

approximately 30 cm of the walls and bases, but not to disturb the existing ground-fern cover. Generally, the walls of the pits and gun pits should not be taken back to a grassed surface. We are of two minds over the issue of blackberry. On the one hand, it prevents people from entering the pits and did so very successfully prior to the close ground-clearance of 1981 (McKinlay, 1994, pers. comm.). On the other hand, there is some evidence that it attracts visitors to reach into pits to gather the fruit which causes some minor collapse, as we saw on our visit. There seems to have been a period of great deterioration of the pits since 1981, and they have only stabilised since the blackberry grew back. On the whole, blackberry should be controlled but allowed to regrow for short periods where it has proven conservation value, such as in the pits.

The following weed species should be removed because they are undesirable: wandering jew, ragwort, passion vine, Mexican Devil, tutsan, balsam, parsley dropwort, and perhaps *Senecio bipinnatisectus*. The site should not be allowed to be perceived by neighbours as a reservoir of weeds that will spread elsewhere. Kikuyu grass could be kept at its present low incidence by removal of young plants.

Woods (1993: 7-9; see also appendix 1) has already offered advice on how to improve the coverage of meadow rice grass (*Ehrharta stipoides*, **pātītī**), noting particularly its value in semi-shaded areas. He recommended spraying of broadleaf weeds to reduce competition, and the elimination of mowing during the rather lengthy and erratic flowering and seeding season (October to February) of the species. Spraying with the appropriate herbicide would also keep down gorse seedlings in taller grass swards. For drier faces with a risk of failure of grass cover, he recommended deliberate seeding of purpose-gathered seed of *Ehrharta* and *Rytidosperma*. *Oplismenus imbecillus* (a forest floor grass) was also recommended for the bottom of pits and in fully shaded areas (such as south side of banks). Experimental work on establishment of these native grass species is ongoing at the time of writing.

### *Visitors*

Allowing grass to seed naturally on the site will introduce an unkempt appearance, at least in the intermediate (5 years) period. This will need to be explained to visitors. The risk of fire will also need to be stressed. It is inappropriate to smoke or eat on the site, so this would also be a useful message for signage (although this appears not to be a problem since very little rubbish occurs on the site and it is not, and should not be, serviced with rubbish bins). Of more serious concern is the need to guide visitors by mown tracks and to keep at least a representative portion of the earthworks readily visible. This should be possible by maintaining a mown track around the perimeter and a selection of access ways within it. The position of the latter should be varied from year to year, and the areas subject to a season's treading then oversown in *Ehrharta stipoides* in the autumn. Alternatively, these mown strips could be oversown with a suitable fescue or browntop, as suggested by Woods (1993: 7).

Finally, some consideration could be given to the possibility of forest recovery on the site or parts of it, especially if intensive management is not achieving the desired conservation results. Because of the isolation of the site from the Russell field centre

(which reduces the practicability of detailed management recommendations), and the complexity of the surface features, it may not be possible or desirable to maintain all the open grassland through mowing in the long term. The existing growth of gorse and other weeds on a site of such significance is unacceptable because, rightly or wrongly, weeds could indicate to the public a lack of management interest by the department. The colonisation of pits and trenches by ferns, koromiko and forest native shrubs indicates the likely future ground cover should intensive management cease. A forest cover, maintained to form a gallery for visitor viewing, may be desirable for practical and spiritual reasons. Part of the pit and trench system could be intensively maintained in low vegetation as a representative example of the whole area.

### **3.4.1 Ruapekapeka: the British position**

The British position, lying about 300 m north from the pā, consists of a low-relief ditch and bank enclosure about 25 x 30 m in plan. The trench and bank enclosure is punctuated with an embrasure (sunken opening with bank) for cannon. The area has been farmland for many decades (an older farmhouse has recently been demolished) but is now part of the reserve. The features are rounded and of low relief and, given the historical wear indicated by the profile, the current conservation status is good.

At present the area is still grazed to control the grass, and kikuyu is seeding into cowpats and spreading into the existing exotic sward, with localised zones or areas of the native grasses. Soon kikuyu will be dominant and will have to be continually mown or grazed. It will rapidly become an almost pure sward. One interesting feature of the grass cover is in the north-west corner, where there is a distinct species composition change over some 2 m of the transverse section of the bank (base to crest only about 50 cm high). The microtopographic sequence is: kikuyu (north-facing slope of bank), *Ehrharta stipoides* (meadow ricegrass, pātītī) (on the dry crest) and cocksfoot (shaded south-face of the slope), each expressing the habitat preferences of the species and highlighting the complexity of site management.

#### ***Management***

Although present grazing seems to be of a low intensity, sporadic nature, we believe this site should be mowed with a minimum setting of 15 cm maintained on convex surfaces. Mowing in the flowering and seeding period of *Ehrharta stipoides* (October to February) should be limited to interpretative paths, the placing of which could be varied year to year. Control of kikuyu should be the subject of further specialist advice. The broader area of the fenced reserve area could be grazed or alternatively could be allowed to revert to a tall-grass cover and stocked once-annually by cattle excluded by electric fence from the British position. Parsley dropwort should be contained.

### 3.5 Pā, Q8/295 GR 216651.

This pā lies within the Pow's Bush Reserve, 1 km south-west of Paparoa township. A tidal stream (Paparoa Creek) marks the western and northern edge of the hill. The hill and "Pow's Bush" is privately owned (Wiremu Farms Ltd.) and lies adjacent to "Roach's Bush" which is a QEII covenant serviced by a walkway, sponsored and maintained by local residents and businesses. Together these sites seem to be highly regarded features of the local landscape, although the planting along the track of species not found naturally in the area indicates that sound ecological advice would be advantageous.

