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# Settlement Permanence and Function at Pleasant River Mouth, East Otago, New Zealand

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ABSTRACT

Recent excavations at Pleasant River Mouth are described and reviewed in relation to current settlement pattern models for southern New Zealand. The site was used repeatedly as a temporary campsite during the fourteenth, fifteenth and sixteenth centuries, with subsistence activity initially focused around moa and seal hunting and later upon fishing. The early camps are interpreted as satellites of a nearby permanent village, while the later occupations appear to have been parts of a more dispersed and mobile settlement system.

*Keywords*: PLEASANT RIVER, SOUTHERN NEW ZEALAND, SETTLEMENT PATTERNS, SEASONALITY, MOA HUNTING, FISHING.

## INTRODUCTION

Pleasant River Mouth is one of a series of large sites rich in moa remains along the east coast of southern New Zealand. The nature of settlement at these sites has been a central issue in reconstructions of the early prehistory of the area since Teviotdale (1932: 91) proposed that the occupants of sites such as Shag River Mouth probably lived "in the northern parts of the South Island and the hunters made yearly excursions, similar to later mutton-birding trips, to secure their supplies of *moa* meat." In contrast, permanent settlement at sites such as Papatowai, Pounawea and Hinahina was postulated following the application of chronometric dating and increasingly systematic excavation techniques in the 1950s, while smaller sites, and most of those in the interior, were interpreted as later phenomena (Lockerbie 1959; Simmons 1969; Hamel 1977). Subsequently, Anderson (1982) proposed that throughout the Archaic phase sites of varying size, function and location were linked in extensive settlement systems that exploited resources of both the coast and interior through annual cycles of mobility. During the early Archaic (*c.* 800–500 BP) these systems included large sites with evidence for a diverse range of subsistence, industrial and domestic activities, described variously as multi-function bases or villages, as well as smaller sites with a restricted range of functions, and single purpose sites such as quarries, *umu tī* (large ovens for cooking the tap root of *tī, Cordyline* spp.) and moa kill localities. In the late Archaic (*c.* 500–350 BP) the large coastal base settlements were replaced by smaller sites of more restricted function, suggesting a decline in settlement permanence. Recent excavations at Shag River Mouth, which demonstrate that it was a permanently occupied

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village in the mid to late fourteenth century (Anderson, Allingham and Smith 1996) provide substantial support for one component of this model.

There have been conflicting views on the degree of settlement permanence that might be indicated at Pleasant River Mouth. Knight (1965) suggested that it was a temporary campsite, and Teal (1975) proposed that occupation was seasonal. In contrast, Anderson (1982: 61, 1983: 21) listed the site as a possible example of a multi-function base, although elsewhere he considered permanent settlement unlikely (Anderson 1989: 136). There have also been conflicting views on the age of the site. With abundant remains of moa and other large game, early Archaic settlement has been suggested (Anderson 1982: 64, 1983: 7), while comparative analysis of artefacts has been used to suggest mid or late Archaic occupation (Simmons 1973: 52).

These views were based upon surface collections and excavations at the site in the early and middle decades of this century (see below). The purpose of this paper is to reconsider the nature and chronology of settlement at the site in the light of excavations undertaken by the University of Otago Field School in Archaeological Methods from 1991 to 1993. Specific objectives were to determine whether archaeological deposits were continuous over the whole site area or concentrated in several small patches; whether the deposits represented a single occupation or repeated activity at the site; at what date(s) occupation occurred; and whether the deposits reflected the full range of activities that might be expected at a permanently occupied village or the more restricted range that would result from temporary camps.

## SITE LOCATION

The Pleasant River drains low coastal hill country in east Otago and enters the sea about 50 km north of Dunedin. Behind a sandspit at its mouth, the river forms an estuary extending more than 2 km inland and bordered by extensive *Salicornia*-covered flats (Fig. 1). Ten archaeological sites, predominantly shell middens and ovens, have been recorded around the estuary. The largest of these is known as the Pleasant River Mouth site (J43/1) and is the focus of the investigations reported here. One of the smaller sites, Tumai (J43/4), has also been excavated (Allingham n.d.b).

The site lies below steep sandstone hills on the eastern bank of the estuary and occupies a tussock-covered sand dune, about 1.9 ha in area, extending westward from the foot of the hills towards the river. Several small 'islands' of sand protruding through the *Salicornia* flats north of this dune have also been considered part of the site. Over most of its area the main dune is no more than 0.8 m above mean high water level in the estuary, although it rises to about 1.7 m along the foot of the hills where the old dune surface has been buried by recent wind blown sand, now stabilising under marram grass. Comparison with an 1862 survey shows that the modern estuary shore has retreated some 10–20 m (B.G. McFadgen pers. comm.), and along this margin of the dune a layer of charcoal-blackened sand is visible discontinuously, while oven stones lie scattered on the shore below.

## PREVIOUS INVESTIGATIONS

Archaeological remains in the vicinity of Pleasant River mouth were first reported in the 1890s (Renata 1894), and David Teviotdale made several visits and collected surface

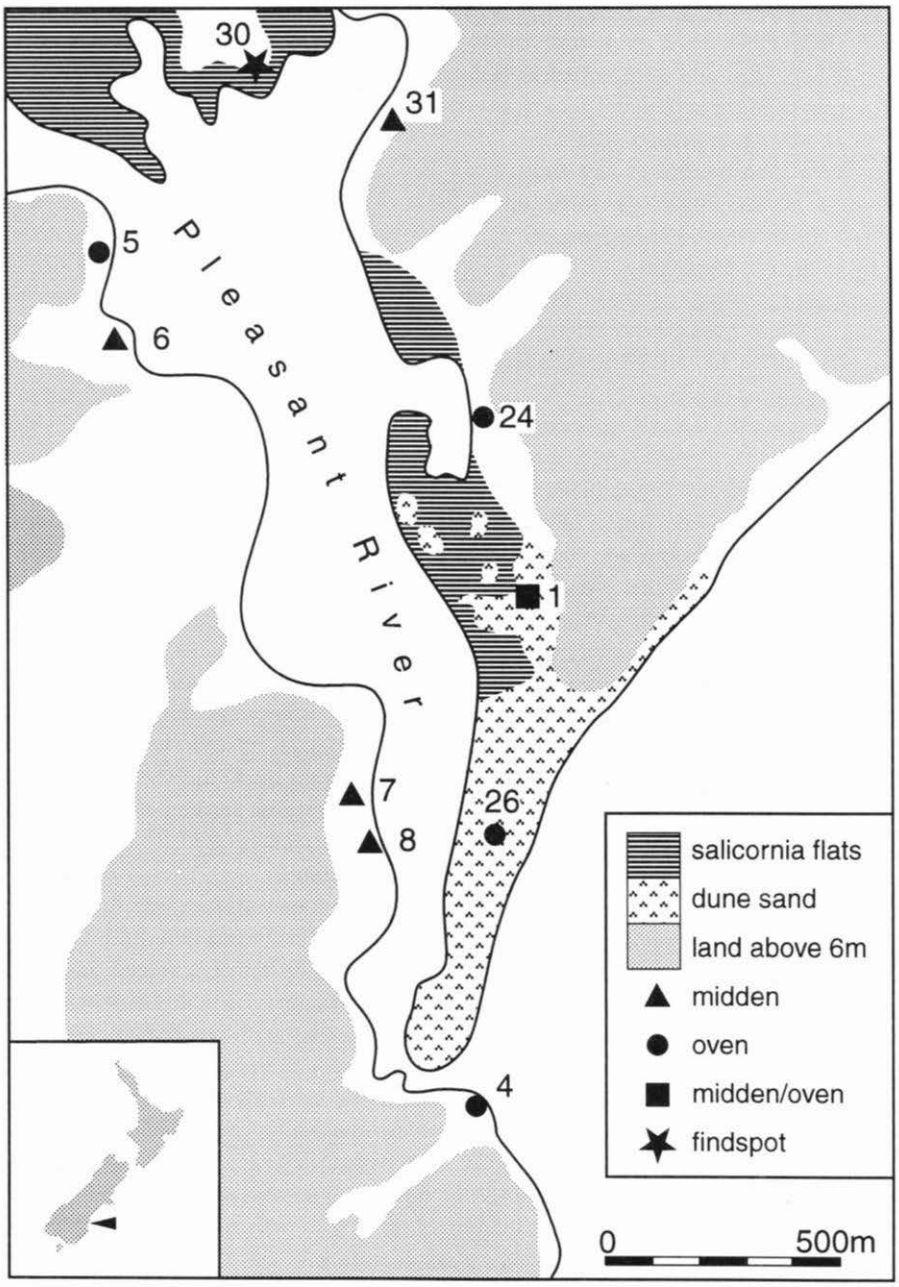


*Figure 1:* Location of archaeological sites around the Pleasant River estuary (site numbers prefixed J43/).

material there between 1915 and 1921, noting the presence of "camping huts ... about a mile from the mouth" (Teviotdale n.d. 18/4/1918). The first recorded excavation, by Michael Trotter (n.d.: 246–248, 1977: 363–364) in 1957 (Fig. 2), revealed a moa pelvis, dog mandible, seal vertebrae and numerous fish bones in a single layer of black sand. He also discovered a grooved *Dentalium* reel necklace unit among oven stones eroded from the river bank near what was later termed Area D.

More extensive investigations were undertaken between 1959 and 1962 by the Otago Anthropological Society under the direction of Peter Gathercole (Otago Anthropological Society 1960; Gathercole 1961; Teal 1975). Initially a series of small squares were excavated in an area of about 70 x 110 ft (*c.* 21 x 33 m), designated Area A, where a single charcoal-blackened occupation layer, subdivided in places by a thin sandy lens, was buried beneath a cap of wind blown sand. Two zones were identified within the layer: an area of ovens about 30 x 40 ft (*c.* 9 x 12 m) towards the southern end of the excavation; and, to the north, an 'area of occupation' about 50 x 70 ft (*c.* 15 x 21 m). Subsequent investigations were focused in Area Z, where small squares were again excavated in an area of similar dimensions to Area A. Stratigraphy varied throughout the area, but appears to have comprised up to three layers containing occupation material: an upper layer, often disturbed; a black layer, sometimes with streaks of white sand; and, at the base, a grey sand. However, in most squares midden or artefacts occurred in only one or two of these. Knight (n.d.) suggested that excavations in this area indicate "a number of fairly localised oven spreads at different depths", and also noted that test pits showed that there had been no occupation in the area between the two excavations.

Analysis of material from these investigations was initially confined to a brief summary of the 1959 excavation (Otago Anthropological Society 1960), noting the abundance of moa bone (86% of total bone[2]) and scarcity of fish, the absence of fish hooks and the predominance of silcrete flakes in the stone assemblage. Knight (1965) indicated that many of the latter were 'flake knives', or what now would generally be termed blades. Small samples of flakes from Area A, included in analyses of stone technology by Leach (1969) and Jones (1972), showed features typical of blade manufacture.

A more complete analysis, involving everything except the moa remains, was undertaken by Teal (1975), although the paucity of surviving stratigraphic information required that all material from Area Z be considered as a single assemblage. In both excavated areas the artefact assemblage was dominated by silcrete flakes and blades. In addition there were small numbers of porcellanite, chalcedony and chert flakes, along with one flake of obsidian in Area A and one piece of nephrite in Area Z. Two fragments of meta-argillite adzes were recovered, as were three cores, three drillpoints, two sandstone abraders and one grooved sinker. Bone artefacts were limited to two bird bone awls and three pieces of worked moa bone. One broken *Dentalium* shell was recovered from Area Z. The faunal assemblages also showed a superficial similarity, with small birds the most common vertebrates (leaving aside moa, which were not considered), marine mammals making a significant contribution and fish scarce. However dogs were considerably more common in Area Z and, amongst the small birds, ducks and shags occurred only in Area Z while penguins were almost entirely restricted to Area A. Both areas produced similar quantities of shell midden but cockles (*Austrovenus stutchburyi*) were the most common species in Area A, while mudsnails (*Amphibola crenata*) predominated in Area Z. More recent examination of moa remains

[2]Whether by weight or number is not reported.

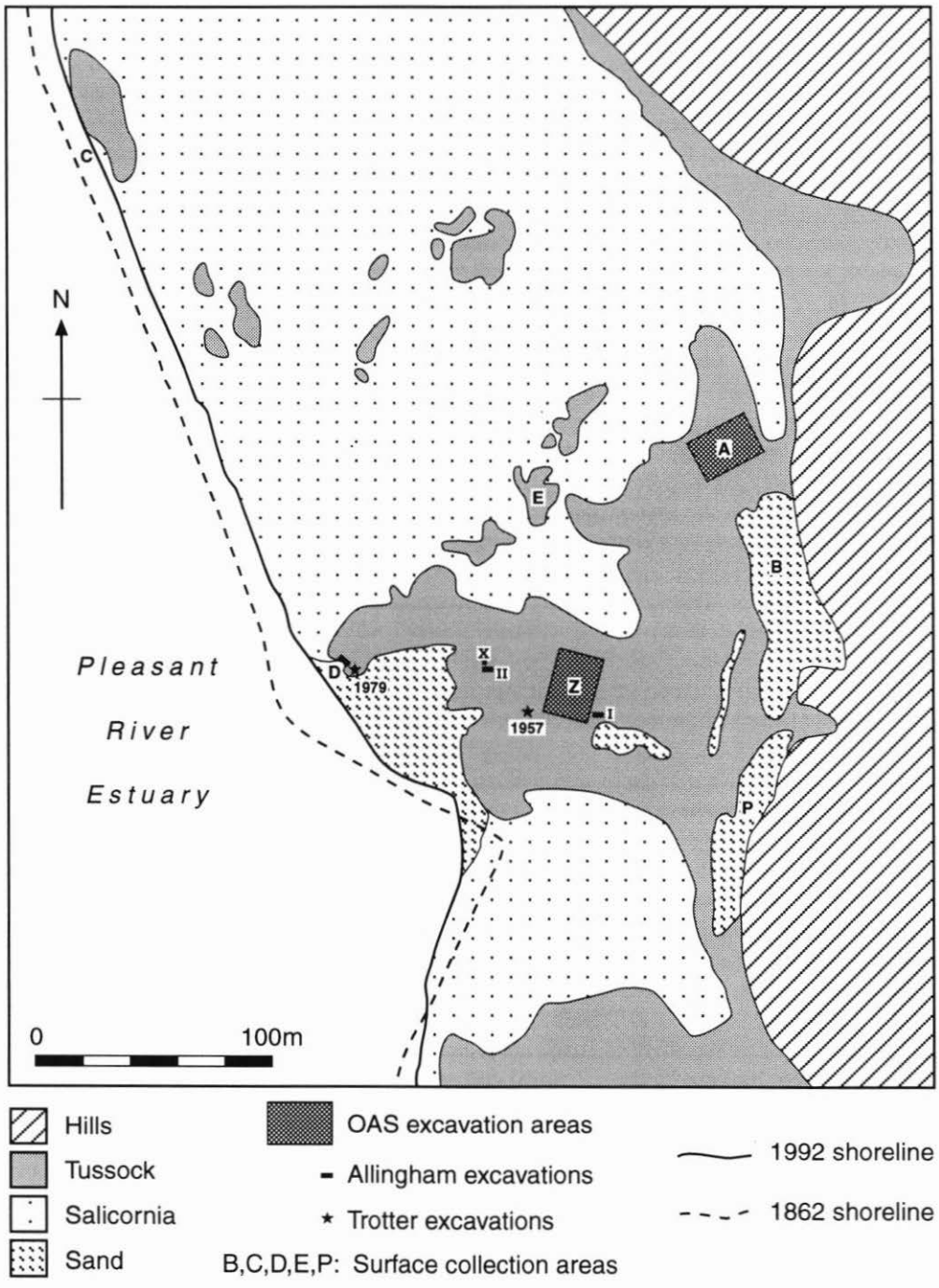


*Figure 2:* Previous excavations at Pleasant River Mouth.

from these excavations (Craig n.d.) indicates the presence of at least three species: *Euryapteryx gravis*, *Emeus crassus* and *Pachyornis elephantopus*.

Further investigations by Brian Allingham (n.d.a, pers. comm.) provide a more comprehensive picture of occupation at the site. Between 1966 and 1975 he regularly collected and described items exposed on the surface, recording their locations in terms of seven general areas (A–E, P, Z) within the site (Fig. 2). More than two thirds of the items were recovered from Area B (C. Campbell n.d.), where oven stones, artefacts and midden were exposed by deflation of the old dune surface, until sterile sand slumping from the hillside above buried most of this area in March 1968. Artefacts were also common in Area D, where a single layer of dark soil was eroding from the river bank and three discrete clusters of oven stones lay just below high water mark. While flakes and blades, predominantly of silcrete, were the most common items in these two areas, there were also numerous flakes of other materials, particularly chalcedony, porcellanite, basalt and obsidian in Area B, and basalt, argillite and obsidian in Area D. Other artefact forms represented include complete, partially made and fragmentary adzes, drillpoints, hammerstones, and a variety of files and abrading tools. A grooved *Dentalium* reel was also recovered in Area D. Elsewhere artefacts were relatively scarce, and restricted almost entirely to silcrete flakes and blades. This was the case in the vicinity of the Area A and Z excavations; in Area E, where rabbit burrowing had exposed silcrete and chalcedony flakes in a black sandy matrix; and in Area P, where just one flake was recovered from a large area of loose wind blown sand. Artefacts were also scarce in Area C, where a layer of mudsnail midden and two ovens were exposed in the eroding river bank, although whether this 'island' of high ground surrounded by *Salicornia* flats should be considered part of the main site is not clear.

Allingham also conducted five excavations, three near Area Z and two in Area D. Trench I, close to the Otago Anthropological Society excavations in Area Z, revealed a single layer with shell, fish bone and a single porcellanite flake. To the western side of Area Z, Trench II (10 x 4 ft [*c.* 3 x 1.2 m]) uncovered two occupation layers. The uppermost (layer 2) was a dark grey sand with shell, fish bone and few artefacts, while layer 4 contained numerous moa remains, including complete limb bones, articulated tracheal rings, a sternum and mandible, along with two silcrete blades and numerous fragments of moa eggshell which were later reconstructed into a nearly complete perforated shell. Subsequent sieving of excavated spoil (which could be from either layer) revealed nine unmodified sections of *Dentalium* shell, a bone needle, several pieces of worked bone that may be from fish hooks or bird spear points, a possible stone bowl and a variety of stone flakes. Square X (5 x 5 ft [*c.* 1.5 x 1.5 m]), adjacent to Trench II, also showed two occupation layers with the same concentration of fish and shellfish in the upper layer and moa remains below. Artefacts were similarly scarce. In Area D, three 2 ft (60 cm) squares excavated during 1968 disclosed a single occupation layer containing sparse midden and oven stones, within which were the very fragmentary remains of a human burial. A Duff (1956) Type 2A adze, large moa bones and an obsidian flake were clearly associated with the burial. Further excavations nearby in 1975 revealed two occupation deposits, a charcoal-blackened sand (layer 3) overlying a grey-brown sand (layer 4) which both contained moa bones, moa eggshell and a range of shellfish.

In 1979 Michael Trotter undertook a small excavation near Area D, recovering two samples for radiocarbon dating from a single layer of black sand, 60 cm in depth (Trotter

pers. comm.). These gave widely divergent results[3]. An *Amphibola* shell sample suggested occupation about the middle of the eleventh century, while a sample of moa bone collagen indicated that it might have been in the late fifteenth/early sixteenth or late sixteenth/early seventeenth centuries. However, both *Amphibola* shell and unpurified bone collagen are now considered unreliable as dating materials (Anderson, Smith and Higham 1996).

