# THE VEGETATION OF RED MERCURY ISLAND

## PART 2: QUANTITATIVE STUDIES IN FOREST AND SCRUB

by Prudence A. Lynch and E. Jean Ferguson.


### SUMMARY

Data are presented to show the structure of coastal *(Metrosideros excelsa)* forest and of *Myrsine australis* scrub on Red Mercury Island, and the results discussed.


### INTRODUCTION

This paper records some quantitative studies in forest and scrub on Red Mercury Island, carried out during the latter part of the week spent on the island during the Field Club trip in August, 1971. Because of the limited amount of time available these studies do not give a complete picture of community structure and are intended merely to give an indication of the type of structure found.

### METHODS

The method used was that of Beever and Beever (1969). Two sites were chosen for study of the pohutukawa forest. Site A was located on the western side of the ridge to the north of the camp at Rolypoly Bay and Site B was located in a small area of forest behind the boulder beach and south of the camp. At each site two transects 30m x 1m were laid out, one running in a north-south direction and the other east-west at right angles to the first. Each transect was then divided into 30 x 1m² quadrats and the nature of the rooted vegetation in each quadrat examined.

Two sites were also chosen for study of the mapou scrub, but because of the difficulty encountered in moving through the scrub only one transect was examined at each site. Transect 1 was laid out in coastal scrub on the slope behind the boulder beach at Rolypoly Bay, at right angles to the shore and along an east-west line. Transect 2 was laid out at the top of the inland (eastern) slope of the ridge behind Rolypoly Bay and was also along an east-west line. The same procedure was followed as for the transects in pohutukawa forest.

### RESULTS

The forest may be considered to have the following structure (heights only approximate)::

(a) Canopy: (12-15m) a sparse but continuous layer of large old *Metrosideros excelsa.*



(b) Sub-canopy: (6-8m) a very discontinuous layer composed of isolated trees of *Neopanax arboreum, Coprosma* spp., *Melicytus ramiflorus,* and *Myrsine australis. Brachyglottis repanda* is an important sub-conopy tree in the forest occupying steep coastal slopes. (Lynch et al, 1972).

(c) Shrub layer: (2-5m) composed largely of scattered *Melicytus ramiflorus, Coprosma* spp. and *Geniostoma ligustrifolium.*

(d) Ground cover: (<0.5m) a fairly continuous layer composed largely of ferns with the small grass *Oplismenus undulatifolius* and Mercury Bay weed *(Dichondra repens)* locally important. Seedlings of *Coprosma* spp, mahoe, mapou, and kawakawa are common.

In the mapou scrub there is a dense continuous canopy layer (2.5 - 3.5m) composed largely of *Myrsine australis* with scattered *Coprosma* spp. The understorey is a dense shrub layer (0.5 - 2.5m) of mixed species in which *Myrsine australis, Geniostoma ligustrifolium* and *Coprosma* spp are the most important. *Doodia media* is by far the most important species in the ground cover. The small orchid *Acianthus fornicatus* var *sinclairii* is locally abundant.

**Table 1: Frequency* of Species in Pohutukawa Forest at Rolypoly Bay on Red Mercury Island.**

| SPECIES | FREQUENCY | |
|---|---|---|
| **Trees and Shrubs** | **Site A.** | **Site B.** |
| *Coprosma* spp.** | 12 | 43 |
| *Melicytus ramiflorus* | 22 | 13 |
| *Geniostoma ligustrifolium* | 13 | 17 |
| *Metrosideros excelsa* | 3 | 8 |
| *Myrsine australis* | 8 | 2 |
| *Macropiper excelsum* | 10 | 0 |
| *Phormium tenax* | 0 | 10 |
| *Brachyglottis repanda* | 8 | 0 |
| *Dysoxylum spectabile* | 5 | 0 |
| *Neopanax arboreum* | 2 | 0 |
| *Parsonsia heterophylla* *** | 16 | 0 |
| *Clematis paniculata**** | 7 | 0 |
| *Muehlenbeckia complexa**** | 0 | 5 |
| **Ground Cover** | | |
| *Asplenium lucidum* | 52 | 2 |
| *Doodia media* | 45 | 5 |
| *Opismenus undulatifolius* | 13 | 3 |
| *Dichondra repens* | 0 | 12 |
| *Polystichum richardii* | 12 | 0 |
| *Gahnia* sp. | 8 | 0 |
| *Phymatodes diversifolium* | 7 | 0 |
| *Adiantum aethiopicum* | 0 | 8 |
| *Calystegia soldanella**** | 0 | 2 |

* Defined as the number of quadrats in which the species occurs expressed as a percentage of the total number of quadrats.

