

TASMANIAN HIGH MOUNTAIN VEGETATION III — LAKE EWART, DOME HILL AND ELDON BLUFF

by J. B. Kirkpatrick and Jennifer Whinam

(with three tables, six text-figures and three plates)

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The Lake Ewart region is highly varied geologically and topographically. It lies within a biologically poorly known and remote part of Tasmania. Eldon Bluff, a high dolerite plateau, is largely covered by mosaic bolster heath within which have formed shallow peat ponds similar to those at Newdegate Pass. Dome Hill, topped by fissile mudstones, has stone stripes similar to those recorded for the fjaldmarks of Pyramid Hill. Subalpine scrub and forest is largely dominated by *Eucalyptus coccifera* and *E. subcrenulata*, although *E. nitida* is important on quartzite. There are small areas of *Athrotaxis cupressoides* woodland and rainforest dominated by *Nothofagus cunninghamii*. The treeless subalpine vegetation consists of a mixture of short herbfield, *Sphagnum* bog and tussock sedgeland on the more fertile substrates, while heathy sedgeland and scrub predominate on more siliceous soils.

Key Words: Lake Ewart, Eldon Bluff, Dome Hill, peat, subalpine vegetation.

INTRODUCTION

The general patterns of variation in the high mountain treeless vegetation of Tasmania are now moderately well understood (Kirkpatrick 1982, 1983, 1986a, 1986b). Earlier papers in this series (Kirkpatrick 1980, 1984) and other work (Martin 1940, Davies 1978, Kirkpatrick & Harwood 1980, Noble 1981, Minchin 1985, Wells 1985) have provided detailed accounts of high mountain vegetation and its environmental relationships for particular mountains. These “windows” supplement the more general ecological studies. The area containing Lake Ewart, Dome Hill and Eldon Bluff was selected for detailed study because of its environmental, particularly geological, diversity within a remote, biologically unknown region where rainfall almost certainly exceeds 2000 mm (fig. 1).

METHODS

All higher plant species observed were noted and/or collected during a field trip in February 1987. Nomenclature follows Curtis (1963, 1967, 1979), Curtis & Morris (1975), Curtis & Stones (1978) and Willis (1970) with the latest publication having precedence. Authors are given wherever nomenclature does not follow these authorities. Specimens are held in the Herbarium of the Tasmanian Museum and Art Gallery.

Notes were made of the occurrence and environmental relationships of species, vegetation structure and periglacial landforms. Sixty-one 10 x 10 m quadrats were located in order to encompass the major part of the variation in the vegetation. All higher plant species, the dominant species, the vegetation structure and details of the environment of each quadrat were recorded. Transects consisting of 2 x 2 m quadrats were placed to typify the phytosociological and environmental situations of two *Sphagnum* bogs (fig. 1A). The longer transect consisted of quadrats separated by 10 m, while in the shorter one the quadrats were contiguous. Peat depths were measured with a metal rod and the surface topography mapped with a clinometer. The vegetation was mapped from field observation and interpretation of 1979 panchromatic vertical aerial photographs.

The 10 x 10 m quadrat floristic data were classified using the polythetic divisive strategy in the program TWINSPAN (Hill 1979). The species in the table produced by TWINSPAN were reorganised using ORDTAB in the ECOPAK suite of programs (Minchin 1986) in order that species with similar distribution patterns could be as close to each other as possible. The results of this procedure cannot be distinguished from those of the hand-sorting method used and justified in earlier papers in this series. Eight groups of quadrats were selected from the results of the

