

A PRELIMINARY ACCOUNT OF THE VEGETATION OF
MOTUHOROPAPA ISLAND, HAURAKI GULF

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INTRODUCTION

Motuhoropapa is one of the few islands in the inner Hauraki Gulf which is still completely covered by indigenous forest and scrub. Part of this plant cover has resulted from succession following disturbance within the last fifty years. However, the presence of large diameter pohutukawa (*Metrosideros excelsa*) suggests that remnants of the original plant cover may be present. This account has been prepared from notes made during a brief visit to the island in July 1954.

Motuhoropapa (25 acres) lies 16 miles north-east of the port of Auckland and is included with Otata (45 acres), Maria Island (4 acres), the David Rocks, and a number of smaller islets and stacks, in the Noises Island group. It consists of an axial NNW-SSE trending convex ridge, 183 ft in height, from which smaller ridges and gullies fall steeply towards the sea, sometimes terminating in small cliffs. Slopes covered by vegetation vary in gradient from 20 up to 45° and there are no permanent streams.

The underlying rock is greywack; sandstones and mudstones belonging to the Waipapa Formation of Permian-Jurassic age. No detailed soil observations have been made but much of the soil is shallow and stony. It is possible that ash from the Rangitoto eruption (see Fergusson and Rafter, 1959) has played some part in soil formation, since soils from this ash shower have been mapped on Rakino Island, 1½ miles to the south-east (New Zealand Soil Bureau 1954).

The island is at present owned by Mr. B. Palmer from whom permission must be obtained when a visit is contemplated.

VEGETATION

The most frequently occurring types of stand on the island can be delimited by differences in canopy composition. They are -

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|---------------------------------|---|---------------|
| (1) Pohutukawa stands | } | Forest stands |
| (2) Pohutukawa / karo stands* | | |
| (3) Karo stands | } | Scrub stands |
| (4) Karo - mixed shrub stands | | |
| (5) Karamu - mixed shrub stands | | |

It must be emphasized that all stands do not fit neatly into the above categories; many of intermediate composition can be found. Fundamentally, the vegetation consists of a number of species occurring in proportions which vary continuously along environmental gradients, particularly those of exposure to wind-carried salt spray, slope and soil depth. Those species of greatest physiognomic importance are pohutukawa, karo (*Pittosporum crassifolium*), karamu (*Coprosma robusta*), houpara (*Pseudopanax lessonii*), makaka (*Carmichaelia australis*), mapou (*Myrsine australis*) and *Astelia banksii*.

The Axial Ridge

The main ridge is covered by dense stands of karo and pohutukawa/karo forest. Along the southern portion of the ridge, pohutukawa is dominant. The karo are of small diameter, have small crowns, and are from 15 to 20 ft in height. The pohutukawa have large diffuse crowns and usually form a discontinuous layer emergent above the karo to a height of 30 ft. Also present in the canopy are raurekau (*Coprosma australis*), mapou, makaka and ngaio (*Myoporum laetum*), Mapou, houpara and mahoe (*Melicytus ramiflorus*) form an understory, and the ground vegetation is made up of *Asplenium lucidum*, *A. flaccidum*, *Microsorium diversifolium*, *Astelia banksii* and *Dianella intermedia*. Abundant wharangi (*Melicope ternata*), 3 to 5 ft in height, were seen to have established beneath a canopy gap not far below the ridge crest in this community.

* The / symbol is here to indicate that pohutukawa forms a discontinuous upper canopy layer above a lower canopy layer of karo. The hyphen links species occurring in the same canopy layer.

At several places along the main ridge and particularly north of the island's summit, there are patches of bracken (*Pteridium aquilinum* var. *esculentum*). These patches usually occur in a mixed shrub community consisting of Karamu, makaka, houpara, koromiko (*Lebe salicifolia*), flax (*Phormium tenax*) and akeake (*Dodonaea viscosa*).

On Steep Slopes and Cliffs

Most of the slopes and cliffs are occupied by pohutukawa/karo and karo-mixed shrub stands. Some of the pohutukawa are of large diameter but only 20 to 35 ft in height. On some slopes in pohutukawa stands, there is a shrub understory of karo, pigwood (*Peniostoma ligustrifolium*), wharangi and kawakawa (*Macropiper excelsum*) with *Astelia banksii*, *Asplenium lucidum*, and sometimes *Teris comans*, on the ground. Under some of the largest pohutukawa the ground is mantled with undecayed pohutukawa leaves, twigs and small branches and in these places there are practically no ground plants. On some of the stony slopes immediately above the beach, the shrub layer is missing and the ground is covered by a dense mat of *Astelia banksii*. On the steepest and most rocky slopes, there is no tree canopy and *Astelia* is often dominant with scattered plants of renga lily (*Arthropodium cirrhatum*), *Senecio lautus* and *taupata* (*Coprosma repens*).

