THE BOTANY OF HINEWAI RESERVE

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Introduction

Hinewai Reserve, in the south-east corner of Banks Peninsula, is a new conservation project which should contribute to the protection of a woefully battered and threatened local heritage of native vegetation and wildlife. The Botanical Society visited the area early in March, 1988, and I hope that this is the start of a continuing involvement.

Hinewai is a 109 ha block which was split off the neighbouring 900 ha Otanerito Station and sold cheaply in 1960, because what was not under native bush of one sort or another was under a dense canopy of 'old-man' gorse. A succession of owners tried to farm it, temporarily clearing the gorse, establishing pasture, and running sheep, cattle and pigs. But it was never an easy farming proposition. Maintenance of pasture has involved a constant and often losing battle against the encroachment of gorse and kanuka.

In late September 1987 the block was bought on my suggestion by the Maurice White Conservation Trust. Maurice is an extraordinary man - a fit, retired accountant who set up a fund several years ago to enable the purchase of land for conservation purposes. Although the fund has suffered from the sharemarket crash (temporarily we hope), the purchase of Hinewai went ahead. I find the project so worthwhile I am contributing as much time as possible to manage the block as a reserve for the protection and restoration of indigenous vegetation and wildlife. The dream is that Hinewai will be a valuable reserve in its own right but that it will also act as a catalyst for reserving as much as possible of the Otanerito catchment. Already a Little River couple have offered finance for potential extensions - we investigated a possible 20 ha addition down valley although without success so far. And already the level of involvement by a wider public has been wonderful.

We need all the help we can get. Nearly a year has gone by since purchase, but we have not yet achieved the very first priority - that of excluding the browsing mouths of sheep and goats, let alone possums, rabbits and hares. Hinewai is worth a lot of effort. The biology is fascinating, the potential high, the wide opportunities for

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some down-to-earth local conservation involving lots of people are exciting.

The Botanical Society has already planned further visits and workparties. This article sets out some background information:

The Physical Setting

The reserve sits on the eroded, weathered flank of the extinct Akaroa Volcano which erupted basaltic lavas between 9 and 8 million years ago. In general the ground is steep and gullied, falling from 620 m at the highest point down to 210 m at the lowest point, about 3 km from the sea at Otanerito Bay. (The 20 ha extension would have taken us down to 110 m, within 2 km of the sea.) Currently the block is 1.6 km long from highest to lowest point, with a little over 5 km of boundary fences.

Soils are derived partly from weathered basalt but more from loess. In places the loess mantle is at least 2 m thick; in others it has been removed altogether and the rock is exposed. These soils are mostly upland yellow-brown earths, moderately fertile to fertile, stable, free-draining, and remaining moist throughout the summer.

Rainfall recorded to date at the house is three times that of Christchurch, and the annual average is likely to be around 2000 mm. The house is at 450 m and strong winds, snow, and frosts have all been experienced there over the last few months. Also mist at this level is very common; the name 'Hinewai' translates as 'mist maiden' or 'water maiden'.

The abundant rainfall results in surprising stream flows. Many small, permanent streams arise mostly as springs between 500 and 600 m, tumble down rock beds and over more than 20 attractive waterfalls and cascades, and unite to form the substantial Narbey Stream. Narbey Stream flows on out to Otanerito Bay, with contributions from further side streams down valley from Hinewai.

Vegetation (i) *Nothofagus*

'Climax' vegetation over the whole Hinewai block is red beech forest, with podocarps, mixed broadleaf trees, tree ferns and black beech in a subsidiary role.

The presence of *Nothofagus* on Banks Peninsula is of exceptional interest when one considers these facts:

(a) *Nothofagus* seems incapable of dispersing across sea gaps. Its present and fossil distribution is related directly to the

former unity of the now widely separate southern land masses, which were once part of the single continent of Gondwana.

(b) But Banks Peninsula has been an island for most of its multi-million year history. It is only in the last few thousand years that the growing shingle fans of the Canterbury Plains have joined it to the rest of the South Island. Probably the earliest this happened was about 20,000 years ago when glacially lowered sea levels drained the shallow seaway between the South Island and 'Banks Island'. It filled again when the climate warmed, and about 6000 years ago sea level was a few metres higher than now. But by then the plains' advancing front was lapping up against the volcanic rocks.