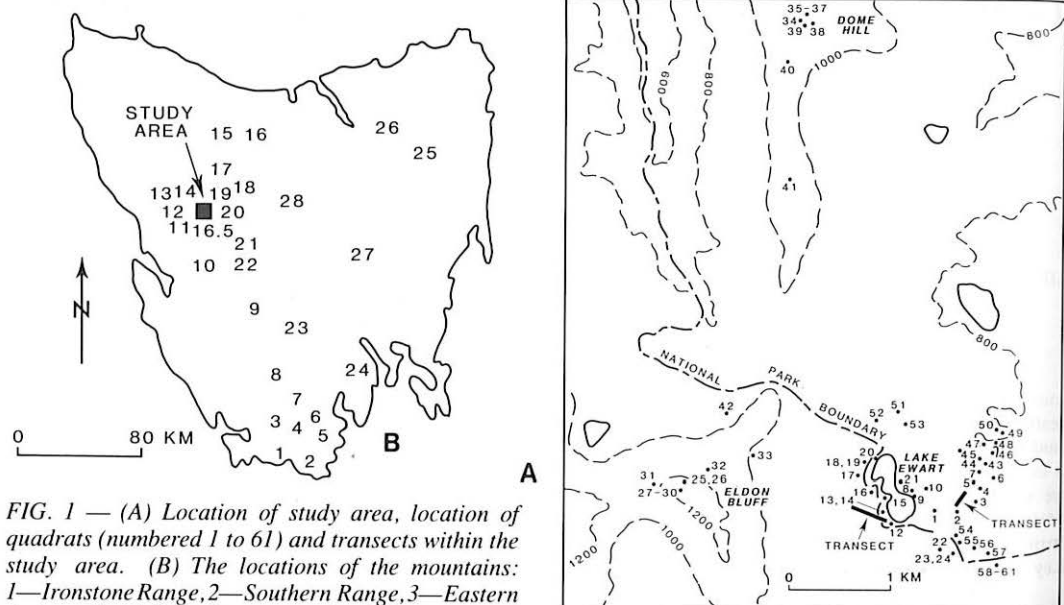


FIG. 1 — (A) Location of study area, location of quadrats (numbered 1 to 61) and transects within the study area. (B) The locations of the mountains: 1—Ironstone Range, 2—Southern Range, 3—Eastern Arthurs, 4—Mt Bobs/Boomerang, 5—Adamsons Peak, 6—Hartz Mts, 7—Mt Picton, 8—Mt Anne, 9—Denison Range, 10—Frenchmans Cap, 11—Mt Sedgwick, 12—Tyndall Range, 13—Mt Road, 14—Mt Murchison, 15—Black Bluff, 16—Mt Roland, 16.5—Pyramid Mt/Rocky Hill, 17—Cradle Mt/Barn Bluff, 18—Mt Oakleigh, 19—Mt Ossa/Pelion East, 20—Walled Mt, 21—Mt Rufus, 22—Mt King William I, 23—Mt Field, 24—Mt Wellington, 25—Ben Lomond, 26—Mt Barrow, 27—Table Mt, 28—Central Plateau.

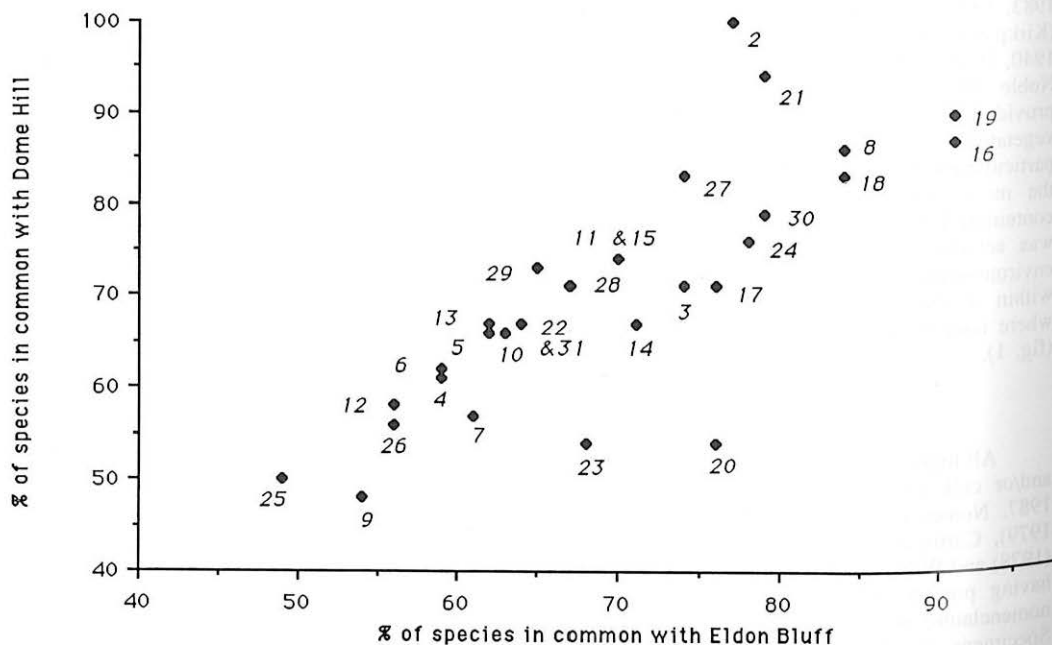


FIG. 2—The similarities of the florae of other Tasmanian mountains to those of Dome Hill (D) and Eldon Bluff (E). Locations and numerical codes of the mountains are shown in figure 1.

TWINSPAN analysis. These groups are called communities in the rest of the paper and are named by their two or three most characteristic species, that is, the species with maximum fidelity and high constancy. Structural terminology follows Kirkpatrick (1983) for the alpine subformations, Gibson & Kirkpatrick (1985) for the divisions of bolster heath, Kirkpatrick & Harwood (1983) for wetland communities, and Specht (1972) for other vegetation.

RESULTS AND DISCUSSION

Floristic Relationships of Alpine Floras

Both mountains belong to the central Tasmanian (group 3) floras of Kirkpatrick (1982). Despite their close proximity, Dome Hill and Eldon Bluff have closer floral affinities to other mountains than to each other (fig. 2), reflecting substrate, topographic and altitudinal differences, most notably the higher altitude and poorer drainage of the high plateau on Eldon Bluff compared to the rounded peak of Dome Hill. Dome Hill has its highest floristic affinity with the nearby sedimentary peak of Pyramid Mountain, while the flora of Eldon Bluff most resembles those of Cradle Mountain and Mt Field (fig. 2).

