NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION MONOGRAPH 9:
Peter Bellwood, *Archaeological Research at Lake Mangakaware, Waikato, 1968–1970*

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Volume 12 University of Otago studies in prehistoric anthropology. Monograph 9 of the New Zealand Archaeological Association

ISSN0110-3709

ARCHAEOLOGICAL RESEARCH AT LAKE MANGAKAWARE

WAIKATO, 1968 - 1970

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Volume 12 Otago University Studies in Prehistoric Anthropology

Monograph No. 9 of the New Zealand Archaeological Association

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Volume 8: A. Fox. Tiromoana Pa, Te Awanga, Hawke's Bay Excavations 1974-75. 1978

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FOREWORD

The excavation of sites on the perimeter of Lake Mangakaware in the Waikato produced an unprecedented range of wooden artefacts. These are shown in detail in the report. The publication of a full account of the excavations is appropriate in at least two respects.

First, funds spent in recent months on the purchase of Maori carvings abroad are not being matched by expenditure on conservation equipment and expertise within New Zealand while public museums in all centres are unable to provide suitable storage and display facilities for the invaluable Maori carvings and textiles they hold.

Secondly, drainage of swamps continues, not the least in the Waikato, and groups of organic artefacts, many at least as rich as those found at Mangakaware, are being lost. The organic material decays very quickly when the acidic and anaerobic conditions provided by wet swamps are removed.

Peter Bellwood is to be congratulated for the concentrated research at Mangakaware and for focussing attention on the inconspicuous but very rich Maori swamp *pa*.

My thanks are due to Professor Charles Higham of the Anthropology Department, University of Otago for making this joint publication possible and to Murray Webb for the cover design.

D.G. Sutton
President N.Z.A.A.
1976-1978.

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GENERAL INTRODUCTION

The archaeological report which follows this general introduction is concerned with the results of an excavation on a prehistoric Maori swamp fortification in the Waikato district of the North Island of New Zealand. I would like to introduce the report by giving an account of the cultural background to such fortified sites in the later part of Maori prehistory, as it is reconstructed from ethnographic and early historical records.

The New Zealand fortifications, which are mainly of the earthwork type with timber superstructures, have long been on record, and were first described by James Cook for the year 1769 (the initial discovery of New Zealand, by Tasman in 1642, was not accompanied by a landing). Recent surveys indicate that there are at least 4000 pa in New Zealand, most distributed in coastal situations in the North Island and northern South Island, and this distribution correlates with that of prehistoric populations living by simple horticulture and the exploitation of marine and forest resources. In the southerly parts of the South Island, where climate was not favourable for horticulture and where population density was slight, there appear to be no fully prehistoric fortifications. From 1769 onwards increasing European contact introduced pigs, the white potato, muskets, metals and other items which, in combination, gave rise to radically different technological and economic patterns. This paper is concerned solely with an aspect of prehistoric Maori culture.

Morphologically, many New Zealand pa resemble the Late Bronze Age and Early Iron Age earthwork hillforts of north-western Europe, and many, by their size and strength, show clear evidence of engineering skill and the ability to organize large labour forces. In general, they are smaller than their European counterparts, and of course form working parts of a very different cultural system. New Zealand economy was generally dependent upon considerable seasonal movement within apparently defined territories, and technology lacked metals, pottery, and horticultural tools beyond the digging stick and the spade. In tropical Polynesia, earthwork (and occasionally stone walled) forts occur widely--in Tonga, Samoa, Hawaii, the Marquesas, Austral and Cook Islands (Green, 1967a). In these tropical island areas the economy was based on fishing, tree-crop exploitation and root crop horticulture, the latter utilizing either methods of irrigation or bush-fallow rotation. Tropical Polynesian settlements were in most cases sedentary, and in this respect economic patterns are very different from those of New Zealand.

There are no obvious regularities joining those societies who, in the past, defended their persons and property within earthwork fortifications. The Polynesians, the Celts and also the Romans adopted this technique, and even these three societies demonstrate social organizations ranging from that of the chiefdom (Sahlins, 1968:24) to that of the state. The fortified enclosure thus appears to be the result of a combination of cultural and environmental factors, and it would be unwise to attempt to list factors which are causal for all cases, apart from the institution of war itself.

From this point the sole topic under discussion will be New Zealand, and the large size and temperate position of this land mass may be noted, for clearly the earliest inhabitants of c. A.D. 750, after their arrival from one of the hot tropical islands of Eastern Polynesia, had to make considerable adjustments. Description of these adjustments, from the early hunting, fishing and gathering phase through to the later phase characterized by small-scale horticulture, is beyond the purpose of this paper. However, while economic adjustments must have been great, throughout their prehistory the Maori never lost the majority of their original tropical Polynesian characteristics. For instance, continuity between New Zealand and the rest of Polynesia may be observed in the land tenure system, which is characterized by overlapping stewardship of the normal Polynesian type, and furthermore the political system remained dependent on a number of conical clans or ramages (Sahlins, 1958:164) as it did elsewhere in Eastern Polynesia. Religious beliefs and traditions also leave no doubt that Maori origins are to be found in Eastern Polynesia; although the problem of Maori origins is not solved, the likely sources indicated by archaeology are certainly the Cook, Society and Marquesas Islands.

The major adaptations of the Maori to their new environment took place within the spheres of technology and economy, which varied not only from the tropical Polynesian pattern, but also between the various environmental regions of New Zealand. The Waikato region considered in this paper is an inland basin some 80 kilometres from north to south and 40 kilometres from west to east, and it is almost completely surrounded by ranges up to 300 metres high broken by only a few gaps (Selby, 1972). Although the region is at least 25 kilometres inland and separated from the western coast of the North Island by a range of hills, it nevertheless supported a large population in prehistoric times. As a geographical sector of the northern part of the North Island (see figure 1), it belonged

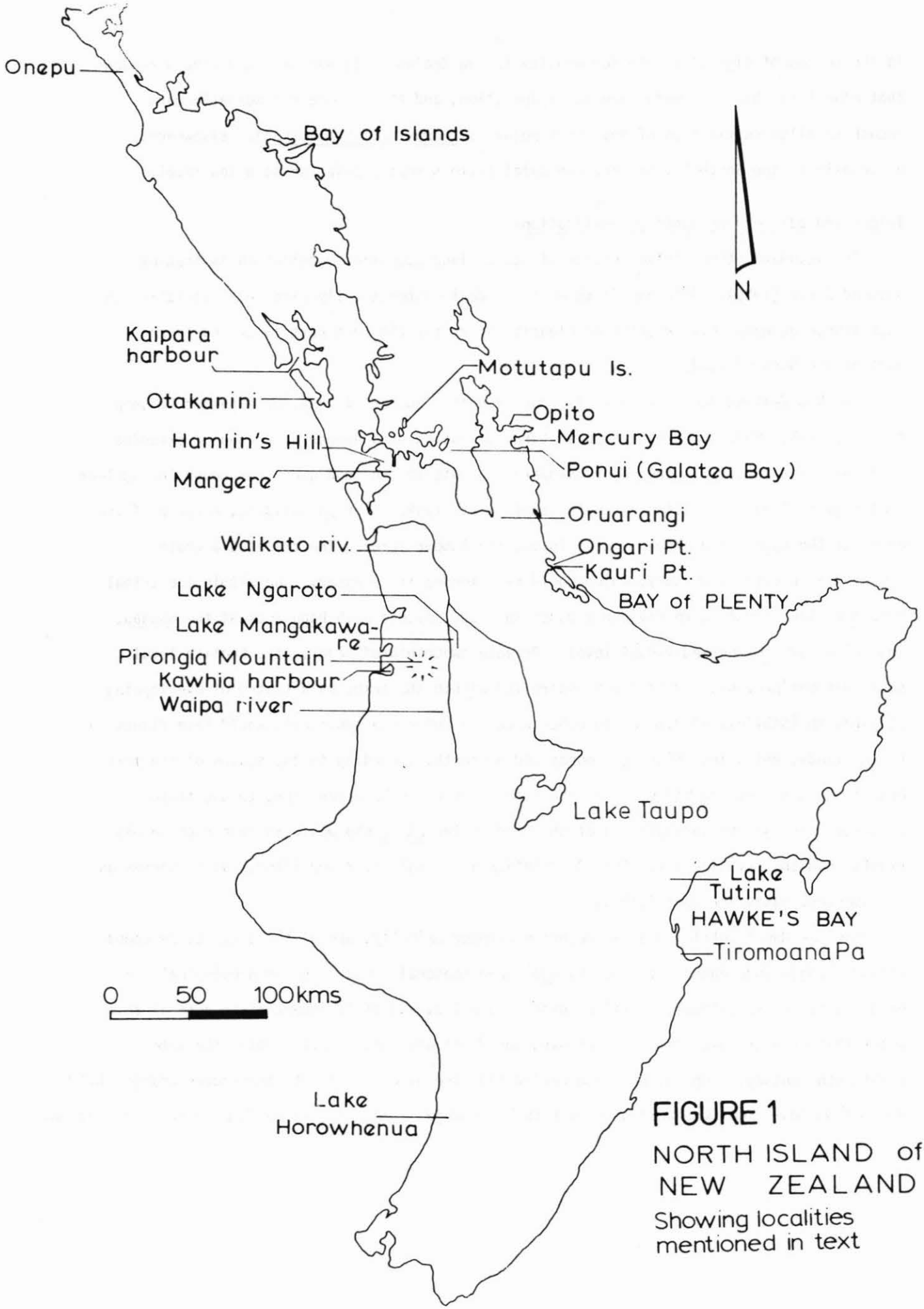


FIGURE 1

NORTH ISLAND of NEW ZEALAND

Showing localities mentioned in text

in the region of highest population density in New Zealand. It was in the northern regions that many large harbours were open to exploitation, and the climate was normally warm enough to allow cultivation of the sweet potato (kumara--Ipomoea batatas). Elsewhere, especially in the South Island, environmental factors kept population at a low level.

Tribes and pa: ethnographic generalisations

The standard ethnographic account of New Zealand economic organization is that by Raymond Firth (1959). Although Firth does not deal systematically with local variation in subsistence economy, his description clearly refers for the most part to the northern part of the North Island.

The New Zealand Maori tribe (iwi) consisted of a number of hapu, or extended kinship groups (Firth, 1959:112) each hapu in turn consisting of a number of whanau or extended families. The latter was the major co-operating unit in the food quest, although the nuclear family quite frequently acted alone for small scale tasks. For pa building, a group of the order of the hapu would probably have formed the labour force. The tribe as a whole occupied a specific territory, which would be defended if necessary, and within the tribal territory land rights were divided amongst the hapu, within each hapu amongst the whanau, and so on down to the individual level. Private ownership of land in the English legal sense was not present, and land was controlled within the tribe by a system of overlapping stewardship (Sahlins, 1958:6). In other words, a reference adult male would have rights to kumara lands, eel weirs, fishing grounds and so forth, according to the season of the year and his genealogical position within the tribe. He would have the right to use these resources through the jurisdiction of the head of the hapu, who would in turn receive his rights from the tribal chief. This description is grossly oversimplified, but it serves as a convenient basis for what follows.

Ancient Maori settlements, as recorded ethnographically, are of three types, defended villages (pa), undefended villages (kainga), and seasonal camps. The archaeological evidence for these categories will be discussed below, and it is important to note at this point that ethnographic records concerning the Maori were not compiled until the later nineteenth century, when the European period had already given rise to tremendous changes in the way of life. For instance, there is no unequivocal evidence for large undefended

sedentary villages in prehistory, and the following discussion will proceed with reference to defended pa, and temporary seasonal camps and hamlets only.

Clearly, hapu and whanau would vary considerably in size, and both groups were subject to fission. There is no fundamental ratio of one pa to one hapu from the viewpoint of residence, and the safest assumption is that each pa was inhabited by one or more whanau. The latter, as the major subsistence unit, would support itself through the year from sections of the agricultural lands, forests, rivers, shorelines and other resource areas belonging to the hapu. The position of each whanau at different times of the year would depend on the geographical location of resources, and some pa therefore acted as home bases with fluctuating populations throughout the year (see below), and seasonal camps would account for the residence of absent members. The amount of population fluctuation would depend on the size of the territory and the distance of the resources. In the northern half of the North Island resources were closely clustered in many favourable areas such as the Bay of Islands, the Kaipara Harbour, or the Auckland Isthmus, and the importance of seasonal camps would be reduced correspondingly. In the southern parts of the South Island resources were fewer, and tribal territories much larger. In most areas, the seasonal pattern of exploitation was actually enforced for certain scarce commodities by means of the rahui system, which in effect involved the placing of a prohibition on ripening crops, shellfish beds and so forth to discourage over-exploitation.

Concerning the resources themselves, and their seasonal availability in the northern half of the North Island, valuable work calendars have been compiled by Firth (1959:72-5) and K. Shawcross (1967:349, for the Bay of Islands). The half-year period from October to March (i.e., late spring, summer, and early autumn) was the period when most food was available. Fishing grounds and forests were exploited, the fern rhizome (Pteridium esculentum) collected, and the sweet potato planted and harvested. According to K. Shawcross the fern rhizome, a New Zealand native plant, was the vegetable mainstay of the diet in the Bay of Islands. This crop is dependable, does not require planting, produces well, and a piece of land can be cropped every three years on the average (Shawcross, 1967: 337-44). The sweet potato is a tropical crop which needs careful cultivation and much labour and it also requires elaborate subterranean storage in the winter, in order to comply with the necessary levels of temperature and humidity. It also requires a bush-fallow rotation,

with cropping for perhaps two years followed by a fallow period of up to ten years (Shawcross, 1967). Taro, yam and possibly young gourds provided additional supplies, but the New Zealand climate never allowed these to become very important. The only domesticated animal was the dog, which was occasionally eaten.

In the winter, fish, fresh-water mussel, birds, and forest foods were available, but the value of stored vegetables such as fern rhizomes and sweet potato must have been at a premium. This was the season for visiting, and feasting and redistribution, and it is at this time of the year when pa would have been most heavily settled, for most foods were stored within them.

Concerning the pa itself, reliable accounts by early explorers give a generalized picture of a defended enclosure, usually in a high place, with houses within the palisades grouped around a central open space (marae), which was used for daily activities and perhaps storehouses. From the above description of the cultural framework behind earthwork fortifications in New Zealand, we may now review the field archaeology of the pa.

The archaeology of the pa: a general summary

In this section the emphasis will be on form and function, but the role of the pa in Maori history may be reviewed briefly before commencing on the main discussion, simply to expand the general picture. Buck (1958: 139) believed that pa developed in a period of unrest following the arrival of the 'Fleet' tribes in New Zealand, which took place from genealogical evidence c. A.D. 1350. However Simmons (1969) has thrown serious doubt on the authenticity of the Fleet traditions, and an archaeological paper which puts forward a model for pa development within New Zealand from c. A.D. 1300, without reference to outside arrivals from Polynesia, has been published by Groube (1970).

A brief discussion of the form of pa must commence with Best's monograph on The Pa Maori (Best, 1927). In this work some of the diversity amongst pa was illustrated, but the first comprehensive classification was that of Golson (1957:73) who defined two major classes on topographical grounds as follows:

Class I Upland pa

A Hill pa terraced type
ditched type

B Promontory pa
C Ridge pa
} with terraces and transverse ditch and bank defence.

Class 2 Flat land pa

A low islands in lakes or swamps, some raised artifically.

B Pa protected by a meandering watercourse on three sides.

C Pa in less advantageous defensive situations where the proportion of artifically to naturally defended perimeter is high.

A more recent publication by Groube (1970) classifies pa from the criterion of morphology of the man made portions of defences, rather than from the topographical viewpoint of Golson. Groube's classification is tripartite, as follows:

Class I Pa with terraces only.

Class 2 Pa, usually on promontories or ridges, with terraces, and one or more transverse ditches barring the route of easiest access, which in all cases is narrow.

Class 3 Sites defended by ditches and banks on more than one side, usually delimiting a flat rectangular or sub-rectangular interior. This class has two subgroups:
Subgroup 3a without associated terraces,
Subgroup 3b with associated terraces.

The swamp pa to be described below, on Lake Mangakaware in the Waikato, is of Golson's class 2A, and is unclassified in Groube's classification. However, concerning the classification of pa, it should be noted that study of the form of the remains visible on the surface of the ground, normally earthworks and mounds, is only a beginning. Archaeological excavation of pa interiors must surely open up new horizons.

The most recent, and also the most thorough examination of pa function, is that by Groube (1964, 1965). Taking the observations recorded in journals kept by some of the earliest visitors to New Zealand (Cook, Banks, l'Horne, Monneron, Crozet and Roux), Groube combines their observations to indicate that:

> The pa is not necessarily permanently occupied, but seems to be the centre of a more extensive settlement pattern of which it is the citadel. Seemingly, in the majority of cases, it was occupied only during crisis with only 'a few remaining' on the pa (at other times). Everyday economic activity, at least during summer, was carried out in dispersed hamlets or huts. Except for an intense concentration of pa around the Bay of Islands and a seeming lack of pa in Hawkes Bay, this pattern seems true for all the parts of New Zealand described by the explorers. It may not be true, however, for inland sites, which were not described in these earliest accounts (Groube, 1965:52-3).

The above statement describes the situation as suggested by ethnographic accounts, and Groube suggests further that pa should show evidence of spasmodic utilization when excavated, and also evidence of communal storage, the presence of which is reported in a number of accounts (e.g. Crozet for Paeroa pa in Roth, 1891: 32-4).

Excavation of pa to date has thrown some light on the function of various sites, and has also raised numerous problems. In the Auckland Province all excavated pa, to the author's knowledge, have provided evidence in the form of large rectangular pits, and most pa show hollows indicating the presence of such structures under the surface. Groube was unable to find satisfactory references to pits in the literature of the Initial Contact Period, but establishes a convincing case for regarding them as storage pits for the winter storage of sweet potato (kumara) (Groube, 1965: chapter 6). Furthermore, Law (1969) has shown that pits of this type in the northern part of the South Island are distributed only in areas where kumara agriculture was possible. The view that rectangular pits of this kind functioned as houses in the prehistoric period would appear to be confounded, and the presence of pits in association with pa must imply storage (see also Fox, 1974).

While evidence for storage seems to be ubiquitous, evidence for dwellings has proved harder to locate. The upper levels of Kauri Point (Golson, 1961; Ambrose, 1962) and Ongari Point (Shawcross, 1964, 1966) yielded many postholes, but no convincing house plans. More recently, Groube has recovered the postholes of a rectangular house at Orakei, Auckland, and Aileen Fox (1975) has excavated a house of 11.8 by 4 metres in size at Tiromoana pa in Hawkes Bay. The recognition of house sites is important, for evidence of storage alone is clearly insufficient to indicate that people actually lived inside a pa.

To date, therefore, the archaeological evidence from pa has given only limited independent confirmation of Groube's hypotheses from initial contact period literature reviewed above. More evidence of a functional nature has been recovered concerning hamlets and seasonal camps, and we may review this evidence in the light of a working hypothesis put forward by Green:

> the picture of prehistoric Maori settlement inferred from that of the initial period of contact projects a. . .flexible settlement type that was centred round a pa, or possibly a number of pa, inhabited semi-permanently,

together with a number of hamlets and a range of functionally different seasonal camps for various economic purposes' (Green, 1967b:111).

Hamlets consisting of one or more house floors associated with storage pits have been recently reported from two localities on Motutapu Island (Leahy, 1972; Davidson 1972), and at Hamlin's Hill near Auckland (Davidson, 1970; Pearce, 1975) while a coastal midden utilized in the summer has been identified by Terrell and Shawcross at Galatea Bay, Ponui Island (Terrell, 1967; Shawcross, 1967). However, the difference between a hamlet and a seasonal camp may be purely semantic, since the hamlet as defined at Motutapu or Hamlin's Hill may well turn out to have been occupied seasonally. Unfortunately, reliable evidence for determining seasonality of occupation is not always available, and at present this is one of the major problems of the New Zealand economic prehistorian.

The above-mentioned view that pa were occupied only semi-permanently may not have universal validity. Kennedy, after examining the journals of Roux and Crozet of the expedition of Marc-Joseph Marion, Sieur du Fresne, to the Bay of Islands in 1772, suggested that:

> The 1772 population (in the Bay of Islands) were a settled fishing community, practising agriculture, and living in fortified settlements, or nucleated unfortified areas associated with these. Restricted mobility of groups smaller than the village varied seasonally, depending on the size of the labour force necessary for a particular task. The defended pa was thus occupied continuously, though at any one time small groups would have been absent. (Kennedy, 1969:167-8).

However, du Fresne was in the Bay of Islands for only 2½ months in the winter of 1772, and Kennedy's argument for permanent settlement is based mainly on the presence of communal storage facilities. A table of seasonal food production for the Bay of Islands in the late eighteenth century published by K. Shawcross (1967:349) indicates a certain amount of seasonal movement, although this does not invalidate Kennedy's suggestion of fluctuating population--indeed it may be used to support it. W. Shawcross has also suggested permanent settlement for the Ngaroto site in the Waikato (Shawcross, 1968:25-6), and this problem will be referred to again in connection with the Lake Mangakaware site described below.

One can hardly escape a hypothesis that pa will show considerable regional diversity in function, especially from the viewpoint of seasonal or permanent settlement. The possibilities are outlined by Groube (1964:139) as follows:

i. permanent settlement within pa

ii. (a) seasonal settlement within pa

(b) permanent settlement with a fluctuating population (see Kennedy, 1969: 167-8)

(c) temporary settlement, perhaps for defence in times of danger only

iii. pa occupied by military personnel only

iv. combination of the above.

Of these possibilities, i and iii would seem to be unlikely on present knowledge. ii(a), (b) and (c) are the most likely possibilities, and by corollary iv. However, it is clear that the excavation of a particular pa will support one of Groube's possibilities or perhaps more than one, but the information cannot be used to reject the other possibilities for pa elsewhere or at a different time. In a case such as this, assuming a degree of variety in pa function, one cannot generalize safely about all pa from one or a few examples, although one can nevertheless predict a pattern for pa in particular areas or particular types of location, and these predictions can then be tested against further data.

The site to be described in the report which follows was probably occupied all year round by a fluctuating population, and it therefore falls into Groube's functional class ii(b) (above). The report describes the defences, houses and other living areas at a swamp pa on the edge of Lake Mangakaware (Site 2 - N65/35) in the central Waikato. Also described is the associated assemblage of artefacts, which includes a very wide range of objects in stone, wood and bone, both from the site and from the neighbouring lake bed. The site and the assemblage probably date from the sixteenth or seventeenth centuries and contain no European influenced material. In addition, a very large assemblage of wooden artefacts recovered from the lake bed adjacent to another of the Mangakaware sites (Site 1 - N65/28) is described.

INTRODUCTION TO THE MANGAKAWARE RESEARCH.

The archaeological research at Lake Mangakaware was carried out in four short fieldwork periods totalling three weeks of excavation time, between August 1968 and December 1970. It was concerned mainly with the excavation of two swamp pa on the edge of the lake, together with the recovery of a quantity of wooden objects from the lake bed. The most extensively excavated pa, referred to in this report as Mangakaware site 2 (MA 2), comprised a palisaded enclosure covering about 2100 square metres, which contained houses, cooking areas and other evidence of human activity. The dwelling areas of the site were built up from sand lenses laid on the original peat surface, and the whole unit would have been defended by the surrounding lake and swamp, as well as by the man made palisades. It dates mainly within the sixteenth and seventeenth centuries A.D., and is one of the best preserved examples of a Classic Maori habitation site to be excavated in New Zealand.

A number of short papers have been published previously on various aspects of the Mangakaware work, and these are briefly listed here in the interests of a complete record. In 1969, I published a very brief note at the end of the first period of fieldwork (Bellwood, 1969), and this was followed, at the end of the third period of fieldwork, by a rather longer paper in the Proceedings of the Prehistoric Society (Bellwood, 1971a). Some sections of this latter paper have been incorporated into this report, including the preceeding general introduction. Two other papers by myself (Bellwood, 1971b, 1972) were written after the fourth and final period of fieldwork was completed. Karel Peters has also published a report (Peters, 1971) on his own 1969 excavations at Mangakaware site 1 (MA 1), and a valuable study of the environment of the lake and the distribution of resources around it was published in 1972 by Richard Cassels (Cassels, 1972). Before excavations began, a brief note on Waikato swamp pa, including a reference to Mangakaware, was published by Douglas Pick (1968).

The present paper serves as a final report on the Mangakaware work, and covers the following major topics:

1. A general description of Lake Mangakaware, particularly with respect to its environment and prehistoric sites.
2. A description of the excavated structures at Mangakaware site 2, together with archaeological features associated with them.

3. A description of the artefacts recovered during the MA 2 excavations, which together form a localised assemblage and date from approximately the sixteenth and seventeenth centuries A.D.
4. A description of the artefacts recovered from the bed of Lake Mangakaware in the immediate vicinity of MA 2.
5. A description of the artefacts recovered from the bed of Lake Mangakaware in the immediate vicinity of Mangakaware site 1.

The information presented in this report is fairly unique at the present time in New Zealand, because swamp pa and their surrounds have so far received relatively little attention from modern archaeologists concerned with detailed excavation and recovery. My main hope is that it will be a base for future research into settlement patterns and patterns of variation in the material culture of the Classic Maori Phase.

LAKE MANGAKAWARE: THE SETTING AND THE SITES

Lake Mangakaware is situated in the central part of the Waikato district, about 20 kilometres southwest of Hamilton, and 13 kilometres northwest of Te Awamutu. The lake is small, with a superficies of only 15 hectares, and three prehistoric swamp pa still surrounded by palisade butts survive on its banks (see figure 2). The outlet stream which drains the lake once flowed into the Waipa River 3 kilometres to the west, although this stream has now been canalized. The inhabitants of the pa were almost certainly able to paddle in canoes to the sea, down the Waipa and lower Waikato rivers, for three complete dug-out canoes still lie on the bed of the lake, each about 7 metres long. By river, the lake is about 160 kilometres from the sea, although it is only 40 kilometres as the crow flies. Access to the sea by land would pass over the lower slopes of Pirongia mountain, 1000 metres high, and it may be that a land route was in use as well, although shellfish were probably brought to the sites by canoe, owing to their weight and perhaps too the need to keep them alive in water.

Between Hamilton and Te Awamutu in the Waikato district there are many peaty lakes such as Mangakaware, most having very clear evidence for past occupation in the form of waterlogged pa. One of the largest of these sites, on Lake Ngaroto, has been recently

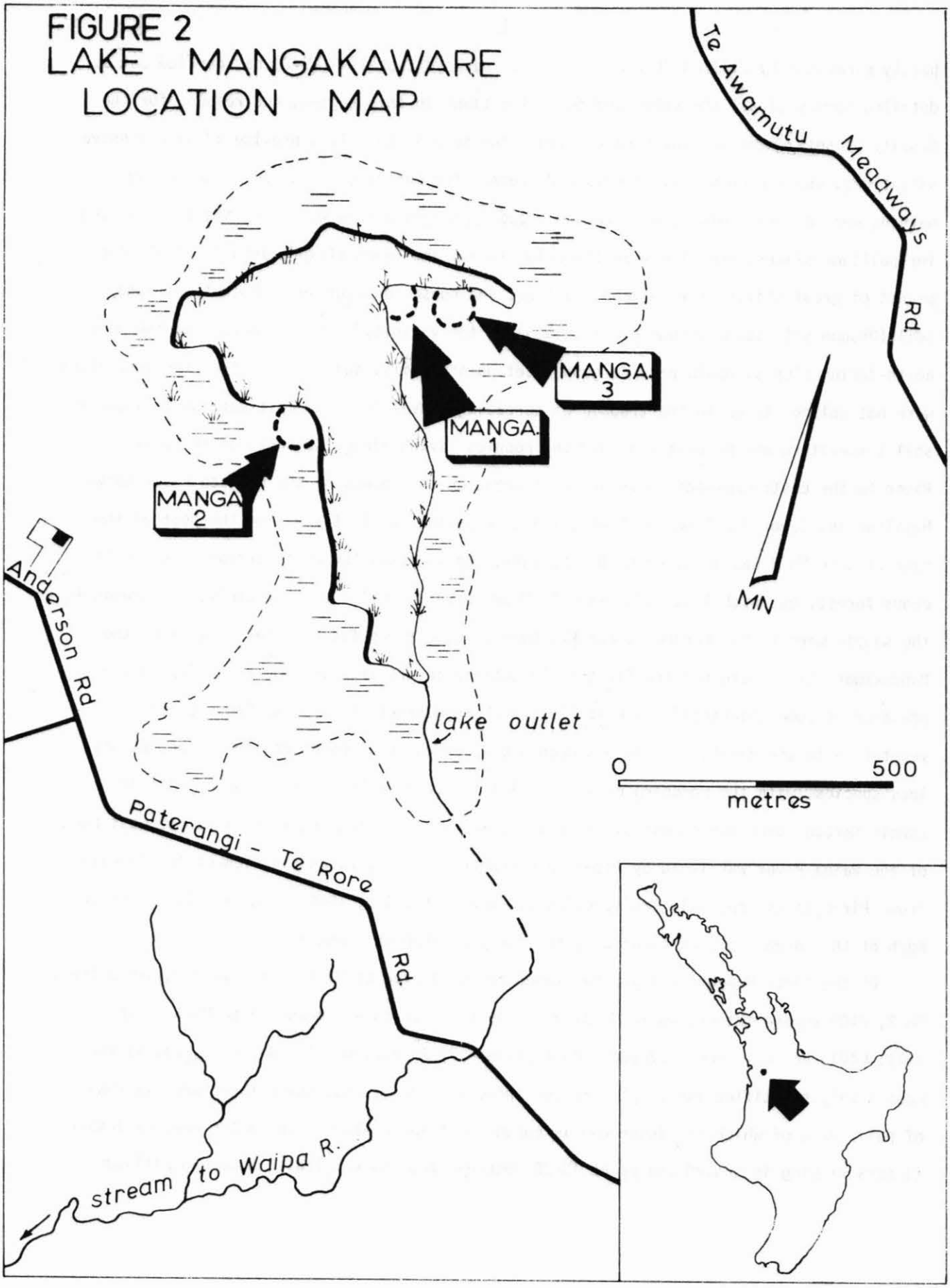


FIGURE 2
LAKE MANGAKAWARE
LOCATION MAP
Te Awamutu Meadways Rd.
MANGA. 3
MANGA. 1
MANGA 2
MN
Anderson Rd
lake outlet
0
500
metres
Paterangi - Te Rore Rd.
stream to Waipa R.

partly excavated by Wilfred Shawcross (1968). Richard Cassell (1972) has carried out a detailed survey of all the sites and their locations in this region, and reasons for the density of settlement are not hard to find. The swamps themselves provide ideal defensive situations, and a rich supply of eels and fresh-water mussel (Hyridella). The swampy margins were densely colonized by manuka (Leptospermum), a tree which was heavily utilized for palisade stakes, and also flax (Phormium tenax) and raupo (Typha angustifolia), two plants of great utility for cordage, matting, and house construction. Pockets of sandy soil (Ohaupo silt loam--Grange et al., 1935) in the vicinity of Mangakaware, and the many north-facing slopes, would provide good sweet potato soils, and it seems that the inhabitants were not obliged to go to the trouble of spreading gravel in their cultivations to increase soil temperature and porosity, as did the peoples living along the banks of the Waikato River to the east; man-made soils are widespread on both banks of the Waikato River between Hamilton and Cambridge (Grange et al., 1935). A pollen sample taken from the peat at the base of site MA 2 was analysed by Dr. N. Moar, who suggests 'an area surrounded by coniferous forest, but with local clearances' (Moar, pers. comm.). Unfortunately, the grains in the sample were rather corroded, but Mr. Moar's suggestions fit expectations, since the Mangakaware sites were not the first to be settled in the area and one would expect the presence of some clearings. Lambert (1970:93) suggests that the Post-Pleistocene vegetation in the Hamilton Basin has been a complex association of coniferous and dicotylous species, with the podocarp element dominant. In 1841 Ensign Best journeyed from Kawhia Harbour over the summit of Pirongia to the Waipa River, and noted that the west bank of the Waipa River was lined by level fern country. He described his view of the Waikato from Pirongia as 'splendid lands, extensive downs' (Taylor, 1966:293), and it may be that much of this area had been cleared by the early nineteenth century.