(c) *Nothofagus* on Banks Peninsula occurs naturally only in the south-east corner (as far away as possible from the Plains and from the rest of the South Island).

Is it possible that beech has survived in the Banks Peninsula region of the earth's crust since that bit of crust was directly linked to a larger fragment of Gondwana?

The southern beeches first appear in the fossil record some 100 million years ago. New Zealand separated from Australia between 80 and 60 million years ago. We know that the Chatham Rise, on which Banks Peninsula sits, was dry land then.

Nevertheless it is highly unlikely that *Nothofagus* has been isolated in the Banks Peninsula region since so long ago. If it had been it would surely have evolved in to local endemic species, just as in all the other separated fragments of Gondwana. But in fact the two species here seem indistinguishable from red and black beech elsewhere in New Zealand, morphologically at least. [Gene flow via wind-blown pollen from distant South Island sources could not account for this similarity]. Furthermore, geological evidence in the form of marine sandstones dated at about 65 million and 20 million years ago, suggests that much or all of what is now Banks Peninsula was submerged for long periods beneath the sea. That hardly bodes well for beech survival. *Nothofagus* must have reached the Banks Peninsula region within the last 20 million years.

But how long ago? The Peninsula's volcanoes began erupting about 15 million years ago, with outpourings of basaltic lard in the vicinity of what is now the head of Lyttelton Harbour. The lava may well have erupted on to dry land formed by Torlesse Terrane

Sedimentary rocks which predate the breakup of Gondwana. These rocks that form the Southern Alps to the west and which stretch across to the Chathams in the east. Torlesse Terrane rocks currently outcrop in the Gebbies Pass area up to 300 m above sea level, as basement rocks underlying basalts of the Lyttelton volcano. It is likely that at least from time to time dry land linked the Banks Peninsula region with a larger landmass to the west where *Nothofagus* would certainly be growing. [This was before the uplift of the present Alps, so it was a "South Island" very different from that of the present].

We know that beech can migrate on to active volcanoes and survive there, just as beech forest survives on the flanks of Ruapehu today. At any one site there may be hundreds or even thousands of years between lava flows.

However beech would have had to compete against podocarp/broadleaved tree forest, which has several advantages in colonizing a volcano more or less surrounded by sea, especially in the warm climates that prevailed for much of the Miocene epoch. It is likely that *Nothofagus* did not gain a foothold on Banks Peninsula until the Pleistocene glaciations, which began about 1.8 million years ago. Glacial climates would have given beech a competitive edge over the podocarp/broadleaved forest which would have long occupied the now extinct and eroded volcanoes. Lowered sea levels would have increased the chances of dry land providing a migration route from the South Island. *Nothofagus* generally is better suited to more continental climates, with greater extremes of temperature, although this is less true for red beech than for mountain beech.

With the return of warmer climates in the interglacials, conditions would favour podocarp/broadleaved forest. Throughout the Pleistocene as climates cooled and warmed and cooled again, the range of beech on Banks Peninsula probably expanded and retreated and expanded. But beech was almost certainly growing here before the expanding apron of outwash gravels secured the present land link to the plains and mountains. With the return of warmer climate in the last post-glacial, over the last 14,000 years or so, conditions would again favour podocarp/broadleaved forest, with the beeches pushed into the uplands of the wettest, coolest corner.

Here it is competitive enough today. Throughout Hinewai all the plant successions lead ultimately to beech dominance, even in the lowermost corner at 210 m. Below this, however, the beeches lose dominance to lowland podocarps and mixed broadleaf trees. Eight

mature kahikatea survive in the 20 ha possible extension, and this area would undoubtedly eventually progress to lowland podocarp/broadleaved forest in the absence of burning and grazing. Important species here are kahikatea, matai, lowland totara, pigeonwood, kawakawa, silver tree fern, and even nikau palm and mamaku, surviving still in adjacent valleys.

Vegetation (ii) General

Currently about 42% of the Hinewai block is under native forest of one sort or another. About 10% is under mature and second growth red beech with scattered black beech and abundant thin-bark totara beneath the canopy. About 14% is under second-growth mixed broadleaved forest with small areas of upland podocarp/broadleaved forest. Fuchsia, fivefinger, mahoe, ribbonwoods, horopito, pate, lemonwood, kowhai, *Coprosma* spp., wineberry, kaikomako, putaputaweta and cabbage trees, plus 3 species of tree fern, are common. About 18% is under kanuka forest, scrub, or rapidly regenerating kanuka shrubland. Beech is actively invading all these forest and scrub types where it is not already dominant.

