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# Dates from the Dunes: A Sequence for the Aupouri Peninsula, Northland, New Zealand

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**ABSTRACT**

Thirty-one radiocarbon dates have been collected from 20 archaeological sites on the Aupouri peninsula at the northern tip of New Zealand over the last 20 years. They range from 668 ± 34 to 160 ± 41 $^{14}$C years B.P. The first human impact on the region may have occurred earlier, perhaps about 1000 years ago. A three-phase sequence of occupation is proposed for the peninsula. It is suggested that an inland Holocene dune belt was occupied between 300 and 500 years ago but that earlier and later sites were largely confined to the coast.

*Keywords:* AUPOURI PENINSULA, COASTAL, DATING, DEFORESTATION, DUNE MOVEMENTS, HOLOCENE, NEW ZEALAND MAORI, NORTHLAND, PALYNOLOGY, PINAKI SOILS, PREHISTORIC POLYNESIAN, RADIOCARBON, SETTLEMENT PATTERNS.

## INTRODUCTION

It has been argued by Kirch (1986) that human settlement of Eastern Polynesia was earlier than had previously been supposed. More recently, Sutton (1987) has attempted to extend this argument to New Zealand, suggesting that human-induced deforestation in the far north, among other areas, dates to around the middle of the first millennium A.D. The Aupouri peninsula north of Houhora is unusual for New Zealand in that a relatively large number of radiocarbon dates from a variety of sites are available to date human settlement and environmental change within a limited area. None of these dates provides clear evidence for settlement earlier than about 1000 $^{14}$C years B.P. The peninsula provides a useful example, however, of the construction of a regional archaeological chronology based on palaeoenvironmental, geomorphological and palynological, as well as archaeological, sources.

The Aupouri peninsula forms the northern tip of the North Island of New Zealand. It comprises a series of former volcanic islands stretching from North Cape to Houhora, now linked to the mainland by a low, 85 km long, tombolo of Pleistocene origin. At least four complexes of dunes, spanning the entire Quaternary period, have been identified on the tombolo and discussed by various writers (Hicks 1975, 1977; Fleming 1980: 67–8; Hay 1981, 1983; Millener 1981: 45, 53; Petty 1982; Coster 1983a: 174–6).

The peninsula has produced many artefacts indicating a long sequence of pre-European Maori occupation (Blucher n.d.; Fairfield 1961; Coster and Johnston 1977; Moore *et al.* 1979: 57, 60, 75; Davidson 1982: 17–19, 25; Law 1984a; Taylor 1984: 51–2, 225; Coster

1985: 13, 20–23; Morgan and Leatherby n.d.; Prickett 1989). In particular, numerous artefacts of 'archaic' form (see Golson 1959) have been found on coastal dunes in the far north (Davidson 1982: 13–14, 19; Taylor 1984: 51–2). From Ninety Mile Beach, Coster and Johnston (1977) have reported a range of distinctively archaic adzes, many of materials such as Tahanga basalt or Nelson argillite, which were exploited in the early period of Polynesian settlement (Moore 1976: 90–1; Davidson 1984: 199). Only two datable sites, however, have been reported as producing such artefacts (Roe 1969; Taylor 1984). On the Ninety Mile Beach dunes, none of the archaic adzes found could be associated with intact deposits (Coster 1983a: 183).

In the unstable coastal dunes of the Aupouri peninsula, it is possible that most of the intact evidence of the first human occupations has disappeared through erosion. Our most reliable information on early human impact in the area therefore comes from direct dating of the few surviving early sites (see Shawcross 1972; Taylor 1984) and from indirect evidence such as palynological studies of undisturbed swamp deposits (see McGlone 1983) and studies of recent subfossil material (see Millener 1981). One potential source of evidence may be discounted. Rowland (1976) suggests that, in middens on the Coromandel peninsula, the presence of the large limpet *Cellana denticulata* represents a narrow temporal horizon spanning the thirteenth and fourteenth centuries, and may thus be used to identify early sites. The species occurs in a number of middens in the extreme north, between Twilight Beach and North Cape (Millener 1981: 131; Taylor 1984: 176–7; Morgan and Leatherby n.d.). It is unlikely to represent an early horizon in this region, however, since a substantial population occurs on the Three Kings Islands, less than 60 km offshore (Morton and Miller 1968: 336, 374) and specimens have recently been found by M. Bellingham on Motuopao Island, within 500 m of the mainland (identification confirmed by W. Ballantine, pers. comm.). *Paphies subtriangulata* shell from a midden (N1&2/969)[2] composed largely of *Cellana denticulata* at Tom Bowling Bay has given a radiocarbon age of 348 ± 34 years B.P. (NZ4688A, Millener 1981: 847), removing any likelihood that the limpet necessarily represents early occupation.

Before 1980, only one archaeological site north of Kaitaia (N6/4, at Houhora, see Shawcross 1972) had been dated by radiocarbon analysis. This paper presents 31 radiocarbon dates from the Aupouri peninsula and proposes a prehistoric sequence for the area. Twenty of the dates come from the Aupouri Sand Dunes Archaeological Study (Coster 1983a). There are also five from Houhora (Shawcross 1972; Millener 1981), three from coastal middens sampled by Millener (1981), two from the Motutangi Swamp (Barber 1984) and one from Te Rehia or Twilight Beach (Taylor 1984). Results from Taumataawhana pā (Davidson 1982) and the Ponaki swamp (Enright *et al.* 1988) are also considered briefly. The location of all sites and localities mentioned in the text is shown in Figures 1 to 3.

## THE DATES AND THEIR SOURCES

Table 1 presents 31 dates from 20 sites on the Aupouri peninsula. In order to simplify subsequent discussion, the number of dates has been reduced in Table 2 to 20, representing 19 sites. In five cases, where the dates overlap at one standard error, and there is reasonable evidence that contemporary events are being dated, multiple dates from a single site (or in one instance, two adjoining sites) have been pooled by the method of Leach (1972) and Law (1975: 449–50). Although none of these dates are either stratigraphically or spatially linked, it is felt that the relative imprecision of $^{14}C$ dating and the probable lack

of time depth within individual sites justifies this procedure. Table 2 gives two dates for one site (N6/4) because two apparently separate occupations are being dated. In four cases, discussed below, dates from charcoal have been rejected as unreliable (N6/4, N6/444) or adjusted (N6/315) for probable 'inbuilt' age (McFadgen 1982: 384–8). Unless otherwise specified, all dates discussed in this paper are given as radiocarbon years before present

