers 1 through 3 in the 1981 profile.
Layer 2	This is a dark brown-black layer of sand and pebbles with some banding which suggests that it accumulated gradually. It contains midden, artefacts and features and represents the earliest cultural activities at the site.	This (2017) layer is equivalent to Layers 4 and 5 on the 1981 profile.
Layer 3	Bands of sand containing pebbles and fragmented shell	These two layers in the 2017 section are naturally deposited beach sediments with no in situ cultural material and are equivalent to the banded sands designated Layers 6 through 11 in the 1981 section.
Layer 4	Medium brown gritty sand with occasional pebbles	

This sample was identified as coming from 1981 Layer 4 (Table 2 and Figure 4). Using the default delta-R for mainland New Zealand ( $-7 \pm 45$ ) the oyster shell date (Wk-22364) calibrates to AD 1223–1417 (95.4 per cent confidence) (Table 3). The four new dates from the excavation were recovered from secure contexts and are from short lived species. Given the greater accuracy and tighter error ranges of modern AMS results, the 2017 dates provide a reliable chronology for the Mangahawea Bay site that is compatible with the Wk-22364 result (Figure 9). The earliest date was obtained from a sample of wood (Wk-46127) from a portion of carbonised ponga (diameter 5 cm) which was found in growth position within Layer 3, immediately beneath one of the large stones lining the base of Feature 1 (dug down from Layer 2). With a calibrated age range of AD 1224–1275 (95.4 per cent confidence) and a low likelihood of significant inbuilt age it is likely that this sample dates the site just prior to the establishment of the first settlement in the

Bay. The two dates from Layer 2 associated with Feature 1 (Wk-46128 and Wk-46129) produced a calibrated age range of AD 1319–1408 (95.4 per cent confidence) which places them within the generally accepted range for the earliest well-dated sites in the country. Another sample from Layer 2 from the interior of another feature (Wk-46126) dates to the period AD 1397–1429 (95.4 per cent confidence). Although this does overlap with Wk-46128 and Wk-46129 at 95.4 per cent confidence, it raises the possibility either that the occupation spanned multiple decades or that there was intermittent activity in the Bay before the deposition of the Layer 1 sands. The second option is consistent with the banded and heterogeneous nature of the Layer 2 sands.

Seven additional dates from pre-contact contexts have also been reported from elsewhere on Moturua Island. Three of these have been excluded from this discussion because the material dated was unidentified carbonised wood samples, and therefore significant inbuilt age is pos-

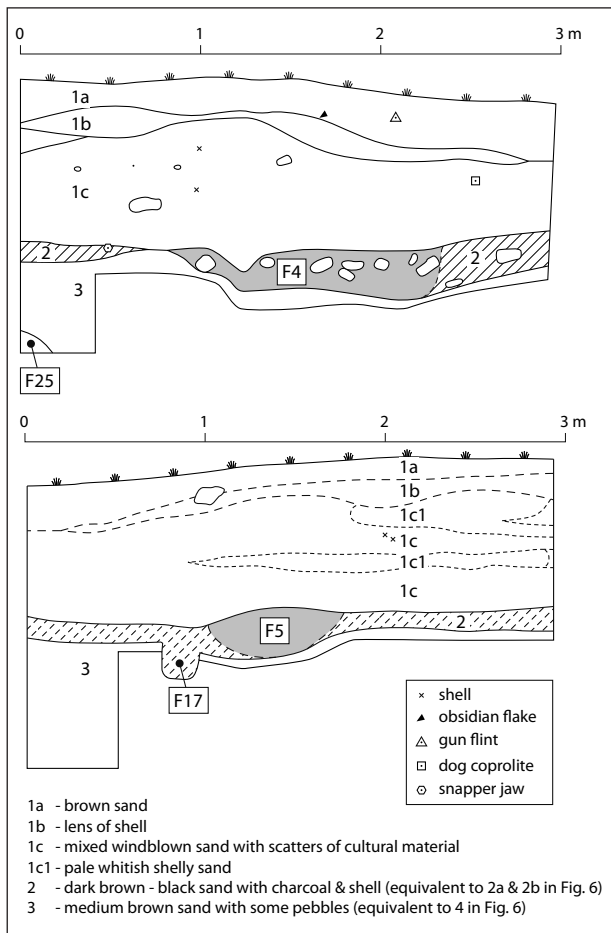


Figure 7. East and West baulks of 1981 Area 1 as re-exposed during the 2017 season.