Kanuka often colonizes open ground concurrently with gorse, in which case it soon overtops and suppresses the gorse (in 5-10 years?). Repeated burning and clearing can give gorse an advantage, because whereas it builds up a large seedbank in the soil, ready to leap into action as soon as the ground is cleared, kanuka must depend on producing fresh seed for only part of the year. Nevertheless, without stock helping to move gorse seed about, its explosive dispersal only carries it a few metres. Flowing water can spread it further. Wind, however, can carry the light seeds of kanuka a long way.

If gorse establishes in the absence of kanuka or other native colonising broadleaf plants such as fuchsia and wineberry, it may form a continuous canopy. But it regenerates poorly in its own shade. In the absence of grazing, the regeneration of shade-tolerant native seedlings under gorse is sure and steady. Once they overtop the over-mature gorse canopy (15-30 years in this climate?) the gorse is doomed, unless fire or other clearance bares the ground again and reactivates the staggered germination of the gorse seed bank. Back to square one!

About 18% of Hinewai is currently under gorse scrub (with broom in places). A further 20% is gorse shrubland where gorse is actively invading pasture. About 15% is clean pasture at present more or

less free of invading woody species, and a further 5% is under fern (mostly *Pteridium* and *Histiopteris*).

The local Noxious Plants Authority wants us to keep clear of gorse and broom any area that has not yet reverted to continuous-canopied scrub. We are attempting to comply, as far as possible without chemicals which would also hinder the native regeneration we want eventually to take over. We are initiating a propagating and planting programme to assist native regeneration, although it is clear we must leave most of the work to Nature! If we can at least keep the gorse back to a spaced shrubland this should provide both shelter and some help against vigorous competition from exotic grasses, for planted out saplings.

A native moth *Anisoplaca ptyoptera*, normally parasitic on *Carmichaelia*, has transferred some of its attention to gorse. Its effects are unlikely to be significant because it itself is kept in check by its own predators. However the possibility of using Hinewai as a release site for the gorse spider mite, recently introduced into New Zealand for biological control of gorse, may assist us in several ways; by knocking the oomph out of gorse it may speed up its replacement by native, and it may give **us** some manoeuvring power with the Noxious Weeds Inspector.

Our aim is to allow the successions to follow their course over the whole block. For the rest of our lifetimes this will result in a mosaic of all the vegetation types discussed so far, except perhaps pasture.

Also significant and not yet mentioned is snow tussockland (*Chionochloa rigida*) and snow tussock shrubland along the higher road boundaries. Among several fascinating species here is the beautiful, restricted, endangered *Celmisia mackaui*.

We intend to display species such as the Celmisia in a small botanic garden by the house (involving a rockery, shrubland, and arboretum). Although for the propagation of seral species to assist revegetation we are drawing on plants **only** from within our catchment at appropriate altitudes, for the botanic garden we are casting our net slightly further afield into adjacent catchments. Thus we hope to display such species as *Libocedrus bidwillii* and *Cordyline indivisa* in the arboretum. Also, should the lower extension proceed, we will consider the reintroduction of nikau palm and mamaku tree fern according to distribution patterns identified from my botanical survey of the whole Peninsula.

We may also use an exotic species, *Chamaecytisus palmensis*, as a seral canopy to help beat the gorse at lower altitudes. This has the added advantage of attracting woodpigeons, an attractive asset themselves but also efficient transporters of native seed.

None of this will make much progress without the control of wild goats. This is our major priority. Already more than 70 goats have been shot on Hinewai! Invasion is continuous from a feral herd of many hundred on neighbouring Otanerito Station. We plan a fence as goatproof as we can make it along our southern boundary. I also hope before long that our neighbours will let us tackle their wild herd so that the source of infestation can be reduced and finally eliminated. Meanwhile it is not only Hinewai that is threatened; the rich botanical legacy of all the neighbouring valleys, including the priceless Armstrong Reserve, is being seriously degraded and diminished. Feral goats on Banks Peninsula are biologically an unmitigated disaster.