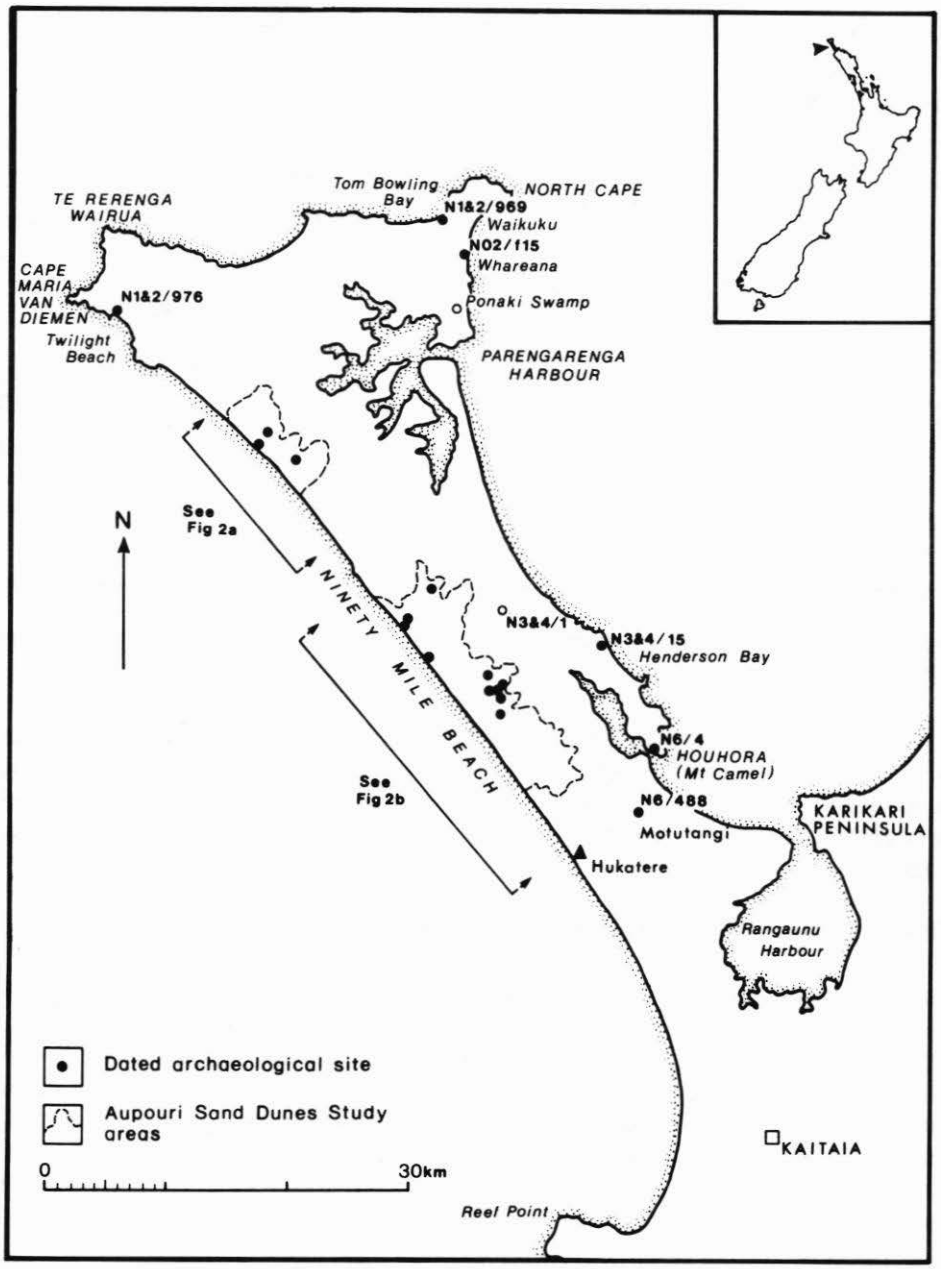


*Figure 1*: Aupouri peninsula, showing sites and places mentioned in the text.

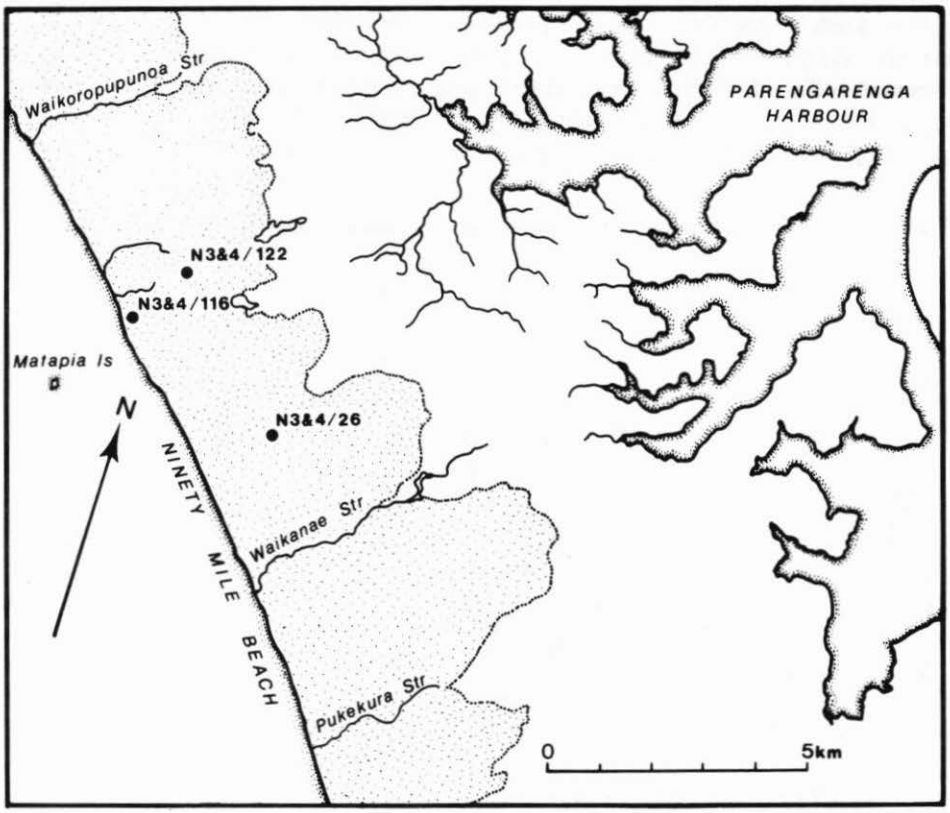


*Figure 2*: Aupouri Sand Dunes Archaeological Study, northern area, showing dated sites. See Figure 3 for key.

(1950), with respect to the old (Libby) half-life of carbon 14, without correction for secular effects. This convention is adopted for the sake of consistency with previous publications. In accordance with Law's (1984b) contention that it is unnecessary to increase the standard error of shell dates, as advocated by McFadgen (1982: 384), no such adjustments have been made.

## THE AUPOURI SAND DUNES ARCHAEOLOGICAL STUDY

During fieldwork carried out for the New Zealand Forest Service between 1976 and 1986, some 400 archaeological sites were recorded in two areas of sand dunes, totalling some 12000 ha, adjoining Ninety Mile Beach on the west coast of the Aupouri peninsula (Coster 1986). Additional surveys have recently been carried out by Johnson (n.d.). An intensive study of some of these sites was undertaken between 1980 and 1983 (Coster 1983a, 1983b). One of the study's major aims was to establish a chronological sequence for human occupation sites on the west coast dunes, using radiocarbon dating (Coster 1983a: 183). Twenty dates for 14 sites within the study areas (see Table 1 and Figs 1–3) are presented in this paper.

Within the study areas, site distribution varies as one moves inland from the west coast. Most of the coastal sites form a dense, narrow band between 50 m and 350 m from high

water mark, whereas the majority of inland sites lie between 1.6 and 4.6 km from the sea (Coster 1986 (Pt 1): 17). There is no clear dividing line between the two groups, but rather a broad irregular hiatus comprising a region of relatively low site density. This region coincides, in the southern of the two study areas at least, with a low-lying coastal deflation zone (Hicks 1975: 25–8; Hay 1981: 3–4, 1983: 9) where it is possible that a higher than

