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

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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 woodland 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), “Kirihau” (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 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.

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 woodland 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).
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 bosis*), and possums (*Trichosorus 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 quadrant, 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.
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 overlaid 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.
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 (*Freyceinetia 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 (*Cytisera 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.
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 Kirihau 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 hinu 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 Kirihau 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
which most commonly associate with kohekohe in the top stratum and subcanopy layer are karaka (Corokia cotinifolia), 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 wheke (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. 6  Plot ordination (principal components analysis) using subcanopy species relative cover. The first two axes account for 57.1% of the variance.
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 steepland 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 novaezelandiae, 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, Putau, and the river valleys to the south-east of Te Iringa. On the other hand, whau (Entelea arborescens), ngai (Myoporum laetum), and wharangi (Melicea ternata), all relatively frost tender species, are restricted to 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 pteridoioides, Ourisia macrophylla, Linderae viridis, and Parahebe catarractae subsp. lanceolata. The last two are common at low altitudes in similar habitats elsewhere on the Egmont plain but the kaikawaka, C. pteridoioides, 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 vuicanicum, Astelia fragrans, and Pittosporum kirkii.

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REFERENCES
APPENDIX 1

Leading dominants (1st, 2nd, 3rd) from all strata.
(a. Top stratum; b. Second stratum; c. Shrub layer; d. Ground cover; e. Lianes and epiphytes).
1. Group (mean altitude 220 m)
   a. kohekohe, rewarewa, tawa
   b. kohekohe, mahoe, pigeonwood
   c. kohekohe, pigeonwood, kawakawa
   d. Uncinia uncinata, bush rice grass, Blechnum chambersii
e. supplejack, Asplenium oblongifolium, Blechnum filiforme
2. Group (mean altitude 280 m)
   a. tawa, rewarewa, rimu
   b. pigeonwood, pukatea, silver fern
   c. kiekie, pigeonwood, tawa-nikau
   d. bush rice grass, Uncinia uncinata, crown fern
e. Collospermum hastatum, supplejack, kiekie
3. Group (mean altitude 353 m)
   a. pukatea, tawa, pigeonwood
   b. pigeonwood, pukatea, tawa
   c. kiekie, soft tree fern, wheki-crown fern
   d. bush rice grass, Uncinia uncinata, crown fern
e. Collospermum hastatum, Phymatosorus diversifolius, Asplenium flaccidum
4. Group (mean altitude 414 m)
   a. hinau, kamahi, rimu
   b. pigeonwood, mahoe, soft tree fern
   c. soft tree fern, kiekie, silver fern
   d. bush rice grass, Uncinia uncinata, kiekie
e. Asplenium flaccidum, Phymatosorus diversifolius, Hymenophyllum spp.
5. Group (mean altitude 470 m)
   a. hinau, kamahi, rewarewa-pigeonwood
   b. soft tree fern, mahoe, pukatea
   c. soft tree fern, kiekie, Pseudowintera axillaris-wheki.
   d. bush rice grass, Blechnum fluitatile, Uncinia uncinata
e. kiekie, Asplenium flaccidum, Phymatosorus diversifolius
6. Group (mean altitude 526 m)
   a. kamahi, hinau, rewarewa
   b. soft tree fern, mahoe, kamahi
   c. soft tree fern, Pseudowintera axillaris, kiekie
   d. bush rice grass, Uncinia uncinata, Blechnum fluitatile — Uncinia gracilenta
e. Asplenium flaccidum, Phymatosorus diversifolius, Metrosideros perforata

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 Laubenfelds [kahi-katea] Locally common in valleys of the south-western sector. †
Libocedrus bidwillii Hook. f. [kai-kawaka] 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 Laubenfelds [miro] Common throughout.
Prumnopitys taxifolia (D. Don) de Laubenfelds [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 indivisa (Forst. f.) Steud. Rare. One plant near Sefton Ridge Track 600 m.
Rhopalostylis sapida Wendel. et Drude in Kerch. [niki] Common on coastal slopes below 450 m.