More recently, samples of charcoal, moa eggshell and marine shell from Allingham's 1975 Area D excavation were dated (Higham 1993, 1994, pers. comm.; Higham and Allingham n.d.). Five dates on moa eggshell were statistically indistinguishable and indicate occupation in the fourteenth century. Two charcoal results were also indistinguishable, and gave an almost identical pooled mean age. In contrast, the marine shell results were variable, with two suggesting occupation in the late thirteenth century, one in the late fourteenth/early fifteenth centuries, and three in the late fifteenth/early sixteenth centuries. Higham (1993) inferred from the consistency of the moa eggshell and charcoal results that the Area D deposits represented a single occupation in the fourteenth century, and suggested that variability in the shell dates may have been due to environmental factors influencing the radiocarbon reservoir in the estuary. These interpretations will be considered further below, in the light of dates from more recent excavations.

## 1991–93 INVESTIGATIONS

The first phase of recent investigations involved a systematic testpit survey of the dune making up the main portion of the site to determine whether archaeological deposits were continuous throughout this area. A total of 197 testpits, each approximately 30 x 30 cm, were dug by spade on a 10 m grid, with excavation proceeding either to the surface of a recognisable cultural layer, or until the excavator was satisfied that none was present, usually at a depth of 50 to 80 cm. The deposits recorded in these have been described in detail elsewhere (Smith 1992).

Just over half (109) of the test pits showed clear indications of occupation, most prominently in the form of charcoal-stained sand. In 46 cases this was a rich black colour, while in another 53 it was dark to moderate grey. Bones, shells, heat-shattered stones and artefacts were strongly associated with these deposits, with one or more of these types of evidence recorded in 33% of the excavations with black sand and 17% of those with grey sand. Small numbers of these items were found in 10 of the remaining test pits, where the deposits were either 'clean' sands in a variety of colours, or 'mottled' sands that appeared to have been disturbed by deflation, rabbit burrowing or earlier digging.

Although the small size of the individual testpits and their wide spacing limit the precision of interpretations that can be offered, the broad pattern of the evidence that they revealed is nonetheless clear. Charcoal-blackened sand, midden and artefacts were concentrated in three large areas along the northwestern edge of the dune (Fig. 3: Zones a–c), and all but one of the four smaller patches also occurred in this area. Grey sand with occasional midden

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[3]Dates by courtesy of M. Trotter (pers. comm.). Conventional ages were recalculated by the laboratory (R. Sparks pers. comm.) and differ slightly from those originally reported. NZ5013 *Euryapteryx* sp. bone collagen, CRA 408±56 BP, $\delta^{13}C$ -24.7; cal AD 2$\sigma$ 1445–1643. NZ5014 *Amphibola crenata* shell, CRA 1341±29 BP, $\delta^{13}C$ -0.4; cal AD 2$\sigma$ 985–1113. Calibrations by methods listed in Table 1.

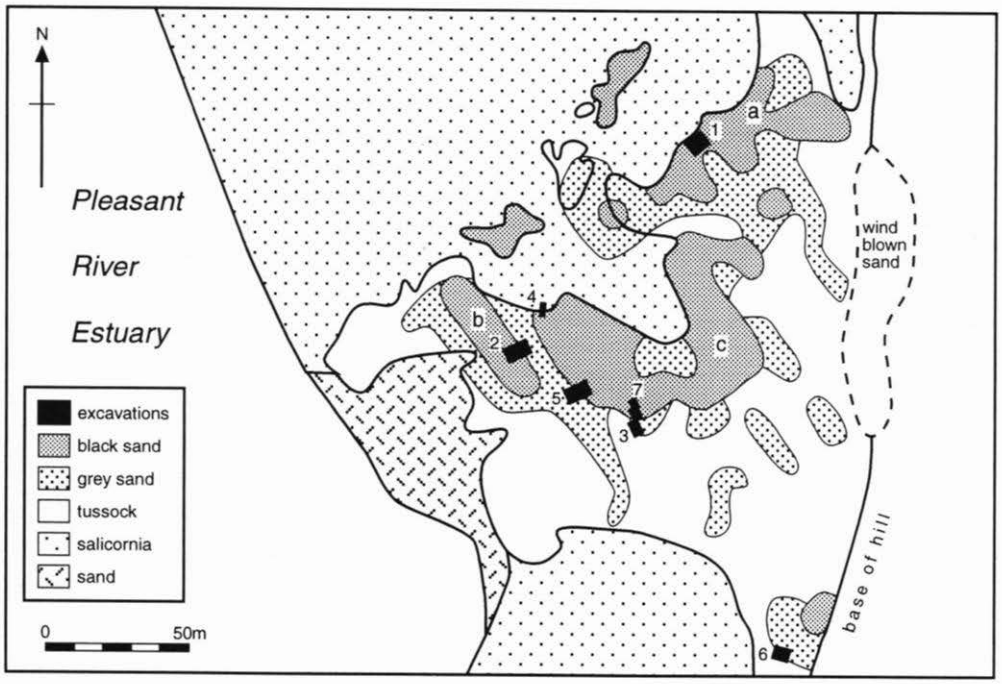


*Figure 3:* Recent excavations and distribution of darkened sands at Pleasant River Mouth.

and artefacts occurred mainly around the peripheries of these areas, although isolated patches were distributed more widely over the dune. Charcoal-stained sands were also observed on the three 'islands' of dune sand immediately northwest of the main dune, and in some test pits excavated in the *Salicornia* marsh in between. Together the black and grey sands covered just under 1 ha, or about half the main site area. Over the rest of the dune, evidence of prehistoric occupation was sparse and discontinuous.

Seven excavations were then undertaken: Area 1 in 1991; Areas 2, 3 and 4 in 1992; and Areas 5, 6 and 7 in 1993. They were placed so as to sample each of the three main concentrations of black sand, along with parts of the surrounding grey sand and the boundary between the dune and *Salicornia* flat (Fig. 3). Together these excavations totalled 128 $m^2$, which represents about 1.3% of the combined area of black and grey sand.

## AREA 1

Area 1 was a 5 x 5 m square located in Zone a, close to the 1959–61 Area A excavations. The northwestern edge of the square ran almost directly along the edge of the *Salicornia*, and the ground surface rose gently southeastwards towards the top of the dune. Beneath a turf, 5–10 cm in depth, four principal layers were identified (Fig. 4).

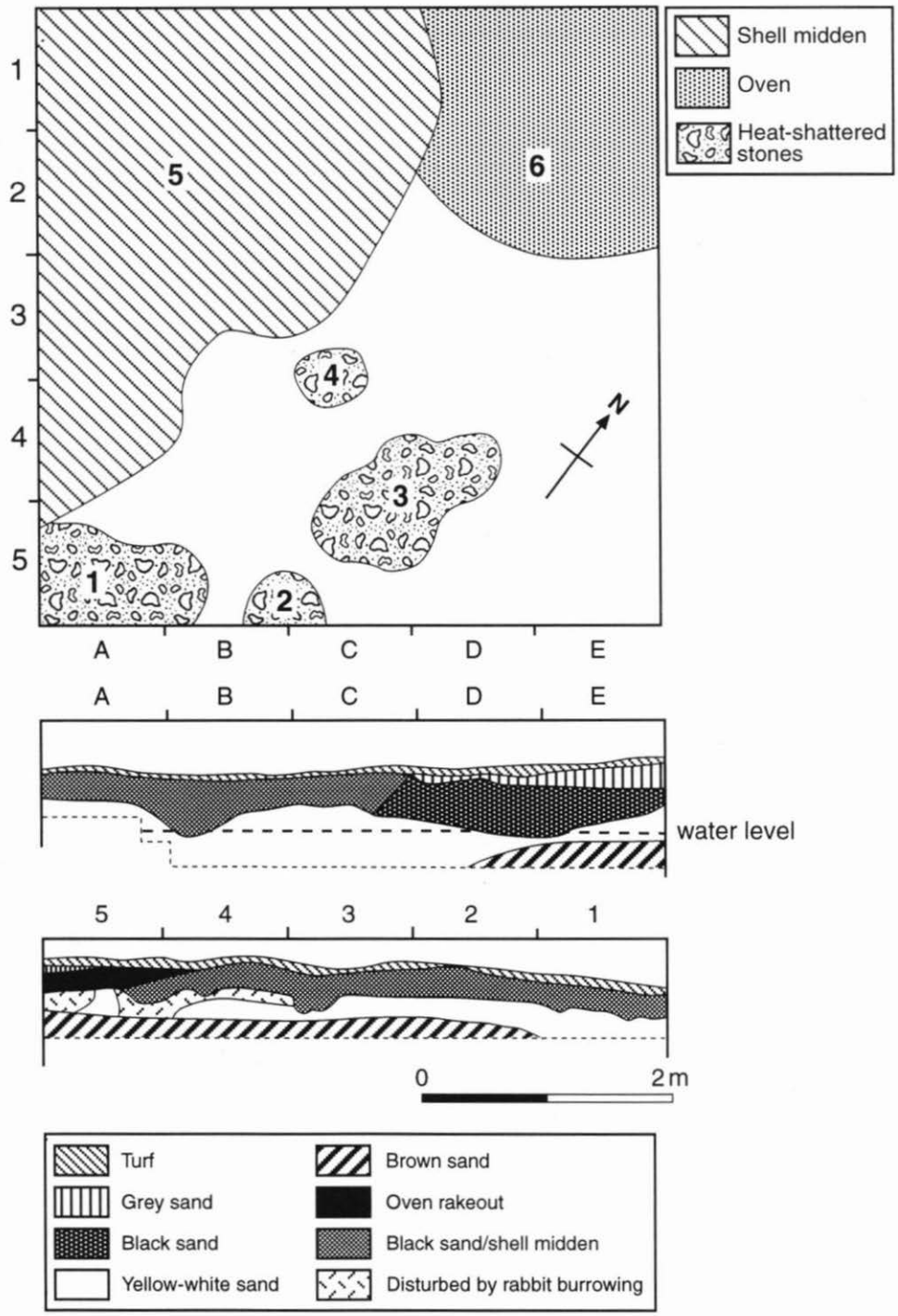


*Figure 4:* Area 1. Top: plan of layer 2. Middle: northwest baulk. Bottom: southwest baulk.

*Layer 1:* Grey sand containing a few heat-shattered stones. Up to 20 cm in depth, but present only in the western third of the area (Squares A1–4, B1–3, C1).

*Layer 2:* Black charcoal-stained sand. In the western third of the area it contained dense shell and bone midden to a maximum depth of 45 cm. The same matrix occurred elsewhere with little or no midden, and thinned to only a few centimetres in depth in the eastern third of the area. This sand was very damp, particularly along the edge of the area bordering the *Salicornia* marsh, and in squares B1 and D1, where the underlying surface dipped, layer 2 extended below water level. Four squares (B3–5, C2) were not excavated below the surface of layer 2.

*Layer 3:* Clean sand, almost pure white along the northwestern edge of the area, where it was very damp and extended below water level, but pale yellow to yellow-grey where it was drier. Over most of the area this layer was 15–20 cm deep, but along the northwestern edge it was at least 50 cm, extending below the base of the excavation. No midden or artefacts.

*Layer 4:* Dark brown sand with no midden or artefacts. Not observed along the northwestern edge of the excavation. Depth not ascertained.

Layer 2 was the only occupation deposit, and six features were encountered within it or on its surface. Four of these (Fig. 4a: Features 1–4) were amorphous clusters of heat-shattered stone, presumably raked out from nearby ovens. Feature 5 was the midden heap, while Feature 6 was a large oven, 30 cm in depth. Although no stratigraphic boundaries between these features could be seen in the black sand matrix, some sequential ordering of events is possible. The oven must have been in use before midden dumping was completed as the edge of the midden encroached over its rim (Fig. 4a,b). Likewise, Feature 1 lay just above the edge of the midden (Fig. 4c), suggesting that the use of the oven from which these stones came postdated this portion of the midden. In addition, the midden heap itself appeared to contain localised concentrations of particular species, suggesting that midden dumping occurred in several discrete stages (Smith 1992). Samples of charcoal (NZ7960) and marine shell (Wk2369, 2370, 2507, 2753, 2851) from the midden were submitted for radiocarbon dating, while a large concentration of charcoal from the oven was sub-sampled, differentially pretreated then dated to assess post-depositional contamination (Higham and Smith n.d.).

## AREA 2

This was a 7 x 4 m rectangle (Fig. 5) laid out on the margin of Zone b, approximately 5 m northwest of Allingham's Trench II and Square X excavations. Beneath a shallow turf, five principal layers and one subsidiary lens were encountered (Fig. 6).

*Layer 1:* Light grey sand with occasional shells, small pieces of bone and stone artefacts, varying from 5 to 20 cm in depth.

*Layer 1b:* A lens of shell midden, with some bones and stone artefacts, in a light grey sand matrix. Confined to the southern corner of the excavation (squares C–D/5–7). Maximum depth 5 cm.

*Layer 2:* Dark sand varying from grey to brown, containing two small firescoops, patches of charcoal, shell, bone and artefacts. Depth varying from 5 to 20 cm.

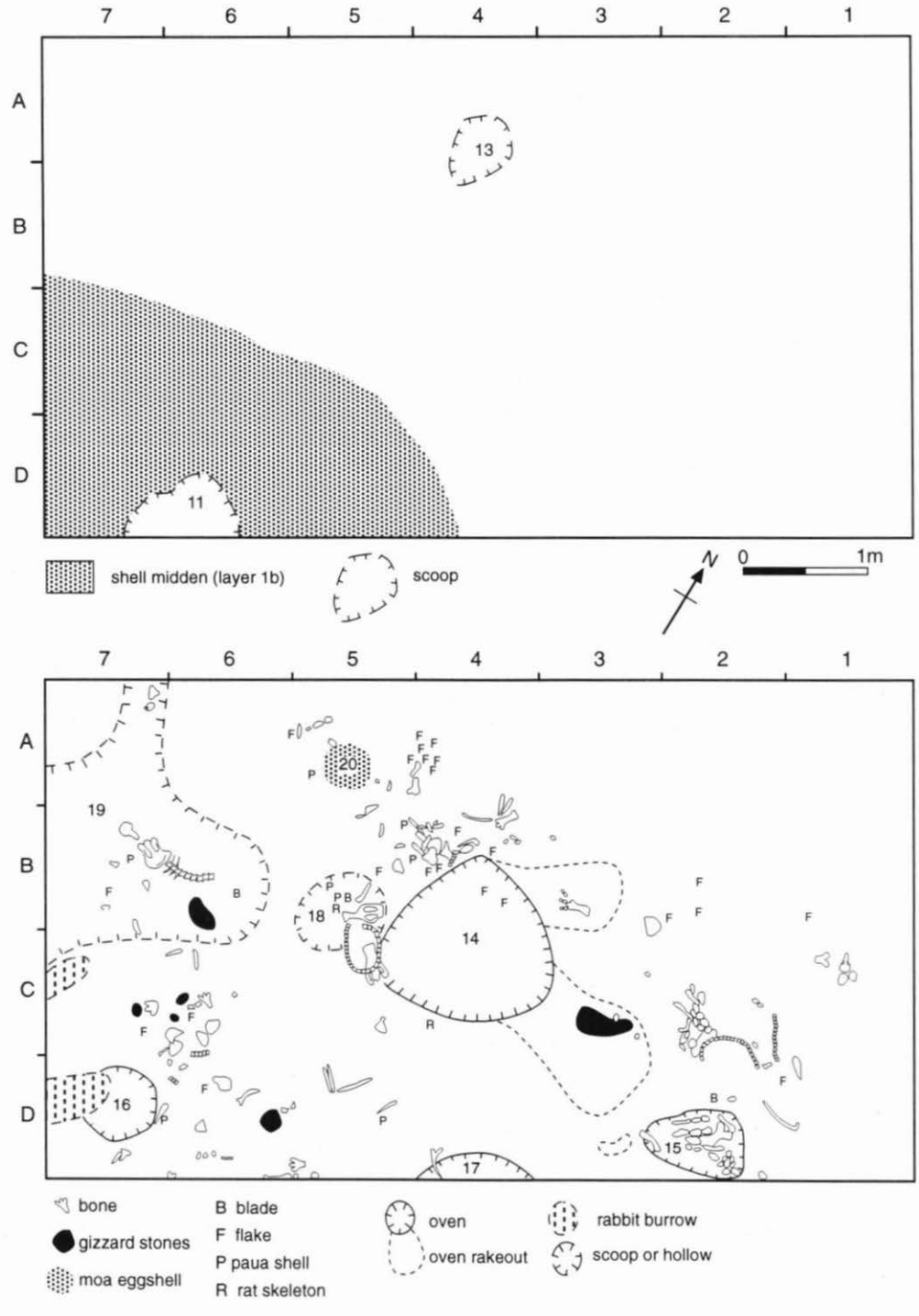


*Figure 5:* Area 2. Top: plan of layers 1b and 2. Bottom: plan of layer 4.

*Layer 3:* Clean yellow-brown sand, predominantly sterile but with occasional shells, bone fragments and stone flakes. Generally 2 to 8 cm in depth, but absent from the eastern squares (D1–5).

*Layer 4:* Dark grey sand, containing small numbers of stone tools, numerous large moa and seal bones, several firescoops and other pits or hollows. Varying from 5 to 40 cm in depth.

*Layer 5:* Clean yellow sand with no midden or artefacts. Stained brown in places by water table activity. Depth not ascertained.

At least two phases of occupation are represented. Layer 4 was a well developed soil horizon which appears to represent the ground surface when occupation began on this part of the site. One large oven 30 cm in depth (Fig.5b: Feature 14) and three shallow (10–20 cm) scoops (Features 15–17) had been dug into this surface. There were also two irregularly shaped hollows (Features 18 and 19) which may have been deliberately dug pits, or perhaps collapsed rabbit burrows, and a dense concentration of moa eggshell (Feature 20). Within and around these features were substantial portions of at least four dismembered moa skeletons, with elements from body parts such as necks, feet, backbones and pelves lying in position of articulation. Further moa leg bones and numerous fur seal and sea lion scapulae were also present. Many of these bones were grouped in clusters, in or beside the scoops and hollows, along with charcoal and blackened sand suggesting deliberate burning of discarded body parts. Charcoal samples from squares C3 and A5 (NZ7963, 7964) were submitted for radiocarbon dating.

The digging of these ovens and scoops may be responsible for layer 3, the more or less sterile sand covering most of the area. Sparse faunal and artefactual remains were found almost exclusively in the base of this layer, suggesting that they derive from layer 4. A charcoal sample from this position in square B4 (NZ7962) was submitted for radiocarbon dating.

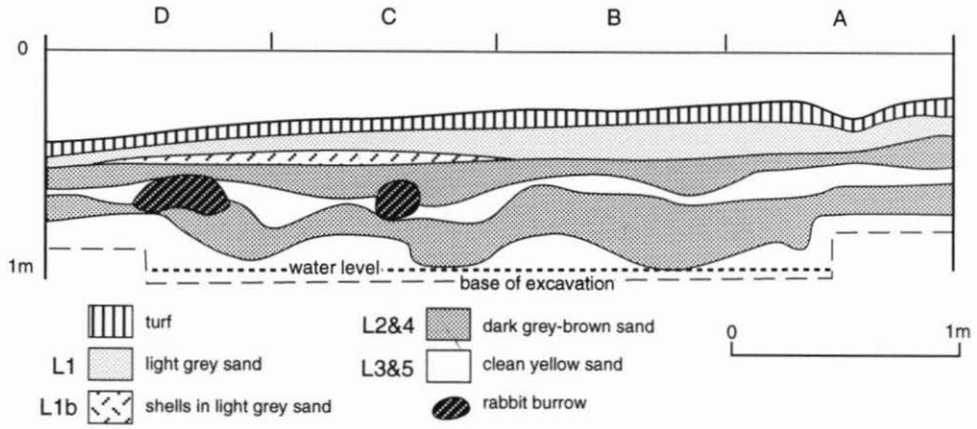


*Figure 6:* Area 2, southwest baulk.

