

## THE VEGETATION OF WHALE ISLAND PART I: THE PLANT COMMUNITIES

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### ABSTRACT

A brief account of the plant communities of Whale Island is given, together with a note on possible future development of the vegetation and a map showing its present distribution.

### INTRODUCTION

The indigenous vegetation of Whale Island has been extensively modified by felling and burning, possibly during occupation by the Maoris, and also by the activity of introduced mammals (goats, rabbits and rats) which have been on the island for some years (Anderson 1971). Little forest now remains, and a major part of the island is occupied by grassland.

The island was visited by one of us (B.S.P.) during the preliminary trip in July and by the other authors during the Auckland University Field Club Scientific Camp in August, 1970.

### THE PLANT COMMUNITIES

Fig 1 shows the distribution of the plant communities on the island.

#### 1. Pohutukawa (*Metrosideros excelsa*) forest.

##### (a) True Coastal Forest.

This community, which is found only on Pa Hill, is one of the least modified on the island and contains the greatest number of indigenous species (Parris 1971). The canopy consists mainly of large pohutukawa, but ngaio (*Myoporum laetum*) is also important. *Litsea calicaris* and *Dysoxylum spectabile* are so rare as to be of no importance in the canopy. Mahoe (*Meliccytus ramiflorus*), whau (*Entelea arborescens*), *Pseudopanax lessonii*, *Coprosma robusta*, *Fuchsia excorticata*, and *Brachyglottis repanda* contribute to the sub-canopy /shrub layer. *Urtica ferox* is common, and the relative abundance of this plant may be due to selective grazing by goats. The ground cover is fairly sparse, containing few seedlings, but fern species are surprisingly common. *Pteris tremula*, *P. macilenta*, *Asplenium spp.*, *Doodia media*, *Blechnum lanceolatum*, and *Polystichum richardii* are the most widespread. The grass *Oplismenus undulatifolius* is an important component of the ground cover.

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KEY

- 1 a TRUE COASTAL FOREST
- 1 b POHUTUKAWA CANOPY : NO OTHER LAYERS
- 1 c CLIFF FOREST
- 2 KANUKA SCRUBLAND
- 3 GRASSLAND
- 4 LAGOON AND SWAMP
- 5 SAND AREAS
-  CLIFF