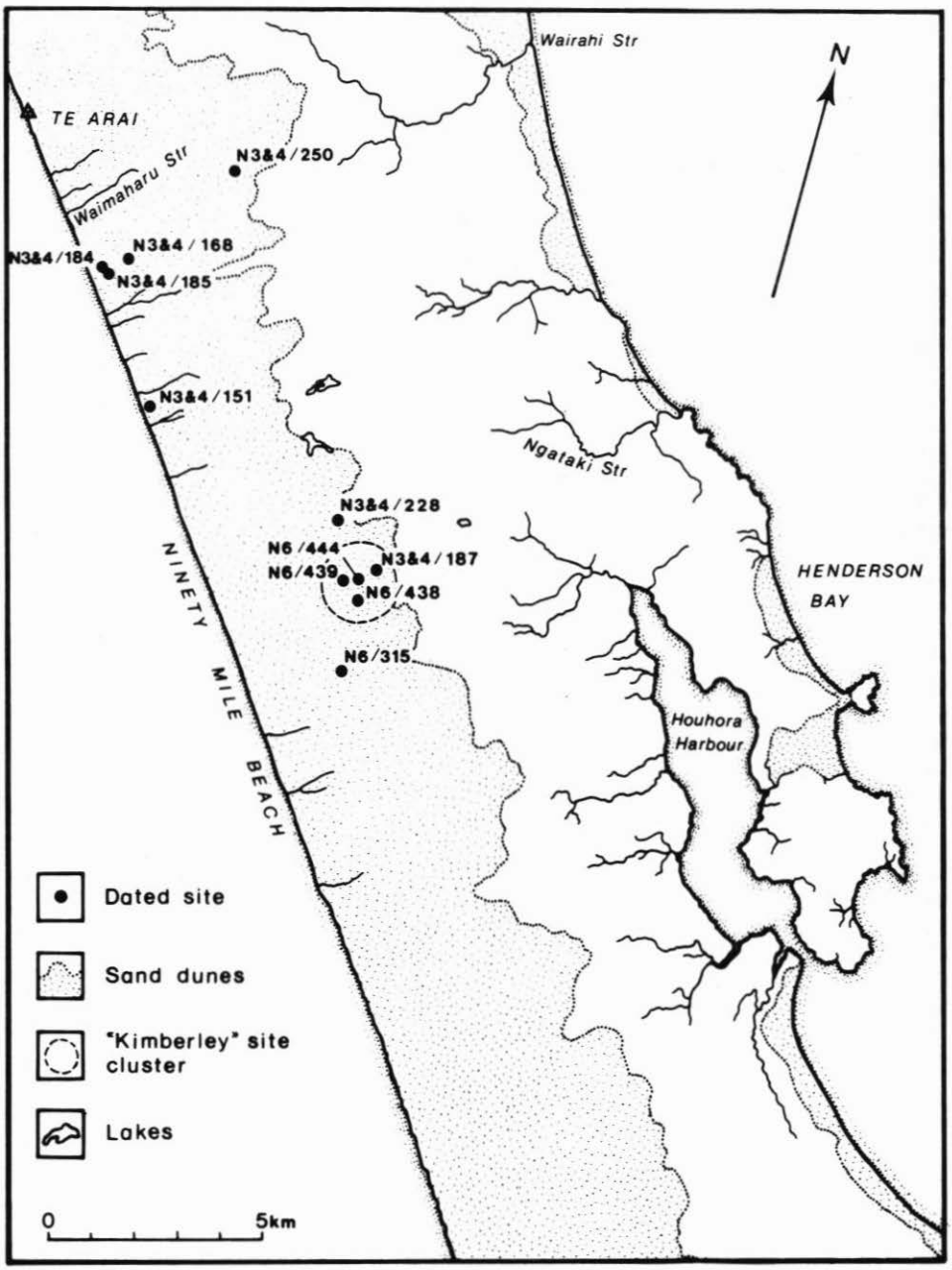


*Figure 3*: Aupouri Sand Dunes Archaeological Study, southern area, showing dated sites.

normal proportion of sites have been obscured by windblown sand or destroyed by wind deflation (Coster 1986 (Pt 1): 7). The division between coastal and inland sites has been set at 750 m from the sea.

In contrast to the situation described by Adkin (1948) for Horowhenua, where there has been considerable coastal progradation and uplift during the period of human occupation, the Aupouri coastline appears to have been stable. In the northern part of the study area, a

TABLE 1: RADIOCARBON DATES FROM ARCHAEOLOGICAL SITES ON THE AUPOURI PENINSULA.

| SITE No. | NZ No. | MATERIAL[1] | Libby Age[2] | CRA[3] | DISTANCE[4] |
|---|---|---|---|---|---|
| N02/f15 | 4682 | sh | 160 ± 41 | 497 ± 39 | 200 |
| N1&2/969 | 4688 | sh | 348 ± 34 | 685 ± 32 | 150 |
| N1&2/976 | 6579 | sh | 668 ± 34 | 1004 ± 38 | 150 |
| N3&4/15 | 4609 | sh | 480 ± 70 | 819 ± 56 | 100 |
| N3&4/26 | 7066 | sh | 430 ± 30 | 766 ± 30 | 1600 |
| N3&4/116 | 7067 | sh | 187 ± 26 | 520 ± 50 | 200 |
| N3&4/122 | 7068 | sh | 480 ± 40 | 816 ± 40 | 1450 |
| N3&4/151 | 6226 | sh | 236 ± 56 | 574 ± 54 | 100 |
| N3&4/151 | 6281 | sh | 338 ± 47 | 675 ± 45 | 100 |
| N3&4/151 | 6282 | sh | 319 ± 58 | 656 ± 55 | 100 |
| N3&4/168 | 6298 | sh | 362 ± 58 | 699 ± 55 | 850 |
| N3&4/184 | 6301 | sh | 195 ± 56 | 528 ± 54 | 250 |
| N3&4/184 | 6302 | sh | 260 ± 47 | 597 ± 45 | 250 |
| N3&4/185 | 6299 | sh | 245 ± 56 | 609 ± 65 | 250 |
| N3&4/187 | 7069 | sh | 375 ± 40 | 711 ± 40 | 3700 |
| N3&4/228 | 7070 | sh | 445 ± 40 | 781 ± 40 | 3300 |
| N3&4/250 | 7097 | sh | 420 ± 30 | 756 ± 30 | 3900 |
| N6/4 | 916 | ch | 796 ± 56 | 775 ± 61 | 100 |
| N6/4 | 914 | ch | 690 ± 44 | 697 ± 49 | 100 |
| N6/4 | 915 | ch | 556 ± 55 | 563 ± 61 | 100 |
| N6/4 | 5007 | mbc | 601 ± 57 | 563 ± 56 | 100 |
| N6/4 | 5008 | mbc | 624 ± 46 | 585 ± 46 | 100 |
| N6/315 | 6581 | ch | 430 ± 33 | 430 ± 32 | 2100 |
| N6/438 | 6227 | sh | 339 ± 58 | 675 ± 55 | 3050 |
| N6/439 | 6228 | sh | 348 ± 46 | 685 ± 44 | 2900 |
| N6/439 | 6303 | sh | 342 ± 57 | 679 ± 55 | 2900 |
| N6/439 | 7105 | sh | 393 ± 59 | 729 ± 59 | 2900 |
| N6/444 | 6229 | sh | 361 ± 57 | 698 ± 55 | 3200 |
| N6/444 | 6608 | ch | 483 ± 42 | 482 ± 40 | 3200 |
| N6/488 | 6448 | pt | 343 ± 56 | 343 ± 60 | 2700 |
| N6/488 | 6447 | pt | 266 ± 56 | 266 ± 60 | 2700 |

Notes

(1) sh = marine shell (*Paphies* spp.); ch = charcoal; mbc = moa bone collagen; pt = peat.

(2) Libby Age refers to the old half life (5568yr). Dates younger than 250 yr B.P. calculated by Garry Law (pers. comm.).

(3) CRA = Conventional Radiocarbon Age. Supplied by Institute of Nuclear Sciences (Leach pers. comm.).

(4) Distance from coast in metres.

presumed Flandrian cliff-line relating to the Holocene sea level maximum (Millener 1981: 112–117, 457; Gibb 1979) lies within about 50 m of the present day high water mark. This indicates a very slow rate of progradation, if any, over the last 6500 years. Further, at least one coastal midden complex on Ninety Mile Beach (N3&4/151), only 150 m from high water mark, dates to the same period as the inland sites. The gap between inland and coastal sites cannot therefore be ascribed to recent coastal progradation.

Factors governing site distribution on the Ninety Mile Beach dunes appear to be both environmental and functional. Coastal sites are generally underlain by unweathered dune sand, whereas inland sites tend to be situated on weathered sandy soils of varying degrees of consolidation. The difference may represent contrasting environments at the time of occupation—perhaps low, open sand-binding vegetation on the coast and bush clad but arable soils further inland. Functional differences between the two groups are reflected in midden content and the presence of artefacts ranging from stone adzes to obsidian flakes. The distinctive content of most coastal middens, which contain large quantities of concentrated, burnt and crushed shell, appears to represent large scale shellfish processing areas, quite different from living sites further inland (Coster 1983a: 186–7). This functional difference is supported by the general absence of artefacts on coastal sites, whereas artefacts are found on about 60 percent of inland sites, though only 16 sites contain large numbers (100–1100) of items (Coster 1986 (Pt 2): 11–13).

One particular group of inland sites, termed the 'Kimberley cluster' (see Fig. 3), are large and artefact-rich. They lie within an area of about 3 $km^2$ comprising mainly Pinaki soils (Sutherland *et al.* 1979) formed on Holocene dunes of the Kimberley complex (Hay 1981: 4, 15; 1983: 9), near a former gumfield known as Kimberley Flat. They may represent permanent villages associated with gardens.

The sites dated in the Aupouri study were generally small, shallow (5–15 cm) middens with little or no internal stratigraphy. Seven dates, however, came from three large complex coastal middens with some stratigraphic depth (30–50 cm). Of the 13 inland samples, one is from the stratified fill of a large hāngi (earth oven), one is from the stratified fill of a small pit, and one is from a shallow, deliberately filled, scoop. Six of the samples were taken from five stratigraphically excavated test squares on four separate sites, the remainder being from freshly spade cut sections (see Coster 1983a: 178–80, 1988: Appendix).

The collection of samples for dating was biased by three main factors. Firstly, the study concentrated on sites which lay more than 300 m from the coast, since it was these which were most immediately threatened by proposed afforestation of the dunes (Coster 1983a: 177). Samples for dating were therefore collected mainly from inland sites, with a small number from coastal sites for comparison. The resulting bias is, however, relatively small. Forty percent of the sites recorded (about 160 out of some 400) are classed as coastal (within 750 m of the sea), while the remaining 60 percent are inland (Coster 1986 (Pt 1): 17). Thirty-five percent of the samples submitted for dating (7 out of 20) were from coastal sites, and 65 percent from inland sites (see Table 1).

A second potential source of bias is that samples could only be collected from sites with intact middens or ovens. Prolonged wind deflation has removed all *in situ* deposits from 40 percent of all the sites recorded (Coster 1986 (Pt 2): 7) and, more significantly, from over half of the inland sites. Selection of deposits for dating was therefore dictated as much by availability as by representativeness, as the uneven distribution shown in Figure 1 indicates.

