

Vegetation Of Nga Manu Sanctuary, Waikanae

*Susan Timmins and Maggy Wassilieff,
Wellington*

INTRODUCTION

Nga Manu sanctuary is a 10 ha swamp west of Waikanae (GR NZMS1 N157, 592731) which since 1975 has been developed as a bird sanctuary by the Nga Manu Trust. A good example of coastal swamp forest, small areas of sand dune forest, sedgelands and some secondary human-induced communities are all contained within the area (Fig. 1).

In April 1983 we mapped the vegetation of the sanctuary at the request of Mr P. McKenzie, the person responsible for the sanctuary's preservation and development.

LOCALITY AND HISTORY

Nga Manu sanctuary enjoys a humid, temperate climate. Meteorological records from Paraparaumu aerodrome, 4 km south of the sanctuary, show an annual mean temperature of 12.9 degrees Celsius, 2053 sunshine hours and an average rainfall of 1050 mm/yr. Prevailing winds are from the north and north-east and strong winds of more than 63 km/h are experienced on an average of 75 days/yr.

The sanctuary is on Recent (late Holocene age) fixed dunes and peat deposits.

Ditches run through the sanctuary; it is not known when they were first dug, but they have been in use for over 50 years. Some timber has been removed and stumps of large sawn trees were excavated from a swamp by P. McKenzie.

Stock had access to the sanctuary until 1975 when it was fenced off from surrounding farmland. Clearings in the forest were in bracken and grass prior to fencing and were grazed by the stock. Since 1975, regular mowing has kept the clearings in a grass cover and grass was sown around the Information Centre in 1979/80.

Some native plants have been planted in the sanctuary including puriri, whau, taupata and kohuhu. A shelter belt of tree lucerne has been planted along the western boundary.

VEGETATION DESCRIPTION AND MAPPING

Using both field observations and a large scale aerial photograph of the sanctuary, many separate vegetation types were recognised. For each vegetation type, the cover of the dominant canopy species was estimated as one of four cover categories: $\geq 50\%$, 20-49%, 10-19% or 1-9% and the type was named (Table 1) using both canopy composition and structural features after Atkinson (1962, 1981). The vegetation types were mapped by identifying and marking appropriate boundary lines on the aerial photograph.

A full botanical investigation of the swamp vegetation was not undertaken in this study.



Fig. 1 View looking south across Nga Manu sanctuary from manuka shrubland in foreground across ponds and islands to [swamp maire/raupo sedgeland and kahikatea-pukatea-swamp maire forest in background.

RESULTS

Twenty-two different vegetation types were recognised and mapped. These were aggregated into four groups: sedgeland, swamp forest, dry forest and human-induced (Fig. 1; Table 1).

Sedgeland

Vegetation types within this group dominate the central part of Nga Manu where there is a permanent exposed water table (Fig. 1, Fig. 2). Very wet areas are dominated by raupo; raupo swamp (I), [swamp maire]/raupo swamp ([E]/I), and in drier areas flax, *Carex* spp., *Cyperus*, or *Scirpus* predominate. The vegetation on the islands in the larger ponds contains a mixture of the wet-loving species; flax, *Carex virgata* (and raupo in the eastern pond) plus hardwood shrub species on the higher ground.

Swamp forest

These vegetation types are found on the waterlogged peat soils between sand dunes. A central remnant contains a fine example of coastal swamp forest (Pd—L—E; Fig. 1, Fig. 2); tall kahikatea, pukatea and smaller trees of swamp maire form a canopy over an understorey of kohekohe, mahoe, kawakawa and wheki tree fern. Only a few old, large kahikatea are present but younger kahikatea, which possibly date from the first forest clearance in the district, have reached the canopy. Puka is epiphytic on some of the larger kahikatea, and the lianes kiekie and bush lawyer are also common.

Kahikatea is absent from the swamp forest types which bound it. On the north-eastern side there is pukatea—swamp maire forest (L—E) with a dense understorey of wheki and *Coprosma aerolata*. The western swamp forest remnant is dominated by an open swamp maire—pukatea treeland (E—L, Fig. 3). Wheki is uncommon in this understorey.

