

The vegetation of the Kaitake Range Egmont National Park, New Zealand

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vegetation descriptions made at a total of fifty-six sites, formed the basis of a vegetation survey carried out at various times between January 1978 and December 1981. Numerous reconnaissance trips were also made throughout the range.

Abstract The results of a vegetation survey of the Kaitake Range, part of Egmont National Park, are presented. More than ninety-five percent of the vegetation is native forest, the main types represented being dominated by kohekohe (*Dysoxylum spectabile*), tawa (*Beilschmiedia tawa*), and kamahi (*Weinmannia racemosa*) respectively. Forest composition changes mainly with increasing altitude but also differs on the landward and coastal slopes of the range. Likely contributing environmental factors are described. An annotated list of the 270 native vascular taxa noted during the survey is included. The flora and vegetation are compared with those of the remainder of Egmont National Park and the Egmont ring plain. The Kaitake Range is found to support the largest remnants of lowland and semi-coastal forest types which covered the Egmont ring plain before farmland development.

Keywords Kaitake Range; Egmont National Park; forest types; induced grassland; scrub; exotic plantations; flora; succession; species distribution; ordination

INTRODUCTION

The Kaitake Range, located near the West Taranaki coast some 15 km south-west of New Plymouth (Fig. 1, 2), is the remnant of a volcano active about 575 000 years ago, and reduced by erosion to a circular area of radiating ridges rising to the central point, Patuha, 684 m (Neall 1980). Other high points on the ridges are Kaitake (650 m), Pioke (650 m), "Kirihaui" (610 m) and Te Iringa (610 m). Since 1900 most (approximately 2400 ha) of the Kaitake Range, has been gazetted as a part of Egmont National Park. Quadrat data collected, and

THE STUDY AREA

Geology and soils

The exposed rocks of Kaitake are mostly hornblende-andesites and diorites which have been hydrothermally altered (Neall 1980). Soils are mapped by the New Zealand Soil Bureau (1968) as yellow-brown loams; Inglewood-Patua soils on the lower slopes and steepland soils on the upper slopes. The Inglewood-Patua soils are derived from volcanic ash erupted from Mt. Egmont during numerous eruptions of the last 50 000 years or more and are slightly acid, moderately to strongly leached, fertile soils. The steepland soils are mostly derived from weathering of exposed rocks, nearly all the volcanic ash deposited on the upper-slopes having been removed by erosion. They are acid, strongly leached, low fertility, erosion prone soils (NZ Soil Bureau 1968). Soils also vary in relation to local topography with deep, sometimes poorly drained, colluvium found in valley bottoms and well drained, shallow soils on ridge crests.

Climate

No climatological stations occur on the Kaitake Range but nearby stations enable the main features of the climate to be characterised. The climate on the lower slopes of the range should be very similar to that of New Plymouth which, between 1941 and 1970, recorded a normal temperature of 13.4°C, a normal rainfall of 1584 mm and had on average 6.9 days of ground frost per year (New Zealand Meteorological Service 1973), whereas the highest peaks of the range should experience a normal temperature of slightly less than 11°C, a normal rainfall in excess of 4000 mm, and at least 60 days of ground frost respectively. However, the landward slopes of the range are generally cooler and wetter than the coastal slopes at equivalent altitudes, particularly towards Pukeiti where an average rainfall of 3450 mm a year has been recorded at an altitude of only 365 m (Pukeiti Rhododendron Trust Inc. 1959).



Fig. 1 View of the Kaitake Range looking south-west from the summit of Paritutu, New Plymouth. The three peaks are, from left to right, "Kirihiu", Kaitake and Patuha.

Photo: M. R. Boase.

The most frequent winds are from the west, sometimes salt-laden, and the south-east. The upper slopes of the range are often cloud covered by the early afternoon.

History

The Kaitake Range has a long history of human interference. There are numerous Maori pa sites on its slopes although most are small and appear to be military outposts for the citadel of Patuha Pa (Rawson 1980). They were probably used for protection during the numerous Waikato raids early in the nineteenth century (Rawson 1981). European activity has also modified the vegetation particularly on the lower north-western slopes in the area formerly known as the 'Patuha Open Lands' which was logged before 1926. In order to control the blackberry (*Rubus fruticosus* agg.) and gorse (*Ulex europaeus*) which developed after the logging, exotic plantations of mainly *Pinus radiata* were established. Planting took place between 1927 and 1935. From 1952 to 1971 most of these trees were clearfelled, allowing reversion to native forest to begin (ENP file 28, Dept. Lands and Survey, New Plymouth). On the lower south-western slopes there were several abortive attempts at gold mining, the main ones being at Boar's Head Creek between 1870 and 1877 and at Konini Creek in 1898 (Scanlan 1961).

Browsing Mammals

Since their introduction by Europeans, goats (*Capra hircus*), cattle (*Bos bovis*), and possums (*Trichosurus vulpecula*) have modified the vegetation considerably. Goats have caused the most damage, tending to congregate in favoured 'camp sites' on

the peaks in the late afternoon but browsing more widely throughout the forest during the day. Cattle trespass has long been a problem but has diminished in recent years with comprehensive park boundary fencing. Damage to the vegetation by browsing and trampling however is still a common occurrence in the vicinity of the Mander's Spur Track. Possum numbers appeared to be low during this survey with only minor damage to the vegetation observed, but severe defoliation of kamahi (*Weinmannia racemosa*), kohekohe (*Dysoxylum spectabile*) and titoki (*Alectryon excelsus*) has been reported in the past (New Zealand Forest Service 1975).

METHODS

To determine the major trends in composition of the indigenous forest, 41 quadrats of 400 m² were located systematically at 61 m (200 ft) intervals along four transects, one in each quadrant of the range, starting near the lower forest margin and extending to the summit. Within each quadrat, all the vascular plants present were listed and species were ranked in order of cover contribution in the following five categories: (1) top stratum (canopy and emergents), (2) second stratum (subcanopy layer), (3) third stratum (shrub layer), (4) fourth stratum (ground cover layer), and (5) lianes and epiphytes. Rankings were made to a maximum of ninth place as in most cases there were fewer than nine species contributing to the cover of the top and second strata. Height and dbh of the dominant trees, altitude, slope, aspect, and descriptions of substrate and drainage were also recorded. Fifteen additional sites representing minor vegetation types

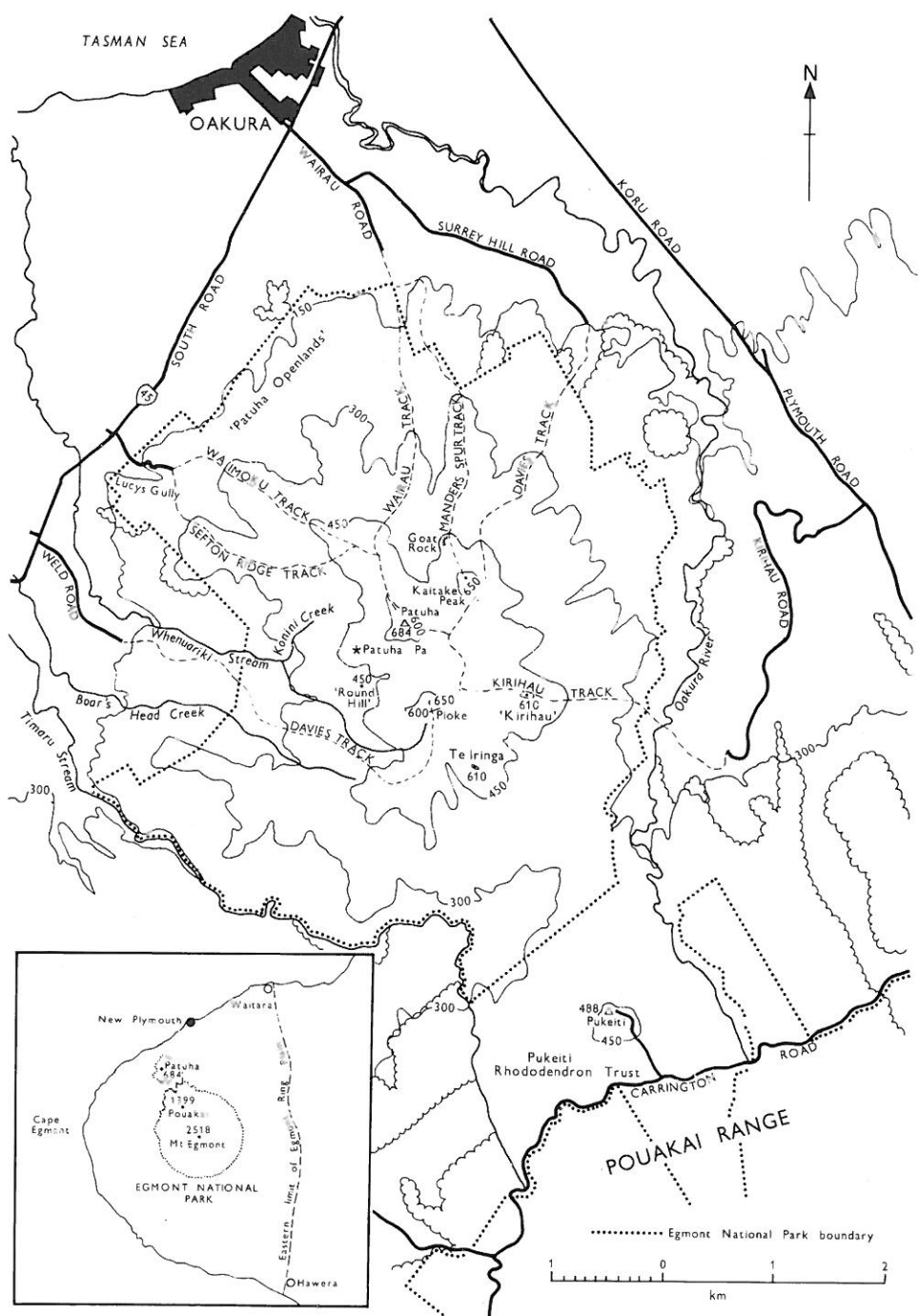


Fig. 2 Location map of the Kaitake Range.