The third major bias of the study resulted from the emphasis placed on reconstructing the prehistoric environment of the present dunes. Samples submitted for dating were generally

from sites which landsnail analysis, carried out by Dr R. T. Wallace (University of Auckland), had indicated were associated in the past with coastal forest (see Coster 1983a: 182–3). The dates tend therefore to be from relatively intact sites, from inland rather than coastal sites, and from sites for which there is evidence of former association with forest rather than with shrubland or lighter dune vegetation. It is felt nonetheless that the dates are reasonably representative of the Aupouri study areas, particularly since they conform with dates collected from comparable sites by Millener (1981) and with those collected by Barber (1984).

The 20 dates from the Aupouri sand dunes study are considered briefly below. Details of their context are reported elsewhere (Coster 1988: Appendix). With the exception of two charcoal dates (NZ6581, NZ6608) the samples are marine shell (*Paphies subtriangulata* or *P. ventricosa*) and, in the absence of evidence to the contrary, are considered to be comparable. In all cases, even where samples were stratigraphically separated, the time depth represented within each site is relatively small.

Single dates from eight sites are presented in Table 2 without any adjustment or pooling. Six of these (NZ7066, NZ7068, NZ6298, NZ7069, NZ7070, NZ7097, from sites N3&4/26, 122, 168, 187, 228 and 250 respectively) are from small shallow deposits lacking any real internal complexity. NZ7067 (N3&4/116) is from a depth of about 10 cm within an upper deposit of a complex, stream cut, stratified and slumped coastal midden. In the absence of any other dates it can only be said to give a time for occupation of the site. NZ6227 (N6/438) is from an isolated, diffuse lens of shell midden sealed by lightly weathered, and possibly redeposited, sand. It represents one of the few cases where an inland midden deposit was found beneath a substantial depth (0.7 m) of sand or soil, but, in the absence of other stratified datable material from the site, it also gives no more than a simple date for occupation.

For the four sites from which two or more shell dates were obtained without revealing any significant time depth, the dates were pooled to give a single date for each site (or, in one case, for a pair of sites). NZ6226 and NZ6281 (N3&4/151) are from two layers of midden separated by 10–20 cm of sterile sand (see Coster 1983a: Plate 2). The two dates are not significantly different, just overlapping at one standard error, and may be pooled at 297 ± 37 years B.P. A third date from N3&4/151 (NZ6282) is from a separate midden within the same site complex whose date is again not significantly different from those for NZ6226 or NZ6281. The three midden depositions dated could, in other words, have occurred virtually simultaneously. The three dates may be pooled at 304 ± 31 years B.P.

NZ6301, NZ6302 and NZ6299 are from two deposits only 70 m apart which, although recorded separately as N3&4/184 and N3&4/185, may be regarded as a single unit. NZ6301 and NZ6302, from separate layers within the same midden, indicate no significant timespan between the two depositions. They overlap at one standard deviation and may be pooled at 234 ± 34 years B.P. NZ6299, from N3&4/185, gives a date midway between NZ6301 and NZ6302, confirming that the 'site', although a separate deposit, is effectively contemporary with N3&4/184. The three dates pool at 237 ± 31 years B.P.

NZ6228, NZ6303 and NZ7105 date various features of site N6/439, a very large (4 ha) inland valley floor occupation area. The relatively high density and overall similarity of occupation debris on the site, together with a general lack of stratified or complex deposits, suggests that it represents a single occupation, or series of occupations, over a short period of time. This impression is confirmed by the three dates, which overlap at one standard error and pool at 358 ± 31 years B.P.

NZ6608 and NZ6581 are charcoal dates from sites N6/444 and N6/315. The drawbacks of charcoal as a radiocarbon dating medium have been discussed at some length. McCulloch and Trotter (1975: 11, 13) suggest that charcoal dates average about 200–300 years older than stratigraphically contemporary shell or bone collagen. Caughley (1988: 250) puts the average difference at around 240 years and argues that charcoal dates cannot be combined with shell or collagen dates to construct a relative chronology. McFadgen (1982: 384) suggests an average inbuilt age of 100–200 years. Law (1984b: 5, 7), using recent data from sites where both shell and charcoal dates are available, calculates that charcoal dates are on average only 83 years 'older' than shell dates. He suggests, however, that because the average difference between shell and charcoal dates is heavily skewed by charcoal samples with a large inbuilt age, it is more valid to compare the modal difference between the two. If this argument is accepted, then shell and charcoal from contemporary deposits give closely similar dates, provided that the charcoal is from relatively young wood with minimal inbuilt age.

For N6/444, a partly-deflated inland occupation area, NZ6608 (charcoal) gives a most probable date 122 years older than that for NZ6229 (shell) from an overlying midden. The two just fail to overlap at one standard error. Taraire (*Beilschmiedia tarairi*) was the dominant species in the charcoal sample, with kanuka (*Kunzea ericoides*) or manuka (*Leptospermum scoparium*) in minor quantities and other unidentified species also present. The charcoal was from small branches and twigs, with fragments of larger branches (Molloy pers. comm.) and as such is unlikely on average to have any great inbuilt age. The stratigraphy of the deposit from which NZ6229 and NZ6608 were taken neither suggests nor excludes any great time depth between the two. For purposes of comparison, therefore, the shell date of 361 ± 57 years B.P. will be taken to represent occupation of the site, with the proviso that initial occupation, represented by the charcoal date, may have occurred a century or so earlier. It is worth noting that NZ6608, regardless of how it relates to human occupation of N6/444, does indicate that taraire and manuka or kanuka were growing on or near the site some 500 years ago.

The second charcoal date (NZ6581), from an oven on site N6/315, was identified as taraire (dominant) and kanuka (sub dominant) by Molloy (pers. comm.). The material comprises large branch wood with many insect borer holes, suggesting the use of dead wood from the forest floor rather than live plants. Taraire is a medium sized tree, the trunk reaching as much as a metre across, while kanuka, though smaller, may reach a trunk diameter of 0.6 m (Salmon 1980: 103, 161). The growth rates of New Zealand trees are not well known (Salmon 1980: 30) but it seems unlikely that firewood gathered from dead branch wood of these two species would have an average inbuilt age of more than 50 years. If this figure is subtracted from NZ6581 to compensate for likely inbuilt age, the result of 380 ± 33 years B.P. is very close to the shell dates for the nearby sites N6/438, 439, 444 and N3&4/187. Though not in itself a justification for adjusting the date, the correspondence between N6/315 and these sites of the Kimberley cluster is consistent with their general similarity of site type, artefact assemblage, locality and situation.

Three general points may be made about the results from the Aupouri study. Firstly, if statistical error is not taken into account and the mean, or most likely, date for each site is considered alone, the three coastal sites (N3&4/116, 151, 184–185) are younger than any of the inland sites. Working from Table 2, the average age of the three coastal sites (243 years B.P.) is 150 years less than the average for the ten inland sites (395 years B.P.). Secondly, and considering inland sites only, there appears to be a general decrease in age from north to south (see Fig. 7). Thirdly, four of the sites dated (N3&4/187, N6/438, 439,

444) belong to the Kimberley cluster, a distinctive concentration of large, artefact-rich, presumed living sites which, because of their general similarity, and their distinctiveness in relation to other sites recorded during the study, were felt to form a cultural, and possibly temporal, unit. This supposition is borne out by their radiocarbon ages, which range from 375 ± 40 to 339 ± 58 years B.P., representing a likely difference of only 36 years, or less than one standard error. N6/315 (380 ± 33 years B.P.) could also be assigned to this group on the basis of age, location and number of artefacts.

## HOUHORA (MOUNT CAMEL), N6/4

Excavations at the mouth of the Houhora Harbour, undertaken by the University of Auckland's Department of Anthropology in 1965–66, revealed an extensive early site with many 'archaic' artefacts and an economy based on moa (mainly *Euryapteryx* spp.), seal hunting and fishing (Shawcross and Roe 1966; Roe 1969; Shawcross 1972; Millener 1981: 240–1, 243; Davidson 1982: 17–19; Smith 1985: 278–91). Until recently, the site was the only one in the far north which had been investigated in detail by archaeologists.

Shawcross (1972: 605) reported two radiocarbon dates for the Houhora site of A.D. 1154 ± 56 and A.D. 1260 ± 44. These are said to represent respectively the "earliest cultural deposits" and the end of the original occupation. They correspond to ages of 796 ± 56 years B.P. (NZ916) and 690 ± 44 years B.P. (NZ914). A third date of 556 ± 55 years B.P. (NZ915) is said to be from an agricultural soil sealing the main occupation (Shawcross 1972: 605; Davidson 1982: 19, 1984: 249). The three dates are all from charcoal (Davidson 1984: 249).