sible (Groube 1966). Two acceptable dates were obtained by Karel Peters from Site Q05/44 in Hahangarua Bay (ANU-542 and ANU-543). They are from agricultural soils (Layers 3 and 5) and from what should be appropriate short lived material given the published descriptions (Peters 1975:179). The limitation of these dates is that the samples were taken from a soil matrix rather than from discrete archaeological features which leaves open the possibility of charcoals from natural fires being incorporated into the sediment. Two further dates from samples of *Paphies australis* were obtained by Leigh Johnson from Layers 3 and 5 of Site Q05/46 in Opunga Bay (Wk-4963 and Wk-4964). Layer 5 was interpreted by the excavator as representing the initial phase of settlement of that beach (or perhaps the island) (Johnson 1997) (Table 3).

### DISCUSSION

The 2017 excavation at Mangahawea Bay successfully settled a number of questions relating to the site. The four new charcoal AMS dates confirm that people were active in Mangahawea Bay by the early fourteenth century AD which means that it was occupied during the first century of New Zealand settlement according to current models (Walter *et al.* 2017; Wilmshurst *et al.* 2011). In addition to fire cracked rock and flaked stone tools, Layer 2 contained the remains of early indicator species such as moa, seal, *Cellana denticulata*, and early style one-piece bone fish-hook forms, including some manufactured in moa bone. The evidence shows that the Mangahawea Bay site is a rare surviving example of very early occupation in the Bay of Islands. However, the stratigraphy of the site does not con-

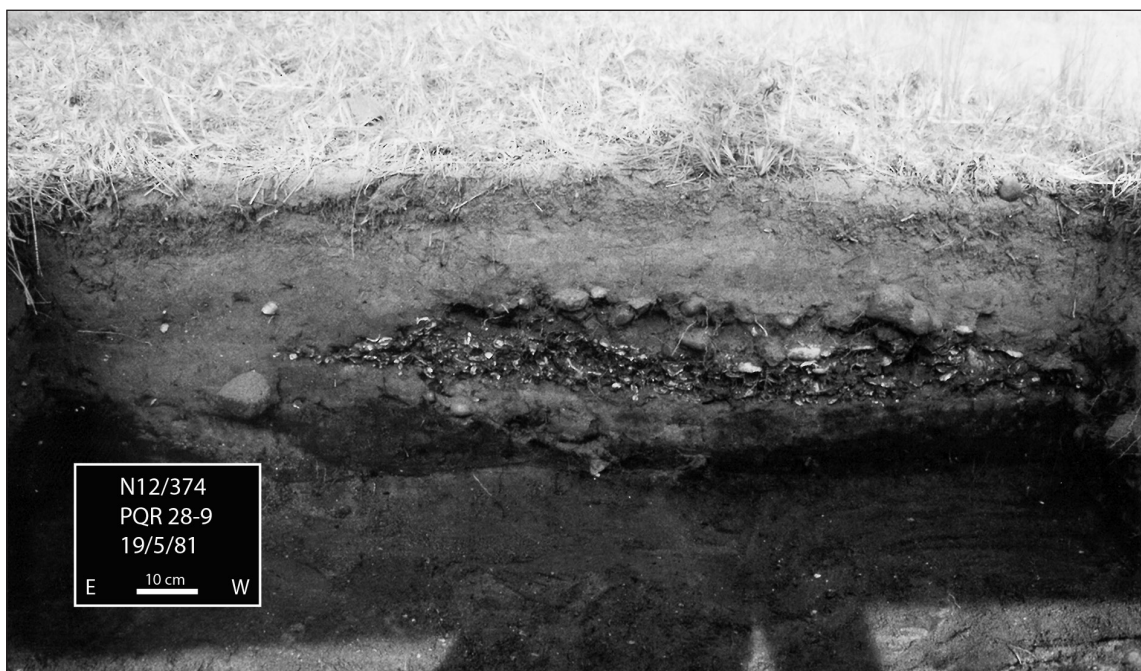


Figure 8. South baulk of Unit PQR (1981 Unit 2) 1981 season.



