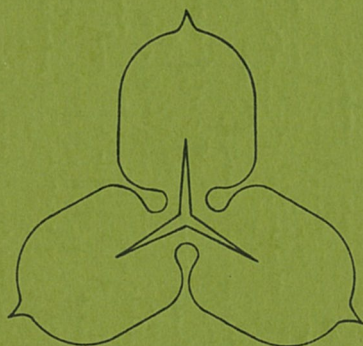


BOTANY DIVISION DSIR



REPORT

BOTANY OF THE AHIPARA GUNLANDS
AND TAUROA PENINSULA

N.M.U. CLUNIE AND P. WARDLE
BOTANY DIVISION, DSIR

APRIL 1983

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SUMMARY

Four major and two minor habitat types are recognised on the Ahipara plateau and adjoining coastline including the Tauroa Peninsula. These, and the vegetation they support are as follows:

1. The plateau surface with leached, poorly-drained soils supporting low, heath vegetation with a complex pattern of communities related to fire, drainage and soil texture. The dominant plants include manuka, prickly hakea, four species of rushlike sedge, and umbrella fern. A partly logged remnant of kauri forest grows on an isolated portion of the plateau that has partially escaped burning.
2. The valleys and gullies, and the inland and coastal escarpments of the plateau are still largely covered by forest that has generally been modified by logging, pigs and cattle but remains rich in species. Gorse, bracken and manuka dominate fire-induced vegetation on comparable sites.
3. Fixed sand dunes towards the coast and on Tauroa Peninsula support rough and improved pasture, as well as low, open shrubland, tall kanuka stands, and semi-coastal bush in the gullies.
4. Mobile dunes are very extensive, and support some large colonies of the native sand-binding grass spinifex.
5. The minor habitats are swamps, and coastal and inland rock outcrops. These cover only a small area, and except for the inland rock outcrops, have been heavily modified.

Five species listed in "Rare and endangered Plants of New Zealand" (Given 1981) were seen, and their habitats and status are described briefly. They are Hibiscus diversifolius, Thelypteris confluens, Pseudopanax ferox, Lycopodium serpentinum, and Phylloglossum drummondii.

RECOMMENDATIONS

1. The northern Gumlands Historic Reserve (gazetted 1975/652, 1982/2715), centred on N9/648578, should be enlarged to about 300 ha. It should be designated in a reserve category appropriate for historic, scenic, biological and other scientific values, including protection of rare plants. Management would include controlled burning, and possibly local manipulation of drainage.

2. The proposed southern gumlands reserve, centred on N9/655550, should be adopted and the area extended. A key feature is the forest remnant with two large kauris in the Waitaha Stream tributary.
3. Ideally, the northern and southern gumlands reserve areas should be amalgamated into a single unit of some 400 to 450 ha (see map). The southwestern boundary could coincide with the top of the steep western escarpment or, preferably, incorporate the bush-clad valleys. (Fig. 1).
4. Every effort should be made to acquire land for a reserve centred on N9/687544 (see map), to include the remnant of kauri forest on gumlands soil. Management will entail exclusion of fire, to allow adjoining gumlands scrub to develop back to forest.
5. All existing native forest has high intrinsic conservation value, and should be protected. The extensive semi-coastal forest and rock bluffs on the steep terrain of the coastal escarpment north of the Waiatua Stream in particular warrant status and management for perpetual conservation, that would include exclusion of livestock. (Fig. 2).
6. Tall kanuka and native bush on fixed sands should be protected, for soil conservation and biological values.
7. Land owners should be persuaded to set up conservation covenants and give suitable protection to localities with Hibiscus diversifolius, Thelypteris confluens, and Pseudopanax ferox.

KEY WORDS:

GUMLANDS plateau : SCRUB; Manuka, hakea, rush-like sedges, umbrella fern.
Kauri remnant.

VALLEYS and SCARPMENTS : FOREST; taraire, broadleaf and podocarp.

FIXED SAND DUNES : Coastal scrub, grasslands.

MOBILE SAND : Spinifex.

LOWLAND SWAMP : Rock outcrops.

RARE PLANTS : Phylloglossum drummondii, Lycopodium serpentinum,
Hibiscus diversifolius, Thelypteris confluens,
Pseudopanax ferox.

RESERVES : Gumlands scrub, kauri forest remnant, native forest.
Conservation covenant.

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I. INTRODUCTION

The Ahipara plateau is by far the largest surviving area of gumlands scrub, which is low heath land, induced and maintained by fire, that occurs in northern New Zealand on impoverished soils that have yielded kauri gum. This vegetation type, once an extensive and characteristic feature of Northland, occurs as scattered remnants that are increasingly vulnerable to development and which will soon disappear unless specific reserves are set up and suitably managed.