Of the three Mangakaware pa, the inner defended area of MA 1 covers 1640 square metres, MA 2, 2100 square metres, while MA 3, which perhaps served as an annexe to MA 1 (Peters, 1971:128), has not been surveyed. MA 1 (figure 3) is very heavily defended, and is the most deeply stratified and complex of the three pa. On its southside there are six rows of palisades, of which the inner one is composed of large planks, the outer rows of lesser timbers sloping in toward the pa at 10-20 degrees from the vertical. Some 630 palisade

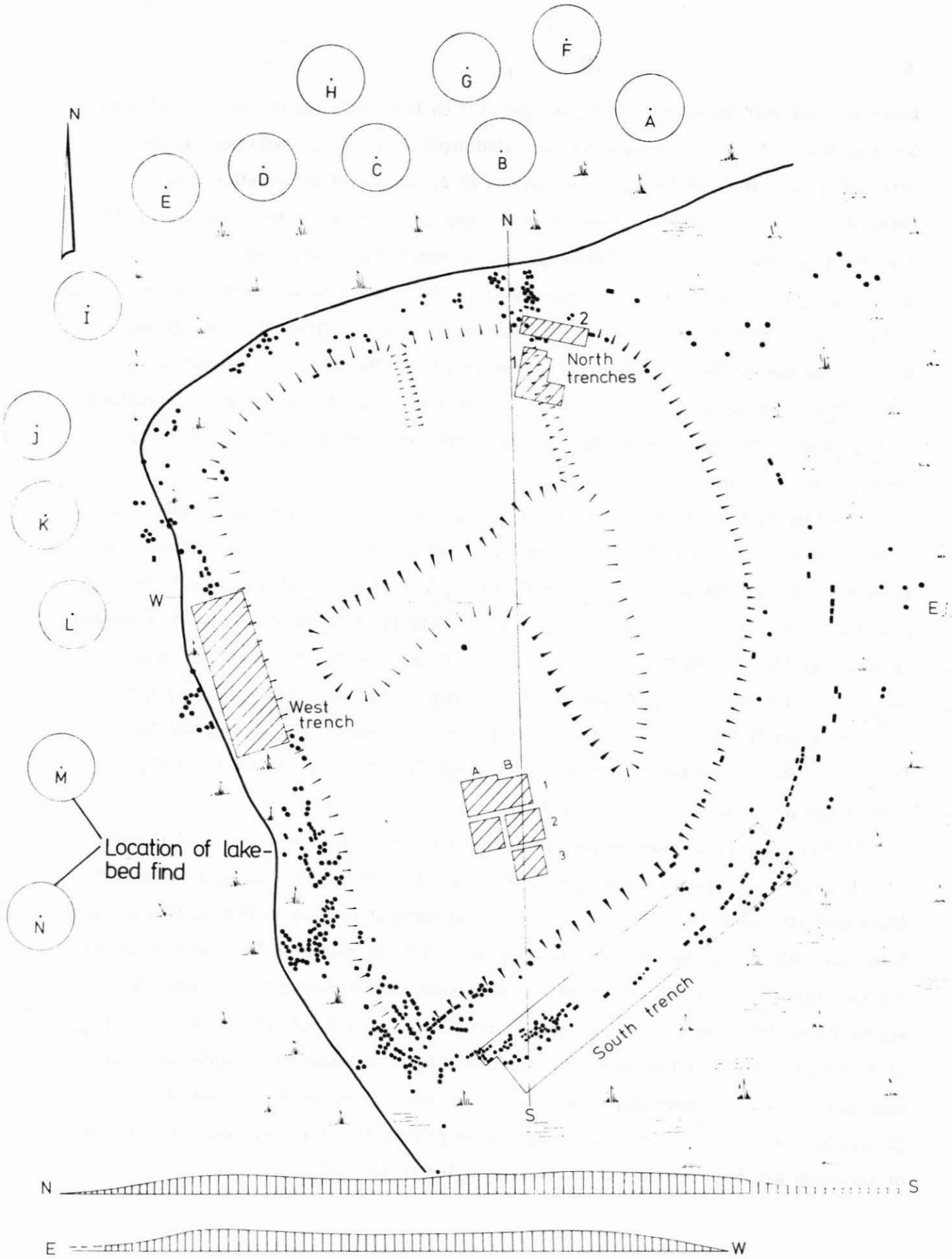


FIGURE 3 MANGAKAWARE 1. showing pallisade posts. K. Peter's 1969 excavations

butts were surveyed around this site, and one post on the north side of the pa still stands 3 metres high. Mr. Peters' excavations revealed deposits inside the palisades up to 2 metres deep, of identical formation to those in MA 2, which will be described below. Although Mr. Peters' trenches did not reach the base of the mound in the centre, they did reveal several phases of house rebuilding, and the houses themselves seem to have been grouped around a central open space, exactly as in MA 2. Other MA 1 structures include possible raised storehouses and canoe landing stages, and, like MA 2, the site may have been constructed partly on a bed of horizontal timbers in the wettest areas next to the lake. MA 1 is so patently similar to MA 2 in nearly all respects that it will be mentioned several times in the following account, although the full contents of Mr. Peters' report are not duplicated here.

According to Maori tradition the first recorded settlement in the Waikato took place at Otorohanga (Roberton, 1965:11), and this was soon followed by the first settlement of the Ngati Apakura tribe at Ngaroto. Traditionally, Ngaroto was settled about A.D. 1500, probably at the site of the deep swamp pa with its 3 metres of occupation deposits excavated by Shawcross (1968). The Mangakaware area was settled by the Ngati Puhiawe, who appear to have branched from the Ngati Apakura, and the radiocarbon dates from MA 2 suggest that this settlement took place after 1500. Perhaps the deep site of MA 1 was settled first, but this is uncertain since the only absolute dates come from MA 2, and fall between 1450 and 1750 at the very outside (see Appendix 1).

Similar swamp pa to those on Lake Mangakaware are known from other areas of the North Island, notably the Hauraki Plains (Green, R. C. and K., 1963), Lake Tutira in Hawkes Bay (Guthrie-Smith, 1953: 71), and the Horowhenua area north of Wellington (Adkin, 1948). The latter was made famous for the quantity of wooden artefacts recovered from the lake bed in the vicinity of the pa, and in each of the above areas the waterlogged environment is the key to the wealth of information, although there is no standard mode of construction for pa of this type. The pa at Oruarangi in the Hauraki Plains was apparently founded on a man-made base of mud, with wood chips and flax mats on top, and the midden deposits over these (Green, R. and K., 1963). Some of the Horowhenua pa were true lake islands, and their mode of formation was described to the Rev Richard Taylor in 1872 as:

> first by driving long stakes into the lake to enclose the required space then by large stones being placed inside them, and all kinds of rubbish being thrown in to fill up the centre, upon which an alternative stratum of clay and gravel was laid until it was raised to the required height, on which the houses were then erected, and the pa surrounded with the usual fence (Taylor, 1872:101-2).

Buller (1893a:173) describes a similar mode of construction for Papaitonga pa on Lake Waiwiri.

However, the Mangakaware pa were not of this totally artificial kind, but resemble more closely in construction the pa of Mangaroa on the swampy border of Lake Horowhenua (Adkin, 1948:33). Both MA 1 and MA 2 appear to have been constructed by identical methods, and the following account, while specific for MA 2, applies to both:

1. The inhabitants arrived at the lake edge to find swamp clothed in bush. The site for MA 2 against the edge of the lake was chosen, the bush cleared, and some of the timbers laid along the edge of the lake to raise the height of the ground. A similar procedure was followed at MA 1. Beyond the lake edge inside MA 2 there is not much evidence for a timber platform, although buried timbers are frequent, and it may be that the centre of the site was originally a slight rise. The lake-edge platform is not very regular, but the timbers are very generally oriented in the same direction. Shawcross presents evidence that such rafts of timber beneath the Ngaroto mound may be natural in origin, the trees being killed by a rise in water level (Shawcross, 1968:10). However, the timber could still have been arranged as a platform by the occupants of the site.
2. The defensive circle of palisades was driven into the peat, and house walls constructed with floor levels of sand and silt from the nearby quarry placed inside them. When the floor was raised high enough to be dry occupation began.
3. After deposition of up to 20 centimetres of occupation dirt another floor was laid. This process continued until the end of occupation. In the case of MA 1 the inner palisade line was eventually used as a revetment to contain the increasing thickness of these deposits, but this never became necessary at MA 2.

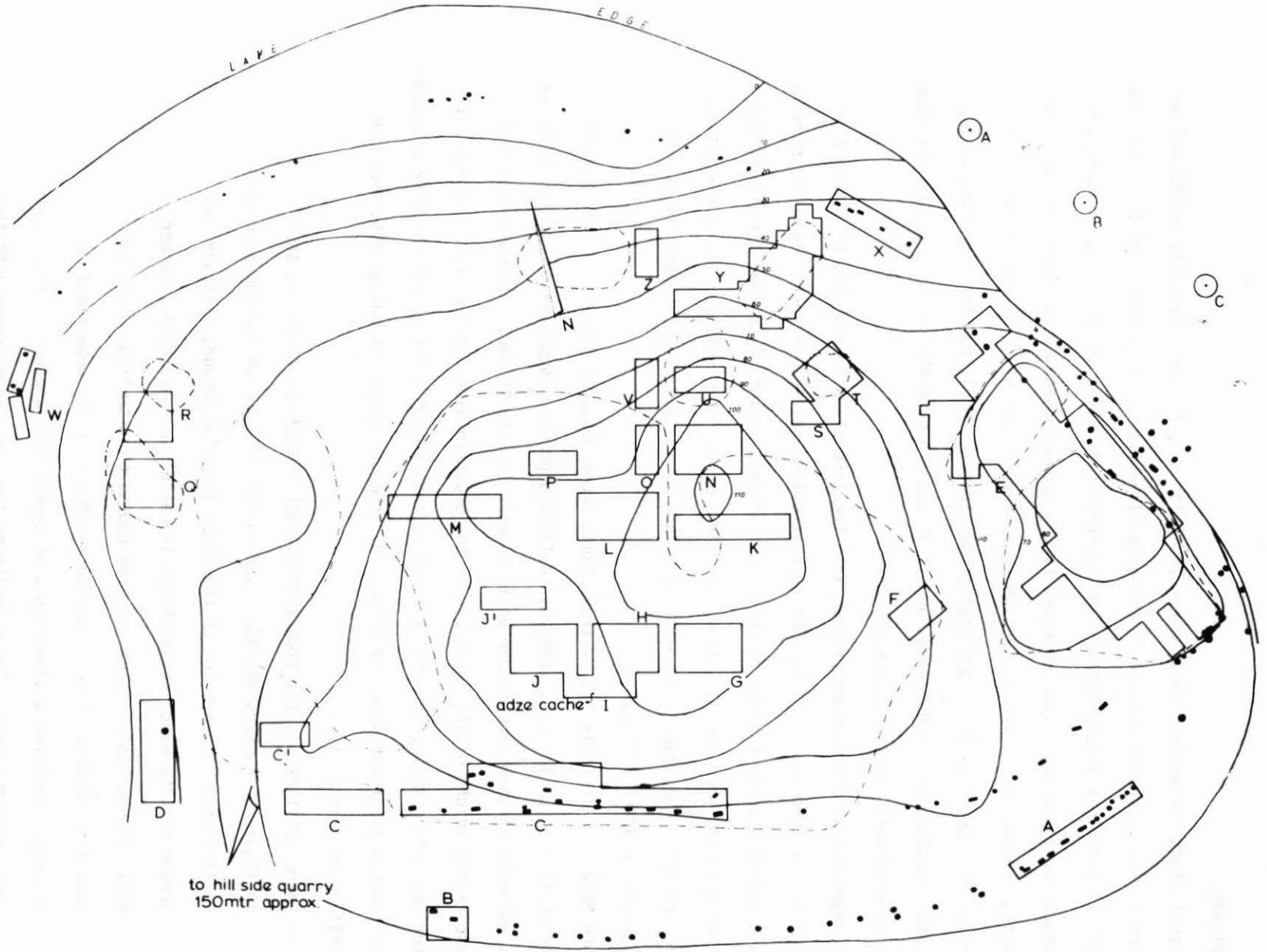
Hence the Mangakaware sites, and Ngaroto, are by nature reminiscent of small tells, and MA 2 was chosen for excavation simply because time depth is short, depth of deposit small, and all deposits have been preserved by intermittent waterlogging. The greater the depth of deposit the less likely becomes the chance of preservation of organic materials, for the upper levels will be raised too far above the water-table.

THE EXCAVATIONS AT MA 2

Figure 4 shows the plan of the site with the excavation trenches A to Z. In 1968 and 1969 the main grid running approximately north-south was used, but in 1970 this was abandoned with trenches E and F and T. Posts and house mounds may be seen quite clearly on the site, so that trenches can be laid out to correspond to the orientation of the feature under investigation. It is felt that to impose a rigid grid system in such circumstances would give rise to much unnecessary work. Trenches E, F and T represent such an adjustment.

The area of the pa is 2,100 square metres, of which 400 square metres, or about 20 per cent, have already been excavated. The greater part of the western side of the pa has been tested by test-bores, and it is clear that no substantial occupation ever took place here, except for that represented by the mound in trenches Q and R. Evidence for occupation was mainly restricted to the mounded areas containing sand lenses, where the trenches were laid out. The western side of the pa shows topsoil resting directly on peat, with no intervening cultural layers. Hence the area of occupation which has been excavated may be as high as 40 per cent.

The reconstructed layout of the site, as determined by excavation and by a series of small test bores over a five metre square grid in unexcavated areas, is shown in figure 16. This figure serves as a final interpretation of the site, and its details are imposed on the basic plan shown in figure 4. Specific features of the site which will be described are the palisades, the entrance, the open central marae, and the line of houses backing on to the lake. Hearths, earth ovens, a raised storehouse and a possible eel drying rack complete the list.



---- sand lenses

form lines with 10cm intervals

FIGURE 4

MANGAKAWARE 2 SITE PLAN

0 — 1p metres

The palisades

Except along the western side, where the palisade posts were probably pulled out in prehistoric times, the defences of MA 2 may still be traced at ground level from the remains of about 110 visible palisade butts. The southern side gives the clearest picture, with a heavy inner and light outer row separated by 8 metres of open space. Along the lake edge the palisades become more crowded, but there appears to be only a single row here. The defences at MA 2 are thus less complicated than those at MA 1, but the situation at the latter site could reflect rebuilding, and it is uncertain whether as many as the six rows visible were actually in use at any one time.

Arrangements of posts which project into the lake at MA 2, and also MA 1, are best interpreted as raised storehouses. One such structure, raised on four posts, is shown in figures 4 and 16. Such storehouses were recorded last century by Buller for Papaitonga pa in Lake Waiwiri, Horowhenua: along the shores of the island, in the shallow places, posts were stuck into the ground, and storehouses erected upon them (Buller, 1893a:573).

When MA 2 was first visited by the Waikato Archaeological Society in 1968 several palisade posts were pulled out, using hydraulic equipment. These are now in the Hamilton museum, and many of them were bedded up to 3 metres in the ground. It would seem that the above ground height of the inner row on the southern side was 4 metres or more, while the outer row, which slopes inwards at about 10^{o} was slightly less. All the MA 2 palisades had been reduced to ground level by 1968, and, from the specimens pulled out, they can be classified into three types:

Type A -- Large split or unsplit tree trunks, with shaped lower ends as shown in figure 5 (numbers 94, 95). The shaped ends appear to have been made to facilitate the driving of the posts into the ground, although the reason for the exact shape chosen is not clear. All have a rather phallic appearance, which might of course be intentional, and many have fire hardened bases. The Auckland University Department of Anthropology holds a single post of type A from another Waikato swamp pa by Lake Maratoto. The majority of the posts were driven into the

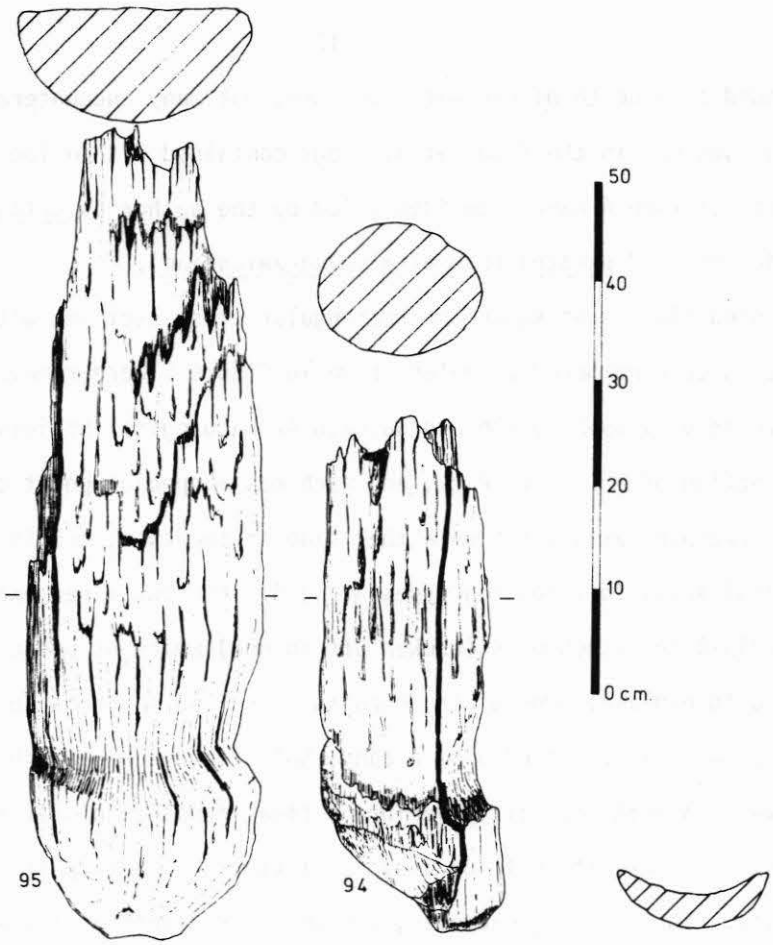
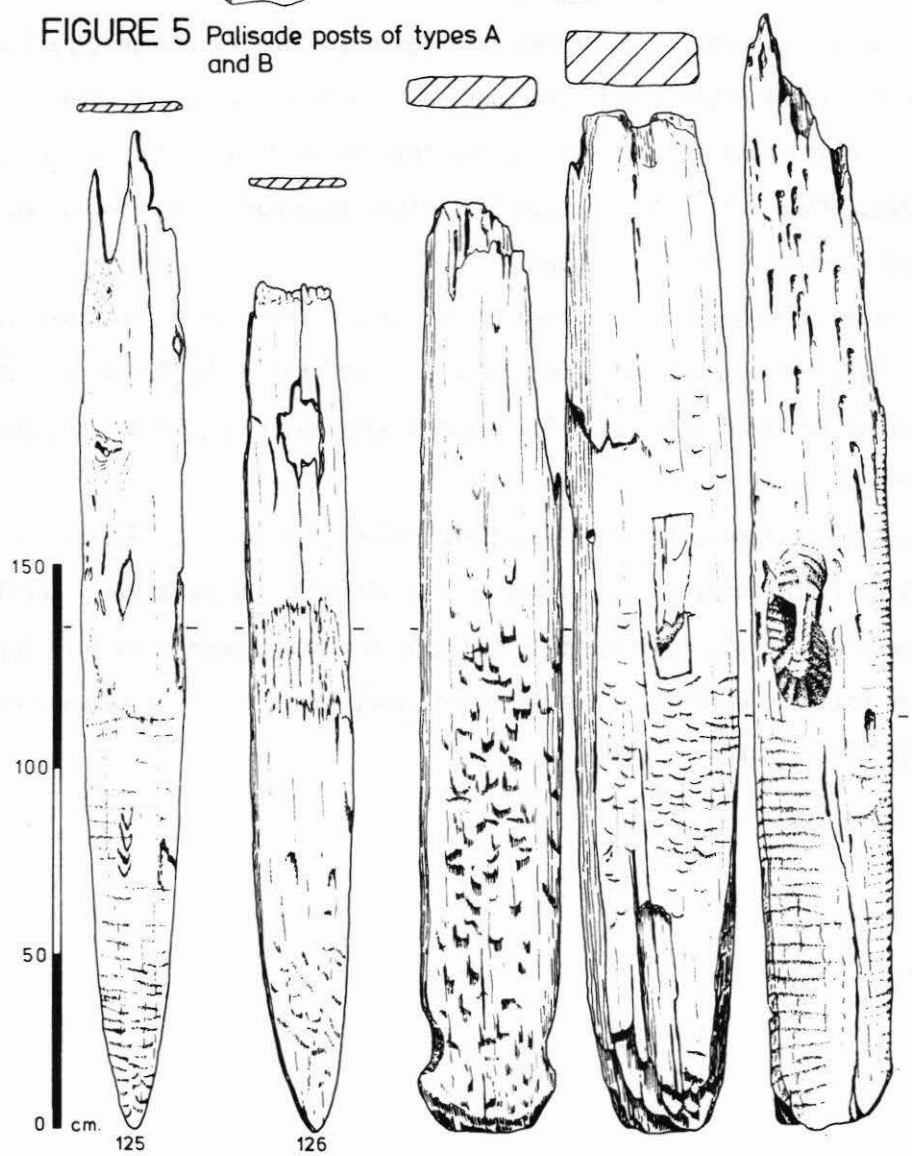


FIGURE 5 Palisade posts of types A and B



ground to a depth of one metre or more, but many encountered obstructions in the forms of old logs contained within the peat. Two posts of type A have been identified by the author as matai (Podocarpus spicatus) and pukatea (Laurelia novae-zelandiae).

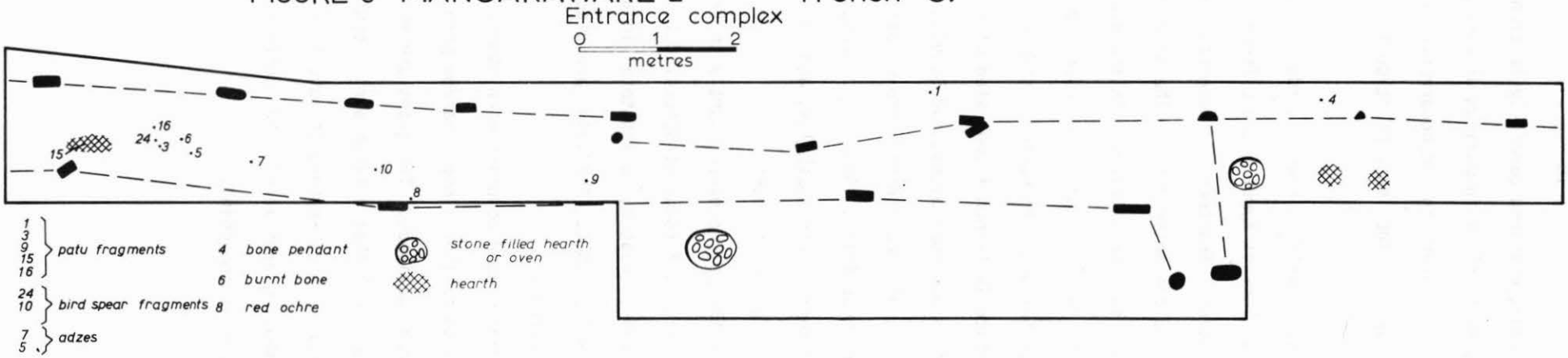
Type B -- Dressed timbers of square or rectangular cross section, with tapered bases. The three unnumbered examples shown in figure 5 were removed from the site in July 1968 by the old Waikato Archaeological Society under the direction of Mr. R. D. Pick, and each has a special point of interest. One example has a notch on either side of the base, and is therefore a transitional form between types A and B. The two other examples have handle-like attachments (broken off in one) which at present are rather hard to explain. One of these posts is hollow in cross section, and may have been first intended as a canoe hull, in which case the handle might have been left for lifting prior to final completion. If the craftsman made an error, it would be a simple matter to split up the hull into palisade posts. In these two examples, the adze marks left during manufacture are particularly clear. The three examples shown are the largest palisade posts from the site, and were sunk up to 3 metres in the ground.

Also shown in figure 5 are two thin tapered palisades of type B (125 and 126), which were found on site MA 1 after they had been removed from the ground by persons unknown.

Type C -- Undressed timbers with tapered bases, many being little more than simple stakes. Three posts of type C have been identified by Dr. R. N. Patel of the Forest Research Institute, Rotorua, as Myrsine, Elaeocarpus sp., and Beilschmiedia sp.

Although all located palisade timbers are shown in figure 4, many of these are of course still in the ground, and so cannot be classified. The relatively small number which have been pulled out indicate that the type A timbers were used only for the massive inner palisade defence on the landward side, while those of types B and C were used for palisades and houses alike.

FIGURE 6 MANGAKAWARE 2 Trench C.



The inner defensive palisade, examined carefully in trench C, consisted of posts of types A and B, of large size, up to 50 cm in maximum dimension in cross section (see figure 6). There is no pattern apparent in the occurrence of the two types, and the posts are approximately two metres apart. The inner palisade is considerably more massive than the outer, and was presumably higher.

The outer defensive palisade, which sloped inwards at about 10 degrees from the vertical, consisted of small timbers of types B and C (none of type A), of up to 20 cm maximum dimension in cross section. Fourteen of these posts were examined in trench A, where they are between 20 cm and one metre apart. The sizes of these posts have been emphasised slightly in figure 4 to improve clarity in the plan.

On the western side of the site palisades are absent, and may have been pulled out after a successful attack (see below). The northern side of the site against the lake has only one palisade line, which in trench X consisted of small posts of types B and C.

Many of the posts have fire hardened bases, and Douglas Pick has suggested that the posts were driven down into the soft peat through the combined efforts of a number of men pulling downwards on a crossbar (Pick, 1968:2-3). Certainly, no palisade posts showed signs of having been inserted into postholes, and such would be very hard to dig in peat criss crossed with underground timbers.

The entrance passage into the pa, recovered partly in trench C, is shown in plan in figure 6 and reconstructed in figure 7 (superstructural details from Best, 1927). Only the inner end of the passage was excavated, so its total length cannot be reconstructed. Narrow ngutu entrances of this type (Best, 1927:66) are described by Crozet for Paeroa pa in the Bay of Islands as follows:

> The entrance gates are not placed opposite each other. After entering the first circuit one has to go further along a narrow path to look for the entrance through the second palisade. The gates are very small (Roth, 1891:29).

The gate at MA 2 was indeed so small that a large person could not have entered or left the pa by this side, and 50 centimetres appears to have been the maximum width, unless the posts were hollowed out above ground level. The entrance passage is 1 metre wide, but narrows to about 60 centimetres at one point.

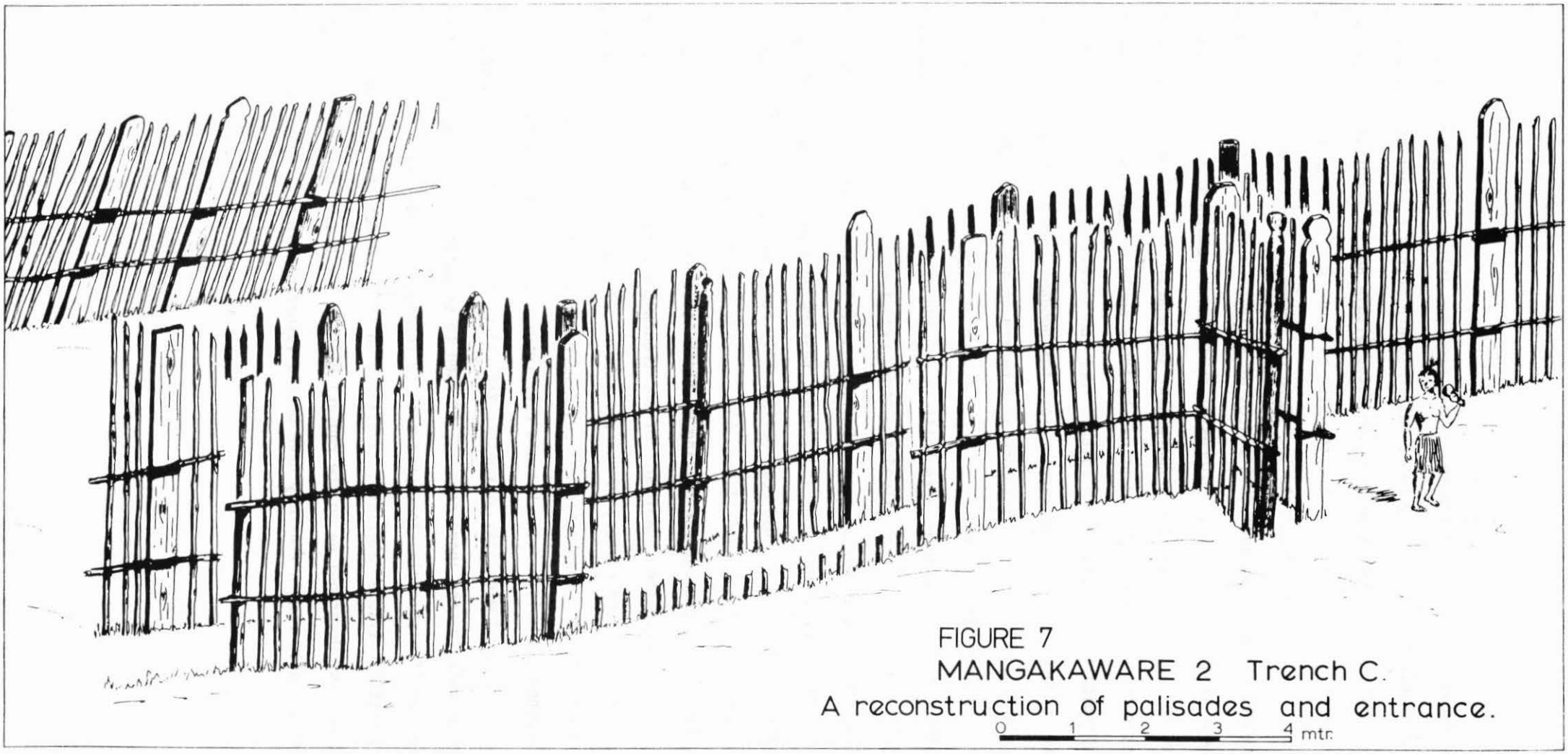


FIGURE 7
MANGAKAWARE 2 Trench C.
A reconstruction of palisades and entrance.
0 1 2 3 4 mtr.

The excavations in the entrance passage provided information of a very unusual and significant kind, for within an area of only 8 square metres no less than eleven artefacts (to be described below) were found, concentrated within and just outside the passage. This density of artefacts is very high for the site as a whole, and is unlikely to be random. The positions of the major artefacts are shown on figure 6, and the actual types found are of importance, because they include 5 pieces of at least 3 onewa (short stone war clubs), 2 bird spear fragments, 2 adzes, 8 pieces of human femur, smashed, burnt and covered with red ochre, and a large piece of red ochre near the bones. A small bone breast pendant was found just outside the palisade. Most of the tools could be used as weapons, and the bones and ochre indicate some rather gory ritual. One conclusion might be that a battle took place within the entrance passage, one warrior lost his pendant through the palisades, and the victors celebrated by cooking a leg bone in a hearth inside the entrance passage close to the cluster of artefacts. A hearth in the entrance passage is, anyway, an unusual circumstance, although several hearths were built in the lee of the defences. If the evidence for a fight be accepted, we may extend the story even further.

In the northwest corner of trench E (figures 12-15) was found a cache of smashed burnt human bone, representing one individual, resting on a piece of wood (see page 26 and Appendix 2). These bones had been deliberately burnt prior to burial. Near the cache was found a handle of wood (figure 19, no. 263; page 54) which may have belonged to a mira-tuatini - an implement for cutting up flesh at cannibal feasts. The culprits in this case may have been the inhabitants of the trench E habitation complex, and, if so, their deed did not go unpunished, as observed above. The attackers appear to have driven out the inhabitants, for the broken weapons were never picked up from the passage floor. However, whether the original inhabitants ever returned, after vegetation had grown in the passage to cover the implements, or whether the attackers occupied the site, may never be known. Unfortunately, the above saga is not open to scientific verification, and the author would apologize if his imagination appears to be running away with him.

Very little reliable material is available on the defences of other swamp pa in the North Island. For Oruarangi pa on the Hauraki Plains, Teviotdale describes a single row of posts, with a double row in what may have been a vulnerable place (Teviotdale and Skinner,

1947:346). For the Mangaroa pa on the edge of Lake Horowhenua, Rolston (1947:265) reports a double row of palisades. In the Waikato the site of Mangakaware 1 has up to six rows of posts in places which slope both inwards and outwards, but these may not have been in use contemporaneously (Peters, 1971:127-8). Another Waikato swamp pa by Lake Mangahia is reported to have up to three rows of palisades on the landward side, and the outer row slopes inwards (Pick, 1968:32). The swamp pa by Lake Rotokauri near Hamilton, recently excavated by the Waikato Museum Archaeological Society under the direction of Ken Gorbey, has two or three rows on the landward side. The general pattern which may be observed for the Waikato swamp pa is that the vulnerable landward sides may have two, three, or more rows, with the outer rows sloping inwards or outwards from the vertical. The lake sides generally have one row only.

The marae area and associated features

Examination of figure 4 will show that a large area in the centre of the site has been built up with sand lenses, and that these lenses extend to the south to cover the area of the entrance passage. This area is interpreted as the marae of the settlement, and it seems to have been relatively free of structures, apart from possible raised storehouses and some cooking areas round its edges. The area along the inside of the entrance passage was also free of any features, perhaps to allow unhindered mobility.

The total area of the lenses, demarcated by the dotted line on the plan, is approximately 750 square metres. In the area of the palisades and trench C1 there is only a single layer of sand, but in the centre of the site there is evidence in places for two or more lenses, indicating more intensive occupation. The characteristic maximum stratigraphy for the area is as follows (from top to bottom):

Topsoil, grading down into an occupation level of black soil, with thick concentrations of charcoal, shell, oven stones, and ash.

A floor of fairly pure yellow sand, quarried locally from a nearby hillside (see arrow on figure 4).

Occupation level of black soil, with thick concentrations of charcoal, shell, oven stones, and ash.

A yellow sand floor (as above).

Occupation level (as above).

A yellow sand floor (as above).

Peat.

The levels described above have not been numbered, purposefully, because the lenses of yellow sand are localised and cannot always be correlated stratigraphically. Not all trenches have the full complement of layers; some merely have one level of sand and some places have no sand at all, but simply an occupation level over peat. The depths of the layers also vary, and sections from topsoil to the peat surface are not over 50 cm deep and are usually rather less. Section drawings are held by the author, but full details are too cumbersome for reproduction here.