Dry forest

A tawa and kohekohe-dominant forest type has developed on the fixed sand dunes between the low lying peat areas (B—D, Fig. 4). There is a continuum between this dry tawa—kohekohe forest and the swamp forest types. Young kahikatea and pukatea are found on damper sites in the tawa—kohekohe forest. Wheki and mamaku are both common in the sand dune forest understorey.

In two small patches of low coastal forest tawa is absent (Mr—M1—(L)); mahoe and ngaio are the canopy dominants with some pukatea present where the dry forest borders swamp forest.

The third dry forest type is a small area of regenerating mahoe scrub (Mr) on the northern boundary sand dune (Fig. 2) and contains many shrub species including red matipo, hangehange, *Coprosma areolata*, young lancewood and manuka and a small amount of barberry. The shrub species appear to have regenerated through a bracken-dominated sere; bracken is present beneath the shrub canopy and also at the periphery of the area.

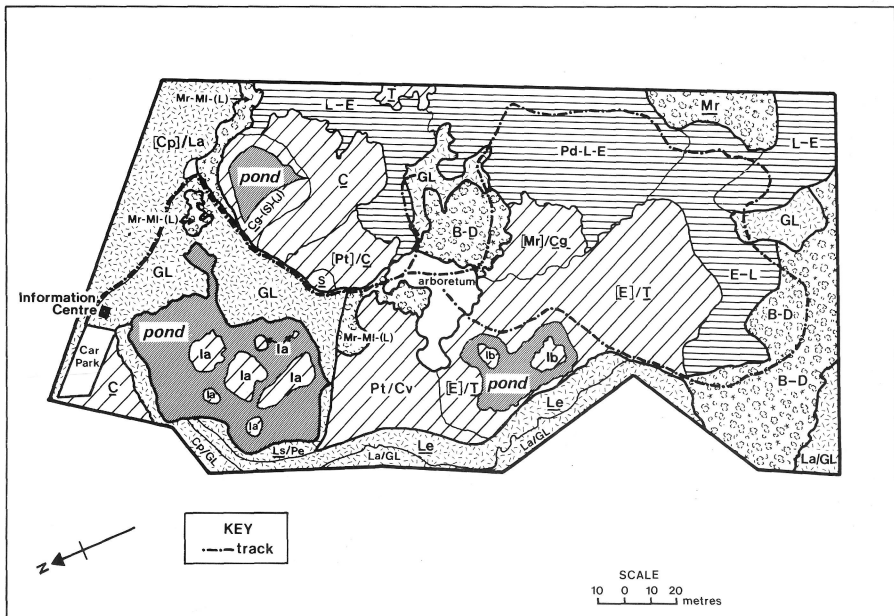















Fig. 2 Vegetation map of Nga Manu Sanctuary, Waikanae.

VEGETATION LEGEND




1. SEDGELAND

Raupo _____	
[Swamp maire] /raupo _____	
Cyperus _____	
[Flax] /cyperus _____	
Flax/carex virgata _____	
Carex geminata-scirpus-juncus _____	
[Mahoe] /carex geminata _____	
Scirpus swamp _____	
Mixed sedge-shrub-flax land _____	
Mixed flax-raupo-shrubland _____	








2. SWAMP FOREST

Pukatea-swamp maire _____	
Swamp maire-pukatea _____	
Kahikatea-pukatea-swamp maire _____	

3. DRY FOREST

Tawa-kohekohe _____	
Mahoe-ngaio-(pukatea) _____	
Mahoe scrub _____	

4. HUMAN INDUCED COMMUNITIES

Manuka shrubland _____	
Manuka/bracken scrub _____	
Tree lucerne/exotic grasses _____	
[Tree lucerne] /lupin scrub _____	
Lupin/exotic grasses _____	
Exotic grassland _____	
Ponds-open water _____	

VEGETATION SYMBOLS

Structural Symbols

- Joins names of species of similar height.
/ Separates names of taller species, to left of symbol, from shorter.