The tracts of lowland forest on the walls and floors of the stream valleys that dissect the plateau and on the coastal escarpment in the southwest are important to soil stability and are of high value for biological conservation. Further, a number of plant species recognised to be 'rare and endangered' have long been known to occur as wild populations in the gumlands and on adjoining coastline and dune of the Tauroa Peninsula.

Very little information about the plant cover of the area is on record. To remedy this, the vegetation of the Ahipara plateau and its associated stream valleys and coastal dune systems, covering an area of some 7 500 ha, was surveyed by the authors over a 7-day period in November 1982, as part of a land use study. This report presents an initial statement of the botany of the area to provide the information required for immediate decisions on land use. A more detailed account of the vegetation, which will include an inventory of the plant species seen, will be prepared over the coming months. There is wide scope for more detailed ecological studies in the area.

II. THE PHYSICAL SETTING

The study area incorporates the entire Ahipara plateau, which is a more-or-less flat-topped uplifted block, ranging in height from some 150 m in the north near Tauroa Point to over 300 m in the south, and bounded by steep escarpments along the coast, the northern Herekino Harbour and the rift valley to the east (see map). The plateau top is dissected by westward-draining streams which have cut deep, steep-walled valleys. Gullies and incised streambeds are restricted to the vicinity of the main valley walls; elsewhere drainage of the plateau is in to wide, shallow valleys with no distinct runoff channels, separated by broad ridges and gentle spurs.

The gumlands extend over the surface of the plateau, which is mantled by podzols, i.e., ancient soils, impoverished of nutrients by leaching, and subject to both periodic waterlogging and intense moisture deficit. The parent material is early Pleistocene dune sands. In most places, topsoil is light grey sand. This is underlain successively by a whitish silica pan which is mostly friable, but can be indurated to form a hard-pan; a soft black humus accumulation layer; and a reddish iron-rich horizon which is usually indurated to form a hard-pan that may impede root penetration. Where the plateau surface drops off into steeper valleys and gullies, erosion has often exposed underlying reddish-brown clay.

Valleys and gullies that are cut into the underlying basalt and dolomite, as well as the high scarps which define the inland limits of the Ahipara plateau, are moister and better drained than the plateau gumlands. The granular clay soils here can show a strong red colour and appear to be more fertile.

Fixed dunes cover large areas, especially in the northwest and southwest. They vary from lightly consolidated, weakly weathered quartz and feldspar sand, to podzolised sands. In places, erosion has revealed underlying leached silica sands, hardpans, and tree roots and stumps in situ.

Mobile sand forms extensive dunes roughly normal to the coastline. In the northwest, moving lobes extend over the Tauroa Peninsula (180 m.a.s.l.) and down to the northern coast, while in the southwest, sand is building up against the high scarp of the plateau.

Lowland swamps are small and generally heavily browsed and trampled by cattle. They are frequent along the narrow coastal terraces of the Tauroa Peninsula, and are caused by extensive foot-seepage from the steep slopes of the northern escarpment.

Rock outcrops occur along the coast, and inland on the coastal escarpment where they are prominent on the north side of the Waiatua stream.

III. THE PLANT COMMUNITIES

The pattern of distribution of the major vegetation types is sharply delimited, and is determined by the primary constraints of physiography, soil or substrate type, and fire. Four main habitat types and two minor ones are used as a basis for describing the vegetation: they coincide with the six physiographic settings described in Section 2.

The HABITAT TYPES are: 1 - the gumlands plateau; 2 - the valleys that have been incised into it; 3 - fixed sand dunes near the coast; 4 - moving sands; and the small areas of 5 - lowland swamps, and 6 - rock outcrops.

1. The Gumlands: The low scrub that clothes the plateau is a pioneer community growing on exposed sites on severely limiting soils. Natural succession to taller scrub and forest is prevented by recurrent burning. The scrub has replaced a former forest cover in which kauri was common - as evidenced by widespread gumdigger's pits and stumps. It is likely that much of this forest was burned during the first centuries of Maori colonisation, when so much of New Zealand was deforested. (Wood samples collected for radio-carbon dating should confirm or disprove this).

The gumlands scrub supports a small flora of fire-resistant plants able to tolerate this harsh environment. The most versatile and ubiquitous of these is manuka, which assumes widespread physiognomic dominance. Other abundant plants which are important visual and structural components of the scrub are umbrella fern, the heath-like shrubs

Dracophyllum lessonianum and mingimingi, and several species of rush-like sedges (especially Baumea teretifolia, Schoenus brevifolius, S. tendo, and, to a lesser extent, Lepidosperma australe). Gorse and prickly hakea are the most important of the few exotic species able to tolerate the environment of the gumlands, but are dominant only locally. Thus, despite repeated burning, the flora is predominantly native.