The trenches to be described in this section are F to P inclusive, and S to V inclusive. Trenches T and U contain lenses which are stratigraphically uncorrelated with those elsewhere, and T contained three small wooden posts which may have supported a shelter. A radiocarbon date (NZ1677) for one of these posts is discussed in Appendix 1. For the other trenches (i.e. excluding T and U) I have divided the lenses into two phases: earlier and later. Figure 8 will show that sand lenses of the earlier phase are confined, as far as can be detected, to trenches G, H, I, J, J1 and L. In trench H, which was not fully excavated, part of a sand lens which preceded the main earlier phase lens was exposed, and in trench J1 the main earlier phase lens was patched. Trench F contained no sand lens at all in the earlier phase, but did have a very well preserved stone filled hearth or oven which was surrounded by a thick deposit of raked-out ash. Apart from trench F, the configuration on the plan suggests two, or perhaps three, discrete earlier phase lenses in the centre of the site, with cooking activity confined on present evidence to hearths without stones.

The configurations of the later phase lenses are shown in figure 9. One large lens of very irregular outline extended from trenches G, H, I, and J, through to trenches K, L, N, and O. A second discrete lens appears in J1 and runs through the western edge of L, and the lenses in P and M most probably belong to this. The greatest extent of the lenses therefore belongs to this later phase, and borings to the base of the topsoil taken over a five metre grid over the whole site show that an area of some 750

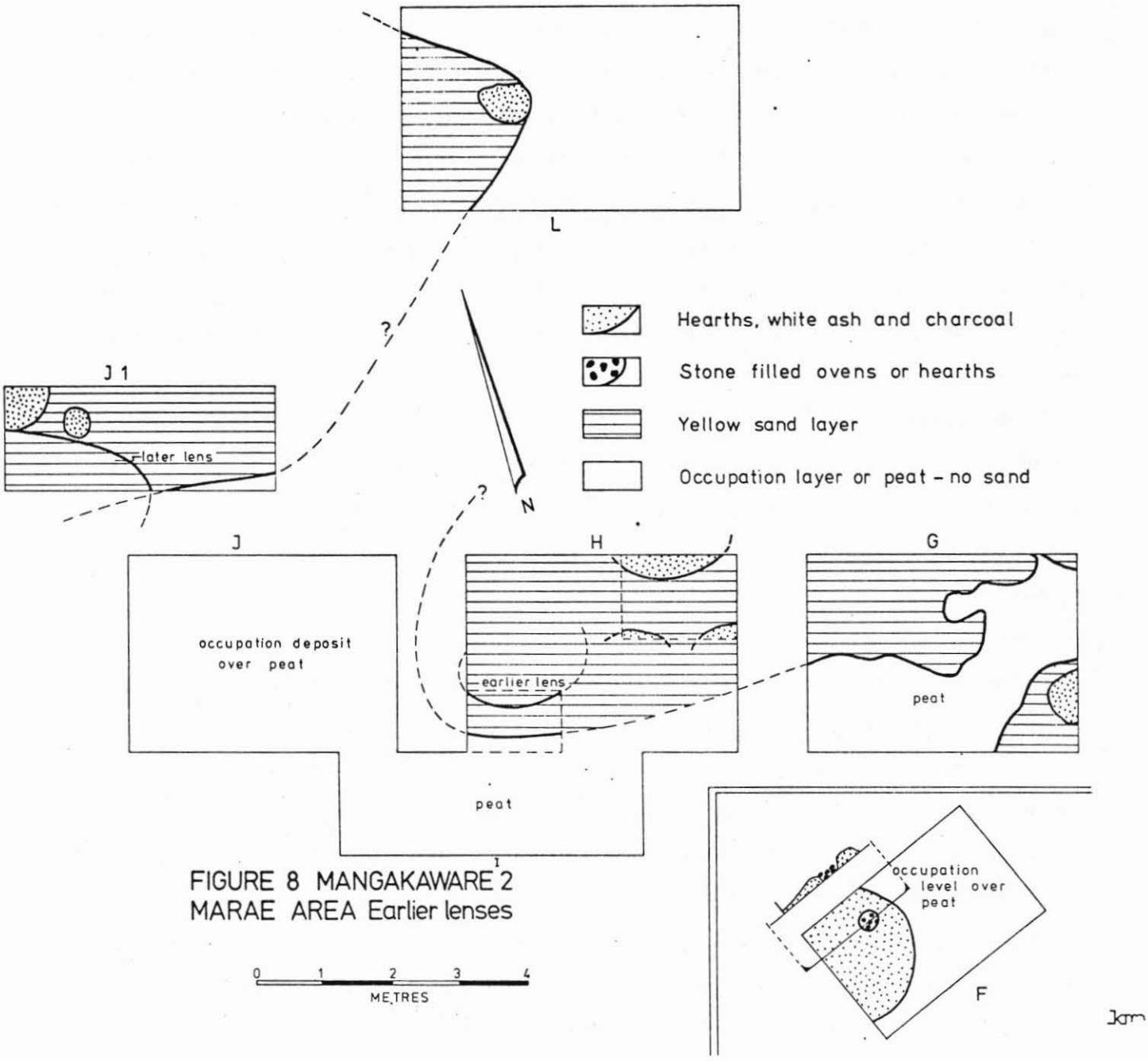


FIGURE 8 MANGAKAWARE 2
MARAE AREA Earlier lenses

square metres was finally covered with sand. There is some evidence for flimsy structures in the central area in the later phase: trench O contained one small post, trench N contained one posthole 40 cm deep, and trenches H and I have 9 very shallow holes which might be postholes. Trench I also yielded the two adzes (numbers 21, 22) which were buried in a hole 25 cm deep, presumably for safety. Trench F continued as a major cooking area in the later phase, and seems to lie on the edge of the central area of sand floors. One seed of white maire (Gymnelaea lanceolata) and seven of kahikatea (Podocarpus dacrydioides) were found in later phase deposits in trench F, but since the area was not covered, deposition by natural agencies is a possibility.

The cooking installations provide evidence of an interesting nature, although it is not possible to state precisely how many were in use at any one time. The hearths consist of grey ash with lumps or flecks of charcoal, and are up to one metre in largest horizontal dimension, and between 5 and 20 cm deep. Two examples in trenches F and L have yellow sandy-clay linings, but none have stone linings (see Leach, 1972). Whether these hearths were used for cooking or heating cannot be determined from the evidence recovered.

The stone filled hearths or ovens correspond to the category of structures denoted haangi in many reports, including my own. Sutton (1971) has shown that this term may be used in error in many cases, as a haangi is strictly a steaming oven, in which water was sprinkled on the hot stones to make steam prior to closure. In this report I use the term "stone-filled hearth or oven" to refer to structures of this general class, and the shorter term "stone-filled unit" is used where the context is clear. Such structures comprise shallow pits which contain water-worn and often heat-shattered stones, which might have been used for oven steaming, oven roasting, or as open fireplaces for cooking or heating. The evidence from MA 2 is not sufficient to allow accurate determination of function, and in many cases depths are difficult to determine because many were cut from higher levels which cannot easily be identified.

No apparent pattern is evident in the distribution of hearths and stone-filled units in the central area, although peripheral areas in trenches F, G, J1 and the western side of L do show higher concentrations of these structures, which might suggest that a central space was left relatively clear for other activities.

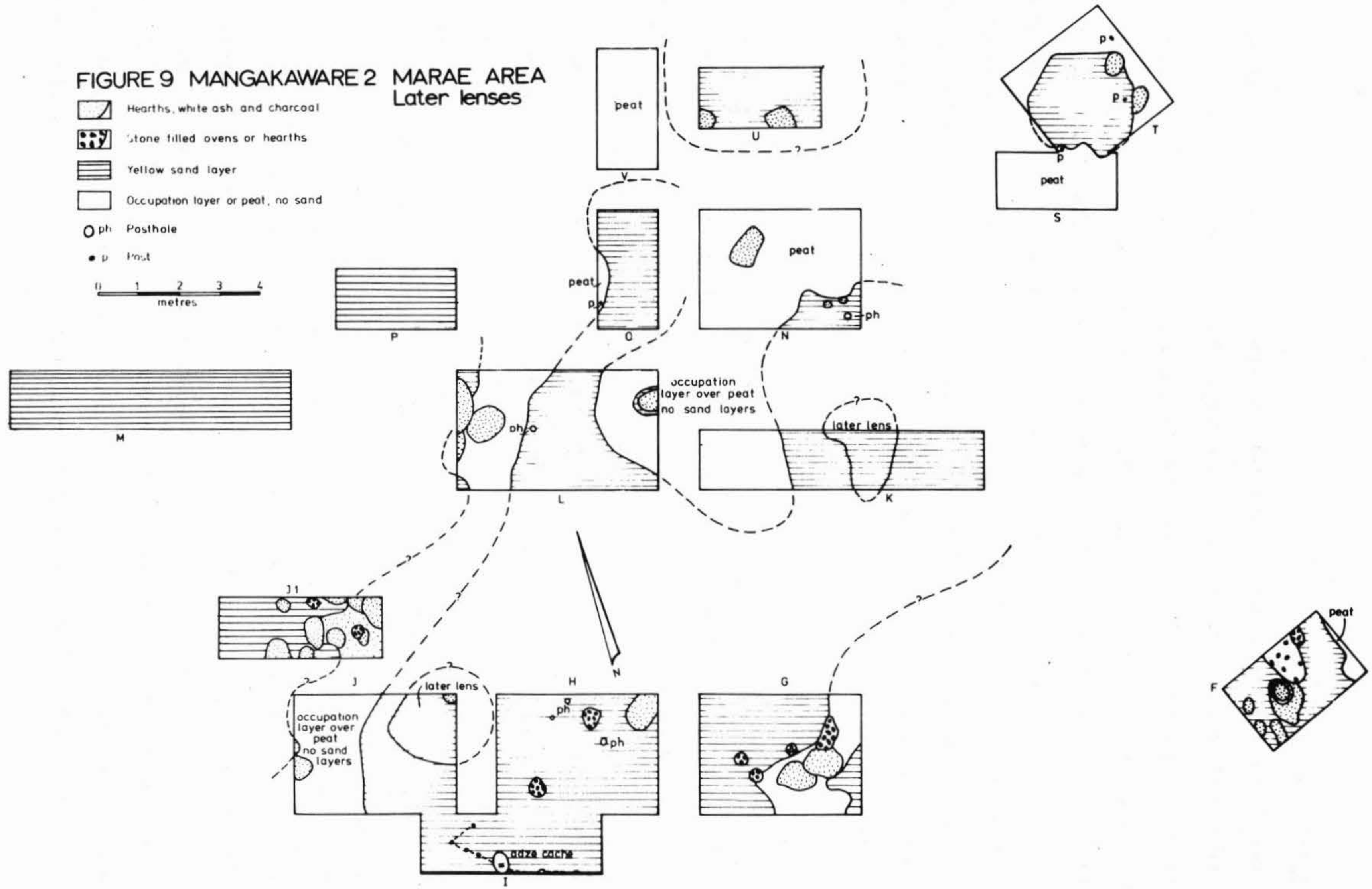


FIGURE 9 MANGAKAWARE 2 MARAE AREA
Later lenses

Houses and shelters

Houses and shelters, which so far total 5 major structures, were concentrated in the northeastern part of the site against the lake. The most important results came from trenches E and Y, but possible locations for other houses in the western lakeside sector are shown in figure 16. The total number of houses in the site may never have exceeded 8 or 10, and it seems unlikely that any houses would have been constructed in areas off the sand lenses, on the damp peat. The trenches Q and R (not figured separately) revealed two rather irregular sand lenses, the lower of which contained two small stone filled units. No other features were found here, and there was strangely no trace of an actual house. However, the discrete position of the lenses, which formed a small mound prior to excavation, would suggest that a dwelling might once have stood here.

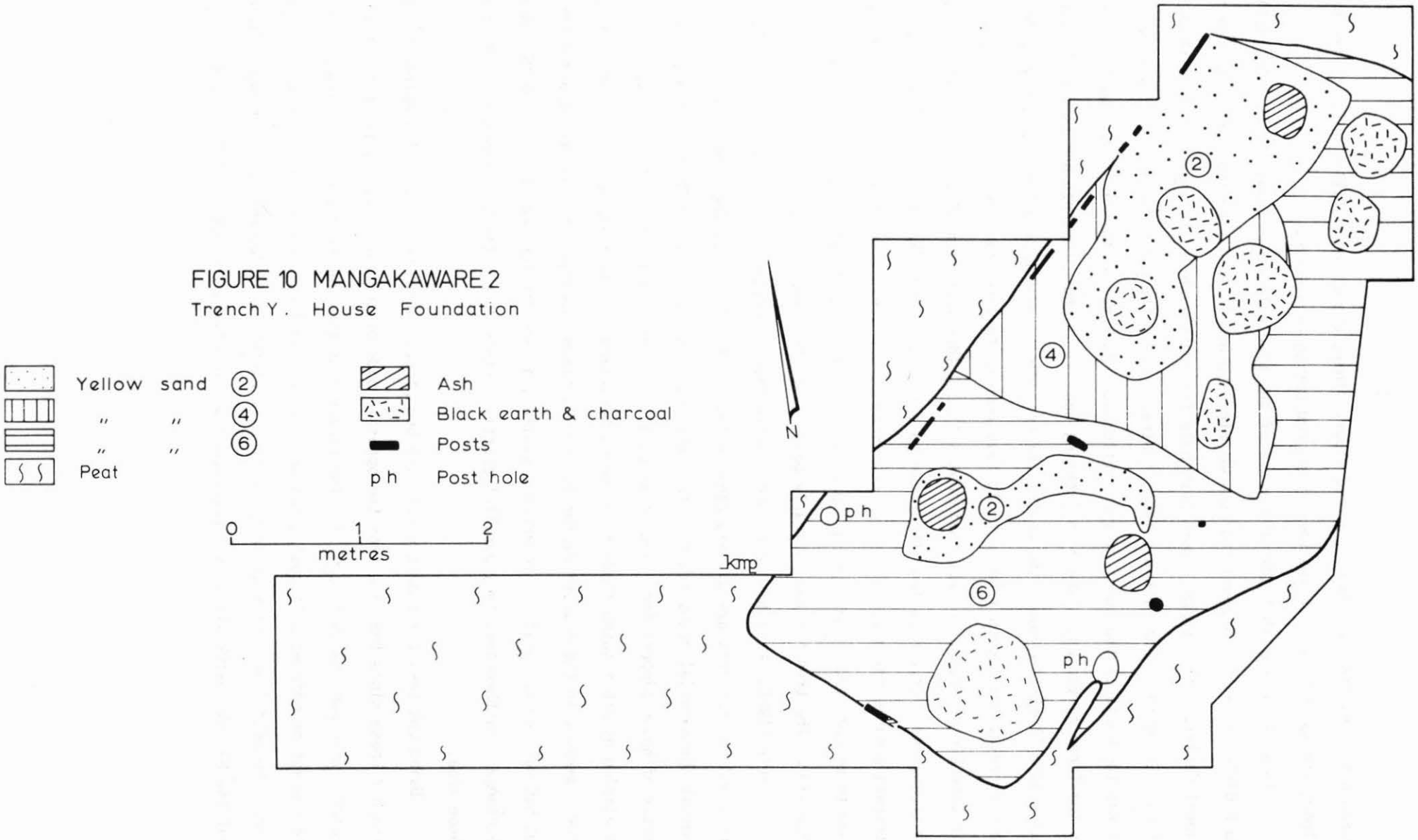
The trench Y house (figures 10 and 11)

This house, at 6 metres long by 2.20 metres wide, is the largest recovered on the site. Its walls, to judge from surviving remains, seem to have consisted of spaced vertical planks on at least one side. The fire-hardened bases of several adzed planks forming the north-western wall were recovered in situ, and the base of one of these planks is 15 mm thick by over 31 cm wide -- unfortunately, one edge has been broken away. The base of this plank is curved and fire hardened, and its size indicates that it was split and shaped with precision from the heart of a mature forest tree. The south-eastern wall of the house consisted of smaller posts, but the north-eastern part has been rather eroded, and no timbers were located in this area. Two posts belonging to a central line supporting a ridge-pole still survive.

Figure 10 shows the configuration of the house floor at a late stage in its life. The main yellow sand floor is designated layer 6, and this may originally have covered the whole house area, although it was not exposed in the north-western part of the house. It is overlain by two successive lenses designated layers 2 and 4, and each of the three lenses are separated by thin occupation layers of black soil with large amounts of charcoal. Three ash hearths, which were probably not in use contemporaneously, are contained within the upper surface, as are a number of charcoal concentrations which may represent unburnt material

FIGURE 10 MANGAKAWARE 2

Trench Y. House Foundation



raked out of hearths and dumped on the floor. There are no stone-filled units in the house floor, and no seeds or berries were recovered during excavation.

It would appear that this house was of the type called wharepuni (Buck, 1958: 121). Buck differentiates wharepuni from common sleeping houses mainly on the grounds of constructional details - the common houses have pole frameworks, while the wharepuni have shaped slabs. Since the trench Y house faces centrally on to the marae, perhaps we may assume that it was the house of the chief of the settlement. MA 2 had no building which would correspond to the large carved whare whakairo (meeting houses) of the nineteenth and twentieth centuries, and Groube (1965:55) notes the absence of references to such structures by early explorers. Nevertheless, the trench Y house would have been quite large by prehistoric standards, for Sir Joseph Banks noted in 1769 that houses 'are seldom more than 16 or 18 feet long, 8 or 10 broad, and 5 or 6 high from the ridge pole to the ground' (Morrell, 1958:134). Groube presents a table for sizes of houses described by early visitors to New Zealand, and there seem to be two size ranges, one group about 20 feet long, the other about 10 (Groube, 1965:36). The trench Y house clearly belongs in the larger category.

Firth (1926:34-9) has described construction techniques for wharepuni in the Tuhoe area, and his comments are of very clear relevance for the following reconstruction. Amongst the material recovered from the lake bed in the vicinity of MA 1 there are a large number of house timbers (see figures 37 to 39), and many of these elements are very closely paralleled by other swamp finds from Onepu, Northland (in the Kaitaia Museum), and Patetonga, near Oruarangi in the Hauraki Plains (in the Auckland Museum). From all three areas the notched wall posts (pou) are remarkably similar, as are the tenoned rafters from MA 1 and Patetonga. Furthermore, they parallel exactly Firth's descriptions of these items in the Tuhoe area.

Using the trench Y plan and the lake bed pieces (which do not actually belong to the trench Y house since they are from the opposite side of the lake), we may reconstruct the trench Y wharepuni as in figure 11. The elements of the drawing are all existing pieces, and consist of notched wall posts, tenoned rafters, purlins, two door jambs, and a ridge-pole. The method of construction is related in Firth's article, and it is perhaps amazing that the MA lake materials should correspond so closely in the method of fitting the

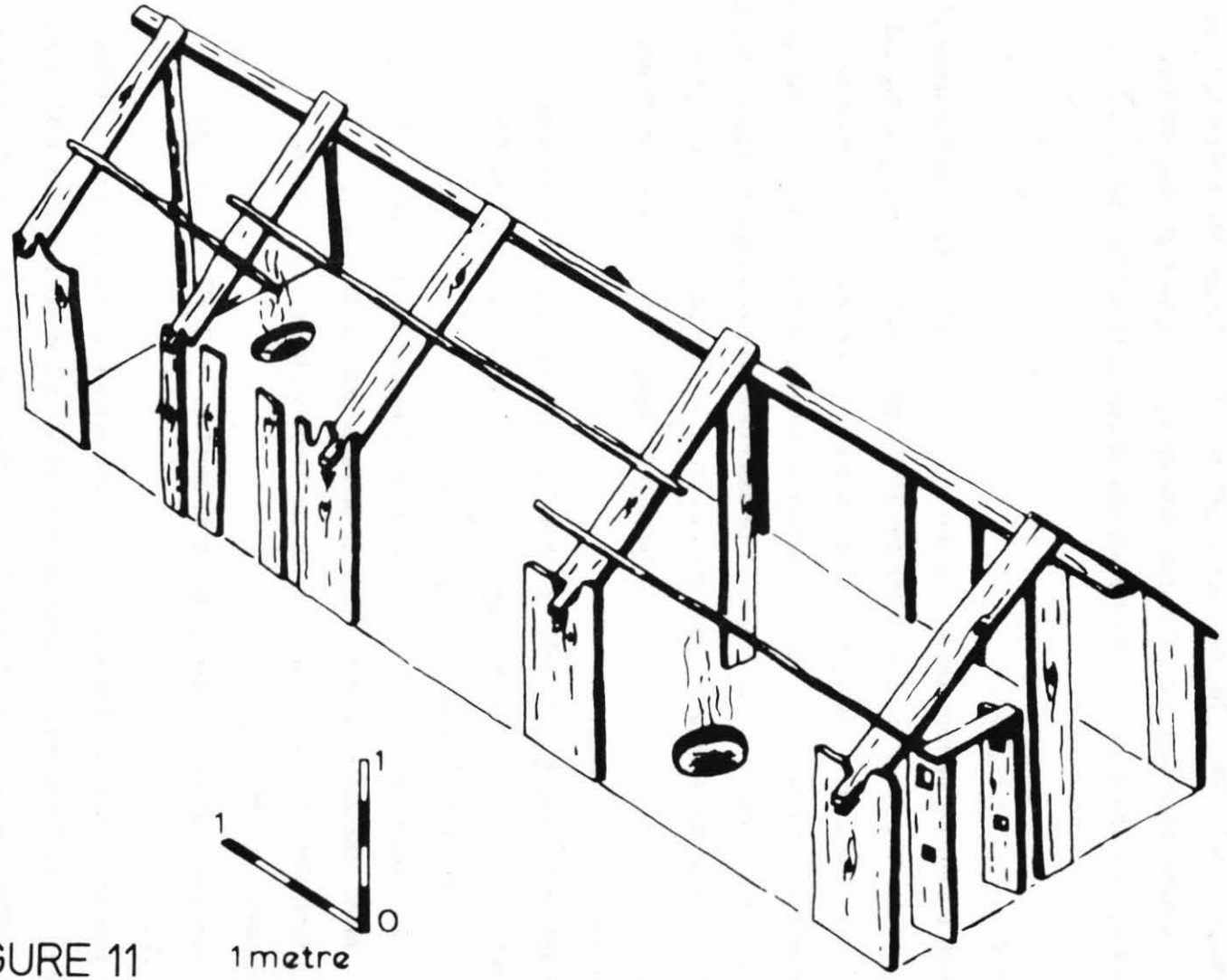


FIGURE 11

MANGAKAWARE 2

Reconstruction of the TrenchY house

rafters into the wall slabs. The numerous pieces from the lake are all described below, but it may be noted here that the wall slabs were up to one metre high, and all fire hardened along their bases, while the doorway was 80 centimetres high, but of unknown width.

The trench E complex of features

Trench E contains perhaps the most interesting complex of features on the whole site, and this area was the focus of work in the two final periods of excavation, in May and December 1970. The area is close to the lake, and high water tables in the past have ensured excellent preservation. The most detailed evidence on structures and site economy comes from trench E, and this evidence will be described with reference to figures 12, 13, 14 and 15. Each of these figures shows the excavated area of trench E, as well as the following structures which are not known, for stratigraphic reasons, to belong to any particular phase of construction:

1. The internal palisade, of small type B and C posts, which delimits an area 20 metres long by 5 to 7 metres wide. For this palisade a quote from Sir Joseph Banks (for 1769) is clearly relevant:

   > Some few of the better sort (i.e. houses) have kind of Court Yards, the Walls of which are made of Poles and hay 10 or 12 feet high which as their families are large incloses 3 or 4 houses (Morrell, 1958:135).

2. The main palisade on the lake side, which consists basically of a single row of posts.

3. The four posts set into the edge of the lake, which may have supported a storehouse. G. L. Adkin (1942) reproduces and discusses a drawing made in 1845 by the Rev. Richard Taylor (from his book Te Ika a Maui), which shows five storehouses, each raised on four posts, set in various locations in and around Lake Horowhenua. The Mangakaware structure might well have been similar.

4. The sand lens E north, which is stratigraphically uncorrelated with the rest of the area. This lens contains a single stone filled hearth or oven, and in

the north-western corner of the trench is the small pit referred to on page 19, which contained a quantity of burnt human bone on a small slab of wood. A report on this bone is given in Appendix 2.

A problem arises with the sand lens E north. Was it open to the sky, or was it roofed? Roofing would be no problem at all, as timbers 4 to 5 metres long would bridge the gap between inner and outer palisades, and no intermediate earth bound timbers would be needed. If it were roofed, it would doubtless provide a useful sleeping area for the warmer months of the year. Unfortunately, however, structural evidence for this lens does not make the situation clear.

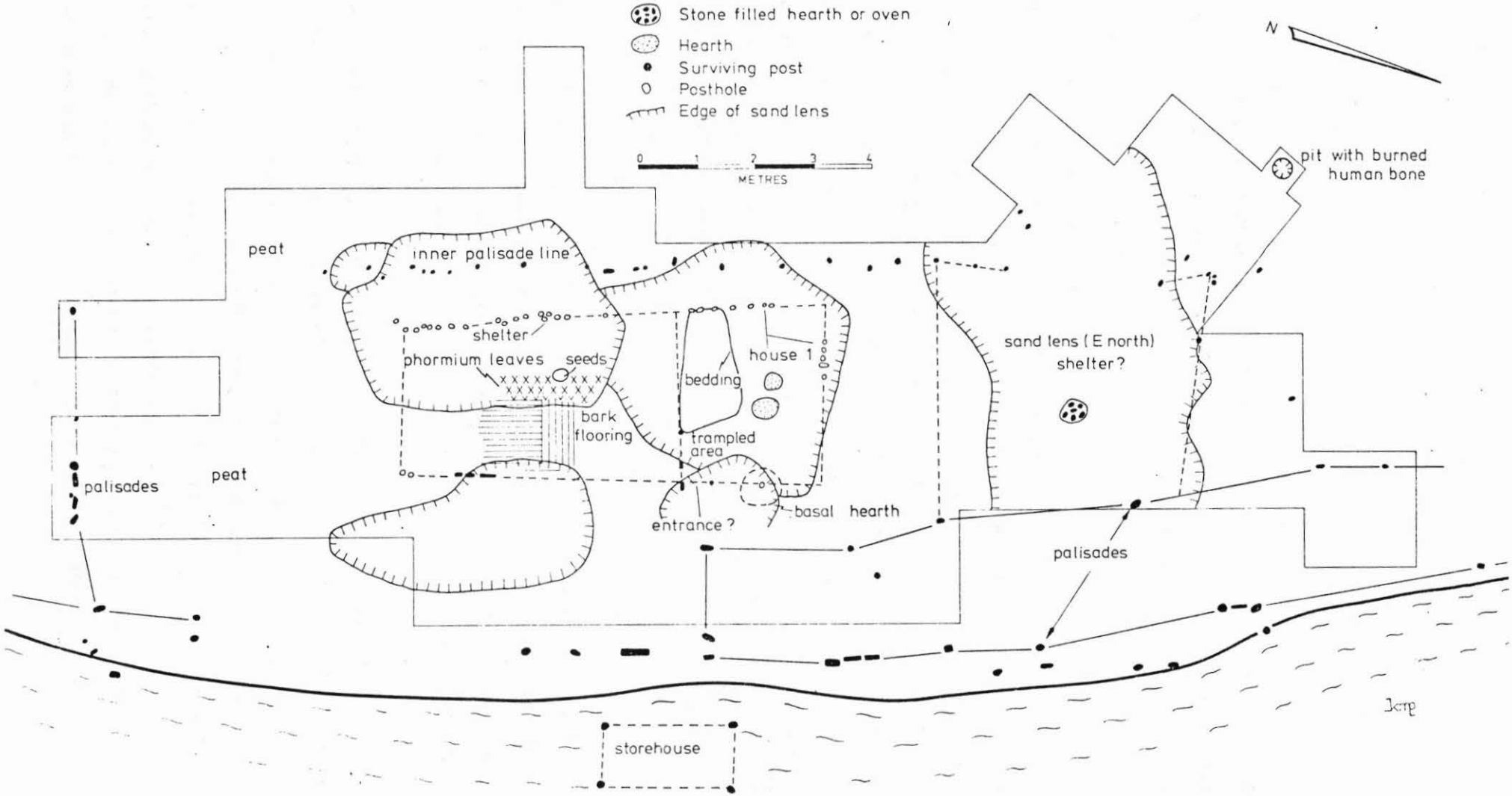
The southern half of trench E contains a complex series of successive sand lenses and timber structures. Stratigraphically, four major phases have been observed here, denoted phases 1, 2, 3 and 4, with phase 1 being the earliest. Whether the internal palisade described under (1) in the above paragraph was standing throughout these four phases is unknown.

Phase 1 (figure 12)

The earliest feature of this phase is a hearth, which underlies the eastern wall of house 1. The two wooden structures belonging to this phase were built on three main sand lenses, which are taken to be roughly contemporary even though one overlaps the edge of another. House 1 was built on the northerly lens, and surviving postholes mark part of its perimeter, while four actual posts survive in the south-eastern corner which appear to belong to this phase. The house as thus defined covers an area of 3 by 2.4 metres, and contains two central hearths and an area of bedding formed of leaf litter, twigs and bark. The entrance was perhaps in the south-eastern corner facing the lake, where an extra lens of sand was laid and where the occupation material over the floor is heavily trampled.

Abutting on to house 1 to the south is a shelter, demarcated by postholes over part of its perimeter, which covers an area of 4.8 by 2.8 metres. The floor of this does not consist of a single lens, and in places was formed by occupation material resting directly on peat. One part was floored with bark strips laid parallel in two rows set at a right angle and later covered with a thick deposit of woody fragments and bark. At the side of

FIGURE 12 MANGAKAWARE 2 Plan of Trench E during Phase 1



this bark flooring was an area with traces of flax (Phormium) leaves set in a rough criss-cross arrangement. These leaves were not particularly well preserved and do not appear to have belonged to a mat, but rather to have been strewn individually on the ground. From this shelter, particularly in the area marked on the plan, were recovered seeds of titoki (Alectryon excelsus), karaka (Corynocarpus laevigatus), and miro (Podocarpus ferrugineus), which together indicate occupation in the warmer months of the year. The open area to the south of this shelter was strewn in localised areas with flax leaves.

The evidence from phase 1 suggests that one basic structure occupied the area under construction, and that it was divided internally into two sections. The southern section was evidently used during the summer and autumn, while the northern section (house 1), with its hearths, might have been occupied during the colder months. Two radiocarbon dates (NZ1121, NZ1679) which suggest a date about A.D. 1500 for phase 1 are discussed in Appendix 1.

Phase 2 (figure 13)

In phase 2, house 1 was rebuilt entirely with close set timber posts on the lake side, and posts of young tree ferns on the other three sides. The tree fern wall is double in some places and may have supported a core of insulation material, perhaps in the form of bundles of raupo (Typha angustifolia). The entrance may have been moved to the inland side, but this is not certain, and the house floor was equipped with a central hearth and an area of bedding, which consisted in part of flax leaves laid quite thickly, although these again do not appear to have belonged to a mat. The presence of seeds of Podocarpus dacrydioides (kahikatea) in the bedding would suggest that it was laid in autumn in preparation for the winter, and house 1 in phases 1, 2 and 3 (see below) would appear to have served as a winter dwelling. To the south of house 1 the shelter continued in use from phase 1, and may have served as a lean-to to the house, although the relationship between the two structures is not very clear. To the south of this shelter a large lens was laid right into the corner of the main palisades of the pa, and on this were constructed 6 stone filled hearths or ovens, and a complex of 55 small posts forming 5 north-south lines covering an area of 4 by 4 metres. These may be interpreted as eel drying racks (see

Bellwood, 1971b:121 -2), although no eel remains were recovered, perhaps owing to the acidity of the soil in this area (pH. 5.25 - strongly acid).

The structural pattern of phase 2 in trench E is not basically different from that in phase 1, i.e. a dwelling house and adjacent shelter, with the addition of surrounding cooking areas and drying racks. Two radiocarbon dates for the tree fern posts of house 1 are discussed in Appendix 1. They suggest a seventeenth century date for the structure.