It is interesting to note that the flora of Hinewai by no means embraces most of the species of Banks Peninsula as a whole. Conspicuously absent are dry habitat plants such as *Cheilanthes distans, C. sieberi, Convolvulus verecundus* subsp. *waitaha, Sophora prostrata, Clematis afoliata, Parsonia capsularis, Scandia geniculata, Olearia fragrantissima* and *Pseudopanax ferox*. We would need to extend to the local coast to include such species as *Griselinia lucida, Crassula moschata*, etc. We have *Solanum aviculare*, here at its southern limit, but not *S. laciniatum* which is the more common of the two on Banks Peninsula generally.

Fortunately we lack so far *Clematis vitalba*, and will watch carefully for any appearance. Next to gorse and broom, the least desirable of the exotic weedy species are Himalayan honeysuckle, blackberry (*Rubus echinatus* I think) and elderberry. We are right in the middle of the curious restricted Banks Peninsula distribution of inkweed (*Phytolacca octandra*) and in season acres of flowering foxglove make a colourful show. None of these are likely to be in the long run competitive against the wave of native regeneration.

Vegetational change is being carefully monitored by photo points and by the recording of fixed plots.

PROVISIONAL CHECKLIST OF THE NATIVE PLANT SPECIES AT HINEWAI

The main list records species found within the current boundaries of the reserve. Those species indented to the right are additional species recorded within 1 km of the boundaries and within the catchment of Otanerito Bay (Narbey Stream).

+	suitable for botanical garden display.
A	abundant at Hinewai
B	more or less common at Hinewai
C	uncommon to rare at Hinewai
HYB	hybrid

Gynmnosperm trees

+	___ ___ *Dacrycarpus dacrydioides*	
+	*Podocarpus hallii*	A
+	___ ___ [*Podocarpus totara* - to confirm]	
+	*Prumnopitys taxifolia*	C

Angiosperm trees and shrubs, including dwarf shrubs, cushions, etc.

+	*Aristotelia serrata*	B
+	*Coprosma areolata*	C
+	*Coprosma crassifolia*	C
+	*Coprosma linariifolia*	C
+	*Coprosma lucida*	C
+	*Coprosma propinqua*	B
+ HYB.	*Coprosma propinqua x robusta*	C
+ HYB.	*Coprosma (propinqua x robusta) x propinqua*	C
+	*Coprosma rhamnoides*	A
+	*Coprosma rigida*	C
+	*Coprosma robusta*	B
+	*Coprosma rotundifolia*	A
+	*Coprosma* sp. aff. *parviflora*	A
+	*Cordyline australis*	C
+	*Coriaria arborea*	C
+	___ ___ *Dracophyllum acerosum*	
+	___ ___ *Drapetes dieffenbachii*	
+	*Elaeocarpus hookerianus*	C
+	*Fuchsia excorticata*	A
+	*Gaultheria antipoda*	C
+	___ ___ *Gaultheria "depressa* var. *novae-zelandiae"*	
+	*Griselinia littoralis*	C
+	___ ___ *Hebe lavaudiana*	
+	*Hebe salicifolia*	B
+	*Hebe strictissima*	C
+	*Hedycarya arborea*	B
+	*Helichrysum aggregatum*	C
+	*Hoheria angustifolia*	B

+	*Kunzea ericoides*	A
+	*Leptospermum scoparium*	C
+	*Leucopogon fraseri*	C
+	___ ___ *Lophomyrtus obcordata*	
+	*Macropiper excelsum*	B
+	*Melicope simplex*	C
+	*Melicytus alpinus*	B
+	*Melicytus ramiflorus*	B
+	*Myoporum laetum*	C
+	*Myrsine australis*	C
+	*Nothofagus fusca*	A
+ HYB.	*Nothofagus fusca x solandri*	C
+	*Nothofagus solandri*	C
+	___ ___ *Olearia avicenniifolia*	
+	*Olearia ilicifolia*	C
+	*Olearia paniculata*	C
+	*Pennantia corymbosa*	B
+	*Pittosporum eugenioides*	B
+	*Pittosporum tenuifolium* subsp. *tenuifolium*	C
+	*Plagianthus regius*	C
+	*Pseudopanax arboreus*	B
+	*Pseudopanax colensoi*	B
+	*Pseudopanax crassifolius*	A
+	*Pseudowintera colorata*	A
+	*Schefflera digitata*	A
+	*Solanum aviculare*	C
+	*Sophora microphylla*	B
+	*Urtica ferox*	B

