

from Mt Egmont, impure chert from Waitara River valley, and indurated greywacke from the valleys of inland Taranaki were exploited (Keyes 1971a; Moore 1977: 62). Exploitation of indurated greywacke sources in the hill country has left some distinctive evidence in the form of working floors, usually associated with ovens, in the Mangaehu, Makahu, and Mangarewa stream valleys (Hooker 1971).

3. Settlement patterns

3.1 SITE DISTRIBUTION PATTERNS

The coarse grained pattern of settlement is documented by the distribution of recorded archaeological sites and is discussed below. There have been a number of formal archaeological site surveys undertaken in the Taranaki-Wanganui region (Appendix 1). These have provided detailed information on classes of sites and their distribution. Aerial photography of the numerous fortifications has also been a prominent feature of the archaeology of the region since the 1960s (Jones 1996, 1997, 1999). In spite of the well-established tradition of site survey work in Taranaki-Wanganui, many areas have not been intensively surveyed, and many sites still await discovery or detailed mapping, or both.

3.1.1 Coastal areas

White Cliffs to Kaihihi Stream. From Pukearuhe south there is a steadily widening area of terrace land. The distribution of pa between Pukearuhe and Onaero River is discussed by Buist (1964). He records 19 sites on coastal cliff top locations, a further 37 in the coastal terrace lands, and 22 in the foothills immediately behind. Some 26 sites are found further inland, mostly along rivers. This is an area where the terrace lands are seldom more than about 2 km wide. Buist (1964) sees this distribution as reflecting an emphasis in the economy on gardening and fishing. Further pa have been recorded in this area since this work was published, but most pa with earthworks in particular, should now have been located.

Beyond the Onaero River the terrace lands are wider and the distribution is less confined. The distribution of pa, and other sites, drops off inland and there are few more than about 5–6 km inland, with the inland penetration greatest where there are major river valleys.

The Sugar Loaf Islands at New Plymouth have long been known as refuge pa, but detailed survey has been confined to one island (Day 1998). South of New Plymouth, the land surfaces were constructed from detritus that accumulated around the volcanic centres of Kaitake, Pouakai, and Egmont. The older surfaces are thickly mantled with tephra. Detailed surveys of pa of the Omata-Oakura (Prickett 1980), Tataraimaka (Prickett 1982), and Okato areas (Prickett 1983a) have been published.

Kaihihi Stream to Oaonui. The landscape changes from around the Kaihihi Stream, but the band of pa along the coast continues uninterrupted. Many pa are located on the characteristic small hills ('lahars') found in this area. Again, site distribution drops off markedly about 5 km inland.

Oaonui to Manaia. The band of sites narrows markedly along this stretch of coast. The younger surfaces of the Opuia and Opunake formations have only a thin soil cover and sites are few. This pattern is thought to be real and not just an artefact of inadequate recording.

Manaia to Whenuakura River. There is a belt of pa extending some distance inland (up to about 12 km) in the vicinity of Hawera. Again the rivers are particularly important.

There is a number of well known 'moa-hunter' sites at mouths of rivers along this stretch of coast. It is not clear whether this distribution is real or is an artefact of site destruction elsewhere along the Taranaki Coast (Anderson 1989).

There is a narrow strip of sand country along part of this coast with few recorded sites. It is not clear whether this is an actual absence of sites, a reflection of the lack of recording, or a lack of visibility of sites. The Waitore site, located between the Patea and Whenuakura Rivers, is currently the earliest dated assemblage of wooden artefacts in New Zealand. The site was buried under metres of sand and only uncovered by a stream cutting into the dune.

Whenuakura River to Turakina River. There is a strip of sand country along the coast, but the major concentration of sites (pa, pits) is inland of this. This belt of pa and pits runs along the terrace lands and into the fringes of the adjoining hill country, but peters out around Wanganui. The terrace lands to the south, e.g. between Wanganui River and Whangaehu, are almost devoid of sites. There are major concentrations of sites up all the major river valleys particularly Patea, Whenuakura, Waitotara, Wanganui, Whangaehu, and Turakina. There have been some surveys along the Whanganui River (Walton 1979; Hellen & Olsen 1984). There has also been limited survey in the Upper Retaruke River Valley (Butts 1981). The size and distribution of the population in the Whanganui River valley in the period 1839-1864 is discussed by Walton (1994). Church (1987) has discussed historical and other evidence for occupation along the Tangarakau River where much of the known occupation is demonstrably of late 19th century antiquity.

Site distribution in river valleys are documented in Bristow (1988b) (Whenuakura), Day (1985) (Waitotara), and Walton (1985) (Whangaehu).

There are few sites recorded in the sand country itself (Buist 1976; Bristow 1988b). The Waipipi area was well known with piles of shells, flaked stone, ovens, and net-sinkers in evidence earlier this century. Field (1877) also reported some unidentified features near Wanganui, but little has been seen in either place in recent decades. A recent survey (Bristow 1988b) reported sites in areas where the dunes had blown out, suggesting that sites are present, but are not visible at the ground surface. The inland margins of the sand country, around the lakes and lagoons, contains a strip of occupation that warrants a special mention.

South of the Turakina River. South of the Whangaehu-Turakina Rivers there are few of the pa which are such a feature of the archaeological landscape of

Taranaki–Wanganui areas. The terrace lands are largely devoid of sites and the site distribution becomes concentrated even more strongly on the river valleys, along the lakes and lagoons of the sand country, and along the coast. Where surveys have been carried out, a narrow belt of middens have been found along the coast, apparently extending most of the way from somewhere north of the Rangitikei River to Paekakariki. Few of these middens are more than one kilometre inland. The other major focus of occupation in the sand country is in the belt of lakes and lagoons. A recent discussion of research in the Rangitikei–Manawatu area is Cassels et al. (1988).

3.1.2 Inland areas

Egmont Volcano. Few sites have been recorded on the upper flanks of Egmont Volcano. In 1929 and 1989 ovens were found which underlay Burrell Ash (Oliver 1931; Alloway et al. 1990) on the flanks of Mt Egmont. The ovens have a likely late 16th century or early 17th century date. A further oven, higher up the mountain, has been found underlying an unnamed ash under Newall Ash (Topping 1974; Alloway et al. 1990). The Newall Formation was deposited in the early 16th century (Neale 1972, 1979; Palmer et al. 1981) and this provides a minimum age for the oven. Maru was a refuge pa constructed high on the western slopes of Mt Egmont (Maxwell 1933). It was taken by Waikato in about 1826 (Smith, S.P. 1910: 414–417). The site is believed to have been destroyed when part of the ridge it occupied slipped into the gorge.

Inland Taranaki. There are strings of sites up most of the major river valleys such as the Mokau, Waitara, Patea, Whenuakura, Waitotara, and Whanganui. The distribution extends well into the hill country at these points. Relatively few sites are known in other parts of the hill country and this is believed to reflect the small number of inhabitants of these areas in prehistoric times, and into the 19th century. One area—reported by Hooker (1971)—has a considerable concentration of stone working areas and this appears to reflect exploitation of stone resources. Mangaehu was visited by Taylor in the 1840s and was the main settlement of the district at that time (Mead 1966: 104–106).