Phase 3 (figure 14)

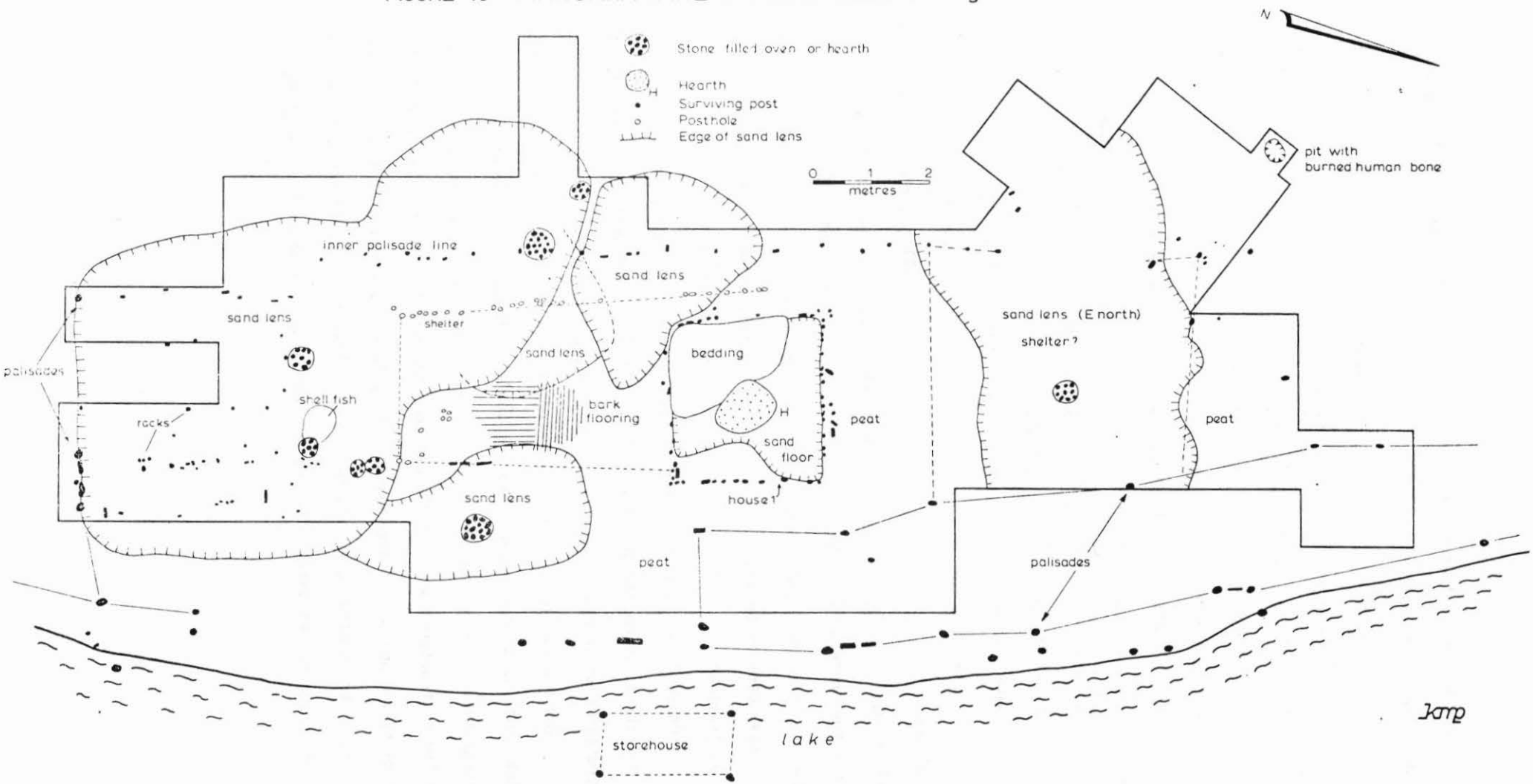
In house 1 in this phase the entrance was definitely on the inland side, where a portion survives of a pebble threshold. Another layer of bedding was laid in the same south-western corner of the house which was occupied by similar material in phases 1 and 2, and the large hearth in the centre continued in use, increasing in size as time went by. The shelter to the south was removed, and a second house with walls of posts and adzed timber slabs was constructed near the lake (house 2), which covered an area of approximately 2.5 by 1.8 metres. House 2 contained a single clay lined hearth, but no evidence for bedding. To the west of house 2 a shelter was constructed of small posts, which evidently abutted on the internal palisade. This structure covered an area of 3.6 by about 1.7 metres, although the post settings are irregular and there is some evidence for replacement. A small fence might have linked this shelter with house 2. To the south the eel-drying racks and stone filled units most probably continued in use from phase 2.

Phase 3 therefore comprises two dwelling houses together with a small shelter, with peripheral areas probably having the same functions as in phase 2.

Phase 4 (figure 15)

House 1 in this phase was provided with two stone filled units, each of which contained about 2 kg of small shattered water-worn pebbles up to 8 cm in maximum dimension. The occupation levels surrounding these units also contained a fairly dense scattering of heating stones, and very thick accumulations of charcoal and ash. In an earlier report (Bellwood, 1971a:86-7) I suggested that these units may have been used for heating, and this may well be a valid explanation. On the other hand, recent analysis of flotation

FIGURE 13 MANGAKAWARE 2 Plan of Trench E during Phase 2



samples has shown that these upper levels in house 1 contained a number of edible seeds and berries, as follows:

3 Podocarpus dacrydioides (kahikatea)

2 Podocarpus ferrugineus (miro)

2 Alectryon excelsus (titoki)

1 Corynocarpus laevigatus (karaka)

2 Elaeocarpus sp. (hinau)

In the earlier phases of the house, when it was used as a dwelling, only seeds of kahikatea were found amongst bedding. The range of edible seeds in the upper layers, despite the small sample size, might suggest that the house was turned into a cookhouse. The presence of the stone filled units would support this view, but no certainty can be claimed.

House 1 received a subsequent reflooring in phase 4, and this was provided with two sand lined hearths (not figured). The most recent work on this house would suggest that identification of a verandah between the western wall and the internal palisade (Bellwood, 1971a:86) might be erroneous. Again, there can be no certainty, and it may be noteworthy that the phase 4 floor does extend outside the house into the area between the western wall and the inner palisade. House 2 was refloored in phase 4, and the drying racks to the south may have been in partial disuse, as a stone filled hearth or oven was constructed in the area previously occupied by the easternmost line of stakes.

Phase 4 is the final phase of occupation in the area, and comprises one dwelling house, one dwelling or cookhouse (house 1), one shelter, and perhaps some of the peripheral structures which cannot be tied to any particular phase.

The description of structural features on the site is now concluded, apart from a final note about cooking and heating installations. 81 of these structures were excavated altogether, in positions which can be easily observed from the plans in this report. 54 of these structures were simple ash and charcoal lenses (hearths), while the other 27 were stone filled units. Of the hearths, only four had linings of sandy-clay -- two on the later lenses of the central area and two in the final floor of trench E house 1 (not figured). Of the stone filled units only one was lined, on the basal lens in trench Q. The linings

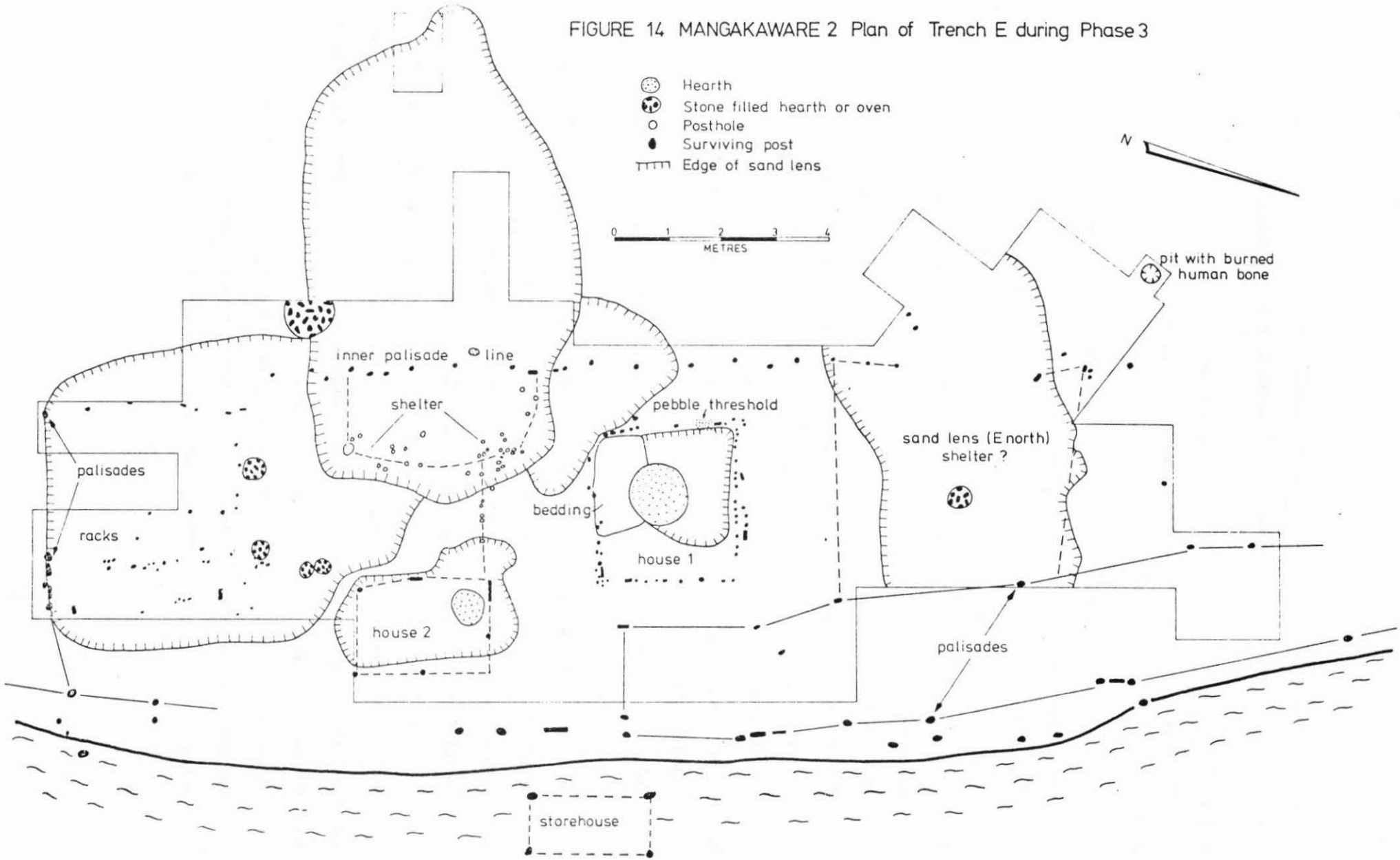


FIGURE 14 MANGAKAWARE 2 Plan of Trench E during Phase 3

are very simple, being 5 to 10 cm thick, and in only one example is there clear evidence of re-lining, in one of the two final-floor hearths in trench E house 1.

A general summary of the evidence for houses and shelters

The houses, shelters, and other structures excavated at MA 2 may be listed as follows:

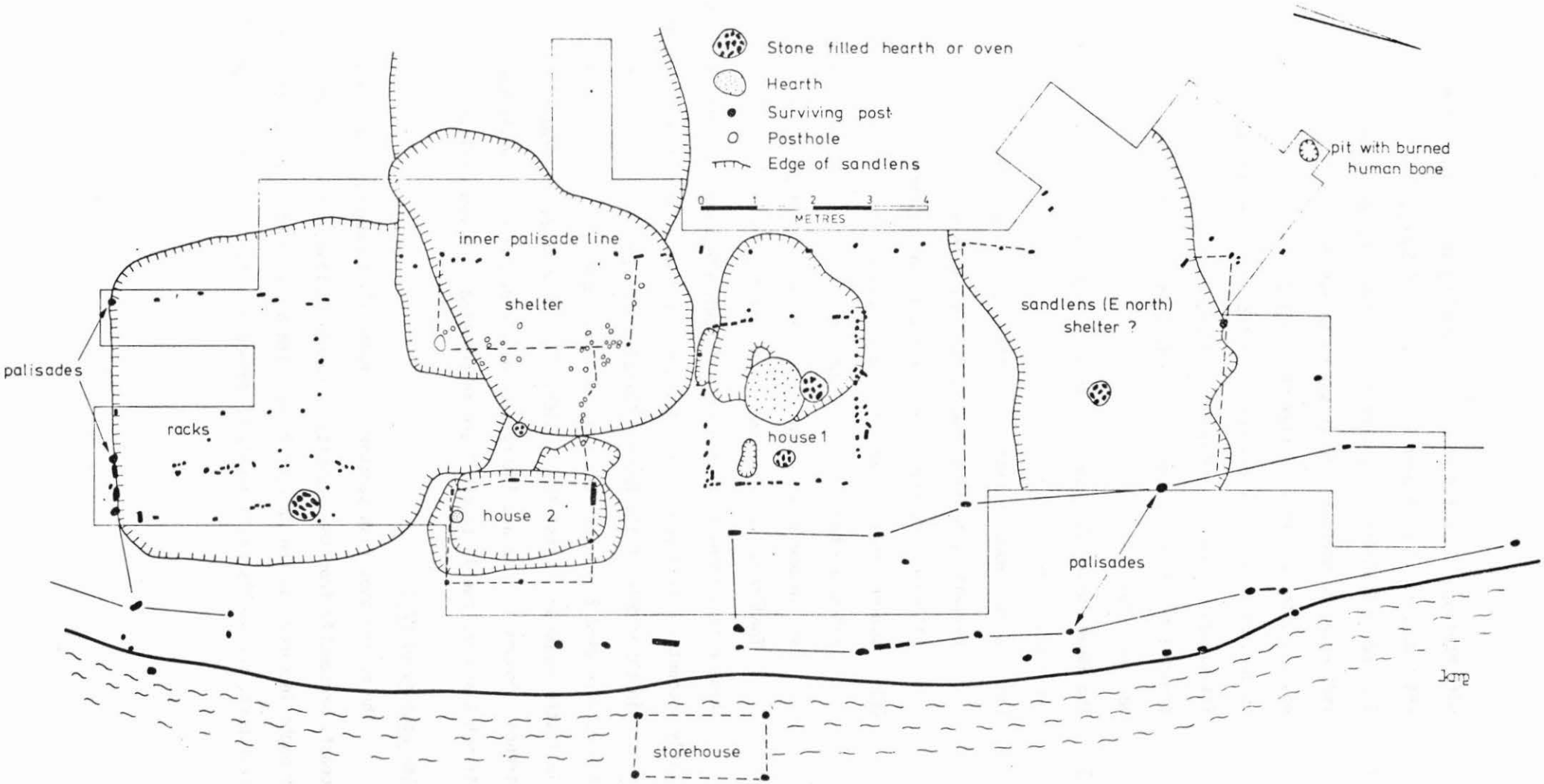
1. Trench Y - a slab and post walled house covering 6 by 2.20 metres. This is the largest structure on the site.
2. The trench T shelter, of which three posts survived together with the sand floor, covering about 2 by 2.50 metres.
3. The structure represented by floors but no evident walls in trenches Q and R.
4. Trench E northern lens - a possible shelter some four metres square.
5. Trench E house 1, 3 by 2.80 metres, with close set tree fern walls. This structure may have served first as a sleeping and later as a cooking house.
6. Trench E house 2, 2.50 by 2 metres, with plank and post walls (phases 3 and 4 only).
7. Trench E central shelter, 4.60 by 3 metres, abutting on to house 1 (phases 1 and 2 only).
8. Trench E shelter which replaced 7 above in phases 3 to 5, of trapezoidal shape, approximately 3.60 metres long by 1.50 to 2.50 metres wide.
9. Trench E drying racks, being five racks each four metres long.
10. Isolated posts in the central area of the pa.

It is not clear just how many of these structures were in use contemporaneously, except for the ones in trench E. Figure 16 shows six structures which may have been in use at the end of occupation, being those in trenches Y, T and E. The total figure at any one time could have been eight structures or more.

In terms of the seasonality of house usage, the following points may be noted:

1. The three houses with solid walls, namely that in trench Y, and trench E houses 1 and 2, contain numerous hearths, which suggest winter use

FIGURE 15 MANGAKAWARE 2 Plan of Trench E during Phase 4



with heating. Trench E house 1 has bedding in its lower levels which appears to have been laid in autumn (above).

2. The trench E shelter of phases 1 and 2 has numerous carbonised seeds, indicating occupation through spring to autumn, as noted above. In addition, the presence of flax mats inside this structure might indicate occupation in a fairly dry period of the year. Neither this shelter, nor its successor, nor the trench T shelter, had hearths during use. The trench E northern shelter may also fall into this category, although this does have one stone filled unit.

3. The above information suggests that it is possible to differentiate between two kinds of dwelling unit:

   (a) winter houses, which have thick walls, and, in one case certainly, small doorways, together with hearths and stone filled units, the latter for heating or cooking (item 1 above);

   (b) summer shelters, with thin walls which do not enclose all sides, no hearths (i.e., these shelters were not for cooking), and in one case Phormium mats and bark boards, together with food remains indicating summer use (item 2 above).

These observations on seasonality of house usage are supported to some extent by early accounts. Sir Joseph Banks stated of the New Zealand winter 'then they light a fire in the middle of the house' (Morrell, 1958:134). Cook noted that the thick walled houses were used in winter, but says that in summer they lived 'dispers'd up and down in little Temporary Hutts' (Reed, 1969:147). For MA 2, the trench Y house, and the trench E houses 1 and 2 are interpreted as winter dwellings, while the three shelters in trench E and the one in trench T are interpreted as summer dwellings.

The economy of MA 2

The marine shellfish scattered sporadically throughout the site came from the west coast, presumably from the vicinity of Kawhia Harbour, and were either carried overland, or brought in canoes up the Waikato River. The presence of shells on the site suggests canoe transport, for shells could easily be dumped into the bottom of a canoe. If they were

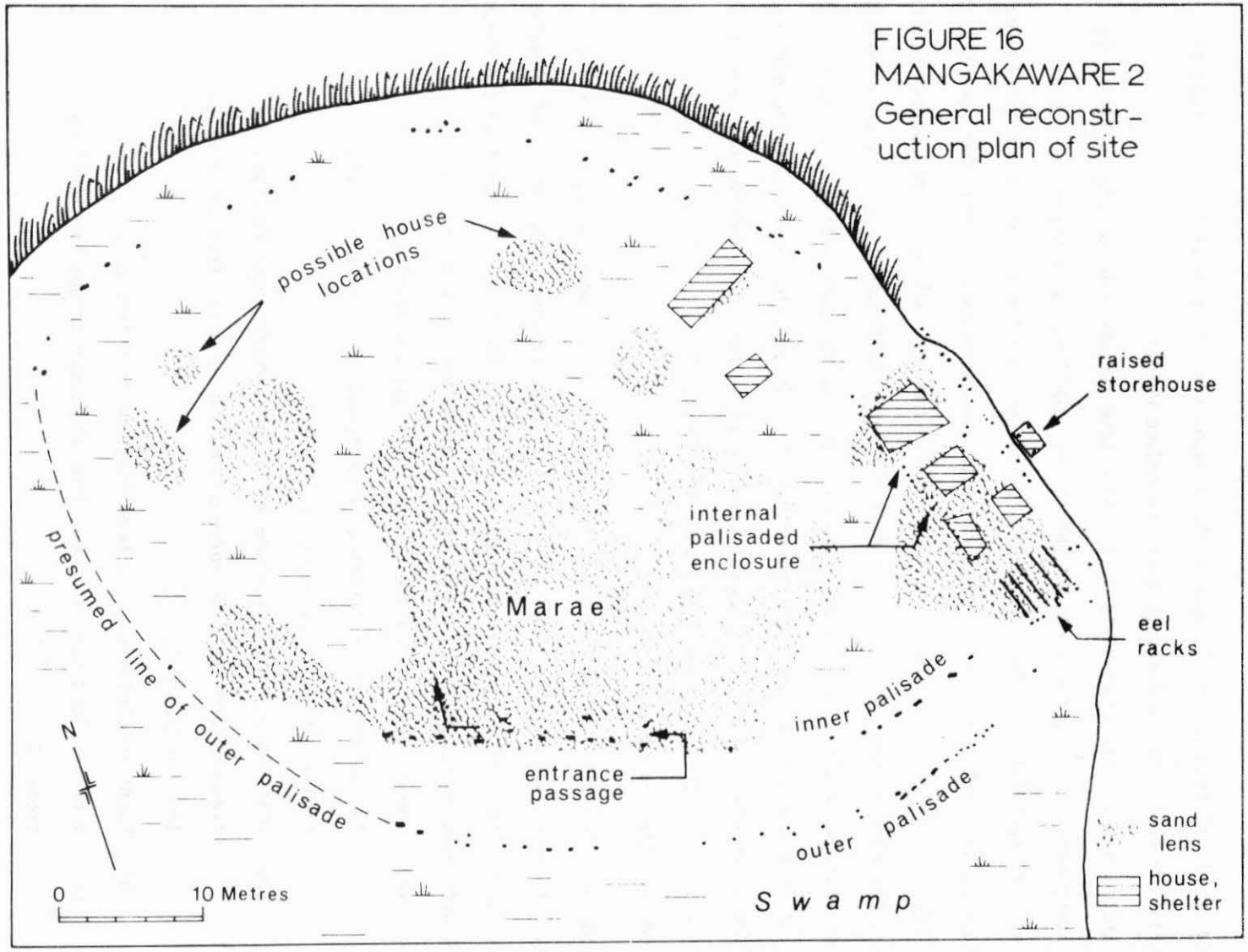


FIGURE 16
MANGAKAWARE 2
General reconstruction plan of site
possible house locations
raised storehouse
internal palisaded enclosure
Marae
eel racks
presumed line of outer palisade
inner palisade
entrance passage
outer palisade
N
0
10 Metres
Swamp
sand lens
house, shelter

carried overland, then one would expect the persons concerned to extract the meat from the shells on the coast, and dry it there to reduce weight.

Unfortunately, the acid soils of the site have reduced many of the shellfish to their horny outer layers, the whole of the calcium shell having dissolved. The fresh-water mussel (Hyridiella menziesi--kakahi) which inhabits the Waikato lakes, including Mangakaware, has suffered badly in this respect. The other major shell food came from the marine pipi (Amphidesma australis), and this has a tougher shell which has survived better. However, the almost total disappearance of the kakahi shells makes a quantitative midden analysis most difficult. Remains of the shells turn up in approximately even quantities to pipi, but they are usually so fragmentary that it is impossible to estimate the number of individuals present. At a guess, kakahi exceed pipi in number by two to one. Very small numbers of scallop (Pecten novaezelandicae) and cockle (Chione stutchburyi) were also imported from the sea coast.

The very few fish and animal bones from the site have survived better than the shells, but there is a notable total absence of any eel remains, despite use of flotation equipment, and the acid soils may again be to blame in this case. A report on the human bone is presented in Appendix 2, and counts for other bones are as follows:

Dog
- (a) one immature individual from the occupation level above the later lens in trench J, represented by right ulna, left radius, left tibia, and a rib fragment.
- (b) possibly a second immature individual, represented by a phalanx fragment and the transverse process of an atlas from the northern lens in trench E.

Bird
- (a) burnt unidentified long bone fragment from trench C.
- (b) a broken long bone fragment from the upper occupation level in trench F.
- (c) one pukeko (Porphyrio melanotus) represented by a left humerus from the phase 4 occupation level in trench E house 1, and a right humerus (from the same individual) from the topsoil above the adjacent northern lens in trench E.

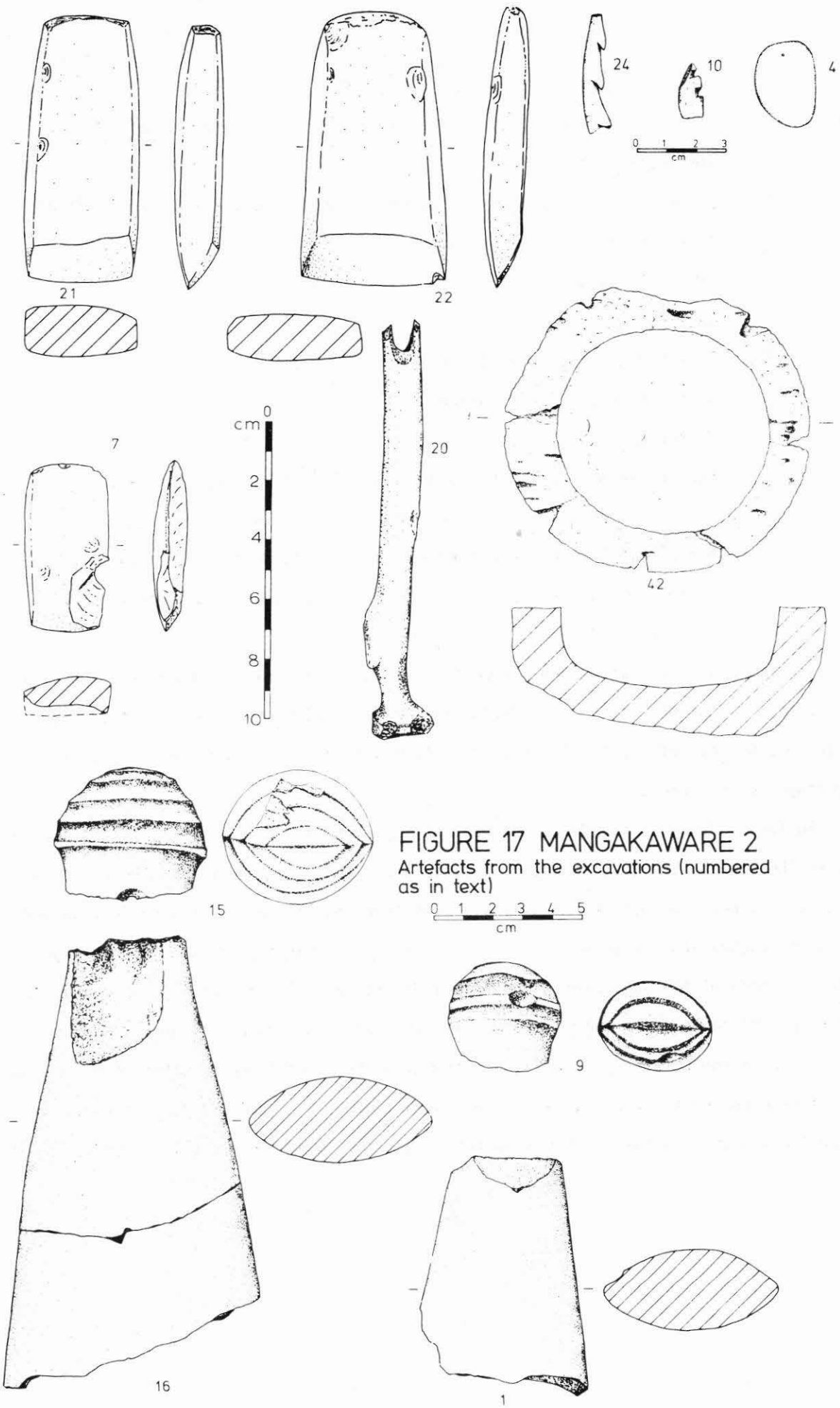


FIGURE 17 MANGAKAWARE 2
Artefacts from the excavations (numbered as in text)

0 1 2 3 4 5
cm

Fish (a) one unidentified teleost spine fragment from the topsoil above the house in trench Y.

(b) 13 vertebrae of marine elasmobranchs (perhaps small shark or dogfish), found in the following areas:

Trench Y topsoil	6
Trench G	1
Trench J1, latest occupation level	2
Trench E, phase 4 occupation	2
Trench E, unstratified	2

None of these bones were found in dwelling house deposits, and there are no other elasmobranch body parts. This might suggest that bodies alone were brought to the settlement, perhaps after dismemberment on the coast, and the Ngaroto site has yielded similar evidence (Shawcross, 1968:23).

The fewness of the food bones from the excavations is a little puzzling, and it is not likely that any were overlooked during excavation. It may be that dogs took any available bones out of the settlement, or perhaps mammals and fish formed only small percentages of the diet.

In terms of general evidence for seasonality of settlement in the site, the evidence from the houses and shelters has been itemised above, and this clearly suggests all year round occupation. The many horticultural tools from the lake also imply spring, summer and autumn occupation. The unfinished basket of Juncus planifolius described on page contained seeds of the same plant, and this indicates activity in January and February, as do a number of seeds of Phormium. Naturally, the warmer months of the year are best represented in the botanical remains, but it may be that the largest number of persons was in residence during the winter, living on stored foods. A degree of population dispersal during the summer is apparent from a number of early accounts (e.g. Cook in Reed, 1969:147).

THE ARTEFACT ASSEMBLAGE FROM SITE MA 2.

The artefacts excavated from site MA 2 probably belong to about the period A.D. 1500-1700, on the basis of four radiocarbon dates which are discussed together in Appendix 1 The MA 2 artefacts are itemised in the list which follows, and these, together with all the other Mangakaware artefacts listed in this report, are now held in the Waikato Art Museum, Hamilton, where they are numbered as indicated below (as well as with the Museum's accession number). The notes on the lithologies of the stone artefacts were kindly provided by Mr. J. Grant-Mackie of the Geology Department, University of Auckland.

Artefacts recovered from the entrance passage area in trench C (see figures 17 and 18)

The following group of artefacts was found in and around the entrance passage into the pa -- an unusual circumstance which, together with the nature of the artefacts themselves, suggests that an attack on the site had once taken place, accompanied by loss of life. The general circumstance is discussed above , and the positions of the artefacts are shown in figure 6.

3, 16. Two joining pieces of an onewa blade (figure 17) made of a Mesozoic coarse sandstone. The nearest outcrop of such rocks is in the belt of Triassic sedimentary rocks which runs between Pirongia Mountain and the Firth of Thames, and which passes within 12 km of the site (Grindley et al., 1961: see map symbol h), although nodules could occur in the Pleistocene sediments of the Middle Waikato Basin in the more immediate vicinity of the site (Grindley et al., 1961: map symbol p). Hence a local source for the stone is very likely.

15. Onewa head with four elliptical grooves (figure 17), of a Mesozoic fine-grained sandstone. This rock is of similar origin to the rock of items 3 and 16 (above), but this head belongs to a different artefact. The perforation is roughly hourglass shaped and quite coarsely scoured, and there can be little doubt that it was done with a hand drill, perhaps using a sand abrasive. There is no indication that a European drill was used. With

its elliptical grooving and technique of perforation this head is almost identical to a complete onewa with four elliptical grooves in the Bruce Thomas collection of artefacts from nearby Lake Ngaroto (a series of drawings of this collection has been made by Mr. F. W. Shawcross, who has kindly allowed me to refer to them). The similarity is such that a single craftsman may be involved, but the Ngaroto example is unfortunately unstratified and hence undatable.

1. Onewa blade section of a Mesozoic argillite, source as with items 3 and 16.

9. Onewa head with 3 elliptical grooves, and no surviving trace of a perforation. This is again a Mesozoic argillite, and almost certainly from the same artefact as item 1, even though the two pieces were found 7 metres apart.

7. A small adze of Duff type 2B (Duff, 1956), of a Mesozoic coarse sandstone, with source as for items 3 and 16. The front face of this adze is shown in figure 17, as the back is damaged.

5. A bevel fragment of a Duff type 2B adze (not figured) of a Mesozoic argillite, with source as for items 3 and 16. Width not preserved, bevel length 3 cm, angle of cutting edge 54 degrees.

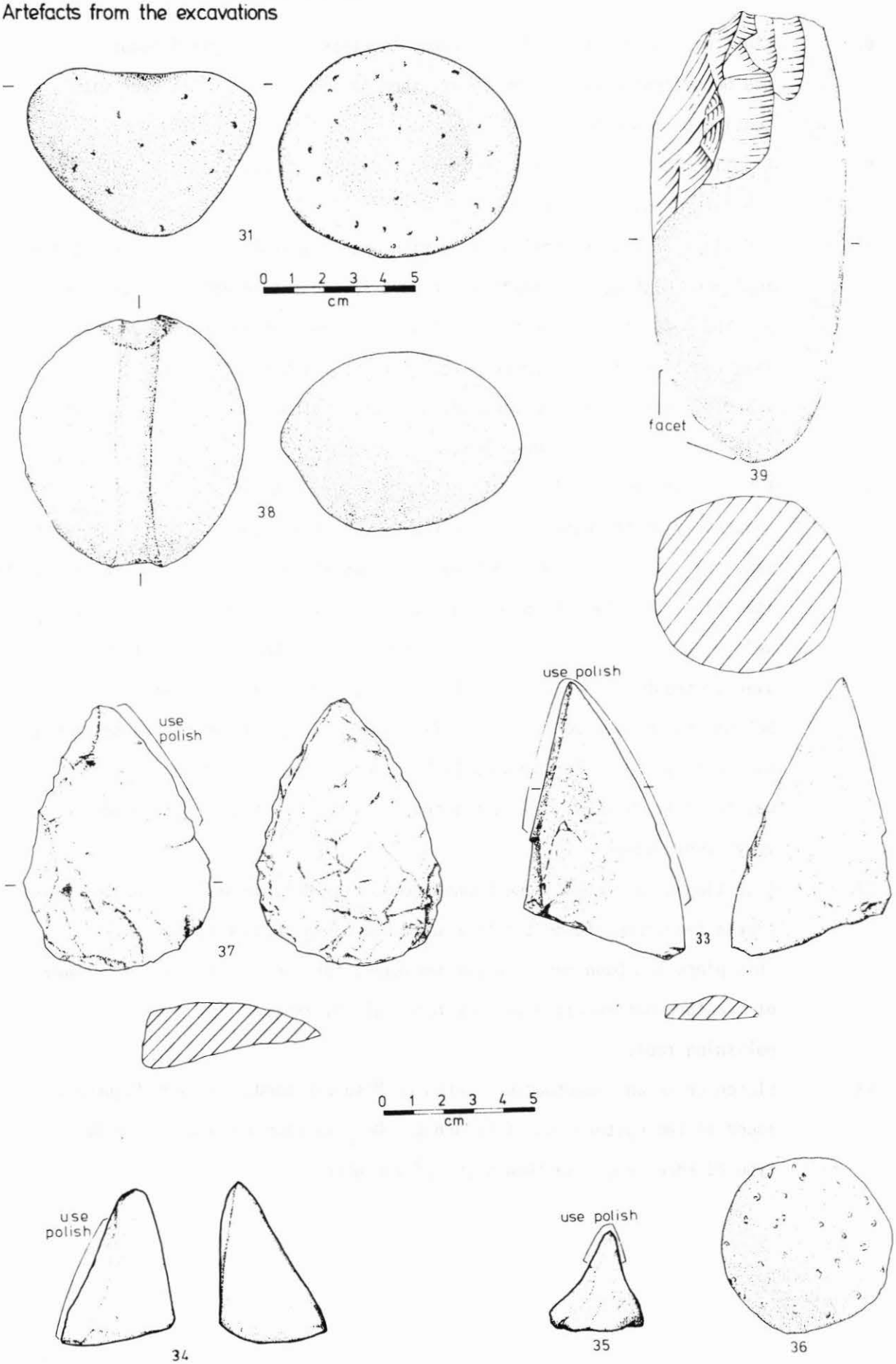
24. Section of bone bird (?) spear with three barbs (figure 17).