Climbers and related trailers

+	___ ___ *Brachyglottis sciadophila*	
	Calystegia tuguriorum	C
+	*Clematis foetida*	B
+	*Clematis paniculata*	B
+	*Metrosideros diffusa*	B
	Muehlenbeckia australis	A
	Parsonsia heterophylla	B
	Ripogonum scandens	B
	Rubus cissoides	A
	Rubus schmidelioides	C

Herbaceous dicots

	Acaena anserinifolia	B
+	___ ___ *Acaena caesiiglauca*	
	Acaena novae-zelandiae (probably naturalised)	C
+	___ ___ *Aciphylla aurea*	
+	___ ___ *Anisotome aromatica*	
+	___ ___ *Brachyglottis lagopus*	
	Cardamine debilis agg.	B
+	___ ___ *Celmisia gracilenta*	
+	___ ___ *Celmisia mackaui*	
	Centella uniflora	B
	___ ___ *Colobanthus strictus*	
+	*Craspedia minor*	C
	Crassula cf. *tetramera*	C
	Epilobium atriplicifolium	B

	Epilobium brunnescens s.s.	B
	Epilobium nerteroides	C
	___ ___ *Epilobium pedunculare*	
	Epilobium pubens	C
	Epilobium rotundifolium	B
+	*Geranium microphyllum*	C
+	___ ___ *Gingidia montana*	
	Gnaphalium audax	B
	Gnaphalium involucratum	C
	___ ___ *Gnaphalium laterale* (check ID)	
	Gnaphalium limosum	C
	Gnaphalium sphaericum	C
+	___ ___ *Gonocarpus incanus*	
+	*Gunnera monoica*	B
	___ ___ *Haloragis erecta*	
+	*Helichrysum bellidioides*	B
+	*Helichrysum filicaule*	B
	Hydrocotyle heteromeria	B
	Hydrocotyle microphylla (check also "*montana*")	B
	Hydrocotyle moschata	B
+	*Hypericum japonicum*	C
+	*Lagenifera pinnatifida*	B
	Lagenifera strangulata	B
	Leptinella dioica x squalida (stabilised hybrid)	C
+	*Nertera depressa*	C
	Oreomyrrhis ramosa	C
	Oreomyrrhis rigida	C
+	___ ___ *Oxalis exilis*	
+	*Pratia angulata*	A
	Pseudognaphalium luteoalbum s.l.	B
	Ranunculus reflexus	B
+	*Raoulia glabra*	C
+	___ ___ *Raoulia subsericea*	
	Schizeilema trifoliolatum	B
	___ ___ *Senecio glomeratus*	
	Senecio minimus	B
	Senecio wairauensis	C
	Stellaria decipiens	B
	Viola cunninghamii	B
	Wahlenbergia gracilis	B

Herbaceous monocots

+	*Arthropodium candidum*	C
+	*Astelia fragrans*	C
+	*Caladenia lyallii*	C
+	*Carex forsteri*	C
+	*Carex virgata*	C
	Chiloglottis cornuta	B
+	*Chionochloa rigida*	C
+	*Cortaderia richardii*	C
	Corybas trilobus	B
	Deyeuxia avenoides	B
	Dichelachne crinita	C
	Eleocharis acuta	C
	Hierochloe redolens	C
	Isolepis habra	B
	Isolepis inundata	C

	Isolepis spp (need checking)	
	Juncus australis	C
	Juncus gregiflorus	C
	Juncus novae-zelandiae	C
	Juncus planifolius	C
	Juncus sarophorus	C
+	*Libertia ixioides*	C
	Luzula picta var. *picta* (check also *L. rufa*)	B
	Microlaena avenacea	C
	Microlaena stipoides	C
	Microtis unifolia	C
+	*Phormium cookianum*	C
	Poa breviglumis	B
	Poa cita (check also *P. imbecilla*)	C
	Poa matthewsii	B
	Prasophyllum colensoi	C
+	*Pterostylis australis*	C
+	*Pterostylis graminea*	B
	Rytidosperma clavatum	B
+	___ ___ *Rytidosperma corinum*	
	Rytidosperma gracile	B
	Rytidosperma unarede	C
+	*Thelymitra longifolia*	B
+	*Uncinia rubra*	C
	Uncinia uncinata	C

Ferns and fern allies.