** *Copr[illegible] australis, C. lucida* x *robusta.* and *C. australis* x *lucida.*

*** Species of scrambling or climbing habit.

**TABLE II Density† of Species in Pohutukawa Forest at Rolypoly Bay on Red Mercury Island.**

| Species | | SITE A | | | | | |
|---|---|---|---|---|---|---|---|
| | Height | < 0.5m | | 0.5-2.0m | | 2.0-5.0m | |
| **Trees and Shrubs** | Transect | 1 | 2 | 1 | 2 | 1 | 2 |
| *Coprosma* spp ** | | 2 | 0 | 1 | 0 | 3 | 1 |
| *Melicytus ramiflorus* | | 11 | 7 | 5 | 3 | 4 | 0 |
| *Geniostoma ligustrifolium* | | 5 | 4 | 5 | 2 | 1 | 0 |
| *Myrsine australis* | | 16 | 2 | 4 | 0 | 0 | 0 |
| *Macropiper excelsa* | | 12 | 5 | 4 | 2 | 0 | 0 |
| *Phormium tenax* | | 0 | 0 | 0 | 0 | 0 | 0 |
| *Brachyglottis repanda* | | 0 | 0 | 2 | 2 | 0 | 1 |
| *Dysoxylum spectabile* | | 0 | 0 | 0 | 0 | 2 | 1 |
| | | Transect 1 | | | Transect 2 | | |
| *Parsonsia heterophylla* *** | | 12 | | | 10 | | |
| *Clematis paniculata* *** | | 4 | | | 0 | | |
| *Muehlenbeckia complexa* *** | | 0 | | | 0 | | |
| **Ground Cover** | | | | | | | |
| *Asplenium lucidum* | | 17 | | | 43 | | |
| *Doodia media* | | 30 | | | 60 | | |
| *C* ...*enus undulatifolius* †† | | 18 | | | 1 | | |
| *Dicnondra repens*†† | | 0 | | | 0 | | |
| *Polystichum richardii* | | 0 | | | 7 | | |
| *Gahnia* sp | | 6 | | | 6 | | |
| *Phymatodes diversifolium* | | 5 | | | 0 | | |
| *Adiantum aethiopicum* | | 0 | | | 0 | | |
| *Calystegia soldanella* *** | | 0 | | | 0 | | |

†Defined as the total number of plants per transect

†† For these species a subjective assessment of number of plants was made.

**TABLE II cont.**

| | SITE B | | | | | |
|---|---|---|---|---|---|---|
| Height | < 0.5m | | 0.5-2.0m | | 2.0-5.0m | |
| Transect | 1 | 2 | 1 | 2 | 1 | 2 |
| | 43 | 21 | 15 | 18 | 6 | 1 |
| | 1 | 0 | 1 | 10 | 0 | 0 |
| | 0 | 0 | 0 | 5 | 12 | 0 |
| | 12 | 7 | 0 | 2 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 |
| | 00 | 0 | 5 | 4 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 |
| | Transect 1 | | | Transect 2 | | |
| | 0 | | | 0 | | |
| | 0 | | | 0 | | |
| | 0 | | | 12 | | |
| | 2 | | | 0 | | |
| | 4 | | | 0 | | |
| | 13 | | | 0 | | |
| | 4 | | | 31 | | |
| | 0 | | | 0 | | |
| | 0 | | | 0 | | |
| | 0 | | | 0 | | |
| | 0 | | | 25 | | |
| | 1 | | | 0 | | |



**TABLE III Frequency* of Species in Mapou Scrub on Red Mercury Island**

| Species | FREQUENCY | |
|---|---|---|
| **Trees and Shrubs** | Transect 1 | Transect 2 |
| *Myrsine australis* | 83 | 66 |
| *Geniostoma ligustrifolium* | 40 | 30 |
| *Coprosma* spp** | 27 | 33 |
| *Cyathodes fasciculata* | 27 | 0 |
| *Leptospermum scoparium* | 17 | 3 |
| *Brachyglottis repanda* | 10 | 0 |
| *Hebe stricta* | 7 | 0 |
| *Melicytus ramiflorus* | 7 | 3 |
| *Pittosporum* sp | 7 | 0 |
| *Carmichaelia cunninghamii* | 3 | 10 |
| *Olearia furfuracea* | 0 | 10 |
| *Phormium tenax* | 0 | 13 |
| *Neopanax arboreum* | 0 | 3 |
| *Pteridium aquilinum* var *esculentum* *** | 27 | 0 |
| *Muehlenbeckia complexa* *** | 3 | 3 |
| **Ground Cover** | | |
| *Doodia media* | 13 | 96 |
| *Oplismenus undulatifolius* | 3 | 3 |
| *Phymatodes diversifolium* | 20 | 0 |
| *Acianthus fornicatus* var *sinclairii* | 17 | 0 |
| *Adiantum hispidulum* | 7 | 0 |
| *Astelia solandri* | 7 | 0 |
| *Gahnia* sp | 7 | 0 |
| *Coprosma rhamnoides* | 3 | 0 |
| *Asplenium lucidum* | 0 | 20 |
| *Dichondra repens* | 0 | 3 |