10. Base of bone bird (?) spear, with two lashing notches and a facetted base, criss crossed with faint incisions (figure 17). Both the above (24 and 10) may belong to the same spear, but intermediate sections are missing. The bone is not identified, but the closest analogue from size and shape would be a dog rib.

4. A perforated pendant of bone, maximum thickness 3 mm (figure 17). This was found at some distance away from the main cluster of artefacts in trench C.

FIGURE 18 MANGAKAWARE 2

Artefacts from the excavations



6. Eight pieces of a human femur, found together. The original femur had been first broken, then burnt, then lavishly covered all over with a coating of red ochre.

8. A solid piece of red ochre (hematite) weighing 35 gm, which was found 3.5 metres away from the burnt bone (item 6).

31. A conical shaped and hollow based river pebble, probably used as a crushing implement without modification. Figure 18 shows side and base elevations, and the base shows clear traces of ochre in and around the hollowed area. This was found in the general area of the burnt bone and ochre (items 6 and 8), but was not recognised as an artefact by the excavator, so that its exact position is unrecorded.

32. 6 pieces of the distal end of a stone pounder (not figured), found separately at the eastern end of trench C. These are of a Mesozoic coarse sandstone, probably from the same source as items 3 and 16. The reconstructed item has a diameter of 55 cm and its end is evenly rounded. It compares well with the distal end of the example from the Ngaroto excavations illustrated by F. W. Shawcross (1968: fig. 7, no. 4). This artefact belongs to the general class of "flax pounders" as discussed and described by Phillips (1939) and Simmons (1971), but in the context in which it was found it might also be noted that such an object would have made a very handy weapon.

27. A section of a second stone pounder (not figured), again of Mesozoic coarse sandstone, found together with the onewa section number 16. This piece had been reused after breakage, for the most extensive surface of fracture has received quite a high polish, indicating use as a polishing tool.

43. Eleven crude and unretouched flakes of Mesozoic sandstone (not figured), found at the eastern end of trench C. One has been removed from a Duff type 2B adze, and none show signs of use wear.

Artefacts found elsewhere in site MA 2

21 and 22. Two adzes of Duff type 2B (figure 17) found in a small pit dug through the central area later period lens in trench I (see figure 9 for position). Both are of a medium grained Mesozoic sandstone, of similar source to items 3 and 16 above, and both were obviously cached purposefully in the ground. Similar adzes, with fairly sharp edge angles and a relatively flat cross-section occur in the Bruce Thomas collection from Lake Ngaroto, and in the assemblage excavated by F. W. Shawcross (1968: fig. 7 no. 3).

30. Flake of an adze or onewa of Mesozoic sandstone, from trench 2 topsoil. Not illustrated.

20. This is without doubt one of the most interesting objects from the site (figure 17), and consists of a human left radius, the distal end of which has been fashioned into two points, which unfortunately have lost their tips. It was found in the phase 4 occupation deposit immediately outside the south-western corner of house 2 in trench E. An almost identical object is preserved in the Bruce Thomas Collection from nearby Lake Ngaroto, which again has two points (F. W. Shawcross: personal communication). In addition I. W. Keyes (1969) has published a four pronged example, also made on a human radius, from the vicinity of the Porirua Harbour near Wellington, and he suggests that this specimen might have been used by a chief, or used for the ceremonial feeding of a person of rank held under restrictions of tapu. Whatever the function of this class of object, however, there are indications that it may one day turn out to be quite well represented in New Zealand Museum collections. For instance, the Auckland Museum holds two four pronged forks made on human humeri in the northern Wairoa sometime prior to 1895 (accession numbers 648 and 649). While these are not identical to the Mangakaware example, they are undoubtedly of related function.

37. A large flake of a siliceous sinter, perhaps from the Rotorua-Taupo area or from the Coromandel Peninsula. There are slight traces of use polish

along one edge, as shown in figure 18, and the tool may have been used on a soft organic material. This came from the topsoil above the phase 4 shelter between houses 1 and 2 in trench E.

33, 34, 35. Three polishing tools of quartzite, which on the basis of hand identification by Mr. R. Grant-Mackie may come from a Palaeozoic outcrop in the area of north-west Nelson, although this is not certain in the absence of microscopic examination. The three are illustrated in figure 18, and each is a nodule of a naturally produced shape, without modification apart from that caused by the polishing action. No. 33 has two main use-surfaces, the one on the left of the drawing having an even polish perhaps produced by a to and fro movement, while that on the right has clear striations at right angles to the edge, indicating use with a scraping action. No. 34 has a high polish all over one rounded surface which culminates in a point, while no. 35 is most probably a boring tool of some kind. All three were found close together in the north-western part of trench E and may represent three members of a single tool kit discarded simultaneously. The three combined would indicate a kit for polishing, scraping and boring of some soft material.

263. A well preserved knife handle of wood (figure 19), found in the northern part of trench E, on top of the basal peat against a cluster of three posts two metres south-east of the pit containing burnt human bone. The positions of these three posts are shown on figures 12, 13, 14 and 15. The handle has a socket 8 mm deep for a cutting edge of some kind, perhaps of obsidian or shark's teeth. Buller (1893b) describes a similar but highly decorated specimen in the Hunterian Museum in Glasgow, which he states was called a mira-tuatini, and which was evidently used for cutting up flesh at cannibal feasts, or for bodily scarification. The proximity of this find close to the pit with the burnt human bone (see Appendix 2) may not be fortuitous, as I have suggested above. The specimen also

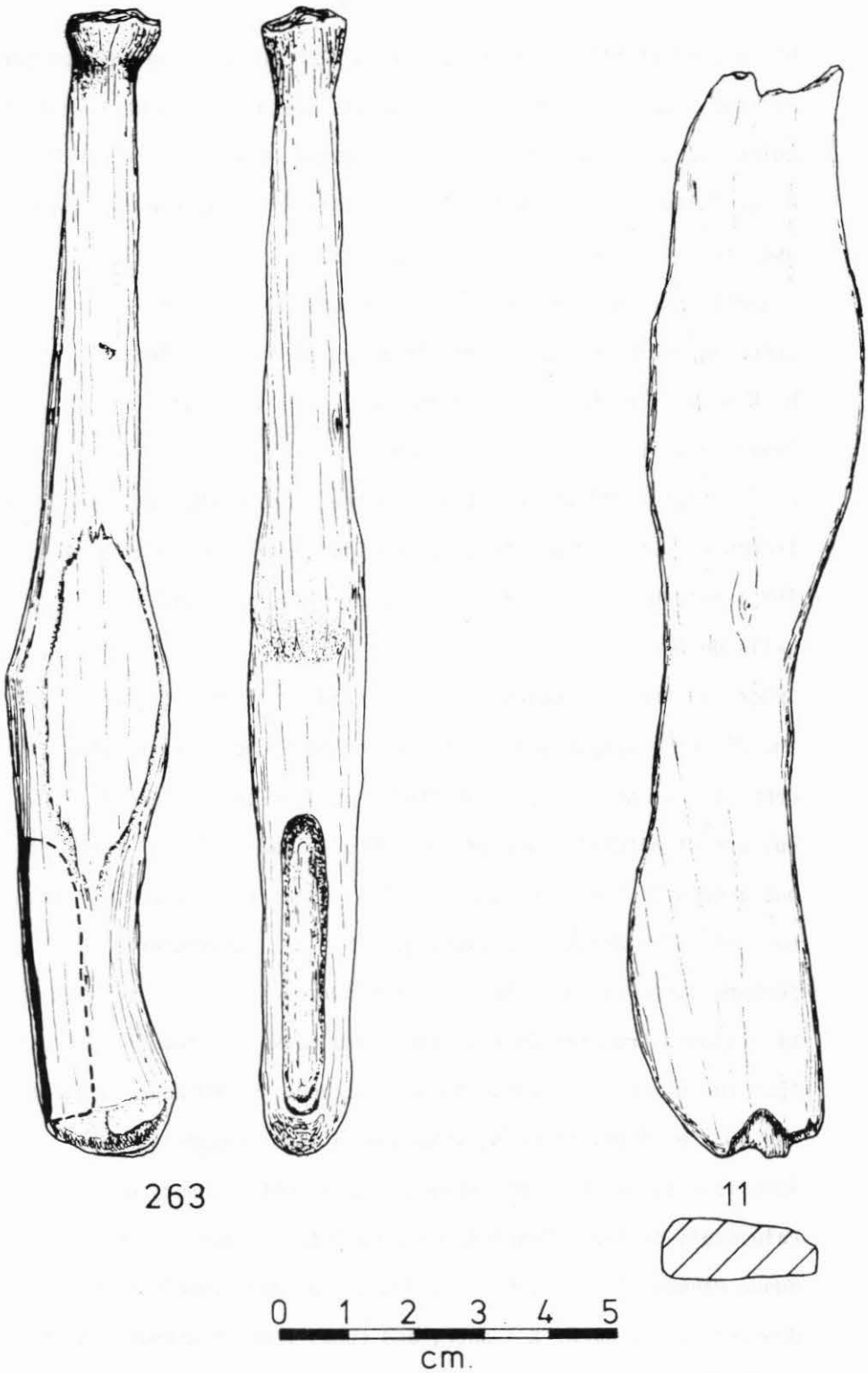


FIGURE 19 MANGAKAWARE 2
Artefacts from the excavations

has a band of slight discolouration, 2 cm in from the knobbed (proximal) end and 3 mm thick, and this is almost certainly the mark left by a cord which was still attached to the implement when it was discarded.

11. A carefully made wooden handle with a fairly flat cross-section, of unknown use. Trench D, peat surface (figure 19).

14. A small bowl (not figured) hollowed out from a piece of curved bark by chipping and burning. Length 10.5 cm, width 5 cm, depth 2 cm, thickness of bark 5 mm. The bowl is oval in shape, and was found in the top occupation level above the house in trench Y.

17. Wooden beater (figure 20) found on the peat in the southern extension of trench W. It is round in cross section, with a maximum diameter of 7.2 cm. The handle has broken off, and the artefact was evidently discarded into the palisade area.

36. Spherical stone of coarse grained porous andesite (figure 18), probably from the Pirongia volcanic area, found in the trench I later phase occupation deposit - weight 147 gm. Whether this item and the one following (number 40) are of natural shape or purposefully manufactured is hard to determine, but a natural shape seems more likely since the surfaces of both objects show no signs of flaking or polishing. This is a characteristic which would perhaps differentiate them from the purposefully facetted and polished slingstones from the Cook Islands, and Banks' statement (Morrell, 1958:144) that the sling was unknown in New Zealand in 1769 would suggest that 36 and 40 are simply throwing stones of a handy natural shape.

40. Spherical stone of quartz veined jasper (not figured) probably from a Palaeozoic or Lower Mesozoic outcrop between Kawhia Harbour and the Hunua Ranges (Grindley et al., 1961: see map symbols h and i). This was donated by Mr. J. A. Krippner, and comes from an unknown location somewhere in the vicinity of MA 2. Weight 95 gm.

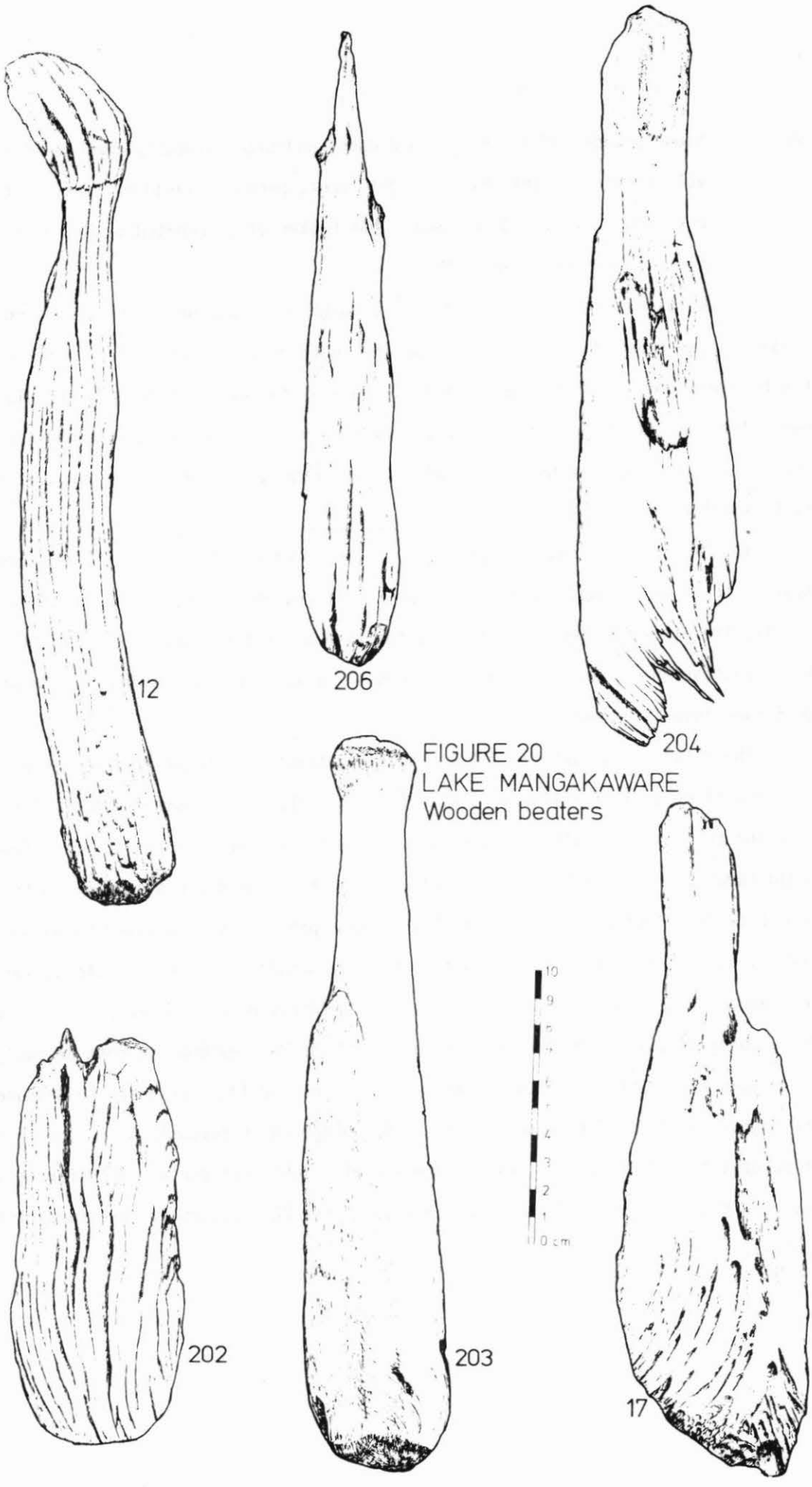


FIGURE 20
LAKE MANGAKAWARE
Wooden beaters

No's 12 and 17 are from MA 2, 204 is from a swamp 1 km north of the lake (donated by J.A. Krippner), the other pieces are from the vicinity of MA 1.

39. Stone pounder of a fine grained dense andesite, probably from the Pirongia volcanic area. This has a slight facet, perhaps caused by wear, at the end (figure 18), and the handle has broken off. Donated by Mr. J. A. Krippner, from the general area of MA 2.

In addition to the above artefacts, a number of fragments of Phormium and a native grass, Juncus planifolius, were found in the south-eastern corner of trench E where they had been discarded against the palisades. Some of the Juncus fragments are plaited, and may belong to a small basket. One piece of finely plaited Phormium matting survives, which measures 5 by 4 cm, with wefts 5 cm wide. The technique is check plaiting, as described by Buck (1958: chapter 4).

The MA 2 excavations also produced 32 pieces of obsidian, two of which have been sourced to Mayor Island, and one to Taupo (Armitage, Reeves and Bellwood, 1972). Unfortunately, the other 29 pieces are lost at the time of writing, and I have a list of find-places in my possession but no detailed measurements. I would apologise should this be a hindrance to future investigations.

The catalogue of artefacts from the excavations at site MA 2 is now completed. Apart from the flake tool of siliceous sinter (no. 37), the three quartzite tools (nos. 33, 34, 35), and the obsidian, all the stone used for artefact manufacture recovered from the site could have come from within a radius of about 12 km. The diagnostic items of the assemblage belong to the Classic Maori phase of New Zealand prehistory as defined by Golson (1959: 47-54), and together with the items from the neighbouring site MA 1 (Peters, 1971) and the Lake Ngaroto site (Shawcross, 1968), give a fairly extensive cross section of Classic Maori material culture in the central Waikato, The MA 2 assemblage most probably dates to between A.D. 1500 and 1700, and the pieces recovered from the entrance passage area are highly likely to form a contemporary assemblage which dates from the end of the period of occupation. Hence a late seventeenth - early eighteenth century date for this group may be a good estimate. The main components of the MA 2 assemblage are summarised in table 1.

FIGURE 21
LAKE MANGAKAWARE
Wooden beaters from the vicinity of Mangakaware 1

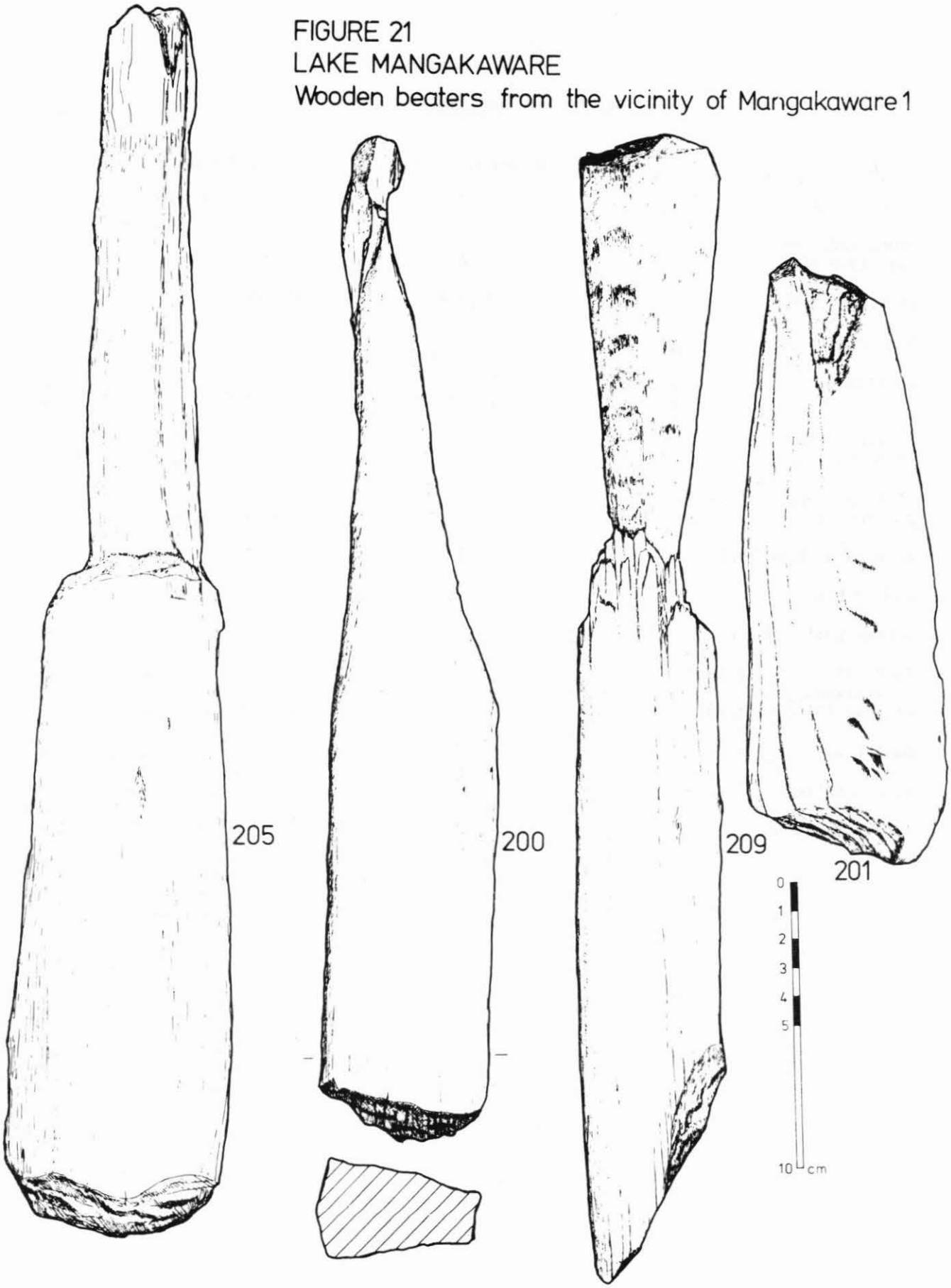


Table 1

The MA 2 Assemblage

Artefact type	Number of artefacts	Specimen numbers
Stone *onewa*	3	1, 3, 9, 15, 16
Stone adzes of Duff type 2B	4	5, 7, 21, 22
Bone bird spear	1 or 2	10, 24
Bone pendant	1	4
Hematite	Many small pieces	8 (largest piece found)
Hollow-surfaced stone "grinder"	1	31
Stone pounders ("flax pounder" type)	3	32, 27, 39
Ceremonial bone fork	1	20
Pumice bowl	1	42
Wooden knife handle	1	263
Tool kit of quartzite for working soft organic (?) materials	3	33, 34, 35
Bark bowl	1	14
Wooden beater	1	17
Spherical stones	2	36, 40

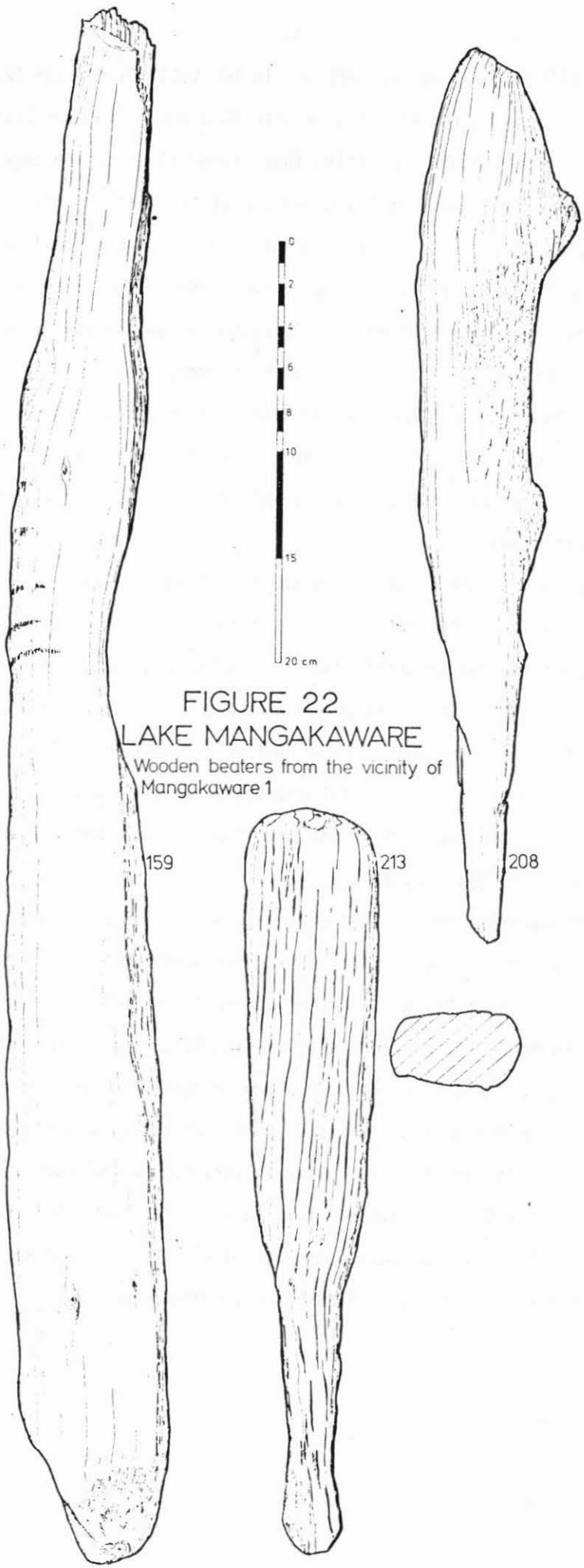


FIGURE 22
LAKE MANGAKAWARE
Wooden beaters from the vicinity of Mangakaware 1

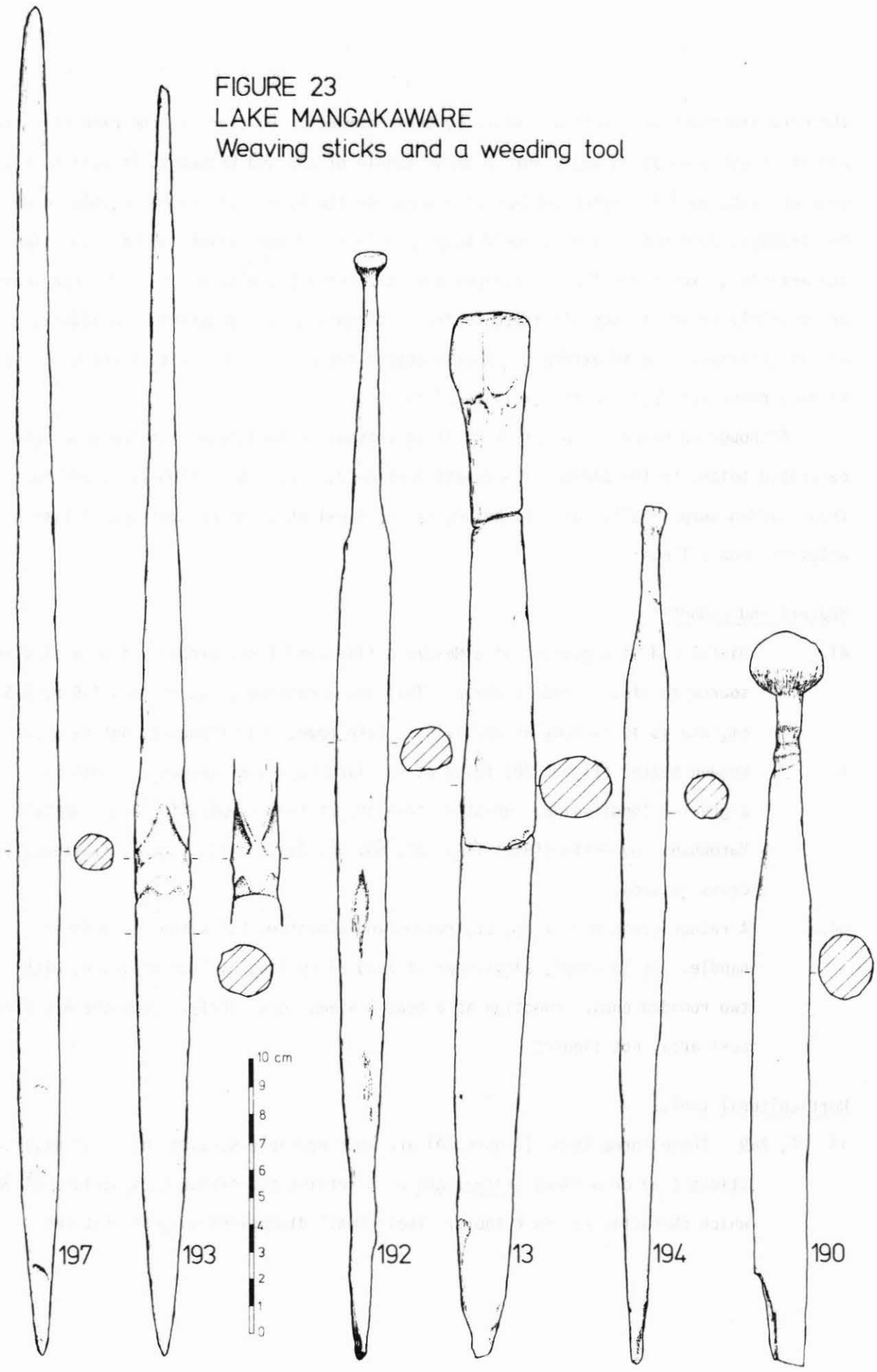
ARTEFACTS FOUND IN THE LAKE BED IN THE VICINITY OF SITE MA 2

The artefacts found in the vicinity of site MA 2 appear to have been deposited under two different sets of conditions. Firstly, those found close to the edge of the lake (all found close to trench E and the storehouse) were probably lost or purposefully discarded into a belt of reeds. The lake edge near the site supports no reeds today because a recent rise in the lake level has made the water too deep. This recent rise may be due to blockage of the outlet by debris from the introduced European willow. Prior to 1800 the level was at least 0.7 metres below that of 1968 (it has been dropped again by local farmers since 1968), and this is indicated by the lower occupation deposits in trench E, which were under the water table when excavations began in 1968. A reed belt in prehistoric times would have served the useful archaeological function of retaining wooden objects, which would otherwise have floated away.

The second group of objects are those which were pushed into the lake mud purposefully, perhaps at the time of the attack on the site. Some of the lake edge finds may be in this category, and many of the larger artefacts, such as the paddles, were pushed into the mud further out in clear water. In the case of small objects it is not always possible to determine whether they were deposited intentionally or unintentionally, but for the larger objects away from the lake edge purposeful deposition is almost certain. Similar caching is evident for the MA 1 artefacts, to be described below, and for the Lake Horowhenua sites (Adkin, 1948:83-4; Rolston, 1948:283).

The artefacts close to the lake edge were found by chance at various times, while those deposited further out were located by members of the Hamilton Underwater Club in December 1970, under the direction of Mr. K. M. Peters of the Anthropology Department, Auckland University. The conditions of recovery were difficult, for apart from the cold temperature of the water, the objects had to be recovered from a dense tangle of naturally deposited dead wood. The lake in the search area is up to 1.5 metres deep and has a base of liquid mud of unknown depth. In addition, the water is very opaque and any disturbance of the mud makes visibility totally impossible. To establish some control over the positions of artefacts, 4 stakes (A to D) were pushed into the lake bed in a line as shown on the site plan (figure 4), and these were used to assist recording. On figure 4 the positions of

FIGURE 23
LAKE MANGAKAWARE
Weaving sticks and a weeding tool



The weaving implements are from the vicinity of MA 1, the weeding tool (No. 13) is from the vicinity of MA 2.

the more important artefacts are shown by their numbers. However, in the case of a long paddle thrust down at an angle into a dense tangle of mud and branches, it will be realised that an exact position corresponding to a point on the plan would be impossible to determine. No stratigraphy can be observed under such conditions of deposition, and the positions of the articles, except for their locations near to trench E (which was the only area searched) are unlikely to be of much significance from a chronological viewpoint. In addition, there was insufficient time to extend the search beyond the A - D line, so that there may still be many other artefacts in the vicinity of the pa.

Although no proof can be offered, it is reasonable to assume that the artefacts to be described belong to the period of occupation of MA 2, i.e. c.A.D. 1500-1700, and that those hidden purposefully may well belong to the final phase of occupation. A list of the artefacts now follows:

Beaters and pounders.

41. Distal end of a pounder of a Mesozoic fine sandstone, probably from a similar source to items 3 and 16 above. This has a rounded cross section 4.5 by 5.5 cm, and is 10 cm long as surviving. Lake edge, near trench E, not figured.

12. Wooden beater (figure 20) found at the lake edge near trench E. This has a greater longitudinal curvature than any of the examples figured from Lake Horowhenua by Adkin (1948: figs. 85, 88, 96, 97) and is slightly flattened in cross section.

64. A rather crude wooden object, resembling a beater, but without a definite handle. It is simply a cylinder of wood 27 cm long by 5 cm diameter, with two rounded ends. Function as a beater seems most likely. From the A-C diving post area, not figured.

Horticultural tools.