Dicotyledonous trees (35)
Beilschmiedia tawa (A. Cunn.) Kirk [tawa] Common throughout.
Corynocarpus laevidens J. R. et G. Forst. [karaka] Locally common on coastal slopes below 300 m. Often associated with pa sites.
Dyssoxyllum spectabile (Forst. f.) Hook f. [kohekohe] Common on coastal slopes below 450 m.
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.
Griselina littoralis Raoul [broadleaf] Common above 600 m.
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 tennata J. R. et G. Forst. [wharangi] Rare. One seedling noted on coastal slopes 110 m.
Melicetus lanceolatus Hook. f. [narrow-leaved mahoe] Rare. One plant noted on “Kirihau”.
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 Tamaura Stream (150 m).†
Myoporum laetum Forst. f. var. laetum [ngai] Uncommon. Scattered in early successional vegetation on northeast 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 [heketa] Uncommon. On dry slopes and ridges below 450 m.
Paratrophis microphylla (Raoul) Ckn. [tirepo] Rare. Two plants; one at Lucy’s Gully and the other on the lower margins of Tamaura Stream.
Pittosporum eugenioides A. Cunn. [tarata] Locally common on north-east slopes below 450 m.
Pseudopanax arboreus (Murr.) Philippson [five-finger] Common throughout.
Pseudopanax colensoi (Hook. f.) Phillipson [mountain five-finger] Rare. On rocky outcrops at Patuha Pa and “Kirihau”.†
Pseudopanax edgerleyi (Hook. f.) C. Koch [raukawa] Common above 600 m.
Vitex lucens Kirk [puriri] Locally common on coastal slopes below 300 m.
Weinmannia racemosa Linn. f. [kamahi] Common throughout.

Dicotyledonous shrubs (32)
Alseosima macrophylla A. Cunn. Common throughout.
Cassinia vanuilliersii (Hornb. et Jacq.) Hook. f. [mountain tuihuini] Rare. Eight plants at Patuha Pa.†
Coprosma arctata Cheesem. Uncommon. On northern slopes below 350 m.†
Coprosma colensoi Hook. f. Locally common on peaks: Patuha, Kaitake, and Iokeke.†
Coprosma robusta Raoul Common throughout.
Coprosma sp. (C. parviflora var. damosa Cheeseman 1906, non C. parviflora var. damosa sensu Allan 1961) Rare. Two plants; one on “Kirihau” and the other near Te Iringa.†
Coprosma tenuifolia Cheesem. Uncommon. Above 600 m “Kirihau Peak” near Patuha and Patuha Pa.†
Coprosma hybrid (C. propinqua A. Cunn. × C. robusta Raoul) Rare. One plant on Timaru Stream margin 260 m.†
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 pteriodotes 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 lignastrifolium A. Cunn. [hangehange] Common below 450 m.
Griselina lucida Forst. f. [puka] Common below 450 M as epiphyte on rimu and pukatea.
Hebe coriigianii Carse Locally common on rocky outcrops at “Kirihau”, Goat Rock, and near Patuha.
Hebe stricata (Benth.) L. B. Moore var. stricata [koromiko] Locally common on some tracksides and stream margins.†
Hebe stricata var. egmontiana L. B. Moore Uncommon. Margins of the Timaru Stream and Okaura River.
Leptospermum scoparium J. R. et G. Forst. [manuka] Rare. A few plants on the margins of the Timaru Stream.†
Leucopogan fasciculatus A. Rich. [mingimingi] Rare. Four plants on rocky outcrops at Goat Rock 480 m.†
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 anomalous (Hook.) Philippson 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.
Rhabdotannus solandri A. Cunn. Locally common on some streambanks below 450 m particularly in the vicinity of former Boars Head Mine.
Senecio kirkii Kirk [kohurangi] Uncommon. An epiphyte on tree ferns in the kamahi forest and associated with Collospermum hastatum on pukatea.
Solarium aviculare Forst. f. [poroporo] Uncommon. Tracksides and forest clearings below 450 m.
Monocotyledonous lianes (2)
Freylinetia baueriana Endl. subsp. banksii (A. Cunn.) Stone [kirie] Common below 450 m particularly on the coastal side of the range.

Dicotyledonous lianes (11)
Calystegia turguriorum (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 Gaerin. Common throughout.
Muehlenbeckia australis (Forst. f.) Meissn. Common throughout.
Parsonisia capsularis (Forst. f.) R. Br. Common throughout.
Parsonisia heterophylla A. Cunn. Locally common in forest on coastal slopes below 350m.
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.