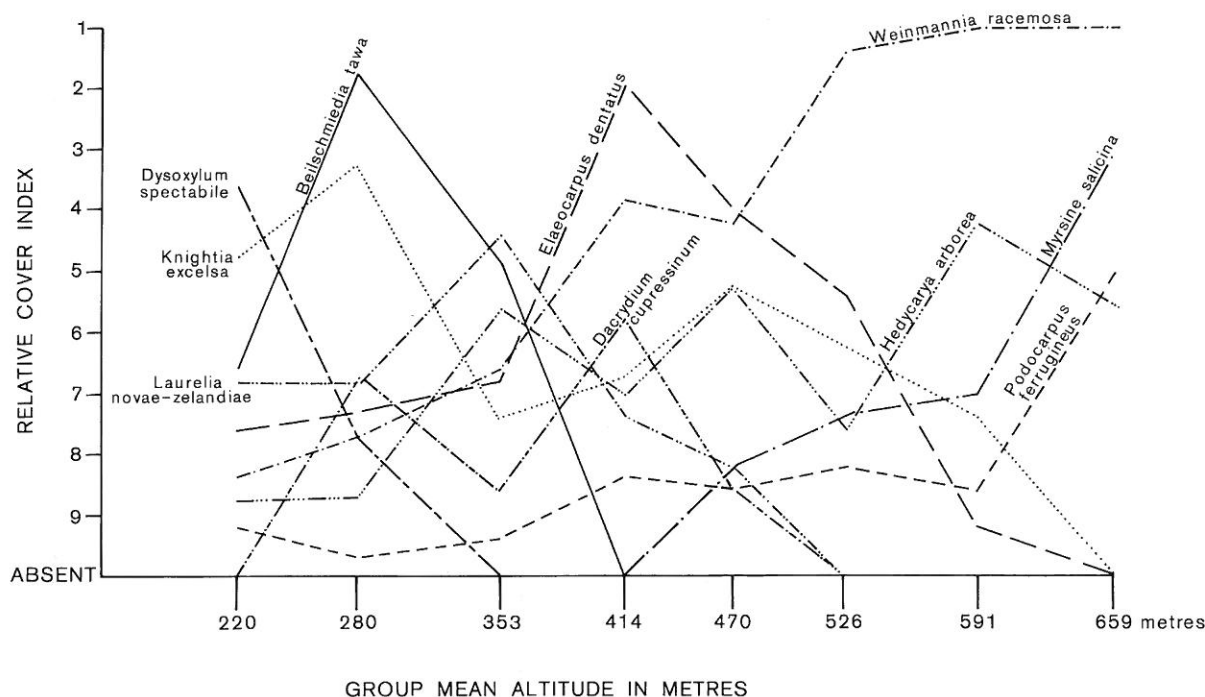


Fig. 3 Relative cover indices of the major top stratum species.

were also selected and described. These included early successional scrub, exotic plantations, cliff face, and pa sites. This method of using rank data to assess vegetation composition was developed, after an investigation of the relative merits of collecting rank and quantitative data, to enable rapid survey by a solo field worker. Rank data collection takes approximately one quarter of the time required to obtain quantitative data (Clarkson 1981). Further information on methods including quadrat locations is given in Clarkson (1981).

ANALYSIS

Both direct and indirect analyses were carried out on the quadrat data (after Whittaker 1967). For direct gradient analysis the quadrat data were amalgamated into eight 61 m (200 ft) elevation groups. The relative cover index for each species in each of the vegetation layers was obtained by averaging the rankings of the species in each quadrat within the elevation group. A species which was the leading dominant in all quadrats within its elevation group would score a relative cover index of

1 while a species absent from all quadrats would score an index of 10. Figures 3 and 4 show the changes in relative cover of major species (i.e., 1st, 2nd, or 3rd dominants in any elevation group) in the top and second strata of the vegetation. Appendix 1 summarises the analyses for all five vegetation categories.

Indirect gradient analysis involved the use of ordination techniques, specifically principal components analysis type PA1 from the Statistical Package for Social Sciences (Nie 1975). The species rankings were transformed as follows: 1st = 9, 2nd = 8, 3rd = 7, 4th = 6, 5th = 5, 6th = 4, 7th = 3, 8th = 2, 9th = 1, absent = 0.

Figures 5 and 6 are top and second strata ordination diagrams obtained by plotting the position of each of the 41 quadrats in terms of their loadings on the first two components extracted. Symbols indicating the leading dominant species of each quadrat have been overlayed in the manner described by Kershaw (1973) to indicate specific trends in the ordination. Reference back to other data collected at each quadrat (location, aspect, slope, altitude, etc) enables indirect determination of the factors affecting forest composition.

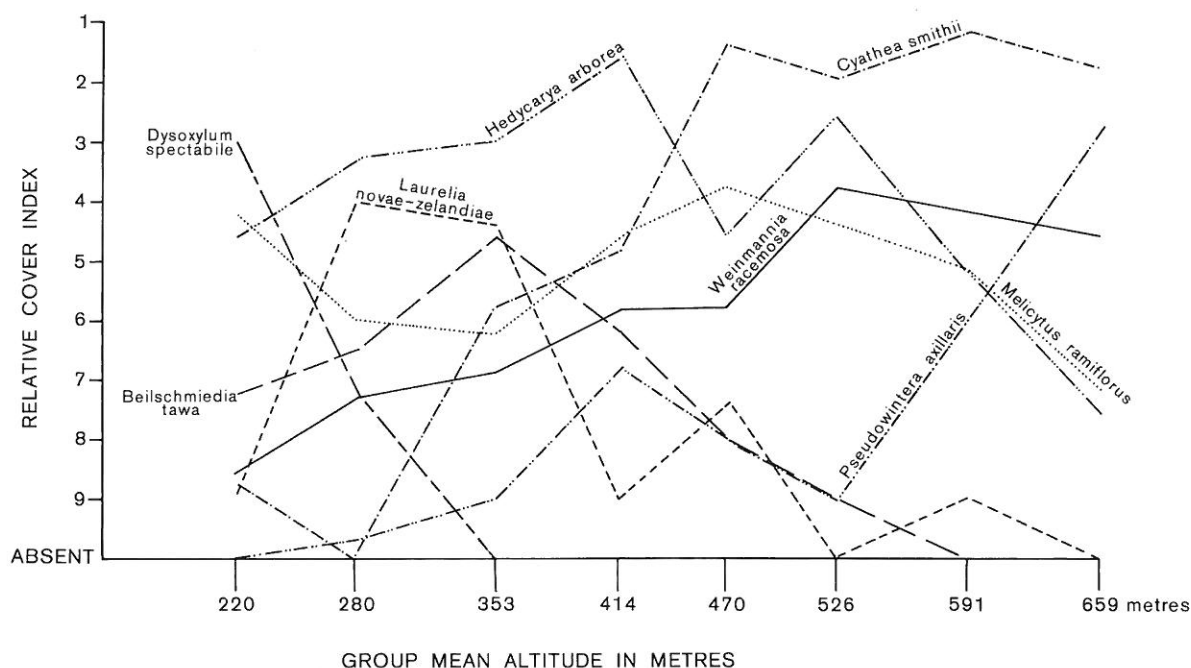


Fig. 4 Relative cover indices of the major subcanopy species.

RESULTS

Forest composition

Direct gradient analysis

With increasing altitude, each species generally rises to a peak value above which it declines in importance. By concentrating on the distribution of the most important top stratum species the general pattern of changing forest composition can be outlined.

Below 240 m kohekohe (*Dysoxylum spectabile*) and rewarewa (*Knightia excelsa*) are leading dominants in the top stratum. Kohekohe is also the subcanopy and shrub layer leading dominant below 240 m but it does not extend above 350 m.

Above 240 m and up to 300 m tawa (*Beilschmiedia tawa*) becomes the leading top stratum dominant and rewarewa remains second. In the subcanopy pigeonwood (*Hedycarya arborea*) and pukatea (*Laurelia novae-zelandiae*) are prominent while in the shrub layer the liane kiekie (*Freyinetia baueriana* subsp. *banksii*) predominates.

Beyond 300 m both tawa and rewarewa decline in importance in the top stratum, being replaced by pukatea. Pigeonwood and pukatea remain as subcanopy leading dominants and kiekie continues to dominate the shrub layer.