Alpine Plant Communities (TWINSPAN groups 1 and 2)

The quadrats in alpine vegetation were placed into two distinct groups (table 1 (pp.154–155), fig. 3). The *Donatia novae-zelandiae* – *Dracophyllum minimum* – *Carpha rodwayi* community consists of mosaic bolster heath on the high plateau of Eldon Bluff. Within the mosaic bolster heath there is variation from dominance by *Carpha rodwayi* and *Donatia novae-zelandiae* in the most waterlogged areas to dominance by *Dracophyllum minimum*, *Pterygopappus lawrencei* and *Donatia novae-zelandiae* in areas where drainage appears to be better. Better drainage is also associated with greater peat depth on the dolerite pediment (plate 1A,B). Organic dams and flark ponds, are floristically similar to those found at Newdegate Pass (Kirkpatrick & Gibson 1984), and although less well-developed are frequent in the mosaic bolster heath (plates 1C,D).

The *Orites revoluta*–*Senecio pectinatus*–*Poa gunnii* community (table 1) consists of quadrats in tall alpine herbfield, short alpine herbfield, heath, coniferous heath and fjaeldmark, all on better drained sites than the quadrats in the other alpine community. This structurally heterogeneous group was further divided by the TWINSPAN analysis into:

- (1) two quadrats on the steep slopes beneath the cliffs and blockstreams of Eldon Bluff, one (31)

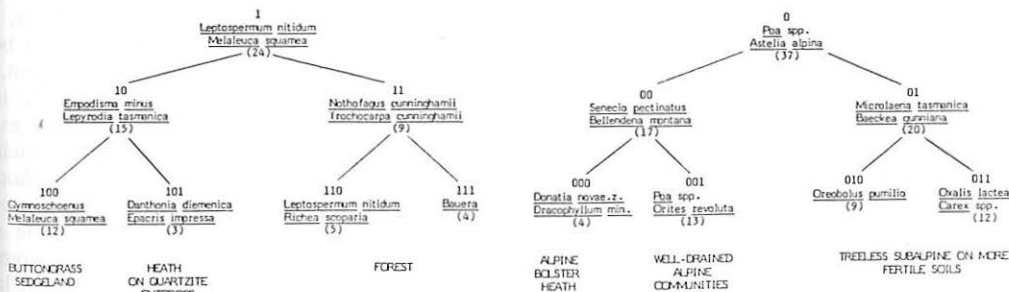


FIG. 3—Group and subgroup structure of TWINSPAN analyses.

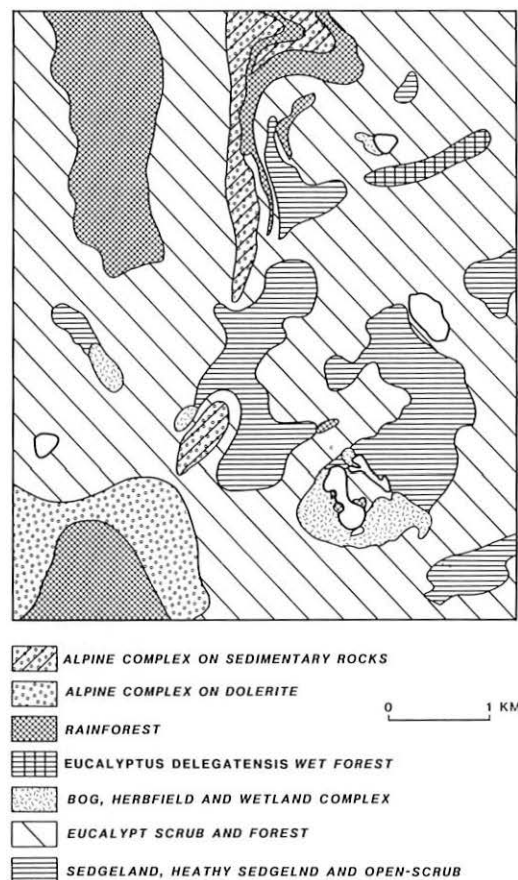


FIG. 4—Vegetation map of the study area.

being heath on a rocky scree, the other (32) being *Milligania densiflora* tall alpine herbfield on a convex fan receiving considerable drainage;

(2) a singleton group consisting of quadrat 33 which was situated in an *Astelia alpine*–*Milligania densiflora* tall alpine herbfield in a snow accumulation site on the eastern slopes of the sedimentary plateau below Eldon Bluff;

(3) a group of four quadrats (26, 28, 38, 40) which includes two well-drained sites on the high plateau of Eldon Peak, and two sites, one in fjaeldmark, on the steepest parts of Dome Hill;

(4) a group of six quadrats in heath, short alpine herbfield and fjaeldmark (plate 1D) on the gentler slopes of Dome Hill.

Fjaeldmark is concentrated on the steep west and southwest facing slopes on mudstone and the flat tops of sandstone plateaus (plate 1D). The

fjaeldmark on the steep mudstone slopes of Dome Hill is identical in its characteristics to that described for Pyramid Mountain (Kirkpatrick 1984). The type of fjaeldmark illustrated in plate 1D appears to owe its genesis to disturbance by fire reinforced by repeated inundation, drying and frost disturbance (Kirkpatrick 1984). This subformation may be an ephemeral feature as it is not found in sites of similar altitude, exposure and substrate.