	Asplenium bulbiferum (check also *A. gracillimum*)	B
HYB.	*Asplenium bulbiferum x flaccidum*	C
	Asplenium flabellifolium	C
	Asplenium flaccidum	C
	Asplenium hookerianum	B
	Asplenium terrestre subsp. *terrestre*	B
	Blechnum chambersii	B
	Blechnum colensoi	C
	Blechnum discolor	B
	Blechnum fluviatile	A
	Blechnum minus	C
+	*Blechnum penna-marina*	B
	Blechnum procerum	A
	Blechnum sp. "black spot"	C
+	*Blechnum vulcanicum*	C
+	*Ctenopteris heterophylla*	C
+	*Cyathea dealbata*	B
+	*Cyathea smithii*	A
+	*Dicksonia squarrosa*	A
	Grammitis billardierei	B
	Histiopteris incisa	A
	Hymenophyllum demissum	C
	Hymenophyllum flabellatum	C
	Hymenophyllum sanguinolentum s.l.	C
	Hypolepis ambigua	C
HYB.	*Hypolepis ambigua x rufobarbata*	C
+	*Hypolepis millefolium*	B
+	*Hypolepis rufobarbata*	B
	Lastreopsis glabella	B
	Leptolepia novae-zelandiae	C

	Leptopteris hymenophylloides	C
+	*Lycopodium fastigiatum*	C
	Lycopodium varium	C
	Lycopodium volubile	C
+	*Paesia scaberula*	C
	Pellaea rotundifolia	C
+	*Phymatosorus diversifolius*	C
	Pneumatopteris pennigera	C
	Polystichum richardii	B
	Polystichum vestitum	B
	Pteridium esculentum	A
+	*Pyrrosia serpens*	C
	Rumohra adiantiformis	C
	Trichomanes venosum	B

Additional listing. Species from adjacent catchments for possible display in an arboretum plus rock garden at the house at Hinewai. This list omits species from adjacent catchments for which the house site would be too far outside their altitudinal range or distributional pattern, but includes a few species (Marked ++) from a little further afield because of their suitability for botanical garden display.

Gymnosperm trees

+	*Libocedrus bidwillii*

Angiosperm trees, shrubs, dwarf shrubs, cushions

+	*Cassinia vauvilliersii*
+	*Coprosma rubra*
+	*Coprosma wallii*
+	*Cordyline indivisa*
+	*Cyathodes juniperina*
+	*Discaria toumatou*
+	*Myrsine divaricata*
+	*Myrsine nummularia*
+	*Neomyrtus pedunculata*
+	*Olearia ilicifolia*
+	*Olearia paniculata*
+	*Pentachondra pumila*
+	*Pseudopanax anomalus*
+	*Pseudopanax edgerleyi*
+	*Streblus heterophyllus*

Climbers and related trailers

+	*Fuchsia perscandens*

Herbaceous dicots

+	*Acaena* sp. '916'
+	*Aciphylla subflabellata*

+	*Forstera tenella*
++	[*Gentiana serotina*
	- Panama Rock, above Le Bons]
+	*Gingidia enysii*
+	*Linum monogynum*
+	*Mentha cunninghamii*
+	*Myosotis* sp. "drucei"
+	*Myosotis* sp. "Lytteltonensis"
	Oreomyrrhis colensoi
+	*Ourisia lactea* subsp. *lactea*
++	[*Oxalis magellanica*
	- Crown Island Stream]
+	*Parahebe lyallii*
+	*Ranunculus foliosus*
+	*Ranunculus multiscapus*
+	*Raoulia hookeri*
+	*Scleranthus biflorus*
+	*Scleranthus uniflorus*
+	*Viola filicaulis*

Herbaceous monocots.

++	[*Bulbinella angustifolia*
	- Summit Road above Le Bons]
+	*Caladenia catenata*
+	*Chionochloa conspicua* subsp. *conspicua*
+	*Earina autumnalis*
+	*Festuca* "B.P. blue tussock"
	Koeleria novozelandica
	Lachnagrostis "sp. common"
+	*Phormium tenax*
+	*Poa* cf. *anceps* "B.P. blue"
+	*Pterostylis montana*

Ferns and fern allies

+	*Adiantum cunninghamii*
+	*Cyathea colensoi*
	Grammitis poeppigiana
	Hymenophyllum minimum
	Hymenophyllum multifidum
	Hymenophyllum peltatum
	Lastreopsis hispida
+	*Lycopodium scariosum*
	Tmesipteris sp.