Between 370 m and 490 m hinau (*Elaeocarpus dentatus*) is the top stratum leading dominant with kamahi second dominant. Pigeonwood is still prominent in the subcanopy but above 440 m mahoe (*Melicytus ramiflorus*) and soft tree fern (*Cyathea smithii*) become more important than pukatea. Soft tree fern dominates the shrub layer and kiekie is relegated to second dominant.

Above 490 m kamahi becomes top stratum leading dominant and in the two uppermost elevation groups is the leading dominant in all of the quadrats measured. Soft tree fern remains as leading dominant in the subcanopy and as well, is the most prominent species in the shrub layer.

The ground cover layer, displays more homogeneity than other layers; bush rice grass (*Microlaena avenacea*) and hooked sedges (*Uncinia* spp.) are prominent throughout the eight elevation groups. Below 440 m however, crown fern (*Blechnum discolor*) is an important associate, and above 440 m *B. fluviatile* becomes prominent.

The most important epiphyte below 490 m is *Collospermum hastatum* and above this altitude it is *Asplenium flaccidum*. The liane, supplejack (*Ripogonum scandens*) and climbing stems of kiekie are both prominent below 490 m.

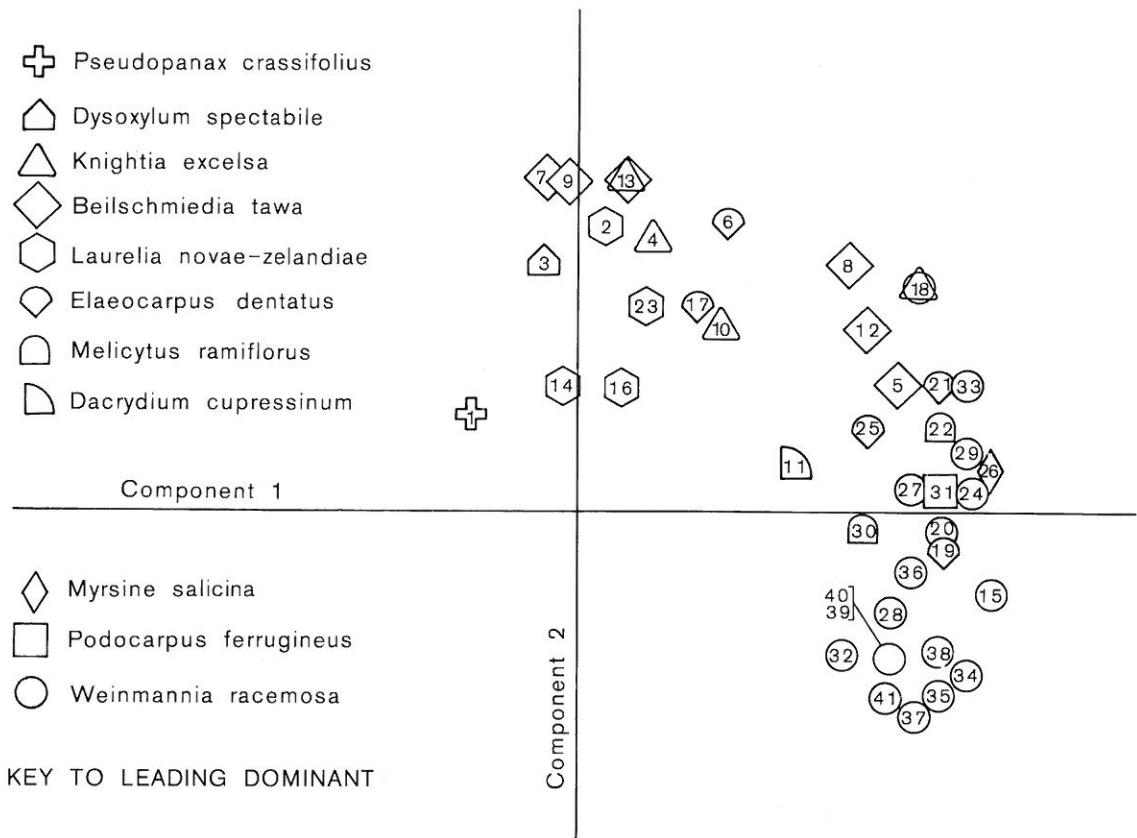


Fig. 5 Plot ordination (principal components analysis) using top stratum species relative cover. The first two axes account for 48.5% of the variance.

Indirect gradient analysis

The first two components of the ordination using top stratum species relative cover (Fig. 5) are both significantly correlated with altitude ($r = 0.68$, $P < 0.001$ and $r = -0.67$, $P < 0.001$). Each of the quadrats is numbered in sequence (1–41) from the lowest to the highest altitude and for the most part this sequence is reflected in the ordination. Ten quadrats do not conform to this sequence. Of these, quadrats 5, 11, 15, and 20 are located on the steep south-east slopes of the Kaitake Range alongside the Kirihaui Track. Here, in contrast to the other locations sampled, kamahi is second dominant to tawa at low altitude (244 m) and becomes the top stratum dominant above 370 m. Quadrats 14, 16, 17, and 23 all have a large component of pukatea and their average slopes are all less than 10° . Quadrat 19, although a mid-altitude site on the coastal slopes, has a comparatively large amount of hinau and kamahi and few of the expected mid-altitude species. In quadrat 33 rewarewa, usually a leading

dominant below 450 m, is second dominant to kamahi at an altitude of 585 m on the coastal side of the range.

Figure 6 is a similar ordination diagram, obtained by using second stratum species relative cover. The first two components are both significantly correlated with altitude ($r = 0.67$, $P < 0.001$ and $r = -0.87$, $P < 0.001$). Again a number of quadrats obviously do not conform to the overall altitudinal trend, for example, quadrats 5 and 15, both located alongside the Kirihaui Track. Quadrat 5, although at relatively low altitude (244 m), has kamahi as leading subcanopy dominant. In quadrat 15 soft tree fern is leading subcanopy dominant, again at a lower altitude (366 m) than is usual.

Using the indirect gradient analyses it is possible to identify the major gradients of forest composition and to relate these to the environmental data recorded for each quadrat.

Kohekohe is prominent below 240 m on the ridge sides of the coastal slopes of the range. Species

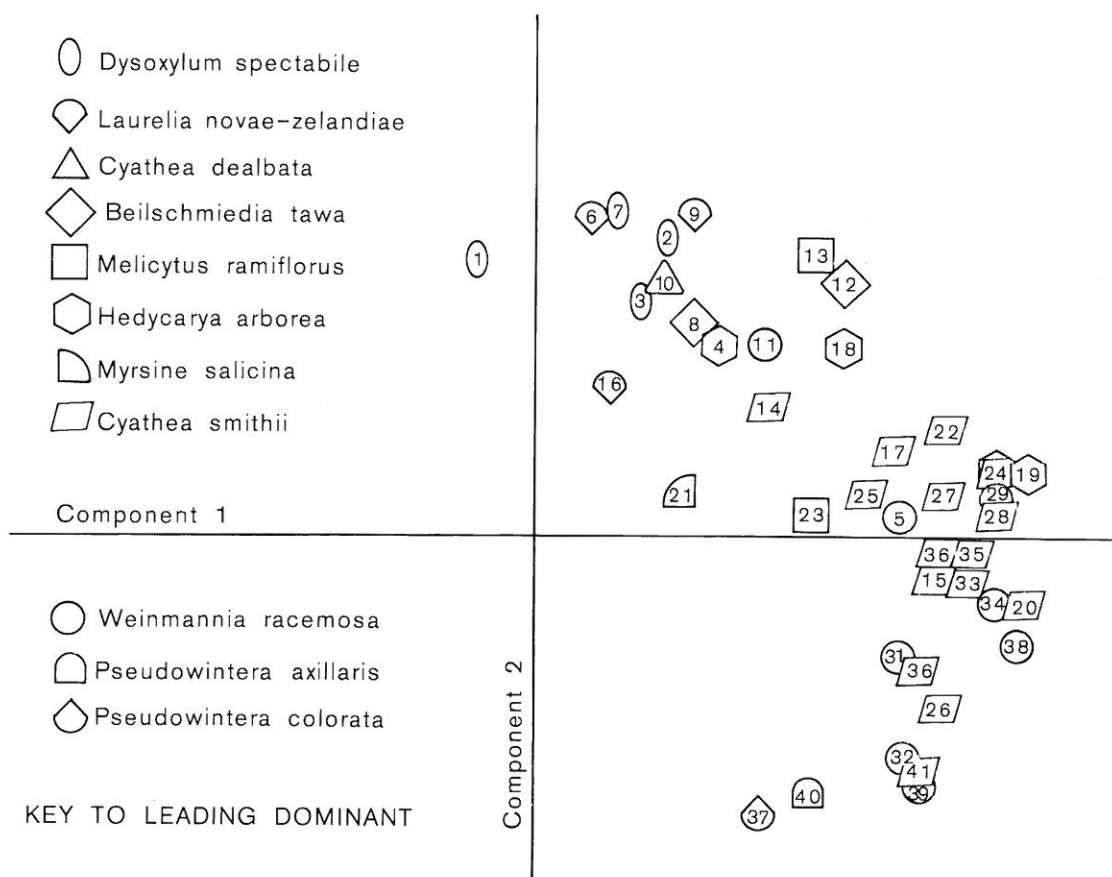


Fig. 6 Plot ordination (principal components analysis) using subcanopy species relative cover. The first two axes account for 57.1% of the variance.

which most commonly associate with kohekohe in the top stratum and subcanopy layer are karaka (*Corynocarpus laevigatus*), mamaku (*Cyathea medullaris*), kawakawa (*Macropiper excelsum*), rewarewa, and silver fern (*Cyathea dealbata*). In some instances, the forest is still at the relatively early stages of reverting, after clearance, to a kohekohe-dominated forest (for example, quadrat 1 dominated by lancewood (*Pseudopanax crassifolius*) up to 9.1 m in height).