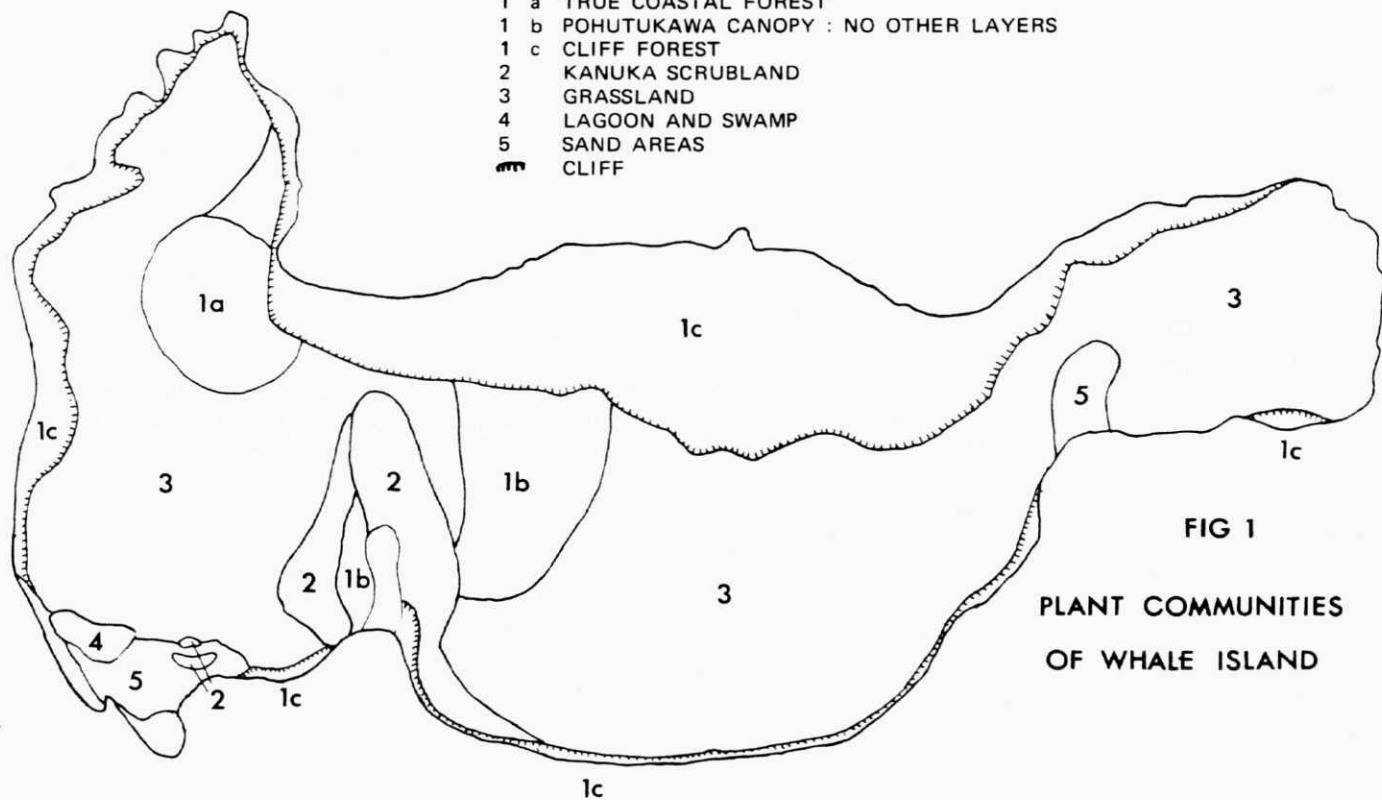


FIG 1

PLANT COMMUNITIES  
OF WHALE ISLAND

FIG. 1 : Distribution of plant communities on Whale Island.

## (b) Coastal Forest without understorey.

This community is confined to the eastern slopes of the ridge between Camp Valley and Sulphur Valley. Here *Metrosideros excelsa* forest has been modified to such an extent that the sub-canopy/shrub and ground cover layers are virtually absent. Extensive wind damage is evident and the ground is littered in places with fallen branches of various sizes. Regeneration of kanuka (*Leptospermum ericoides*) is occurring but seedlings of forest species are generally absent.

Along the top of Fumarole Ridge, on the east-facing slope, there are scattered local areas where numerous kanuka and pohutukawa seedlings are present under mature pohutukawa. In some of these areas about 50% of the pohutukawa seedlings showed signs of attack by scale insects.

## (c) Cliff Forest.

This community is found on all the cliffs surrounding the island. Mature pohutukawa and scattered (rare) ngaio form the canopy. On the landward side a rich sub-canopy layer is developing in the gullies. Local groups of ngaio (*Myoporum laetum*), mahoe (*Melicactus ramiflorus*), *Coprosma repens*, *C. robusta*, *Geniostoma ligustrifolium*, *Brachyglottis repanda*, and *Coriaria arborea* occur, and fern species are again common. On the higher, more exposed, less stable cliffs of the seaward side there is a thin sward of grasses but no shrubs occur except for the occasional bush of *Cassinia leptophylla*.

*Peperomia urvilleana*, *Arthropodium cirratum*, and *Phormium tenax* are restricted to this habitat and are very rare, being seen only in places inaccessible to goats.

2. Kanuka (*Leptospermum ericoides*) scrub.

*Leptospermum* scrub is best developed on the floor and eastern slopes of Sulphur Valley, where the vegetation consists almost exclusively of a dense pure stand of kanuka. In a few areas there is a dense fern understorey composed of *Cyathea dealbata*, *C. medullaris*, *Histiopteris incisa*, *Hypolepis tenuifolia*, and *Pteris tremula*. *Psilotum nudum* is locally abundant under open kanuka between Camp and Sulphur Valleys.

Small stands of low kanuka are found in unconsolidated sand hollows on dunes, while other stands of varying size and age occur in grassland throughout the island.

## 3. Grassland.

This induced community covers the largest area of the island but its boundaries are indistinct and the grassland forms a mosaic with stands of pohutukawa, kanuka, and various shrubs scattered throughout. Most of the many adventive species on the island occur in the grassland community.

Co-dominant in the grassland community are a large unidentified grass and

*Scirpus nodosus*, while *Cyperus ustulatus* is locally important. *Acaena ?ovina* covers large areas on the shaded landward side of the central section, while *Phytolacca octandra*, *Erechtites atkinsonii*, *Erigeron canadense*, and *Cirsium vulgare* are widespread. *Rosa rubiginosa* and *Cirsium arvense* are not important at present, but may spread. Bracken (*Pteridium aquilinum* var. *esculentum*) is, surprisingly, limited in occurrence, except at the eastern end of the island.