Compositional Symbols

- | | | |
|------|-------------------------------|--------|
| Pt | Cover of species underlined | ≥ 50% |
| Pt | Cover of species | 20-49% |
| (Pt) | Cover of species so bracketed | 10-19% |
| [Pt] | Cover of species so bracketed | 1-9% |

TABLE 1 — VEGETATION COMMUNITIES
OF NGA MANU SANCTUARY, WAIKANAE

Symbol	Name	Details
SEDGELAND		
T	Raupo swamp	<i>Typha orientalis</i> swamp
[E]T	[Swamp maire] raupo swamp	<i>Typha orientalis</i> swamp and <i>Carex geminata</i> , <i>Leptospermum scoparium</i> and emergent <i>Syzygium maire</i> , <i>Cordyline australis</i> , <i>Dicksonia squarrosa</i> common in southern sector.
C	Cyperus swamp	<i>Cyperus ustulatus</i> swamp
[Pt]C	[Flax]cyperus swamp	<i>C. ustulatus</i> swamp and <i>Phormium tenax</i> , <i>Phytolacca octandra</i> , <i>Muehlenbeckia australis</i> , <i>M. complexa</i> and <i>Coprosma propinqua</i> .
Pt/Cv	Flax/carex virgata swamp	<i>Phormium tenax</i> / <i>Carex virgata</i> swamp with <i>Pseudopanax crassifolius</i> , <i>Melicytus ramiflorus</i> , <i>Pteridium esculentum</i> , <i>Muehlenbeckia australis</i> with <i>Leptospermum scoparium</i> common.
Cg-(S)-(J)	<i>Carex geminata</i> -scirpus-juncus swamp	<i>Carex geminata</i> swamp with <i>Scirpus prolifer</i> , <i>Juncus pallidus</i> and (<i>Rubus fruticosus</i> , <i>Pteridium esculentum</i> , <i>Solanum aviculare</i> , <i>Muehlenbeckia australis</i>).
[Mr]Cg	[Mahoe]carex geminata, swamp	<i>Carex geminata</i> dominated swamp with <i>Melicytus ramiflorus</i> shrubs and one <i>Podocarpus dacrydioides</i> .
S	Scirpus swamp	<i>Scirpus prolifer</i> pond.
la	Mixed sedge-shrub-flax land	Varying combinations of <i>Cyperus ustulatus</i> , <i>Phormium tenax</i> , <i>Carex virgata</i> , <i>Rubus fruticosus</i> , <i>Pteridium esculentum</i> , <i>Leptospermum scoparium</i> , <i>Coprosma robusta</i> , <i>Cortaderia toetoe</i> .
lb	Mixed flax-raupo-shrub land	<i>Phormium tenax</i> - <i>Typha orientalis</i> - <i>Muehlenbeckia australis</i> - <i>Pteridium esculentum</i> islands.
SWAMP FOREST		
L-E	Pukatea-swamp maire forest	<i>Laurelia novae-zelandiae</i> - <i>Syzygium maire</i> / <i>Dicksonia squarrosa</i> - <i>Coprosma areolata</i> swamp forest with <i>Pseudopanax crassifolius</i> , <i>Myrsine australis</i> .
E-L	Swamp maire-pukatea treeland	<i>Syzygium maire</i> - <i>Laurelia novae-zelandiae</i> open swamp forest with understorey of <i>Coprosma areolata</i> .
Pd-L-E	Kahikatea-pukatea-swamp maire forest	<i>Podocarpus dacrydioides</i> - <i>Laurelia novae-zelandiae</i> - <i>Syzygium maire</i> / <i>Dicksonia squarrosa</i> / <i>Coprosma areolata</i> swamp forest with <i>Freyinetia baueriana</i> ssp. <i>banksii</i> , <i>Dysoxylum spectabile</i> , <i>Macropiper excelsum</i> , <i>Geniostoma rupestre</i> , <i>Coprosma grandifolia</i> , <i>Asplenium bulbiferum</i> , <i>A. oblongifolium</i> , <i>Melicytus ramiflorus</i> . Bordered by regenerating shrub species, e.g., <i>M. ramiflorus</i> .