Tall alpine herbfield dominated by *Milligania densiflora* occupies much of the cliff base of Eldon Bluff (plate 2A), being concentrated in persistent flushes where sediment accumulates. Short alpine herbfield occurs where wind-deposited fine sediments accumulate on the drier lee slope of Dome Hill. However, most of the alpine zone is occupied by heath in which dominance is highly variable both between and within sites. Some coniferous heath is found on both mountains, indicating that parts of their peaks have not been fired for a considerable number of years (Kirkpatrick & Dickinson 1984). There is, however, evidence of at least one fire that occurred more than 30 years ago (estimate from *Banksia* whorl count) over most of the study area, and through much of the alpine zone, particularly on Dome Hill.

Treeless Subalpine Plant Communities (TWINSPAN Groups 3 and 4)

Two TWINSPAN groups are discriminated within this general grouping (fig. 3). They are the *Restio australis*–*Oreobolus pumilio* community which is found on the more poorly-drained sites in this category, and the *Carex* aff. *apressa*–*Oxalis lactea*–*Lagenophora stipitata* community, the quadrats of which occur at least partly on better drained ground with soils composed of peat, silt and boulder clay (table 2, pp.156–157). The latter community has most of the same species as the former, but is richer in small herbs such as *Diplaspis cordifolia*, *Herpilirion novae-zelandiae* and *Hydrocotyle sibthorpioides*, a probable product of the interaction between relatively fertile soils and considerable grazing pressure from wombats and wallabies. This interaction forms scat-laden marsupial lawns (plate 2B) which are concentrated where silt is deposited from normally subterranean streams in the flats to the west and southwest of Lake Ewart (fig. 4).

Sphagnum cristatum bogs transgress both communities. The usual dominant in the bogs is *Richea gunnii*, a species that elsewhere is largely associated with *Sphagnum cristatum* (table 2).

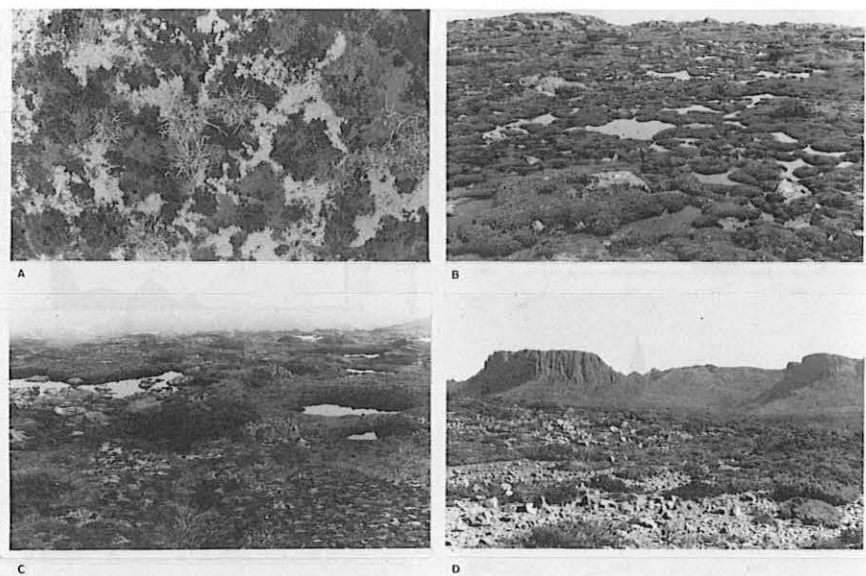


PLATE 1

(A) Mosaic cushion heath from above with *Carpha alpina* emerging from (light to dark) *Pterygopappus lawrencei*, *Donatia novae-zelandiae* and *Dracophyllum minimum*; (B) The plateau on Eldon Bluff. *Carpha rodwayi* is dominant in the foreground where it is initiating the formation of small pools; (C) Mosaic cushion heath and peat-dammed ponds on the Eldon Bluff plateau; (D) Fjaeldmark on the sandstone of Dome Hill with Eldon Bluff in the background.