Pukatea is most important below 470 m particularly on gentle slopes and in valley bottoms. The dominance of pukatea is generally related to soil drainage although in quadrat 16, numerous pukatea less than 20 cm dbh dominate a previously cleared ridge site. Species which most commonly associate with pukatea in the top stratum or subcanopy layer are nikau (*Rhopalostylis sapida*), tawa, and wheki (*Dicksonia squarrosa*). Pukatea is more prominent on the coastal than the landward side of the range and reaches its upper altitudinal limit in valley bottoms.

Rewarewa, although distributed throughout the range, is prominent below 420 m particularly on dry ridge crests of the coast-facing slopes. It is usually emergent (greater than 15.0 m) above a canopy layer of kohekohe or tawa. In most cases the quadrats where rewarewa is an important component of the top stratum are sites of previous logging or forest clearance. For example pure stands of rewarewa (40–70 cm dbh) have developed on the park boundary near the Timaru Stream after forest clearance. Further species which commonly associate with rewarewa in the top stratum or subcanopy layer are silver fern, kawakawa, mamaku, and karaka.

Tawa-dominated forest is found between 240 m and 340 m, in all of the major locations sampled with the exception of Mander's Spur Track where tawa is poorly represented in all strata, a feature probably relating to previous logging in this area. Forest in which tawa dominates the canopy was recorded over the complete range of aspects and most frequently on ridge sides of medium slope.

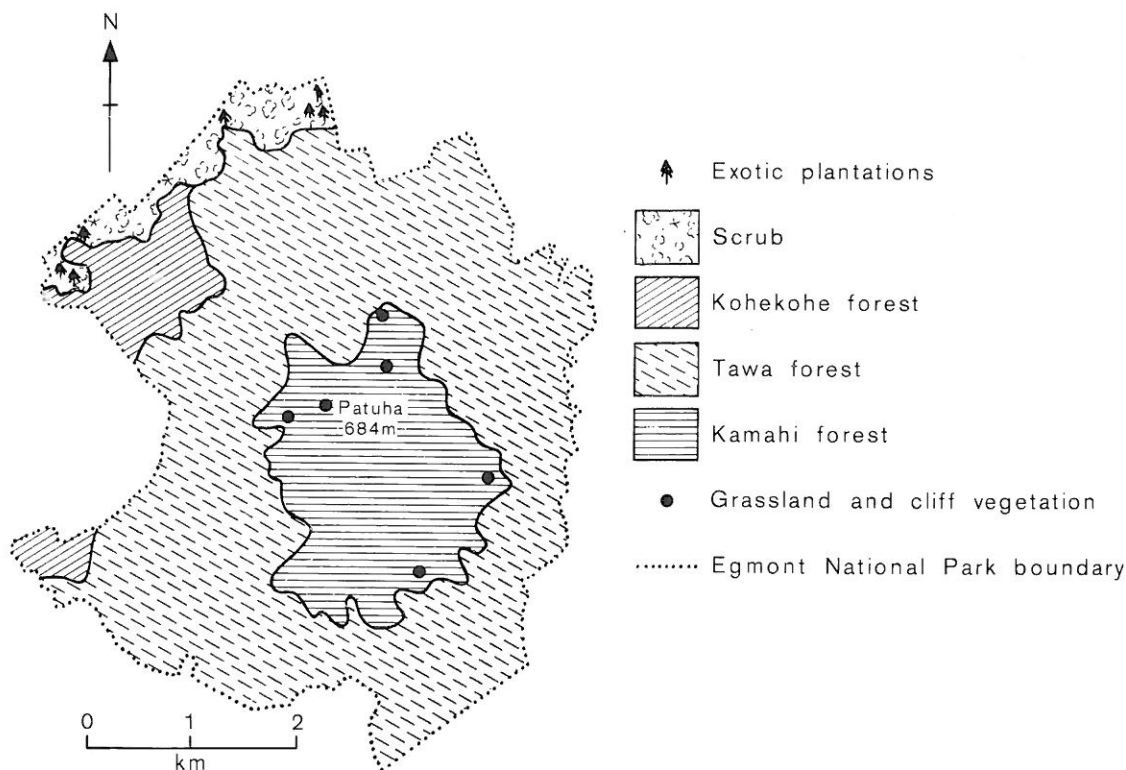


Fig. 7 Vegetation map of the Kaitake Range.

elsewhere in the park, was once the most widespread on what is now the developed farmland of the Egmont ring plain. The combined area of similar forest reserved elsewhere on the ring plain is less than 120 ha (Clarkson & Boase 1982).

Kamahi-dominated forest covers a little more than 480 ha of the range, but is a steep-land variant of rimu-rata/kamahi forest, the most widespread type on the lower slopes of Mt Egmont and the Pouakai Range in Egmont National Park.

The three classes of forest outlined are more or less equivalent to the coastal, general podocarp/hardwood, and Matemateaonga (higher altitude) types of the Taranaki upland described by Nicholls (1956).

The remainder of the vegetation of the Kaitake Range includes early successional scrub, exotic plantations, induced grassland, and cliff vegetation. Together these cover less than 110 ha. Some of this vegetation has the potential to revert to native forest. In the scrub of the north-west slopes for example, gorse can be expected to continue its rapid decline in importance as it becomes overtopped by mamaku and broadleaved trees. Similarly, brush

wattle should also be only a transitory dominant. A reduction of goats will be required however before the induced grasslands of the peaks are able to revert to kamahi forest.

Flora

Thirty taxa recorded on the Kaitake Range were not found in the remainder of the National Park (Appendix 3). Many of these are well known as lower altitude, coastal, or semi-coastal species and the Kaitake Range has the only significant areas within the National Park below 450 m and close to the coast. Furthermore, the early successional vegetation and exotic plantations of the lower north-western slopes of the range have habitats of a type not found elsewhere in the park. *Coprosma colensoi*, *Libertia grandiflora*, *Phymatosorus novae-zelandiae*, and mountain flax, are distributed at higher altitude on the range, but not recorded from seemingly suitable sites in the remainder of the National Park. Mountain flax was cultivated by the Maori (Kirk 1870) so it is possible that it was planted at pa sites on the peaks of the range and subsequently became naturalised there. Six of the

taxa listed—*Coprosma colensoi*, *Phymatosorus novae-zelandiae*, *Corybas aconitiflorus*, *Arthropodium candidum*, *Libertia grandiflora*, and mountain flax—have not been recorded elsewhere on the Egmont ring plain (Clarkson 1981, Clarkson & Boase 1982) and two of these—*Phymatosorus novae-zelandiae* and *Corybas aconitiflorus*—are not known elsewhere in the Taranaki Land District.

The distribution and abundance of each of the 270 taxa confirm the pattern outlined already by the gradient analyses. Many of the taxa distribute predominantly either above or below 450 m. As well, some are more common on the coastal than landward side of the range. *Leptopteris superba*, for example, an indicator of cool humid conditions, is confined to the south-eastern slopes of the highest peak, Patuha, and the river valleys to the south-east of Te Iringa. On the other hand, whau (*Entelea arborescens*), ngaio (*Myoporum laetum*), and wharangi (*Melicope ternata*), all relatively frost tender species, are restricted within the park boundary, to the lowest altitude sites, on the north-western slopes of the range.

Some of the taxa listed were recorded only on the margins of the two rivers, Oakura River and Timaru Stream, which flow down from the Pouakai Range and are deflected in a northern and western direction respectively by the Kaitake Range. Examples are kaikawaka (*Libocedrus bidwillii*), *Coriaria pteridoides*, *Ourisia macrophylla*, *Lindsaea viridis*, and *Parahebe catarractae* subsp. *lancoolata*. The last two are common at low altitudes in similar habitats elsewhere on the Egmont ring plain but the kaikawaka, *C. pteridoides*, and *O. macrophylla* result from dispersal of seed from higher altitude sites in the Pouakai Range where these species are common. Kaikawaka for example is uncharacteristically found growing alongside nikau and rewarewa at 160 m asl on the margin of the Timaru Stream.

The rare occurrence on the Kaitake peaks of seven species more typically subalpine in distribution has already been noted. Further species common in the montane or subalpine vegetation of the Pouakai Range, but only sparingly present on the Kaitake Range because of its lack of high ground, are *Cordyline indivisa*, *Luzuriaga parviflora*, *Pseudopanax anomalus*, *Coprosma tenuifolia*, *Hymenophyllum armstrongii*, *H. pulcherrimum*, *Polystichum vestitum*, *Blechnum vulcanicum*, *Astelia fragrans*, and *Pittosporum kirkii*.