A few species, e.g. Dracophyllum lessonianum and Schoenus brevifolius, flourish only in the gumland and are of little or no significance in other communities. (S. brevifolius grows also on peat swamps at Motutangi and at Whangamarino in the Waikato). The insectivorous sundews and ground orchids (notably Thelymitra spp.) with underground storage organs from which they shoot perennially, are especially prominent in the gumlands. Many of the other species, e.g., bracken, the sedges Gahnia setifolia, Lepidosperma laterale and Morelotia affinis and the shrub Pimelea prostrata, reach some abundance only on sites where the upper soil has been disrupted, and appear to be at the limit of their tolerance where the podzol profile is intact.

Three factors determine the proportion of species in the vegetation at any one site : the wetness of the soil (and, conversely, soil aeration, which may be as limiting as water); soil texture (and/or associated fertility); and time since the last fire.

Time since the last fire exerts a strong and varying influence upon both species composition and the structure and general appearance of the scrub. Seedlings of manuka, gorse and hakea germinate in large numbers after each fire. Sedges may appear to dominate post-fire vegetation, especially in damp hollows, because they rapidly regain their height and density, but closer inspection invariably reveals an abundance of young shrubs coming up through the cover. These subsequently will overtop the tall sedge sward, causing a dramatic change in the appearance of the community. The visual impact of community pattern is reinforced by a competition effect along the boundaries between burnt and intact scrub, which results in sharply-defined communities of different age (Fig. 3).

Manuka will form dense scrub on nearly every kind of gumland site, though there are few places where prickly hakea is completely absent. On well-drained knolls and on the upper flanks of spurs there are extensive patches of dense hakea, and this introduced shrub seems to be increasing on these relatively favourable sites. Gorse and bracken on the other hand, seldom dominate on true gumland sites, except where heaps and ridges of soil have been thrown up during digging.

Gumland vegetation, on the whole, seems more dense on the Epākauri block than on the northern part of the plateau. This may be a result of more difficult access and therefore less frequent burning.

In the few places where freedom from fire has permitted manuka scrub to reach a height of three or more metres, and there is forest nearby, tree seedlings, including those of kauri, rimu, tanekaha and miro, establish freely. Most of the gumland is so distant from forest, however, that forest seedlings, other than those of towai and karamu, are rare.

In the head of Hunahuna stream (grid ref. N9/685744) a patch of kauri forest occupies a small portion of the Ahipara plateau that is isolated by deep valleys, which have given a measure of protection from fire. At least part of this stand is underlain by sand podzol with a conspicuous silica pan; it seems to be the last surviving fragment of kauri forest on gumland soils on the plateau, if not in New Zealand. Though logged, the stand has recovered well. Tall kauri (c. 26 m x 45-60 cm d.b.h.), that has passed the ricker stage, occurs either as densely stocked stands over pole kawaka,

rimu, tanekaha, Hall's totara and pole kauri, or as scattered emergents over a main lower canopy (at c. 10 m) of old kanuka and pole Hall's totara, kawaka, rimu and tanekaha.

If the Ahipara Plateau (and other gumlands) were once occupied by kauri forest, where did the distinctive native gumland species come from? Most of them are adapted to survive in alternative habitats on impoverished acid soils or swamps. We suggest, by analogy with undisturbed vegetation on "pakihi" soils in Westland, that they would have occupied extremely infertile soils in shallow depressions and on exposed ridges, where tree growth was impossible or was so stunted and open that sedges could dominate.

2. Deeply-incised valleys and scarp walls: These are largely forest-covered; there are still extensive tracts quite rich in species, despite damage by pigs, cattle and logging.

Inland the forest is luxuriant (Fig. 6), with a closed but uneven main broadleaf canopy at c. 20 m, with taraire (to 60 cm d.b.h.) and towai dominant. On upper slopes puriri (up to 1 m d.b.h.), and rewarewa are conspicuous, while tawa and kohekohe are abundant on lower slope and valley floors. Much taller (to 35 m x 90 cm d.b.h.) podocarps, particularly rimu, mostly with broken crowns, occur as scattered emergents, having been passed over during earlier selective logging. Kauri is present in most areas, though nearly all the large trees are gone, with the notable exception of two in a tributary gully of the Waitaha Stream. Kawaka, seldom a common species anywhere, was seen at three localities.

On the coastal escarpment (Fig. 2) taraire dominates, with abundant rewarewa and (on lower slopes) kohekohe, and widespread but scattered puriri. Miro, rimu and hall's totara are scattered, and kauri occurs in patches on the upper slopes. On exposed spur crests and faces the canopy is lower and more broken, with hinau, karaka and shrubs including kanuka, Olearia albida and Pittosporum tenuifolium conspicuous in the low (to 10 m) canopy. Tracts of relatively dense manuka/kanuka on spur crests and upper faces suggest recent incursion of fire.