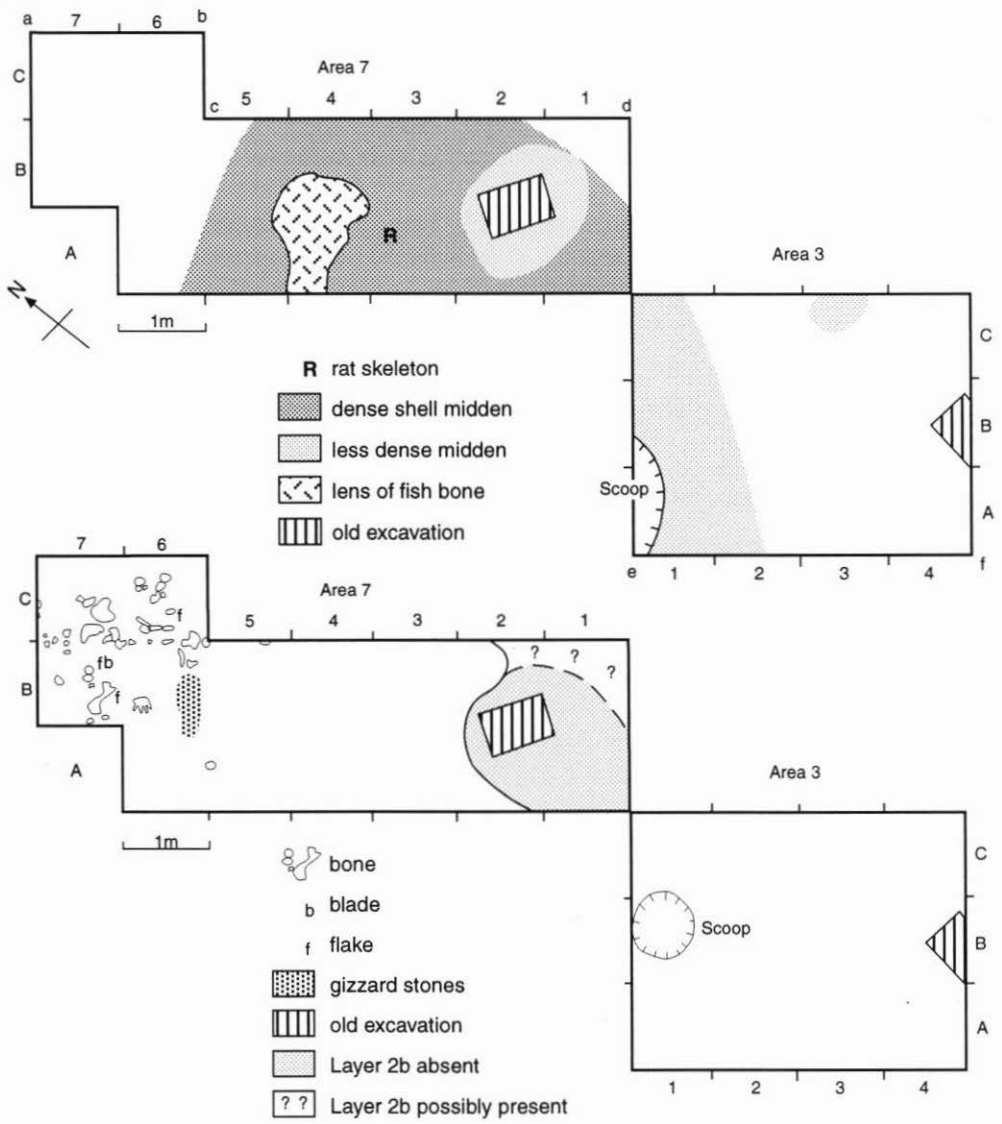


*Figure 7:* Areas 3 and 7. Top: plan of upper layers. Bottom: plan of lower layers.

Layer 2 represents reuse of this portion of the site, although the smaller number and size of the fire scoops (Fig. 5a: Features 11 and 13) and the scarcity of large moa and seal bones suggest a change in the character or intensity of occupation. Charcoal from squares B1 and C1 was combined into a sample for radiocarbon dating (NZ7961). On stratigraphic grounds it is impossible to determine whether the Layer 1b shell midden is simply an upper component of layer 2, or represents a discrete occupation. A sample of shells from squares C–D/7 (Wk3508) was submitted for radiocarbon dating to assist in resolving this issue.

Layer 1 appears to represent the gradual buildup of sand and soil development since abandonment of this part of the site. The material that it contains may be scattered from subsequent occupation elsewhere on the site, or disturbed from lower layers by rabbit burrowing.

## AREAS 3 and 7

These contiguous areas, excavated in successive seasons, were located on the southern margin of Zone c, in the general vicinity of the 1961–62 Area Z excavations.

Area 3 was a 4 x 3 m rectangle (Fig. 7) and beneath a shallow turf four layers were identified (Fig. 8).

*Layer 1:* Light grey sand containing flecks of charcoal, scattered stones, shells and bones. Depth 5–18 cm.

*Layer 2:* Clean yellow sand with only a few scattered shells and bone fragments. Depth 6–20 cm.

*Layer 3:* Dark grey-brown sand with a few small pieces of bone. Depth 8–10 cm.

*Layer 4:* Clean yellow sand with no midden or artefacts. Depth not ascertained.

Despite the relative scarcity of material, two phases of occupation are represented. Layer 3 was a soil horizon with a single shallow firescoop (Fig. 7b) containing heat-shattered stones. All the bones and artefacts from this layer were found around the edges of this feature or within its fill. A sample of the fill was retained, but did not yield sufficient charcoal for radiocarbon dating.

Layer 2 appeared to be a wind blown sand, and the small quantities of bone and shell within it may have been scattered from activity elsewhere on the site. However, most of these items were found in the upper few centimetres of this layer in exactly the same

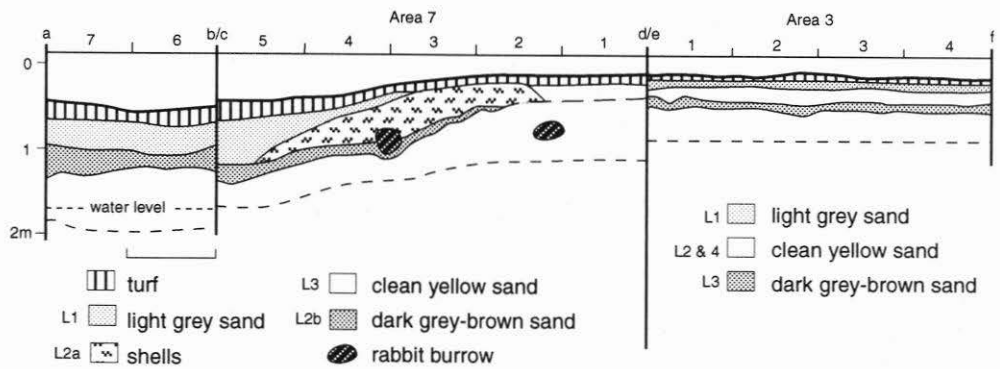


*Figure 8:* Areas 3 and 7, stratigraphic profiles.

squares in which midden predominated in Layer 1, suggesting that they may have been displaced downwards from there.

Layer 1 was a weakly developed soil. A small lens of pipi (*Paphies australis*) shells was found in Square C3, while a shallow firescoop, extending into the northwestern corner of the excavation, was surrounded by a dispersed scatter of shells and bones (Fig. 7a). A charcoal sample from the fill of this scoop was submitted for radiocarbon dating (NZA2802). The edge of an old excavation square was located by the southern baulk.

Area 7 was a 15 $m^2$ excavation (Fig. 7) immediately northwest of Area 3. Beneath the turf four layers were identified (Fig. 8).

*Layer 1:* Light grey sand containing scattered shells and some bone fragments. Up to 50 cm in depth at the northern end of the area, but thinning to the south and entirely absent in squares A–B/1–2.

*Layer 2a:* Dense shell and bone midden in a grey-brown sand matrix. Up to 45 cm in depth but confined to squares A1–5 and B2–5.

*Layer 2b:* Dark grey-brown sand with numerous moa bones and scattered shells. From 10 to 35 cm in depth at the northern end, but thinning to the south and present only as a faint trace in squares A–B/1–2.

*Layer 3:* Clean yellow sand with no artefactual remains, extending below the water table.

Two stratigraphically distinct activities are represented, although they are not separated by sterile sand as was the case in Area 3. The first is represented by Layer 2b, a well developed soil horizon which appears to have been the ground surface at the time this part of the site was first occupied. Although disturbance by earlier excavation in squares A–B/1–2 makes it difficult to be sure, this seems to be the same horizon designated layer 3 in Area 3. Bones and artefacts discarded from moa butchering and other food waste were confined to a dip in the original ground surface at the northern end of the area (Fig. 7b), and were all buried within the palaeosol, indicating continuation of soil development after this activity. Charcoal fragments scattered amongst the moa bones in squares B6–7 were combined into a sample for radiocarbon dating (NZ8099).

The second activity is represented by the concentrated midden deposit in Layer 2a. Although not clearly apparent in the illustrated profile, the distribution of midden (Fig. 7a) shows that this equates to Layer 1 of Area 3. A sample of shell from the deepest part of this midden was submitted for radiocarbon dating (Wk3510), while the only charcoal suitable for this purpose was from square B2 at the shallower end (NZA3740).

Layer 1 appears to represent accumulation of windblown sand in the hollow at the northern end of the area. The occupation material within this deposit is almost certainly derived from layer 2a, differing from the latter only in that it was less concentrated. A sample of shells from Square A4 was submitted for radiocarbon dating (Wk3509) to test this proposition.

## AREA 5

This was a 7 x 4 m rectangle, 30 m northwest of Areas 3 and 7 on the edge of Zone c. Beneath a shallow turf, three principal layers were encountered (Fig. 9).

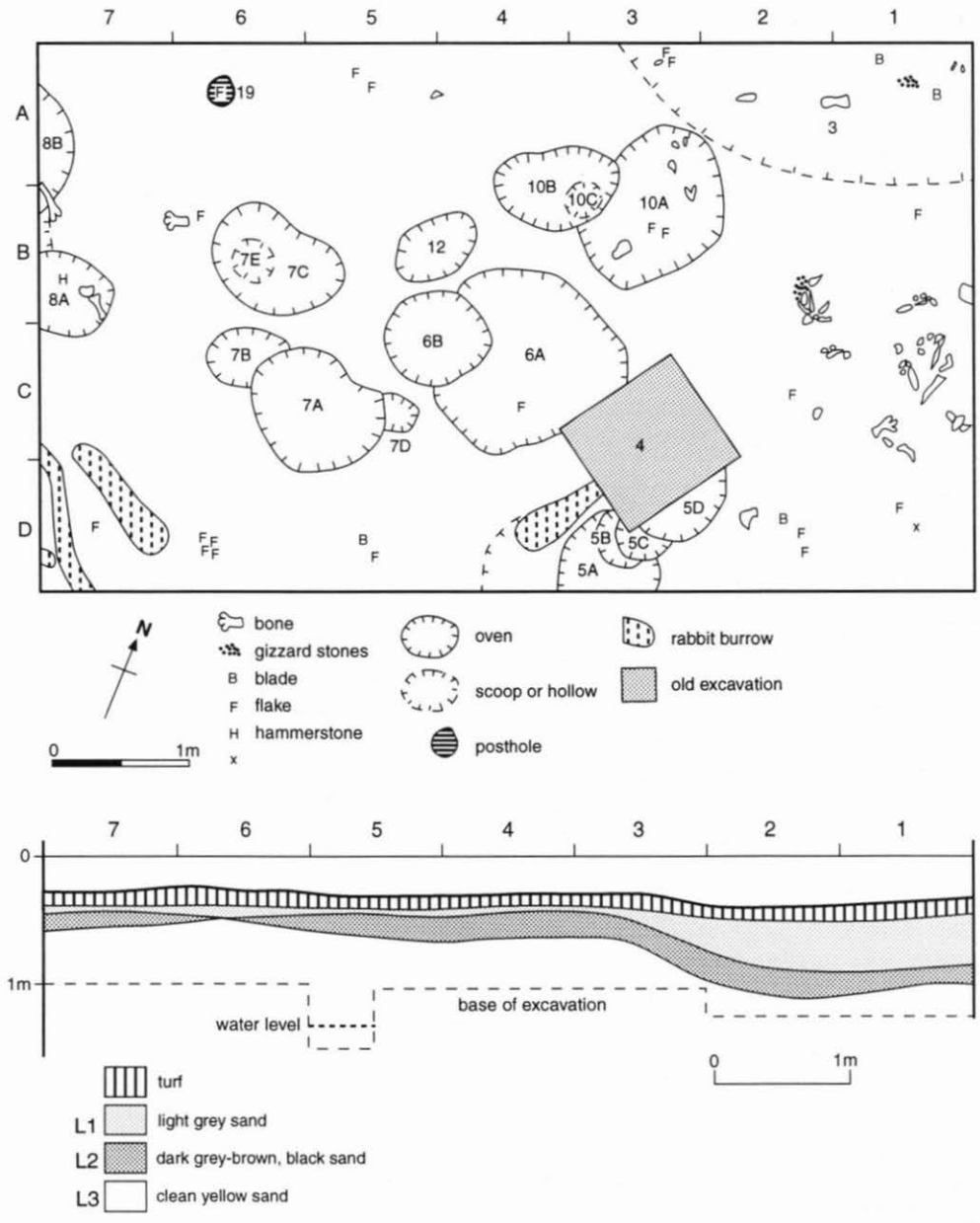


*Figure 9:* Area 5. Top: plan of layer 2. Bottom: northern baulk.

*Layer 1:* Light grey sand with occasional shells, small pieces of bone and flaked stone. Depth generally 5–10 cm, but up to 40 cm in squares A1–2.

*Layer 2:* Dark sand, varying in colour from black through dark grey to a dark brown and containing many concentrated patches of charcoal, heat-shattered stone, numerous bones and some flaked stone tools. Depth generally 10–20 cm, but reaching 65 cm in the base of the deepest ovens.

*Layer 3:* Clean yellow sand with no artefactual remains, extending below the water table.

This area appears to represent a single phase of occupation. The dark brown sand representing layer 2 at the northeastern end of Area 5 appears to be a soil horizon that was developing at the time this area was occupied. Portions of butchered moa, seal and dog carcasses lay within this soil, particularly within and around a dip in the ground surface in the northwestern corner of the area (Fig. 9a: Feature 3). Over the remainder of the area the natural stratigraphy had been disturbed by the digging of ovens. Eleven of these were shallow (10–25 cm) scoops (Features 5B, 5D, 6A, 7B, 7D, 8A–B, 10A–C, 12), while the remaining six (Features 5A, 5C, 6B, 7A, 7C, 7E) were between 40 and 65 cm in depth. In all but three cases these intercut one or more other ovens, indicating repeated use of the area for cooking. An earlier excavation (Feature 4) cut through several of these ovens, and a single posthole (Feature 9), 10 cm in diameter and 15 cm deep, was also discovered. Charcoal samples from Features 3 (NZ8095), 6A (NZ8096), 6B (NZ8098), and from square C7 (NZ8097) were submitted for radiocarbon dating.

Layer 1 appears to represent the gradual buildup of sand and soil development since abandonment of this part of the site. The small amount of material that it contains almost certainly derived from the lower layer, as it too was concentrated in the northwestern corner of the excavation.

## AREA 4

A 4.5 x 1 m trench was excavated across the boundary between the tussock-covered dune and the *Salicornia* marsh 25 m northwest of Area 5 on the edge of Zone c. The purpose of this excavation was to clarify the stratigraphic relationship between the deposits associated with human occupation on the dune, and those on which the *Salicornia* was growing. Four layers were identified in the Area 4 profile (Fig. 10), although some of these varied in their characteristics from the higher drier southern end to the low, damp northern end.

*Layer 1:* Dark grey topsoil and root zone at the southern end, 2–8 cm in depth, changing abruptly to a soft brown peat at the tussock/*Salicornia* boundary and deepening to 12–15 cm at the northern end.

*Layer 2:* Light grey sand, dry at the southern end but very damp at the northern end. Depth varying from 2 to 20 cm.

*Layer 3:* Dark grey charcoal-stained sand at the southern end which grades into a very moist black sand at the northern end. One silcrete flake was recovered from the damper part of this layer. Depth varying from 8 to 15 cm.

*Layer 4:* Light grey sand. Very damp and compacted throughout. A lens of rusty brown mottling at mean high water level. Depth not ascertained.

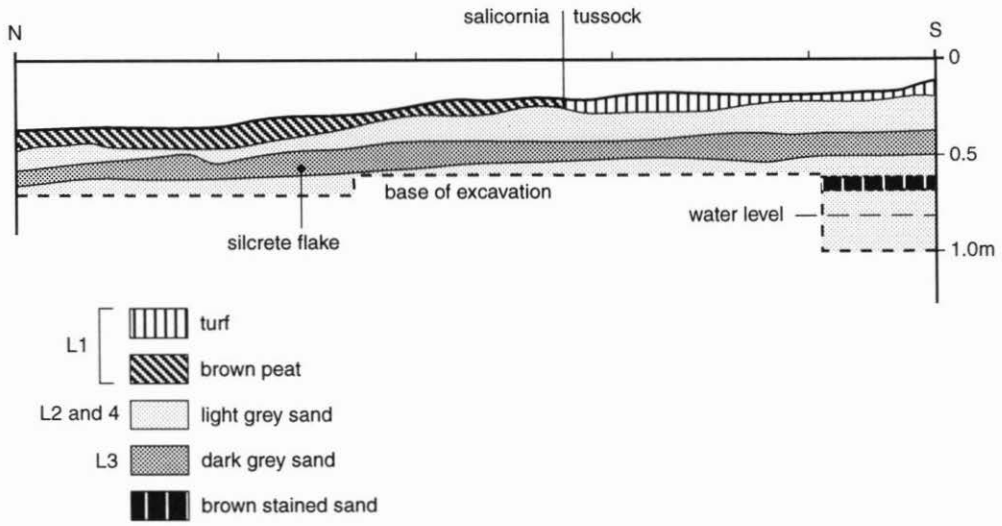


*Figure 10:* Area 4, eastern baulk.

Despite the distance between the two areas, correlation of these strata with those in Area 5 is reasonably straightforward. The colour, charcoal content and presence of an artefact suggest that layer 3 equates with the occupation horizon (layer 2) in Area 5. Thus layer 4 would correlate with the basal sand (layer 3), and layer 2 with the overlying sand (layer 1) in Area 5. These observations suggest that the *Salicornia* extended over this part of the site after the buildup of sand which overlies occupation in Area 5.

AREA 6

This was a 4 x 4 m square located at the base of the hill near the southeastern corner of the site, where testpits had indicated the presence of a dark sand layer containing midden and oven stones. Beneath a shallow turf three layers were identified.

*Layer 1:* Light grey sand containing large slabs of sandstone, clay nodules and some seal, dog and bird bones. Depth 5–15 cm.