18, 26, 289. These three items (figure 24) are most probably sections of small digging sticks (ko) or weeders (ketu), and each retains the expanding spatulate blade which characterises such tools. Their small dimensions suggest that the

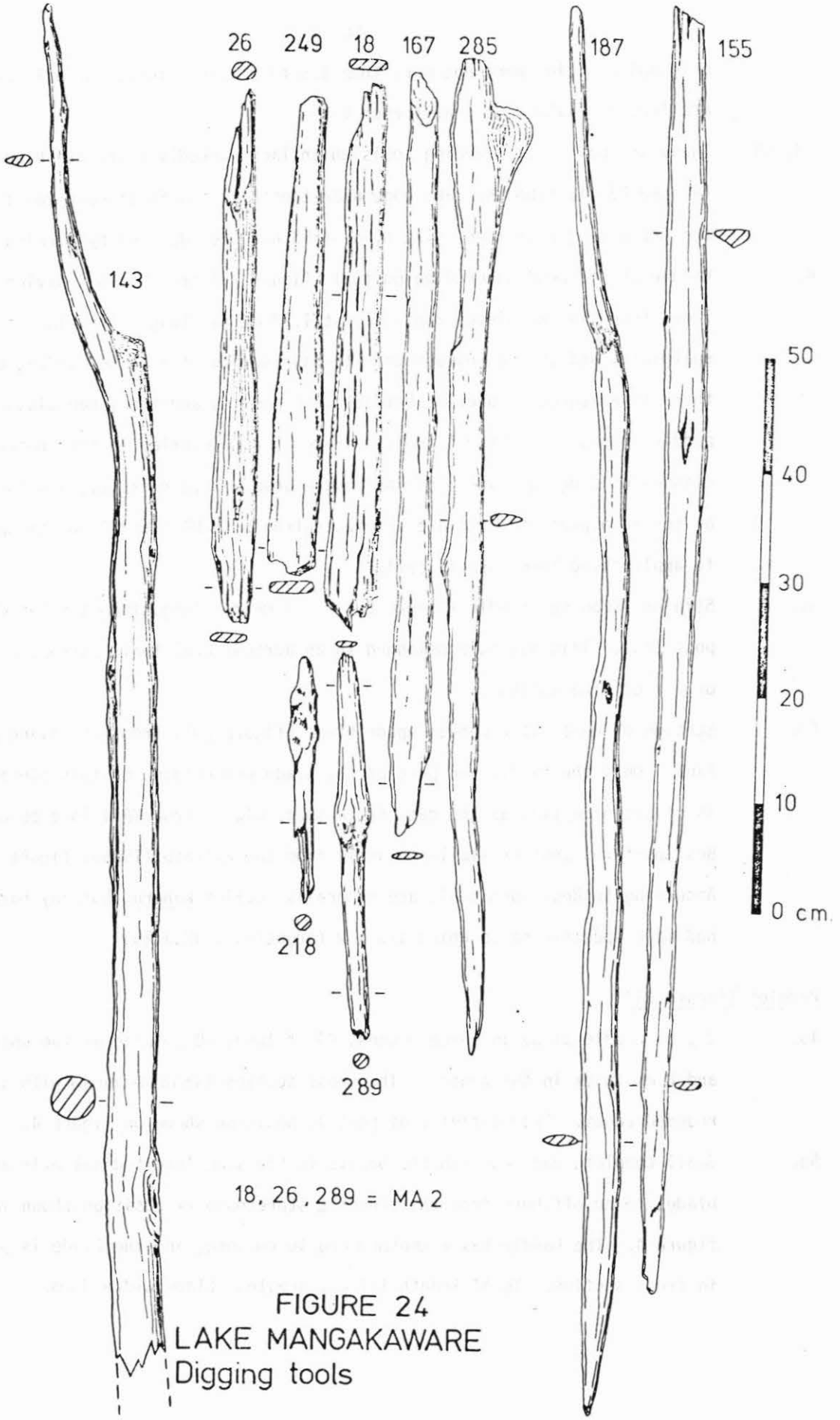


FIGURE 24
LAKE MANGAKAWARE
Digging tools

original articles were not more than 1.5 to 2 metres long, and all three are from the lake edge near trench E.

13, 55. These are both small weeding tools which lack markedly spatulate blades. 13 (figure 23) is from the lake edge near trench E, and 55 (figure 26) is from the A-C diving post line. The head of 55 has been damaged by burning.

46. Paddle shaped weeding or digging tool (figure 25) from the A-C diving post line, found in two pieces and at least 1.22 metres long. The blade is spatulate, and too narrow and thin to have served as a canoe paddle, although there is a degree of overlap between true paddles and the large class of paddle shaped agricultural tools. There is also overlap in form between the classes of digging stick (ko) and paddle shaped weeder (ketu), and for many of the incomplete Mangakaware artefacts from both MA 1 and 2 no attempt is made to apply these terms specifically.

48. Straight smoothed handle (figure 25), 1.17 metres long, from the A-C diving post line. This may have belonged to an agricultural tool, perhaps a spade or a tool like 46 above.

59. Section of detachable wooden spade blade (figure 29), from A-C diving post line. Only the handle and part of the blade now remain of this piece, which is of the same type as the detachable spade blades from MA 1 (see below), and Best pictures another similar example from the Waikato (1925a: figure 7, top). According to Best such tools are generally called kaheru, but may have once had more specific names which are now forgotten (1925a:25).

Paddles (figure 31)

45. Tip of paddle blade in three pieces, 43 cm long, 10 cm wide at the upper end, and 8 mm thick in the centre. The cross section is plano-convex with slightly rounded edges. From vicinity of post A, position shown on figure 4.

56. Small complete paddle, with the handle in the same longitudinal axis as the blade, found offshore from the trench E storehouse -- position shown in figure 4. The handle has a knobbed end 10 cm long, and the blade is plano-convex in cross section. Total length 117 cm, greatest blade width 9 cm.

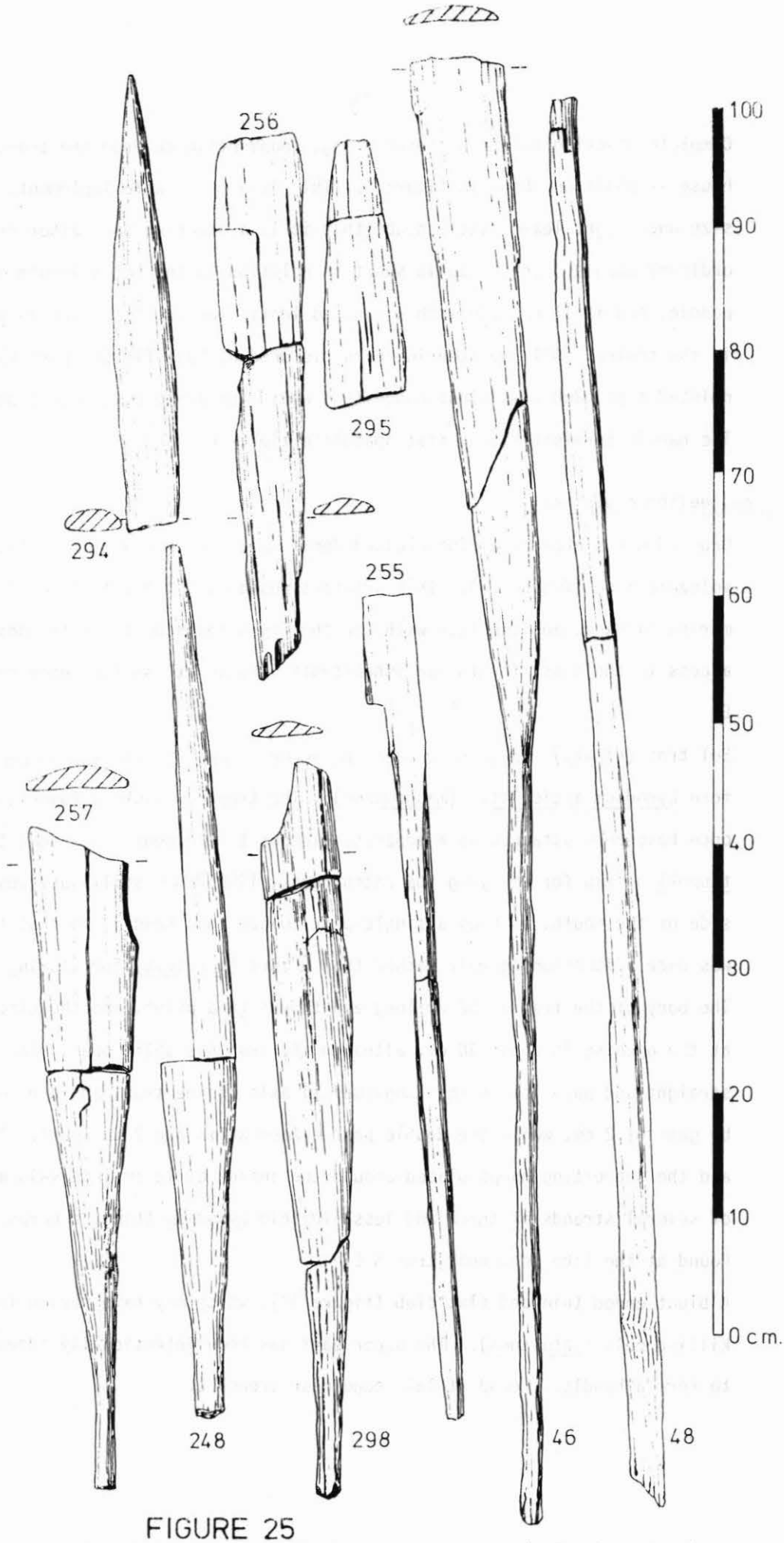


FIGURE 25
LAKE MANGAKAWARE Paddle-shaped digging tools

These are all from the vicinity of MA 1, except No's 46 and 48 which are from MA 2.

57. Complete steering oar, 2.03 metres long, found offshore from the trench E store-house -- position shown in figure 4. This is a remarkable implement, and its size and weight leave little doubt that it is a steering oar rather than an ordinary paddle. The blade is short in relation to the total length of the paddle, and is 11 cm wide with a rounded lenticular cross section 25 mm thick in the centre. All the steering oars pictured by Best (1925b: part V) have pointed tips, and this blunt ended form would appear to be somewhat unusual. The handle terminates in a flat spatulate tip 17 cm long.

Fishing and eeling equipment

38. Grooved net sinker of a fine grained dense andesite, probably from the Pirongia volcanic zone (figure 18). This artefact would most probably be used for marine fishing, and together with the shellfish found on the site indicates access to the coast for the pa inhabitants. Found at the lake edge near trench E.

44. Eel trap (hinaki) made in a double pair twine technique from stems of the fern Lygodium articulatum (mangemange). The trap now lacks a funnel, which may once have been attached as a separate element to the body. However, the small taupoki or cap for emptying the catch (Buck, 1958:232) still survives on one side of the mouth, as does a single-pair twined loop handle, so that the object was once a functioning weir rather than a corf (korotete) for storing live eels. The body of the trap is 52 cm long and tapers to a point, and the circumference at the opening is about 30 cm, although the trap has split open. The warps run straight and parallel in the longitudinal axis of the trap, and are separated by gaps of 2 cm, while the double-pair twined wefts are 7 cm apart. The rim and the supporting hoops placed around the inside at 12 cm intervals are each of several strands of thick and less flexible Lygodium than the warps and wefts. Found at the lake edge near trench E.

25. A blunt-ended thin and flat club (figure 32), which may have served for killing eels (patu tuna). The upper part has been intentionally adzed away to form a handle. Found at lake edge near trench E.

Spears (not figured)

60. Spear point 13 cm long, diameter 2 cm, of an unidentified timber (not manuka). Most of this spear is lost, and this fragment was found as shown in figure 4.

61. Spear point, 53 cm long, 1.5 cm diameter. Position shown in figure 4.

62. Possible section of spear shaft, 1.05 metres long, 1.5 diameter. Point and butt are missing, and this was found in the general area of the A-C diving posts.

Bowl.

28. Base section of a large wooden bowl, from the lake edge near trench E. This was hollowed across the grain from a large log, and was originally at least 30 cm in diameter -- in fact the curvature suggests a diameter of 60 cm or more. The inside was heavily burnt before the bowl was broken. Not figured.

Points and wedges (not figured)

66, 67, 69. These are small wooden pieces with thin sharp points, and may perhaps be called simply "wooden points". There could clearly be many functions for such objects. 66 is 22 cm long, and 3 by 1 cm in cross section, and has a long sharp point on one end and a hollowed scoop like point on the other. 67 is 28 cm long and 1.5 by 1 cm in rounded cross section, and simply has a tapered sharp point at one end. 69 is pointed, 41 cm long, and 4 by 1.5 cm in cross section. Such objects could serve many functions, perhaps as tines for shellfish dredges or eel spears. All from A-C diving post area.

53, 54, 68, 69, 70. Five small and crude wooden wedges, perhaps used for tightening lashings in building construction. They are similar to the wedge figured by Adkin from Lake Horowhenua (1948: fig. 98).

Posts

Some 20 butts or sections of type B posts were recovered from the lake, none complete. Cross sections are generally rectangular, or plano-convex if they were cut from the outsides of trees. Posts of this kind could have functioned both as palisade and as house posts, and there is a great range of sizes, up to

25 by 5 cm in cross-section. Where the tapered ends are preserved they are mostly fire-hardened. No type A posts have been recovered from the lake.

There are also 5 type C posts, simply being branches or trunks with a point. None are complete, and sizes range from small stakes to a palisade post 1.15 metres in surviving length by 8 cm diameter. As with the type B posts, this group could serve many functions.

Objects of uncertain function

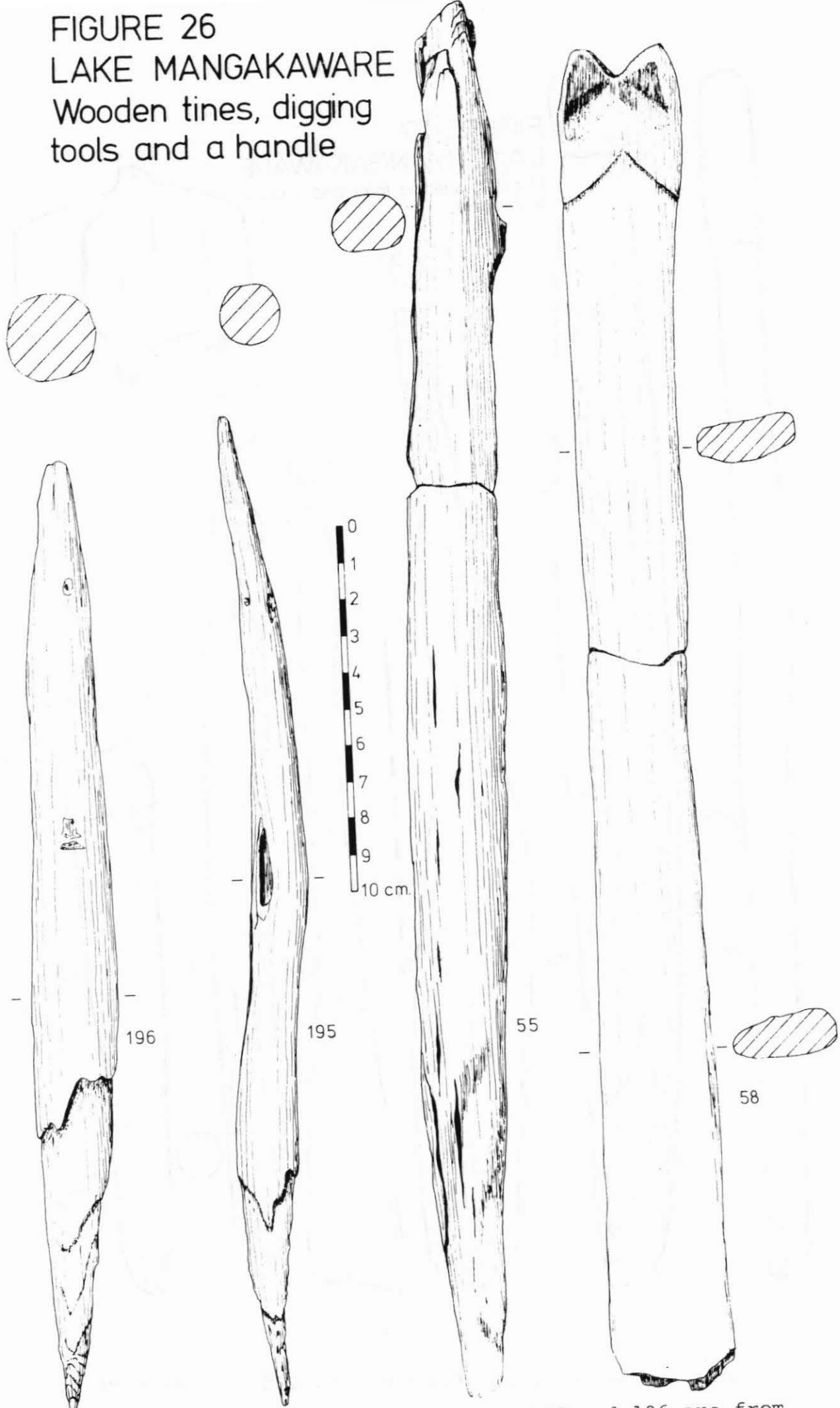
63. A rather intriguing piece of timber, 90 cm long, with a cross section of 9 by 4 cm. It is very well shaped, and the cross section grades from rectangular at one end to plano-convex at the other. Both ends are broken, so the original item was longer than the surviving fragment, and the shape of this section suggests that it may have come from a very large digging stick. From the A-C diving post line, not figured.

65. A cylindrical piece of wood 11 cm long by 9 cm diameter, shaped rather like a large top, with one end flat and the other rounded. Found in the A-C diving post area, not figured.

58. Carved handle (figure 26) found offshore from the trench E storehouse -- position shown in figure 4. This is 57 cm in surviving length, and averages 3 by 1 cm in cross section, and also has an unusual axial twisting, although this may simply be warping of the timber. The carving is too crude for clear identification, but the two upper projections suggest that it may be a very stylised human face. Since the part missing appears to be the working end, no suggestions can be given regarding function. As with many of the "indeterminate" objects, the range of possible functions is enormous.

134. This is another enigmatic object of unknown function, and consists of a piece of wood 1.20 metres long, and 6 by 3 cm in plano-convex cross section. Both ends have been purposefully tapered and blunted, and the object is complete. One possibility is that it may be a specialised form of agricultural tool.

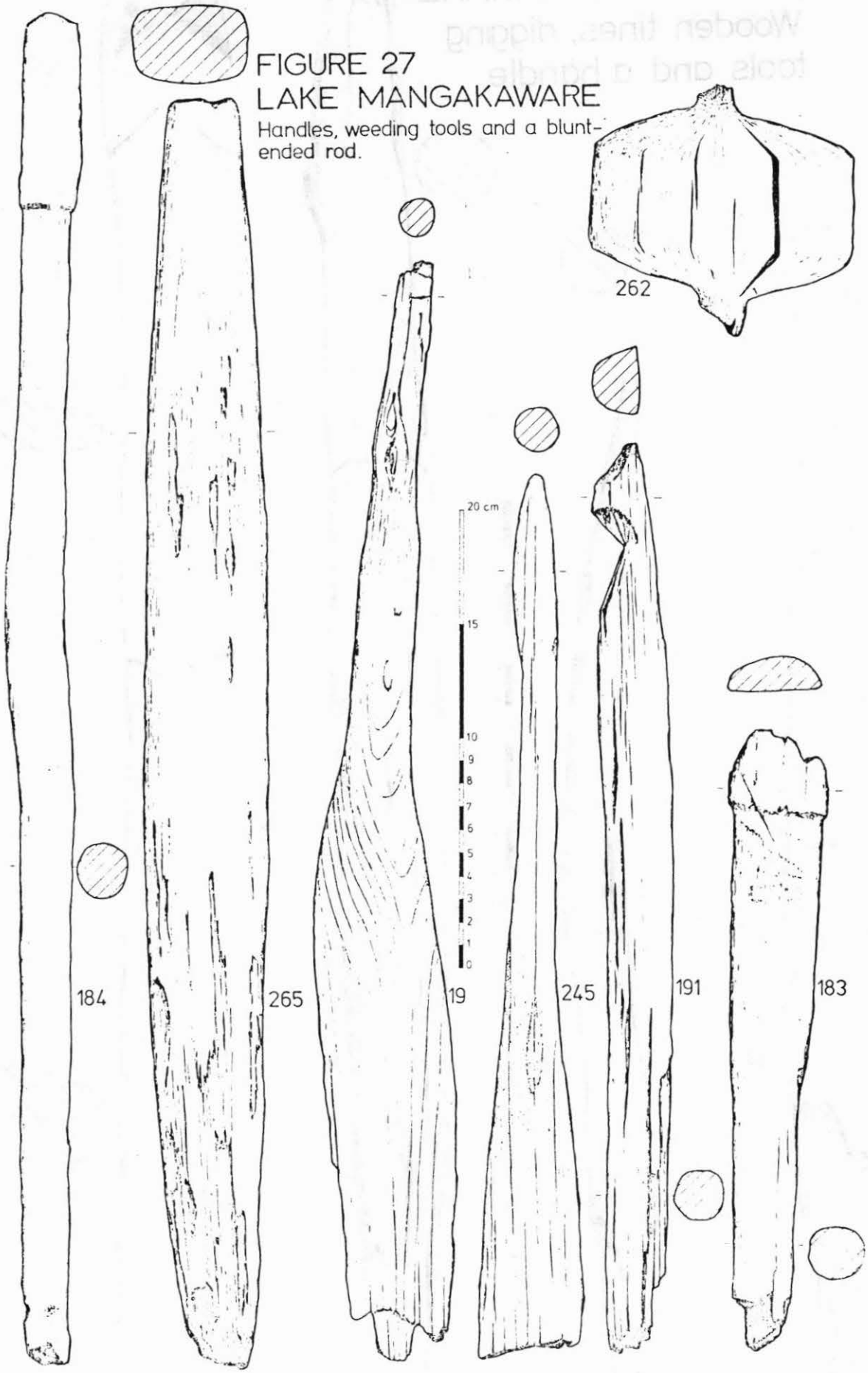
FIGURE 26
LAKE MANGAKAWARE
Wooden tines, digging tools and a handle



No's 55 and 58 are from MA 1. No's 195 and 196 are from the vicinity of MA 2.

FIGURE 27
LAKE MANGAKAWARE

Handles, weeding tools and a blunt-ended rod.



All items, including the rod (No. 265) are from MA 1.

The description of the artefacts from the lake in the immediate vicinity of site MA 2 is now concluded, and the information summarised in table 2.

Table 2

The MA 2 assemblage - lake finds

Artefact type	Number of artefacts	Figured specimens
Stone pounder	1	
Wooden beaters	2	12 (figure 20).
Digging sticks and spatulate agricultural tools	6	13 (figure 23), 18, 26, 289 (figure 24), 46 (figure 25), 55 (figure 26).
Handles	1 + fragments	48 (figure 25).
Spade blades	1	59 (figure 29).
Paddles	2	45, 56 (figure 31).
Steering oar	1	57 (figure 31).
Stone net sinker	1	38 (figure 18).
Eel trap	1	
Eel club	1 + fragments	25 (figure 32).
Spear sections	3	
Bowls	1	
Wooden points	3	
Wedges (?)	4	
Type B posts	20	
Type C posts	5	
Unidentified objects	4	58 (figure 26).

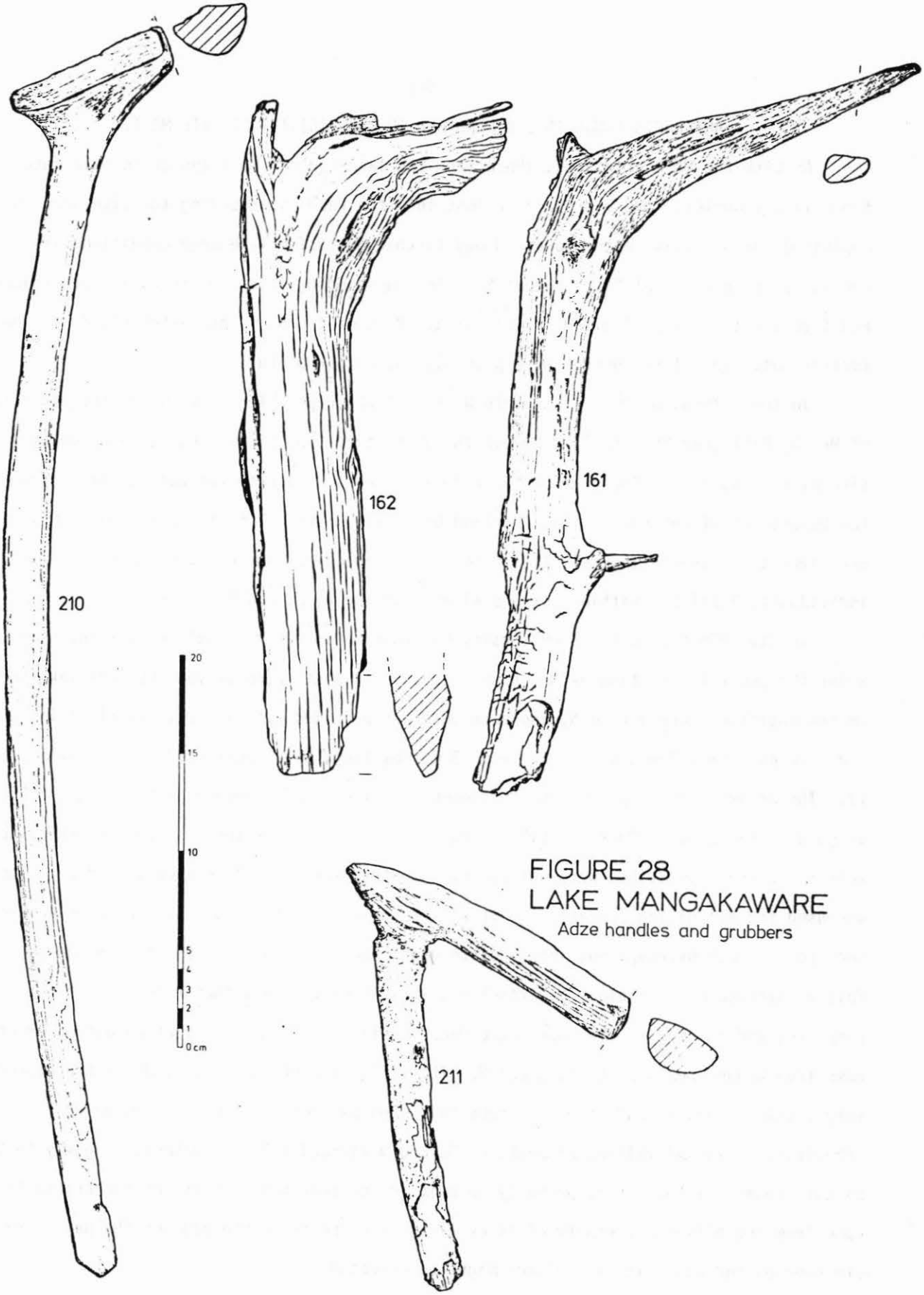


FIGURE 28
LAKE MANGAKAWARE
Adze handles and grubbers

All items are from the vicinity of MA 1.

ARTEFACTS FOUND IN THE LAKE BED IN THE VICINITY OF SITE MA 1.

As with the MA 2 artefacts, those from the lake-bed off MA 1 appear to fall into two main categories: those dropped or lost into the reeds surrounding the site, and those deposited purposefully in the lake bed mud further out. The lake edge conditions are generally the same as at MA 2, but at MA 1 the surrounding fringe of reeds is much thicker, and investigations were limited in this area. Most of the MA 1 lake artefacts come from further out, and a large number were probably cached purposefully.

In April 1969, members of the old Waikato Archaeological Society under the direction of Mr. D. Pick searched the lake bed in the vicinity of the circles L, M, and N on the site plan (figure 3). These artefacts were later passed over to the Waikato Art Museum via the Department of Anthropology at Auckland University, and in the following descriptions are given the abbreviation WA69 (for Waikato Archaeological Society 1969), and are not individually localised within the general area of the L, M, and N circles.

In May 1970 the Auckland University Underwater Club carried out further investigations under the general direction of Mr. K. M. Peters. 14 posts were driven into the lake-bed in the positions marked A to N, and each post was provided with a small swivel at its upper end. To each swivel was attached a rope 3 metres long, with knots tied at intervals along it. The divers worked by swimming in concentric circles around each post, using the knots as guides, for as with MA 2 visibility under the water was absolutely zero. As the artefacts were found their positions were noted, and then they were placed in a waiting dinghy, which was used for all diving operations. It will be noted from the plan that the circles around each post do not overlap, but intermediate areas were searched in order to provide as full a coverage as possible. Nevertheless, it is highly likely that recovery was not complete, and the mud is over one metre deep in places. The majority of recovered artefacts came from around posts B, C, D, G and H. The vicinities of posts E, I, J and K produced very little material, and it may be that this area was not frequented often by the inhabitants. The vicinities of posts L, M, and N yielded a lot of material, mostly to the Waikato team in 1969. It is probably no coincidence that the majority of the artefacts came from the offshore vicinity of thick clusters of posts on the edge of the pa, where storehouses and canoe landing places might be expected.

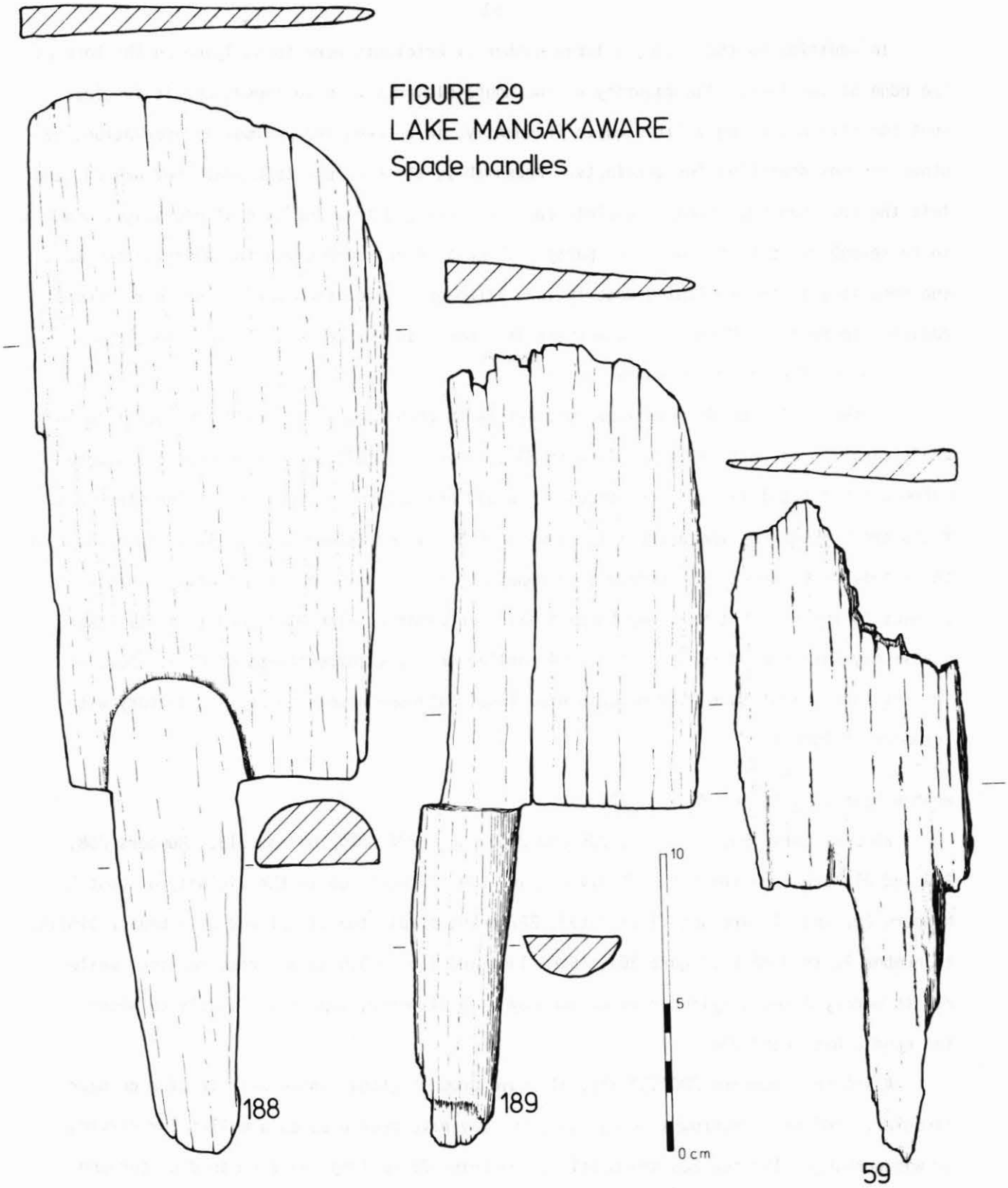


FIGURE 29
LAKE MANGAKAWARE
Spade handles

No's 188 and 189 are from MA 1. No. 59 is from MA 2.

In addition to the above, a large number of artefacts were found lying on the bank at the edge of the lake. The majority of the house elements were so found, and it is clear that the site was being visited quite frequently, in between the periods of excavation, by other persons searching for artefacts. Presumably, these people took what they wanted, and left the rest behind. Even a complete canoe was dragged from the lake at one stage, and had to be re-submerged by the Auckland party. These artefacts are given the abbreviation NL (no locality) in the following descriptions although most of them were found on the shore adjacent to posts L, M and N, where there is a break in the reeds sufficient to allow access to the lake from the shore.

