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Cover: Silver beech, *Cordylone indivisa* and *Cyathea smithii* near Renata, Taranua Range. Photo: G. C. Kelly.

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Omarupapaku (Round Bush), Foxton

A. E. Estler and R. M. Greenwood, Palmerston North.

"As we ran along within two miles of the shore I saw a remarkable grove of high pine trees, near the mouth of a river called Manawatu. . . ." So wrote E. J. Wakefield in 1840. For many years this landmark was used to guide vessels to the port of Foxton and it became a Harbour Board reserve. Though now much modified, it has assumed a new importance as a relic of the Manawatu sand country vegetation.

Omarupapaku, a reserve now vested in the Manawatu County Council, lies just over 3 miles from the coast and is within 1/4 mile of No. 1 State Highway, 2 miles N of Foxton. It is sheltered in all directions except the E by dunes sculptured by the prevailing NW winds. The dunes have also restricted drainage, thus helping to create a forest environment in an area otherwise very unfavourable for forest — a 32-inch rainfall, persistent strong winds, high evapotranspiration and sandy soil. Over a period of many centuries an 8-inch peaty topsoil has developed. It is much more stable, more fertile and more retentive of water than the raw sand.

About 1918 most of the kahikatea, the dominant species, was removed by sawmillers. For a period up till 1962 cattle had free access and depleted parts of the forest. The present pattern of vegetation reflects this history as well as inherent differences in habitats.

The Omarupapaku reserve covers 126 acres, containing 70 acres of forest, two areas of *Coprosma propinqua* shrubland, a swamp, and dunes with bracken and exotic shrubs. The forested area includes a magnificent stand of pukatea and a larger area of secondary forest occupying much of the flat and extending on to the rim of the flanking dunes.

The pukatea stand apparently has not suffered excessively from the ravages of the past. It seems that the scarcity of kahikatea in this almost pure stand may have deterred sawmillers and in winter, at least, the muddy streams may have discouraged cattle from penetrating. The pukatea trees, with a density of about 200 stems per acre, reach to nearly 90 ft. Most have diameters between 12 and 24 inches but a few reach 36 inches. The trees are possibly not of great age but undoubtedly were there when the reserve was milled. There is no regular subordinate layer but a few tawa reach to about 60 ft tall and some kiekie climbs up the pukatea to about the same level. Supplejack is abundant and there are a number of shrubs, particularly *Coprosma areolata*, mahoe, hange-

hange and kaikomako. *Asplenium bulbiferum*, *Aspidium* and *Pteris macilenta* abound among the buttresses and surface roots of pukatea.

The secondary forest is dominated by ngaio, titoki and tawa, forming an irregular canopy mostly about 50 ft high below a few emergent kahikatea and pukatea and above a more or less continuous layer of tawa, mahoe, mapou and kohuhu. A dense understory of *Coprosma areolata*, *Paratrophis microphylla*, kaikomako and saplings of mahoe, pukatea and titoki has developed fairly recently. *Asplenium bulbiferum* is abundant on the floor and *Asplenium lucidum*, *Carex* spp. and seedlings of pukatea, mahoe and tawa are prominent.

The tiers of vegetation broadly represent age groups. The tallest kahikatea and pukatea are relics of the original forest. The subordinate species mostly established after 1918, and the low plants date from the time of the exclusion of cattle.

A variant of this type of vegetation occurs at the NW end of the forest where there are more emergent kahikatea (mostly malformed) and more cabbage trees in a major subordinate layer consisting principally of ngaio and *Coprosma propinqua*. Possibly regeneration is proceeding more slowly here because of higher water-table on the margin of the raupo swamp. On the dune margin the secondary forest is not markedly different from the rest except that *Coprosma crassifolia*, *Polystichum richardii*, *Pellaea rotundifolia* and *Microlaena stipoides* seem to be confined to the dune and totara is a little more abundant there.