Inland Patea. This area is little known. It is likely that the area has most in common with the hill country of Inland Taranaki, with some sites in more favoured locations in some river valleys. George (1990) describes early settlement in the Ohakune area based on oral traditions, but much of the area opened up to Maori and other settlement only in the 1860s (Walton 1994: 140). Batley (1960, 1961) reports some sites along the Upper Rangitikei River, but in the 1840s the main pa was Matuku. This settlement was visited by Taylor (Mead 1966: 68) in 1845 and Colenso (Bagnall & Petersen 1948) two years later. Colenso describes an ‘outlying plantation village of only two huts’ and refers to ‘distant and scattered cultivations’ in the vicinity (Bagnall & Petersen 1948: 251), indicating that potatoes were an important item of food. The local people were related to the Ngati Kahungunu of Hawkes Bay rather than to Taranaki and Whanganui iwi.

3.2 SETTLEMENTS AND BUILDINGS

A range of structures is known from the archaeological record. Semi-subterranean storage pits are often conspicuous as rectangular depressions at the ground surface. Above ground timber buildings and structures were probably also common but have often left few clues at the ground surface to signal their presence. They are usually only detected by stripping the topsoil to reveal the pattern of post-holes in the subsoil. Large areas need to be cleared to get an adequate plan of a settlement. This sort of large-scale excavation has rarely been undertaken in the Taranaki-Wanganui region.

From historical and archaeological data, Groube (1964) has defined a domestic unit consisting of shelter, storage pits, and ovens. A large settlement would contain a number of domestic-level units. Houses are generally difficult to identify from surface evidence so all three components would usually only be identified by excavation. One excavation in the Taranaki-Wanganui area to produce evidence of domestic units is Smart's (1962) work at Tarata (R22/27). He excavated some 50 m of ridgetop on one part of the pa and located two house floors (3×5.5 m and 2.1×2.4 m), three shallow and one deep rectangular pit, ovens, drainage channels, a palisade line, and unidentified structures represented by postholes. On the east side of the ridge were a series of rua. The site was occupied only once, probably late in the prehistoric sequence.

Another site with evidence of the domestic unit is Puketarata (Q21/44) (Walton 1982b). One small structure (3×4 m) with a stone-edged hearth was found in the outer area of the pa along with 18 rua, 5 ovens and 18 firepits, the last usually occurring in sets of two. This part of the pa was probably last occupied in the early 19th century as the skeletons of two pigs were found in a rua. A carbonised cob of maize was also found. No other material diagnostic of a 19th century date was found.

Excavations at Kumara-kaiamo (Q19/71) at Urenui (Buist 1964) revealed numbers of rectangular storage pits from a number of periods of occupation and evidence of houses in the form of a stone-edged hearth and a house-floor with central postholes and a remnant of a scooped hearth. The excavations confirmed that the site was not occupied once and then abandoned, but had a complex history.

There are numerous sketches of the 1840s and 1850s that can help interpret the archaeological evidence. Many types of structure known from historical records are, however, still poorly documented archaeologically. In addition to those few houses noted above, Buist (1962a) has described archaeological evidence of a contact period house from Waimate measuring 3.2×2.6 m with a stone-edged hearth. Marshall (1836: 210-214) reported some 200 huts of different sizes and functions, including sleeping-houses, cooking-sheds and raised storehouses, at Waimate in October 1834. Underground stores were 'so numerous as completely to honeycomb the whole of the ground'. Also of interest in Marshall's description are the piles of wood for heating and cooking. These represent an oft-forgotten, but vital, resource.

Soil is occasionally stripped from archaeological sites by erosion revealing the plans of structures. This has occurred in one area at Otumatua (P21/23), a

clifftop site occupied up until the early 1850s, where square entrances to underground rua, and an alignment of nine postholes are amongst the features evident. The site is well-known from historical records. Skevington described it as 'a large pa' and noted the strength of the defences in April 1842 (Church 1991b: 44). Bishop Selwyn visited in October 1842 and found the inhabitants were absent at their cultivations except for a woman who emerged from 'a potato store as if she came out of the ground' (Church 1991b: 54-55). Taylor counted 257 people at Otumatua in 1843 (Church 1991b: 113). The pa occupies an area of about 5000 m² or about 20 m² per person.

Pits excavated at Kumara-kaiamo, Pukearuhe and elsewhere appear to conform in their shape and layout to those known from other areas of New Zealand. Some pits cut into sandstone still have the adze-marks from their construction visible on their walls (Bristow 1988a).

Most examples quoted above concern structures unearthed on pa. Relatively little is known of the undefended settlements. Jonas undertook limited excavations at Q19/140 in 1963 investigating the outlines of four house floors and two rua uncovered by roadworks (NZAA Site Record Form). The Kokako site (Q22/21), excavated in 1974, is interpreted as a small settlement, probably seasonally occupied, associated with the tending of gardens (Cassels & Walton 1991). The area around contains abundant evidence of gardening in the form of borrow pits and made soils. Evidence of cooking and storage was uncovered at the Kokako site, but houses or shelters were either not present or were not found. Knowledge of the archaeology of the region is undoubtedly biased towards the highly visible pa and has, perhaps unwittingly, exaggerated their importance in the settlement pattern at the expense of undefended settlements.

Davidson (1984: 151-170) has suggested that the evidence is that, throughout prehistory, most groups maintained a base, sometimes fortified and sometimes not, where food was stored and where people spent much of the winter, together with a number of temporarily occupied out-settlements associated with particular economic activities. The Kokako site is one of a number of pit or pit and terrace sites on the terrace-lands above the Kokako stream. A large pa (Q22/29), potentially a fortified home base for these out-settlements, lies about 2 km away on the Whenuakura River. The pa occupies a ridge in a loop in the river. The outer defences consist of three lines of ditches and banks. Large holes for palisades were visible behind the third ditch in 1974 (unpublished notes by R. Cassels). The interior is divided into units by further ditches. The site contained storage pits and terraces, the latter potential house sites. Midden was sparse, but included freshwater mussel and snapper and dogfish bones. There were karaka trees at the foot of the slopes. The evidence implies an economy orientated to exploiting a range of habitats and using the river for transport.

3.3 FORTIFICATIONS

The most conspicuous sites in the Taranaki-Wanganui region are the earthworks of fortified settlements. Generally situated in places with good natural defences, the defended areas vary greatly in size: in one district in Taranaki, Prickett (1983: 38) recorded defended areas from less than about

180 m² to over 55,000 m². Many of the pa, particularly those built in pliant volcanic ash soils, demonstrate the willingness of their inhabitants to extensively remodel the original shape of the hill to sculpture platforms, terraces, and ditches and banks (see Figs 9, 10, and 11). The layout was, however, largely determined by the topography and all efforts to associate particular forms of fortifications with a particular time or group have been unconvincing. The assumption is often made that, while simple fortifications may have been built at any time in the late prehistoric period, the more elaborately defended pa probably belong to the later part of the pa-building period.