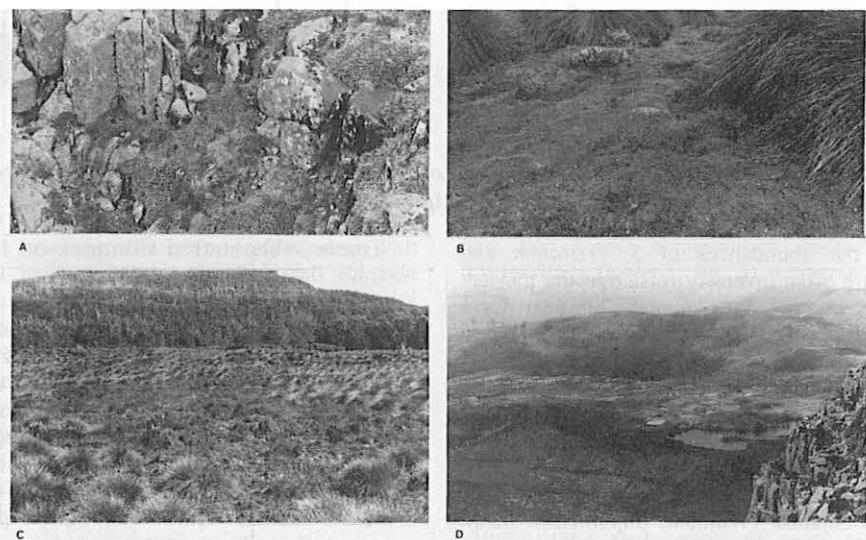


PLATE 2

(A) *Milligania densiflora* tall alpine herbfield on the northern face of Eldon Bluff; (B) Marsupial lawn between *Gymnoschoenus sphaerocephalus* hummocks; (C) The plain to the east of Lake Ewart looking towards Castle Mountain. *Gymnoschoenus sphaerocephalus* tussock sedgeland occupies the moraine ridges. Sphagnum bog dominated by *Richea gunnii* occupies the flats. *Eucalyptus subcrenulata*-*E. coccifera* forest occupies the background; (D) Lake Ewart and the quartzite ridges from Eldon Bluff.

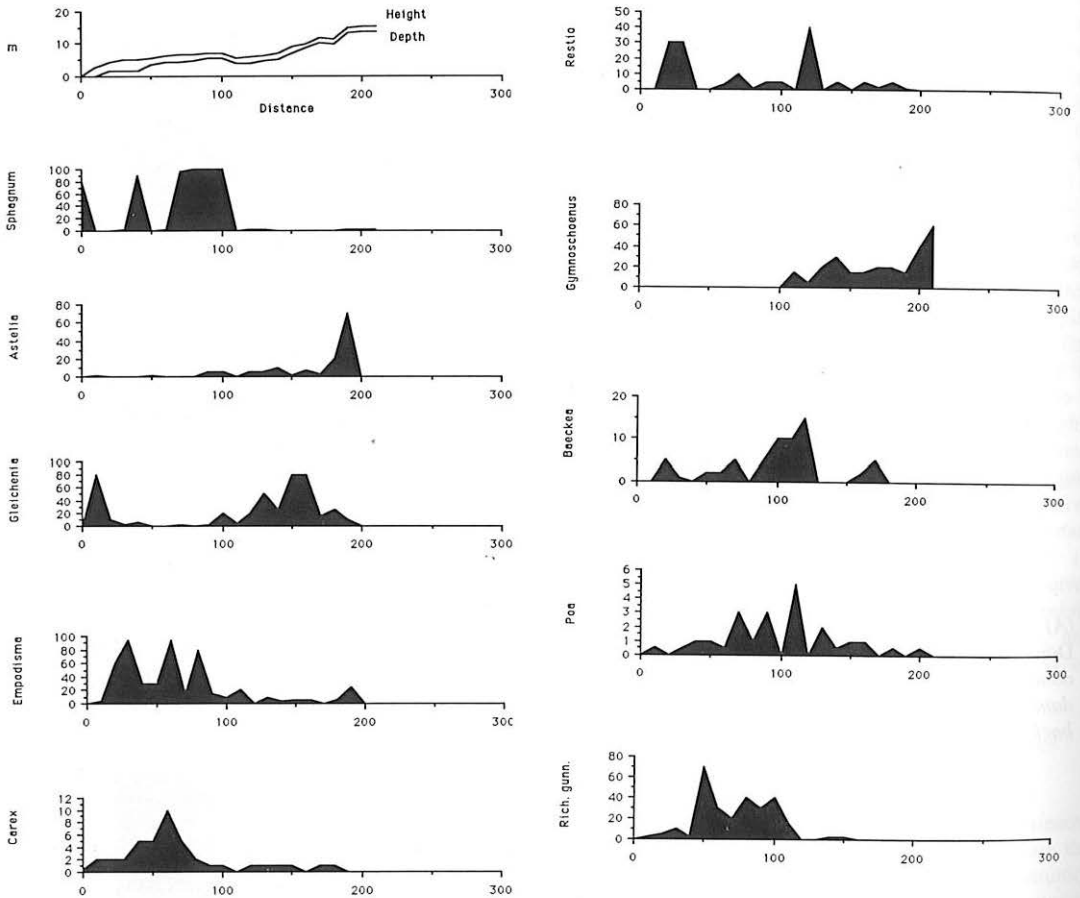


FIG. 5—Transect across a *Sphagnum* bog to the west of Lake Ewart (fig. 1) showing surface topography, peat depth and variation in the cover of the more important species.

However, the abundances of *S. cristatum* and *R. gunnii* are often inversely related at the transect scale (figs 5, 6). Two metres of peat have accumulated between the moraines (figs 5, 6; plate 2C), possibly not all attributable to *Sphagnum* and its associates, as *Carex gaudichaudiana* dominates some small areas of shallow wetland within the matrix of the *Sphagnum*. In some places *Sphagnum* is intermixed with tussocks of *Gymnoschoenus sphaerocephalus*, a relatively unusual association (Whinam, unpublished data). Also unusual is the presence of *S. cristatum* as a dominant in the ground stratum of scrub dominated by *Leptospermum rupestre* and forest dominated by *Eucalyptus subcrenulata*. The Lake Ewart region also contains an ombrotrophic (raised) *Sphagnum* bog, a rare phenomenon in Tasmania.