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Mr M. R. Boase, Mr J. E. Peacock, and Mr J. Jordan gave assistance in the field. Mr R. Davies showed me the locality of *Corybas aconitiflorus*. The Egmont National Park Board gave permission to carry out the work and the National Parks Authority provided a travel grant. The latter part of the work was carried out while I was in receipt of a National Parks Authority Fellowship. The staff of the Department of Lands and Survey, New Plymouth provided valuable assistance during this period.

Mr A. P. Druce kindly made available his unpublished checklist of higher plants of Mt Egmont, an invaluable aid to species identification, and verified the identity of a *Coprosma* hybrid and a *Nertera* species. Dr P. J. Brownsey identified several *Asplenium* and *Hypolepis*, and Dr E. Edgar some *Carex* and *Juncus*. Mrs B. R. Clarkson, Mr G. C. Kelly, Dr I. A. E. Atkinson, and Dr P. Wardle made valuable comments on the manuscript.

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APPENDIX 1

Leading dominants (1st, 2nd, 3rd) from all strata.

(a. Top stratum; b. Second stratum; c. Shrub layer; d. Ground cover; e. Lianas and epiphytes).

- Group (mean altitude 220 m)
 - kohekohe, rewarewa, tawa
 - kohekohe, mahoe, pigeonwood
 - kohekohe, pigeonwood, kawakawa
 - Uncinia uncinata*, bush rice grass, *Blechnum chambersii*
 - supplejack, *Asplenium oblongifolium*, *Blechnum filiforme*
- Group (mean altitude 280 m)
 - tawa, rewarewa, rimu
 - pigeonwood, pukatea, silver fern
 - kiekie, pigeonwood, tawa-nikau
 - bush rice grass, *Uncinia uncinata*, crown fern
 - Collospermum hastatum*, supplejack, kiekie
- Group (mean altitude 353 m)
 - pukatea, tawa, pigeonwood
 - pigeonwood, pukatea, tawa
 - kiekie, soft tree fern, wheki-crown fern
 - bush rice grass, *Uncinia uncinata*, crown fern
 - Collospermum hastatum*, *Phymatosorus diversifolius*, *Asplenium flaccidum*
- Group (mean altitude 414 m)
 - hinau, kamahi, rimu
 - pigeonwood, mahoe, soft tree fern
 - soft tree fern, kiekie, silver fern
 - bush rice grass, *Uncinia uncinata*, kiekie
 - Asplenium flaccidum*, *Phymatosorus diversifolius*, *Hymenophyllum* spp.
- Group (mean altitude 470 m)
 - hinau, kamahi, rewarewa-pigeonwood
 - soft tree fern, mahoe, pigeonwood
 - soft tree fern, kiekie, *Pseudowintera axillaris*-wheki
 - bush rice grass, *Blechnum fluviatile*, *Uncinia uncinata*
 - kiekie, *Asplenium flaccidum*, *Phymatosorus diversifolius*
- Group (mean altitude 526 m)
 - hinau, kamahi, rewarewa
 - soft tree fern, mahoe, kamahi
 - soft tree fern, *Pseudowintera axillaris*, kiekie
 - bush rice grass, *Uncinia uncinata*, *Blechnum fluviatile* — *Uncinia gracilentia*
 - Asplenium flaccidum*, *Phymatosorus diversifolius*, *Metrosideros perforata*

- Group (mean altitude 591 m)
 - kamahi, pigeonwood, soft tree fern
 - soft tree fern, kamahi, mahoe-pigeonwood
 - soft tree fern, *Pseudowintera axillaris*, *P. colorata*
 - bush rice grass, *Uncinia uncinata*, *Blechnum fluviatile*
 - Asplenium flaccidum*, *Rumohra adiantiformis*, *Hymenophyllum* spp.
- Group (mean altitude 659 m)
 - kamahi, toro, miro
 - soft tree fern, *Pseudowintera axillaris*, toro
 - soft tree fern, *P. axillaris*, *P. colorata*
 - bush rice grass, *Blechnum fluviatile*
 - Asplenium flaccidum*, *Hymenophyllum* spp., *Collospermum microsporum*

APPENDIX 2

Indigenous vascular taxa recorded on the Kaitake Range.

* Specimens lodged at Department of Lands & Survey, New Plymouth.

† Specimens lodged at CHR Lincoln.

Gymnosperm trees and shrubs (6)

Dacrycarpus dacrydioides (A. Rich.) de Laubenfels [kahikatea] Locally common in valleys of the south-western sector. †

Dacrydium cupressinum Lamb. [rimu] Common throughout.

Libocedrus bidwillii Hook. f. [kaikawaka] Rare. One tree on the margin of the Timaru Stream 160 m. *
Podocarpus hallii Kirk [Hall's totara] Common above 600 m.

Prumnopitys ferruginea (D. Don) de Laubenfels [miro] Common throughout.

Prumnopitys taxifolia (D. Don) de Laubenfels [matai] Rare. Two plants on coastal slopes below 350 m.

Monocotyledonous trees and shrubs (4)

Cordyline australis (Forst. f.) Endl. [cabbage tree] Rare. One plant on forest margin near Lucy's Gully.

Cordyline banksii Hook. f. Common throughout.

Cordyline indivisa (Forst. f.) Steud. Rare. One plant near Sefton Ridge Track 600 m.

Rhopalostylis sapida Wendl. et Drude in Kerch. [nikau] Common on coastal slopes below 450 m.

Dicotyledonous trees (35)

Alectryon excelsus Gaertn. var. *excelsus* [titoki] Uncommon. Coastal slopes below 400 m. Mainly saplings.

Aristotelia serrata (J. R. et G. Forst.) W. R. B. Oliver [wineberry] Locally common in early successional vegetation on north-east slopes.

Beilschmiedia tawa (A. Cunn.) Kirk [tawa] Common throughout.

Carpodetus serratus J. R. et G. Forst. [marbleleaf] Common throughout.

Corynocarpus laevigatus J. R. et G. Forst. [karaka] Locally common on coastal slopes below 300 m. Often associated with pa sites.

Dysoxylum spectabile (Forst. f.) Hook f. [kohekohe] Common on coastal slopes below 450 m.

Elaeocarpus dentatus (J. R. et G. Forst.) Vahl [hinau] Common throughout.

Entelea arborescens R. Br. [whau] Uncommon. Scattered throughout early successional vegetation on north-east slopes below 300 m. †