The main platform of the pā lies on the broad crest of a ridge and is about 80 x 30 m in plan. This main area has a defensive perimeter consisting of an intermittent ditch and steepened scarp, particularly pronounced and with an interior bank on the easy access from the slopes to the north-east. To the north-west and south-west are subsidiary ridges with transverse ditches and scarps 30 m and 40 m respectively from the main defensive perimeter. There are many rectangular pits and some terracing throughout the pā, with particular concentrations of pits on the main north-western perimeter and on the south-western ridge. (Site notes are based on the plan prepared by James Robinson and filed with the New Zealand Archaeological Association site record.)

#### *Vegetation*

The hill possesses a skirt of **kānuka** forest 30-60 years old on its lower slopes. Kauri is predominant towards the crest. Most of the kauri are conical rickers, but some have emergent, spreading crowns. The latter are relatively few with trunks up to 0.8 m d.b.h. (diameter at breast height). One has been "tapped" for gum. By the access track on the northern slopes, the stump of a mature kauri (diameter 2 m) indicates the former presence of scattered trees on the lower slope. **Tōtara**, tanekaha, a few kahikatea, and **pūriri** form the remaining canopy. The understorey is dense **nīkau**, hangehange and *Coprosma rhamnoides*, both of the latter browsed by goats. The sedges, *Gahnia* sp. and *Uncinia* sp., are common ground cover plants. A single karaka tree was observed. Kauri and **kānuka** (some unusually large) appear to have been the first species to establish, followed by successive phases of **tōtara** and tanekaha regeneration, so that a range of sizes occur. Kauri regeneration has now ceased.

The pits, trenches and ditches are numerous and extremely well preserved. They are not covered in as dense undergrowth as the lower slopes, possibly the result of goat-browsing. However, large kauri grow directly from pits and the roots of **tōtara** can be seen framing the edges of semi-subterranean pits. **Nīkau**, tree ferns, *Coprosma* and supplejack grow from the pits which are partially infilled with leaf-litter and humus.

#### *Management*

The vegetation offers an excellent opportunity for investigation in terms of succession since occupation, plants of ethnobotanical interest (e.g., karaka), plants of historical significance (e.g., large **kānuka** and kauri), and the impacts of various species on the

archaeological features. Management of the understorey species (e.g., *Coprosma rhamnoides*) could enhance the visibility of the features. The role of goats in keeping the understorey open could be assessed through the use of exclosures.

At present, the site appears to have relatively few visitors. Publicity for the reserve does not extend beyond local roadside signs, which do not mention the pā. Some attention could be given to interpreting the archaeological features. Monitoring of visitor impacts on the site may be warranted in future.

### 3.6 Okuratope, P05/204 GR 888529 (N15/15).

This pā lies on a ridge in the headwaters of the Waitangi River, Waimate North. It is important because of (a) the remarkably good state of preservation of many of its surface structural details, including possible "palisade slots" (stockade trenches?) and open drains or path ways around house compounds within the pā, and (b) the detailed descriptions of the site in January 1815 by the Rev. Samuel Marsden and J.L. Nicholas (Fox, 1985). Nicholas's account, in particular, describes the details of the defences, houses, storehouses, "arms stores", latrines, and an open space or marae where the chief sat: "either for business or pleasure just as occasions required his consulting with his people" (Nicholas, cited in Fox, 1985: 10). After the description by Cook and Banks of Wharetaewa in 1769, this is among the most detailed and earliest description of any early pā, and the earliest and fullest of any 19th-century pā.

The site, as mapped by Leatherby and Morgan (Fox, 1985), consists of a central platform with a scarped or ditch-and-bank perimeter, forming an irregular pentagon in plan, with the longest sides measuring 70 m. On the broad, easy slope to the north-east is an outer ditch and bank 45 m long. The main platform is finely detailed into many more or less rectangular enclosures defined by shallow trenches about 1-1.5 m across and 20-60 cm deep, each enclosure averaging about 12 x 6 m (size varies from 6 m square to 15 x 8 m in plan). To the north-west of the main platform, a ridge descends gradually, and presents a defensive scarp as well as more trenched enclosures. There are rua in many places on the platform. Lying about 6 m outside the ditch and bank perimeter, and more or less continuous with it, is a palisade or stockade "slot" (i.e., a narrow trench approximately the width of a stockade).

Overall, the site is in good conservation condition, with very few erosion patches. The few areas of erosion are at obvious tracking points, chiefly on the north-western ridge.

#### *Vegetation*

The vegetation of this pā (and surrounding Historic Reserve) has largely developed since abandonment in 1830, although the grove of large pūriri on the surveyed wāhi tapu enclosed within the boundaries of the reserve could be older than this. Okuratope was the subject of a botanical survey and forest management review by Segedin (1985). Her description of the central ridgeline and the "main part of the Okuratope pā site" is quoted in full:

The two ends of the ridge have a canopy of approximately 9-12 m. At the western end podocarps dominate, mostly rimu and tanekaha with scattered totara and a few kanuka and kauri. In this area large trees (> 20 cm dbh) are common with many greater than 30 cm dbh and there are few trees 10-20 cm dbh but seedlings and saplings mostly less than 5 cm dbh of lancewood, matipo, and Coprosma spp. are abundant, often concentrated in patches. The ground cover is very sparse, probably due to the apparent dryness of the soil and the layer of plant litter. At the eastern end, the dominants are rimu and totara with the occasional towai and taraire. The subcanopy is both more varied and more dense

when compared with the western end. It contains lancewood, matipo and *Coprosma* spp. but also mamaku, tanekaha, kohekohe, supplejack, rewarewa, *Nestegis lanceolata* [maire], *Olearia rani*, rimu and totara. The ground cover is thick in patches with ferns including *Hymenophyllum* spp., *Lygodium* sp., *Phymatosorus* spp. and *Asplenium bulbiferum*.