The *Coprosma propinqua* stand in a clearing near the eastern end of the reserve is slowly replacing the dense sward of tall fescue and is nurturing seedlings of trees and shrubs which will eventually form a new forest. The tangles of vines which are invading the sward are also playing their part in hastening the reappearance of forest as *Coprosma propinqua* and kaikomako are appearing in their shade, and by sending up erect shoots are growing above the vines. However, it will be many decades before kahikatea dominates the area and many centuries before it reaches the proportions of the heavy stand that was milled from there about 1918.

An island of coprosma near the western end of the reserve has developed where sand has spilled off the end of a dune into the swamp. This scrub is a development from swamp rather than a reversion after forest.

The swamp vegetation is principally raupo more than 8 feet tall with toetoe, phormium (which has been cut for fibre in the past) and cabbage trees. The pink-flowered form of *Calystegia*

sepium is abundant in the more open parts. This swamp is probably typical of swamps which were a significant feature of the sand country and it is fortunate that such an area has been preserved.

The flora in its variety reflects the wide range of habitats within the reserve. However, many species such as rewarewa, pokaka, hinau, kowhai, swamp maire, *Hoheria* sp. (seedling only seen) and *Sarcoclitus adversus* are represented by only a few individuals. *Loranthus micranthus* (referred to as *Ileostylus micranthus* by Barlow, Aust. J. Bot. 14, 421, 1966) in this same category is threatened with extinction. This mistletoe was once abundant on *Coprosma propinqua* but has been reduced to a few plants by opossums and is likely to disappear in the next few years. The future of tree ferns is difficult to predict but there is little evidence of recent increase. Omarupapaku is possibly the only place on the Manawatu plains where *Dicksonia fibrosa* remains. Some plant species noted a few years ago have not been seen recently e.g. *Olea montana*, wineberry and *Fuchsia perscaudens*. We know of no record of filmy ferns in the reserve.

Exotic plants occur mostly on the dunes and in the eastern coprosma stand. On the dunes tree lupin is plentiful, in company with gorse, broom, and blackberry. Pine trees have been planted recently. Around the eastern coprosma stand blackberry and tall fescue are the main exotics but blackberry seems to be less aggressive than it was before the reserve was fenced. Exotic plants in the forest are of minor importance. *Solanum dulcamara* and *S. pseudocapsicum* and some other weeds are present in the secondary forest but the pukatea stand is entirely weed-free.

Mammals have had an influence on Omarupapaku. The density of saplings in the secondary forest bears witness to the damage previously caused by cattle. Opossums are defoliating titoki and possibly also ngaio but their effects on other species (apart from *Loranthus*) are not very evident. Sambar deer are present but their numbers appear insufficient to cause appreciable damage.

Future changes in the forest and shrubland will be towards the reappearance of the original vegetation. Pukatea is flourishing and is more abundant than kahikatea, but sufficient kahikatea is present to ensure a prominent place for the species in the new vegetation. However, for a long period tawa, titoki, mahoe and some of the taller shrubs will occupy a major part of the canopy except where pukatea is already dominant. Ngaio is a diminishing species; most of the trees are old and seedlings are rare. This is to be expected as it is a seral species which established after

the removal of the timber trees fifty years ago at Paraka, on the other hand, is increasing and will become more prominent than in the original forest. Seedlings occur by the thousand in some places.

Changes in the understorey will occur as more of the present flush of seedlings reach higher levels. The resulting decrease in light reaching the base of the forest will have an adverse effect for a time on survival of all but the most shade-tolerant seedlings. We predict that the undergrowth may not always be as dense as at present.

These predictions assume that there will be no major change in the environment. Adjustment of the water-table could occur, for the reserve is surrounded by farmland. Lowering the water-table would destroy the conditions by which made forest growth possible. Pines planted on the bordering dunes could affect the water-table too, but they will produce other more detrimental effects as they are planted too close to the forest to be beneficial.