**TABLE IV Density†of Species in Mapou Scrub on Red Mercury Island**

| Species | Height | < 0.5m | | 0.5-2.0m | | 2.0-5.0m | |
|---|---|---|---|---|---|---|---|
| | Transect | 1 | 2 | 1 | 2 | 1 | 2 |
| *Myrsine australis* | | 28 | 3 | 41 | 16 | 7 | 26 |
| *Geniostoma ligustrifolium* | | 7 | 27 | 15 | 10 | 1 | 1 |
| *Coprosma* spp ** | | 0 | 1 | 5 | 6 | 3 | 7 |
| *Cyathodes fasciculata* | | 0 | 0 | 5 | 0 | 3 | 0 |
| *Leptospermum scoparium* | | 0 | 0 | 3 | 0 | 3 | 1 |
| *Brachyglottis repanda* | | 0 | 0 | 1 | 0 | 2 | 0 |
| *Hebe stricta* | | 0 | 0 | 2 | 0 | 0 | 0 |
| *Melicytus ramiflorus* | | 2 | 0 | 2 | 0 | 0 | 1 |
| *Pittosporum* sp | | 2 | 0 | 2 | 0 | 0 | 0 |
| *Carmichaelia cunninghamii* | | 0 | 0 | 0 | 0 | 1 | 3 |
| *Olearia furfuracea* | | 0 | 1 | 0 | 3 | 0 | 0 |
| *Phormium tenax* | | 0 | 0 | 0 | 6 | 0 | 0 |
| *Neopanax arboreum* | | 0 | 0 | 0 | 0 | 0 | 1 |

| | Transect 1 | Transect 2 |
|---|---|---|
| *Pteridium aquilinum var esculentum* *** | 9 | 0 |
| *Muehlenbeckia complexa* *** | 1 | 1 |
| **Ground Cover** | | |
| *Doodia media* | 20 | 118 |
| *Oplismenus undulatifolius* †† | 1 | 1 |
| *Phymatodes diversifolium* | 11 | 0 |
| *Acianthus fornicatus var sinclairii* | 54 | 0 |
| *Adiantum hispidulum* | 6 | 0 |
| *Astelia solandri* | 2 | 0 |
| *Gahnia* sp | 2 | 0 |
| *Coprosma rhamnoides* | 1 | 0 |
| *Asplenium lucidum* | 0 | 7 |
| *Dichondra repens* †† | 0 | 1 |

## DISCUSSION

The structure of the pohutukawa forest on Red Mercury differs considerably from that of the forest on Cuvier Island. Thus there are only four strata compared with the five found in pohutukawa forest on Cuvier (Beever and Beever, 1969), and of these both the sub-canopy and shrub layers are sparse. One of the factors responsible for the poor development of sub-canopy and shrub layers on Red Mercury Island may be the presence of colonies of petrels, with the resulting modification of soil structure and the prevention of seedling establishment in the burrowed unstable soil. Atkinson (1964) suggests that the burrowing of petrels maintains soil aeration at a high level and makes the soil more prone to drought in the summer.

The future development of the mapou scrub will be of great interest. The *Coprosma* species which are now so important in the canopy and shrub layer may be expected, eventually, to overtop the other species present, and later, new forest species may invade the community. Much further study is needed before any conclusions may be drawn.

## REFERENCES


Atkinson, I.A.E. 1964 The Flora, Vegetation, and Soils of Middle and Green Islands, *N.Z.J.Bot. 2*:385-402.

Beever, R.E., Beever, J.E. 1969 Studies on the Vegetation of Cuvier Island. II Structure of the Forest. *Tane 15*:69-74.

Lynch, P.A., Ferguson, E.J., Hynes, P. 1972 The Vegetation of Red Mercury Island. Part I: The Plant Communities and a vascular plant species list. *Tane 18* (this issue).