The central portion of the ridge includes the main part of the Okuratope pa site. The ridge top has been artificially flattened and some of the slopes terraced. In this area podocarps form the major part of the emergent vegetation. There are a number of large (> 30 cm dbh) rimu, tanekaha, totara and a few towai in the central enclosure which is within the main defensive ditch of the pā site....

The canopy consists of 6-9 m high trees, mainly podocarps (rimu, kahikatea, totara and especially tanekaha) with a significant proportion of broadleaf species (towai, matipo, *Coprosma arborea* and the occasional kanuka and rewarewa). The majority of the trees are above 10 cm dbh and create a fairly complete canopy layer. The subcanopy of this area tends to be sparse but mamaku, ponga, *Cyathodes fasciculata* and *Coprosma* spp. occur. A number of different seedlings including tanekaha, kahikatea, rimu, *Coprosma* spp., rewarewa, lancewood, matipo, karaka and a variety of ferns are scattered in this area, often concentrated where light levels are higher. The northern corner of the main pā extends into the border vegetation between that of the ridge and the scrub on its northern boundary. The canopy of this corner consists of an increasing amount of manuka towards the scrub zone. It also opens up considerably and there are patches of low bracken, other ferns, *Lycopodium* sp., gorse and/or other low shrubs. (Segedin, 1985: no pagination)

### ***Wider ecological processes on the site***

Segedin (1985) noted the presence of hares, possums and goats in the reserve. On our visits in 1994, the ground cover was notably open and we understand that goats had been in the reserve, although we saw no very recent signs.

Three wildlife observations were also made in the course of our visit:

- Deposits of taraire seeds beneath perches (of kereru, presumably) in kanuka forest, where no taraire exists, is an example of a very important forest ecological process - seed dispersal;
- The ground is littered with fallen *Astelia* inflorescences, cut off and partly eaten by possums or rats: in the long term this process would influence the demography of a dominant epiphyte through reducing seed production, and therefore regeneration;
- Fallen rewarewa fruits with the fruit-cases ripped open and the developing seeds eaten, presumably by rats. This seems to be a rare phenomenon which we have not seen previously.

### *Management recommendations*

Segedin listed the advantages and disadvantages of various vegetation management regimes with regard to protecting pā features. She concluded that "no drastic action should be taken" (Segedin, 1985: 19) because there is no evidence (nor any research) that useful stratigraphy, if it exists, is being unreasonably compromised by vegetation - one of the principles on which vegetation manipulation should be based (Hamel and Jones, 1982). Our observations suggest that the forest cover of Okuratope preserves surface features very well with the exception that the shallow ditches have become infilled with forest litter and are thus obscured. Okuratope offers opportunities to understand the detailed impacts of trees and forest processes on a variety of surface and subsurface features of historical importance. In our earlier report (Jones and Simpson, 1995: 114) we discussed Segedin's report, and we would concur with her opinion that only her options 1 (leave as is) and 5 (remove any seedlings or saplings less than 10 cm d.b.h. of potentially large native forest species) are justified.

For long term management we favour option 5, on the grounds that active management is needed to maintain a protective canopy, ground visibility, and to minimise root penetration into archaeological features as well as other damaging forest processes such as tree throw. The more drastic options of felling trees in the 10-20 cm d.b.h. range and retaining larger trees, or clear-felling all trees, are not appropriate for a site with such an ecologically well developed character. Based on Table 1, the procedure of removing some saplings will leave a podocarp canopy consisting primarily of tanekaha with towai becoming dominant in future decades. A dense canopy, supported by a minimum of boles, containing a diversity of species, including epiphytes, is vital in providing for a stable understorey, and a healthy regeneration pattern to fill canopy gaps. Total boles supporting the canopy would be about 90 or one bole per 30 m<sup>2</sup> which, although still

**Table 1** Size of trees in "central enclosure" of pā site (approx. 2820 m<sup>2</sup>) (after Segedin, 1985: App. 3). \* = tree species present in the reserve but not established in the "central enclosure".

	> 20 cm dbh	approx. 17 cm - 20 cm d.b.h.	approx. 10 cm - 17 cm d.b.h.
Tanekaha	15	10	1
Rimu	8	6	1
Towai	6	19	13
*Totara			
Coprosma arborea	1	4	
Kanuka	1	2	
Matipo [sic]		5	
*Kahikatea			
*Rewarewa			
<b>TOTAL</b>	<b>33</b>	<b>51</b>	<b>34</b>

Potentially large native tree species on the site are listed in Table 2. These would need to be identified and removed before they reach 10 cm d.b.h.

Table 2 Potentially large native tree species at Okuratope pā (from Segedin, 1985).