Psilocephyls and Lycopods (6)
Tinsetipers elongata Dang. (incl. T. elongata subsp. robusta Chinnock) Common throughout as an epiphyte on tree ferns.
Tinsetipers lanceolata Dang. Rare. A few plants on Cytara medullaris at Lucy's Gully.
Tinsetipers tannensis (Spreng.) Bernh. Common above 450 m as an epiphyte on ferns.
Lycopodium scaritum Forst. f. Locally common on rocky outcrops of the main peaks.
Lycopodium varium R. Br. Common throughout. Forms fitting the description of L. billiardii 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 australis (R. Br.) Presl. Rare. A few plants at the Davies Track entrance (northern end) and in forest on coastal slopes below 250 m.
Anarthrophyllum lanceolata (J. Smith) L. B. Moore Common trunk epiphyte below 450 m.
Arachnitis 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 oblongifolium Col. Common epiphyte below 450 m. Occasionally terrestrial.
Asplenium polyodon Forst. f. Common epiphyte throughout.
Asplenium hybridum (A. bulbiferum s.s. × A. hookerianum) Rare. One plant near Lucy's Gully.
Asplenium hybridum (A. bulbiferum s.s. × A. flaccidum subsp. flaccidum) Rare. A few plants in early successional vegetation on north-east slopes growing terrestrially.
Blechnum chamberiis 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 [crow 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 fluitale (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.) Schlcht. 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 “Kiriau”.
Botrychium bifomer Col. Uncommon. Near Lucy's Gully and on pa site on north-east slopes 170 m.
Ctenopteris heterophylla (Labill.) Tindale. Common trunk epiphyte throughout.
Cytara cunninghamii Hook. f. [gully tree fern] Locally common between 300 and 600 m Manders Spur Track.
Cytara dealbata (Forst. f.) Swartz [silver fern] Common below 450 m.
Cytara medullaris (Forst. f.) Swartz [mamaku] Common below 450 m.
Cytara smithii Hook. f. [soft tree fern] Common above 450 m.
Dicksonia fibrosa Col. [kewhi-ponga] Rare. One plant in exotic plantation at Lucy's Gully.
Dicksonia squarrosa (Forst. f.) Swartz [kewhi] Common throughout.
Grammitis billiardii Wildl. 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. nothofageti 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.
Hyptis phyllium dilatatum (Forst. f.) Swartz Common
trunk epiphyte above 450 m.

Hyphnum phyllium ferrugineum Colla Common throughout
mainly as epiphyte on tree ferns.

Hyphnum phyllium flavellatum Labill. Common trunk epiphyte
above 450 m.

Hyphnum phyllium flexuosum A. Cunn. Common trunk epiphyte
above 450 m.

Hyphnum phyllium multifidum (Forst. f.) Swartz Common
trunk epiphyte above 600 m. Also recorded as a
rupestral. ♦

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

Hyphnum phyllium ranum R. Br. Common above 450 m as
an epiphyte on tree ferns.

Hyphnum phyllium revolverum Col. Common throughout as
an epiphyte on tree ferns and rupestral on rocky outcrops of
higher peaks.

Hyphnum phyllium sanguineolentum (Forst. f.) Swartz Common
trunk epiphyte above 450 m. ♦

Hyphnum phyllium scabrum A. Rich. Common trunk epiphyte
above 450 m.

Hyphnum phyllium ambiguum (A. Rich.) Browney 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. ♦

Hyphnum phyllium rifobarbata (Col.) Wakefield Rare. A few plants at
Whenauiri Stream 240 m. ♦

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

Lastreopsis hispida (Sw.) Tindale Common throughout.

Lastreopsis microsora (Endl.) Tindale subsb. pentangula-
ris (Col.) Tindale Rare. A few plants near Lucy’s Gully.

Leptotrichia phyllophylloides A. Rich. Common above
450 m.

Leptotrichia superba (Col.) Presl [prince of Wales feather]
Uncommon. In valleys west of Te Iringa and near
Patahu. ♦

Lindleafa trichomanoides Dryand. Common above 450
m. ♦

Lindleafa viridis Col. Locally common on banks of Timaru
Stream and Oakura River. ♦

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

Paesia scabrella (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-zealandiae (Baker) Pic. Ser. Uncom-
mon. 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.