Table 3. Radiocarbon dates from Moturua Island, CRA's and calibrated ages (OxCal 4.3.2 [Bronk Ramsey 2017], [SHCal 2013], [Hogg et al., 2013], [Marine 2013], [Reimer et al., 2013]), NZ Delta-R:  $-7 \pm 45$ .

Site	Context	Lab no.	Material dated	CRA	$\delta^{13}\text{C}^*$	Cal AD (68.2 % confidence)	Cal AD (95.4 % confidence)
Q05/682 Mangahawea Bay	6N2E L2 spit ii	Wk-46126	Twig, angiosperm	574 ± 15		1403–1420 (68.2%)	1397–1429 (95.4%)
Q05/682 Mangahawea Bay	Below feature	Wk-46127	Juvenile ponga (Cyathea)	820 ± 15		1230–1250 (45.1%), 1261–1271 (23.1%)	1224–1275 (95.4%)
Q05/682 Mangahawea Bay	L2 spit ii	Wk-46128	Twig (Myrtaceae)	629 ± 15		1325–1342 (43.6%), 1390–1399 (24.6%)	1319–1351 (58.9%), 1385–1404 (35.6%)
Q05/682 Mangahawea Bay	7N2E L2 spit ii	Wk-46129	Twig (Myrtaceae)	623 ± 15		1326–1341 (33.6%), 1390–1402 (34.6%)	1320–1350 (51%), 1386–1408 (44.4%)
Q05/682 Mangahawea Bay	L4, midden and artefacts	Wk-22364	Rock Oyster ( <i>Saccostrea commercialis</i> )	1066 ± 32		1268–1385 (68.2%)	1223–1417 (95.4%)
Q05/44 Hahangarua Bay	L5 Peters, Agricultural soil	ANU 543	Fine fragments or twigs	510 ± 85	-24	1391–1504 (61%), 1591–1615 (7.2%)	1313–1359 (8.5%), 1380–1630 (86.9%)
Q05/44 Hahangarua Bay	L6 Peters, soil and charcoal, IBP	ANU 542	Fine fragments or twigs	720 ± 100	-24	1266–1397 (68.2%)	1162–1439 (95.4%)
Q05/46 Opunga Bay	T2, L3	Wk-4963	Pipi ( <i>Paphies australis</i> )	670 ± 60		1534–1688 (68.2%)	1478–1810 (95.4%)
Q05/46 Opunga Bay	T2, L5	Wk-4964	Pipi ( <i>Paphies australis</i> )	890 ± 60		1360–1370 (3.3%), 1385–1500 (64.9%)	1305–1575 (95.4%)

\* 2017 Dates have been  $^{13}\text{C}$  fractionation-corrected using a  $\delta^{13}\text{C}$  value measured on the accelerator (Dr Fiona Petchey, Waikato Radiocarbon Dating Laboratory, pers. comm., 2017). As this value can differ from the  $\delta^{13}\text{C}$  value of the original material,  $\delta^{13}\text{C}$  values are not reported here.