Fire-induced vegetation on comparable soils consists mainly of gorse, manuka and bracken, and in places these have invaded abandoned pasture. Where such fernland and scrub adjoin forest, vigorous invasion by young trees is offset by recurrent burning.

3. Fixed sand dunes: Most of the grazing, and certainly all the better grazing is on this landform, including some good dryland pasture on podzolised sands on the north side of the Tauroa Peninsula. More typical is unimproved cover with lupin (often extensive), pampas grass (replaced by toetoe nearer the coast), bracken, more open patches with kikuyu, rice-grass, Vulpia and catsear, tangled masses of Muehlenbeckia complexa, scattered flax and cabbage trees and many other native and introduced species.

Native bush and tall (to 12 m) scrub, heavily penetrated by cattle, is also extensive, especially on rough terrain. On upper slopes kanuka, and to a lesser extent manuka, form shelter for plants such as five-finger, lancewood, native broom and Bank's cabbage tree. In the gullies the scrub-bush canopy is more mixed, and includes mangaeo, akeake, black treefern, pigwood, Olearia albida, and occasional taraire, karaka, puriri and kohekohe. Ngaio occurs in closed stands on some low sand terraces.

4. Moving sands: There are good colonies of the native sand-binding grass Spinifex (Fig. 5) and, in places, the introduced marram. Only one colony of pingao was seen.

5. Lowland swamps: Though heavily disturbed by cattle, the small swamp areas examined along the north coast of the Tauroa Peninsula support quite a large assemblage of native swamp plants. Communities range from raupo and tall Baumea swamp bounded by manuka, to open, short, grazed sedge-turf dominated by species of Eleocharis, Scirpus and Juncus.

6. Rock outcrops: On coastal outcrops, despite heavy modification by cattle browsing and trampling and invasion by introduced plants, a considerable number of native species survive, including tussocks of Stipa stipoides and an unusually succulent form of a coastal groundsel Senecio lautus.

Inland rock outcrops support tall tussocky monocots such as Cape Reinga lily, astelias, flax, gahnias and the wide-leaved sedge Machaerina sinclairii.

IV. RARE AND ENDANGERED PLANTS

Seven species listed in "Rare and endangered plants of New Zealand" (Given, 1981) are reported to grow in the study area, and we saw five of them. In this report, we describe the localities only in general terms, but the grid references have been supplied to the study co-ordinator.

Hibiscus diversifolius grows on a swampy terrace, mostly within 20-30 m of the tidal rock platform on the north side of Tauroa Peninsula (Fig. 4). This plant, though very rare in New Zealand, occurs widely but sporadically in the tropical Pacific, and may well have been introduced by the Maori. Plants grow amongst tall, dense swamp vegetation. They apparently are unpalatable to cattle, and their survival in this boggy habitat seems to be encouraged by moderate trampling and browsing which restricts the vigorous growth of Baumea articulata and other tall sedges and the creepers Calystegia sepium and C. marginata that would tend to smother it, and opens the substrate to establishment of seedlings and vegetative propagules. It is, however, possible that earlier pressure from cattle may have constricted Hibiscus to these swampy sites. On the present habitats heavy trampling would affect seedling establishment adversely if cattle stocking was increased.

A clump of goat willow in this area is a very undesirable feature, in relation to survival of the native plants, and should be removed.

Thelypteris confluens : This delicate fern was seen in two seepage bogs at the feet of the slopes on the north side of Tauroa Peninsula up to 80 m inland from the beach dike. It grows, with Baumea articulata, on very moist but slightly raised mounds and banks above bog communities with heavily grazed raupo, Baumea rubiginosa and other swamp sedges, and Isachne globosa, and is itself grazed to some degree.

We saw T. confluens also at Motutangi swamp (the subject of a separate report), and it occurs beyond New Zealand.

Pseudopanax ferox : We saw three adult trees and a considerable number of juveniles of fierce lancewood on a stabilised sandy knoll on the summit of the Tauroa Peninsula. It is growing together with the common lancewood in tall kanuka. On the eastern side of the knoll, vegetation, including a P. ferox sapling, is being covered by an active dune. On the other hand, it is clear that P. ferox owes its survival to moving sand having provided a fire break.

We searched similar kanuka stands without success for P. ferox, but a report by Bartlett indicates there may be other colonies in the neighbourhood. Given (1981) reported only one stand of P. ferox in the North Island, but another has been found since.

Fuchsia procumbens : Reputed to grow on the Tauroa Peninsula but we did not see it.