*Layer 2:* Grey-brown sand containing several lenses of dark grey sand and very small quantities of bone, shell and stone. Extensively disturbed by rabbit burrowing. Depth 15–40 cm.

*Layer 3:* Light brown sand with no cultural material. Depth not ascertained.

Nothing excavated here provided convincing evidence for occupation of this area. The dark grey sand of layer 2 is suggestive of occupation nearby, but the extent of disturbance by rabbit burrowing made it impossible to be sure how much of the material recovered here was *in situ*.

## CHRONOLOGY

Twelve charcoal samples and eight marine shell samples from the 1991–93 excavations were radiocarbon dated (Table 1 and Appendix 1). The charcoal samples were identified to species by Dr Rod Wallace, Anthropology Department, University of Auckland, and comprised twigs and material from species which do not grow large diameter wood (Wallace pers. comm.). In addition, subsamples from a single concentration of charcoal were used in a pretreatment experiment (Higham and Smith n.d.). Three pretreated extracts were statistically indistinguishable and gave a pooled mean age significantly older than an untreated sample, while rootlets extracted from the sample gave a modern result. This suggests contamination of the charcoal with younger carbon from rootlets and carbonates in the site environs. For this reason, the twelve charcoal samples used in assessing absolute age of the site were subjected to acid-base-acid pretreatments. All were dated at the Institute of Geological and Nuclear Sciences, the ten largest by gas proportional counting and the two smallest (NZA2802, NZA3740) by accelerator mass spectrometry. The shell samples were identified at Otago University and were either cockle (*Austrovenus stutchburyi*) or mudsnail (*Amphibola crenata*). The latter were included as part of a wider investigation into the reliability of this material for dating (Higham 1993) and are not used here in the assessment of site chronology. All were pretreated by acid washing and dated at the Waikato Radiocarbon Dating Laboratory by liquid scintillation.

When considered in total the 1991–93 charcoal and marine shell series both show variability. Taken together, the charcoal results are significantly different, but fall into three groups: one early date (NZ8095); a set of eight (NZ7962–4, 8096–9, NZA 3740) that are indistinguishable and give a pooled mean age of 650±17 BP; and three later dates (NZ7960–1, NZA2802) that are again indistinguishable and pool at 487±41 BP. Likewise the *Austrovenus* dates differ significantly, and cluster into three groups: three older dates (Wk2370, 2753, 2851) that are indistinguishable and give a pooled mean age of 965±25 BP; two much younger dates (Wk3509–10), also indistinguishable and pooling at 740±30 BP; and Wk3508 in between. Similarities in the spread and clustering of the two series suggest that the excavated deposits represent more than one period of occupation and that there is no *a priori* reason to infer that the marine shell dates are more variable than those on charcoal.

These conclusions are reinforced when the radiocarbon results are considered by area and layer (Fig. 11). Two of the excavated areas disclosed stratigraphic evidence for multiple occupation. In Area 2 the charcoal dates for layer 4 (NZ7963–4) along with that for the base of layer 3 (NZ7962) are indistinguishable, pooling at 638±33 BP (cal AD 1$\sigma$ 1310–1352 and 1386–1403) and significantly older than the single charcoal date (NZ7961) for layer 2, suggesting an earlier occupation in the fourteenth century and a later one somewhere in the fifteenth or sixteenth century. The calibrated ages for NZ7961 and the single shell date (Wk3508) from layer 1b are in reasonable agreement, indicating that these two upper deposits are likely to be components of the same occupation. They overlap at 1$\sigma$ in the mid fifteenth century (1438–1466), which is probably the best estimate for the age of this occupation.

TABLE 1
Radiocarbon dates from Pleasant River Excavations 1991–93

| Provenance Note 1 | Type Note 2 | CRA | Cal Age AD Note 3 1σ | 2σ | $\delta^{13}C$ | Lab. no. |
|---|---|---|---|---|---|---|
| 1/2; A1 (F.5) | C | 507±64 | 1403–1493 (.96)<br>1605–1613 (.04) | 1319–1343 (.03)<br>1392–1529 (.79)<br>1544–1634 (.18) | -27.6 | NZ7960 |
| 1/2; B1 (F.5) | M | 1020±50 | 1304–1385 (1.0) | 1272–1423 (1.0) | 0 | Wk2370 |
| 1/2; B1 (F.5) | M | 970±35 | 1343–1409 (1.0) | 1317–1430 (1.0) | 0.4 | Wk2851 |
| 1/2; B1 (F.5) | M | 910±45 | 1391–1457 (1.0) | 1336–1477 (1.0) | 0.4 | Wk2753 |
| 1/2; B1 (F.5) | M | 1180±45 | 1171–1267 (1.0) | 1099–1294 (1.0) | 1.2 | WK2507 |
| 1/2; B1 (F.5) | M | 1300±50 | 1032–1142 (1.0) | 996–1206 (1.0) | 1.2 | Wk2369 |
| 2/1b; C-D7 | M | 880±40 | 1416–1466 (1.0) | 1381–1498 (1.0) | 0.4 | Wk3508 |
| 2/2; B-C1 | C | 443±83 | 1438–1523 (.59)<br>1563–1630 (.41) | 1403–1660 (1.0) | -27.5 | NZ7961 |
| 2/3-4; B4 | C | 615±59 | 1309–1354 (.54)<br>1384–1421 (.46) | 1300–1436 (1.0) | -28.4 | NZ7962 |
| 2/4; C3 | C | 602±69 | 1310–1353 (.46)<br>1385–1432 (.54) | 1292–1452 (1.0) | -26.4 | NZ7963 |
| 2/4; A5 | C | 665±41 | 1306–1326 (.34)<br>1335–1365 (.52)<br>1365–1374 (.13) | 1296–1404 (1.0) | -25.8 | NZ 7964 |
| 3/1; A1 | C | 494±62 | 1409–1501 (.94)<br>1603–1614 (.06) | 1398–1529 (.77)<br>1538–1634 (.23) | -25.1 | NZA2802 |
| 7/1; A4 | M | 760±40 | 1478–1620 (1.0) | 1463–1631 (1.0) | 1 | Wk3509 |
| 7/2a; A5, B4-5 | M | 720±40 | 1523–1620 (1.0) | 1491–1654 (1.0) | 0.5 | Wk3510 |
| 7/2a; B2 | C | 624±65 | 1308–1359 (.59)<br>1380–1415 (.41) | 1295–1437 (1.0) | -27.35 | NZA3740 |
| 7/2b; B6-7 | C | 624±37 | 1312–1351 (.63)<br>1387–1410 (.37) | 1305–1368 (.58)<br>1372–1422 (.42) | -28 | NZ8099 |
| 5/2; C7 | C | 647±37 | 1309–1356 (.73)<br>1383–1400 (.27) | 1301–1408 (1.0) | -26.1 | NZ8097 |
| 5/2; C4 (F.6A) | C | 705±35 | 1292–1311 (.37)<br>1351–1387 (.63) | 1286–1327 (.39)<br>1334–1395 (.61) | -27.6 | NZ8096 |
| 5/2; C4 (F.6B) | C | 655±33 | 1308–1357 (.77)<br>1381–1397 (.23) | 1302–1403 (1.0) | -26 | NZ8098 |
| 5/2; A2 (F.3) | C | 878±33 | 1185–1252 (1.0) | 1069–1070 (<.01)<br>1129–1131 (<.01)<br>1160–1281 (1.00) | -28.7 | NZ8095 |

Notes

1 Provenance listed as:Area/layer; Square (Feature).

2 Sample Materials: C = charcoal; M = marine shell.

3 Species identifications are listed in Appendix 1. Charcoal dates calibrated according to Stuiver and Pearson (1993) with 40 year Southern Hemisphere offset. Marine shell dates calibrated according to Stuiver and Braziunas (1993) with $\Delta R$ = -30±13.

In Areas 3 and 7 there is a single charcoal date (NZ8099) for the lower horizon (Area 7 layer 2b) indicating fourteenth century occupation. For the upper horizon, the shell dates for Area 7 layer 1 (Wk3509) and Area 7 layer 2a (Wk3510) are almost identical, pooling at 740±30 BP (cal AD 1σ 1501–1584), confirming the observation during excavation that material in the former deposit was likely to have derived from the latter. Likewise, the

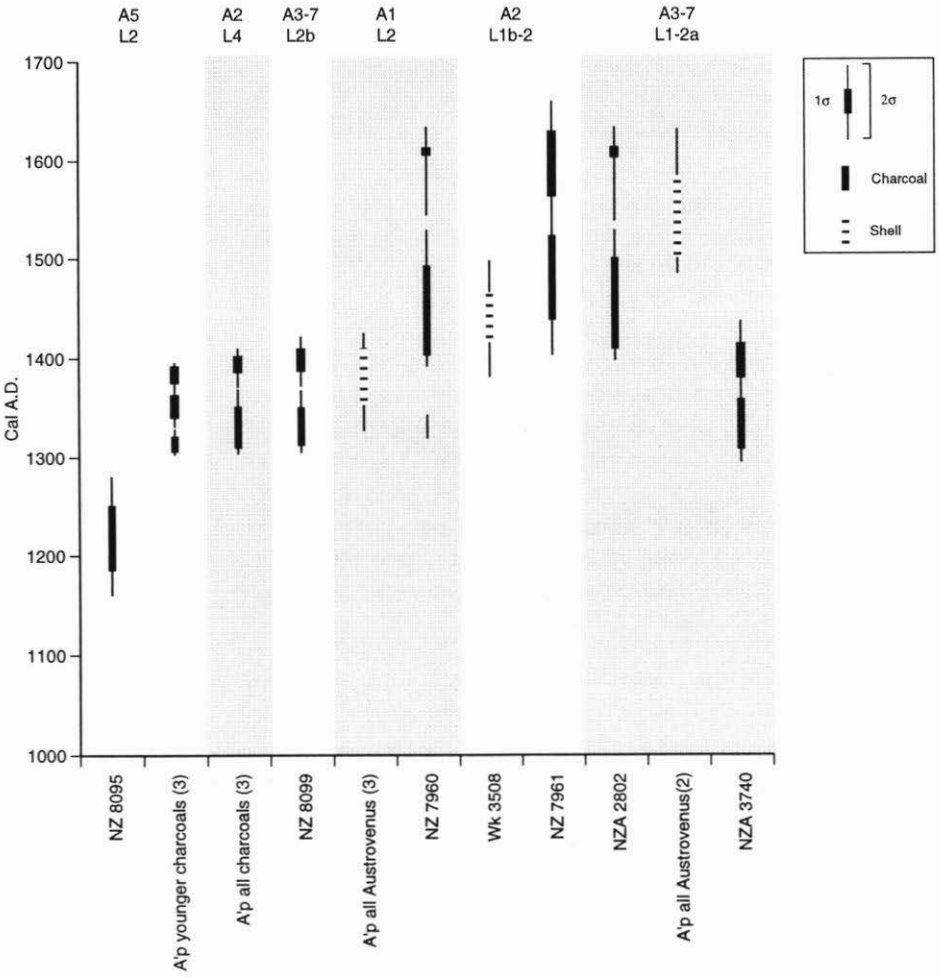


*Figure 11:* Calibrated radiocarbon ages for primary occupation deposits. Pooled mean ages (A'p) are shown where multiple samples from the same context are statistically indistinguishable (see text).

charcoal dates from Area 3 layer 1 (NZA2802) and Area 7 layer 2a (NZA3740) are statistically indistinguishable, even though they differ by 130 radiocarbon years. These would give a pooled mean age of 557±47 BP (cal AD 1σ 1401–1442) which is considerably earlier than that for the shell dates from the same context—even at 2σ their calibrated ranges would not overlap (charcoal 1310–1353 and 1385–1471; shell 1485–1632). An alternative explanation is that the older charcoal sample is stratigraphically misplaced. NZA3740 was recovered from near the southern end of Area 7 where all the layers thinned as they rose up an old dune surface, and was also close to an area of disturbance by previous excavation, raising the possibility that material from layer 2b had become mixed with layer 2a. Furthermore, the younger charcoal shows much better agreement with the

shell dates, suggesting that a late fifteenth or sixteenth century date is most likely for the upper occupation.

Dates are available for two further areas. Three of the four from Area 5 layer 2 (NZ8096–8) were indistinguishable, giving a pooled mean age of 668±23 BP (cal AD 1σ 1306–1322, 1340–1364 and 1375–1393), while the fourth (NZ8095) was more than 200 radiocarbon years older. While this might indicate that layer 2 represents two phases of activity, several factors suggest that this is unlikely. There were no stratigraphic distinctions between the northeastern end of the area, from which the older sample derived, and the remainder of the deposit. The only clear evidence for reuse of the area is in the intercutting of ovens, and samples from an earlier shallow scoop (NZ8096) and later deep oven (NZ8098) were indistinguishable. Other explanations are possible. The older sample may have had significantly greater inbuilt age. However, as its sole constituent, matagouri (*Discaria toumatou*), appears to have a maximum life span of 100 years (Anderson 1991: 780) this is unlikely to account for all of the difference and furthermore, some of the minor constituents of the younger samples (e.g., *Kunzea ericoides*, *Olearia* sp., *Pseudopanax* sp.,) are potentially longer lived. Alternatively, NZ8095 may have been older driftwood and the others relatively fresh when collected and used. Thus, while an earlier phase of activity in this part of the site cannot be entirely ruled out, layer 2 of Area 5 appears to represent occupation in the fourteenth century. No dates are available for layer 1, but it was argued above that this is not a primary occupation deposit and that most if not all of its contents derive from layer 2.

Area 1 disclosed only one occupation deposit, layer 2. The three *Austrovenus* dates are indistinguishable and pool at 965±26 BP (cal AD 1σ 1353–1410). The calibrated age of the single charcoal date (NZ7960) is predominantly later, but at 1σ the two ranges just overlap in the early fifteenth century (1403–1410), while at 2σ there are two periods of overlap (1327–1343 and 1392–1425). The simplest interpretation of these results is that this deposit results from a single short occupation at some time in the fourteenth or early fifteenth century. The overlapping of excavated features here indicated a succession of oven digging, midden dumping and oven emptying activities, and the possibility that layer 2 represents repeated or longer term occupation cannot be entirely discounted. However, on the present evidence a fourteenth/early fifteenth century age is to be preferred.

In summary, at least three phases of occupation are indicated. There is secure evidence for activity during the fourteenth century in the lower layers of Areas 2, 5 and 7, and during the fourteenth or early fifteenth century in Area 1 layer 2; during the mid fifteenth century in the upper layers of Area 2; and during the late fifteenth or sixteenth century in the upper layers of Areas 3 and 7. In addition, the possibility of late twelfth/early thirteenth century activity in Area 5 cannot be excluded. Reconsideration of the earlier Area D results in this light discloses a parallel trend, with most dates falling in the fourteenth and early fifteenth century, a second set in the late fifteenth/early sixteenth century, and a smaller number suggesting activity as early as the late thirteenth century, perhaps indicating that there had been some mixing of material from separate occupations along the eroding river edge of the site. When viewed in total, the radiocarbon dates indicate that activity at the site may have begun as early as the late twelfth or thirteenth century, was at a peak during the fourteenth and early fifteenth centuries, and persisted into the late fifteenth or sixteenth century. Both the stratigraphic and chronological evidence are suggestive of repeated short term occupations rather than continuous settlement, and this hypothesis will be considered below in relation to the faunal and artefactual remains from the recent excavations.

## FAUNAL REMAINS

Two methods were employed in recovering faunal and artefactual remains from the excavations. In Area 1 Layer 2, where the midden was particularly dense, seven squares (A1–4, B1–2, C1) were removed as bulk samples and returned to the laboratory for detailed analysis. Elsewhere, smaller bulk samples were recovered from each major stratigraphic unit, and all other excavated materials were sieved through 1/8 inch (3.175 mm) screens and all bones, shells and artefacts retained. These procedures yielded samples from 16 stratigraphic contexts which were kept as discrete assemblages for analytical purposes, except where radiocarbon dating had shown that contiguous deposits were contemporary, as in the upper layers of Area 2 (layers 1b and 2), the upper layers of Areas 3 and 7 (A3 layer 1, A7 layers 1 and 2a), and the lower layer of Areas 3 and 7 (A7 layer 2b, A3 layer 3).

After cleaning, the recovered material was sorted by material type and major taxonomic category, then identified by comparison with reference specimens in the Anthropology Department, University of Otago or, in the case of diagnostic portions of moa bone, by Trevor Worthy. Remains of each class of vertebrate fauna were quantified in terms of the number of identified specimens (NISP) present, and the minimum number of anatomical elements (MNE) and minimum number of individual animals (MNI) that these represented in each excavated assemblage, using procedures described in detail elsewhere (Smith and Anderson 1996). MNI for molluscan fauna were calculated from the total count of spires for each gastropod species, and by halving the total number of hinges for bivalves (Samson 1995). All identification data are stored in the Excavation Database System at the Otago Anthropology Department, where the excavated material is also currently housed.

Before considering the composition of the assemblages it is pertinent to review the contexts from which they derived. Six were clearly from primary occupation deposits with moderate or high concentrations of fauna (Table 2). Two of these (A1/2, A3–7/1–2a) were dense shell and bone middens, and a third (A2/1b–2) contained a concentrated shell deposit and a high proportion of bones with evidence of burning, suggesting that it was on the periphery of a cooking area. The remaining three (A2/4, A5/2, A3–7/2b–3) were from deposits with numerous partially articulated animal body parts located, in two cases, alongside cooking ovens, indicating that they were the focus of food preparation activities. All of the primary assemblages exhibit relatively low rates of attrition by dog or rat gnawing and, with the exception of A2/1b–2, have low rates of weathering. The remaining assemblages all appeared to be in secondary deposition and generally show higher rates of gnawing and weathering. Four of these (A2/1, A2/3, A3/2, A5/1) may still provide useful information, as it is likely that all or most of their contents derived from a contiguous primary deposit. The two remaining assemblages (A6/1, A6/2) were from deposits extensively disturbed by rabbit burrowing and have been excluded from most of the analyses discussed below.

TABLE 2
Quantities and concentrations of shell and bone
and major taphonomic indices in the excavated assemblages

| | | shell | | bone | | bone taphonomy | | |
|---|---|---|---|---|---|---|---|---|
| Assemblage | excavated volume $m^3$* | quantity MNI | concentration MNI/$m3^3$ | quantity NISP** | concentration NISP/$m^3$ | burnt %NISP | gnawed %NISP | weathered %NISP |
| 1/2 | 5.2 | 7306 | 1405.0 | 5723 | 1100.6 | 2.0 | 0.5 | 10.4 |
| 2/1 | 5.6 | 1110 | 198.2 | 805 | 143.8 | 1.6 | 4.2 | 18.5 |
| 2/1b-2 | 3.8 | 1267 | 333.4 | 1713 | 450.8 | 43.0 | 0.9 | 12.1 |
| 2/3 | 1.2 | 64 | 53.3 | 248 | 206.7 | 4.8 | 6.5 | 6.9 |
| 2/4 | 5.6 | 148 | 26.4 | 2153 | 384.5 | 0.4 | 0.6 | 8.4 |
| 3-7/1-2a | 3.5 | 2242 | 640.6 | 7218 | 2062.3 | 3.8 | 0.1 | 3.8 |
| 3/2 | 1.8 | 9 | 5.0 | 33 | 18.3 | - | 3.0 | 15.1 |
| 3-7/2b-3 | 3.3 | 553 | 167.6 | 2092 | 633.9 | 6.4 | 0.1 | 9.1 |
| 5/1 | 3.4 | 899 | 264.4 | 273 | 80.3 | 8.8 | 0.4 | 15.8 |
| 5/2 | 5.6 | 1147 | 204.8 | 1610 | 287.5 | 10.4 | 0.9 | 9.3 |
| 6/1 | 1.6 | 5 | 3.1 | 13 | 8.1 | - | - | 53.8 |
| 6/2 | 4.0 | 3 | 0.8 | 59 | 14.8 | 1.7 | 3.4 | 34.5 |

* estimated from area and depth of each deposit
** excludes exotic mammals

## MAMMALS

Mammalian fauna was represented in all assemblages, making up 12% of total NISP. A small proportion (11%) of these were from exotic mammals, rabbit (*Oryctolagus cuniculus*) and sheep (*Ovis aries*), and are clearly intrusive. They predominate in the disturbed assemblages (A6/1: 86.3% of total NISP; A6/2: 54.3%) and are also relatively common in some of the secondary deposits (A5/1: 2.8%; A2/1: 2.4%), but are scarce or absent in primary deposits, with the highest values in two of those found close to the surface (A1/2: 1.1%; A2/1b–2: 1.0%). These remains have been excluded from assessment of the relative abundance of other fauna.