Treeless Vegetation Complex on Highly Siliceous Rocks

To the east of Lake Ewart glacial activity has left an erosional surface consisting of quartzite *roche moutonnee* steps which run as north-west-southeast ridges, occasionally breached by major streams. Quadrats from the quartzite catena which runs from skeletal ridge to peaty and poorly-drained valley are included within the *Gymnoschoenus sphaerocephalus*-*Melaleuca squamea*-*Empodisma minus* community and the *Epacris impressa*-*Danthonia diemenica* community (table 3, pp.158-159). Soil (= peat) depth and drainage interact such that the poorly drained and constantly wet valleys support *Gymnoschoenus sphaerocephalus* tussock sedgeland or heathy

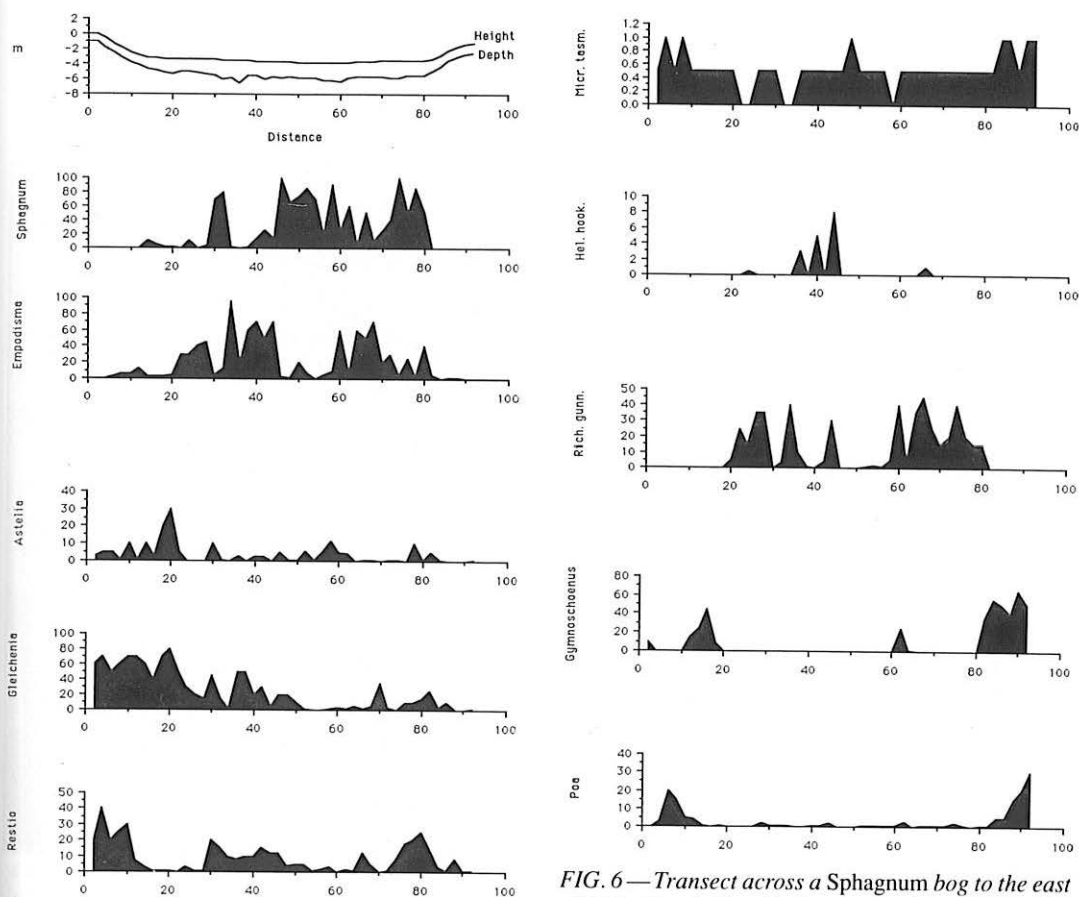


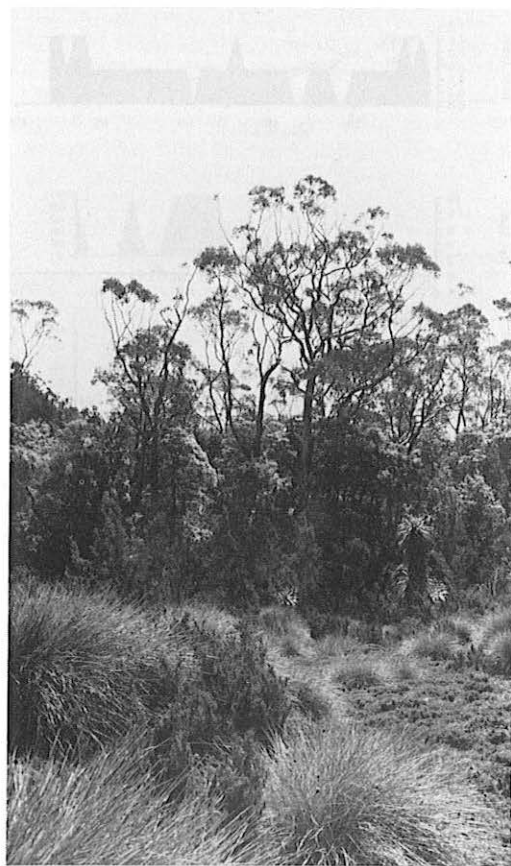
FIG. 6—Transect across a *Sphagnum* bog to the east of Lake Ewart (fig. 1) showing surface topography, peat depth and variation in the cover of the more important species.

sedgeland (*sensu* Kirkpatrick 1977) dominated by *Melaleuca squamea*. The better-drained areas with some soil have a scatter of 4-6 m tall *Banksia marginata* with less than 10% cover overlaying a mixture of myrtaceous shrubs and sedges. The ridges have little vegetation cover, what there is being concentrated in crevices and cracks. They do, however, have a distinct floristic composition (table 3, pp.158-159).