<i>Agathus australis</i>	<i>Knightea excelsa</i>
<i>Beilschmiedia tarairi</i>	<i>Laurelia novae-zelandiae</i>
<i>B. tawa</i>	<i>Metrosideros robusta</i>
<i>Corynocarpus laevigatus</i>	<i>Phyllocladus trichomanoides</i>
<i>Dacrycarpus dacrydioides</i>	<i>Podocarpus [i. e., Prumnopitys] ferrugineus</i>
<i>Dacrydium cupressinum</i>	<i>Podocarpus totara</i>
<i>Dysoxylum spectabile</i>	<i>Vitex lucens</i>
	<i>Wienmannia silvicola</i>

a large area for a single tree to cover, suggests that a reasonably closed canopy would be maintained. However, this will depend on the shape of the crown (and hence the habit of canopy growth) at both juvenile and mature stage of the species chosen to be retained. Rewarewa always has a narrow crown, whereas **pūriri** is spreading. **Tōtara** and **tanekaha** are narrow when young and spreading when older.

Even this degree of selective removal will introduce greater light levels to the forest floor, encouraging ground-level shrubs, ferns, grasses and sedges. Figure 17 shows the dominance of tree fern on the ditches and banks where drier and better lit conditions have prevailed in the last few decades.

It is likely, then, that cutting of shrubs and the encouragement of a ground cover of ferns, low-light tolerant sedges such as *Uncinia*, bush-rice grass (*Ehrharta avenacea*), and the forest-floor grass *Oplismenis imbecillis* will be desirable. Tree ferns will also continue to be an important ground and sub-canopy component. However, because of the massive size of their trunks at ground level, they should be removed from the interior of the pā. Outside the defensive banks they should be encouraged. Some selective clearing of forest duff from the internal trench demarcations of the house platforms within the defensive perimeter may be required to prevent soil formation that will eventually fill the trenches in.

At present, the Conservancy does not strongly promote the reserve and pā as a **visitor** destination, and continuing low visitor numbers are desirable. Higher visitor numbers would require boardwalks through the site to protect the finely detailed features. Access is currently across open farmland, with little signage or tracking.

Damage to vegetation caused by rats or possums warrants further review. A primary objective should be to review the effect on forest regeneration in the light of the above recommendations.

### 3.7 Coastal Bay of Islands

#### 3.7.1 Kororipo pā, Kerikeri, P5/15 GR 987643 (N11/35) (Figs. 18(a), (b))

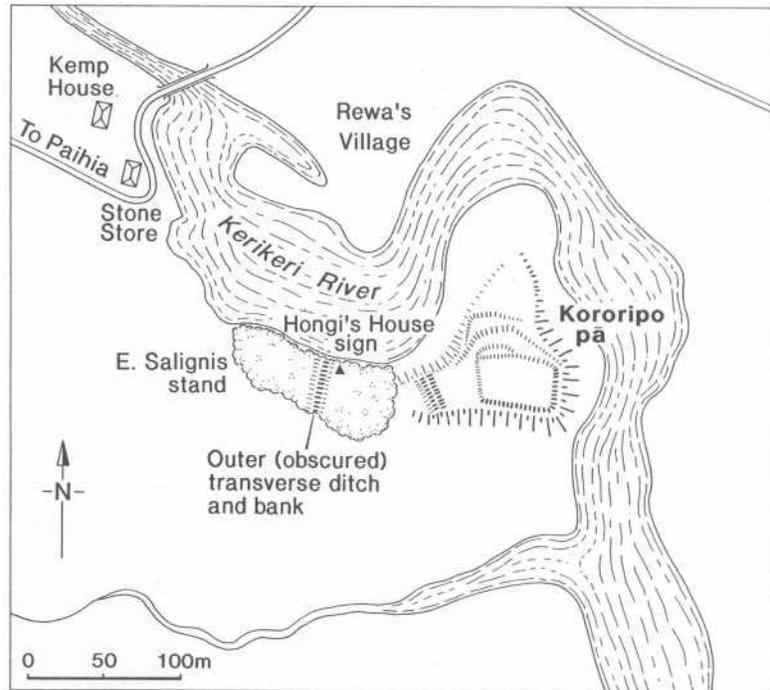
Kororipo is known as the pā of the Ngā Puhī leader, Hongi Hika, an important protector and ally for the early mission settlement (established 1819) at Kerikeri, represented today by the Stone Store and Kemp House. The association has been questioned for a number of reasons (Ross MS on file, Historic Places Trust 29002/008). The archaeological plan today is impossible to square with the description given by George Clarke (an early missionary) in his old age (cited in Best, 1975: 370). Whether associated with Hongi Hika or not, the pā is an important feature of the landscape views of the Kerikeri basin from the Stone Store. The pā commands views across the inlet back to the Stone Store and Kemp House and also down river.

The pā complex consists of three main elements at present under quite different land management and site stabilisation regimes: (a) *Eucalyptus saligna* forest on the broad neck west of the main defensive earthworks of the pā; (b) the main visible and interpreted unit of the pā; and (c) a low-lying (approximately 2 m above High Water Mark) promontory forming a point in the Kerikeri River and lying north of the main pā unit Fig. 18(b) in an unmanaged weedy shrubland. The main pā was mapped by David and Glenys Nevin in the late 1970s (Fig. 18). The site is defended by a single ditch and bank across a neck some 25 m wide, broadening to a central platform some 50 x 30 m in plan. The south-western aspect of the platform was also probably an inner transverse ditch and bank, now largely infilled. Terraces step down from the platform to the north to the low-lying promontory forming the point in the Kerikeri River.