The symbolic importance of fortified places (Barber 1996), whether related to either group-identity or status, does not diminish or remove their defensive function. The comment that some defences were motivated more by 'prestige rather than dire necessity' is, therefore, misconceived. The desire for prestige complements, and does not preclude, a defensive purpose (Chapman 1999: 107).

Manukorihi at Waitara (Q19/67) was one of the first pa in New Zealand to be accurately surveyed. It was mapped by Carrington in 1842 (see Best 1975: 177). Descriptions of individual pa include Skinner (1911) on Otumatua (Q18/13), Maxwell (1933) on Maru (P20/14), Best (1922) and Smart (1961) on Operiki (S21/1). Part IV of Best (1975) is entitled 'Detailed descriptions of old fortified villages' and contains numerous Taranaki and Whanganui examples, many the result of Best's own fieldwork in the 1910s.

Regional studies of pa were pioneered in Taranaki. Best's (1975: 223) map of the area between Onaero and Mimi Rivers is one of the first showing the distribution of pa and it was first published in 1927. Buist (1960c) published brief descriptions of some of the numerous pa around Hawera and in 1964 published a small, but very important, monograph on the archaeology of part of North Taranaki. Prickett (1980, 1982, 1983a) mapped pa in the Omata, Oakura, Tataraimaka, and Okato districts, south of New Plymouth. Gumbley (1997, 2000) has mapped in detail six pa in historic and other reserves.

There have been few excavations of pa (see Appendix 2) but they have the potential to provide a detailed picture of many aspects of life in the later period of prehistory. There are often relevant oral traditions about pa that can also add important details, including identifying individuals and groups associated with a place. All this data points to the centrality of defence, raiding and warfare in the late prehistoric and early contact periods.

Archaeologists have generally abandoned the premise that different types of site and sizes of pa can be associated straightforwardly with iwi, hapu, and whanau as levels of social organisation. This idealised model is derived from ethnographic sources (Allen 1996), but may not be particularly helpful even in that context. Instead, it has been increasingly argued that groups were more varied than this model suggests and that the idea of iwi, hapu, and whanau levels of social organisation cannot be projected back into the past. What the archaeological evidence suggests is a mosaic of small-scale communities linked into wider networks by ancestral ties, requirements of defence, and patterns of exchange. Visiting and the periodic gatherings of neighbouring communities were probably an important part of social interaction.

Allen (1994) has identified what he calls 'polities' in Hawkes Bay on the basis of clustering of pa, and similar clusters can be seen in the South Taranaki-Whangaehu area, but not in North Taranaki. The five clusters identifiable by inspection in the South Taranaki-Whangaehu area are:

- Hawera area, roughly from Kaupokonui to Manutahi
- Patea and Whenuakura Rivers area
- Waverley-Kai Iwi area
- Whanganui River area
- Whangaehu-Turakina River valleys

The interpretation of these data is difficult. It is tempting to make a correlation between identified clusters and particular iwi living in the area in the 1800s, but this should be resisted while so little is known about the antiquity of the pa involved.

3.3.1 Number and distribution

A map of the distribution of pa in Taranaki reveals large numbers of sites occupying a coastal zone, generally up to about 5 km wide. Distance from coast, elevation, and soil types account for much of the variation in the location of pa and pit sites. Over 90% of pa lie below 200 m. Yellow-brown loams occupy 30% of the region, but more than 56% of pa are located on this soil type and more pa lie on immediately adjacent ridges in the hill country. That the distribution of pa is sensitive to changes in soil type is demonstrated by the pattern of sites near Opunake. In this area the belt of pa narrows and almost disappears. The discontinuity in the distribution of pa here is real, and not just an artefact created by inadequate recording. It is likely that the relative absence of sites in this area is substantially explained by crucial differences in landforms and soil types, particularly the extent of low-lying areas and the thinness, or absence of, tephric material in the soils (Palmer et al. 1981).

3.3.2 The burden of defence

A fortification enables a smaller force to hold its own against a stronger. Keeley (1996: 57) identifies four general types of fortification world-wide (which are not mutually exclusive): fortified settlements, fortified refuges, fortified elite residences, and military fortresses. Only the first two are recognisable in Taranaki-Wanganui and most pa functioned as fortified settlements (Davidson 1987). They were built where they were for many different reasons and must often represent a compromise between the requirement for defence, the topography of the site selected, and the time and labour available. Warfare was endemic in Maori society and inter-group relations were built around the necessity of resort to force of arms to some extent in every dispute (Ballara 1976). Yet probably only a minority of fortifications ever saw much fighting. The forces engaged in warfare were generally small (Vayda 1970a). There were probably skirmishes and ambushes, but battles and sieges were almost certainly rare. Sieges became a more prominent feature of warfare only in the changed conditions of the early 19th century. The most common form of warfare in late prehistoric times was probably small scale raids aimed at destroying or capturing resources and killing the enemy. Adult male captives were almost

invariably killed, and neither age nor sex was any guarantee of survival. Fortifications were thus essential to the survival of a community.

Probably the most discussed examples of fortified refuges in the region are those on the Sugarloaf Islands (including the largest, Moturoa) offshore from New Plymouth. These were described by Marshall (1836: 155-156) and by Dieffenbach (1843 v.1: 164-165) and Wakefield (1845 v.1: 168). Wakefield (1845 v.1: 172) noted that 'about half a dozen huts were perched about on different parts of the rock [Moturoa], and caves were hollowed out wherever the ground had been soft enough, and neat wooden doors placed to shelter the stores in them'. The inhabitants, who included the whaler Dicky Barrett, used the islands as places of refuge and security, because of constant rumours of further invasions from the Waikato.

Oral traditions confirm the significance of fortified places in the pattern of warfare (Skinner 1893; Downes 1909, 1915; Smith, S.P. 1910; McEwen 1986). The traditions establish that warfare was not a minor distraction in the lives of chiefs and their followers: their role as warriors was central to their lives and their mana. Many pa can be identified as the places named in relation to events which, according to oral traditions and genealogical reckoning, occurred in the late 18th and early 19th centuries. Well-known examples include Koru (P19/53), Mokai-a-tonga (R22/136) (Downes 1915: 154-155) and Operiki (S21/1) (Downes 1915: 92-94, 162-163). These traditions do not usually indicate when a pa was first built, but do indicate at least one period when a place was occupied.