Lycopodium serpentinum : This club-moss is rare in New Zealand, though it grows also in Australia and New Caledonia. We verified its continued presence in the northern Ahipara Gumland Historical Reserve, growing in small patches among mosses and the bog sundews (Drosera binata and D. spatulata) in a very restricted seepage habitat that has been created by diggers' earthworks.

Phylloglossum drummondii : At one time this tiny Australasian club moss was widespread in the northern gumlands, but today the Ahipara Plateau is possibly the only locality where it still grows. There are numerous plants in damp, silted-up depressions in the northern historic reserve, but we found it nowhere else.

Corybas unguiculatus : An otherwise Australian orchid recorded from Tauroa Peninsula by Bartlett. We did not find this plant, possibly because the season was unusually dry.

V. BOTANICAL CONSERVATION CONSIDERATIONS

1. Gumlands vegetation:

a) Gumlands scrub: The Ahipara plateau provides the last opportunity to reserve an extensive area of gumland vegetation. The gumlands scrub communities almost certainly owe their origin largely to forest destruction and repeated burning by the early Maori, and are maintained by fire, though suitable habitats must have existed in pre-human times. They are a unique and important historic feature of the Northland landscape; at the time of European settlement (c. 1840) gumland scrub covered a part of the Coromandel Peninsula and about one-quarter of the land north of Auckland. Today, they are a threatened vegetation type. Other than the 'sand gumlands' of the Ahipara Plateau, these communities exist now only as isolated remnants, most of which are vulnerable and will soon succumb to pressures for development, particularly programmes of exotic afforestation. Although few species would be exterminated if the gumland scrub were to be eliminated, survival or some of the more specialised plants would be precarious and unique assemblages of native species would be lost.

It is particularly important that the opportunity be taken now to preserve a representative area of the gumlands scrub large enough to encompass a landscape type. We emphasise the historical significance of the Ahipara gumlands, and their distinctive scenery. It is desirable, in terms of management and setting, that the Historic Reserve be an integral part of a landscape-sized reserve managed in accordance with its biological and scenic features.

Gumlands reserves will also be valuable for applied research on soil and vegetation. In particular, study of natural gumlands soils will aid in managing similar soils converted to pasture and forest, while study of the vegetation will provide information relevant to the control of plants such as manuka and hakea on pastoral land.

Much of the interest of the gumlands vegetation lies in the mosaic pattern of plant communities related to fire and to subtle variations in soils and drainage. Fire will be an essential tool of management for maintaining this diversity, and local manipulation of drainage may be necessary if populations of Phylloglossum and Lycopodium serpentinum are to survive. Phylloglossum, although found also in Australia, has suffered major loss of suitable habitats and is threatened in both countries. Although its presence on the Ahipara Plateau seems related to disturbance, it is nevertheless an interesting and unique plant of ancient affinities that is well worth protecting.

A botanical reserve will need to be large enough to accommodate the fire patterns and habitat diversity, and to provide buffers against external influences such as invasion of pines from forestry areas, or drift of fertiliser and entry of stock from land developed to farming.

b) Kauri forest on gumland soils: An exceedingly rare vegetation type, probably the last viable remnant of healthy kauri forest on gumland podzols, occurs on an isolated sector of the plateau in the Hunahuna basin (see Section III). Kawaka, generally an uncommon species, is plentiful in the lower tree stratum. This remnant, together with the adjoining gumlands scrub showing various stages of development back to forest, are of the highest scientific interest.

2. Forest in the valleys and on escarpments: The forest remaining within and around the plateau retains a high diversity of species despite disturbance, and if protected from cattle and pigs would recover rapidly. All remaining forest in coastal and lowland parts of New Zealand has a high value for biological conservation. The forest on the steep terrain of the valley walls and escarpments plays an essential role in soil conservation and is of major scenic impact in the landscape. The Crown should not contemplate clearing any native forest, and private and Maori interests should be discouraged from doing so. It is noted with regret that a forestry company has clear-felled native forest on the steep terrain of the southern (Herekino) escarpment in preparation for pine afforestation.