Two moa bone collagen dates (NZ5007, NZ5008), obtained by Millener for the Houhora site, agree well with each other and postdate the earliest charcoal date by nearly 200 years. Millener suggests that the collagen dates are of greater reliability than the charcoal dates but gives no details of their archaeological context or stratigraphic position, except to note that they come from unnumbered specimens in the University of Auckland Anthropology Department (Millener 1981: 243, 847–8).

Millener's dates for the earliest occupation at Houhora will be adopted in preference to the two previously published charcoal dates, for three reasons. Firstly, Law's (1984b: 5) and Caughley's (1988: 249) contention that moa bone collagen dates are generally consistent with marine shell dates makes them more suitable for this paper, where most dates are from shell. Secondly, any charcoal whose inbuilt age cannot be estimated must be regarded as unreliable for dating. Thirdly, although the context of Millener's specimens is not well defined, the same criticism may be made of Shawcross' charcoal dates, whose stratigraphic position and context is described only loosely (Shawcross 1972: 605).

NZ5007 and NZ5008 differ from each other by only half of one standard error. They will be regarded as dating a single event (the early occupation) and pooled, giving a date of 615 ± 36 years B.P. The late charcoal date (NZ915) will be regarded as coming from a separate occupation, bearing no direct relationship to the dates for the earlier occupation on the site. As with other charcoal dates, however, the possibility that the sample is substantially older than its supposed context needs to be borne in mind.

TWILIGHT BEACH (TE REHIA), N1&2/976

This site is a remnant coastal midden, formerly recorded in the New Zealand Archaeological Association's site record file as N1&2/106. It lies at the northern end of Twilight Beach, just south of Cape Maria van Diemen, and was excavated in 1981 by a team from the Anthropology Department, University of Auckland (Taylor 1984). Numerous bones of seals (*Arctocephalus forsteri*), pilot whales (*Globicephala melaena*), forest birds and fish were recovered from the site, along with artefacts of early Maori type, notably one-piece bone bait hooks (Taylor 1984: 103, 180–93, 242–9; see also Davidson 1984: 66–8). In its faunal and artefactual content, though probably not in its extent or function, the site is clearly analogous to the Houhora site (Taylor 1984: 224–5).

NZ6579 dates a sample of toheroa (*Paphies ventricosa*) shell taken from Layer III at the base of the Twilight Beach midden (Taylor pers. comm.). The site is considered to have accumulated over a relatively short period, perhaps a single summer (Taylor 1984: 198–9, 203), so the date may be taken to be representative of the site as a whole.

MOTUTANGI, N6/488

As part of a wider study, Barber (1984: 70–127a, 220) undertook a number of small test excavations, apparently in the immediate vicinity of grid reference N03:242039 (New Zealand Lands and Survey 1984) on the western part of archaeological site N6/488. The site is part of a complex of presumed horticultural ditch systems on the western edge of the Motutangi Swamp, some five kilometres south of the Houhora site.

NZ6447 and NZ6448 are described by Barber (1984: 78, 91, 118, 123, 127a) as coming from two separate samples of peaty soil taken from directly above basal lenses of water-deposited sand in an artificial ditch. He argues that organic matter from the base of a ditch in which water was flowing "...would have decomposed into a peaty soil or peat *immediately after* the canal had ceased functioning..." [emphasis mine] and that cessation of function would have equated roughly with abandonment of the ditch system (Barber 1984: 91, 123). It is, however, easy enough to imagine a drain or irrigation channel continuing to carry water, without accumulating a significant amount of organic matter, for several years at least after last being cleaned out.

The dates can be interpreted, therefore, only as representing some time after the ditch was last cleaned out, that is after initial establishment of the Motutangi garden systems, rather than necessarily dating abandonment of the ditch system as Barber suggests. Since the two dates apparently represent the same event, and overlap at less than one standard error, a pooled date of 305 ± 40 radiocarbon years B.P. is adopted in this paper.

Peat cores were collected from N6/488 by Barber for palynological analysis by M. S. McGlone (Botany Division, DSIR, Christchurch). One of these (pollen core 3) was radiocarbon dated to determine an approximate date for deforestation in the Motutangi region. Barber is not specific about the situation from which pollen core 3 was taken, but it would appear to be from pasture land rather than from an undisturbed swamp deposit (see Barber 1984: 109–11, 127a). McGlone's analysis indicated a period of deforestation bracketed by two radiocarbon dates of 338 ± 56 years B.P. (NZ6358A) and 545 ± 52 years B.P. (NZ6388A) (Barber 1984: 260–3). Barber (1984: 261) takes a rounded arithmetic mean of the two dates to give an estimate of approximately 450 years B.P. for deforestation at Motutangi. Applying a rigorous interpretation, it would be more correct to say that

deforestation occurred after the lower limit (to two standard errors) of the earlier date, that is after 649 radiocarbon years B.P. Similarly, a much higher level of land clearance and burning (indicated by dramatic increases in charcoal levels and Graminae pollens) appears to have occurred after the lower limit (to two standard errors) of the later date, that is, after 450 years B.P. (see Barber 1984: 263).

## MILLENER'S SITES, N02/f15, N1&2/969, N3&4/15

Three archaeological sites between Houhora and the North Cape area have been dated by Millener (1981) in the course of an extensive study of the Holocene avifauna of the region. All are coastal middens underlain by Holocene sands. N1&2/969, at Tom Bowling Bay, is a one metre thick deposit containing, among other shellfish species, *Cellana denticulata*, *Turbo smaragdus*, and *Paphies subtriangulata* (Millener 1981: 131). N02/f15 (Geological Society of New Zealand fossil record number) represents an extensive midden toward the northern end of Whareana Bay (Millener 1981: 159–61, Fig. 65). The only archaeological site recorded at Whareana is N1&2/70, which seems unlikely to correspond to Millener's site with any degree of precision (see Davidson 1975: Appendix). N3&4/15 is a complex of shell middens at the northern end of Henderson Bay. The deposit which Millener sampled appears to have been one of a group of individual middens within Area B, feature (i), of the site, situated on the top of a coastal escarpment some distance from a foreshore deposit originally identified by Coster and Johnston (1976b: 6–10) as archaic (see also Coster and Johnston 1976a; Millener 1981: 179, Fig. 75).

Millener provides no information on the internal stratigraphy or differentiation of the three coastal middens he dated. All that can be inferred from his dates, therefore, is that in each case they represent human occupation at the site. The dates are from marine shell (*Paphies subtriangulata*).

## THE PONAKI SWAMP

Recent core sampling and dating of sediments in the Ponaki swamp by Enright *et al.* (1988: 375) resulted in a radiocarbon date from charcoal of 239 ± 55 years before 1950 (NZ6824A). This result dates swamp sediments at a depth of 2.17 m and represents a major period of pre-European burning. Pollen analysis indicated a deforested environment before this event.

## TAUMATAAWHANA PĀ, N3&4/1

An unreported radiocarbon date of 3140 years B.P. (Hicks 1977: 58), obtained by D. Vincent of Kaitaia on a sample collected from an apparently adzed stump, is almost certainly from subfossil swamp wood. It is not considered relevant to the present discussion, since it is unlikely to bear any direct relationship to the date of the site itself (see Davidson 1982: 24–25).

## RESULTS

Table 2 presents the 20 dates obtained by pooling, adjustment or rejection of the original 31 dates given in Table 1. They are arranged in order of age and grouped into three periods — early, middle and late. The spread of dates is illustrated by a histogram in Figure 4. Early sites, represented by Twilight Beach and Houhora, are most likely to be older than 500 years, while late sites are most likely to be younger than 250 years. Middle period sites range from 300 to about 500 years in age. The dates presented in Table 2 are illustrated in Figure 5. In Figure 6, they are rearranged according to distance from the sea. Early and late sites are confined to the coast, whereas most middle period sites lie further inland. If sites from the Aupouri dunes study alone are considered, 92 percent (or all but one) of the middle period sites lie in the inland zone.

Table 2 also shows the relative distance northwards along the Aupouri peninsula of each inland site. This distance was measured on a map by drawing a tangent to the central portion of the slightly curving Ninety Mile Beach and then dropping perpendiculars from it to each site and to Hukatere, a prominent hill on the west coast to the south of Houhora. Distance northwards (actually northwestwards) along the peninsula is expressed in kilometres from each perpendicular to that through Hukatere. Figure 7 plots age against distance along the peninsula for these sites. A significant correlation is observed between the two variables.