It is likely that the larger pa were communal fortresses intended for the defence of a wider social group. There is strength in numbers. Smaller fortifications are generally more vulnerable than large, but would provide adequate protection for small social groups from aggression by their immediate neighbours. Buist (1964) and Prickett (1982) have developed these arguments. Buist (1964: 40) has noted that pa in north Taranaki were located 'where people needed to be.' The large number of single unit pa (which generally indicate small sites) implies small kin groups were the basic social unit and that the larger pa indicated aggregation of population at certain times. Prickett (1982: 50) refers to the many small pa as 'fortified homesteads' and suggests some held no more than 30 or 40 inhabitants (see also Prickett 1983b: 315). An example of a small ring-ditch pa is Pukewaranga (P19/194) (Prickett 1982: 17-19). The site (Fig. 9) occupies a strong position on a prominent hill. Artificial defences consist of a single encircling ditch and bank. The platform has an area of about 425 m² and contains five or more terraces for houses or other surface structures and rua or pits. The area occupied by the defences take up a large percentage of the total area of the pa. Sites were chosen to give the greatest possible security (Figs 10 and 11), but considerations of location and access to resources were also important. As underlined by the evidence of occupation on the platform at Pukewaranga, pa were as much settlements as forts.

Fortifications protect not only the people and facilities within their perimeter, but also provide a base from which defenders may impose control over the surrounding area. Fortifications required large inputs of labour to build. They would have required constant maintenance, but could be refurbished in times of need. If, as Prickett suggests, small pa are functionally equivalent to

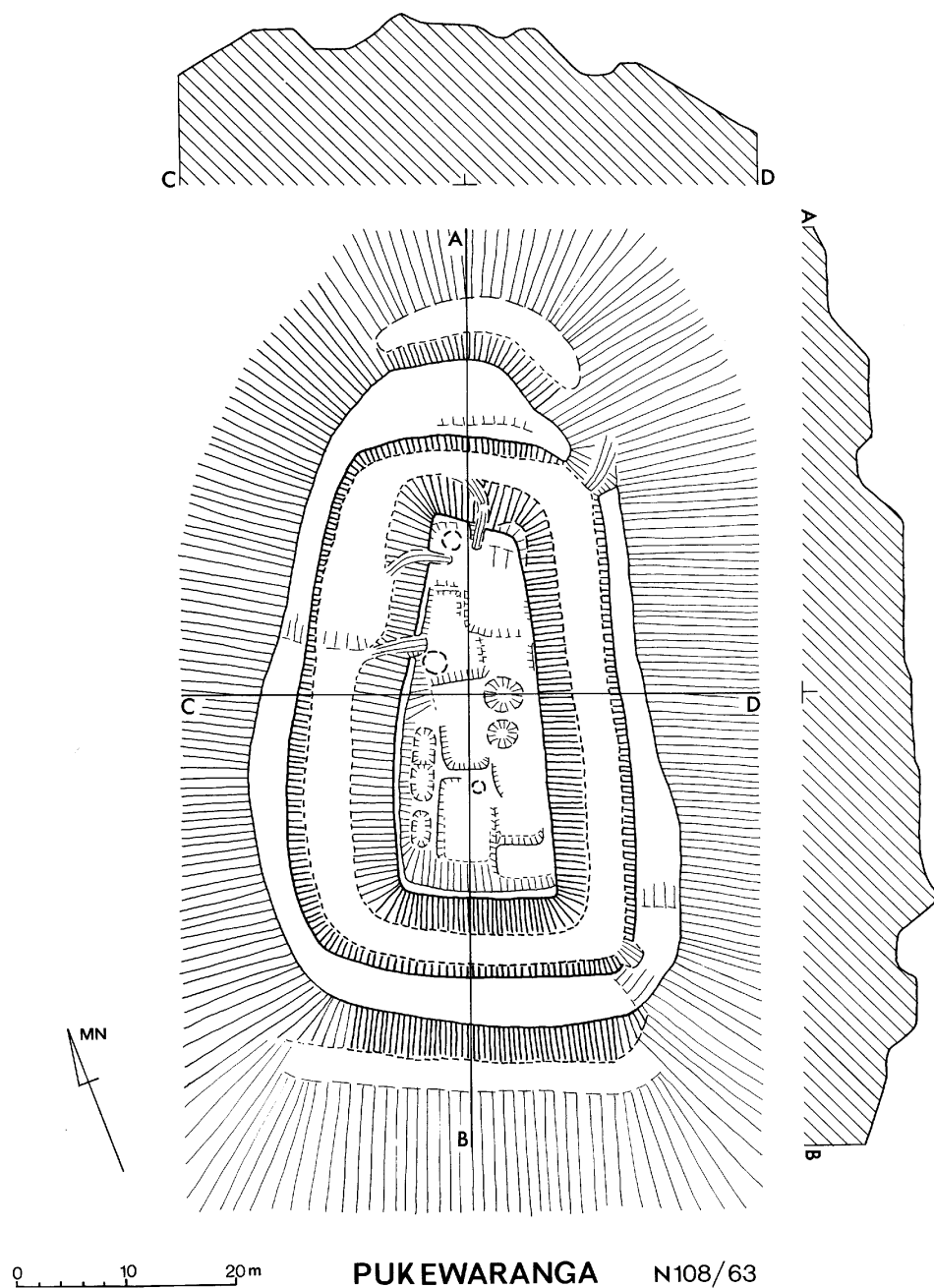


Figure 9. Pukewaranga, a ring-ditch pa (P19/194) after Prickett (1982:18).

undefended sites elsewhere, the implication is that society was very fragmented, with considerable local independence, that the small communities had to compete hard for resources, and that warfare was particularly prevalent. New Zealand is marginal for tropical root crops and food resources were hard won and worth fighting for. Effort put into defence, however, is effort not put into economic activities, so the burden of defence was a large, and probably regularly anticipated, call upon labour.

If the threat was sufficient, occupants could congregate at a nearby large fortification for mutual security. It is tempting to see a hierarchy of settlements in the size distribution of pa, but the pattern probably reflects little more than a pragmatic concern of small groups with collective security against large-scale