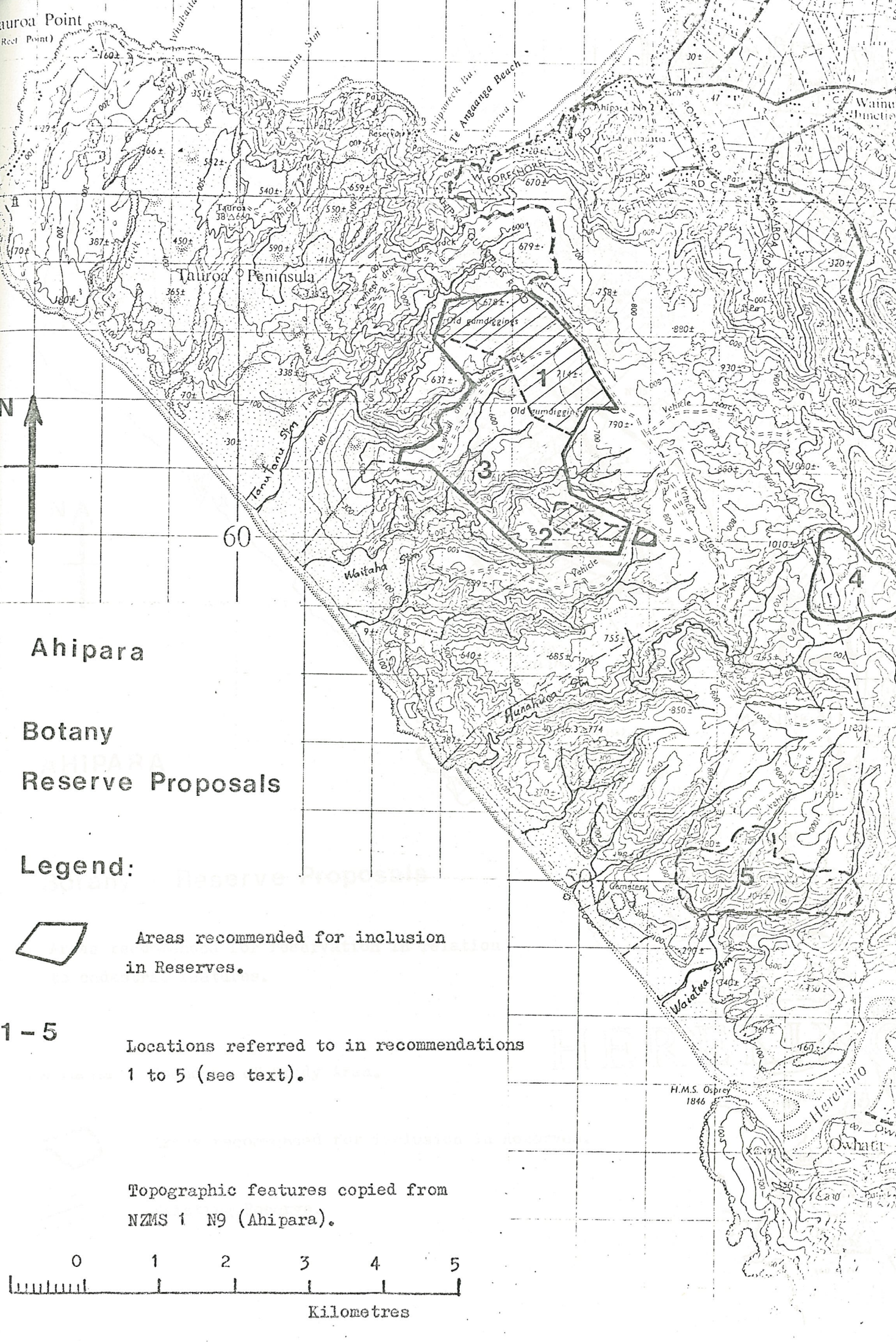
Protection of the native forest remnants is not incompatible with development of open land for exotic forestry and farming, provided adequate zones are set up to allow recovery of damaged margins, and stock are fenced out. Nor is protection of such forest necessarily incompatible with future extraction of native timber on a sustained yield basis, although physiographic constraints in the interest of soil conservation would make it prudent to confine any such operation to the relatively small areas of gentle slope.

Fire-induced low heath and bracken land on the clay soils of the valleys and basins have relatively low intrinsic conservation value, unless strategically located as buffers to forest.

3. Fixed sand dunes: Much of this is rough pasture, that is capable of being improved. The native kanuka scrub and bush in the gullies, however, should be protected, both because it is interesting vegetation with a marked coastal aspect, and because it provides buffers against gully erosion and moving sand.
4. The moving dunes: Other than some good colonies of spinifex, these dunes contain little of botanical interest, and we have no recommendation. The sand-blasted, skeleton forest east of Tauroa Hill, however, is a remarkable feature, that merits appropriate recognition and protection.
5. Rare and endangered plants: In our view, protection of vegetation types in the study area is of more immediate priority than protection of the rare species, though due consideration should be given to the latter. For two species, Phylloglossum drummondii and Lycopodium serpentinum, the northern Historic Reserve will give adequate protection, provided it is enlarged and managed appropriately. We do not regard either the Hibiscus diversifolius or the Thelypteris confluens on the Tauroa sites as being of as high conservation priority as would be the case for rare endemic species or vanishing types of vegetation. Nevertheless, the Hibiscus does not present a major problem in protection, and the land owners should be encouraged to take out a conservation covenant and to accept advice on management of the area. A similar procedure would be appropriate for the Pseudopanax ferox site (or sites)?; in this case encroachment of the dunes should be watched, and if there is immediate danger of the plants being overwhelmed, seedlings could be transplanted into other areas of kanuka-dominated scrub.