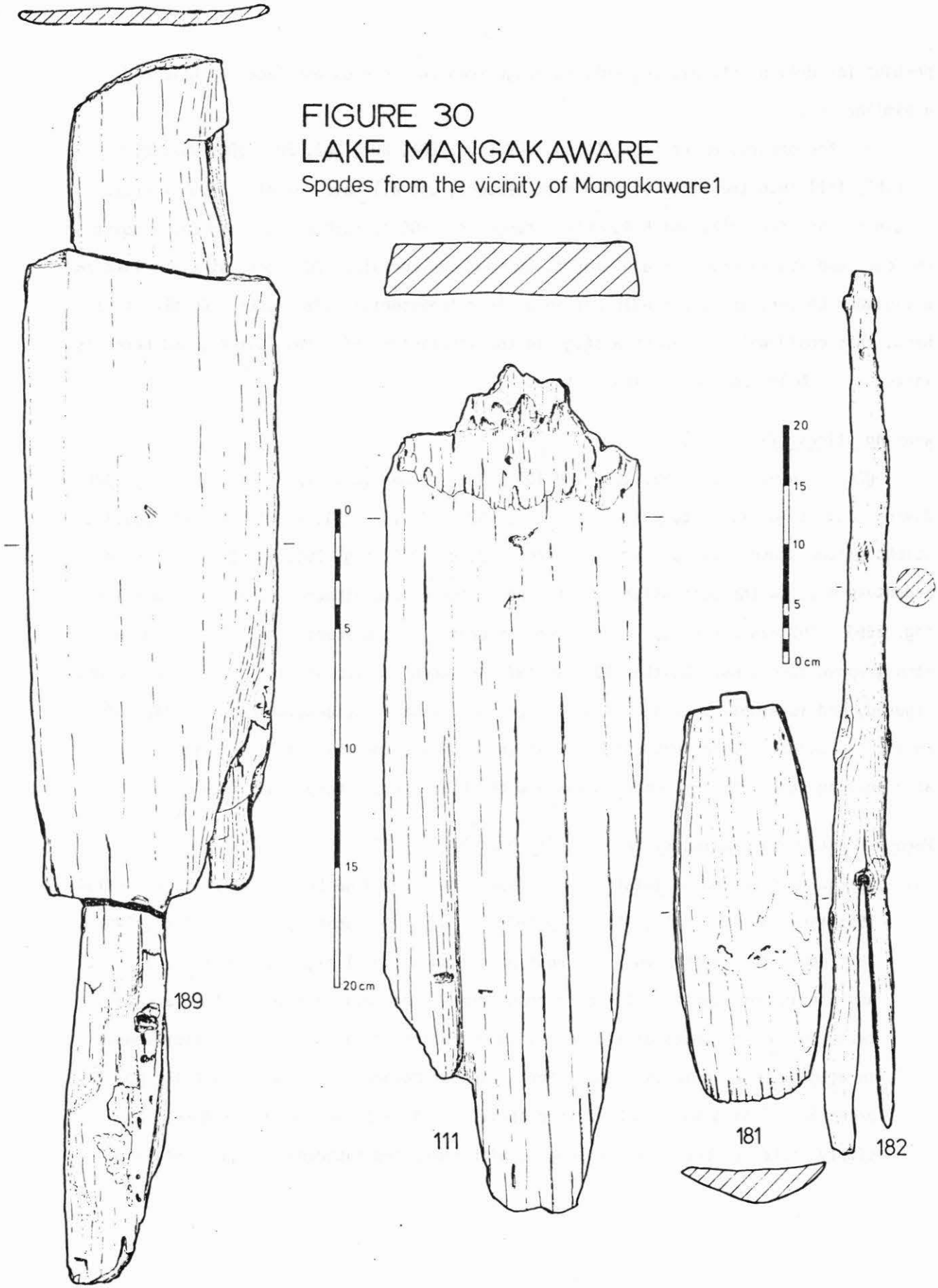
In the following descriptions, the artefacts recovered in May 1970 are localised to the vicinities of posts A to N. As with MA 2, precise localisation to within one square metre was not possible, and such precision would probably not be relevant. The other artefacts are preceded by the abbreviations WA69 or NL, as explained above. It is apparent that the artefacts belong to the period of occupation of site MA 1, but it is only possible at present to suggest that MA 1 may be partially contemporary with MA 2, and that its lower levels may have been deposited at a date earlier than the commencement of MA 2. Some of the artefacts might therefore predate A.D. 1500, but none appear to be contemporary with European influence.

Wooden beaters (figures 20, 21, 22)

WA69 numbers 159, 200, 203, 205 and 206. NL - 201, 202, 207 and 213. Numbers 208, 209 and 212 are from the May 1970 diving, and 209 is localised to the vicinity of post G. Numbers 207 and 212 are not illustrated, 207 being simply the distal end of a beater similar to number 12 from MA 2 (figure 20), 16 cm long and 4.5 by 3.5 cm in cross-section; while 212 is merely a rough cylinder 16 cm long by 6 cm diameter, tapering slightly to where the handle has been broken off.

Apart from numbers 200 and 213, all have cross sections which are circular or near-circular. 200 has a narrow working edge, and may have been used as a mallet for carving or woodworking. 159 and 205 are massive, 159 being 72 cm long and 7 cm in diameter and provided with a hand grip cut away on one side. It was certainly used with two hands,

FIGURE 30
LAKE MANGAKAWARE
Spades from the vicinity of Mangakaware1



perhaps for driving stakes, and 205, to judge from the wear on one face may have had a similar use.

All the others, apart from 206 and 209 (i.e. 201, 202, 203, 207, 208, 212, 213) probably fall into the class of fern root beaters, and all have roughly circular cross sections apart from 213, which is sub-rectangular. 206 is rather small and has a point at one end, and its function as a beater is by no means certain. 209 looks at first like an unfinished beater, and the handle has very clear longitudinal adze marks. On the other hand, this could well represent a stage in the manufacture of a top (potaka) and hence is listed again below in the section on tops.

Weaving sticks (figure 23)

WA69 - numbers 190, 192, 193, and 194. NL - number 163. 197 is from the May 1970 diving, and is localised to post B. Numbers 190, 192, 193, 194, and 197 are all weaving sticks of the standard illustrated type (e.g. Buck, 1958: fig. 29), and 190 retains an indentation below the butt which marks the positions of the attached cords (see Buck, 1958: fig. 26b). 193 has a stylised carving at its centre, reminiscent of motifs carved on many ethnographic specimens. Neither 193 nor 197 have knobs at the proximal ends. 163 is not figured, and is simply a pointed stake 43 cm long, with a rectangular cross section of 3 by 1.5 cm, and a deliberately cut notch at the proximal end. It could well have functioned as a weaving stick, but is, in comparison with the others, a very crude implement.

Weeders (ketu) and digging-sticks (ko) (figures 24, 25, 27)

(a) Narrow pointed and spatulate tools (figure 24) WA69 number 218. NL - numbers 154, 155, 156, 160, 166, 167, 308. May 1970 diving - 143 (post N), 187 (post H), 249, 285 (post L). These tools are best described as small digging sticks or weeders, and are in most cases little more than trimmed and pointed stakes. None are very large, and no examples of the very large ko which are usually so well represented in ethnographic collections have been found at Mangakaware at all, with the possible exception of item 63 from MA 2 (see above). 154, 156 and 160 (not figured) are simply stakes of one metre in length, with sharp and tapering but quite heavily

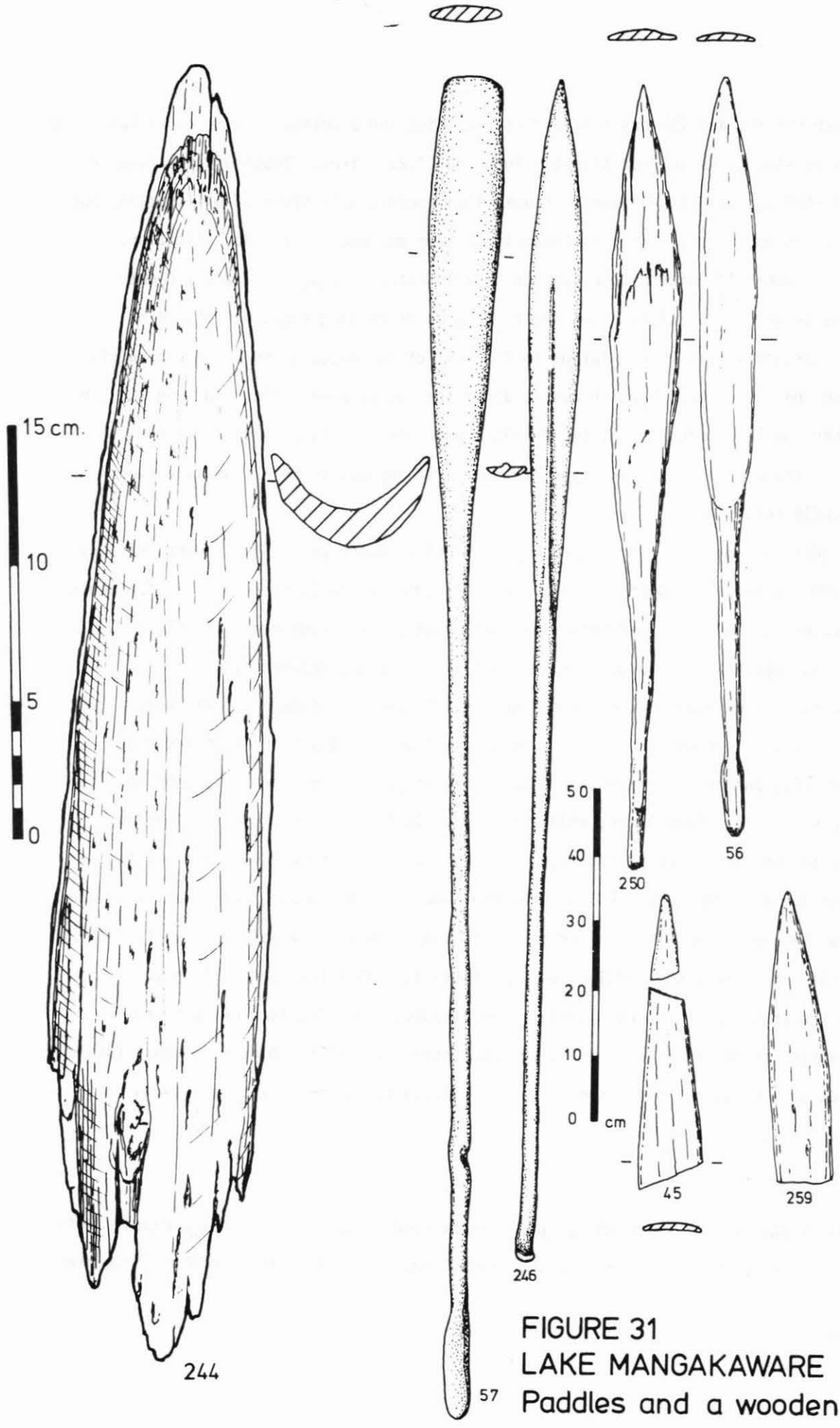


FIGURE 31
LAKE MANGAKAWARE
Paddles and a wooden bowl

All items except 45, 56 and 57 are from MA 1.

worn points, and 154 has a fire hardened point and a deliberately rounded butt. 155 is similar to these, but slightly longer at 1.20 metres. Tools of this kind are classed as agricultural tools because their points show signs of utilisation, but for obvious reasons there is bound to be some uncertainty in identification.

Item 143, with a total length of 2.10 metres (figure 24 - total length not shown), is possibly some kind of digging or weeding tool, but its point is strangely flimsy in relation to the rest of the object, and was deliberately made on a side branch which was retained for the purpose. Items 187 and 285 are both complete, and have quite definite spatulate blades, and 249 seems to be a segment of a similar type of tool. 218 appears to be a crudely carved handle terminal.

(b) Paddle shaped tools (figures 25, 27) WA 69 - number 245. NL - number 19. May 1970 diving - 248 (post G), 255, 256, 294, 295 and 298 (post C). All these tools are of the paddle shaped ketu class with handles of circular or elliptical cross section which merge fairly abruptly into paddle shaped blades of lenticular or plano-convex cross section. 19 and 245 (figure 27) are very similar, each consisting of a short handle (purposefully pointed in the case of 245), and the upper portion of a blade, of plano-convex cross section in both cases (compare Adkin, 1948: fig. 84). In these two examples the handle meets the blade with a slight change in the plane of the dorso-ventral axis, but in items 248, 255, 256 and 298, the handle is in the same dorso-ventral plane as the blade. As with similar tools from MA 2, there is a possibility of confusion with canoe paddles, but the tools described here generally have narrower blades than true paddles. Admittedly, classification of such small samples of broken objects is rather subjective, and it is to be hoped that future research might establish some clearer criteria for differentiation between the two types of tool.

Grubbers (figure 28)

Items 161 and 162 (both WA69) appear to be crude grubbers of the timo class. Both are made on sharply curved branches, and 162 has apparently lost its handle. These are

FIGURE 32
LAKE MANGAKAWARE
Eel clubs and miscellany

All items except 25 are from MA 1.

much cruder than the majority of *tiwo* in museums, although this is not surprising as much of the Mangakaware assemblage represents everyday tools from prehistoric times which would not normally survive to enter museums.

Spades (figures 27, 29, 30, 38)

WA69 - 180, 181/2, 183, 185, 191. NL - 111, 123. May 1970 diving - 188 (post C), 189 (post H). The sum total of 11 spade elements from Mangakaware (including item 45 from MA 2) indicates that the inhabitants of the two *pa* made their spades with handles and blades separate (as in Best, 1925a: fig. 7). No one piece spades (as in Best, 1925a: figs. 3, 5, 11) have been found at all, and it would therefore be a matter of some interest to examine the distribution of the two-piece implement, as it might well be of localised occurrence. It will be seen that one side of 188 resembles very closely the example illustrated by Best from the Wanganui Museum (1925a: fig. 7B), while the reverse side of 189 resembles very closely the example illustrated by Best from a Waikato swamp (1925a: fig. 7A). Even this limited amount of evidence suggests that the detachable spade blades will show enough typological variation to make a museum study worthwhile.

Of the blades, which all show a good deal of scour-grooving along preserved working edges, items 111 and 181 both have short stubby tangs, and 180 has a plain tang 16 cm long. 123 is a rather massive piece, with a slightly plano-convex cross section 2.5 cm thick (figure 38). The working edge of this is missing, and it would originally have been longer than the other examples. The tang has a roughly square cross section, slightly hollowed at the back to take a handle. 181 has a companion forked handle (182), found with it, and both are illustrated together (figure 30). Numbers 188 and 189 are of special interest because they both have shaped tangs with half-circular cross sections and terminal knobs. 188 has a recess on the flat side of the tang, and both these tools were clearly meant to take a flattened handle such as 183 (rather than the forked type) which would be lashed flat surface to flat surface on to the blade. Indeed, 183 (fig. 27) fits blade 188 so exactly that the two might belong to each other, even though they were found some distance apart, and 183 still retains the slight grooves left by lashings. 191 (figure 27) is probably another spade handle, of slightly different shape, and would fit best an implement with a recessed tang.

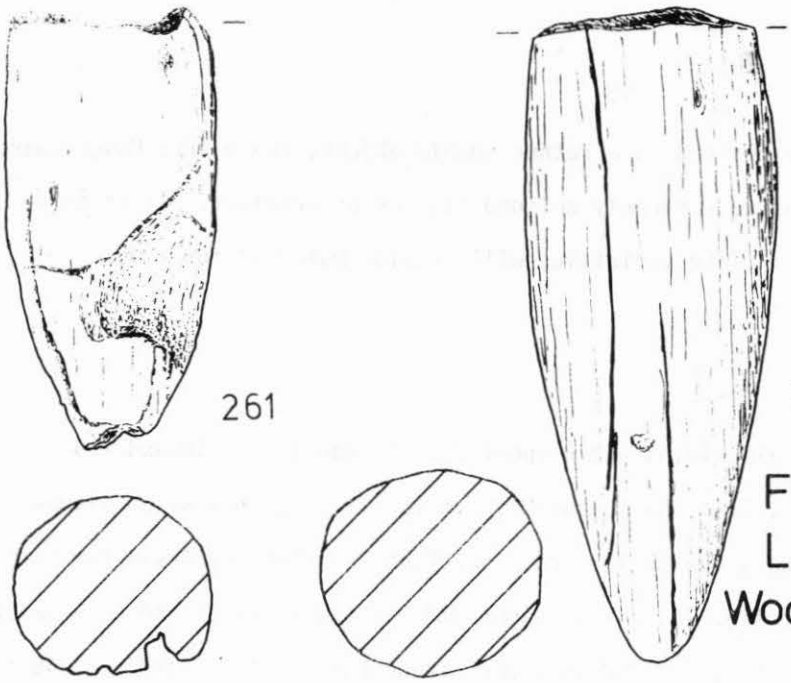
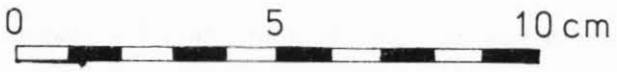
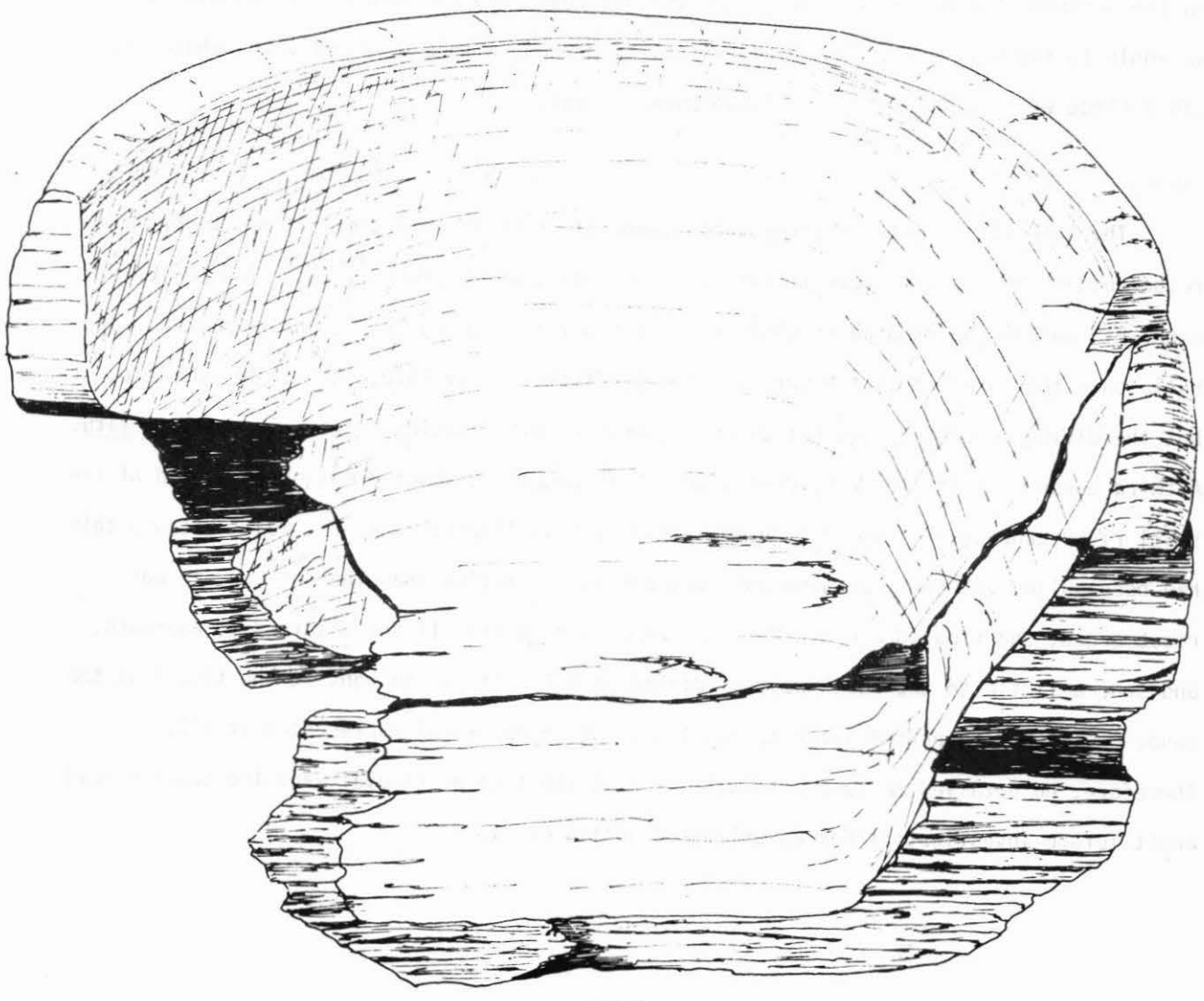


FIGURE 33
LAKE MANGAKAWARE
Wooden tops and a bowl





240

All items are from MA 1.

Although the spade could be classed as a rather humble object, those from Mangakaware form one of the best preserved and most clearly defined classes of artefact. It is to be hoped that future investigations in lake vicinities will provide material for a more comprehensive analysis.

Paddles (figures 27, 31)

WA69 - 184 (handle). May 1970 diving - 246 (post B), 250 (post D), 258 and 259 (blade fragments). These paddles, like those from MA 2, have blades with shallow plano-convex cross sections, and none have the hollow cross sections described by Adkin for some Horowhenua examples (Adkin, 1948: fig. 70). 184 (figure 27) is the terminal end of a paddle handle with a rounded knob at the top, and 250 is a very crude but complete paddle. 246 is a most remarkable object, made with great care and of very fine balance. The blade has a perfectly central mid-rib running down the flat side, like two examples from Horowhenua in the Dominion Museum (Black Collection 263 and 264), and the knob of the handle is set at an angle to the main axis. The blade is fairly narrow, with a width of 8 cm, while 250 has a blade width of 11 cm, and is also much shorter.

Canoes

The lake still contains three canoes, one of which is complete. It was beyond the resources of the Auckland team to lift these objects, which probably weigh half a ton or more when waterlogged and which would require heavy lifting equipment and transport. Two hulls on either side of post N were located by divers in May 1970, and may be complete, but the diving conditions did not allow a complete investigation. They are still in situ. A third canoe near the shore by diving post M is complete, about 7 metres long, and of the small river canoe (waka tiwai) type described by Best (1925b: figs. 88, 89). Because this had been pulled ashore by persons unknown, and was splitting from the hot sun, it was resubmerged, and floated over to MA 2, which is more difficult for visitors to approach, and sunk a little to the north-west of diving post A. It was thought at the time that the canoe could be transported later to Hamilton, but no opportunity presented itself. Therefore, no detailed measurements were made at the time of removal, and the canoe should await future investigators for an unlimited period of time.

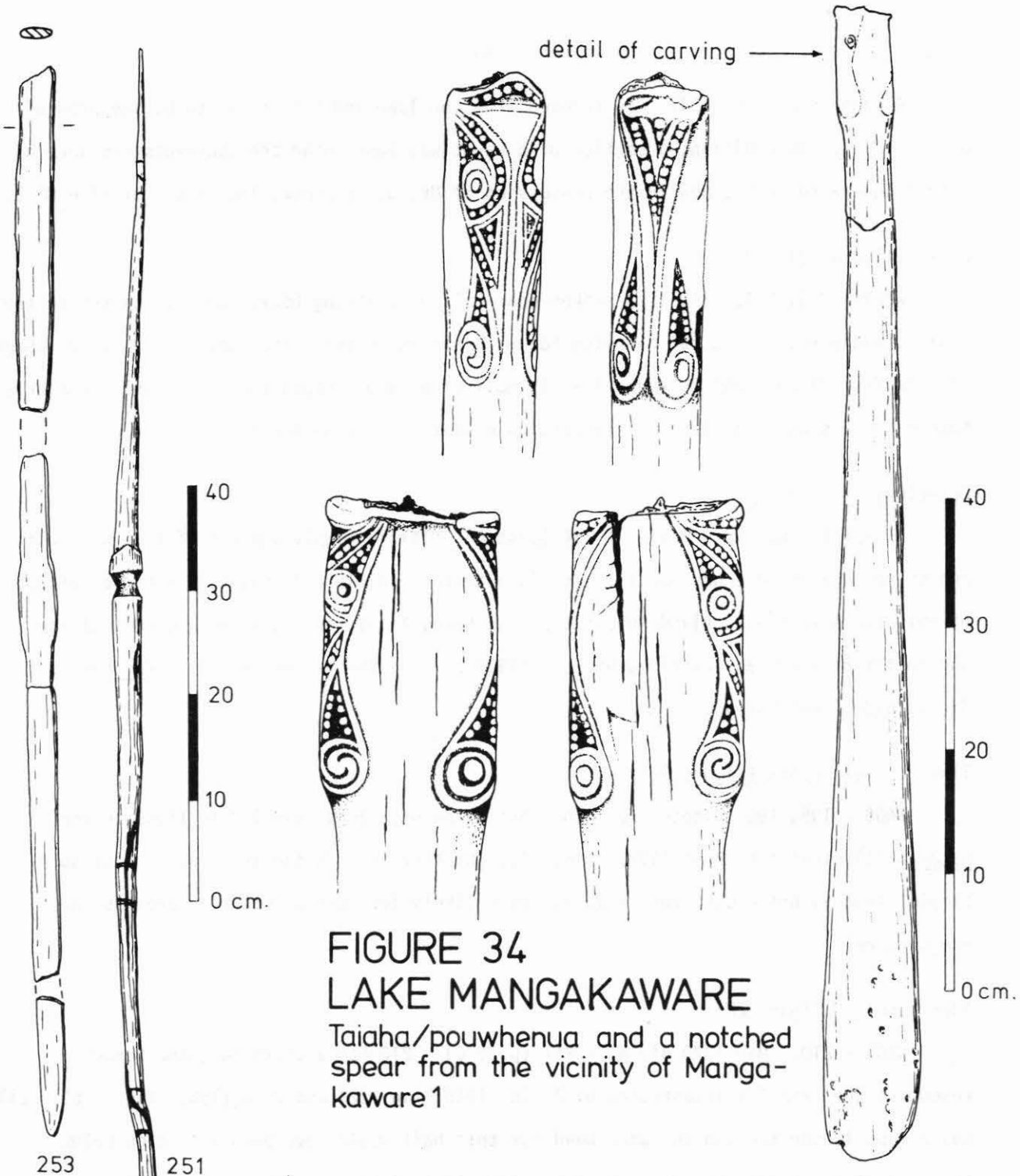


FIGURE 34
LAKE MANGAKAWARE

Taiaha/pouwhenua and a notched spear from the vicinity of Mangakaware 1

A canoe prow (NL - 242) was removed from the lake and this seems to be the prow of a waka tiwai. In addition, a section of a canoe was found near the south-western lake of Lake Mangakaware and is now in the possession of Mr. J. Krippner, the lessee of site MA 2.

Bowls (figures 31, 33)

WA69 - 240, 244. 240 is a broken near-half of a strong bowl, heavily charred on the inside, and perhaps used for carrying hot oven stones in the latter days of its life (compare item 28 from MA 2). 244 is approximately half of a canoe shaped food bowl, and the Auckland Museum has a single similar item (accession number 13770 - no location).

Eel-clubs (figure 32)

NL - 151. May 1970 diving - 254 (post C). 151 is simply a piece of flat wood with one sharp edge and a crude handle. 254 is a better example and resembles a number of items of this class in the Auckland Museum. It is sharp, light, and would be a good tool for underwater killing, as described by Best (1929:104). The timber of 254 is Podocarpus dacrydioides (kahikatea).

Tines of eel spears (figure 26)

WA69 - 195, 196. These are both short bi-pointed rods, similar to those in the matarau illustrated by Best (1929: fig. 34). Whether this is the true function of such simple items is not clear, but it is at least likely for such an eel rich area as Lake Mangakaware.

Adze handles (figure 28)

WA69 - 210. May 1970 diving - 211 (post C). 210 has a short toe, and hence resembles the examples illustrated by Adkin (1948: fig. 82) and Buck (1958: fig. 37b). 211 has a much longer toe and the adze head for this haft would have been lashed on below the axis of the handle (as in Buck, 1958: fig. 37c), instead of above as in 210.

Wooden tops (figure 33)

WA69 - 260, 261. Both these items are of a common form and require little comment. 260 has been lightly charred over much of its surface. Item 209, listed above under wooden beaters, might well be a stage in the manufacture of a large top. There is a fourth

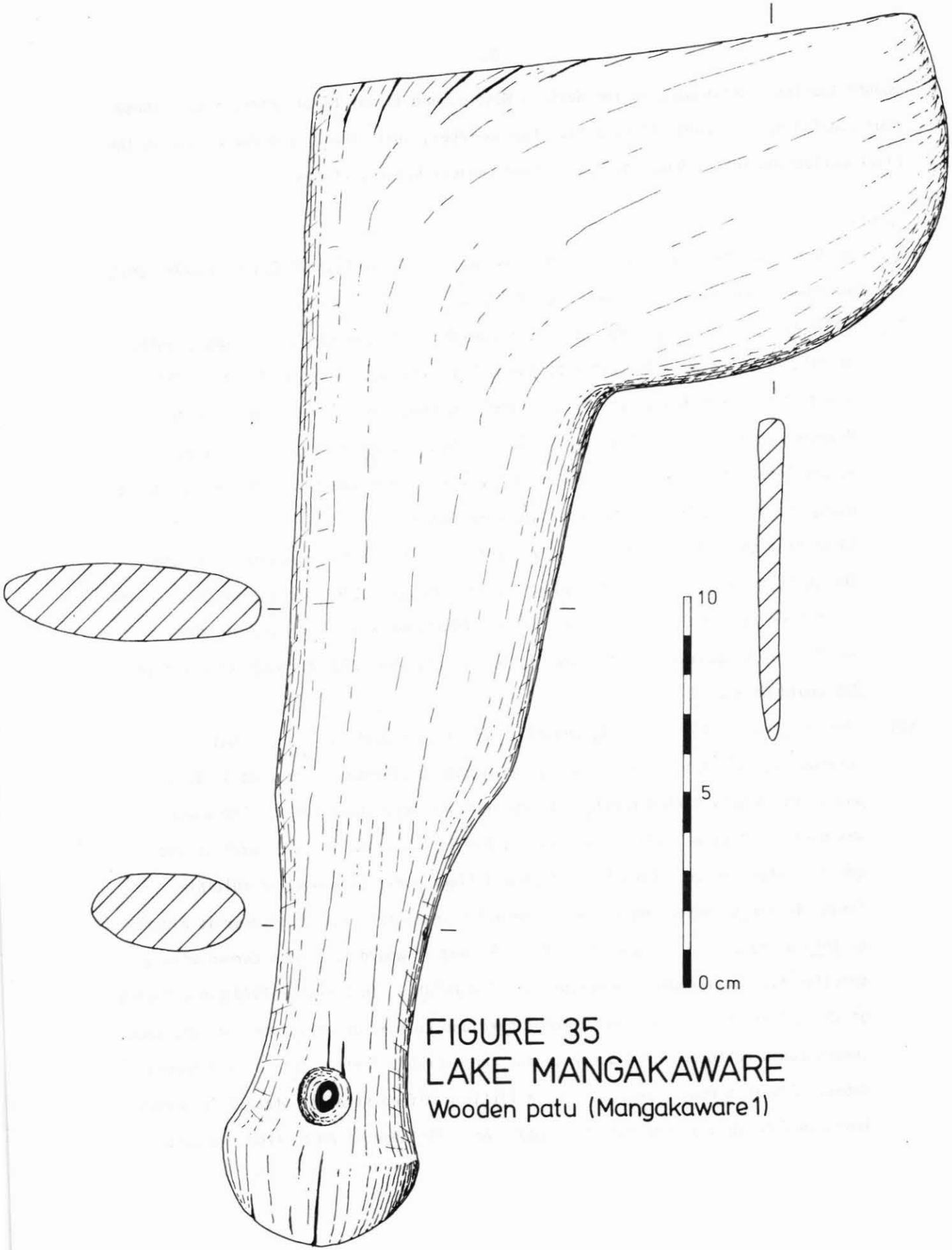


FIGURE 35
LAKE MANGAKAWARE
Wooden patu (Mangakaware 1)

wooden top from Mangakaware in the Waikato Museum, and it may be of interest that these four (including item 209) all have flat top surfaces, while those from Horowhenua in the Black Collection in the Dominion Museum have conical upper surfaces.

Spears

WA69 - 266. May 1970 diving - 251 (post A), 267 (post L), 275 (post L), 276 (post L). The spears fall into two classes, as follows:

(a) Plain spears - 266, 267 and 276 (not figured) These are simply straight pointed shafts, of the type illustrated by Adkin from Lake Horowhenua (1948: fig. 79). 266 is 1.5 metres long, but may be broken and hence once longer, and 2 cm in diameter at the butt. It is very well polished and sharpened, and shows an almost lathe like precision. 267 is 2.05 metres long, again perhaps broken at the butt, and is 3 cm in butt diameter and hence much more massive than 266. At 50 cm from the point there is a very faint ridge around the circumference, and the shaft is well smoothed and polished, as with 266. 276 is rough and not smoothed, 2.4 metres long and only 1.5 cm diameter. Functions are not clear, but 266 and 267 may be palisade or throwing spears (Buck, 1958:271-2) and the flimsier 275 could be a bird spear.