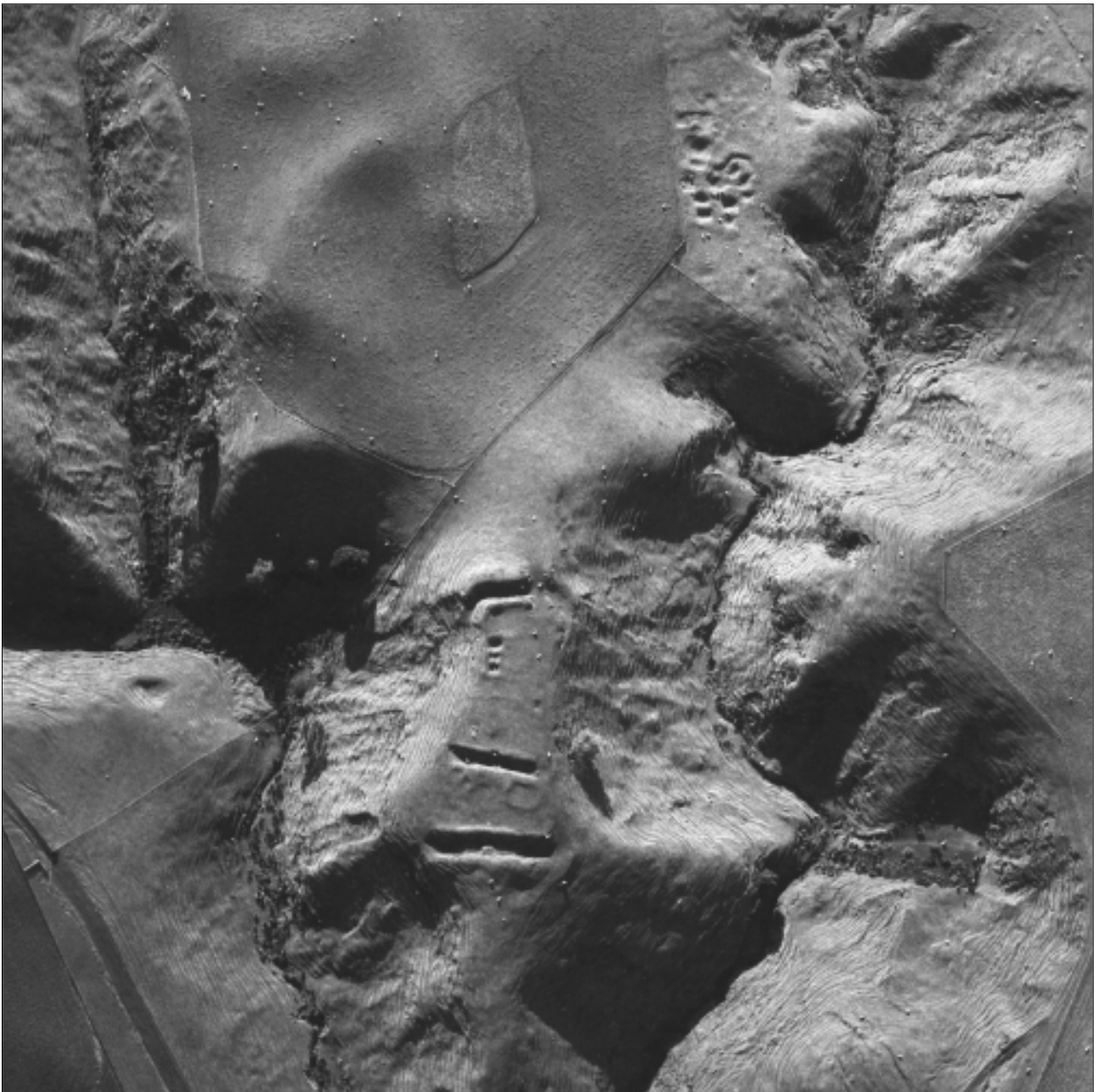


Figure 10. R22/111, 1995. Photographer: K. Jones (Department of Conservation).

raids. The combination of a concentration of force and fortifications would provide adequate protection against most eventualities. It is important to note, however, that a solid defence does not necessitate shoulder to shoulder manning of the entire perimeter. It is the points of attack that need to be defended, not the entire perimeter. Unless caught by surprise, defenders can always move men more quickly to any point around the defensive perimeter than their assailants, i.e. the defenders hold the interior lines. The important thing is to 'get there first with the most men' as Nathan Bedford Forrest once succinctly expressed it (Ward et al. 1994: 270).

It is often assumed that conflicts increase in frequency and intensity as populations grow in size and density and compete for resources. Elements identified are commonly:

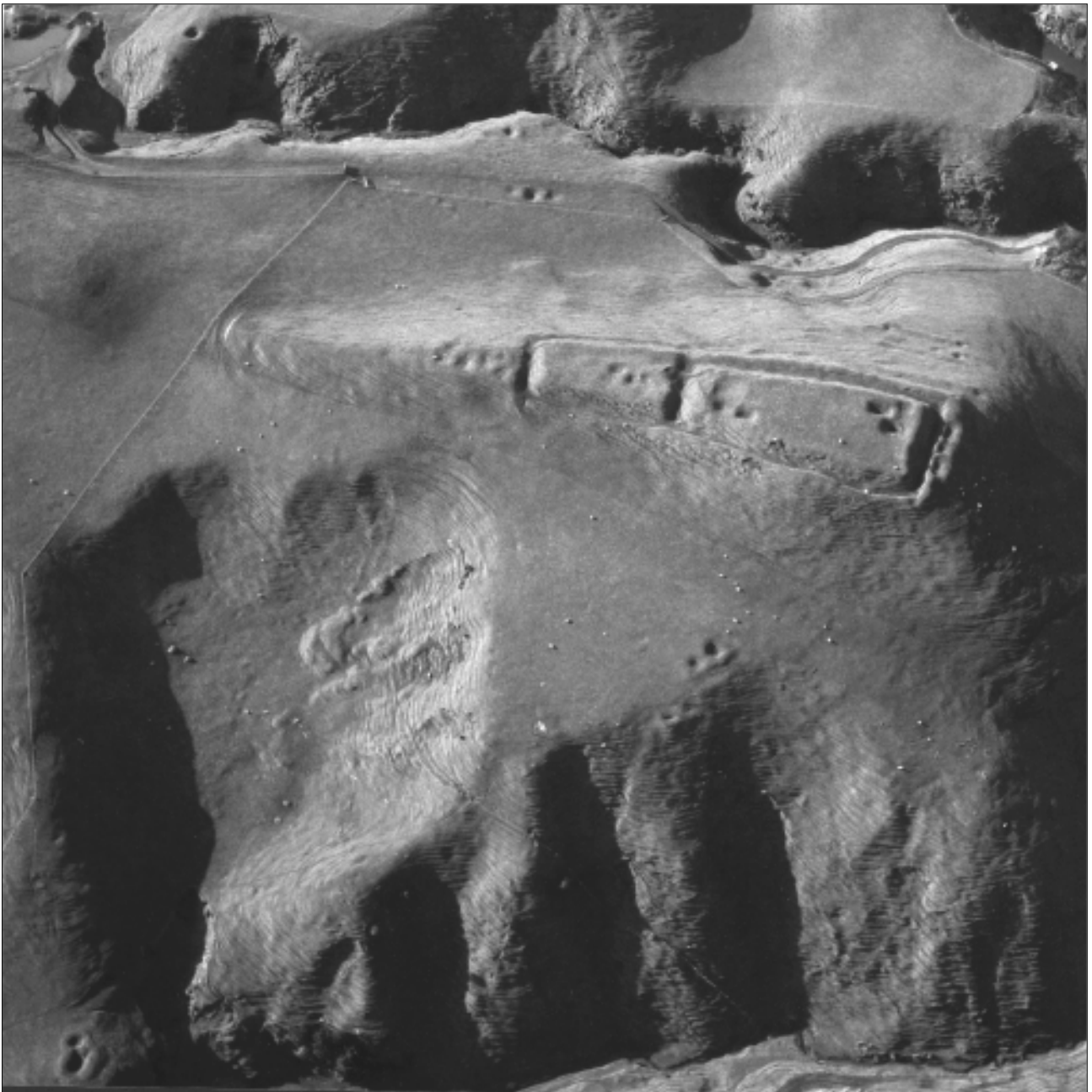


Figure 11. R22/144, in 1995. Note pits within pa and pit sites in the near vicinity. Photographer: K. Jones (Department of Conservation).