- Fuchsia excorticata* (J. R. et G. Forst.) Linn. f. [fuchsia] Locally common on some stream margins.
- Griselinia littoralis* Raoul [broadleaf] Common above 600 m.
- Hedycarya arborea* J. R. et G. Forst. [pigeonwood] Common throughout.
- Knightia excelsa* R. Br. [rewarewa] Common throughout.
- Laurelia novae-zelandiae* A. Cunn. [pukatea] Common below 450 m mainly in valley bottoms.
- Lophomyrtus bullata* (A. Cunn.) Burret [ramarama] Uncommon. Noted on some northern slopes below 300 m. †
- Macropiper excelsum* (Forst. f.) Miq. var. *excelsum* [kawakawa] Common on coastal slopes below 450 m.
- Melicope ternata* J. R. et G. Forst. [wharangi] Rare. One seedling noted on coastal slopes 110 m.
- Melicytus lanceolatus* Hook. f. [narrow-leaved mahoe] Rare. One plant noted on "Kirihaui".
- Melicytus ramiflorus* J. R. et G. Forst. subsp. *ramiflorus* [mahoe] Common throughout.
- Metrosideros robusta* A. Cunn. [northern rata] Uncommon. Scattered throughout the range. Some seedlings noted on rocky outcrops.
- Mida salicifolia* A. Cunn. [sandalwood] Uncommon. Several plants on ridge south of Davies Track (230 m) and on southern margins of Timaru Stream (150 m). †
- Myoporum laetum* Forst. f. var. *laetum* [ngaio] Uncommon. Scattered in early successional vegetation on north-east slopes below 300 m. †
- Myrsine australis* (A. Rich.) Allan [mapou] Common on coastal slopes below 450 m.
- Myrsine salicina* Hook. f. [toro] Common above 450 m.
- Nestegis cunninghamii* (Hook. f.) L. Johnson [black maire] Uncommon. Scattered throughout the range. *
- Nestegis lanceolata* (Hook. f.) L. Johnson [white maire] Uncommon. On northern ridges below 450 m. *†
- Olearia rani* (A. Cunn.) Druce [heketara] Uncommon. On dry slopes and ridges below 450 m.
- Paratrophis microphylla* (Raoul) Ckn. [turepo] Rare. Two plants; one at Lucy's Gully and the other on the lower margins of Timaru Stream.
- Pittosporum eugenioides* A. Cunn. [tarata] Locally common on north-east slopes below 450 m.
- Pseudopanax arboreus* (Murr.) Philipson [five-finger] Common throughout.
- Pseudopanax colensoi* (Hook. f.) Philipson [mountain five-finger] Rare. On rocky outcrops at Patuha Pa and "Kirihaui". †
- Pseudopanax crassifolius* (A. Cunn.) C. Koch [lancewood] Common throughout.
- Pseudopanax edgerleyi* (Hook. f.) C. Koch [raukawa] Common above 600 m.
- Schefflera digitata* J. R. et G. Forst. [pate] Common throughout.
- Vitex lucens* Kirk [puriri] Locally common on coastal slopes below 300 m.
- Weinmannia racemosa* Linn. f. [kamahi] Common throughout.
- Dicotyledonous shrubs (32)**
- Alseuosmia macrophylla* A. Cunn. Common throughout.
- Brachyglottis repanda* J. R. et G. Forst. var. *repanda* [rangiora] Common throughout.
- Cassinia vauvilliersii* (Homb. et Jacq.) Hook. f. [mountain tauhinu] Rare. Eight plants at Patuha Pa. †
- Coprosma areolata* Cheesem. Uncommon. On northern slopes below 350 m. *
- Coprosma colensoi* Hook. f. Locally common on peaks: Patuha, Kaitake, and Pioke. *
- Coprosma grandifolia* Hook. f. [raurekaui]. Common throughout.
- Coprosma lucida* J. R. et G. Forst. Common throughout.
- Coprosma robusta* Raoul Common throughout.
- Coprosma* sp. (*C. parviflora* var. *dumosa* Cheeseman 1906, non *C. parviflora* var. *dumosa* sensu Allan 1961) Rare. Two plants; one on "Kirihaui" and the other near Te Iringa. †
- Coprosma tenuifolia* Cheesem. Uncommon. Above 600 m on "Kirihaui Peak" near Patuha and Patuha Pa. *
- Coprosma* hybrid (*C. propinqua* A. Cunn. × *C. robusta* Raoul) Rare. One plant on Timaru Stream margin 260m. †
- Coprosma* hybrid (*C. propinqua* A. Cunn. × *C. tenuifolia* Cheesem.) Rare. One plant on Timaru Stream margin 230 m. *
- Coriaria arborea* Lindsay var. *arborea* [tutu] Locally common in early successional vegetation and on some stream margins.
- Coriaria pteridoides* W. R. B. Oliver Rare. One plant recorded on margin of Timaru Stream 170 m. †
- Gaultheria antipoda* Forst. f. Locally common on rocky outcrops and in forest clearings above 600 m.
- Geniostoma ligustrifolium* A. Cunn. [hangehange] Common below 450 m.
- Griselinia lucida* Forst. f. [puka] Common below 450 m as epiphyte on rimu and pukatea.
- Hebe corriganii* Carse Locally common on rocky outcrops at "Kirihaui", Goat Rock, and near Patuha.
- Hebe stricta* (Benth.) L. B. Moore var. *stricta* [koromiko] Locally common on some tracksides and stream margins. *
- Hebe stricta* var. *egmontiana* L. B. Moore Uncommon. Margins of the Timaru Stream and Oakura River.
- Leptospermum scoparium* J. R. et G. Forst. [manuka] Rare. A few plants on the margins of the Timaru Stream. †
- Leucopogon fasciculatus* A. Rich. [mingimingi] Rare. Four plants on rocky outcrops at Goat Rock 480m. †
- Olearia arborescens* (Forst. f.) Ckn. et Laing Uncommon. On Patuha, "Kirihaui", Kaitake and upper reaches of Waimoku Track. Mainly seedlings. †
- Pittosporum cornifolium* A. Cunn. Uncommon. Several localities below 450 m associated with *Collospermum hastatum* as an epiphyte on emergent rimu. *
- Pittosporum kirkii* Hook. f. ex Kirk Rare. One plant at Patuha 640 m as epiphyte on kamahi. †
- Pseudopanax anomalus* (Hook.) Philipson Rare. One plant in kamahi forest Patuha 640 m. *
- Pseudowintera axillaris* (J. R. et G. Forst.) Dandy [lowland pepper tree] Common below 500 m.
- Pseudowintera colorata* (Raoul) Dandy [mountain pepper tree] Common above 500 m.
- Rhabdothermus solandri* A. Cunn. Locally common on some streambanks below 450 m particularly in the vicinity of former Boars Head Mine.
- Senecio elaeagnifolius* Hook. f. [leatherwood] Uncommon. At Patuha Pa, "Kirihaui" and Patuha. Mainly seedlings. †
- Senecio kirkii* Kirk [kohurangi] Uncommon. An epiphyte on tree ferns in the kamahi forest and associated with *Collospermum hastatum* on pukatea.
- Solanum aviculare* Forst. f. [poroporo] Uncommon. Tracksides and forest clearings below 450 m.

Monocotyledonous lianes (2)

Freycinetia baueriana Endl. subsp. *banksii* (A. Cunn.) Stone [kiekie] Common below 450 m particularly on the coastal side of the range.

Ripogonum scandens J. R. et G. Forst. [supplejack] Common below 450m.

Dicotyledonous lianes (11)

Calystegia tuguriorum (Forst. f.) Hook. f. Locally common at margins of forest on coastal slopes below 350 m. *Clematis paniculata* Gmel. Common throughout.

Metrosideros diffusa (Forst. f.) Smith Common throughout.

Metrosideros fulgens Gaertn. Common throughout.

Metrosideros perforata (J. R. et G. Forst.) A. Rich. Common throughout.

Muehlenbeckia australis (Forst. f.) Meissn. Common throughout.

Parsonsia capsularis (Forst. f.) R. Br. Common throughout.

Parsonsia heterophylla A. Cunn. Locally common in forest on coastal slopes below 350 m.

Passiflora tetrandra DC. [N.Z. passion vine] Locally common at margins of forest on coastal slopes below 350 m.

Rubus australis Forst. f. Common above 600 m.

Rubus cissoides A. Cunn. [bush lawyer] Common throughout.

Psilopsids and Lycopods (6)

Tmesipteris elongata Dang. (incl. *T. elongata* subsp. *robusta* Chinnock) Common throughout as an epiphyte on tree ferns.

Tmesipteris lanceolata Dang. Rare. A few plants on

Cyathea medullaris at Lucy's Gully. *†

Tmesipteris tannensis (Spreng.) Bernh. Common above 450 m as an epiphyte on tree ferns.

Lycopodium scarosum Forst. f. Locally common on rocky outcrops of the main peaks.

Lycopodium varium R. Br. Common throughout. Forms fitting the description of *L. billardieri* Spring are common as epiphytes on large forest trees below 450 m whereas *L. varium* s.s. is common as an epiphyte in the kamahi forest above 450 m. A few plants grow terrestrially. †

Lycopodium volubile Forst. f. Common in early successional vegetation on north-east slopes.

Ferns (76)

Adiantum cunninghamii Hook. [maidenhair fern] Locally common on some stream banks and in forest on coastal slopes below 350m. *

Athyrium australe (R. Br.) Presl. Rare. A few plants at the Davies Track entrance (northern end) and in forest on coastal slopes below 250 m. †

Anarthropteris lanceolata (J. Smith) L. B. Moore Common trunk epiphyte below 450 m.

Arthropteris tenella (Forst. f.) Smith Rare. One plant recorded as a climber on mahoe at Lucy's Gully. †

Asplenium bulbiferum Forst. f. s.s. [hen and chicken fern] Common throughout.

Asplenium flaccidum Forst. f. subsp. *flaccidum* Common throughout as an epiphyte on forest trees. A few plants growing terrestrially in early successional vegetation on the north-east slopes.

Asplenium gracillimum Col. Rare. A few plants near Lucy's Gully. *

Asplenium hookerianum Col. Uncommon. In early successional vegetation on north-east slopes and near Lucy's Gully. *†

Asplenium oblongifolium Col. Common epiphyte below 450 m. Occasionally terrestrial.

Asplenium polyodon Forst. f. Common epiphyte throughout.

Asplenium hybrid (*A. bulbiferum* s.s. × *A. hookerianum*). Rare. One plant near Lucy's Gully.

Asplenium hybrid (*A. bulbiferum* s.s. × *A. flaccidum* subsp. *flaccidum*). Rare. A few plants in early successional vegetation on north-east slopes growing terrestrially. †

Blechnum chambersii Tindale Common throughout particularly on stream banks.

Blechnum colensoi (Hook. f.) N. A. Wakefield Locally common at stream sides on the south-west slopes and near Patuha.

Blechnum discolor (Forst. f.) Keys [crown fern] Common throughout.

Blechnum filiforme (A. Cunn.) Ettingshausen Common below 450 m as climber on trees and as a creeper on the forest floor.

Blechnum fluviatile (R. Br) Salom. Common above 450 m particularly at stream sides.

Blechnum membranaceum (Col.) Mett. Common below 450 m particularly on stream banks.

Blechnum nigrum (Col.) Mett. Common above 600 m on heavily shaded banks.†

Blechnum sp. (*B. capense* (L.) Schlect. agg. common sp. lower pinnae reduced in length) [kiokio] Common throughout, particularly on stream banks and rocky outcrops.

Blechnum sp. (*Lomaria latifolia* Col.) Locally common on ridge crests upper Waimoku Track and near Patuha. †

Blechnum vulcanicum (Blume) Kuhn. Uncommon. On rocky outcrops at Goat Rock, Patuha Pa, and "Kirihaui" *

Botrychium biforme Col. Uncommon. Near Lucy's Gully and on pa site on north-east slopes 170 m. *

Ctenopteris heterophylla (Labill.) Tindale. Common trunk epiphyte throughout.