## DISCUSSION: CHRONOLOGY OF SETTLEMENT ON THE AUPOURI PENINSULA

Evidence for the age of Polynesian settlement in the far north comes from two main sources: direct dating of archaeological sites and indirect dating of human influence through deforestation and faunal extinction. These will be discussed in turn.

### ARCHAEOLOGICAL DATES

As described above, radiocarbon dates for the Aupouri peninsula can be grouped into early, middle and late categories. Two of the three early dates relate to occupations at Twilight Beach (N1&2/976) and Houhora (N6/4) which occurred between 600 and 700 years ago and are demonstrably archaic in economy and material culture. Twilight Beach replaces Houhora as the earliest dated site in Northland, if both the unreliability of unidentified charcoal and the comparability of shell and moa bone collagen as dating materials are accepted. The third early date, from the overlying agricultural soil at Houhora, may also relate to early occupation, but could equally represent charcoal from old wood with substantial inbuilt age or derived originally from a context other than that which it is claimed to date.

The middle dates span a probable period of 200 years, between 300 and 500 years ago. With one marginal exception, each of the 14 dates in the middle group lies within one standard error of its nearest neighbours. Most of the sites from the middle period lie within the Aupouri sand dunes study area, and of these only one is coastal. There appears to be a progressive reduction in age of the inland dune sites along the peninsula from northwest

TABLE 2: POOLED AND ADJUSTED RADIOCARBON DATES FOR THE AUPOURI PENINSULA.

| PERIOD | COLLECTOR | NZ No. | SITE No. | YRS BP | SE | INLAND/ COASTAL | DIST NTH km |
|---|---|---|---|---|---|---|---|
| | Taylor | 6579 | N1&2/976 | 668 | 34 | C | - |
| Early | Millener | 5007,5008 | N6/4 | 615 | 36 | C | - |
| | Shawcross | 915 | N6/4 | 556 | 55 | C | - |
| | Millener | 4609 | N3&4/15 | 480 | 70 | C | - |
| | Coster | 7068 | N3&4/122 | 480 | 40 | I | 43 |
| | Coster | 7070 | N3&4/228 | 445 | 40 | I | 16 |
| | Coster | 7066 | N3&4/26 | 430 | 30 | I | 40 |
| | Coster | 7097 | N3&4/250 | 420 | 30 | I | 25 |
| | Coster | 6581 | N6/315 | 380 | 33 | I | 13 |
| Middle | Coster | 7069 | N3&4/187 | 375 | 40 | I | 15 |
| | Coster | 6298 | N3&4/168 | 362 | 58 | I | 24 |
| | Coster | 6229 | N6/444 | 361 | 57 | I | 15 |
| | Coster | 6228,6303,7105 | N6/439 | 358 | 31 | I | 15 |
| | Millener | 4688 | N1&2/969 | 348 | 34 | C | - |
| | Coster | 6227 | N6/438 | 339 | 58 | I | 14 |
| | Barber | 6447,6448 | N6/488 | 305 | 40 | I | 0 |
| | Coster | 6226,6281,6282 | N3&4/151 | 304 | 31 | C | - |
| | Coster | 6299,6301,6302 | N3&4/184,185 | 237 | 31 | C | - |
| Late | Coster | 7067 | N3&4/116 | 187 | 25 | C | - |
| | Millener | 4682 | N02/f15 | 160 | 41 | C | - |

Notes:

Based on old half life without secular correction (Libby Age). One date per site except N6/4, where two occupations are possible. Distance north measured northwestwards from Hukatere.

to southeast (Fig. 7). This may indicate that occupation of the inland dunes spread southwards from the Parengarenga area over a period of a century or two.

The three youngest dates, all less than 250 years B.P., which form the late group, are from coastal middens. The lack of dates younger than 300 years B.P. for the Ninety Mile Beach inland dune sites suggests that by that time they were no longer occupied. The suggestion (Coster 1983a: 186–7) that the majority of coastal sites on Ninety Mile Beach result from shellfish preservation activities therefore raises the possibility that during the late period people were visiting that part of the peninsula mainly to obtain and preserve shellfish for storage, and that such visits may have been seasonal or infrequent because people were living some distance away to the east or north. The question of whether or not any substantial occupation of the Ninety Mile Beach coastal zone had occurred in the early or middle periods might be clarified by further dates. It is possible, however, that deflation and sand movement on this coast have destroyed or hidden all but the more recent coastal sites.

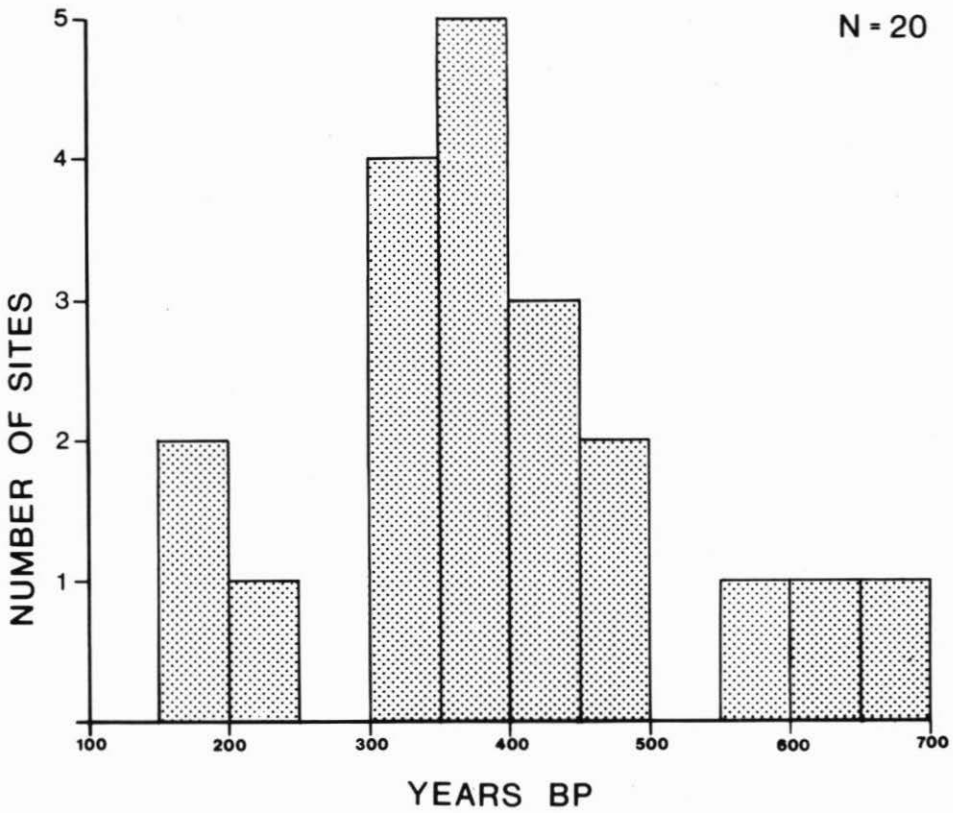


*Figure 4*: Bar chart showing distribution through time of archaeological $^{14}C$ dates from Aupouri peninsula. Data taken from Table 2.

## DEFORESTATION AND FAUNAL EXTINCTIONS

The evidence from palynology broadly supports the direct archaeological dates. Barber's and McGlone's results from Motutangi (N6/488) suggest that initial forest clearance in the area could have occurred at about the same time as the earliest dated human occupations, that is, around 600–700 years ago, though it appears more likely to date from the middle period, when occupation of the Motutangi site probably occurred. McGlone's pollen core date from Motutangi of 338 ± 56 years B.P., after which a substantial increase in land clearance and burning is indicated, comes toward the end of the middle period and may correspond to abandonment of the erosion-prone inland dunes.