- Increasing clearance of bush
- Declining availability of wild food
- Increasing opportunity for conflict
- Increased need for fortifications

McGlone et al. (1994) suggest that it was only in exceptional circumstances that an area could provide all that a group needed to survive. The group had to be large enough to gather all necessary resources, often requiring dispersion on a temporary basis, but with the necessity to also be able to defend themselves against intruders. Most groups were small, even in the 19th century when threat of war was a major determinant of settlement size. In the Whanganui River valley in 1843 the 32 settlements ranged in population from 14 to 556, but only

4 had more than 200 inhabitants, and 17 (over 50%) had 60 or less (Walton 1994: 126). Some of the larger groups resulted from smaller groups coming together for mutual defence and they dispersed when the threat of war subsided. In South Taranaki in 1843, Taylor listed 15 settlements which ranged in population from 29 to 353, but only 3 had more than 200 inhabitants, and over half had less than 100 (Church 1991b: 113). The small size of most settlements indicated by these censuses would not be unexpected in the conditions of late prehistoric times.

A stoutly defended and well-provisioned stronghold was extremely difficult to take. Physical obstacles such as scarps, ditches and banks, and palisades formed the perimeter. The perimeter needed to be strong on all sides (whether by natural or artificial obstacles, or both) as it was only as strong as the weakest point. One of the fundamental principles of military tactics is, however, to 'never rely for security on your first line of defence' (Saunders 1989: 189). Outer walls set around inner ones, the division of the interior into separate compartments, and the existence of an inner stronghold (citadel) added depth to the defence. A citadel is a self-contained fortress, usually within or adjacent to a stronghold, intended as a place of last resort. The various defensive elements provided means for delaying, breaking up, or halting an attack. All these features are evident in pa.

Pa like Pukerangiora (Q19/69), Rewarewa (P19/165), and Puketarata had large defended areas abutting a smaller, well-defended inner core. Only Puketarata has been investigated, and that only in a limited way, but the evidence of rua and cooking there suggests that the large outer areas of pa provided additional living space. Although it was originally reported that there was little surface evidence of occupation at Pukerangiora (Walton & Jones 1996: 284), further examination over time has now produced good surface evidence of both cooking and rua in some outer areas of the pa. Some of the outer areas, such as Te Ruaki (Q21/5) and Pukerangiora, have long defensive perimeters in terrain that is not naturally favourable for defensive purposes. The extensions probably represent making the best of an unsatisfactory situation.

Until the advent of the musket, all attacks on strongholds were dominated by hand to hand fighting. Thrown weapons such as stones, darts, and spears (Salmond 1991: 414–422) had a very limited effective range (not much more than 30 m) and their inaccuracy restricted their usefulness to a limited set of circumstances such as when attackers were rushing the defences en masse. If the attackers could be channelled into a small area by defensive structures, they would be vulnerable to thrown weapons and, because they were crowded, would also be less able to defend themselves from long hand-held spears. In hand-to-hand fighting, advantages of height and reach are extremely important. Ngaweka attackers could be channelled into a corridor between the defences that lead to a steep drop over the edge of a cliff (Day pers. comm. 2000). Pearce (1977: 21) has noted that slopes, even without palisades, tilt the odds in favour of the defender, as the slope helps make the assailants vulnerable to the defenders' weapons. Fortifications thus tilt the odds heavily in favour of the defender. The best hope of success for the attacker usually lay in surprise or in exploiting complacency or treachery.

With the advent of muskets, men on the fighting-platforms, previously invulnerable, were exposed. This was clearly demonstrated by the French during their attack on Paeroa Pa in the Bay of Islands on 14 June 1772 (Salmond 1991: 399). The most effective means of countering a party armed with guns is to return fire from a well-sheltered position. Many strongholds would have been defensible with few modifications if guns were available to the defenders. The basic requirements for fortifications to withstand attack by musketry are:

- A ditch and bank and palisade sufficient to prevent escalade.
- Positions from which defenders can shelter from enemy fire and keep up fire of their own.
- A trace (ground plan) with no dead ground where attackers could gather unscathed to prepare an assault.

Enfilade fire is more effective than direct fire for countering assaulting forces gathering in the ditch, but limited use seems to have been made of the angle bastion, and returns in the perimeter need not represent an adaptation to musket warfare.

The Taranaki-Wanganui region suffered from a series of raids by northern taua armed with muskets in the 1820s and 1830s (Wells 1878; Smith, S.P. 1910). Tataraimaka (P19/218) was attacked and taken in about 1818 when guns were used for the first time in the region. Firearms reached North Taranaki in small numbers in the 1820s and only became more available locally with the establishment of a trading station at Ngamotu in 1828 (Urlich 1970). The unfavourable balance of weapons contributed to a decision to migrate which resulted in large numbers leaving Taranaki in the 1820s and early 1830s (Urlich 1972). The level of muskets available was probably still below one firearm per two fighting men in the early 1830s, but this was sufficient to produce some victories. Pukerangiora was attacked by a Waikato taua in 1833 and, in spite of stubborn resistance, was taken. The Waikato taua then went on to Ngamotu (New Plymouth) where they attacked a small pa named Otaka (P19/10). They failed to take it and retreated north. Te Ruaki near Hawera was besieged and taken by a Waikato taua in late 1834, which also took Ohangai (Q21/9). Successful defences by local groups however, indicated that a stalemate was developing. A small garrison at Te Namu (P20/19) held off a Waikato force in 1833 and Waimate (P21/5) and Orangi-Tuapeka (P21/6) held off a Waikato force in 1834 or 1836 (Smith, S.P. 1910; Church 1991a: 209). Shore-parties from *HMS Alligator* burnt Te Namu in 1834 and bombarded and burnt Waimate and Orangi-Tuapeka (Marshall 1836) in the first clashes between Maori and British forces.

Musket pa took a variety of forms. Te Karaka (Q19/178) which was besieged in the late 1850s during the Puketapu feuds, had a central fortified area and an outer perimeter of small hills used as outposts, some reached by a trench (Walton 1988: 49-50). In the New Zealand Wars, well prepared positions with underground 'bunkers' provided protection against artillery and gunfire. Pa built in the 1860s such as Weraroa (R22/66) and Taurangaika (R22/110) are known largely from contemporary plans and descriptions (Cowan 1983 v.2: 50, 286). Few definite surface traces are now evident. On the other hand, little is known historically of a gunfighter position at Whenuakura (Q22/28) which has a small (no more than 40 × 60 m) quadrilateral trace with traverses to prevent

fire along the length of the trenches (Buist 1976: plate 6; Jones 1994: 181, 207). Supposition would date the work to the mid or late 1860s. There is no evidence to support 'Oika' ('Ohika'), the name of a nearby 1850s and 1860s settlement, as an authentic name for the position.

3.3.3 Radiocarbon dates from pa

Schmidt (1993, 1996) and McFadgen et al. (1994) suggest pa construction began in New Zealand after about AD 1500. The need for better dating, and more of it, is vital. Radiocarbon dates are currently available from just 11 Taranaki-Wanganui pa. A much larger sample is desirable.