James Wilson in 1914 writing in *Early Rangitikei* stated, "Stock have, however, so damaged the trees that they are dying and Omarupapaku may soon be 'Tupapaku' (a dead body)". We hope that this will never occur.

NATIVE PLANTS OF OMARUPAPAKU RESERVE.

TREES AND SHRUBS

- Alectryon excelsus*
Aristolelia racemosa
Beilschmiedia tawa
Brachyglottis repanda
Carrnichaelia flagelliformis var. *corymbosa*
Carpodetus serratus
Coprosma acerosa
C. areolata
C. crassifolia
C. propinqua × *robusta*
C. rhamnoides
C. tenuicaulis
C. tenuifolia
Cordylone australis
Cyathodes fusciculata
C. fraseri
Corynocarpus laevigatus
Elaeocarpus dentatus
E. hookerianus
Eugenia maire
Geniostoma ligustrifolium
Griselinia lucida
Hedycarya arborea
Hoheria sp. (seedling)

- Knighitia excelsa*
Laurelia novae-zelandiae
Loranthus micranthus
Macropiper excelsum
Meliclytus micranthus
M. ramiflorus
Myoporum laetum
Myrsine australis
Myrsine bullata
M. bullata × *obcordata*
M. obcordata
Olea cunningghamii
O. lanceolata
O. montana
Olearia solandri
O. virgata
Paratrophis microphylla
Pennantia corymbosa
Pittosporum eugenioides
P. tenuifolium
Podocarpus dacrydioides
P. spicatus
P. totara
Pseudopanax crassifolium
Schefflera digitata
Solanum aviculare
Sophora microphylla

LIANES

- Calystegia sepium*
Clematis paniculata
C. foetida
Freyinetia banksii
Fuchsia perscandens
Metrosideros colensoi
M. perforata
Muehlenbeckia australis
M. complexa
Parsonsia capsularis
P. heterophylla
Rhipogonum scandens
Rubus schmideloides
Tetrapathaea tetrandra

DICOT HERBS

- Cardamine debilis*
Epilobium sp.
Erechtites minima
Gnaphalium collinum
Hydrocotyle novae-zelandiae
Parietaria debilis
Ranunculus rivularis
Solanum nodiflorum
Urtica linearifolia
Wahlenbergia gracilis

MONOCOT HERBS

- Astelia grandis*
Astelia solandri
Carex forsteri
C. lucida
C. ternaria
C. virgata
Colospermum hastatum
Cortaderia toetoe
Earina autumnalis

- E. mucronata*
Eleocharis acuta
Gahnia xanthocarpa
Lemna minor
Microlaena avenacea
M. stipoides
Phoridium tenax
Poa anceps
Pterostylis banksii
Scirpus reticularis
Typha muelleri
Uncinia clavata
U. uncinata
Sarcocollis adversus

FERNS

- Asplenium bulbiferum*
A. falcatum × *lucidum*
A. flaccidum × *bulbiferum* ?
A. flaccidum
A. lucidum
Blechnum capense
B. filiforme
Cyathea medullaris
C. smithii
Dicksonia fibrosa
D. squarrosa
Hypolepis punctata
H. tenuifolia
Pellaea rotundifolia
Phymatodes diversifolium
P. scandens
Polystichum richardii
Pteridium aquilinum var. *esculentum*
Pteris macilentia
P. tremula
Pyrosia serpens
Thelypteris penniger

The editor regrets that two errors occurred in the table in "Asteliad Names, Old and New" by L. B. Moore, Bulletin No. 34, p.5, and corrections should be made as follows:

1. The positions of *A. fragrans* and *A. grandis* should be reversed, so that *fragrans* = "silvestris", and *grandis* = "erect, in swamps".

2. A question mark should be inserted after "South Id" in the lower right-hand corner. The author would be very interested to hear of any definite South Island occurrences of *C. microsperrnum*.