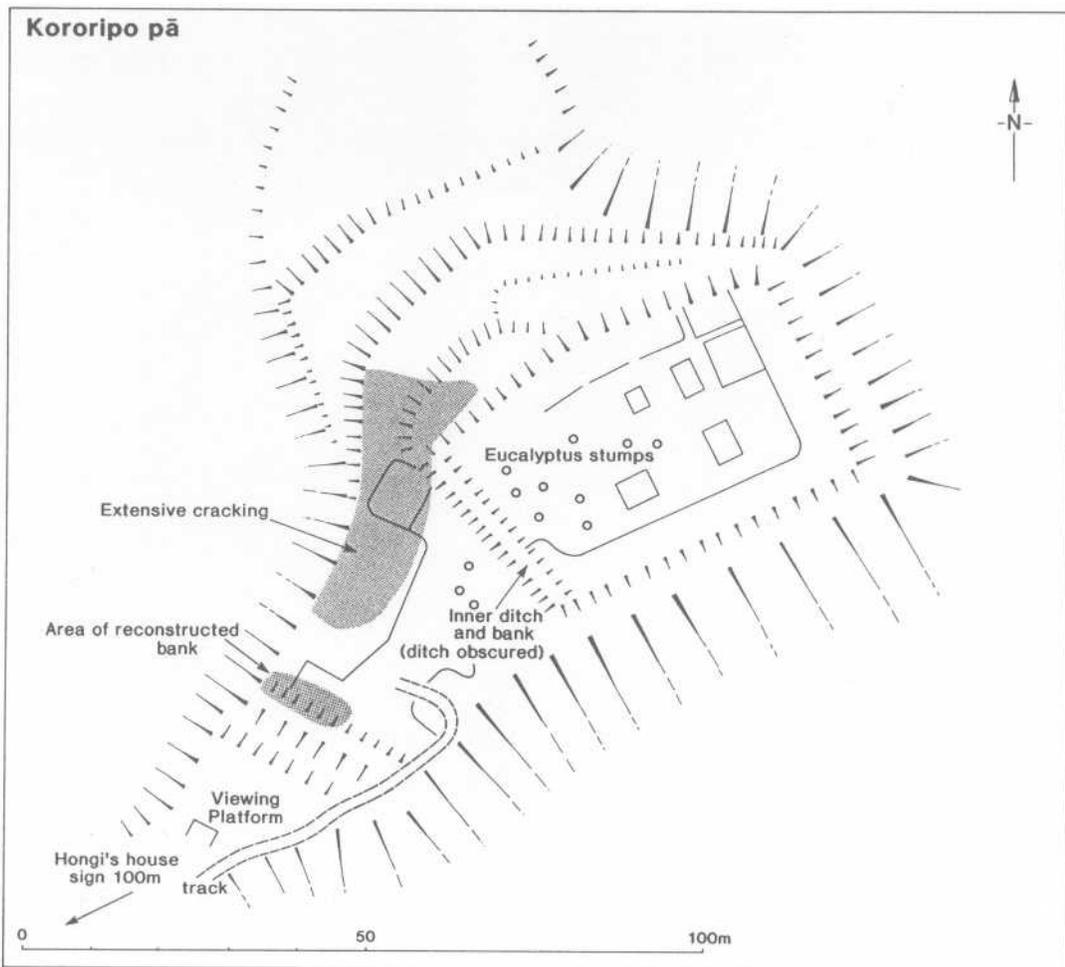
The peripheral neck and promontory areas were surveyed by Aidan Challis in September 1986. He recorded dense midden on the east of the promontory, and fire bricks on the surface at one spot. The latter is probably remains of an early slaughter house that was built here. Of more interest is Challis's findings on the neck towards the Kerikeri landing, the supposed site of Hongi's house. This area, in contrast to the main pā, has been heavily scraped by a bulldozer in the past, infilling an outer ditch and bank. This ditch and bank is about 4 m across and about 40 cm deep in its present surface form. It is about 15 m west or south-west of the Hongi's House sign and about 100 m south-west of the surviving transverse ditch and bank. Challis's record therefore suggests a larger, more complex pā than hitherto thought. Closer investigation and confirmation of its main features is warranted. The pā may have three sets of transverse ditches and banks enclosing a broad curve of the ridge top approximately 200 x 20-40 m in plan.

A frequently used interpretative viewing platform has been built on the slope leading down and east to the surviving transverse ditch and bank. The track from it into the main pā unit runs to the south-east of the ditch and bank and then scales back up the sides on to the lower platform south-west of the main platform. The approximate line of this entry track has been proposed for an elevated boardwalk which would reduce some mild erosion and improve access for the less able-bodied to visit the site and use the viewpoint. A new, more direct route from the Kerikeri landing into the site has

Figure 18(a), (b) Plans of Kororipo (P5/15) showing site stabilisation and interpretative issues. (a) Plan of general area of Kororipo. (b) Kororipo pā in greater detail.



18(a)



18(b)

recently been formed and is anticipated to raise visitor numbers from approximately 15,000 toward 30,000 per annum (figures are estimates).