Of the remainder, 28% were identified positively to species or genus, and another 14% placed in a probable taxonomic category. The former include remains of the New Zealand fur seal, *Arctocephalus forsteri* (12.6% of mammal NISP); Polynesian dog, *Canis familiaris* (9.6%); Polynesian rat, *Rattus exulans* (4.0%); New Zealand sea lion, *Phocarctus hookeri* (1.0%); southern elephant seal, *Mirounga leonina* (0.5%); and one human (*Homo sapiens*) represented by a tooth. Most of the less securely identified items were fragmentary ribs and vertebrae that could have been from either fur seals or sea lions (10.1%), with smaller quantities in the overlapping size and shape ranges of dogs and fur seals (1.8%) or sea lions and elephant seals (0.5%), and items identifiable only as 'large marine mammal' (1.5%), which may be from elephant seals or cetaceans. Although these items made significant additions to MNE counts in most assemblages, they seldom contributed to MNI values, as these less securely identified elements could generally be assigned to an individual already identified positively by other skeletal parts. The 58% of mammalian NISP that could not be further identified were almost exclusively small, often weathered, fragments and it is notable that these were most common in some of the secondary deposits (A5/1: 91.8%; A2/1: 74.2%) and one of the stratigraphically highest primary assemblages (A2/1b–2: 90.4%).

Two species, dogs and fur seals, clearly dominate the mammalian fauna, making up about half of the identified individuals (Table 3). Although the former have a slightly greater overall MNI, the latter may well have been more common, as it is likely that most of the animals identifiable only as 'fur seal or sea lion' were actually fur seals. The more or less even representation of these species is apparent throughout the site, with marked inequalities evident only in A5/2 where dogs predominate, and A2/4 where fur seals are more common. A different pattern is evident with the other marine mammals. They are confined almost entirely to the primary deposits and are most common in A1/2 and the lower layers of Areas 2 and 5, while in the upper layers they are represented by just two bones in A3–7/1–2a and five in the secondary deposit of A2/1. However, even where they are more common, only small numbers of bones (predominantly cranial fragments) and teeth are present, which must raise doubts about the extent to which they were exploited as sources of food.

TABLE 3
MNI of Mammals from Pleasant River Excavations

| taxon | 1/2 | 2/1 | 2/1b-2 | 2/3 | 2/4 | 3-7/1-2a | 3/2 | 3-7/2b-3 | 5/1 | 5/2 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| dog | 3 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 3 | 16 |
| fur seal | 3 | 1 | 2 | 1 | 5 | 1 | 1 | - | - | 1 | 15 |
| fur seal or sealion | - | - | - | - | 3 | - | - | 1 | - | - | 4 |
| sealion | 1 | 1 | - | 1 | 1 | - | - | - | - | 1 | 5 |
| sealion or elephant seal | - | - | - | - | - | 1 | - | - | - | - | 1 |
| elephant seal | - | 2 | - | - | 4 | - | - | - | - | - | 6 |
| large marine mammal | 1 | - | - | - | - | - | - | - | - | - | 1 |
| rat | 1 | 1 | 1 | 1 | 3 | 3 | - | 2 | - | 1 | 13 |
| human | 1 | - | - | - | - | - | - | - | - | - | 1 |
| **TOTAL** | **10** | **6** | **4** | **4** | **19** | **6** | **2** | **4** | **1** | **6** | **62** |

Estimates of age at death based upon epiphyseal fusion and tooth eruption (Silver 1969; Sisson 1930) were possible for 14 of the dogs. Of these 43% were clearly adult (>18 months), 7% subadult (6–18 months) and 21% juvenile (<6 months), with 21% 'adult or subadult' and another 7% 'subadult or juvenile'. This emphasis on adult and near mature individuals parallels the age distribution of dogs from the Area A and Z excavations (Teal 1975: Table 6) and may indicate that these animals were being drawn from a breeding population elsewhere.

Analysis of butchery patterns is hampered by the small sample sizes in most assemblages, with only three sufficiently large for meaningful interpretation (Fig. 12). In each case elements from virtually all body parts are represented, indicating that at least one complete dog carcass was discarded in each of these parts of the site. Additional individuals are represented solely by high meat value upper forelimbs in A2/4 and A5/2, suggesting discard from food preparation or consumption alongside the ovens in these areas. This may also be the case in A1/2 where both upper forelimbs and upper hindlimbs are well represented, but with equally high numbers of bones from the head it is apparent that greater proportions of each dog carcass were discarded in this area. In this assemblage 9.6% of the dog bones (12.8% if 'dog or fur seal' bones are included) show cut marks, which elsewhere were apparent on no more than 4% of specimens. None of these are suggestive of industrial processing. They are exclusively small cuts around the ends of limb bones or on the mid shafts of ribs that would have resulted from the reduction of major butchering units into smaller food portions, suggesting more intensive food processing in this area.

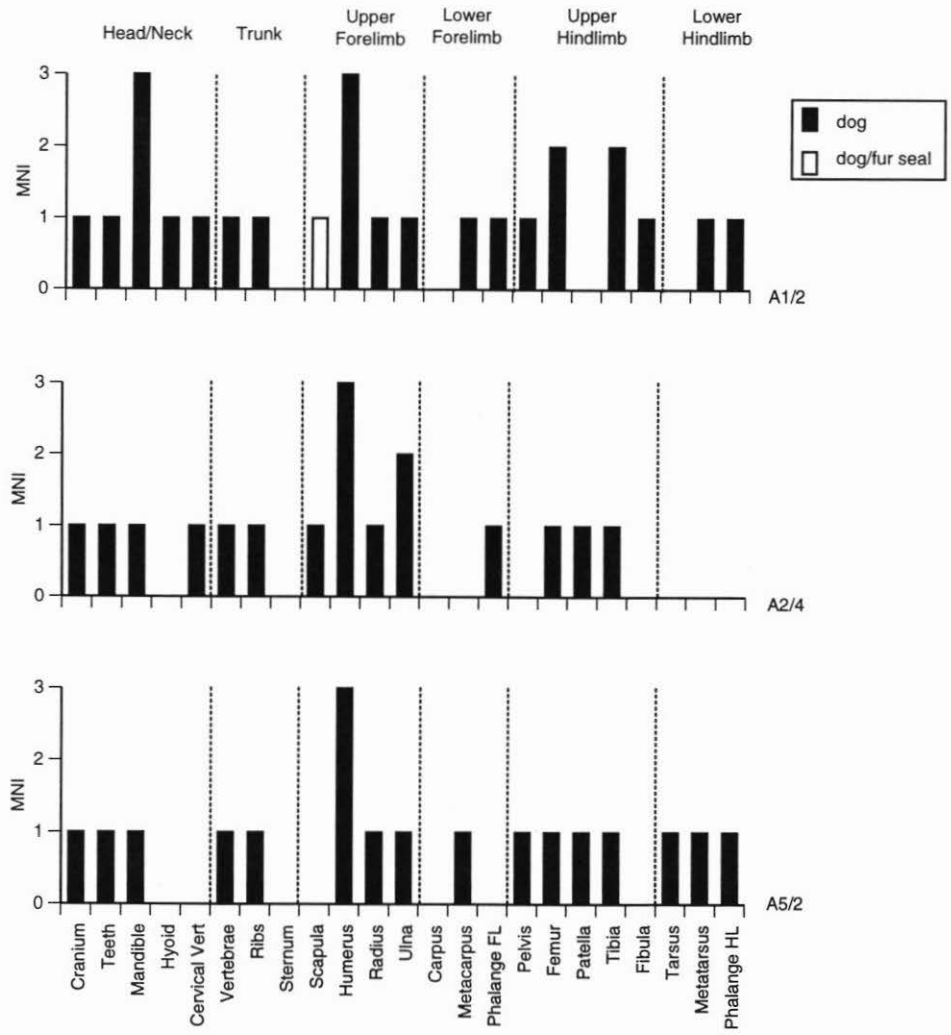


*Figure 12:* Dogs: body parts representation in the three largest assemblages.

Fur seal bones show a similar pattern; all but three of the specimens with cut marks come from A1/2, where they comprise 11% of fur seal NISP. These cut marks occur on a wider range of elements, but again suggest intensive food processing. All three of the larger assemblages show a consistent pattern of butchery, with some elements from all body parts, but a major focus on the upper limbs, particularly in A2/4 (Fig. 13). Clearly most of these animals were butchered elsewhere and only selected meaty body parts brought to these parts of the site, suggesting that they may have been captured some distance away. The nearest existing fur seal colony is a non-breeding station at Shag Point, 12 km north of the site, although Bobbys Head at about half that distance may have provided a suitable habitat for a small colony (Smith 1985: 196). Whatever the case, it is clear that these animals were

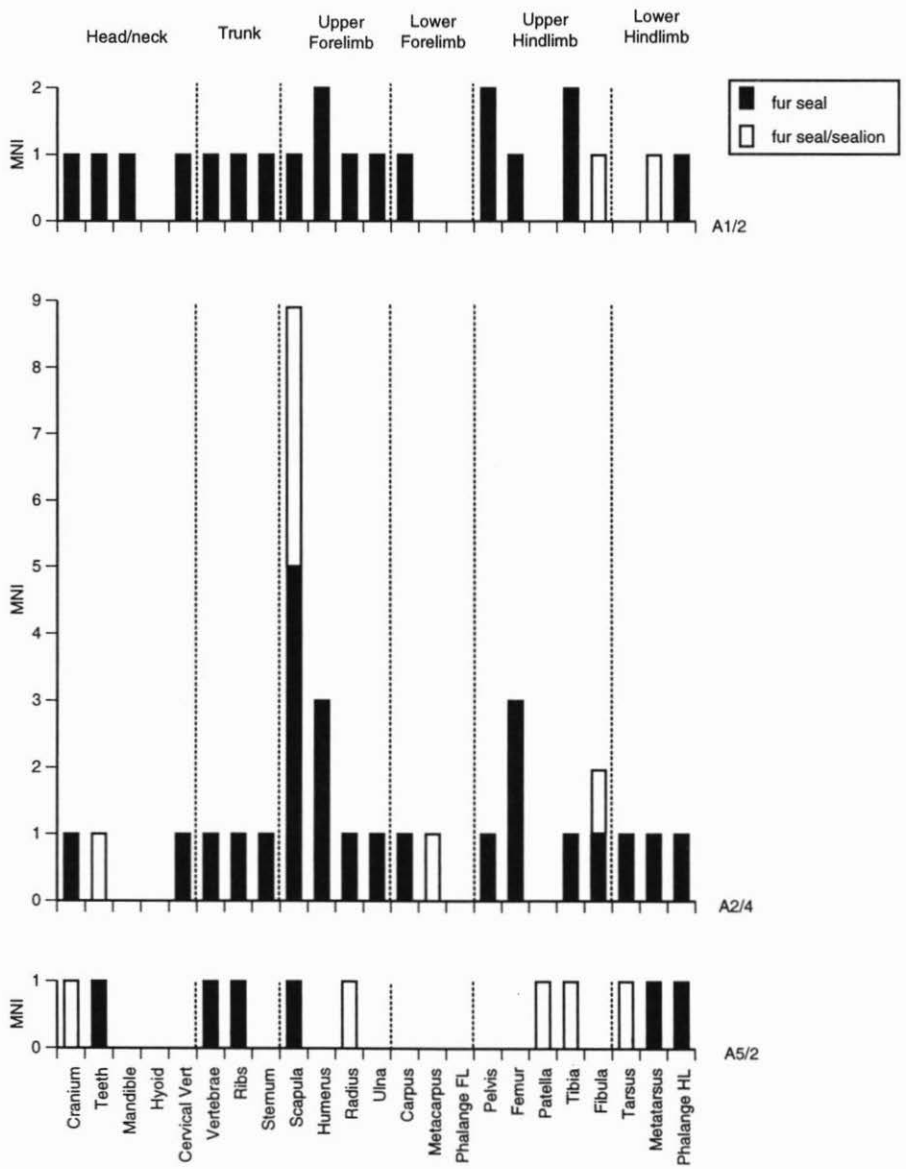


*Figure 13:* Fur seals: body parts representation in the three largest assemblages.

taken from a non-breeding colony. Eleven of the fur seals were assigned to an age-sex class on the basis of epiphyseal fusion and bone dimensions (Smith 1985). More than half (55%) of these were juveniles (*c.* 10 months to 4 years), another 18% either juvenile or sub-adult male (4–10 years), and 27% adult, probably male. Both the emphasis on juveniles and the absence of pups and adult females indicate that these animals were not taken from a breeding colony.

Rats occurred in all assemblages except two of the secondary deposits (A3/2, A5/1), but were in most cases represented only by a few scattered bones. However, clusters of bones that appear to derive from single individuals were located in two of the primary deposits: 14 bones in square C4, and 35 in square B5 of A2/4 (Fig. 5b); and 11 bones in square A3 of A7/1–2a (Fig. 7a). Although these were clearly *in situ* skeletons, it is impossible to be sure whether they represent food waste or animals that died while scavenging on the middens.

## MOA

Moa bones were common throughout the site, occurring in every assemblage (in four cases as the most abundant vertebrate remains), and overall comprising 41% of recovered bone specimens. A considerable proportion of these (68% of moa NISP) were fragments that could not be identified to anatomical element. The remainder derive from at least 29 individual moa, of which 72% were identifiable to species level (Table 4). Among these, Emeid moa predominate, with *Euryapteryx geranoides* making up almost half of the total and *Emeus crassus* nearly a quarter. *Pachyornis elephantopus* is also well represented and there is a single individual of *Dinornis struthoides*.

TABLE 4
MNI of Moa from Pleasant River Excavations

| **taxon** | **1/2** | **2/1** | **2/1b-2** | **2/3** | **2/4** | **3-7/1-2a** | **3/2** | **3-7/2b-3** | **5/1** | **5/2** | **Total** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *E. geranoides* | 4 | - | 1 | 1 | 2 | 1 | - | - | - | 1 | 10 |
| *Emeus crasssus* | - | 1 | - | - | 2 | - | - | 1 | - | 1 | 5 |
| *P. elephantopus* | 1 | - | - | - | 1 | - | - | 2 | - | 1 | 5 |
| *D. struthoides* | - | - | - | - | 1 | - | - | - | - | - | 1 |
| Moa ?sp. | 3 | 1 | - | 1 | - | - | 1 | - | 1 | 1 | 8 |
| **TOTAL** | **8** | **2** | **1** | **2** | **6** | **1** | **1** | **3** | **1** | **4** | **29** |

Comparison of the ratios of bones per individual and fragments per bone in each assemblage allows some interpretation of the processes involved in their formation (Table 5). Four of the primary assemblages (A1/2, A2/4, A3–7/2b–3, A5/2) exhibit relatively high numbers of bones per moa in conjunction with low or moderate rates of fragmentation, indicating deposition of substantial portions of each moa carcass and only minimal breakdown of elements through industrial use of bone or weathering. A similar pattern is evident in A2/3, supporting the inference that this secondary deposit was derived from A2/4. All of the remaining assemblages have relatively low numbers of bones per individual and moderate or extensive fragmentation, raising the possibility that moa remains had been incorporated into these layers through reuse or scattering from primary deposits elsewhere.

Assessment of body parts representation in the four main primary assemblages suggests some differences in butchery patterns (Fig. 14). In A1/2 all body parts are well represented, indicating that more or less complete moa carcasses were discarded there. Fragile elements such as crania and ribs are notably abundant, and tracheal rings (Table 5; not shown in Fig. 14, as the number per individual is not known) make up 34% of all identified elements. Tracheal rings are equally common in A2/4, where the large number of pelves and feet indicate that primary butchery was undertaken, although the generally lower representation of head and trunk elements and high numbers of leg bones indicate partial processing of some carcasses before arrival. The A5/2 and A3–7/2b–3 assemblages, which have lower

numbers of bones per individual, show greater inequalities in body parts representation. With low representation of feet, pelves and tracheal rings it can be suggested that at least half of the moa in each of these assemblages had been butchered elsewhere.

TABLE 5
Some characteristics of the moa assemblages from Pleasant River

| | Total Assemblage | | | | Legs | |
|---|---|---|---|---|---|---|
| assemblage | identifiable bones (MNE) | bones per individual (MNE/MNI) | fragments per bone (NISP/MNE) | tracheal rings (%MNE) | identifiable bones (MNE) | fragments per bone (NISP/MNE) |
| A1/2 | 571 | 71.4 | 8.7 | 34.0 | 37 | 29.2 |
| A2/1 | 26 | 13.0 | 19.2 | 30.8 | 6 | 15.3 |
| A2/1b-2 | 18 | 18.0 | 35.9 | 5.5 | 4 | 43.0 |
| A2/3 | 46 | 23.0 | 2.9 | 47.8 | 1 | 16.0 |
| A2/4 | 239 | 39.8 | 6.0 | 34.7 | 20 | 3.3 |
| A3-7/1-2a | 12 | 12.0 | 13.6 | 16.7 | 4 | 3.8 |
| A3/2 | 3 | 3.0 | 3.3 | 66.7 | 1 | 6.0 |
| A3-7/2b-3 | 62 | 20.7 | 13.9 | 1.6 | 7 | 7.5 |
| A5/1 | 2 | 2.0 | 30.0 | - | - | - |
| A5/2 | 71 | 17.8 | 4.41 | 18.3 | 14 | 2.0 |

The assemblages also differ in the extent to which leg bones have been fragmented, with only small numbers of fragments per leg bone in A2/4, A5/2 and A3–7/2b–3, and similarly low values in the smaller primary assemblage from A3–7/1–2a (Table 5). In marked contrast, A1/2 along with A2/1b–2 and all but the smallest secondary assemblages show extensive fragmentation. In most of the latter group the entire moa assemblage shows extensive fragmentation, suggesting weathering. However, this is not the case in A1/2, which may indicate that leg bones were deliberately broken up in this area. Only one moa bone showed evidence of sawing, making it probable that this fragmentation was for marrow extraction rather than industrial purposes. As was the case in the dog and fur seal assemblages, most (80%) of the cut marks observed on moa bones were in A1/2.

Moa eggshell was recovered from all assemblages except those in Areas 3 and 7 and the upper layer of Area 5. Only small quantities were present in most of these; 58% of the total weight (415 g) derived from A2/4 and another 31% from A2/3. Fragments from a dense concentration in the former (Fig. 5b: Feature 20) were reconstructed into a partially complete egg (Fig. 15).