3.4 ROCK CARVINGS

Little has been published on the prehistoric artwork of the region, although local museums contain numerous items in wood, bone, and stone. The prominence of rock carvings (petroglyphs) in the published record is attributable, at least in part, to their durability. There was early interest in petroglyphs in the 1920s (Phillipps 1927, 1948; Best 1927) and later, but the extent of rock art in Taranaki has only gradually been realised. In the north, Delph (1939) described petroglyphs at Tongapurutu (Q18/58) and Law (1969) described a site at Mokau (R18/7). A feature of the sites in this area is the 'stylised human foot' motif.

Day (1980, 1982b) summarises current information about Taranaki petroglyph sites. The sites are a feature of the archaeology of the Cape Egmont part of Taranaki. Most of the glyphs are spirals. Two further discoveries have been reported since 1980 (Prickett 1981b; Fyfe 1989c). One stone with a petroglyph has since been removed to Otago (Ellison 1987).

One of the best known rock art sites in the region is Kohi Cave in South Taranaki (Downes 1925; Phillipps 1950). The significance of the motifs there remains undetermined.

4. Change

4.1 POPULATION GROWTH

The difficulty of deriving accurate population estimates from archaeological evidence should not prevent consideration of demographic factors. A close relationship is usually assumed among population growth, the decline of moa, pa construction, horticulture, and forest clearance. Most models of New Zealand prehistory require a rapid increase in population in the early and middle part of the sequence (Groube 1970: 141; Davidson 1984: 57; McGlone et al. 1994: 158; McFadgen et al. 1994: 230; Houghton 1996: 189–191). The key variables are the date of first settlement, the size of the founding groups, the size of population at the end of prehistory, and mean annual population growth. Slight changes in the assumptions made can produce different results, but a period of rapid population growth in the early and middle of the prehistoric period is unavoidable.

To construct a model requires some assumptions to be made about each of the crucial variables. It is important to note that ‘a mathematical model is not an attempt to provide a complete description of a natural phenomenon; rather, it is an attempt to see how far we can get with a limited set of principles, an attempt to establish the model’s boundary conditions’ (Dunbar 1995: 99). There can be no adequate explanation for anything that happened in prehistoric times that does not take into account the growth in the size of the population.

Recent studies of radiocarbon dates (Anderson 1991; McFadgen et al. 1994; Higham & Hogg 1997) suggest that New Zealand was settled in about the 13th century. Houghton (1996: 189–191) adopts a date of settlement of about AD 1200 and notes that, with an initial group of 14 people and an annual growth rate of 1.6%, the population would reach 100,000 in 550 years. Larger initial populations and slower growth rates would produce the same outcome. Houghton (1996: 189–191) concludes that a short settlement time is compatible with a small founding group and that population size at contact is not crucial: a couple of decades could easily take it from the lower to the higher end of the likely range of figures. There are a number of clues, however, that considerable numbers of people arrived in New Zealand from different parts of Polynesia in the early part of the sequence. Genetic diversity amongst present-day Maori populations suggests the probability of settlement by groups with a minimum of 50–100 founding women.

Genetic variation amongst kiore (*Rattus exulans*) suggests the probability of multiple contacts with at least the Southern Cook Islands and Society Islands (Matisoo-Smith et al. 1998). Two strains of ancient cultivars among kumara may also suggest settlement from two different sources (Harvey et al. 1997).

Houghton’s suggested growth rate of 1.6% is, however, extremely high and the conservative view is that lower growth rates of about 1.0% are more probable. A rate of about 1.0%, however, suggests that there would have been a period of at least two hundred years when the population was very small, with rapid growth occurring in the 14th and 15th centuries and, perhaps, levelling-out sometime between the mid 17th to mid 18th centuries.

TABLE 1. POPULATION DOUBLING TIMES.

PERCENTAGE INCREASE	DOUBLING TIME (YEARS)
0.5	140
0.8	87
1.0	70
1.5	47
2.0	35

The prehistory of the Taranaki-Wanganui region has to fit within this general pattern. The earliest dates for settlement in the region are from the moa-hunter sites of South Taranaki. These dates indicate settlement by the mid 14th century. Pollen evidence also suggests settlement was well established by AD 1500. Otherwise, the early part of the sequence is poorly documented.

Prickett (1983b) has suggested that the population of Taranaki at the end of prehistory was of the order of 9,750–13,650. This is based on an 1878 population of 4344 living between Parininihi and Waitotara and a total New Zealand population in 1769 of between 125,000 and 175,000. The comparable method applied to the wider Taranaki-Wanganui area, and adjusted for a preferred population of between 100,000 and 150,000 in 1769, produces figures of between 14,000 and 21,000. These figures provide a likely order of magnitude.

A calculation of the order of population can also be derived from the number of recorded pa in the region. Some 97% of recorded pa lie north of Lat. 40° 05' S: an area thought to have contained some 80% of the population at the end of prehistory in 1769. The Taranaki-Wanganui region contains 13% of recorded pa in this northern region suggesting a Taranaki-Wanganui population of from 10,400 to 15,600, assuming a total New Zealand population of between 100,000 and 150,000. These calculations are not entirely independent from the earlier set, because the percentage of population in the northern region used is itself derived from 19th century population figures. The two methods do not show up any striking differences, however, and the results are not inconsistent with early census figures for the region (e.g. Walton 1985: 26–30, 1994; Cassels et al. 1988: 113; Church 1991b: 113–115).

There have been various attempts to model environmental and cultural change over time. Different economic opportunities in different parts of the country are one key variable (Anderson 1997). The protein-rich big-game resources provided a focus for early settlers and promoted dispersal at low densities in areas such as the eastern seaboard of the South Island. As the population grew, big-game resources declined and there was greater competition for resources, economic strategies changed, there was a movement of people into horticultural regions and into formerly peripheral areas, and pa were built in increasing numbers. The question is to what extent was demographic growth a causal factor in changes in settlement and subsistence patterns?

The conventional model of New Zealand prehistory implies a high rate of growth in the number of pa constructed between c. AD 1500 and c.1850. If 6,500 pa were built in this 350 year period, then on average 18 pa were built

every year. If it is assumed, however, that the number of pa being built reflected the rise in population then the rate of pa building may have increased dramatically in the 16th and 17th centuries.

Groube (1970) modelled population growth and the construction of pa, and attempted to build in the constraint of the burden of defence. He approximated the burden of defence by calculating the *average percentage of the population involved in fort building per year*. A group that builds a replacement fort every 50 years, for example, is committing an average of 2% of its population to fort building per year. He concluded that to keep values for burden of defence realistic, the growth curve for both population and fort building needed to initially grow exponentially, followed by a reducing rate of increase. The values he worked with would differ from those accepted now and current figures for number of pa are higher and the period of pa-construction is shorter than he allowed. Nonetheless, this is one of the few attempts to model the growth of population and pa construction and allow for the likely impact of a significant burden of defence construction.