The pohutukawa/karo stands of the slopes are similar to those described for the main ridge. Gradations in floristic composition occur between this community and the karo-mixed shrub stands in which emergent pohutukawa are either very sparsely distributed or absent. The most abundant shrubs are karamu, houpara and mapou while makaka, wharangi, koromiko and rangiora (*Brachyglottis repanda*) are also of frequent occurrence. On some sites the karo (up to 10 in. in diameter) emerge above the shrubs to form a two-layered canopy but in most cases there is a one-layered uneven canopy from 10 to 20 ft in height. Seedlings and saplings of wharangi, houpara and ohokohe (*Dysoxylum spectabile*) are common in this community while *Asplenium lucidum* is the most abundant ground plant.

Patches of bracken and grass occur within karamu-mixed shrub stands on the northern slopes of the island. These are continuous with the bracken and mixed shrub communities described on the northern part of the main ridge. The shrub

stands are usually less than 15 ft in height with karamu, makaka, rangiora and mahoe most abundant. Also present are cabbage tree (*Cordyline australis*), fivefinger (*Nothopanax arboreum*), akeake, *Cassinia retorta* and *Pittosporum umbellatum*. Two slips were observed in this community, both of which were being colonized by masses of pohutukawa seedlings and a few makaka seedlings. *Scirpus nodosus*, flax and patches of *Mesembryanthemum australe* were also present.

The Gullies

Owing to the frequency of slipping, few of the island's steep narrow gullies have remained undisturbed for sufficient time to develop forest. Usually they are filled with karamu-mixed shrub stands which are similar in structure to those of the slopes though taller. With the karamu are makaka, pohutukawa, houpara and pigwood. In one gully, on the southeast side of the island, a very definite pattern of plant distribution was noticed: karamu-mixed shrub stands in the gully, pohutukawa/karo stands on the flanking slopes, and makaka forming a narrow transitional zone between these two types of stand. In places these gully scrub communities have a canopy shorn by wind-carried salt spray (see Boyce, 1954)

The Shoreline

Shoreline communities, comparable to those described for Marotiri Island by Pook (1956), are present though not well defined. In the zone regularly reached by salt-water splash, open communities of abundant lichens have developed with *Salicornia australis* in moist crevices. Higher above the shore, patches of *Mesembryanthemum australe* occur, particularly where there are pockets of soil. Also present here are taupata, *Poa anceps* and *Euphorbia glauca*. At higher levels these communities grade rapidly into the scrub stands already described.

DISCUSSION AND SUGGESTIONS FOR FURTHER STUDIES.

The vegetation of Motuhoropapa contrasts with that of the neighbouring Otata island described by Mason and Trevarthen (1950). On the latter island pohutukawa and karo communities occur along the steep eastern slopes but most of the island is covered by Mahoe, mapou, manuka (*Leptospermum scoparium*) and flax-*Danthonia semiannularis* communities. These differences

are possibly a result of the fires that have occurred on Otata and the presence of rabbits. Neither mahoe nor manuka are of physiognomic importance on Motuhoropapa, but the bracken patches do suggest the past occurrence of either localized fires or possibly clearing. As far as is known there are no browsing animals on that island, although rats may be present.

What is needed now is a detailed ecological survey of Motuhoropapa in which the distribution of the main communities is properly mapped.* Future investigators should not necessarily follow the community classification adopted here but endeavour to establish their mapping units on a quantitative bases.

One of the first problems to be tackled will be the reconstruction of the island's recent history. Are the existing scrub communities to be related to interference by man, exposure to salt spray, or regeneration on slips following undercutting by wave erosion? Are some of the taller forest stands remnants of the original plant cover of the island? It is quite possible that during Maori times Motuhoropapa was little altered since in the absence of any continuous water supply, the island is unlikely to have been permanently occupied. To what extent the Maori used the island for birding expeditions is not known and a census of the birds present nesting on the island would be interesting in this respect.

A second group of problems worthy of investigation are concerned with changes in composition and structure at present taking place within each of the main communities. Counts of species by age groups on different sites, together with the establishment of permanent quadrats and transects, are necessary here. A useful approach to these questions may be made by studying the distribution of juveniles and adults of a single species in relation to environmental factors such as slope, aspect, soil depth and exposure to salt spray. It may be pointed out that some plants, e.g. tawapou (*Sideroxylon novo-zelandicum*), nikau (*Rhopalostylis sapida*), and *Pittosporum*

* Unfortunately, the present aerial photographs are too poor to be of much use here.