## SMALL BIRDS

Small bird remains were present in every assemblage but nowhere particularly common, making up just 2.3% of total NISP. Although only 35% of these specimens were able to be identified positively to species or genus and another 11% to family or ordinal level, they represent more than half of the vertebrate taxa present in the site. At least 27 species are present, although 55% of the identified bones are from just four of these—Pied Shag *Phalacrocorax varius* (27.1%), Spotted Shag *Stictocarbo punctatus* (10.9%), Sooty Shearwater *Puffinus griseus* (9.0%) and Yellow-eyed Penguin *Megadyptes antipodes* (8.1%). Moderately well represented are the Blue Penguin *Eudyptula minor* (4.5%), Fairy Prion

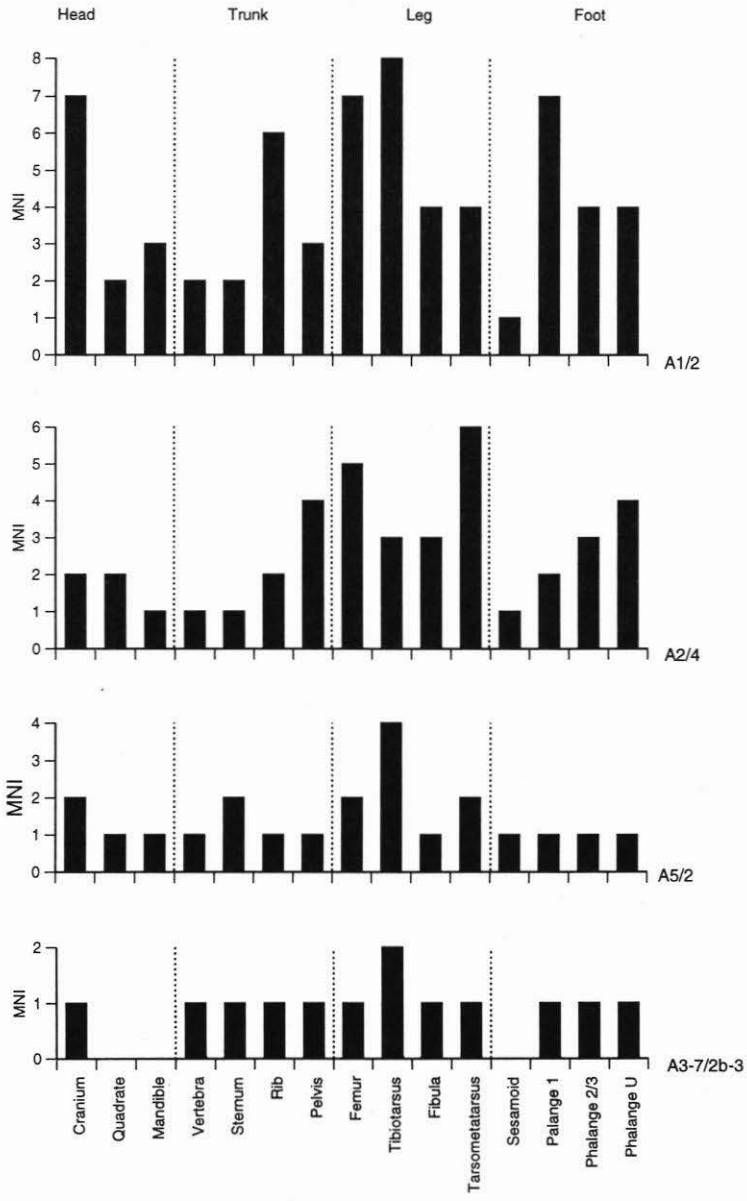


*Figure 14:* Moa: body parts representation in the four largest assemblages.

*Pachyptila turtur* (4.1%), Brown Teal *Anas aucklandica chloitis* (3.6%), Stewart Island Shag *Leucocarbo chalconotus* (2.7%), New Zealand Pigeon *Hemiphaga novaeseelandiae* (2.7%) and New Zealand Quail *Coturnix novaezelandiae* (2.3%). This order of abundance differs somewhat when expressed as MNI (Table 6) because of variations in the distribution of these species throughout the site. For example, the relatively small number of Brown Teal

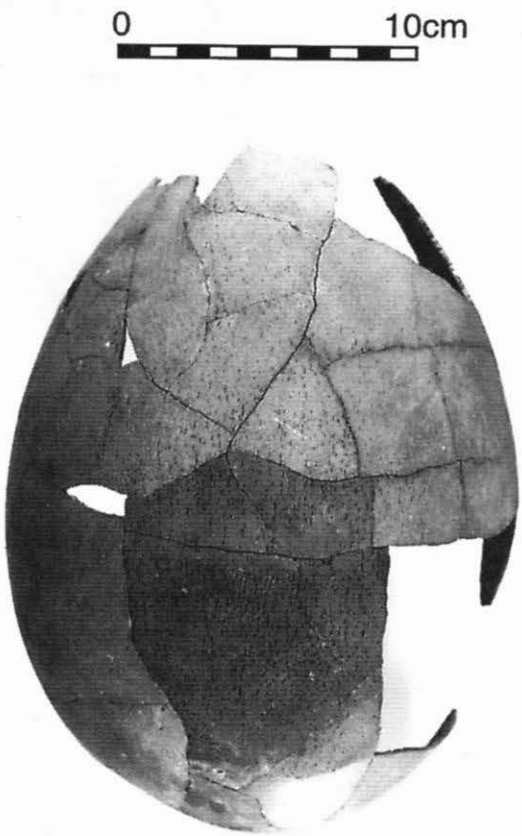


*Figure 15:* Partially reconstructed moa egg from Area 2 layer 4.

bones are spread through five separate assemblages, indicating double the number of birds represented by the much larger sample of Sooty Shearwater bones found only in A1/2. The 17 remaining species are each represented by only one or two bones, and it is likely that some of these were incorporated into the deposits from beach wrecks rather than as food remains. One, the introduced Black Swan in A2/1, is clearly intrusive and has been excluded from further consideration. Also excluded are the remains from the disturbed deposits in Area 6, which included a single bone from the New Zealand Coot (*Fulica chathamensis*) which was the only extinct small bird recovered during excavations.

TABLE 6
MNI of Small Birds from Pleasant River Excavations

| taxon | | 1/2 | 2/1 | 2/1b-2 | 2/3 | 2/4 | 3-7/1-2a | 3/2 | 3-7/2b-3 | 5/1 | 5/2 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| White-capped Mollymawk | *Diomedea c. cauta* | - | - | - | - | - | - | - | - | - | 1 | 1 |
| Albatross or Mollymawk | *Diomedea* sp. | - | - | - | - | 1 | - | - | - | 1 | - | 2 |
| Sooty Shearwater | *Puffinus griseus* | 3 | - | - | - | - | - | - | - | - | - | 3 |
| Giant Petrel | *Macronectes giganteus* | - | - | - | - | - | 1 | - | - | - | - | 1 |
| Common Diving Petrel | *Pelacanoides u. urinatrix* | 1 | - | - | - | - | - | - | - | - | - | 1 |
| Fairy Prion | *Pachyptila turtur* | 2 | - | - | - | - | - | - | - | - | - | 2 |
| Prion ?sp. | | - | - | - | - | 1 | - | - | - | - | - | 1 |
| Erect-crested Penguin | *Eudyptes scalteri* | - | - | - | 1 | - | - | - | - | - | - | 1 |
| Yellow Eyed Penguin | *Megadyptes antipodes* | 3 | 1 | - | - | 1 | - | - | - | - | - | 5 |
| Blue Penguin | *Eudyptula minor* | - | 1 | - | - | 2 | - | - | - | - | 1 | 4 |
| Penguin ?sp. | | 1 | - | - | - | - | - | - | - | - | - | 1 |
| Pied Shag | *Phalacrocorax v. varius* | 2 | 1 | - | - | 1 | - | - | - | - | 1 | 5 |
| Little Shag | *P. melanoleucos brevirostris* | 1 | - | - | - | - | - | - | - | - | - | 1 |
| Stewart Island Shag | *Leucocarbo chalconotus* | 1 | - | 1 | 1 | - | - | - | - | - | 1 | 4 |
| Spotted Shag | *Stictocarbo p. punctatus* | 3 | - | 1 | - | - | - | - | - | - | 2 | 6 |
| S.I. Pied Oystercatcher | *Haematopus ostralegus finschi* | - | - | - | - | - | - | - | - | - | 1 | 1 |
| Black-backed gull | *Larus dominicanus* | - | - | - | - | - | - | - | - | - | 1 | 1 |
| Paradise Shelduck | *Tadorna variegata* | - | - | - | - | - | - | - | - | 1 | - | 1 |
| Blue Duck | *Hymenolaimus malacorhynchus* | - | - | - | - | 1 | - | - | - | - | - | 1 |
| Grey Duck | *Anas s. superciliosa* | - | - | - | - | 1 | - | - | - | - | - | 1 |
| Brown Teal | *Anas aucklandica chloritis* | 1 | - | 1 | 1 | 1 | - | - | 2 | - | - | 6 |
| Teal ?sp | | - | - | - | - | - | 1 | - | - | - | - | 1 |
| N.Z. Shoveller | *Anas rhynchotis variegata* | - | - | - | - | - | - | - | - | - | 1 | 1 |
| Black Swan | *Cygnus atratus* | - | 1 | - | - | - | - | - | - | - | - | 1 |
| South Island Weka | *Gallirallus australis* | - | - | - | - | - | - | - | - | - | 1 | 1 |
| N.Z. Quail | *Coturnix novaezelandiae* | - | - | - | - | - | 2 | - | - | - | 1 | 3 |
| N.Z. Pigeon | *Hemiphaga n. novaeseelaniae* | 1 | - | - | - | - | 1 | - | 1 | - | 1 | 4 |
| Parakeet | *Cynoramphus* sp. | 1 | - | - | - | - | - | - | - | - | 1 | 2 |
| Bellbird | *Anthornis m. melanura* | 1 | - | - | - | - | - | - | - | - | - | 1 |
| Tui | *Prosthemadera n. novaeseelandiae* | 1 | - | - | - | - | 1 | - | - | - | - | 2 |
| South Island Kokako | *Callaeas c. cinerea* | 1 | - | - | - | - | - | - | - | - | - | 1 |
| Bird ?sp. | | - | - | - | - | - | - | 1 | - | - | - | 1 |
| **TOTAL** | | **23** | **4** | **3** | **3** | **9** | **6** | **1** | **3** | **2** | **13** | **67** |

TABLE 7
MNI of Fish from Pleasant River Excavations

| **taxon** | | **1/2** | **2/1** | **2/1b-2** | **2/3** | **2/4** | **3-7/1-2a** | **3/2** | **3-7/2b-3** | **5/1** | **5/2** | **Total** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Barracouta | *Thyrsites atun* | 1 | 1 | 28 | - | - | 16* | - | 14 | 4 | 15 | 79 |
| Red cod | *Pseudophycis bachus* | 5 | - | 1 | - | - | 15 | - | 2 | 1 | 4 | 28 |
| Blue cod | *Parapercis colias* | 18 | - | - | - | 2 | 1 | - | 1 | - | - | 22 |
| Black cods | *Notothenia* spp. | 4 | - | 1 | - | - | - | - | - | - | - | 5 |
| Wrasses | *Pseudolabrus* spp. | 1 | - | - | - | - | 2 | - | - | 1 | - | 4 |
| Tarakihi | *Nemadactylus macropterus* | 2 | - | - | - | - | - | - | - | - | - | 2 |
| Horse mackerel | *Trachurus novazelandiae* | 1 | - | - | - | - | - | - | - | - | - | 1 |
| Ling | *Genypterus blacodes* | - | - | 1 | - | - | - | - | - | - | - | 1 |
| Carangid sp. | | - | - | - | - | - | 1 | - | - | - | - | 1 |
| Fish ?sp | | - | - | - | 1 | - | - | 1 | - | - | - | 2 |
| **TOTAL** | | **32** | **1** | **31** | **1** | **2** | **35** | **1** | **17** | **6** | **19** | **145** |

* 399 when additional elements are included (see text)

None of the identified species is represented in more than five of the ten assemblages under analysis and never by more than two or three individuals, indicating that fowling activity at the site was sporadic and opportunistic rather than targeted at particular species. When identifications are grouped at a more general level there are some indications of a focus on shags, which make up 48% of identified NISP, 24% of MNI and occur in six assemblages, but this may reflect no more than their relative abundance on the East Otago coast (Gales 1985). Likewise, ducks (18% MNI, nine assemblages) were probably abundant in the estuary, penguins (16%, five) on adjacent beaches and forest birds (15.2%, four) on nearby hills. Shearwaters/petrels/prions (12.1%, three) may have nested in or visited the area. In contrast, open country birds (6.1%, two), albatross and mollymawks (4.5%, three) and waders (3.0%, one) are all relatively scarce. The small sample sizes from most areas preclude detailed assessment of inter-assemblage variability, but a general similarity can be detected, with ducks present in all excavated areas, shags and penguins everywhere except Areas 3 and 7, and forest birds absent only in Area 2.

## FISH

Fish remains dominate the vertebrate fauna, accounting for 46% of total bone NISP. However, there is considerable variation throughout the site, with particularly high values in A3–7/1–2a (94%), A3–7/2b–3 (56%) and A2/1b–2 (46%) and low values in A1/2 (4%) and A2/4 (2%). Of the total assemblage, 92% of the specimens were vertebrae, spines and other elements and fragments not usually identifiable to taxon. The remainder derive from at least nine species (Table 7). Barracouta, *Thyrsites atun*, predominate, making up 55% of identified individuals and occurring in all except the three smallest assemblages. Red cod *Pseudophycis bachus* (20%) and blue cod *Parapercis colias* (15%) are also relatively common, but of the remainder only the black cods *Notothenia* spp. and wrasses *Pseudolabrus* spp. are represented by more than one or two individuals. The dominance of barracouta is evident in all the large assemblages except A1/2, which also stands out for its high numbers of blue and black cods and its wider taxonomic range.

The MNI listed in Table 7 were calculated by the standard method employed in New Zealand (Leach 1986) which relies upon the numbers of five paired cranial bones—articular, dentary, maxilla, premaxilla, quadrate—along with some other distinctive bones such as the pharyngeal clusters of wrasses. M. Campbell (n.d.) re-examined the fish remains from Pleasant River, identifying as wide a range of skeletal elements as possible. This showed that in all but one assemblage the bones employed in the standard method provided the maximum MNI for each species. However in A7/1–2a, a significantly greater number of barracouta (399) were indicated by other elements (Table 8). All of the 'additional' individuals are represented by bones from the branchial and hyal arches, which support the gill structure. Barracouta bodies, as represented by vertebrae, are nearly as common as mouth parts and Campbell suggests that the additional branchio-hyal bones reflect removal of the gills along with viscera from most of a large catch before it was preserved, perhaps by drying, and taken elsewhere for consumption. Red cod, the other main species in this assemblage, show a different pattern, with more or less equal representation of heads and bodies, suggesting that they were prepared, eaten and discarded as whole fish. The latter pattern seems to apply, irrespective of species, wherever samples are large enough to tell elsewhere in the site.

TABLE 8

MNI per element for Barracouta and Red Cod in A7/1-2a
(after M. Campbell n.d.:Table 2)

| **element** | **barracouta** | **red cod** |
|---|---|---|
| dentary | 16 | 15 |
| articular | 14 | 11 |
| quadrate | 16 | 6 |
| maxilla | 12 | 11 |
| premaxilla | 9 | 11 |
| prevomer | 2 | 9 |
| palatine | 6 | 3 |
| ectopterygoid | 1 | - |
| basihyal | 374 | - |
| urohyal | 16 | - |
| dorsal hypohyal | 302 | 1 |
| ventral hypohyal | 307 | 1 |
| ceratohyal | 220 | 1 |
| epihyal | 273 | - |
| 1st pharyngobranchial | 203 | - |
| 2nd pharyngobranchial | 399 | - |
| 3rd pharyngobranchial | 246 | - |
| infrapharyngeal | 273 | - |
| hyomandibular | 4 | - |
| preopercular | 1 | 1 |
| interopercular | - | 2 |
| opercular | 6 | - |
| subopercular | 2 | 1 |
| cleithrum | 4 | 2 |
| coracoid | 1 | - |
| scapula | 2 | 2 |
| postcleithrum (upper) | - | 1 |
| supracleithrum | 2 | 5 |
| post-temporal | 6 | - |
| otolith | - | 1 |
| basioccipital | 1 | 10 |
| 1st vertebra | - | 12 |
| vertebra | 9 | 9 |

TABLE 9
Molluscan MNI from Pleasant River Excavations

| **Taxon** | **1/2** | **2/1** | **2/1b-2** | **2/3** | **2/4** | **3-7/1-2a** | **3/2** | **3-7/2b-3** | **5/1** | **5/2** | **6/1** | **6/2** | **TOTAL** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gastropoda | | | | | | | | | | | | | |
| *Amphibola crenata* | 4542 | 829 | 1077 | 31 | 52 | 966 | 3 | 474 | 205 | 299 | - | - | 8478 |
| *Cookia sulcata* | 227 | 13 | 17 | 4 | 8 | 88 | 1 | 4 | 17 | 9 | - | 2 | 390 |
| *Diloma subrostrata* | - | 89 | 37 | - | 1 | 2 | - | - | - | - | - | - | 129 |
| *Turbo smaragdus* | 24 | 5 | 4 | - | 1 | 59 | - | 3 | 11 | 15 | - | - | 122 |
| *Haliotis iris* | - | 1 | 4 | 2 | 7 | 1 | - | - | 1 | 2 | - | - | 18 |
| *Haliotis* sp. | 1 | - | 1 | 1 | 5 | 4 | - | - | 1 | 3 | - | - | 16 |
| *Cominella glandiformis* | - | 10 | 3 | - | - | - | - | - | - | 2 | - | - | 15 |
| *Cellana strigilis* | - | - | - | 2 | - | 7 | - | - | 2 | 2 | - | - | 13 |
| *Micreleuchus tenebrosus* | - | 5 | 5 | - | - | - | - | - | - | - | - | - | 10 |
| *Radiacmea* sp. | - | 3 | 2 | - | - | 1 | - | - | - | 3 | - | - | 9 |
| *Melagraphia aethiops* | - | - | 1 | - | - | 8 | - | - | - | - | - | - | 9 |
| *Cellana* sp. | 6 | - | - | - | - | - | - | - | 2 | - | - | - | 8 |
| *Umbonium zelandicum* | - | 2 | 1 | - | - | - | - | - | 1 | 1 | - | - | 5 |
| *Sigapatella novaezelandiae* | - | 2 | 2 | 1 | - | - | - | - | - | - | - | - | 5 |
| *Scutus breviculus* | - | 1 | - | - | - | 2 | - | - | - | - | - | - | 3 |
| *Trochus viridis* | - | 3 | - | - | - | - | - | - | - | - | - | - | 3 |
| *Cominella* sp. | 1 | - | - | - | - | 1 | - | - | - | 1 | - | - | 3 |
| *Buccinulum* sp. | - | 2 | - | - | - | 1 | - | - | - | - | - | - | 3 |
| *Dentalium* sp. | 1 | - | - | - | 1 | - | - | - | - | - | - | - | 2 |
| *Emarginula* sp. | - | 1 | - | - | - | - | - | - | - | - | - | - | 1 |
| *Maoricolpus roseus* | - | - | - | - | 1 | - | - | - | - | - | - | - | 1 |
| *Xymene huttoni* | - | - | 1 | - | - | - | - | - | - | - | - | - | 1 |
| *Benhamina obliquata* | - | 1 | - | - | - | - | - | - | - | - | - | - | 1 |
| *Strutholaria* sp. | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 |