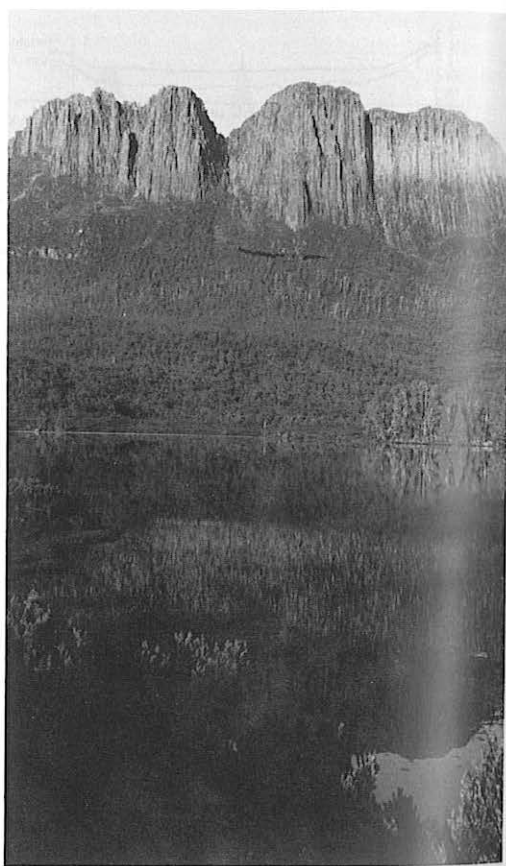
Forest Communities (TWINSPAN Groups 5 and 6)

Open-forest dominated by *Eucalyptus coccifera* and/or *E. subcrenulata* (plate 3A), or rainforest (*sensu* Jarman & Brown 1983), are found below 1100 m on dolerite, sedimentary rocks and deposits ultimately derived from these sources,

where drainage is good or fire highly infrequent. The two forest communities discriminated by TWINSPAN (table 3, fig. 3) transgress the open-forest/rainforest boundary. The *Richea scoparia-Phyllocladus aspleniifolius* community is successionaly closer to the open communities than is the *Eucalyptus subcrenulata-Oxalis lactea* community. However, there are few lowland parts of the study area that do not show evidence of succession from open vegetation to rainforest, so lucidly posited to follow fire by Jackson (1968), Bowman & Jackson (1981) and Brown & Podger (1982). One such stand of pure rainforest is protected by the fjældmark arc of Dome Hill. Another is protected by a sandstone cliff (fig. 4). Three small patches of *Athrotaxis cupressoides* woodland, one on a poorly-drained site, have been protected from fire by the morphology of Lake



A



B

PLATE 3

(A) *Eucalyptus subcrenulata* open-forest over a *Nothofagus cunninghamii* rainforest understorey with *Gymnoschoenus sphaerocephalus*, *Baeckea gunniana* and a sward of *Gleichenia alpina* in the foreground; (B) Lake Ewart and Eldon Bluff with *Eleocharis acuta* aquatic sedgeland in the foreground and a small stand of *Athrotaxis cupressoides* woodland in the right middleground on a fire-protected peninsula. The lower slopes of Eldon Bluff are covered by *E. coccifera* open-forest burned more than 30 years ago.

Ewart (fig. 4). The woodland on the poorly drained site (15) was classified with the *Carex* aff. *appressa*-*Richea gunnii*-*Lagenophora stipitata* community rather than either of the forest communities.

The *Eucalyptus coccifera* low open-forest which covers steep sedimentary and dolerite slopes between 900 m and the upper treeline (plate 3B) has an understorey that varies from dwarfed rainforest species, particularly myrtle, to sedges and sclerophyll shrubs, particularly *Gahnia grandis* and *Orites revoluta*. No *Eucalyptus delegatensis*

stand was visited, although some forest of this type was mapped (fig. 4) from its distinct crown attributes. *Eucalyptus nitida* and its intermediates with *E. coccifera* form an occasional patch of low open-forest in quartzite valleys.

Wetland Vegetation

Lake Ewart is a shallow (mostly less than 2 m), mesotrophic water body with a floor largely covered by organic ooze. The deeper parts of the lake support an aquatic herbfield dominated by

Isoetes gunnii. Near the eastern and southeastern shores is good development of *Myriophyllum* aquatic herbfield and occasional patches of *Eleocharis acuta* sedgeland (plate 3B) and *Carex gaudichaudiana* sedgeland. Rich marginal herbfields have developed on the gentler shores. These are highly variable in their species composition and appear to be heavily grazed by marsupials.