### *History of vegetation management*

The state of this site has been documented for just on sixty years. In 1934 when Leslie Kelly (1934) visited the site, it had just been cleared of gorse. He observed:

Actually, the gorse had been a blessing in disguise, for its thick growth had served to preserve the various earthworks; but now, with their protective vegetation removed, the *pā* will be exposed to the action of weather and the destructive wandering of cattle, and the crumbly nature of the soil leads one to believe that it will not be long before the trenches of Kororipo have vanished (Kelly, 1934: 188)

Ross (MS cited above) notes a report by C.W Devonshire in 1964 that the *pā* was by then overgrown by gorse and gums. In 1968, the local Lions Club began a programme of clearing vegetation and constructing picnic facilities, and Janet Davidson, a member of the Historic Places Trust board, reported to the board on the result. The board sought a stop to the clearance activities. In 1969, Ormond Wilson, then chairman of the Historic Places Trust board, also visited the site and found that:

a nasty gash has been made in the defensive bank, while the clearing, immediately inside it, is an unsightly mess of fallen trees, rank weeds, concrete blocks and other building material. (Historic Places Trust file 29002/008)

Wilson recommended that the exotic trees should be cleared, an archaeological survey be conducted, and "judicious planting" of native trees.

... the ditch and bank should be cleared and partially restored. Trees growing on it would be destructive and obscure the outline of the bank. Tree ferns have however already established themselves and their tough fibrous roots provide a strongly stabilising influence. When fully grown their straight trunks would expose the earthworks to view. Careful removal, by stages, of the present secondary growth might therefore be followed by planting more tree ferns, and some restoration work carried out at the same time. In particular, one narrow track only should be left through the bank, so that it becomes impossible to drive beyond the defences.

... and as a long-term project, the existing exotic trees might be replaced by the judicious planting of native forest trees which thrive in the north. In a century hence Kororipo would then be clothed in bush interlaced with paths giving view of the waterfront and inlet, and perhaps too at some places showing additional traces of the original fortifications uncovered by archaeological excavation (Historic Places Trust file 29002/008).

This excellent vision was partially implemented by the Department of Lands and Survey in the late 1970s. The north-western end of the middle transverse ditch and bank (by the viewing platform) was restored with advice from Nigel Prickett. This restoration is still satisfactory although it appears not to have recovered the full profile. People were avoiding the constructed path and climbing down the easy slope provided by the restored bank. Over the wider area of the pā, the vegetation is as described below

### *Vegetation*

The vegetation of the three units differs greatly: on the neck the cover is *Eucalyptus salignis*; on the main pā unit, rough grasses; and on the flanks of the pā unit and the promontory is a cover of rampant Japanese honeysuckle (*Lonicera japonica*) and banana passion fruit, overwhelming the few native shrubs and other exotic shrubs such as *Cotoneaster? glaucophyllus*. *Cotoneaster* and native shrubland are also prominent on the semi-shaded floor of the *Eucalyptus* forest of the neck. The rampant ground creepers are also covering and killing the shrubland established on the low promontory into the Kerikeri River. The main pā unit is in a closely mown grass, with some scalping and failure of the grasses on convex surfaces such as the banks. The main grasses are warm temperate or sub-tropical species. Carpet ("buffalo") grass (*Axonopus affinis*) is dominant on most flatter areas, with *Paspalum* sp., ratstail (*Sporobolus africanus*) and *Ehrharta stipoides* present. The last two are the main grasses on the banks; the ratstail forms clumps with broadleaf weeds between (Woods, 1994, pers. comm.).

### *Management recommendations*

The current management of this grassland is unsatisfactory to maintain the conservation status of the site. On mowable areas, cutting heights should be raised to a minimum of 10 cm, with greater allowance made for convex areas such as banks. Steep slopes such as the scarp and counter-scarp of the ditches should be maintained in tall grass. This will not mask the appearance of the profile, since what is lost in apparent depth at the base will be made up at the crest of the bank. Generally, the grassland requires careful application of fertiliser and perhaps lime, especially in the areas where a thicker sward is needed, such as the convex bank surfaces. A regime such as that recommended for Ruapekapeka (see above) may be appropriate but specific advice should be sought from Agresearch, Kerikeri.

On the neck, the *E. salignis* has a condition known as "feathertip", whereby the root system rots partially, the crown dies out (the appearance is similar to canopy damage due to wind) and large, high branches begin to die, rot and fall. Despite their desirable landscape framing, as viewed from the basin, the eucalypts are quite unsatisfactory cover for an historic reserve with extant archaeological features, because of their root penetration of the archaeologically significant stratigraphy. If logged, they would have some monetary value. When removed, the trees should not be allowed to regenerate. An opportunity should be taken, prior to the removal of the trees, to section with a hydraulic digger the outer ditch and bank, the existence of which was first suggested by Challis in his site record. It would be feasible eventually to reconstruct this ditch and

bank, and an impressive entry way and landscape view would be provided from the Kerikeri landing.

The lower terraces north-west of the main platform exhibit extensive cracking in summer and autumn. This is not untypical of certain Northland brown granular clay soils, but the phenomenon is present only on these terraces, and not general over the site. This suggests that the cracking is related to instability of the body of fill or the filled edges of the terraces. In places the cracks are denuded of grass cover at their edges. These cracks should not be filled, since as the fill works down into the cracks and winter rain expands the soil, greater instability will result. The cracks should be mulched with straw, or coarse grass clippings. If seeded in the medium term, this will establish a longer grass cover and lessen water infiltration. In the longer term, the terraces may slump in this vicinity. The most neutral way to deal with this problem would be to leave a defined area of these terraces to re-vegetate to shrubland to match the flanks.

The flanks have a dense cover of invasive and smothering weeds. The only solutions to these problems are labour-intensive clearance and re-planting into shrubland. The prospects for this occurring are not good and, at present, a reasonable stabilising cover is provided.