TABLE 9 Continued

| **Taxon** | **1/2** | **2/1** | **2/1b-2** | **2/3** | **2/4** | **3-7/1-2a** | **3/2** | **3-7/2b-3** | **5/1** | **5/2** | **6/1** | **6/2** | **TOTAL** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bivalvia | | | | | | | | | | | | | |
| *Austrovenus stutchburyi* | 2502 | 115 | 59 | 14 | 65 | 341 | - | 15 | 281 | 401 | 3 | 1 | 3797 |
| *Paphies australis* | 1 | 18 | 45 | 7 | 6 | 761 | 5 | 57 | 372 | 402 | 2 | - | 1676 |
| *Tellina liliana* | - | - | - | - | 1 | - | - | - | 5 | 4 | - | - | 10 |
| *Glycermis modesta* | - | - | 1 | 1 | - | - | - | - | - | 1 | - | - | 3 |
| *Tellina charlottae* | - | - | - | - | - | - | - | - | - | 2 | - | - | 2 |
| *Aulacomya ater maoriana* | - | 1 | - | - | - | - | - | - | - | - | - | - | 1 |
| *Mytilus edulis* | - | - | - | - | - | - | - | - | 1 | - | - | - | 1 |
| *Modiolus areolatus* | - | 1 | - | - | - | - | - | - | - | - | - | - | 1 |
| *Ostrea lutaria* | - | 1 | - | - | - | - | - | - | - | - | - | - | 1 |
| *Mactra discors* | - | - | 1 | - | - | - | - | - | - | - | - | - | 1 |
| *Zearcopagia disculus* | - | - | - | 1 | - | - | - | - | - | - | - | - | 1 |
| *Notirus reflexus* | - | 1 | - | - | - | - | - | - | - | - | - | - | 1 |
| Crustacea | | | | | | | | | | | | | |
| *Notosaria nigricans* | - | 6 | 6 | - | - | - | - | - | - | - | - | - | 12 |
| **TOTAL** | **7306** | **1110** | **1267** | **64** | **148** | **2242** | **9** | **553** | **899** | **1147** | **5** | **3** | **14753** |

## SHELLFISH

Shellfish made up 40% of the faunal items recovered in the excavations, and were particularly common in A5/1 (77%), A2/1 (58%) and A1/2 (56%), and notably scarce in A2/4 (6%). At least 36 taxa were identified (Table 9), but 95% of identified individuals belonged to just three of these—mudsnails *Amphibola crenata* (57.5% of molluscan MNI), cockles *Austrovenus stutchburyi* (25.7%) and pipi *Paphies australis* (11.4%). Of the remainder, only Cook's turban *Cookia sulcata* (2.6%) made a significant contribution throughout the site, although three others were relatively common in some assemblages—the topshell *Diloma subrostrata* in the upper layers of Area 2 (A2/1: 8%; A2/1b–2: 2.9%), catseyes *Turbo smaragdus* in A3–7/1–2a (2.6%) and paua *Haliotis iris* in the lower layers of Area 2 (A2/3: 4.7%; A2/4: 8.2%). Most of the remainder are likely to have arrived in the site as accidental by-catches, rather than through deliberate exploitation (Samson 1995).

The dominance of mudsnails, cockles and pipi demonstrates clearly that shellfishing activity was concentrated on the adjacent estuary. However, there are marked differences between the assemblages in relative abundance of these major species. Mudsnails are overwhelmingly dominant, with no other species making up more than 10% of MNI in the upper layers of Area 2 (A2/1: 75%; A2/1b–2: 85%) and A3–7/2b–3 (86%), and they are the most abundant species in A1/2 (62%) where cockles are also common (34%), and A3–7/1–2a (43%) where pipi are a significant component (34%). Cockles (44%) just outnumber mudsnails (36%) in A2/4, while all three species make significant contributions in Area 5 (A5/1: pipi 41%, cockles 31%, mudsnails 23%; A5/2: 35%, 35%, 26%). There is no clear stratigraphic or chronological pattern to these variations and in conjunction with the generally low concentrations of molluscan remains (Table 2), they suggest that most shellfish collecting at the site was small scale exploitation of localised patches within the estuary, rather than targeting of particular species. Of the concentrated middens, only A1/2 is large enough to suggest more intensive predation. Examination of its internal composition shows that the relative abundance of the two dominant species varies in a consistent manner, with mudsnails predominant in Squares A1 and B1, closest to the salt marsh, and cockles more common higher up the dune in Squares A3 and A4 (Smith 1992: Figure 6). This may indicate that the midden expanded horizontally through the deposition of shells from discrete collecting episodes.

## SEASONALITY

The small numbers by which most taxa are represented at Pleasant River limit their utility in determining the seasonality of site occupation. Furthermore, most are likely to have been available in the vicinity either continuously or sporadically throughout the year. Of the more common species, Spotted, Pied and Stewart Island Shags (Gales 1985), Yellow-eyed Penguins (Darby and Seddon 1990), and Brown Teal (Oliver 1974) are all likely to have been resident in the area, and dogs could presumably have been killed at any time of year. Although fur seals would have been most common from December to February (Smith 1996) and barracouta from October to May (Graham 1956), and Blue Penguins ashore and in best condition during spring and summer (McGovern-Wilson *et al.* 1996), they too could have been taken at almost any time of year.

TABLE 10
Artefacts from Pleasant River Excavations 1991-1993

| Assemblage | awls | tab cores | fish hooks | worked bone | total bone | files | drill points | cores | hammer stones | adzes complete | adzes flakes | blades complete | blades portion | flakes | fragments | total stone |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A1/2 | - | 1 | 1 | 2 | 4 | 1 | 2 | 1 | 1 | 1 | 2 | 5 | 16 | 75 | 77 | 181 |
| A2/1 | - | - | - | 1 | 1 | - | - | 1 | - | - | - | - | 1 | 4 | 2 | 8 |
| A2/1b-2 | - | - | - | - | 0 | 1 | - | - | - | - | 1 | 1 | 2 | 17 | 14 | 36 |
| A2/3 | 2 | - | - | - | 2 | - | - | - | - | - | - | 1 | - | 3 | 5 | 9 |
| A2/4 | - | - | - | 1 | 1 | - | - | - | - | - | 1 | 1 | 2 | 20 | 9 | 33 |
| A3-7/1-2a | - | - | 1 | - | 1 | - | - | - | - | - | - | - | - | 4 | 1 | 5 |
| A3/2 | - | - | - | - | 0 | - | - | - | - | - | - | - | - | 2 | - | 2 |
| A3-7/2b-3 | - | - | - | - | 0 | - | - | - | - | - | - | 1 | - | 5 | 2 | 8 |
| A5/1 | - | - | - | - | 0 | - | - | 1 | - | - | - | - | - | 10 | 6 | 17 |
| A5/2 | - | - | - | 2 | 2 | 1 | - | - | 1 | - | - | - | 4 | 20 | 2 | 28 |
| **TOTAL** | **2** | **1** | **2** | **6** | **11** | **3** | **2** | **3** | **2** | **1** | **4** | **9** | **25** | **160** | **118** | **327** |

More reliable inferences can be drawn from analysis of growth rings in cockle shells. Samson (1995) compared growth profiles of shell samples from ten of the excavated assemblages with modern samples collected from four localities in the estuary adjacent to the site at monthly intervals over a period of one year. The latter showed clear differences in growth profile characteristics for each month but, because of the potential for between-year variations in growth, are best interpreted at a seasonal level.

Six of the excavated assemblages provided clear indications of shellfish collecting during a restricted season (Samson 1995: Table 8). A2/4 and A7/2b provided close matches to the spring pattern, A2/1 and A7/1–2a to summer, and both A5/1 and A5/2 fitted the autumn profile. Another three assemblages produced samples too small for clear interpretation, although both the A2/1b and A2/2 samples approximate the summer pattern observed in A2/1, while A2/3 is likewise similar to the spring pattern in A2/4. In contrast, the A1/2 assemblage yielded a profile that did not match any single seasonal pattern, suggesting that it represents collecting at more than one time of year. When the A1/2 data are considered by excavation square, six of the seven subsamples do show a clear seasonal pattern. None was apparent in square A1, but square B1 indicates collecting in winter to late spring, both A2 and B2 in summer, A3 in autumn, and A4 in late winter to spring. While it seems unlikely that these arbitrary excavation units would each have sampled discard from a discrete shellfishing episode, the observed pattern nonetheless corroborates the inference drawn from changing patterns of species abundance that the midden expanded horizontally through a series of such episodes.

## ARTEFACTS

Artefacts were notably scarce in the excavated assemblages, and more than half (55%) derived from A1/2 (Table 10). They were assigned to general tool types on morphological grounds using procedures defined elsewhere (Anderson, Allingham and Smith 1996). As noted in earlier investigations, bone artefacts were particularly scarce. Only two definite fish hooks were recovered; in each case the point leg of a one-piece bait hook of the common southern form (Hjarno 1967, Type D1) with a U-shaped bend and incurved point (Fig. 16a, b), although another three pieces of worked bone may be fragments of hooks. One tab core from fish hook manufacture was recovered (Fig. 16c) and two awls (Fig. 16d, e), both made from bird long bones. Two of the remaining worked pieces (Fig. 16f, g) had been ground to points, and the third (Fig. 16h) drilled, in each case suggesting that they may be fragments of harpoons.

Almost half (49%) of the stone artefacts were flakes. Another 36% were small fragments of debitage and 10% were blades. Of the scarcer types, adzes were represented by one complete nephrite specimen (Fig. 17a) with lateral reduction on one side of the butt, placing it within Duff's (1956) Type 1B, along with one meta-argillite and three basalt flakes with one or more polished surfaces showing that they had come from adzes. The remaining flakes of meta-argillite (one from A2/3, four from A2/4) and basalt (one each from A1/2 and A5/2) were of fine-grained material suitable for adze making, but lacked evidence of surface finish. One drill point (Fig. 17b) was of chalcedony, and a less convincing example (Fig. 17c) of silcrete. The latter material provided two small cores, with a third of porcellanite, while there was one small chalcedony hammerstone and a larger example of basalt, and three sandstone files (Fig. 17d, e).

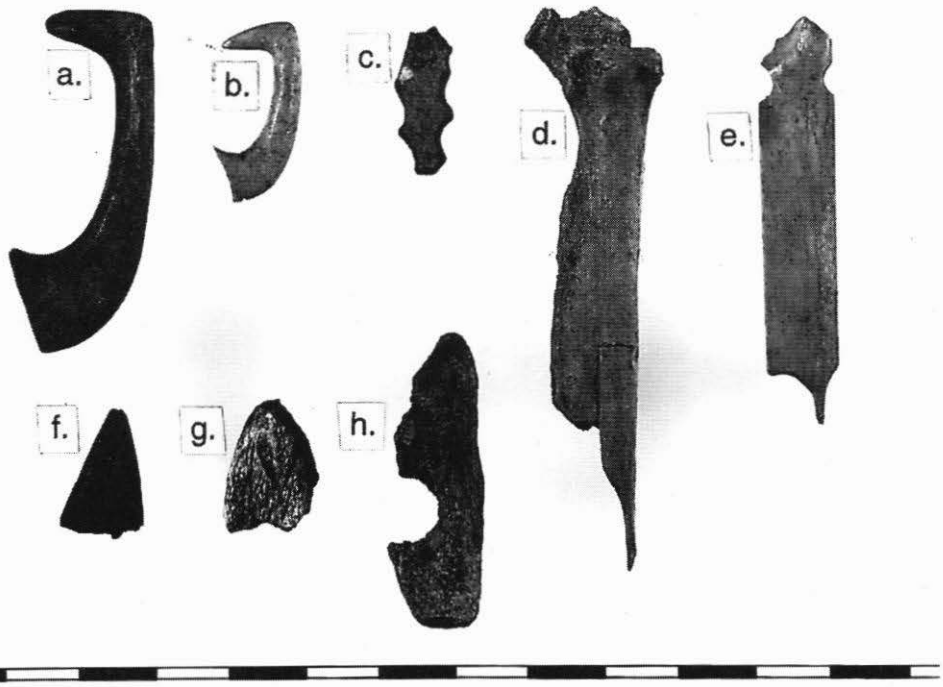


*Figure 16:* Selected bone artefacts from Pleasant River. Fishhooks: a, PLR 50-BW1, b, PLR 1056-BW1. Tab core: c, PLR 35- BW1. Awls: d, PLR 348-BW1, e, PLR 331-BW1. Worked pieces: f, PLR 76-BW1, g, PLR 254-BW1, h, PLR 226-BW1.

Silcrete dominates the flake assemblage, with 78% of the items of this material. Chalcedony and obsidian (each 7%), porcellanite (5%) and chert (3%) make up the remainder. All of the blades were of silcrete and included 8 complete specimens along with 16 proximal, 4 medial and 6 distal portions. The majority of these (65%) show no retouching (e.g., Fig. 17f). Where retouching does occur it is confined almost exclusively to small sections of the lateral edges, most commonly on one face of one edge (15%) or on one face of both edges (12%). There are only three specimens with bifacial retouch, in one case (Fig. 17g) on portions of both edges. In none of these examples does the retouching significantly alter the shape of the tool, suggesting that it was not intended to produce specific tool types. Most of the blades (71%) show some evidence of use, usually in the form of small scalar flakes singly or in clusters on part of one or more edges. As with retouching, evidence of use is confined almost entirely to the lateral edges, and occurs most commonly as unifacial wear on one (21%) or both (21%) edges. In all, 37% of the lateral edges exhibit some unifacial wear, whereas only 18% show bifacial wear. This close parallel between the locations of usewear and retouching is consistent with the suggestion made elsewhere (Smith *et al.* 1996) that retouching of blades was undertaken largely to rejuvenate edges blunted by use.

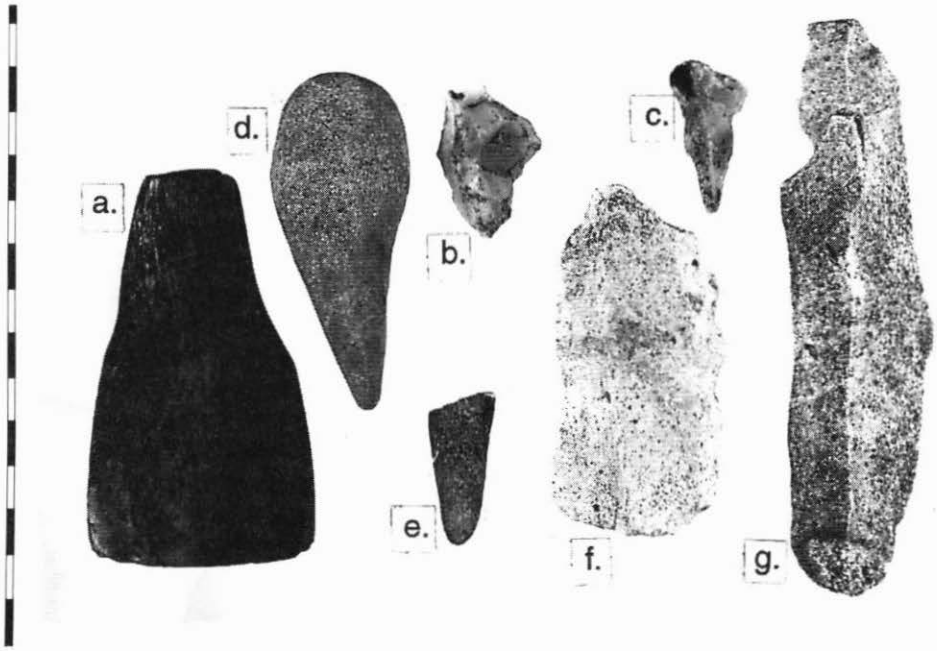


*Figure 17:* Selected stone artefacts from Pleasant River. Adze: a, PLR 44-LA1. Drillpoints: b, PLR 65-LA17, c, PLR 57-LA10. Files: d, PLR 755-LA1, e, PLR 157-LA1. Blades: PLR 1059-LA1, g, PLR 56-LA14.

## DISCUSSION

Both the stratigraphic and radiocarbon evidence show that there were multiple phases of occupation at Pleasant River. Areas 2 and 3–7 disclosed stratigraphically separated primary occupations. The lower layers of these along with the single primary deposit in Area 5 are securely dated to the fourteenth century; fourteenth or early fifteenth century occupation is indicated for the primary deposit in Area 1. The upper layers are less tightly dated but those in Area 2 appear to be mid fifteenth century, while those in Areas 3–7 are probably late fifteenth or sixteenth century. On this evidence alone, two broad interpretations of settlement pattern are possible. Each of the primary deposits may represent a single brief occupation. Alternatively, they may represent discrete activity areas within two, or perhaps three, more substantial settlements.

The range and form of excavated features and the character and abundance of both faunal and artefactual remains assist in selecting between these alternatives. Each of the primary deposits in the early phase of occupation provides evidence for a range of activities, rather than functional specialisation. In A2/4 primary butchery of at least four moa, one fur seal and a dog is attested. However, it is clear that this was not solely an area for initial processing of kills. Legs of another two moa and shoulder blades of at least eight fur seals and sea lions that must have been butchered elsewhere were brought there, presumably for cooking in the single large oven that dominates the area. Many of the bones from

meat-yielding body parts of moa and seals had been discarded into firescoops, suggesting that they were eaten there. Other food items include small numbers of penguins, ducks and other birds and a few fish and shellfish. Most of the artefacts were flakes and blades likely to have been used in butchery and food preparation, but other activities are suggested by a flake spalled from an adze, four probable adze flakes and a piece of worked bone, along with the two bone awls and another probable adze flake found in A2/3 which almost certainly derive from this layer. The general scarcity of artefacts suggests that occupation was brief. Likewise, the high proportion of moa body parts remaining in articulation indicates minimal disturbance after butchery, and growth profiles of the shellfish show that they were collected during a short period in spring. Together these data suggest a small temporary camp, focused around moa and seal hunting but with opportunistic exploitation of other resources and limited manufacturing or maintenance activities, rather than a discrete butchery and cooking area within a more substantial settlement.

A similar interpretation can be suggested for the lower layers of Areas 3–7, which yielded a few flakes and a blade amongst the primary butchery remains of a moa, along with meat-yielding parts from a second moa, a dog, a seal, several birds, a small catch of fish and a collection of shellfish gathered in spring. A shallow firescoop with bones and shells scattered in and around its fill indicates that at least some of these foods were eaten there.

Likewise, the primary deposit in Area 5 also indicates both primary and secondary processing of moa, seals and dogs, along with a slightly greater range and quantity of small birds, fish and shellfish. In this case their remains are located around 17 intercutting scoops and deeper ovens, indicating more intensive cooking activity, perhaps suggestive of a specialised food preparation area within a larger settlement. However, there are no indications that parts of animals prepared here were taken elsewhere for consumption and, as in A2/4, a small proportion of the artefacts appear to be unrelated to food preparation activities. The greater number of ovens may simply reflect a campsite of somewhat longer duration. Seasonal estimates from shellfish adjacent to the ovens, as well as from the eastern and western ends of the area, were strongly similar (Samson 1995: 94–96), indicating that activity was confined to the autumn.