Pneumatococcus penniger (Forst. f.) Holtum Common
below 450 m particularly on stream margins.

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

Pleustichium silvaticum (Col.) Diels Common throughout.
♦

Pleustichium vestitum (Forst. f.) Presl Rare. One plant at
Patahu 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 mar-
gin on north-east slopes 120 m. ♦

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

Rutidosis catenata (L.) 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 endlicheri (Hook.) 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)

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

Aporostylis biolata (Hook. f.) Rupp et Hatch. Rare. A few
plants near Patahu.

Bulbophyllum pygmaeum (Smith) Lindl. Locally com-
mmon. An epiphyte on rewarewa, kamahi, and miro. Also
a rupestral on rocky outcrops of Patahu Pa and Patahu. ♦

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 rivilatus (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
Patahu Pa and Patahu.

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

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

Gastrodia sesamoides R. Br. Rare. A few plants in red-
wood plantation Lucy’s Gully.

Mycotis 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.

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

Pterostyles montana Hatch Rare. A few plants near Patahu.

Thelymitra longifolia J. R. et G. Forst. Locally common
on some forest margins near the park boundary.
Grasses (7)
Cortaderia selloides (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.

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

Microloaena 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.

Rytydochus clavatum (Zotov) Connor et Edgar Uncommon. In induced grassland on Patuha, Patuha Pa, and “Kirihau”.

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 disitata Blytt. 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 Waimoku 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 resinae Blytt. var. resinae Locally common in swampy stream margins near the park boundary on the coastal side of the range.

Carex solandria Blytt. Locally common on coastal slopes below 450 m.

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


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 Kirihau Track.

Schoenus maschalis 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 “Kirihau”.

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

Uncinia banksii R. Br. Common above 450 m.

Uncinia gracilenta Hamlin Common above 450 m.

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

Uncinia zotovi 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.†


Monocotyledonous herbs (14)
Arthropodium candidum Raoul Uncommon. At Lucy’s Gully and Davies Track (Weld Road entrance).

Astelia fragrans Col. Uncommon. At Kirihau 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. [kakakaha] Common above 450 m as an epiphyte on large trees.

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


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 ridges tops at the upper end of the Waimoku Track 580 m. In recent years the population has been greatly 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.†


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 squallida Hook. f. subsp. squallida Locally common on margins of the Timaru Stream and Oakura River.

Gnaphalium audax subsp. audax Drury Uncommon. On rocky outcrops of “Kirihau” and Patuha Pa.†

Gnaphalium delicatum Drury Locally common in induced grassland on “Kirihau” and Patuha Pa.

Gnaphalium tenerum DC. Locally common on track sides and in induced grassland on “Kirihau” and Patuha Pa.†

Gnaphalium limosum Drury. Uncommon. On margin of Whenuruki 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. leuc-u-album L. agg.) Locally common at forest margins near park boundary and in induced grasslands on “Kirihau” and Patuha Pa.

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

Lagenaria pumila (Forst. f.) Cheesm. Locally common in induced grasslands on “Kirihau” 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)

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

Acaena nova-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.


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 track sides.

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 Waitara 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.†


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.) Gärnek-Jones Uncommon. On banks and boulders of Timaru Stream and Oakura River.

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

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


Viola fiaculis 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, Arthropodium tenella, Asplenium gracillimum, Botrychium bifurcata, Calystegia turguriorum, Carex forsteri, Coprosma colensoi, Corybas aconitiflorus, Corynoglossus laevigatus, Dichelachne crenata, Dicentra repens, Dicksonia fibrosa, Entelea arborescens, Hydrocotyle dissecta, Juncus palidus, Lastreopsis microsora subsp. pentangularis, Libertia grandiflora, Lophomyrtus bullata, Melicytus ternata, Mida salesifolia, Myoporum laetum, Passiflora tetrandra, Phormium cookianum subsp. hookerianum, Physeteris novae-zelandiae, Pteris tremula, Tmesipteris lanceolata, Trichomanes endlicherianum, T. elongatum, Vitex lucens.