Cyathea cunninghamii Hook. f. [gully tree fern] Locally common between 300 and 600 m Manders Spur Track. *

Cyathea dealbata (Forst. f.) Swartz [silver fern] Common below 450 m.

Cyathea medullaris (Forst. f.) Swartz [mamaku] Common below 450 m.

Cyathea smithii Hook. f. [soft tree fern] Common above 450 m.

Dicksonia fibrosa Col. [wheki-ponga] Rare. One plant in exotic plantation at Lucy's Gully.

Dicksonia squarrosa (Forst. f.) Swartz [wheki] Common throughout.

Grammitis billardieri Willd. Common throughout. Mainly epiphytic but some terrestrial plants. †

Grammitis patagonica (C. Chr.) Parris Locally common on some rocky outcrops particularly at Goat Rock. †

Grammitis magellanica Desv. subsp. *nothofagei* Parris Rare. One plant at Te Iringa as an epiphyte on kamahi. †

Histiopteris incisa (Thunb.) J. Smith Locally common on some track sides and under canopy gaps.

Hymenophyllum armstrongii (Baker) Kirk Rare. One plant at Te Iringa in clump of moss epiphytic on kamahi. †

Hymenophyllum bivalve (Forst. f.) Swartz Common trunk epiphyte above 600 m.

Hymenophyllum demissum (Forst. f.) Swartz Common above 450 m. Mainly terrestrial.

Hymenophyllum dilatatum (Forst. f.) Swartz Common trunk epiphyte above 450 m.

Hymenophyllum ferrugineum Colla Common throughout mainly as epiphyte on tree ferns.

Hymenophyllum flabellatum Labill. Common trunk epiphyte above 450 m.

Hymenophyllum flexuosum A. Cunn. Common trunk epiphyte above 450 m.

Hymenophyllum multifidum (Forst. f.) Swartz Common trunk epiphyte above 600 m. Also recorded as a rupestral. †

Hymenophyllum pulcherrimum Col. Rare. One plant in valley to west of Te Iringa as an epiphyte on a tree fern.

Hymenophyllum rarum R. Br. Common above 450 m as an epiphyte on tree ferns.

Hymenophyllum revolutum Col. Common throughout as an epiphyte on tree ferns and rupestral on rocky outcrops of higher peaks.

Hymenophyllum sanguinolentum (Forst. f.) Swartz Common trunk epiphyte above 450 m. *

Hymenophyllum scabrum A. Rich. Common trunk epiphyte above 450 m.

Hypolepis ambigua (A. Rich.) Brownsey et Chinnock Rare. A colony of plants in a seepage below a rocky outcrop at the junction of Waimoku and Sefton Ridge Track 500 m. †

Hypolepis rufobarbata (Col.) Wakefield Rare. A few plants at Whenuariki Stream 240 m. †

Lastreopsis glabella (A. Cunn.) Tindale Common below 450 m.

Lastreopsis hispida (Sw.) Tindale Common throughout.

Lastreopsis microsora (Endl.) Tindale subsp. *pentangularis* (Col.) Tindale Rare. A few plants near Lucy's Gully.

Leptopteris hymenophylloides A. Rich. Common above 450 m.

Leptopteris superba (Col.) Presl [prince of Wales feather] Uncommon. In valleys west of Te Iringa and near Patuha. †

Lindsaea trichomanoides Dryand. Common above 450 m. †

Lindsaea viridis Col. Locally common on banks of Timaru Stream and Oakura River. *†

Ophioglossum coriaceum A. Cunn. Uncommon. About twenty plants on a grassy knoll on the upper Waimoku Track 550 m.

Paesia scaberula (A. Rich.) Kuhn Locally common in early successional vegetation on north-east slopes and on some of the peaks.

Phymatosorus diversifolius (Willd.) Pic. Ser. Common throughout as a trunk climber.

Phymatosorus novae-zelandiae (Baker) Pic. Ser. Uncommon. A few plants on tree trunks near the Waimoku Track (490 m) and near Te Iringa. †

Phymatosorus scandens (Forst. f.) Pic. Ser. Common trunk climber below 450 m.

Pneumatopteris pennigera (Forst. f.) Holttum Common below 450 m particularly on stream margins.

Polystichum richardii (Hook. f.) J. Smith Locally common in forest on coastal slopes below 350 m.

Polystichum silvaticum (Col.) Diels Common throughout. †

Polystichum vestitum (Forst. f.) Presl Rare. One plant at Patuha Pa. †

Pteridium esculentum (Forst. f.) Cockayne [bracken] Locally common in early successional vegetation on north-east slopes and on some of the peaks.

Pteris macilenta A. Rich. Common below 450 m.

Pteris tremula R. Br. Rare. A few plants near forest margin on north-east slopes 120 m. †

Pyrrosia serpens (Forst. f.) Ching Common trunk epiphyte throughout.

Rumohra adiantiformis (Forst. f.) Ching Common above 450 m.

Sticherus cunninghamii (Hook.) Ching Locally common on rocky outcrops of the high peaks.

Trichomanes colensoi Hook. f. Uncommon. On some shaded stream banks below 450 m.

Trichomanes elongatum A. Cunn. Uncommon. Growing on boulders at trackside on Davies Track (northern end) 460 m. †

Trichomanes endlicherianum Presl Locally common on boulders at some stream sides below 450 m. †

Trichomanes strictum Hook. et Grev. Rare. A few plants on banks of Timaru Stream 290 m. †

Trichomanes venosum R. Br. Common throughout as an epiphyte on tree ferns. *

Orchids (20)

Acianthus fornicatus R. Br. var. *sinclairii* (Hook. f.) Hatch Uncommon. Growing on logs in the vicinity of Davies Track (Weld Road entrance).

Aporostylis bifolia (Hook. f.) Rupp et Hatch. Rare. A few plants near Patuha.

Bulbophyllum pygmaeum (Smith) Lindl. Locally common. An epiphyte on rewarewa, kamahi, and miro. Also a rupestral on rocky outcrops of Patuha Pa and Patuha. †

Caladenia catenata (Sm.) Druce Locally common in the vicinity of Davies Track (Weld Road entrance).

Chiloglottis cornuta Hook. f. Locally common in exotic plantations near Lucy's Gully.

Corybas aconitiflorus Salisb. Rare. A few plants near Lucy's Gully.

Corybas oblongus (Hook. f.) Reichb. f. Common on stream banks below 450 m.

Corybas orbiculatus (Col.) L. B. Moore Common on stream banks below 450 m.

Corybas rivularis (A. Cunn.) Reichb. f. Rare. A few plants on the margins of a 'ponded' stream south of Te Iringa 290 m. †

Corybas trilobus (Hook. f.) Reichb. f. Common throughout.

Dendrobium cunninghamii Lindl. Common trunk epiphyte throughout. Also a rupestral on rocky outcrops of Patuha Pa and Patuha.

Drymoanthus adversus (Hook. f.) Dockrill Uncommon. An epiphyte on tawa, hinau, and mahoe below 450 m.

Earina autumnalis (Forst. f.) Hook. f. Common trunk epiphyte throughout. Also a rupestral on rocky outcrops of Patuha Pa and Patuha.

Earina mucronata Lindl. Common trunk epiphyte throughout. Also a rupestral on rocky outcrops of Patuha Pa and Patuha.

Gastrodia sesamoides R. Br. Rare. A few plants in redwood plantation Lucy's Gully.

Microtis unifolia (Forst. f.) Reichb. f. Locally common on some forest margins near park boundary and at Goat Rock.

Orthoceras strictum R. Br. Rare. About fifteen plants at Goat Rock.

Pterostylis banksii A. Cunn. Locally common on some forest margins near the park boundary.

Pterostylis montana Hatch Rare. A few plants near Patuha.

Thelymitra longifolia J. R. et G. Forst. Locally common on some forest margins near the park boundary.

Grasses (7)

Cortaderia fulvida (Buchan.) Zotov [toetoe] Locally common on margins of Timaru Stream and Oakura River. Also on rocky outcrops near upper Waimoku Track.

Dichelachne crinita (L. f.) Hook. f. [plume grass] Rare. A few plants on banks in early successional vegetation of north-east slopes.

Microlaena avenacea (Raoul) Hook. f. [bush rice grass] Common throughout.

Microlaena stipoides (Lab.) R. Br. Common on coastal slopes below 350 m.

Poa anceps Forst. f. var. *anceps* Locally common on banks below 450 m but also recorded on higher peaks.

Rytidosperma clavatum (Zotov) Connor et Edgar Uncommon. In induced grassland on Patuha, Patuha Pa, and "Kirihaui".

Rytidosperma gracile (Hook. f.) Connor et Edgar. Locally common in induced grassland of higher peaks and at forest margins near the park boundary. †

Sedges (16)

Carex dissita Boott. Locally common on coastal slopes below 450 m. †

Carex forsteri Wahl. Rare. A few plants in a seepage below rocky outcrop at the junction of Waiomoku and Sefton Ridge Track 500 m. †

Carex geminata Schkuhr. Locally common in swampy stream margins near the park boundary on the coastal side of the range.

Carex secta Boott. var. *secta* Locally common in swampy stream margins near the park boundary on the coastal side of the range.