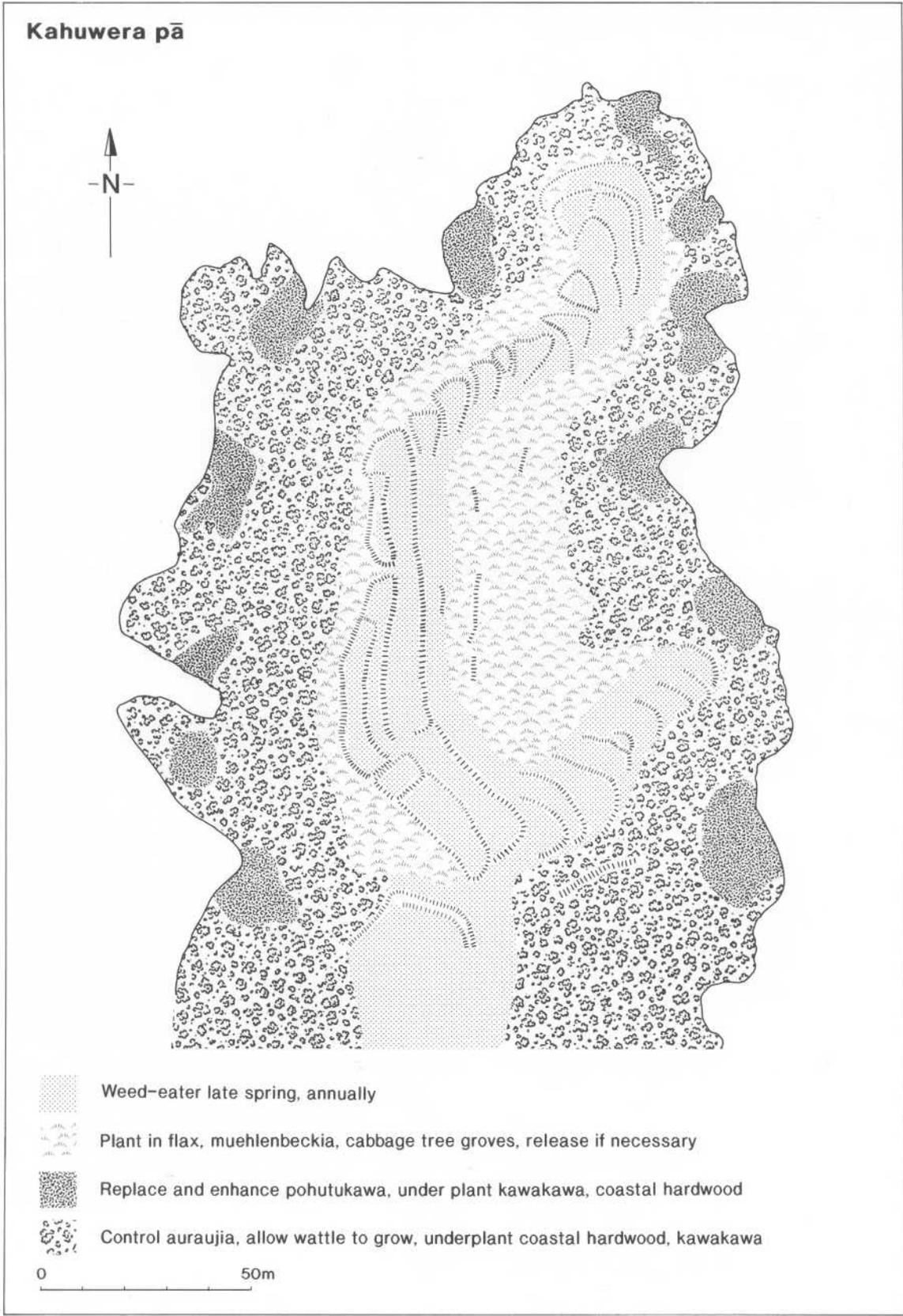
The stumps of several large gum trees, cut to ground level in 1968-72 to allow for mowing, occur on the main platforms. Some of these have now rotted. The rotted or partially rotted ones should be cut back to below the ground surface, a diaphragm of filter fabric (shade cloth or wind break) placed into the base of the resulting hole, and the cavity filled with a suitable soil of a fertility that matches that of the platform. The filled area should be mulched as noted above for cracks.

Overall, Kororipo is a site like others in the Kerikeri basin that needs to have a clear vision for its future use and interpretation established. This will involve careful review of its use in the overall interpretation of the Kerikeri basin, some basic restoration work, re-vegetation, clearance of *E. salignis* and a thorough consideration of the future management of the obscured, outer defences of the pa in the "Hongi's House" vicinity.

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### 3.7.2 Kahuwera, Q05/42 GR 179588 (N12/4).

Kahuwera is a mainland peninsula pā located in the south-west of the bay, a short distance east of Russell. A pā "Kahuwera" was painted in the course of Dumont D'Urville's visit to the Bay of Islands in 1827. The painting is justly famous for its accurate depiction of house styles and settlement layout at this period. The pā now known as Kahuwera is, however, not that shown in the painting (Kelly, 1938). The painting is likely to be of the pā, Tarawa Tangata, about 180 m west (Kelly calls it "Old Kahuwera"). Be that as it may, the pā now known as Kahuwera is a fine landscape element in the setting of the south-western part of the Bay of Islands. Its features (Fig. 19) are as follows:



**Figure 19 Plan of Kahuwera (Q05/42, N12/4) (after Leatherby and Morgan), showing suggested vegetation management zones.**