REFERENCE

- Given, D.R. 1981: "Rare and endangered plants of New Zealand".
A.H. & A.W. Reed Ltd, Wellington and Sydney.



Taurua Point
Reef Point



Ahipara

Botany
Reserve Proposals

Legend:

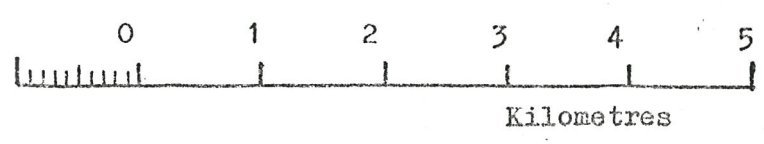


Areas recommended for inclusion
in Reserves.

1-5

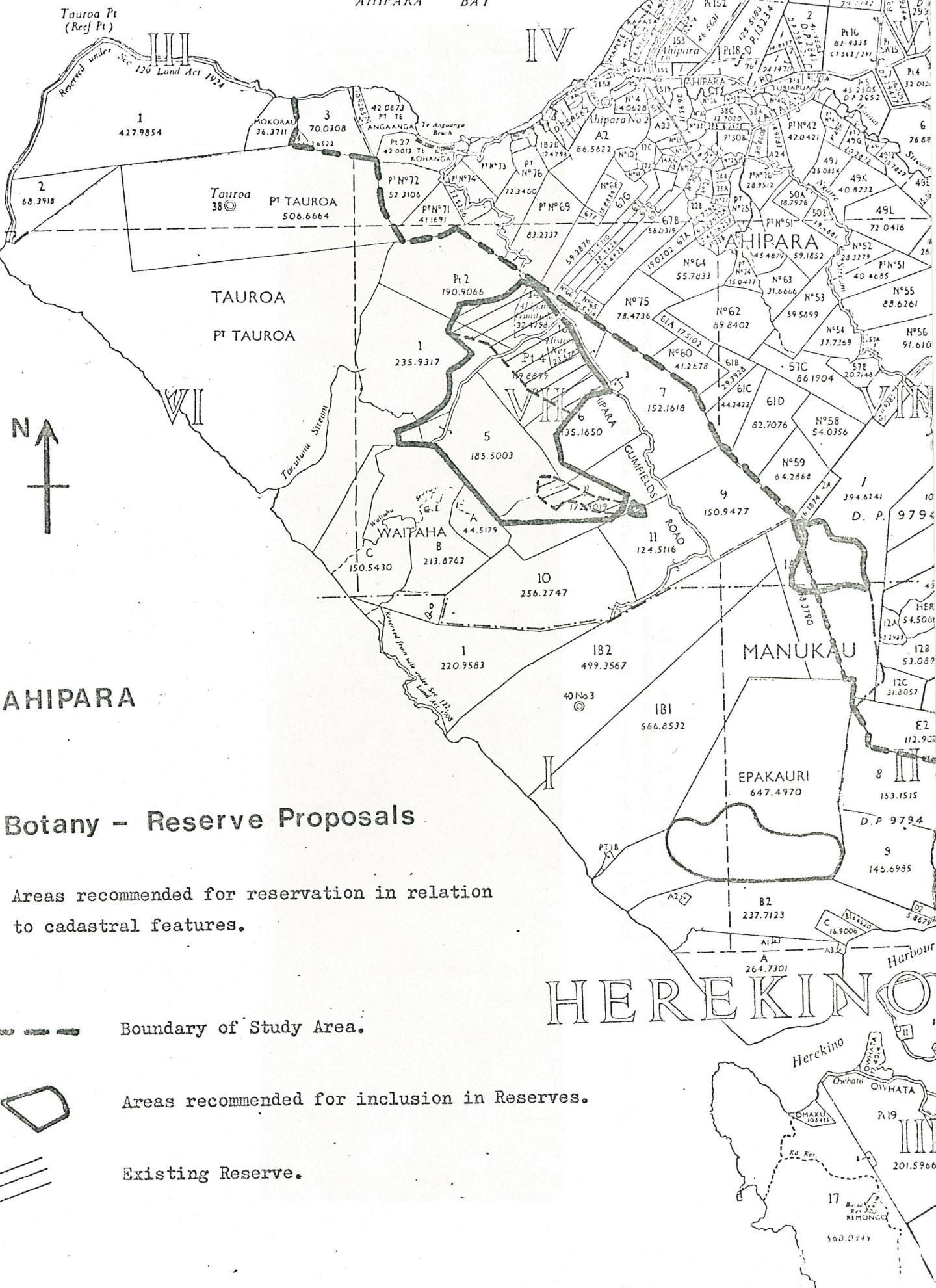
Locations referred to in recommendations
1 to 5 (see text).