Millener (1981:146, 155–6, 240–7, 285–96, 456–8, 768, 779, 782–3) argues that, between about 6500 and 1000 years ago, extensive forests, growing on coastal dunes in the far north, supported a rich avifauna. A variety of evidence, including radiocarbon dates from subfossil bird bone, *Placostylus* shell and wood is cited in support of this contention (Millener 1981: 847–8). Millener notes a general lack of any natural faunal remains younger than about 1000 years and a virtual absence of bird bones from midden deposits younger than 500 years. He concludes that a sudden decline in the bird population between these two dates

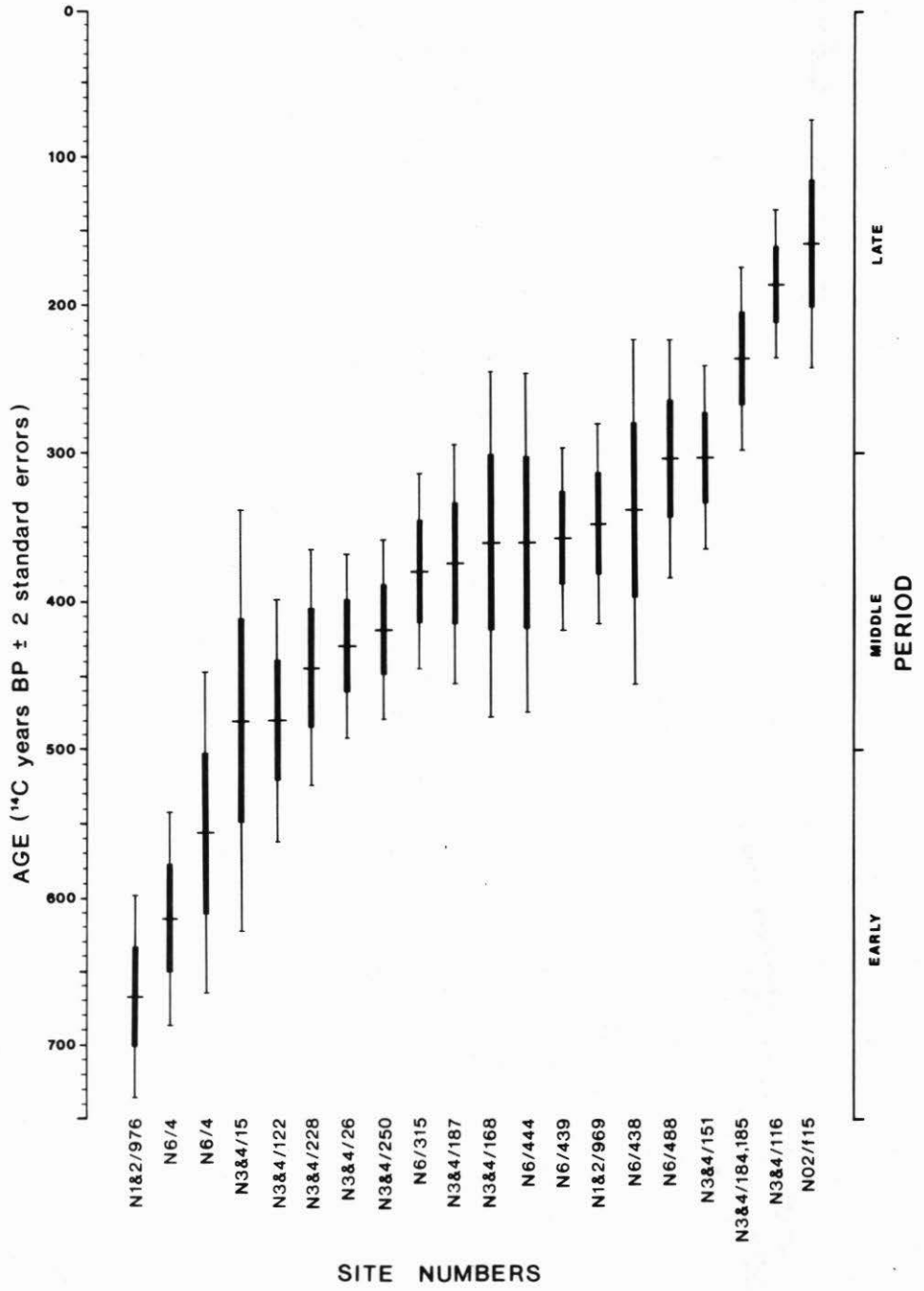


*Figure 5*: Radiocarbon dates from Aupouri peninsula in chronological order, showing statistical range to two standard errors. Data taken from Table 2. N = 20.

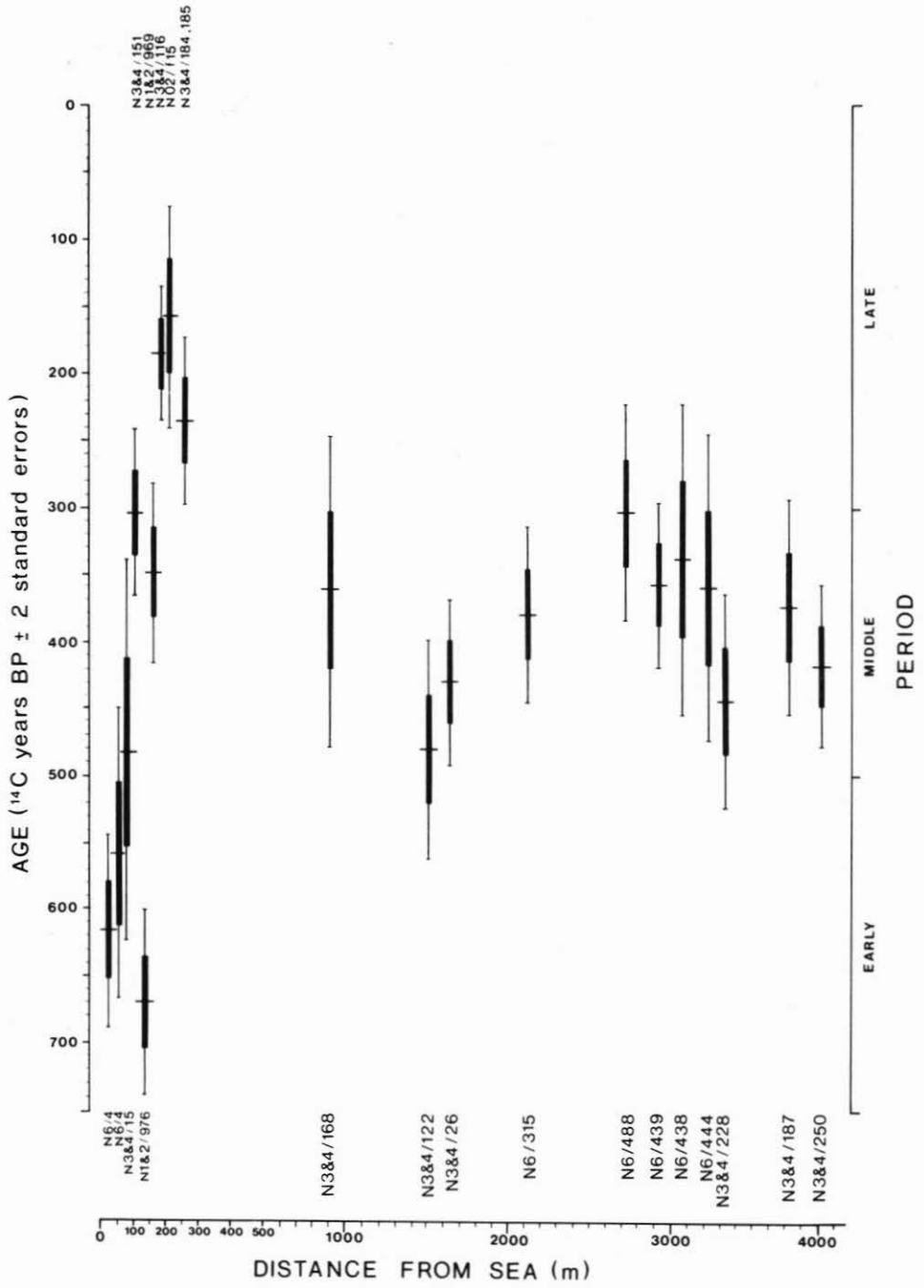


*Figure 6*: Plot of age against distance from coast for archaeological $^{14}C$ dates from Aupouri peninsula, with statistical range to two standard errors. Data taken from Table 2. N = 20.