An important part of Groube's argument was the limited ability of the economy to maintain a surplus to support warfare and fort construction. Defence and economic well-being are inextricably linked. It is likely that the Groube model underestimated the strength of the economy. If most groups enjoyed relative economic strength then the burden of defence is less onerous. It is obvious from distribution data that pa are mainly a feature of the kumara growing areas, indicating a strong link with horticultural production. Production from gardens may be more important than is currently assumed.

The implications of this model of prehistory are that there never was a period in New Zealand prehistory when things were relatively static. The past was characterised by fluidity and complexity and by dramatic social, economic, and political change. Much of the detail is irretrievably lost, although it is reflected to some extent in oral traditions and, more dimly, in the archaeological record.

4.2 POPULATION, WARFARE, AND SETTLEMENT IN THE CONTACT PERIOD

The late 18th and early 19th centuries were a period of rapid change brought about by contact with Europeans. These changes have been much discussed by archaeologists and historians (Wright 1967; Groube 1964; Belich 1996). The introduction of new crops and livestock changed settlement patterns by providing more reliable and versatile crops, particularly the potato. The introduction of the musket changed the pattern of warfare, upset old balances of power, and displaced many from their ancestral lands (Urlich 1970, 1972; Vayda 1970b). North Taranaki was particularly badly affected by warfare and outwards migration in the 1820s and 1830s. The introduction of new diseases decimated the population (Pool 1977, 1991).

Groube (1964, 1977) has emphasised that the early 19th century accounts of Maori life and culture were describing a rapidly changing situation. Little has been written on the archaeology of this period in Taranaki-Wanganui. There

were many changes in the type of structures and the layout of settlements and pattern of resource exploitation in this period. The pa at Putikiwaranui near Wanganui was laid out as a town in 1849 (Walton 1994: 156) and new style houses replaced the older structures and layout recorded in the much-reproduced sketches by Gilfillan. Although more 'traditional' pa continued to be lived in and were even built into the late 1850s, changes were rapidly accumulating at every level of Maori society. As the threat of inter-tribal war eased, pa were abandoned for more convenient and accessible locations (see Walton 1994 for a discussion of the Whanganui River evidence). It is no easy matter to subtract the impact of new factors to reconstruct the likely pattern of the immediate prehistoric period. Yet this late evidence has been massively influential in determining how 'traditional' Maori culture was, and still is, depicted. The historical ethnographic record is, nonetheless, rich in suggestive possibilities for interpreting aspects of the archaeological record.

The historical period saw a major change in burial customs. In late prehistory, inhumation was rare and no prehistoric cemeteries, large or small, have been identified in the Taranaki-Wanganui region. Most burials were treated in an individualistic manner which usually involved the temporary disposal of the corpse, sometimes by inhumation, followed after an interval by recovery of the surviving remains and the final disposal of the bones in a secret location as a precaution against desecration (Oppenheim 1973; Davidson 1984: 172-177). Burial caves in the Kaitake Range and on the western flanks of Taranaki/Mt Egmont are examples (Scanlan 1961: 45-48). These preferred methods of disposing of the dead have generally left few traces in the archaeological record. With the introduction of Christianity, inhumation in cemeteries, which were often sited on old pa, gradually became established.

4.3 MATERIAL CULTURE

In their interpretations of culture change, New Zealand archaeologists have identified two main phases: a 'moa-hunter' or 'archaic' phase followed by the 'classic Maori' phase. There is little doubt about the convenience of this division, but how the distinctive artefacts of 650 years ago gave way to those of about 250 years ago has not been explained in any detail. There is a tendency now to avoid using these labels in favour of absolute dates. This has been made possible by scientific methods of dating, particularly radiocarbon determinations. Most sites do not have distinctive assemblages of artefacts and the question of how and why changes occurred in material culture cannot be addressed with the available information from the Taranaki-Wanganui region. A sudden switch is unlikely and the many changes may reflect the rapid increase in population some 500 years ago. The limited regional variation in material culture suggests the probability of close contact between groups and significant inter-regional population movements in prehistoric times.

Buist (1961) has published a list of archaic type adzes and the localities where they were found. It is difficult to draw any firm conclusions from this survey, but the study showed that archaic adzes had been found in many parts of Taranaki.

Wood carving styles have been the subject of most discussion. Keyes (1971b, 1973, 1981) has discussed the composite wooden adze haft, its distribution, and significance. Wood and other non-durable materials often do not survive in the archaeological record, except in wetland or other sites with special conditions. The wooden material from Taranaki wetlands is, therefore, of considerable significance. There have been persistent suggestions of a change from an earlier rectangular form to a later curvilinear form, and tribal or regional styles have been identified and argued over. Much of the discussion of changes in style is handicapped by a lack of well-dated, securely provenanced material. The Waitore site assemblage (Cassels 1979; Lawlor 1979) is particularly important as it has been dated by radiocarbon to about the 15th century and is, therefore, the oldest dated assemblage of wooden artefacts in New Zealand. Regional styles have been identified from historical records and material in museum collections and this has often included arguments about Taranaki, South Taranaki, and Whanganui styles. Neich (1996), for example, argued for a 'western or Taranaki/Whanganui style' of storehouse entrance carvings.

There have been numerous finds of wooden artefacts in swamps in Taranaki, particularly in the Waitara area. The artefacts recovered near Waitara include elaborately carved paepae, epa, and pare, together with ko and implements (Cater 1982; Day 1983b; Duff 1961; Fyfe 1989a, 1989b; Houston 1939, 1958a, 1959a, 1959b, 1960; Scarlett 1960; Site Records N99/23, N99/116-117; Walton 1988). Day (1983b) suggested that much of the wooden material recovered from swamps was deliberately hidden in the unsettled 1820s and 1830s.

Discoveries at Tokaora near Hawera were noted by Houston (1937). A prow found near Cape Egmont was described by Houston (1958b). Items found near Tapunikau Pa were discussed by Ford (1979) and Day (1996b). Day (1982a) reported the discovery of a carved pataka door form Okato.

Downes (1932a, 1932b) described wooden artefacts recovered from the Waverley area. Excavations at the Johnston site (Q22/77) by Jacomb in 1989 have elucidated the context and likely dating of these finds. Further details of the work await publication.

Few studies of non-wooden artefacts from the Taranaki-Wanganui area have been published. Exceptions include an adze from Mangapapa River (McKinlay 1974), a discussion of four stone figures from south of Cape Egmont (Day 1983a) and of an ivory figurine from North Taranaki (Day 1996a). Unpublished data on the sources of the obsidian used in the Taranaki-Wanganui region (McFadgen pers. comm. 1998) indicates predominant use of Mayor Island and Central North Island sources but with material from other sources (such as Northland and Coromandel) present in small quantities. Many adzes are made in materials imported from other regions, such as fine-grained metasomatised argillite from the Nelson area. The major sources are on the eastern side of Tasman Bay and on D'Urville Island and are a relatively short voyage of some 40 nautical miles away. There is also a range of artefacts made in local stone, which provided a supplementary source of raw material (Keyes 1971a).