DRY FOREST

B-D	Tawa-kohekohe forest	<i>Beilschmiedia tawa</i> - <i>Dysoxylum spectabile</i> / <i>Dicksonia squarrosa</i> - <i>Cyathea medullaris</i> - <i>Melicactus ramiflorus</i> dry forest with patches of <i>Podocarpus dactyloides</i> and <i>Laurelia novae-zelandiae</i> on peat intrusions.
Mr-MI-(L)	Mahoe-ngaio-(pukatea) forest	<i>Melicactus ramiflorus</i> - <i>Myoporum laetum</i> - <i>Laurelia novae-zelandiae</i> with <i>Pseudopanax crassifolius</i> , <i>Coprosma robusta</i> , <i>Macropiper excelsum</i> . <i>Melicactus ramiflorus</i> regenerating in central remnant adjacent to arboretum.
Mr	Mahoe scrub	<i>Melicactus ramiflorus</i> scrub with <i>Myrsine australis</i> , <i>Pteridium esculentum</i> , <i>Geniostoma rupestre</i> , <i>Coprosma areolata</i> , <i>Pseudopanax crassifolius</i> , <i>Leptospermum scoparium</i> , (<i>Berberis glaucocarpa</i>).

HUMAN MODIFIED/INDUCED COMMUNITIES

Le	Manuka shrubland	<i>Leptospermum scoparium</i> shrubland with <i>L. ericoides</i> trees.
LS/Pe	Manuka/bracken scrub	<i>Leptospermum scoparium</i> / <i>Pteridium esculentum</i> scrub on dugout peat.
Cp/GL	Tree lucerne/exotic grasses	<i>Chamaecytisus palmensis</i> /exotic grassland with planted shrubs.
[Cp]/La	[Tree lucerne]/lupin scrub	<i>Lupinus arboreus</i> shrubland with <i>Phormium tenax</i> , <i>Dodonaea viscosa</i> , <i>Chamaecytisus palmensis</i> , <i>Pteridium esculentum</i> , <i>Phytolacca octandra</i> , <i>Rubus fruticosus</i> and two <i>Rhopalostylis sapida</i> .
La/GL:	Lupin/grass shrubland	<i>Lupinus arboreus</i> /grassland (with planted shrubs, <i>Coprosma repens</i> , <i>Dodonaea viscosa</i>).
GL	Introduced grassland	Introduced grassland (<i>Agrostis tenuis</i> , <i>Holcus lanatus</i>).

Human modified/induced communities

Secondary shrublands have developed around the western and southern perimeters of the sanctuary after human disturbance in these areas (Fig. 2). Lupin-dominant shrublands ([Cp]/La and La/GL) are found on the cleared sand dunes and there is a small strip of tall kanuka trees over manuka shrubs (Le) on the sand dunes bounding the two large northern ponds (Fig. 1).

Planted tree lucerne, akeake, taupata and kohuhu provide a wind shelter behind the kanuka/manuka border, i.e. in the grassland (La/GL).

A young manuka and bracken cover (LS/Pe) clothes the peat banks which were deposited around the largest pond in 1975.

DISCUSSION

Nga Manu contains the best example of a coastal swamp forest in the vicinity of Wellington. Although small in area, it appears to be in a healthy state and understorey regeneration has been encouraging since the sanctuary was fenced.

The Nga Manu trust has a term lease on the sanctuary land and at present there is no guarantee that the area will have permanent protection. The area to the east of the sanctuary contains further good examples of mature kahikatea—pukatea—swamp maire forest and tawa—kohekohe forest. It would be desirable that some form of long term protection could be placed over this area as well as over Nga Manu sanctuary.