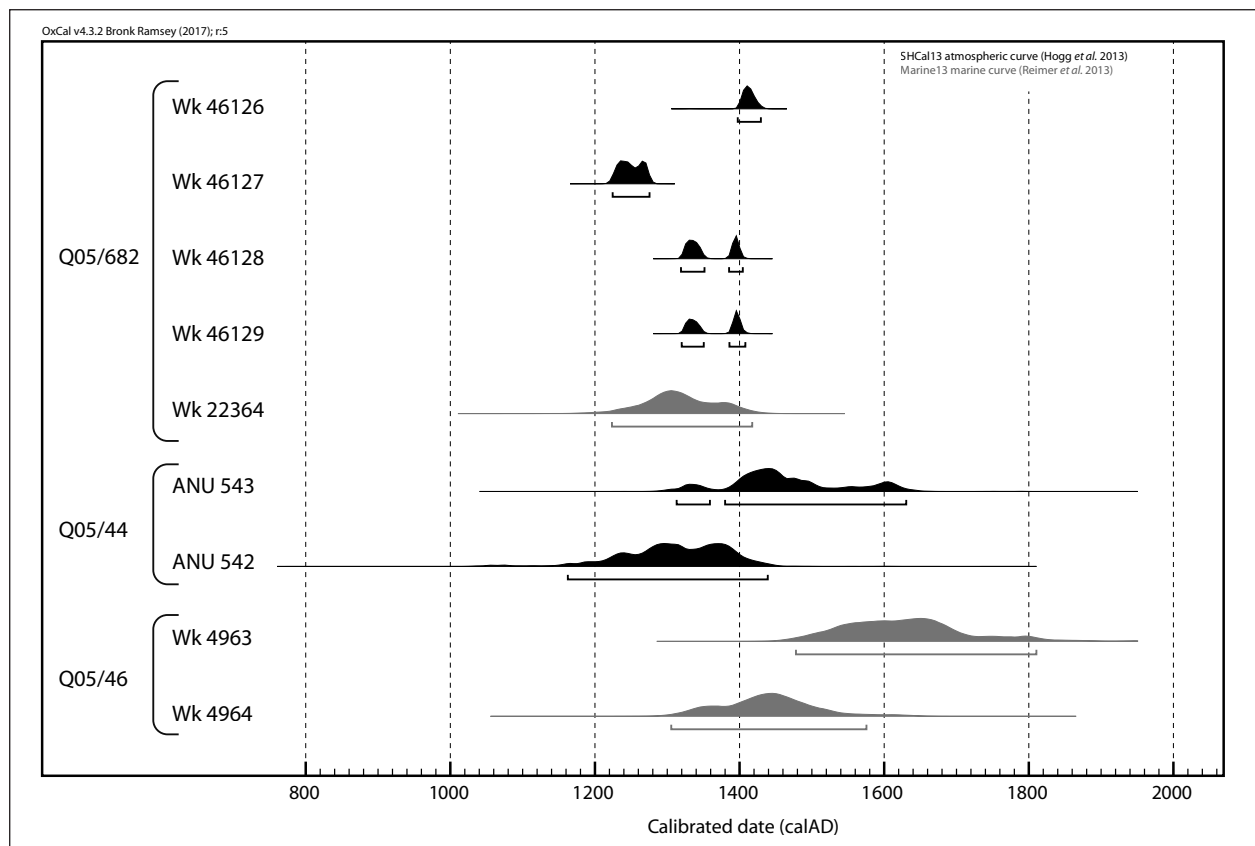


Figure 9. Calibrated atmospheric and marine radiocarbon dates, 95.4% confidence (OxCal 4.3.2 (Bronk Ramsey 2017)). For sample and calibration details see Table 3.

tain evidence of multiple cultural layers, or continuous occupation over a lengthy period as is sometimes informally reported. The first arrivals at Mangahawea Bay settled a pristine beach ridge and brought with them components of a well described early East Polynesian toolkit such as is found widely in sites of this period throughout New Zealand (Davidson 1986: 63–117; Golson 1959). They also had access to industrial stone from a range of sources in the North Island which is also a common feature of sites that date within the first 50–100 years of settlement (Walter *et al.* 2010). Both the stratigraphy and radiocarbon samples support the interpretation that the first occupation may have spanned decades or have involved more than one set of events, but the site was abandoned by the early fifteenth century at the latest. The only stratigraphic evidence of activity post-dating the Layer 2 occupation is a localised band of shell midden in 1981 Unit 1 separated by 50 cm of sand from the earlier cultural horizon. This is undated but was probably deposited before European arrival given the presence of obsidian flakes and may have represented a short-term visit rather than an extended occupation. Early European artefacts including clay tobacco pipe fragments, glass and iron are mixed into the upper levels of Layer 1. Although there is no evidence for sustained, long-term occupation of site Q05/682 the notion of continuous pre-European occupation of Moturua Island is completely plausible given that the island was well inhabited when Cook visited the Bay of Islands in 1769 (Salmond 1991: 230), radiocarbon dates in Table 3 that cover the period between the early fifteenth century and European arrival, and the field evidence of pā on the island (pā construction appears to have begun around AD 1500) (Schmidt 1996).

The 2017 excavation has demonstrated the significance of the Q05/682 site for contributing to an understanding of the early occupation of northern New Zealand. It was occupied during a period when migrants from tropical Eastern Polynesia and their immediate descendants were settling in to their new environments and establishing a stable and self-reliant colony.

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