This community probably provides the main feeding area for the few goats remaining, and rats and rabbits also appear to be extensively utilising the grassland.

The grassland covering the eastern end differs from that elsewhere. The most extensive regeneration of pohutukawa and *Cordyline* on the island occurs here, doubtless following the reduction of the goat population. In the central part of the area there is a large stand of young *Metrosideros excelsa* shrubs, varying in height from 0.9 m to 3.0 m, with scattered young *Cordyline australis* also present. Large, isolated, mature pohutukawa are present throughout, and on the landward coast there is a stand of mature *Cordyline australis*.

*Scirpus nodosus* is the sole dominant in much of the grassland, but bracken (*Pteridium aquilinum* var. *esculentum*) is frequently an important sub-dominant. *Muehlenbeckia complexa* forms dense scrambling masses throughout the area, particularly on rocky outcrops.

#### 4. Lagoon and Swamp vegetation.

This community, the smallest on the island, occurs on the sand flats at Camp Bay, under Pa Hill. The only freshwater supply on the island occurs nearby, and the area is probably damp throughout the summer months. The lagoon was at one time open to the sea but in the "Wahine" storm of April 10, 1968, it was sealed off by the development of a boulder beach across its outlet (M.J. Imber, pers. comm.).

*Baumea (Cladium) juncea* is dominant, while *Juncus australis* and *Juncus* sp. are scattered throughout. *Typha orientalis* and *Cortaderia sellowiana* are rare. *Cyperus ustulatus* is important in the semi-swamp vegetation along Camp Valley floor.

#### 5. Sand Areas.

Low sand dune areas are found at Camp Bay and to a smaller extent at McEwain Bay. *Spinifex hirsutus* sparsely covers the dunes, while kanuka is important locally. Several introduced species are present, of which *Gnaphalium luteo-album* and *Leontodon taraxacoides* are widespread. *Zoysia pungens* is an important stabiliser behind the poorly developed foredune system while *Carex pumila* grows in the damp hollows between dunes. The area at Camp Bay is extensively burrowed by both rats and rabbits. At McEwain Bay a small colony of *Lupinus arboreus* occurs but this species is absent from Camp Bay.

### FUTURE DEVELOPMENT OF THE VEGETATION

The shooting of most of the goats present on the island, which took place in

1964, appears to have had a beneficial effect on the vegetation. (See Hall 1964; Angus and Howard 1965; and Vipond 1966, for previous descriptions of the vegetation.) Young pohutukawa, *Cordyline australis*, and shrub species present in the grassland community have probably become established during the last six years. This new growth is particularly evident at the eastern end of the island. There are, however, signs that rats and/or rabbits are having a deleterious effect on the vegetation, as seedling establishment in forest areas does not seem as vigorous as that described in earlier accounts (Angus and Howard 1965; Vipond 1966).

Should all exotic animals be removed from the island, the following predictions could be made on the subsequent development of the vegetation:

1. The grassland community would probably eventually be covered in most areas by a mosaic of pohutukawa/kanuka/*Cordyline australis*, developing from the young plants already present and growing vigorously. Once a canopy had developed, the present rank growth of grass would probably disappear, enabling establishment of shrub species to take place.
2. No major changes should take place in the lagoon and swamp vegetation.
3. The cliffs at present in grass would probably remain unchanged after the removal of animals, as on Cuvier Island, where no replacement of grass by the original coastal scrub community has occurred after the elimination of goats (Beever et al 1969).
4. No major changes in species composition should occur in the vegetation of the landward coast of the central cone, where coastal scrub has already developed.
5. Pa Hill would probably be the main nucleus for the establishment of shrub and herb layers under existing pohutukawa and kanuka. The community there contains several important constituent species of these layers which are absent or rare elsewhere on the island. These species should be able to establish under existing canopies if exotic animals are removed, except possibly in areas where petrel burrowing is likely to destroy seedlings. The cliffs of the landward coast would also be important in proving a seed source for some species.
6. The scarcity of coastal forest canopy trees, apart from ngaio, available to replace pohutukawa and kanuka, which are not known to re-establish under their own canopy, could be serious. The present scarcity of such species e.g. *Dysoxylum spectabile* and *Corynocarpus laevigatus* may be due to absence of seed transportation by birds from the mainland, the eating of seeds by rats, or the eating of seedlings by goats and rabbits. It is difficult to envisage a varied non-myrtaceous coastal forest developing under present conditions.

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