(b) Notched spears - 251 (fig. 34) and 275. 251 is a remarkable and unusual instrument, 1.45 metres long and 3 cm in greatest diameter. The butt is lost, and it has a very marked notch at 53 cm from its very sharp point. The spear was clearly of great value to its owner, for it was found in three pieces, and the area where these pieces abutted showed clear marks of single or multiple strand lashings indicating repair. The notch indicates that this spear is a pere or teka as described by Buck (1958:273-4), and it would have been thrown with a specific type of throwing apparatus called a kotaha. In December 1970 Dante Bonica of the Waikato Art Museum made a model pere and kotaha, and demonstrated that such spears could be thrown with accuracy for considerably further than a hand thrown spear. 275 is a rough spear made on a little modified straight stake 2.75 metres long and 2 cm in diameter (not figured). At a distance of 20 cm from the butt

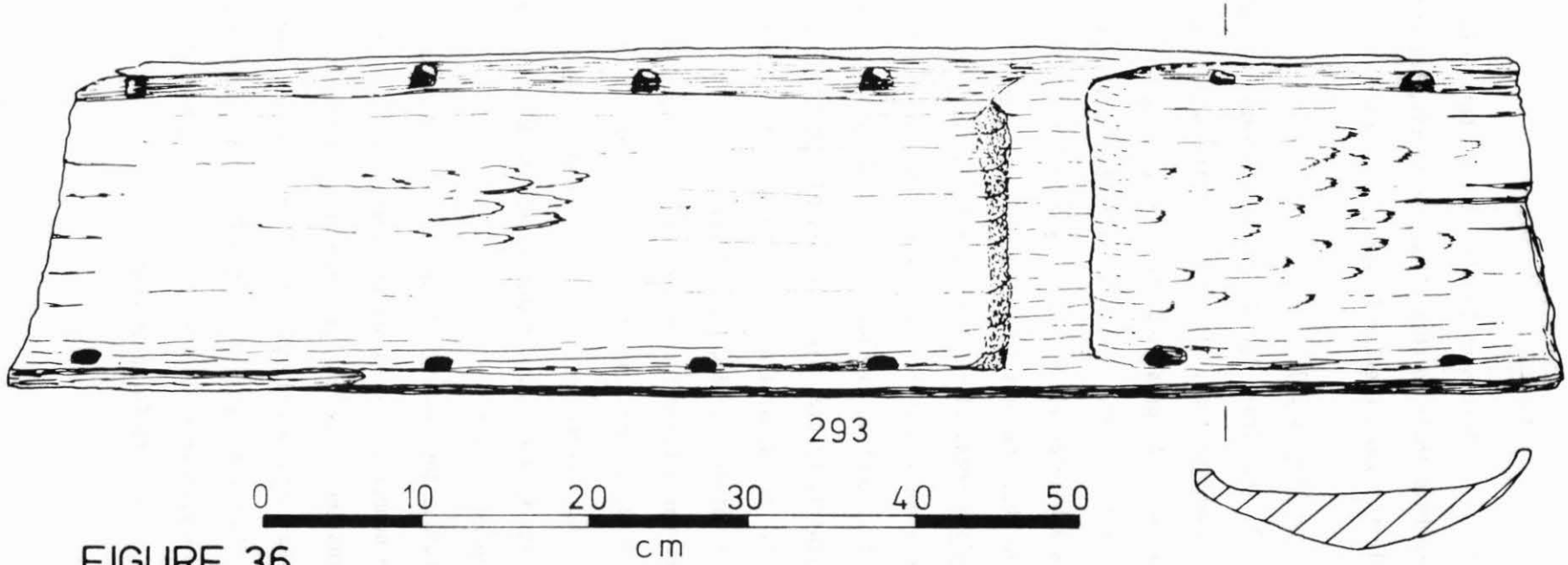
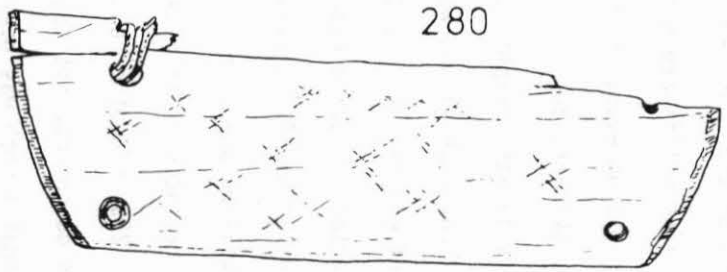


FIGURE 36
LAKE MANGAKAWARE Bone box slabs (Mangakaware 1)



a notch has been cut 5 cm long, which reduces the diameter at this point to 1.2 cm. 251 and 275 therefore have their notches at opposite ends, but their functions were most probably the same, whether in sport or in war.

Weapons of the taiaha/pouwhenua type (figure 34)

May 1970 diving - 247 (post B), 253 (post B). 247 is a remarkable and unique spatulate weapon, of the general taiaha or pouwhenua type, although since the butt is missing it is difficult to give a precise Maori name. As preserved, it is 91 cm long and has a blade of lenticular cross section 7 cm in maximum width. The most striking feature of this object is the carved butt end, which has a bilaterally symmetrical face-like motif in low relief on either side. Immediately above these two motifs are what might be the lip or eyebrow motifs of the standard type of taiaha head, although too little survives for certainty. The face like motifs are not the same - one has shell inlaid eyes and spiralled nostrils, the other has no eyes, and nostrils of concentric circles. Adkin (1948:92) after quoting H. D. Skinner, suggests that concentric circles may be a very old motif owing to their rarity in ethnographic collections. The dissimilarity of the two motifs is best seen from front and back views, which show a rather engaging kind of asymmetry. The small square relief elements in the designs are parallelled in a number of items from New Zealand collected on Cook's expeditions (D. R. Simmons, personal communication), but the exact distribution of the motif is unknown. Otherwise, the motifs are unique and this weapon may well be one of the oldest of its kind known, and thus represent a fashion which had been replaced at the time of European contact.

253 is another unusual spatulate instrument and consists of five pieces of timber which do not now fit together. A number of pieces are presumably still in the lake. The original length was over 90 cm, and the blade has a lenticular cross section up to 4.5 cm wide. One portion has a slight swelling, and the form is slightly reminiscent of a pouwhenua, although most of these in ethnographic collections have a thicker and more rounded cross section. The piece therefore remains rather enigmatic, and like 247 may represent a fashion which did not survive to European contact.

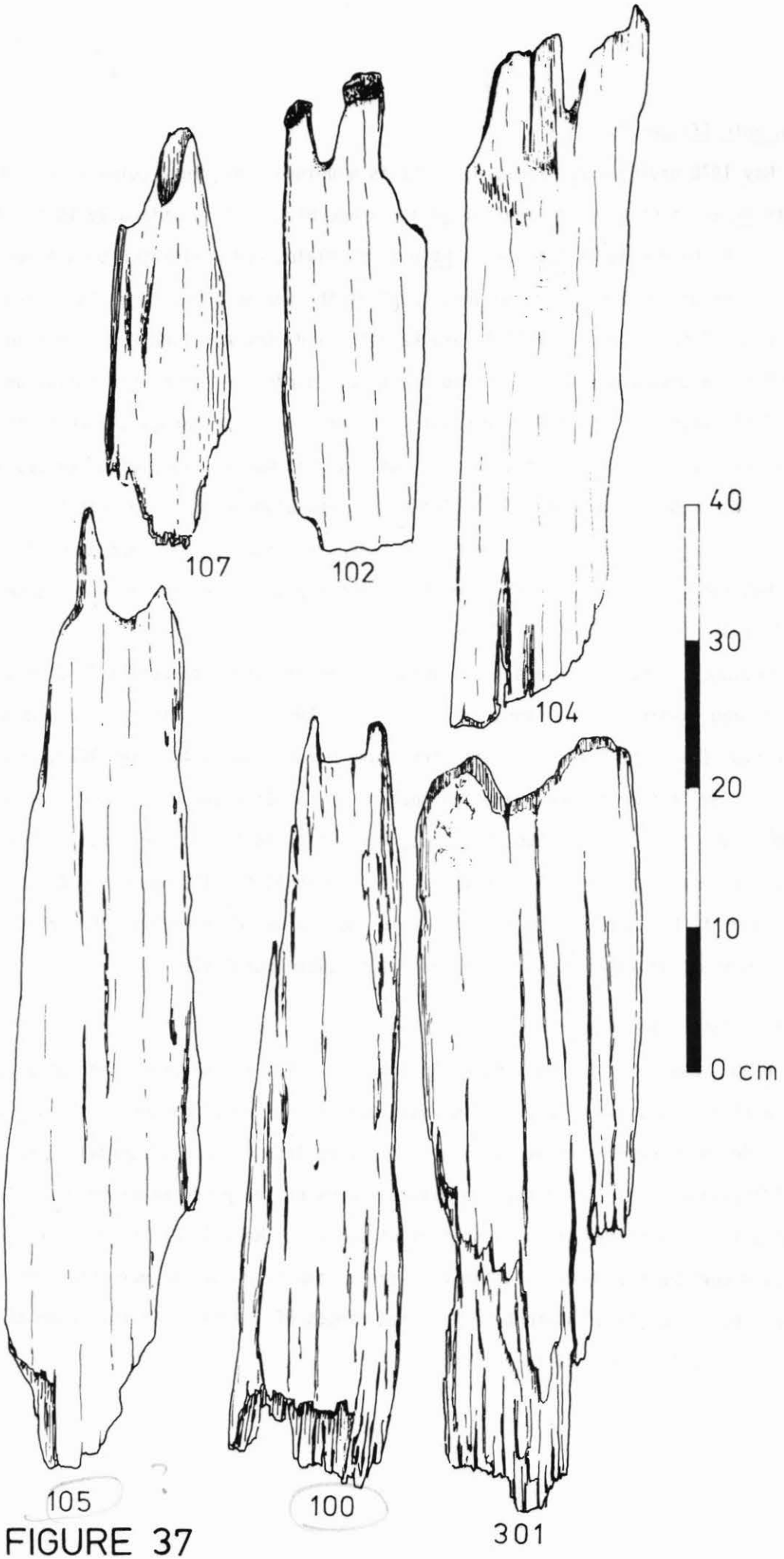


FIGURE 37
LAKE MANGAKAWARE
Notched wall slabs (Mangakaware 1)

Wooden patu (figure 35)

May 1970 diving - 252 (post A). 252 is a unique hand club, being a cross between a tewhatewha and a patu in form, although its shape places it functionally in the latter class. The handle is of the normal patu type, plain, and perforated by a hole with an hourglass cross section. The "business end" of the weapon seems to be the sharp curved outer edge of the blade. Parallels are hard to find; the Auckland Museum has in its collections a small, unperforated, and rather crude patu in stone, of similar shape to 252, from Kiokio (Piopio ?) in the King Country (accession number 1869), and there is a wooden example from a swamp near South Kaipara Head which is marginally similar (accession number 2735). Mr. K. Gorbey of the Waikato Art Museum has also informed me that the Te Awamutu Museum holds a sickle shaped wooden weapon (accession number 134), but none of the above items has such a sharp differentiation between the patu shaped handle and the tewhatewha - shaped blade.

Because the form seems to be unique it is difficult to relate it ancestrally to the patu and wahaika of the ethnographic period. Adkin illustrates a wooden weapon of the latter type (which he calls a kokoti) from Lake Horowhenua (1948: fig. 104), and there is one of a similar form in the Banks' collection in the Ethnographical Museum at Stockholm (Rydén, 1965: fig. 33; see also Shawcross, 1970: fig. 16 for another specimen collected on Cook's first voyage). But these have a more pronounced sickle shape than 252, and the latter seems to be an idiosyncratic item which has survived by chance, and which at present exists in something of a vacuum with respect to close parallels.

Bone box slabs (figure 36)

WA69 - 293. May 1970 diving - 280 (post C). 280 is the broken end of a bone box slab, with four lashing holes with an hourglass cross section caused by the use of stone tools. One hole retains three fragments of a vine lashing, one of Cordyline sp., two of rata (Metrosideros sp.), and the two main surfaces of the piece have the very clear marks of careful adzing in two directions at right angles. The original slab had rounded sides, and would perhaps have been of a similar size to the slabs of the Horowhenua bone box pictured by Adkin (1948: plate 6). No other pieces of the same box have come to light, and 293 seems to belong to a different unit.

FIGURE 38
LAKE MANGAKAWARE
Tenoned rafters, other house elements and a spade blade (Mangakaware 1)

Item No. 123 is the spade blade.

293 is a complete side of a bone box, 93 cm long and 24.5 cm wide, and has a hollowed curvilinear cross section. The outer side has been smoothed and rounded, but the inner side has been hollowed out, quite deeply at either end, but with a band 7 cm wide left in slight relief near one end. Each side has six square lashing holes, again punched out with an hourglass cross section. The inner side also retains clear adze marks, which indicate a blade width for the tool of about 4 cm. This element clearly belonged to a rectilinear form of bone box, unlike the pyramid shape of the Horowhenua example (Adkin, 1948: plate 6). Its location in the lake (near posts L, M, and N) so close to the site suggests that it may have been cached deliberately.

Points

A number of wooden points have been recovered at various times from the lake near MA 1, and the largest of these is 33 cm long by 1.2 cm diameter. Some have circular cross sections, some lenticular, and one is pointed at both ends. They are all crudely fashioned, and like the points from MA 2, can perhaps be interpreted as dredge or spear tines, although there can be no certainty. None are figured.

Wedges

The best example is 239 (WA69 - figure 32) which is a thick solid wedge with two bevels, of a kind which was probably used for splitting large timbers. In addition to this there are 5 rectangular small thin pieces of wood, up to 14 by 5 cm in size, with thin rectangular cross sections up to 1 cm thick. All of these have one purposefully sharpened edge, and may have been used for tightening lashings in building construction, or for splitting lesser timbers for building purposes.

House and storehouse elements

The functions of the items identified as house elements are discussed above in the section on the trench Y house at MA 2 , and they correspond in form to the house elements described by Firth (1926) for the Tuhoe area. Both these areas were evidently characterised by the use of notched wall slabs and tenoned rafters in construction, and evidence for this technique also comes from sites in Northland and on the Hauraki Plains.

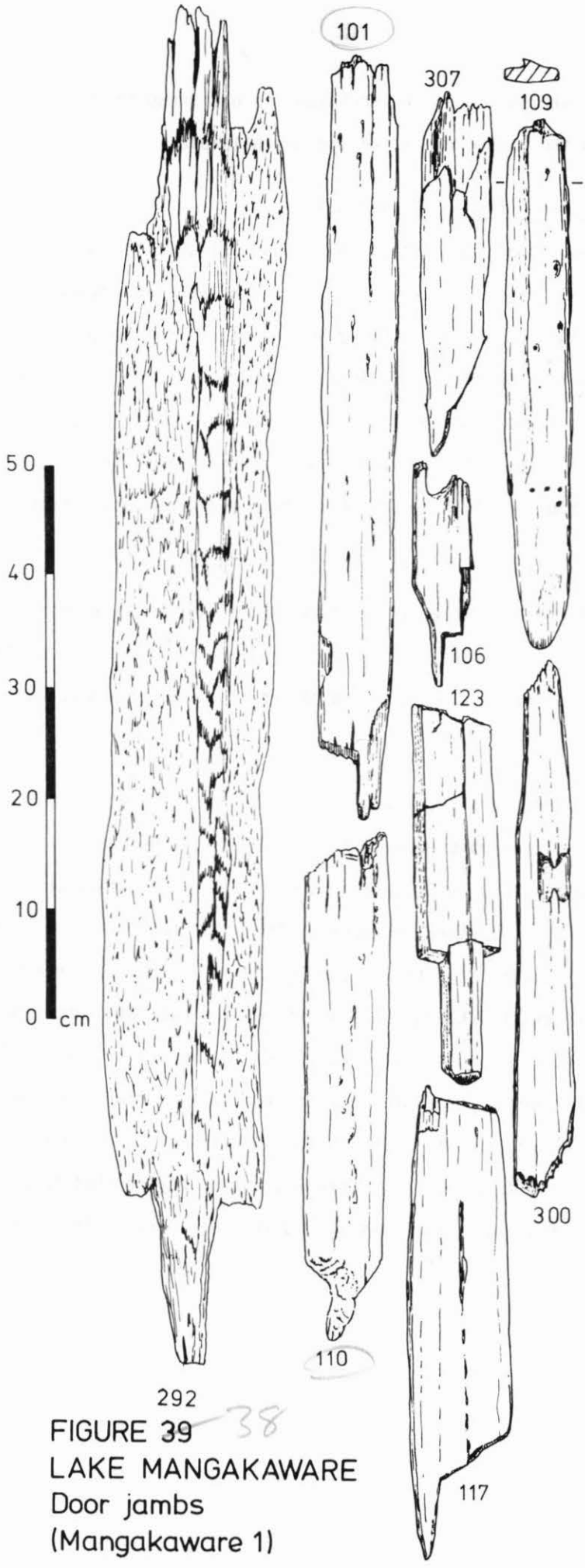


FIGURE 39 38
LAKE MANGAKAWARE
Door jambs
(Mangakaware 1)

The overall distribution of the technique is not known to me, but it was evidently widespread in the northern part of the North Island.

Notched wall slabs (figure 37, all NL)

Six examples of these slabs were found, of which 100 has a square cut notch like examples from Patetonga, Hauraki Plains, in the Auckland Museum, while the others are cruder. 105 and 107 appear to be split and do not retain their full notches, and 102 has been burnt at the top of the notch and its base has been cut square, which suggests that it was re-used for some other purpose, as it would probably be too small for a wall slab as it is now. All are flat slabs with a rectangular cross section, and their lengths would suggest that house walls were 40-50 cm above the ground on average.

Tenoned rafters (figure 38, all NL)

Four of these items were found, of which 101 has an offset tenon, like some examples from Patetonga, and 110 and 292 have central tenons. 292 is made from a split slab of tree fern, 6 cm thick. 307 has been damaged by burning and cannot be identified as a rafter with certainty.

Door jambs (figures 38, 39, all NL)

Of the five examples found, 115 and 116 might be partners since both have a single hole near the top, and both may have stood some 75 cm out of the ground. The holes are crudely cut and countersunk, evidently with stone tools. 114 is a broken section with two holes and the remains of a third, and 106 (fig. 38) may be a very small section of a similar piece, of particular interest because it retains half of a notch at the top (the other half has split off). This notch might have been to support a lintel. 23 was found separately at the southern end of the lake, and has two small perforations and a fire hardened base. The original doorway to which this belonged may have been about 90 cm high. The nature of the doors used at Mangakaware is unknown, but it may be that they were of a thatched material on a framework which was lashed in place through the perforations in the jambs.

Other house elements

Item 117 (fig. 38, NL) might possibly be a window sill or a door lintel, and has a pointed projection at each end (one is broken). However, its asymmetrical shape makes certain identification difficult. 300 (fig. 38, NL) is a house or storehouse post with a notch cut into one side. The bar which once continued across the notch is now broken. 109 is a small tapered slab with a groove cut down part of one side, as shown in figure 38, and 113 (fig. 39) is a tapered slab with a notch cut in either side. The functions of both these pieces are not clear. A number of straight unworked pieces of what may be manuka were found in the lake, and these could be remains of purlins. There is also a well worked piece of timber 112 cm long and 7 by 4 cm in rectangular cross section (item 118, not figured), and this could possibly be a section of a ridge-pole.

In addition to the above items, a number of fragmentary or complete slabs and battens have been recovered, and the complete ones are of particular interest since some appear to be simple wall slabs which were not notched to take the tenoned rafters. These slabs are up to 80 cm long, 25 cm wide, and have squared-off tops and tapered bases. Like the notched posts, they suggest wall heights of approximately 50 cm. Two tree fern slabs up to 2.4 metres long, with rectangular or plano-convex cross sections, have also been recovered.

Palisade posts of type B

A number of sections of squared slabs, most probably for palisades, were recovered from the edge of the pa, where they had been left by artefact collectors. The best examples (items 125 and 126), with tapered bases which still retain adze marks, are shown in figure 5. These slabs average 35 cm wide and 4 cm thick, and one broken section is 3.6 metres long. The greater parts of 125 and 126 were below ground level, which would suggest above-ground heights of possibly 5 metres.

Posts of type C

These posts are very numerous, and survive up to 1.6 metres long and 9 cm in diameter. All are simply pointed stakes or posts and could have served a number of functions. None are figured.

Palisade bindings

Several pieces of binding were found in the wet soil around the bases of the palisade posts at the south end of MA 1. The finest coil consists of a single strand of rata vine (Metrosideros fulgens) which had been wound around the post seven times.

Objects of unknown function:

a) Wooden artefacts with two blunt and/or tapered ends WA69 - 264, 265 (fig. 27). May 1970 diving - 271 (post D, figure 32). 271 and 265 are almost the same, as the illustrations will show. Both are 56 cm long, 265 is 5.5 by 4 cm in cross section, and 271 is 6 by 4 cm in cross section. 265 is smoothly finished, and tapers to one square end and one roughly tapered end. 271 has more taper than 265, and both ends are bluntly pointed. 264 is similar to the above two but only 39 cm long and 4.7 by 2.8 cm in cross-section (not figured). It is not tapered like the above two, however, and the ends are rounded and blunt. The timber of 264 has been determined as Podocarpus dacrydioides (kahikatea). Search of the Auckland Museum collections has revealed nothing similar, and 265 and 271 at least would appear to have the same function. At present it seems pointless to offer vague suggestions, but the two are so well finished that the form may well have been of importance in the prehistoric tool kit of this part of the Waikato.

b) Cleft stake. May 1970 diving - 272 (post M, figure 32) This is another puzzling object, being a post 59 cm long and 5.5 cm diameter, with one blunt rounded end, and one tapered end which has a small cleft 3 cm deep cut across at right angles to the axis of the taper. Otago Museum has a similar specimen from Oruarangi on the Hauraki Plains, and this is 120 cm long and 10 cm in diameter (accession number D33.787, seen by me in a drawing executed by Wilfred Shawcross). The closest parallel would be a clothes line prop as used by some housewives today, and indeed this object may have been used to support a sagging suspended line, perhaps in use as a temporary eel drying rack or something of that nature.

c) Drum-shaped device with projecting spindles WA69 - 262 (figure 27). This object was clearly made to deceive the unsuspecting archaeologist. It consists of a wooden

drum with rounded top and base, the drum being oval with axes of 11 and 9 cm and with a length of 7 cm, and from it project two spindles. One shows signs of wear, as though the object has been spun like a top, and the other is broken and may once have been much longer. At first sight one might think it is a spinning top, but the spindles are placed eccentrically with respect to the circumference of the oval and do not align in the vertical axis. Attempts to make the object spin are not successful and no spinning tops of this shape are known to me from ethnographic collections. No further suggestions can be offered.

The description of the MA 1 lake assemblage is now complete, and it remains to draw together the information in table 3.

Table 3

The MA 1 assemblage - lake finds

Artefact type	Number of artefacts
Wooden beaters	12
Weaving sticks	6
Narrow pointed and spatulate agricultural tools	12 + fragments
Paddle shaped agricultural tools	8 + fragments
Grubbers	2 + fragments
Spades and handles	10
Paddles	3 + fragments
Canoes	3 + section
Wooden bowls	2
Eel clubs	2
Eel spear tines (?)	2
Adze handles	2
Wooden tops	2
Spears	5
Taiaha/pouwhenua	2
Patu	1
Bone box slabs	2
Wooden points	4 + fragments
Wedges	6
Notched wall slabs	6
Tenoned rafters	4
Door jambs	5
Other house elements	5
Plain house or storehouse slabs	6
Tree fern posts	5
Type B palisade posts	15

Table 3 (cont'd)

The MA 1 assemblage - lake finds

Artefact type	Number of artefacts
Palisade bindings	2 + sections
Type C posts	17
Blunt ended rods of wood	4
Cleft stake	1
Wooden drum	1

Note:

A previous table of artefacts from Mangakaware (Bellwood, 1971a:89) was published before the December 1970 period of investigation. This is now outdated, and is replaced by this table and the two preceding. These tables do not account for every single piece of utilised wood from Mangakaware and a small number of pieces have been ignored. All the illustrated lake artefacts in figures 20 to 39 are from MA 1, unless they are listed in table 2 as coming from MA 2.

CONCLUSIONS CONCERNING ARTEFACTS

The artefacts described belong to what may be called a Mangakaware component of the Classic Maori Phase, to use the terminology of Golson (1959). Whether this component will ever be shown to be part of a regional aspect in Golson's terminology is a debatable point, since Classic Maori cultural variation may proceed by gradations rather than distinct breaks. Unfortunately, there is so little material of a directly comparative nature that speculation cannot proceed very far. It is difficult at this stage of research into New Zealand prehistory to proceed much beyond the descriptive level for an assemblage of wooden artefacts such as that from Lake Mangakaware, for comparisons with other swamp assemblages, such as that from Lake Horowhenua, are of little value unless the person concerned has some control over the total range of variation within New Zealand for any class of artefact. I do not have this control, and do not have the time or opportunity to comb every museum in New Zealand to acquire it. This can only be done by future researchers, and it may indeed be many years before the Mangakaware artefacts can be understood in a wider cultural context. So the future for this kind of research lies partly in a careful study of museum artefacts, particularly of those types, such as paddles, spades and weaving sticks, which may show some regional variation. Whether Skinner's (1921) idea of the culture area, or Golson's idea of the aspect, will turn out to be clearly defined, or whether they will be replaced by a complex of clines for each artefact class, is for the future to decide.

While this report may be deficient in these wider aspects of interpretation, it is nevertheless the case that this kind of interpretation can only proceed as more detailed reports of this kind are published. This of course brings up another important consideration,

which is that assemblages of the Mangakaware type can only be expected to be recovered from swampy areas. The distribution of such areas in New Zealand is fairly limited, and full assemblages of wooden artefacts are not likely to be available for the full prehistoric period from all areas. New Zealand museums are well provided with artefacts made after initial European contact, but it may be misleading to assume that these will give a reliable picture of regional variation for the period prior to 1769. Just how far a reliable knowledge of the perishable aspect of prehistoric Classic Maori material culture will proceed in the future can only be a matter for speculation at present.

GENERAL CONCLUSIONS

MA 1, with its area of 1640 square metres and MA 2, with 2100 square metres within the palisades, are both small when compared to the Lake Ngaroto site with its 5400 square metres (Shawcross, 1968). A traditional and archaeological view of the Ngaroto site as a founder site in the Waikato lake district would seem to be justified, and the Mangakaware sites may have been settled from it around A.D. 1500. Shawcross suggests that the Ngaroto site comprised a number of clay platforms grouped around a central open space, and this is the basic plan observed at MA 2, and possibly MA 1 as well. The degree of cultural homogeneity observed so far from Waikato swamp pa does indeed seem to be very high, and this generalisation also extends to artefacts.

In my earlier paper (Bellwood, 1971a:90) I suggested a possible population of 30 persons for MA 2, and 100 for the Ngaroto site. When more details are available from other Waikato swamp pa it may be possible to reconstruct the size of the late prehistoric population of the area in some detail. So far, only MA 2 has produced a reasonably complete plan of housing, and I believe it may have been less densely built up than most other sites. Only further excavation can verify this possibility.

The economy of the Mangakaware sites has been reconstructed in some detail, and it would appear that MA 2 was utilized throughout the year, but the population in residence may have fluctuated in number. In winter there would be several families inhabiting the pa, while in summer some persons perhaps moved to plantations and foraging areas, while others exploited the marine resources to the west by canoe, and brought back a few fish

and shellfish when they returned inland. MA 2 can hardly be regarded as a temporary encampment, and the evidence from it does support the ethnographic view of the pa as a defended village, occupied throughout the year. However, the environmental settings of the Waikato lakes clearly promoted the construction of combined living areas and fortifications on single sites - the lakes themselves provided both food and opportunities for defence. Generalisations from sites such as MA 2 can hardly be applied to dry land ridge or promontory pa, which were often constructed quite far from the best food producing areas. The flexibility of the Maori settlement pattern is only just beginning to emerge from the excavation trench.

APPENDIX 1

Radiocarbon Dates from Mangakaware site 2

In an earlier report on site MA 2 I suggested that occupation might fall within the period A.D. 1720-1820 (Bellwood, 1971a: 77) i.e. the century before the arrival of musket warfare in the Waikato. I also suggested that the site may have been occupied for about 50 years. Now that six radiocarbon dates are available for the site, it is apparent that the first, and perhaps even both of these estimates are too conservative.

Of the six dates, there are four which are of archaeological relevance. The other two are so old that they can only indicate the use of dried-out swamp timber on the site. These two, based on the old half-life of 5568 years, are as follows:

NZ1120, 2760±70 B.P. This sample was of charcoal from a hearth below the sand lens in trench A.

NZ1677, 1140±60 B.P. This sample was from what was believed to be a post of the trench T shelter, although the date is so old that this interpretation may be erroneous.

It is not considered that the two samples throw any light on the date of occupation of the site.

Two dates have been determined for wood fragments in the phase 1 occupation deposits of trench E. Based on the old half-life, these are as follows.

NZ1121, 424±74 B.P. (A.D. 1536±74). Wood fragments from the floor of the central shelter, phase 1.

NZ1679, 389±54 B.P. (A.D. 1561±54). Wood fragments from the phase 1 occupation level below house 2.

When calibrated to the bristlecone pine curve (a procedure carried out by the New Zealand radiocarbon laboratory), these dates are as follows: NZ1121, A.D. 1490±74; NZ1679, A.D. 1482±55. As with the first two samples discussed, there is a chance that these could be from old swamp timber. However, they are not of an unreasonable magnitude, and suggest a terminus post quem for the MA 2 settlement of c. A.D. 1450-1500.

Two dates have been determined on tree fern wall posts from house 1 in trench E. Based on the old half-life, these are as follows:

NZ1125, 280±76 B.P. (A.D. 1670±76).

NZ1678, 232±38 B.P. (A.D. 1717±38).

When calibrated to the bristlecone pine curve, these dates are as follows: N.Z.1125 unchanged; NZ1678, A.D. 1601±39. Taken together, they suggest a seventeenth century date for house 1 in trench E. The tree fern walls of the house were probably standing during phases 2, 3 and 4 of trench E, but it is of course very likely that the posts were replaced from time to time, and the exact position in the sequence of the two posts which were dated is unknown.

On the whole, dates of c. A.D. 1450 to A.D. 1750 seem reasonable as outside limits for the date of occupation of MA 2. The total time span of occupation was probably less than 300 years, as the deposits are relatively shallow, and there is no stratigraphic evidence to suggest intermittent occupation. However, given the above radiocarbon dates, a time span of only 50 years for the site may be too short. Of the 6 dates, the two on tree fern (NZ1125, 1678) are probably the most reliable, since these posts were presumably made from freshly cut young timber. Occupation of the site within the sixteenth and seventeenth centuries is therefore the best conclusion which can be drawn from the evidence, and occupation before or after this period is subject to increasing uncertainty.

APPENDIX 2

Human Bone from Mangakaware site 2

1. Burnt bone deposit in trench E (see the discussion on page 19, 26)

A quantity of burnt human bone was found in a small pit in the north-western corner of trench E (see figures 12, 13, 14, 15) where it had been buried deliberately. The pit was about 30 cm in diameter and 15 cm deep, and the bone had been dumped loosely on top of a small flat piece of wood which had been placed across the bottom of the hole. There were no sand floors in this area, so the pit was dug directly into the upper surface of the peat.

The skeletal material, kindly examined for me by Mr. G. L. Barnett, is very fragmentary and fairly heavily charred. Technically, the remains may best be described as cremated, since the degree of burning is far more than would be expected from cooking for a cannibal feast. It is not clear whether the bones were in fact used for cannibalistic purposes, but it may not be coincidence that the knife handle (item 263) was found just nearby. In addition, six fragments of long bone shafts showed signs of crude bevelling at one end, and this would appear to be circumstantial evidence of a ritual defilement of the mana of their former owner. So a possible sequence of events might be initial cannibalism followed by deliberate cremation of the remains and burial.

The fragmentary nature of the material makes analysis difficult, but it seems likely that only one individual -- possibly an adult female of small stature -- is involved. The evidence for this is partially negative, in the sense that there is no clear evidence for more than one individual. Approximately 550 bone fragments comprise the material, and a list of the identifiable pieces is held by the author. No pathologies or other points of interest were discerned.

From the occupation deposit in the immediate vicinity of the pit the following objects were recovered (not itemised in the main MA 2 artefact list):

2 pieces of pumice, deliberately shaped into angular polygons.

4 flakes and 2 cores of chert, showing no clear signs of utilisation.

2 waste flakes of fine grained Mesozoic sandstone.

2 fragments of a polishing stone, with a very smooth hollow surface.

1 fragment of a separate polishing stone, too small for identification regarding use.

2. Human Bone from elsewhere in site MA 2

The eight pieces of human femur from the entrance passage have been listed in the MA 2 artefact list under item 6. In addition, four small fragments of burnt bone, probably human, were recovered from the upper occupation level above the house in trench Y. Finally, a fibula of an immature individual, lacking its distal extremity, was found to the south of house 2 in trench E.

ACKNOWLEDGEMENTS

At the outset I must state that this report is a combined piece of work since Mr. Karel Peters of the Department of Anthropology, University of Auckland, has spent many hours preserving the artefacts in the laboratory and producing the excellent drawings which are reproduced here. Without his continued assistance this report could not have been prepared in its present detail.

Mr. J. Krippner, lessee of site MA 2 from the Pirongia Domain Board, also deserves a special acknowledgement for the hospitality he provided during all the periods of fieldwork and for camping facilities on his farm. Students of Auckland University and members of the Auckland University Archaeological Society carried out the excavations, and assistance was also provided by members of the old Waikato Archaeological Society and the Hamilton Underwater Club. Mr. Noel Roe and Mr. Ken Gorbey, both former directors of the Waikato Museum, provided valuable assistance at various times.

For professional advice and assistance I am indebted to Mr. D. R. Simmons of the Auckland War Memorial Museum (ethnology and general discussion), Mr. J. Grant-Mackie of the Geology Department, Auckland University (lithology), Miss J. Goulding of the Auckland War Memorial Museum (seed and plant identifications), Dr. R. Patel of the Forest Research Institute (wood identification), Mr. R. Scarlett of the Canterbury Museum (bone identification), Mr. G. L. Barnett of the Anthropology Department, Auckland University (human bone analysis for Appendix 2), and the Institute of Nuclear Science at Gracefield (radio-carbon dates).

Mr. F. W. Shawcross and Mr. R. Cassels of the Anthropology Department, Auckland University, provided valuable assistance at various times, and Mr. Cassels brought a new dimension to the MA 2 excavations in May 1970, in the form of a flotation machine. Mr. D. Pick of Rukuhia first took me to visit the site, and from his detailed knowledge of the central Waikato stimulated my interest in its excavation. Finally, Mrs. B. McFadgen of the Dominion Museum kindly allowed me to examine the Black Collection of artefacts from Lake Horowhenua.

Site MA 2 is listed as N65/35 in the New Zealand Archaeological Association files, and site MA 1 is N65/28. The grid reference for site 2 on the New Zealand Map Series 1 (1 inch to one mile), Map N65 Hamilton, is 730292, and for site 1 the grid reference is 732294.

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