Carex solandri Boott. Locally common on coastal slopes below 450 m.

Carex virgata Boott. Locally common in swampy stream margins near the park boundary on the coastal side of the range. †

Cyperus ustulatus A. Rich. Uncommon. In swampy stream margins near the park boundary on the coastal side of the range and near Lucy's Gully.

Eleocharis acuta R. Br. Uncommon. In swampy stream margins near the park boundary on the coastal side of the range.

Gahnia pauciflora Kirk Locally common on ridge tops above 450 m and particularly at Patuha Pa and "Round Hill".

Gahnia setifolia (A. Rich.) Hook. f. Locally common on stream sides particularly Timaru Stream, Oakura River, and lower reaches of the Kirihaui Track.

Schoenus maschalinus Roem. et Schult. Uncommon. On some stream margins, at a seepage near the junction of the Waimoku and Sefton Ridge Tracks, and on a slip face at "Kirihaui". †

Scirpus reticularis (Col.) Edgar Uncommon. In swampy stream margins near the park boundary on the coastal side of the range. †

Uncinia banksii Boott. Common above 450 m.

Uncinia gracilenta Hamlin Common above 450 m.

Uncinia uncinata (Linn. f.) Kuk. Common throughout. *

Uncinia zotovii Hamlin Common above 450 m.

Rushes (4)

Juncus gregiflorus L. Johnson Uncommon. In swampy stream margins near park boundary and at a seepage near the junction of the Waimoku and Sefton Ridge Tracks.

Juncus pallidus R. Br. Rare. About twenty plants in a swampy area on the north-east slopes within the park boundary 105 m. †

Juncus sarophorus L. Johnson Rare. A few plants on the Timaru Stream margin 310 m. †

Luzula picta A. Rich. var. *picta* Uncommon. At Goat Rock.

Monocotyledonous herbs (14)

Arthropodium candidum Raoul Uncommon. At Lucy's Gully and Davies Track (Weld Road entrance). †

Astelia fragrans Col. Uncommon. At Kirihaui Track entrance, near Patuha Pa and near Te Iringa. †

Astelia solandri A. Cunn. Common throughout as an epiphyte but also a rupestral on rocky outcrops of the higher peaks.

Collospermum hastatum (Col.) Skottsb. [kahakaha] Common below 450 m as an epiphyte on large trees.

Collospermum microsporum (Col.) Skottsb. Common above 450 m as an epiphyte on kamahi and miro.

Dianella nigra Col. Blueberry. Uncommon. In early successional vegetation on north-east slopes, at Lucy's gully and on rocky outcrops of the peaks.

Lemna minor L. [duckweed] Rare. In one 'ponded' stream near the park boundary on the coastal side of the range.

Libertia grandiflora (R. Br.) Sweet Locally common on steep ridge tops at the upper end of the Waimoku Track 580 m. In recent years the population has been markedly depleted by goat browsing.

Libertia ixioides (Forst. f.) Spreng. Rare. A few plants at Patuha Pa. †

Libertia pulchella (R. Br.) Spreng. Common above 600 m.

Luzuriaga parviflora (Hook. f.) Kunth. Rare. One patch growing on a large rock in the vicinity of Patuha Pa. †

Phormium cookianum Le Jolis subsp. *hookeri* (Hook. f.)

Wardle [mountain flax] Locally common on rocky outcrops at Goat Rock, "Kirihaui", Patuha, and Patuha Pa. Also an epiphyte in nearby kamahi forest.

Phormium tenax J.R. et G. Forst. [N.Z. flax] Rare. One plant on the margin of the Timaru Stream 180 m.

Typha orientalis C. B. Presl [raupo] Rare. A single colony in one 'ponded' stream near the park boundary on the coastal side of the range.

Composite herbs (10)

Cotula squalida Hook. f. subsp. *squalida* Locally common on margins of the Timaru Stream and Oakura River.

Gnaphalium audax subsp. *audax* Drury Uncommon. On rocky outcrops of "Kirihaui" and Patuha Pa. †

Gnaphalium delicatum Drury Locally common in induced grassland on "Kirihaui" and Patuha Pa.

Gnaphalium gymnocephalum DC. Locally common on track sides and in induced grassland on "Kirihaui" and Patuha Pa. †

Gnaphalium limosum Drury. Uncommon. On margin of Whenuariki Stream and in a valley to the south-east of Te Iringa. †

Gnaphalium kerriense A. Cunn. Locally common on the banks of the Timaru Stream and the Oakura River. †

Gnaphalium sp. (*G. luteo-album* L. agg.) Locally common at forest margins near park boundary and in induced grasslands on "Kirihaui" and Patuha Pa.

Helichrysum sp. "*Helichrysum alpinum*" of Cockayne, 1928. Rare. A few plants at Goat Rock, Patuha, and Patuha Pa. †

Lagenifera pumila (Forst. f.) Cheesem. Locally common in induced grasslands on "Kirihaui" and Patuha Pa and on the margins of the Timaru Stream.

Senecio minimus Poir. Locally common at forest margins near the park boundary.

Other dicotyledonous herbs (27)

Acaena anserinifolia (J. R. et G. Forst.) Druce [bidibidi] Locally common on track sides and on some of the higher peaks. *

Acaena novae-zelandiae Kirk [bidibidi] Locally common at forest margins near the park boundary.

Cardamine sp. (*C. debilis* agg. the "Long Style" of Pritchard, 1957). Common throughout. †

Centella uniflora (Col.) Nannf. Locally common at forest margins near the park boundary.

Dichondra repens J. R. et G. Forst. Uncommon. In macrocarpa plantation Wairau Track entrance.

Epilobium alsinoides A. Cunn. subsp. *alsinoides* Uncommon. In induced grassland Patuha Pa and on slip face near Patuha. †

Epilobium brunnescens (Cockayne) Raven et Englehorn subsp. *brunnescens* Locally common on banks of the Timaru Stream and Oakura River.

Epilobium nerteroides A. Cunn. Locally common on boulders in the Timaru Stream and Oakura River.

Epilobium rotundifolium Forst. f. Locally common in forest clearings and at tracksides.

Euphrasia cuneata Forst. f. Rare. One plant on margin of the Timaru Stream 305 m. †

Gunnera monoica Raoul Locally common on banks of Timaru Stream and Oakura River.

Haloragis erecta (Murr.) Eichl. Locally common in early successional vegetation on north-eastern slopes and near Lucy's Gully. †

Hydrocotyle dissecta Hook. f. Uncommon. In macrocarpa plantation Wairau Track entrance and on track sides Waimoku and Sefton Ridge Tracks. †

Hydrocotyle elongata A. Cunn. Uncommon. At forest margin near park boundary on the coastal side of the range and on Sefton Ridge Track. †

Hydrocotyle heteromeria A. Rich. Locally common at forest margins near the park boundary and at track sides.

Hydrocotyle moschata Forst. f. Locally common at forest margins near the park boundary and on track sides.

Jovellana repens (Hook. f.) Kranzl. Locally common in moist valley bottoms on the south-east side of the range.

Nertera depressa Gaertn. Common throughout. †

Nertera sp. (unnamed sp., aff. *N. dichondraefolia* (A. Cunn.) Hook. f.) Uncommon. On southern slopes above Timaru Stream.

Ourisia macrophylla Hook. Rare. A few plants on the margins of the Timaru Stream. Probably var. *drucei* L. B. Moore.

Oxalis lactea Hook. Locally common on banks of Timaru Stream and Oakura River.

Parahebe catarractae (Forst. f.) Oliver subsp. *lanceolata* (Benth.) Garnock-Jones Uncommon. On banks and boulders of Timaru Stream and Oakura River.

Pratia angulata (Forst. f.) Hook. f. Common throughout.

Ranunculus hirtus DC. s.s. Common throughout. †

Stellaria parviflora Hook. f. Common throughout.

Viola filicaulis Hook. f. Common above 600 m.

Wahlenbergia sp. (cf. *W. gracilis* (Forst. f.) Schrad.). Locally common at forest margins near the park boundary, in early successional vegetation on the north-east slopes, at Goat Rock, and Patuha Pa. †

APPENDIX 3

Taxa found on the Kaitake Range but not noted in the remainder of Egmont National Park by Clarkson (1981, and unpublished data).

Acianthus fornicatus var. *sinclairii*, *Arthropodium candidum*, *Arthropteris tenella*, *Asplenium gracillimum*, *Botrychium biforme*, *Calystegia tuguriorum*, *Carex forsteri*, *Coprosma colensoi*, *Corybas aconitiflorus*, *Corynocarpus laevigatus*, *Dichelachne crinita*, *Dichondra repens*, *Dicksonia fibrosa*, *Entelea arborescens*, *Hydrocotyle dissecta*, *Juncus pallidus*, *Lastreopsis microspora* subsp. *pentangularis*, *Libertia grandiflora*, *Lophomyrtus bullata*, *Melicope ternata*, *Mida salicifolia*, *Myoporum laetum*, *Passiflora tetrandra*, *Phormium cookianum* subsp. *hookeri*, *Phymatosorus novae-zelandiae*, *Pteris tremula*, *Tmesipteris lanceolata*, *Trichomanes endlicherianum*, *T. elongatum*, *Vitex lucens*.