Topographic features copied from
NZMS 1 N9 (Ahipara).



AHIPARA

AHIPARA BAY



AHIPARA

Botany - Reserve Proposals

Areas recommended for reservation in relation to cadastral features.



- Boundary of Study Area.
- Areas recommended for inclusion in Reserves.
- Existing Reserve.

HEREKINO



Fig. 1. Forest- and scrub-clad slopes of the Waitaha Stream valley (Crown land that adjoins Waitaha Block), and gumlands recommended for inclusion in the extended reserve. View north from Waitaha Block at N9/637 546.



Fig. 2. Semi-coastal forest and rock bluffs - coastal escarpment to the north of Waiatua Stream, Epakauri Block.



Fig. 3. Competition effects at a fire boundary—gumlands scrub on the southern Historic Reserve (Grid. ref. N9/655 550), looking north towards the valley of a Waitaha Stream tributary.



Fig. 4. The rare plant Hibiscus diversifolius on a swampy coastal terrace of the northern Tauroa Peninsula, and the dense cover typical of its habitat.



Fig. 5. Spinifex on mobile sand, and fixed dunes with abundant lupin, North of Tanutanu Creek.



Fig. 6. View to the northwest from the northeastern corner of the Epakauri Block (Grid. ref: N9/693 523). To the right - forest in the head valley of the Hunahuna Stream (Maori land); to the left - gumlands scrub of the Epakauri Block.

APPENDIX: Common names of plants and scientific equivalents

* - introduced species.

akeake	<i>Dodonea viscosa</i>
Bank's cabbage tree	<i>Cordyline banksii</i>
black treefern	<i>Cyathea medullaris</i>
bracken	<i>Pteridium esculentum</i>
cabbage tree	<i>Cordyline australis</i>
Cape Reinga lily	<i>Arthropodium cirrhatum</i>
* catsear	<i>Hypochaeris radicata</i>
dracophyllum	<i>Dracophyllum lessonianum</i>
five-finger	<i>Pseudopanax arboreus</i>
flax	<i>Phormium tenax</i>
* goat willow	<i>Salix caprea</i>
* gorse	<i>Ulex europaeus</i>
hinau	<i>Elaeocarpus dentatus</i>
kanuka	<i>Leptospermum ericoides</i>
karaka	<i>Corynocarpus laevigatus</i>
karamu	<i>Coprosma lucida</i>
kauri	<i>Agathis australis</i>
kawaka	<i>Libocedrus plumosa</i>
* kikuyu	<i>Pennisetum clandestinum</i>
kohekohe	<i>Dysoxylum spectabile</i>
lancewood (common)	<i>Pseudopanax crassifolius</i>
lancewood (fierce)	<i>P. ferox</i>
* lupin	<i>Lupinus arboreus</i>
mangaero	<i>Litsea calicaris</i>
manuka	<i>Leptospermum scoparium</i>
* marram	<i>Ammophila arenaria</i>
mingimingi	<i>Cyathodes fasciculata</i>
miro	<i>Podocarpus ferrugineus</i>
native broom	<i>Carmichaelia aligera</i>
ngaio	<i>Myoporum laetum</i>
* pampas grass	<i>Cortaderia selloana</i>
pigwood	<i>Geniostoma ligustrifolium</i>
pingao	<i>Desmoschoenus spiralis</i>
* prickly hakea	<i>Hakea sericea</i>
puriri	<i>Vitex lucens</i>
raupo	<i>Typha orientalis</i>
rewarewa	<i>Knightia excelsa</i>
rice-grass	<i>Microlaena stipoides</i>
rimu	<i>Dacrydium cupressinum</i>
rush-like sedges (the four most common gumland species)	{ <i>Baumea teretifolia</i>
	{ <i>Schoenus brevifolius</i>
	{ <i>S. tendo</i>
	{ <i>Lepidosperma australe</i>
spinifex	<i>Spinifex hirsutus</i>
tanekaha	<i>Phyllocladus trichomanoides</i>
taraire	<i>Beilschmiedia tarairi</i>
tawa	<i>B. tawa</i>
toetoe	<i>Cortaderia splendens</i>
towai	<i>Weinmannia silvicola</i>
umbrella fern	<i>Gleichenia circinata</i>