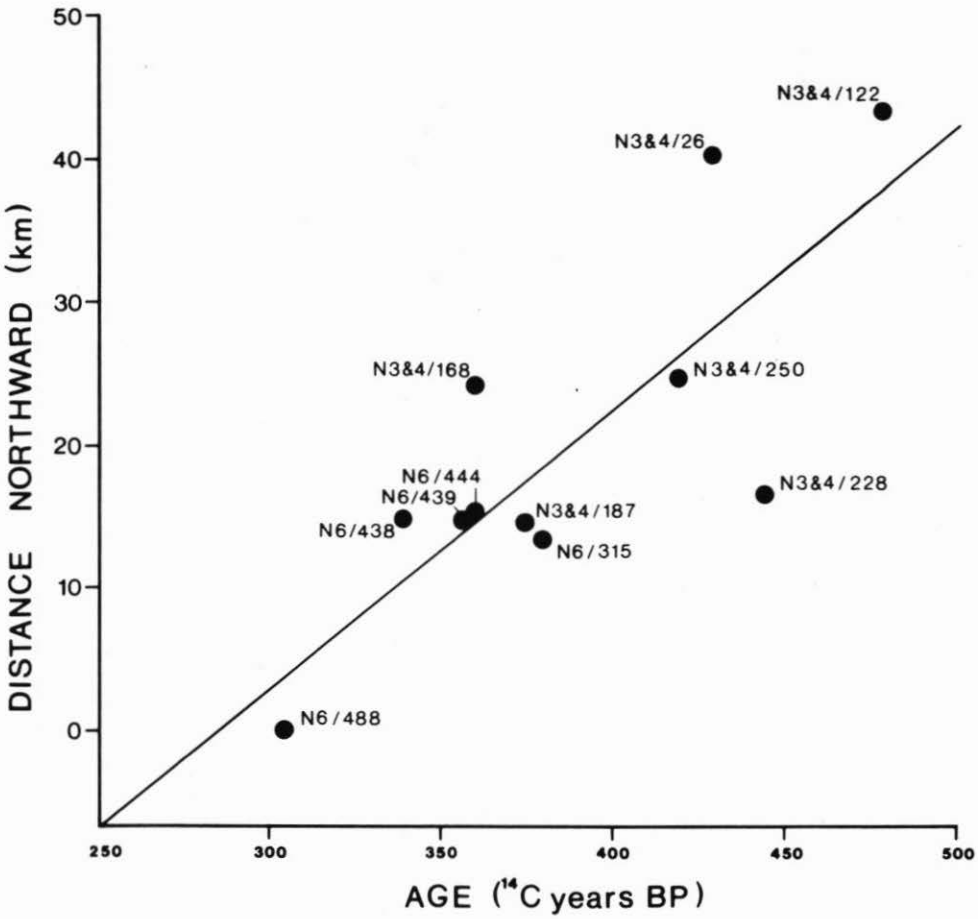


*Figure 7*: Plot of age against distance northwestwards from Hukatere for inland dune sites on the western Aupouri peninsula (N = 11). The Pearson product moment correlation coefficient (r) for the plot is 0.809. The t-test for the significance of r indicates the significant probability of a linear relationship between age and distance (p>99.5%). Exclusion of the outlying value N3&4/228 (N = 10) gives a result of r = 0.919 (p>99.9%).

was due to widespread deforestation.

Additional evidence cited by Millener for earlier localised destruction of coastal forest comes from the presence of relatively unconsolidated sands overlying the distinctive, fossiliferous, yellow-brown semi-consolidated Holocene sands which date from the last 6000 years (Millener 1981: 291–2). Four such occurrences are noted for the Aupouri peninsula. The two earliest, from Herangi, near Cape Maria van Diemen, and from Tom Bowling Bay, are dated respectively at 1595 ± 70 years B.P. (NZ4835A) and 1610 ± 65 years B.P. (NZ4675A) (Millener 1981: 84, 138, 847). Two later occurrences of unconsolidated, or semi-consolidated but charcoal-stained, sands from Waikuku Beach and Henderson Bay date respectively to 1020 ± 35 years B.P. (NZ4686A) and 950 ± 60 years B.P. (NZ4608A) (Millener 1981: 154, 179, 292, 847). Millener's description of these sands is not entirely consistent. He describes NZ4608 on p. 292 as coming from "rather less consolidated" sands

than the earlier distinctive paleosols at Henderson Bay and also (p. 179) as coming from "semi-consolidated" sands. The assumption is made here that NZ4608 does in fact come from a later series of sands, especially since it is also described as "charcoal-stained" and charcoal is absent from virtually all of the Holocene sands described by Millener (1981: 295).

The gap of nearly 600 years between the above pairs of dates makes it unlikely that the events they represent are connected. Millener (1981: 291–2; pers. comm.) does not consider that the presumed forest disturbance of around 1600 years ago was due to human influence. He clearly prefers to accept that humans arrived in the far north only within the last millennium (see Millener 1981: 146, 155–6, 240, 296, 458, 767, 779) and makes frequent reference to the fact that the earliest dated human occupation in the area is only 600–700 years old. On this basis, Millener attributes the sudden decline in bird population after about A.D. 1000 primarily to human destruction of the habitat by fire, combined with the introduction of Polynesian dogs and rats (Millener 1981: 146, 155–6, 243, 247, 768, 779, 783). Sutton's (1987: 143–4) attempt to argue for human influence before 1000 years B.P. is contrary to Millener's view and under-rates the likely role of natural localised fires (see also Enright and Osborne 1988).

## SUMMARY

In this discussion of the prehistoric chronology of the Aupouri peninsula, evidence has been considered from radiocarbon dating of both archaeological and subfossil sites. This evidence indicates that Polynesians probably did not arrive in the area until less than 1000 years ago. The earliest period of occupation is not directly dated, except towards its upper limit, where culturally archaic occupations date to 600–700 years ago at Twilight Beach and Houhora.

The dates relating to a middle period of occupation derive mainly from sites on eroded inland dunes more than 750 m from the present coast. Here, ages range from 300 to 500 years, and sites appear to decrease in age from north to south. Eighty percent (all but two) of the middle period inland sites studied are underlain by Pinaki soils formed on late Holocene dunes (see Coster 1988: Appendix; Barber 1984). A recognisable subgroup of sites, the Kimberley cluster, spans a very narrow time range, supporting the impression that it represents a single cultural and temporal unit, perhaps a series of villages or dwellings.

The three sites from the late period are coastal middens yielding dates of less than about 250 years B.P. As well as being spatially and temporally distinct from the inland sites, it is suggested that those from Ninety Mile Beach, at least, are also functionally different.

## CONCLUSION

A three-phase model is proposed to explain site distribution and chronology on the Aupouri peninsula. In broad terms, it is not inconsistent with Davidson's (1984: 223–4) three part sequence for the whole of New Zealand prehistory, although the chronology proposed differs significantly from Davidson's. The model is as follows.

*Phase I: about 1000 to 500 years B.P. Exploitation of a new land.*

The initial impact of Polynesian settlers was on the coastal forest and dunes. Fire destroyed much forest, with a severe impact, exacerbated by the introduction of dogs and rats, on the formerly numerous bird population. Apart perhaps from distinctive artefacts, the first occupation left little or no trace, possibly because of severe erosion of the coastal dunes as a result of deforestation. By about 600–700 years ago, settlement was still primarily coastal. Fishing and sea mammal hunting were important aspects of subsistence. Moa may by this time have been imported from the Coromandel region, together with some stone for artefacts (Millener 1981: 241; Davidson 1982: 18). Fur seal colonies were probably declining as a result of exploitation (Smith 1985: 308–9). The role of horticulture at this time is not clear.

*Phase II: about 500 to 300 years B.P. Expansion of settlement and horticulture.*

As the population increased and the immediate coastal environment became less productive, settlement moved gradually into marginal inland areas, particularly the unstable, but forested and relatively fertile, Holocene dune belt. This movement began in the north and spread steadily southwards. Extensive horticultural ditch systems were developed in some areas. Quite suddenly, after only about 200 years, the inland dunes were abandoned, possibly as a result of their breakdown to form the present-day uninhabitable mobile western dune belt.

*Phase III: about 300 years B.P. to the present. Return to the coast.*

Following devegetation and breakdown of the usable dune soils, people moved back to the more stable volcanic soils around Houhora and the North Cape block, where gardening continued. Fish and shellfish formed the main source of protein. The western shore of the tombolo (Ninety Mile Beach) served as a route for travellers and as a major source of shellfish for people living to the east and north. Intermittent seasonal exploitation of the west coast continued among the tangata whenua (Te Aupouri and Ngati Kuri) virtually to the present time.

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NOTES

1. Formerly Department of Conservation, Auckland.

2. Throughout this paper references to site numbers follow the NZMS1 series of maps. The equivalent site numbers in the new metric NZMS260 maps is provided below.

| NZMS1 | NZMS260 |
|---|---|
| N1&2/70 | N2/57 |
| N1&2/106 | M2/14 |
| N1&2/969 | N2/811 |
| N1&2/976 | M2/162 |
| N3&4/1 | N3/1 |
| N3&4/15 | N3/9 |
| N3&4/26 | N2/821 |
| N3&4/116 | N2/870 |
| N3&4/122 | N2/876 |
| N3&4/151 | N3/482 |
| N3&4/168 | N3/499 |
| N3&4/184 | N3/515 |
| N3&4/185 | N3/516 |
| N3&4/187 | N3/519 |
| N3&4/228 | N3/562 |
| N3&4/250 | N3/582 |
| N6/4 | N3/59 |
| N6/315 | N3/323 |
| N6/438 | N3/449 |
| N6/439 | N3/450 |
| N6/444 | N3/455 |
| N6/488 | N3/639 |

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