I climbed the steep slope until I came to the first line of defence, a fosse across the narrow neck of the ridge-summit, five or six feet deep with a parapet on the *pa* side. The entrance-way skirted the right-hand extremity of the fosse and ended on the second terrace. The summit of the *pa* consisted of a long level strip about 12 feet in width adjoining the cliff-edge on the western side. . . . A second level terrace ran almost parallel to the first three or four feet below on the eastern side. Hereafter the ground fell steeply to the seashore, jutting out slightly at the northern and southern ends of the *pa*. These two points were cut into tiny terraces, each just large enough to provide room for a house, and situated one below the other, like huge steps, down the steep slopes. (Kelly, 1938: 23,28)

### *Vegetation*

Overall, the slopes of the reserve are in poor condition with surface features barely discernible, widespread but small areas of eroding soil and a patchy cover of various vegetation types, none in particularly good health or of particularly desirable character. The hinterland is dominated by gorse. The patchy nature of the Kahuwera vegetation reflects a history of animal disturbance (goats) and management to remove certain weed species such as brush wattle (*Paraserianthus lophantha*, formerly *Albizzia pseudoacacia*). On the ridge crest and terraces, the conservation status of the archaeological features of the *pa* appears to be good, judging from published accounts, although the density of the kikuyu ground cover obscures detail of the features.

Brush wattle dominates the upper side slopes, while much of the terraced platform is covered by kikuyu. Two multiple-stemmed cabbage trees, one dead, presumably from Sudden Decline, occur on the edge of the platform. The lower flanks of the site are heavily tracked by goats and vegetation is discontinuous. A significant zone of *Araujia sericifera* occurs on the east side, and a similar expanse of *Convolvulus arvensis* occurs on the sunnier, west side. Gullies contain kawakawa, **māhoe**, karamu and taupata; one karaka, a few **kānuka** and several patches of flax occur on the foot of the western slope. The western face near the original transverse ditch is better covered than the remainder. *Solanum mauritianum* is common, and gorse is prominent on the terminal (eastern) face, but is not vigorous, and there is a small area of native grassland (*Rhytidosperma* sp.) that is likely to be smothered from above by kikuyu. Bracken is restricted to one small patch. Five mature **pōhutukawa** located around the north and east face are dead, presumably killed by possums. All of these features indicate instability in the vegetation.

### *Vegetation management*

Disturbance by goats is causing erosion and maintaining the vegetation in an unstable state on the slopes. Grasses are being grazed within the *Araujia* zone, and the kikuyu is heavily tracked. The **pōhutukawa** have been killed (despite metal bands around one to exclude possums). The peninsula would seem to lend itself to being fenced to exclude possums and goats. The vegetation is very weedy and some species - especially *Araujia*, *Convolvulus*, kikuyu grass and *Solanum* - will restrict regeneration of coastal

forest species, by smothering them. However, the weeds do help to stabilise the soil surface. The few sweet-pea shrubs (*Polygala myrtifolia*) that occur could be removed.

The site is primarily characterised by having a high, tumbling mass of kikuyu over the platforms which provides good conservative effect but obscures the features for viewing, both close-up and as part of the landscape. John Coster (1985), then archaeologist for the Department of Lands and Survey, sought to have the kikuyu and any weeds on the platforms controlled by a weed-eater. We confirm the need for this, although controlled grazing might perform the same function, especially if details are to be maintained. The kikuyu is adequate to protect the terrace surfaces, but the lower flanks should ultimately be covered in forest, dominated by **pōhutukawa**. These will colonise naturally if possums are controlled, but the process could be speeded and weeds managed better if pohutukawa and associates were selectively planted on the flanks.

The steep sides and cliffs of the **pā**, having been cleared of false wattle and other trees some 10 year ago, have re-generated into an arrested plant succession which unfortunately is starved of opportunity by *Araujia*. On the eroding sides, especially the east, some means of controlling *Araujia* has to be devised, and the kawakawa, *Muehlenbeckia* or other suitable shrubs, encouraged. **Pōhutukawa** should be planted to replace the present dead specimens on lower slopes only. The only taller trees to be encouraged or planted on or within 5 m "slope distance" of terraces should be cabbage tree which could be planted to enhance the density of the few existing specimens. False wattle is a poor soil stabiliser because it is prone to wind-throw. Therefore, native hardwoods should be encouraged underneath, and the brush wattle eventually removed.

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### 3.7.3 Motuarohia Island, **Pā Hill**, Q05/77 GR 169627 (N12/39).

Motuarohia is an exceptionally scenic island; it is composed of several former islands and stacks that have become interlinked by sand and gravel beaches. Vertical cliffs lie along the length of the northern side. The island is dominated by **Pā Hill** (73 m a.s.l.), the top of which is reached by a walkway up the easy western slopes. It is one of the **pā** that Parkinson illustrated in 1769 (Cook's first voyage) (Spencer, 1983: 269-70).

**Pā Hill** is a high point dominated by perpendicular cliffs to the west and north, with five broad terraces to the east lying at the head of a lower set of cliffs. Access to the terrace is up a steep slope. This slope and the area of the terraces has been severely and deeply tracked by stock (cattle and sheep) and human visitation over the years. The crest of the **pā** is frequently visited by sightseers seeking the fine outer bay views. The cliffs pose considerable potential danger. A wooden boardwalk and steps and a railed viewing platform have been constructed more or less on the line of the former track. The boardwalk is relatively unobtrusive from a distance, and offers slightly elevated views of the broad grassed terraces of the site. Its installation has more or less stopped on-going erosion of the track (Fig. 20).