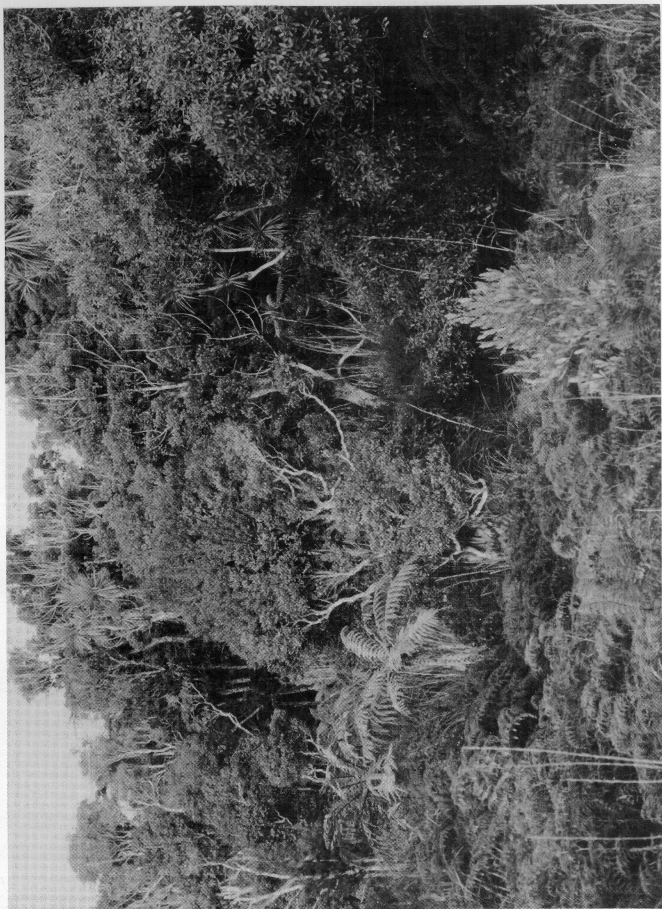


Fig. 3 Structure of swamp maire-pukatea treeland, showing the distinctive, white, upright branches of pukatea and the rounded form of *swamp maire*



Fig. 4 View from grassy knoll in southern corner of sanctuary looking into tawa-kohekohe dry forest. A patch of kahikatea is emergent in the background.

ACKNOWLEDGEMENTS

We would like to thank the Department of Lands and Survey for providing transport to Nga Manu; Mr P. McKenzie for kindly providing accommodation at Nga Manu; and our husbands, Kerry Hollingsworth and Con Wassilieff, for logistic support at Nga Manu.

REFERENCES

- Atkinson, I. A. E., 1962: Semi-quantitative measurements of canopy composition as a basis for mapping vegetation. *Proceedings of NZ Ecological Society* 9: 1-8
- Atkinson, I. A. E., 1981: Vegetation map of Tongariro National Park, North Island, New Zealand. Scale 1:50 000. DSIR, Wellington.

APPENDIX 1 — COMMON NAMES USED IN TEXT

<i>Common Name</i>	<i>Scientific Name (symbol)</i>
Akeake	<i>Dodonea viscosa</i>
Barberry	<i>Berberis glaucocarpa</i>
Bracken	<i>Pteridium esculentum</i> (Pe)
Bush lawyer	<i>Rubus australis</i>
Carex geminata	<i>Carex geminata</i> (Cg)
Carex virgata	<i>Carex virgata</i> (Cv)
Cyperus	<i>Cyperus ustulatus</i> (C)
Flax	<i>Phormium tenax</i> (Pt)
Hangehange	<i>Geniostoma rupestre</i> var. (= <i>G. ligustrifolium</i>)
Juncus	<i>Juncus pallidus</i> (J)
Kahikatea	<i>Podocarpus dacrydioides</i> (Pd)
Kanuka	<i>Leptospermum ericoides</i> (Le)
Kawakawa	<i>Macropiper excelsum</i>
Kiekie	<i>Freycinetia baueriana</i> ssp. <i>banksii</i>
Kohekohe	<i>Dysoxylum spectabile</i> (D)
Kohuhu	<i>Pitiosporum tenuifolium</i>
Lancewood	<i>Pseudopanax crassifolius</i>
Lupin	<i>Lupinus arboreus</i> (La)
Mahoe	<i>Meliclytus ramiflorus</i> (Mr)
Mamaku	<i>Cyathea medullaris</i>
Manuka	<i>Leptospermum scoparium</i> (Ls)
Ngaio	<i>Myoporum laetum</i> (M1)
Puka	<i>Griselinia lucida</i>
Pukatea	<i>Laurelia novae-zelandiae</i> (L)
Raupo	<i>Typha orientalis</i> (T)
Red matipo	<i>Myrsine australis</i>
Scirpus	<i>Scirpus prolifer</i> (S)
Swamp matire	<i>Syzygium</i> (= <i>Eugenia</i>) <i>maire</i> (E)
Taupata	<i>Coprosma repens</i>
Tawa	<i>Beilschmiedia tawa</i> (B)
Tree lucerne	<i>Chamaecytisus palmensis</i> (= <i>Cytisus proliferus</i>) (Cp)
Wheki	<i>Dicksonia squarrosa</i>