The A1/2 deposit presents a number of contrasts. While primary butchery of moa, dogs and perhaps also seals is attested, there are signs of more intensive processing. Greater proportions of each moa and dog carcass are represented than in the other deposits, the moa leg bones are extensively fragmented, perhaps for marrow extraction, and almost 10% of the dog bones show cut marks consistent with the reduction of major butchering units into smaller food portions. Both the abundance and taxonomic range of small birds and fish are greater than elsewhere and, in contrast to the other early deposits, there is a substantial shell midden. Artefacts are more common and include a wider range of types. These indications of more intensive occupation are supported by the shellfish growth profiles which show that the A1/2 midden represents more than a single season of collecting. However, most of these differences appear to be a matter of scale rather than of kind. The same constellation of cooking ovens, butchery and food waste seen in the other deposits is repeated in A1/2, and the wider range of artefact types almost certainly reflects no more than the larger sample size. Indeed, the proportion of artefacts other than the ubiquitous blades, flakes and fragments in A1/2 (6.6%) is virtually identical to that in A2/4 (6.1%) and substantially less than that in A5/2 (14.3%). While sample size may provide a partial explanation for the wider taxonomic range of fauna in A1/2, the greater seasonal span of occupation is probably also reflected. Thus A1/2 does not appear to represent a functionally discrete component of a larger settlement, and differs from the other early camps only in its duration of occupation.

Whether this resulted from repeated visits of short duration or continuous occupation throughout the course of a year or more is not entirely clear, as either situation could have produced both the patterned composition of the midden dump and the stratigraphic arrangement of features which are suggestive of a sequence of activities in this area.

The two deposits from the later phase of occupation also appear to be temporary encampments, although with a somewhat different economic focus. Both A2/1b–2 and A3–7/1–2a contained small numbers of moa, seal and dog bones, but these were highly weathered and fragmentary, suggesting that they were probably redeposited from elsewhere rather than *in situ* waste from food preparation. Instead the middens were dominated by fish, shellfish and small numbers of birds. In A3–7/1–2a a large catch of barracouta appears to have been processed for preservation, but most other food remains suggest immediate consumption. At least some of these were presumably cooked in firescoops adjacent to the middens, and the extent of burning on bones in A2/1b–2 suggests more intensive cooking activity nearby. As in the earlier deposits, artefacts were scarce and mostly flakes and blades, but also included small numbers of other items—an adze fragment and file in A2/1b–2 along with a piece of worked bone and a core in the overlying secondary deposits, and a fishhook in A3–7/1–2a. Shellfish from both deposits indicate brief periods of activity during the summer.

Temporary occupation also seems to have occurred on the south side of the river at Tumai (J43/4), which Allingham (n.d.b) interpreted as a small, intermittently occupied settlement. Unfortunately, the two radiocarbon dates from this site are on *Amphibola* shell, and cannot be considered reliable evidence of its age; however, the predominance of fish and low numbers of moa and seals in the fauna (Smith 1985: 195–198) may indicate that it post-dates the early camps on the northern shore.

This interpretation of Pleasant River as a location for repeated temporary encampments is supported by comparison with the nearby Shag River Mouth site. This permanently occupied village, more than 3 ha in extent, showed a clear spatial separation between dwelling areas, characterised by stone-lined hearths, artefact clusters and evidence of artefact manufacture, and cooking and butchery areas with ovens and midden dumps (Anderson and Smith 1996a: 276–78; 1996b). Excavated samples from primary deposits in the former[4] showed high concentrations of artefacts and low concentrations of animal bones, while the opposite pattern was typical of the cooking areas (Fig. 18). Occupation deposits at Pleasant River occur discontinuously over an area of less than 1 ha and exhibit neither the clearly organised spatial distribution of activity areas suggestive of a single integrated settlement, nor the hearths and artefact clusters that might indicate former dwellings. Significantly, none of the Pleasant River assemblages exhibits artefact concentrations that approach those seen in the dwelling areas at Shag River, and only in the longer duration A1/2 camp does either measure compare closely with part of the permanently occupied site. The five areas interpreted as brief seasonal campsites exhibit markedly lower concentrations of both bones and artefacts than either settlement component at Shag River. Closer inspection of the total artefact assemblages from each site shows lower concentrations of all classes at Pleasant River, with marked differences in the abundance of fishhooks, adzes and items related to bone and stone working (Fig. 19). In sum, these observations place the Pleasant River occupations clearly within the category of restricted function camps, defined by Anderson

[4]Shag River dwelling assemblages: SM/A L2, SM/B:FHA L2, SM/C:Swamp L2, SM/D:1 L5, SM/D:2 L1, SM/D:3 L1. Cooking assemblages: SM/C:Dune L2–11.

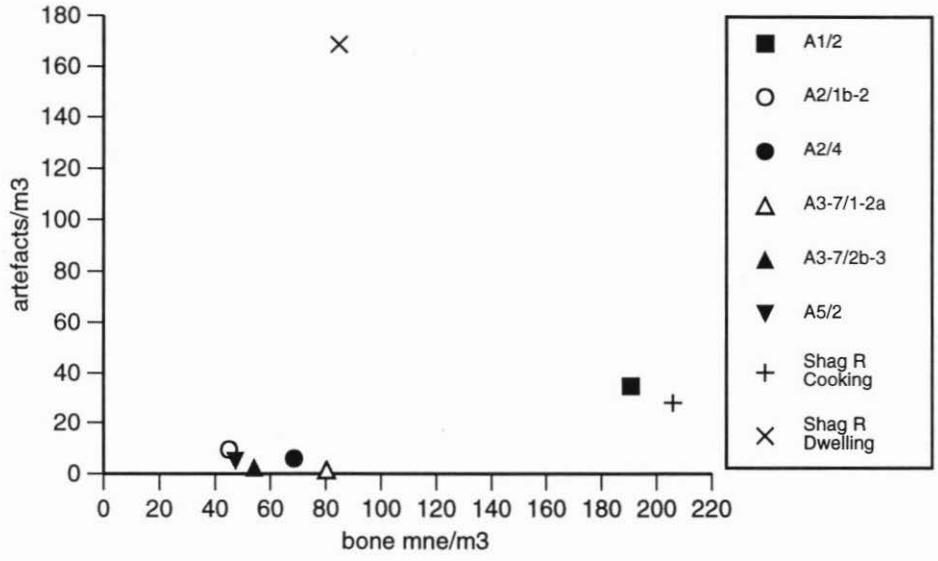


*Figure 18:* Concentrations of artefacts and bones in primary deposits at Pleasant River, compared with mean values for cooking and dwelling areas at Shag River. Bone values for both sites exclude exotic mammals, and for Pleasant River also exclude all fish elements other than the standard mouth parts used in quantifying the Shag River assemblages (cf. Anderson and Smith 1996b).

(1982: 61) as "places at which more than one activity was of significance, but which do not exhibit the wide range of fauna and artefacts or the size of multi-function bases."

Contemporaneity of the early camps at Pleasant River with the Shag River village and the close proximity of the two sites prompt speculation that the former were made by people generally resident at the latter. Although the archaeological data provide no direct means for confirming it, this proposition is compatible with the settlement model proposed for the early part of the Archaic phase in southern New Zealand (Anderson 1982) in which restricted function camps on the coast and more specialised moa hunting sites and stone working quarries in the interior were utilised by populations based at large coastal villages through a pattern of systematic mobility. In the early 1980s, seasonal data were insufficient to document the scheduling of this process, although a strategy of intra-seasonal task-specific movements throughout the year rather than regular seasonal transhumance was preferred. More recent evidence, especially from Shag River which shows that it was occupied throughout the year, has suggested a strategy of aggregation at or near coastal villages during the winter half of the year and dispersal of parts of the population both along the coast and into the interior during the warmer months (Anderson and Smith 1996a: 286–90).

With data from Pleasant River indicating that two of the early camps occurred in spring, one in autumn, and another at a variety of times or perhaps continuously through winter, spring, summer and autumn it can be proposed that there was considerable fluidity in the

seasonal pattern of community fission and fusion. It is also apparent that these satellite camps did not serve a direct provisioning role for the village. Moa and seals, which dominate the inferred diet at Shag River, also feature prominently at the early Pleasant River camps and, wherever the excavated assemblages are large enough to tell, these resources seem to have been prepared for immediate consumption rather than preservation or transport back to the village. Likewise, there is no clear evidence at Shag River for regular importing of moa and seals caught elsewhere. Thus it seems unlikely that the interrelation of village and satellite camp was driven by either seasonal or locational patterns of resource availability. In ecological terms, the purpose of dispersion to satellite camps might be seen as a strategy for spreading the burden of predation on local moa and seal populations over an area wider than the immediate environs of the village. Alternatively, it might be argued that the abundance of big game resources in the area opened the way for flexibility in settlement organisation, allowing fission and fusion of the community to be driven largely by social factors.

Although the later camps also fall into the category of restricted function sites, they appear to have been components of a somewhat different settlement system. None of the coastal Otago sites dating to the fifteenth and sixteenth centuries can be classified as a large village, and Anderson (1982) has proposed that there was a decline in settlement permanence with

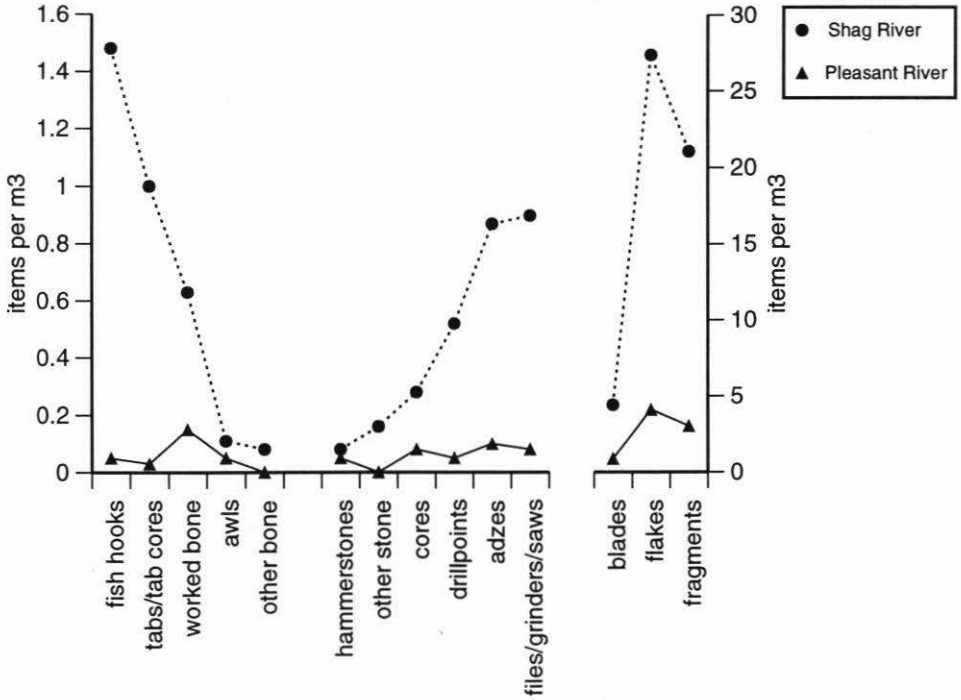


*Figure 19:* Concentrations of artefacts in total assemblages from Pleasant River and Shag River.

fragmentation of the population amongst smaller restricted function and specialised sites. Seasonal data for the later camps at Pleasant River indicate brief periods of summer activity. Autumn or winter shellfishing has been identified in contemporary deposits at Ross's Rocks (layer 3) and Long Beach (Layer 4a) (Till and Blattner 1986), supporting the contention of regular seasonal mobility between smaller sites. Evidence from one of the later camps at Pleasant River (A3–7/1–2a) that a large catch of barracouta was processed and then removed from the site suggests that there was also an increased economic interdependence between components of the later settlement system.

Changes in settlement pattern in southern New Zealand have generally been linked to depletion of big game resources (Lockerbie 1959; Simmons 1969; Hamel 1977; Anderson 1982), and recent investigations suggest that this was the case in coastal east Otago. At Shag River the numbers of moa and seals declined significantly during the period of occupation, and it has been argued that the demise of these preferred resources was the major reason for abandonment of the village (Anderson and Smith 1996a). With faunal spectra covering a longer time span, Pleasant River provides stronger evidence for this pattern of resource loss. Both moa and seals were less common in the fifteenth and sixteenth century assemblages than they had been in the fourteenth century (Fig. 20), and there are indications that the moa and seal bones in the later assemblages were in secondary deposition rather than waste from primary butchery. Since all of the occupations at Pleasant River were of short duration it would be inappropriate to suggest that reduction in the availability of moa and seals led to abandonment of the site. Nonetheless, the radiocarbon dates do demonstrate that temporary encampments there were less frequent after the fourteenth century. Although it is possible that this was because localised scarcity of preferred game made Pleasant River a less attractive camp site, it seems more likely that it reflects abandonment of the nearby village and a consequent reduction in settlement density on this part of the east Otago coast.

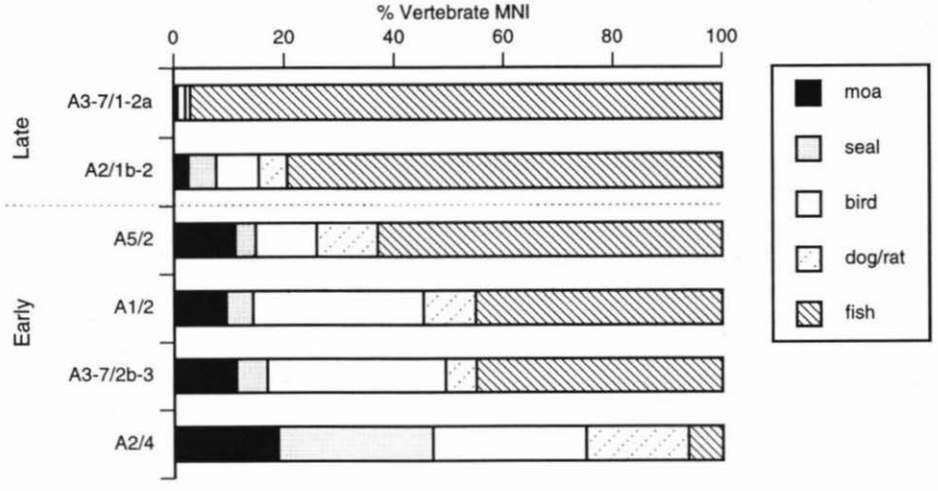


*Figure 20:* Relative abundance of main vertebrate taxa in early and late deposits at Pleasant River.

Whether the more dispersed and mobile settlement pattern which seems to have emerged after the fourteenth century can be explained solely in terms of adaptation to an environment depleted of big game is difficult to determine, although several features of the Pleasant River evidence point in this direction. As already noted, seasonal data for the early camps indicate that moa and seals could be hunted at any time of the year, reducing the need for tight seasonal scheduling of settlement shifts or storage and transportation of seasonally abundant foods. Without reliable supplies of these resources, such flexibility in settlement organisation may no longer have been possible. At present there are too few quantified and seasonally dated faunal assemblages from fifteenth and sixteenth century sites to assess the seasonal and locational imperatives of exploiting alternative resources. That these were different from the earlier period is implied by the apparent emergence of food preservation and transport only at the end of the Pleasant River sequence, but as no other east Otago assemblages have been analysed in a manner that would have been able to detect this activity it is impossible to be sure of its temporal or spatial distribution.

## CONCLUSION

Recent investigations have shown that Pleasant River was used repeatedly as a temporary campsite during the fourteenth, fifteenth and sixteenth centuries. The range of activities represented in each occupation indicate that these were not specialised around a single economic function, but fall into a broader category of restricted-function sites. Although small temporary camps of this sort have been recognised in the archaeological record of southern New Zealand for many years and explicitly modelled within settlement patterns since Anderson's (1982) review of the Archaic phase in the region, there have been few attempts to examine specific examples of this site type within the context of a broader settlement and subsistence system.

Assessment of the Pleasant River evidence in this light has provided substantial support for the settlement model proposed by Anderson and refined more recently by Anderson and Smith (1996a), demonstrating that restricted function camps coexisted with large permanently occupied villages during the early part of the Archaic phase and persisted into the later Archaic after the demise of the major village sites. For the early part of this period the Pleasant River data provide a deeper understanding of the dynamics of settlement pattern organisation. If, as has been argued, the fourteenth century camps at Pleasant River were satellites of the nearby village at Shag River, there was considerable flexibility in the seasonal scheduling of population movements between the two sites and these were not motivated solely by the requirements of resource exploitation. In these circumstances, factors such as avoidance of inter-group tensions or maintenance of territorial rights by occupation may have played an important role. The settlement system within which the later camps at Pleasant River operated is much less clearly understood, principally because of a lack of adequate information from well dated sites. Rectifying this problem stands as one of the major priorities for further research in the archaeology of southern New Zealand.

### ACKNOWLEDGEMENTS

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## APPENDIX 1

SPECIES IDENTIFICATIONS FOR RADIOCARBON SAMPLES IN TABLE 1

| Lab No. | Species composition | Total sample weight |
|---|---|---|
| NZ7960 | *Coprosma* sp. (50%), Discaria toumatou (25%), Shrub ? *Coprosma* sp. (25%) | 6 g |
| Wk2370 | *Austrovenus stutchburyi* (100%) | 30.6 g |
| Wk2851 | *Austrovenus stutchburyi* (100%) | 56 g |
| Wk2753 | *Austrovenus stutchburyi* (100%) | 35.2 g |
| WK2507 | *Amphibola crenata* (100%) | 32.5 g |
| Wk2369 | *Amphibola crenata* (100%) | 30.6 g |
| Wk3508 | *Austrovenus stutchburyi* (100%) | 31.4 g |
| NZ7961 | *Discaria toumatou* (70%), Ribbonwood/lacebark (26%), *Cordyline australis* stem (4%) | 2.99 g |
| NZ7962 | *Olearia* sp. [cf. *avicenniaefolia*] (36%), *Myrsine australis* (36%), *Pittosporum* sp. (7%), *Hoheria/Plagianthus* sp. (7%), *Pseudowintera colorata* (7%), *Discaria toumatou* (7) | 5.3 g |
| NZ7963 | *Discaria toumatou* (58%), Shrub ?sp. (21%), Ribbonwood/lacebark (11%), *Hebe* sp. (5%), *Coprosma* sp. (5%) | 3.7 g |
| NZ7964 | *Discaria toumatou* (58%), *Olearia* sp. (16%), *Hebe* sp. (16%), bark (8%) | 9 g |
| NZA2802 | *Olearia* sp. (100%) | 1.1 g |
| Wk3509 | *Austrovenus stutchburyi* (100%) | 34.5 g |
| Wk3510 | *Austrovenus stutchburyi* (100%) | 32.14 g |
| NZA3740 | *Discaria toumatou* (100%) | 0.12 g |
| NZ8099 | Ribbonwood (33%), *Discaria toumatou* (23%), *Pittosporum* sp. (16%), *Myrsine australis* (15%), *Olearia* sp. (6%), *Hebe* sp. (6%) | 14 g |
| NZ8097 | *Plagianthus divaricatus* (38%), *Hebe* sp. (31%), *Discaria toumatou* (23%), *Kunzea ericoides* (4%), *Pseudopanax* sp. (4) | 10.5 g |
| NZ8096 | *Discaria toumatou* (40%), *Pittosporum* sp. (32%), Ribbonwood (28%) | 14.5 g |
| NZ8098 | *Discaria toumatou* (34%), Ribbonwood (28%), *Hebe* sp. (21%), *Coprosma* sp. (10%), *Nothofagus* sp. twig (7%) | 21.5 g |
| NZ8095 | *Discaria toumatou* (100%) | 21.5 g |

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