In ponds and small lakes that have formed in the more siliceous country *Baumea arthropphylla* sedgeland, *Agrostis meionectes* grassland and *Myriophyllum pedunculatum* marginal herbfield were observed.

GENERAL DISCUSSION

The patterns of variation in vegetation of the study area largely conform to previous correlations that have been made between vegetation type and environment in perhumid Tasmania. Alpine vegetation (*sensu* Kirkpatrick 1983) is found above the climatic treeline and on sites below the climatic treeline where poor drainage or exposure inhibit growth of most lowland species and subalpine trees. Thus, the alpine element is most prominent at the lowest altitudes in the study area on the southeast-facing cliffs, on skeletal soils on ridges and on badly waterlogged ground. Within the alpine zone there is clear variation related to soil qualities, drainage and the decline in summer warmth with altitude. The terrestrial vegetation at lower altitudes fits well within the models provided by Jackson (1968) and Kirkpatrick & Duncan (1987), and the wetland vegetation fits within the model provided by Kirkpatrick & Harwood (1983). The role of substrate in mediating vegetation type is critical within all these models.

The Lake Ewart region straddles the boundary between the siliceous country of western Tasmania and the more argillaceous country of the centre of Tasmania, the Eldon Range forming a salient of fertility in a high rainfall and oligotrophic landscape. Thus, it is not surprising that its bogs and alpine vegetation have attributes and species that are rare in Tasmania as a whole. It is fortunate that some of the area is reserved and desirable that the rest of it gains the same status.

ACKNOWLEDGEMENTS

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(accepted 30 March 1988)

TABLE 1
Alpine Communities

Species*	TWINSPAN																
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	2	2	2	3	3	4	3	3	3	3	3	4	3	2	2	3	3
	5	7	9	0	3	1	9	7	6	5	4	0	8	8	6	2	1
<i>Senecio pectinatus</i>	1	-	-	1	1	1	-	1	-	1	-	1	-	1	1	1	1
<i>Carpha alpina</i>	1	-	-	1	-	1	1	-	1	-	1	-	1	-	1	-	-
<i>Cyathodes dealbata</i>	1	1	-	-	-	1	-	1	1	1	1	-	1	-	1	-	-
<i>Epacris serpyllifolia</i>	1	1	-	-	-	1	1	1	1	1	-	1	1	1	1	-	-
<i>Bellenden montana</i>	1	1	-	1	-	-	-	1	1	1	-	1	1	1	1	1	-
<i>Milligania densiflora</i>	1	1	-	1	1	-	-	-	-	-	-	1	1	1	-	1	1
<i>Euphrasia</i> spp.	-	1	-	-	-	1	1	1	-	1	1	-	-	1	-	1	1
<i>Gentianella diemensis</i>	1	1	1	1	1	-	-	1	1	-	-	-	-	1	1	1	-
<i>Oreobolus pumilio</i>	1	1	1	1	1	1	1	1	1	-	1	-	-	-	-	-	-
<i>Erigeron stellatus</i>	1	1	1	-	-	-	-	-	1	-	1	-	-	-	-	-	-
<i>Ewartia meredithae</i>	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Dracophyllum minimum</i>	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Donatia novae-zelandiae</i>	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-
<i>Drosera arcturi</i>	-	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-
<i>Carpha rodwayi</i>	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Mitrasacme archeri</i>	1	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Pterygopappus lawrencei</i>	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Campynema lineare</i>	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Sprengelia incarnata</i>	-	1	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-
<i>Coprosma pumila</i>	-	1	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-
<i>Diplaspis cordifolia</i>	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Centrolepis monogyna</i>	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Species*	TWINSPAN																
	000				001												
	2	2	2	3	3	4	3	3	3	3	3	4	3	2	2	3	3
5	7	9	0	3	1	9	7	6	5	4	0	8	8	6	6	2	1
<i>Hibbertia procumbens</i>	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-
<i>Diplarrena latifolia</i>	-	-	-	-	-	1	-	1	1	-	-	-	-	-	-	-	-
<i>Lycopodium scariosum</i>	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-
<i>Schoenus calyptratus</i>	1	-	-	-	1	1	-	1	-	-	-	-	-	-	-	1	-
<i>Danthonia pauciflora</i>	-	1	-	-	1	1	-	1	-	-	-	-	-	-	-	-	-
<i>Baeckea gunniana</i>	1	-	-	-	-	1	-	-	1	-	1	-	-	-	-	-	-
<i>Empodisma minus</i>	1	-	-	-	-	-	-	1	1	-	1	-	-	-	-	-	-
<i>Microlaena tasmanica</i>	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-
<i>Celmisia longifolia</i>	-	-	-	-	-	-	1	-	1	-	1	-	-	-	-	-	-
<i>Astelia alpina</i>	-	1	-	-	1	-	1	1	1	1	1	-	-	-	-	-	-
<i>Plantago tasmanica</i>	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-
<i>Helichrysum milliganii</i>	-	-	-	-	-	1	1	-	1	1	1	-	-	-	-	-	-
<i>Helichrysum backhousei</i>	-	-	-	-	-	-	-	1	1	1	1	1	-	1	-	-	-
<i>Exocarpos humifusus</i>	-	-	-	-	-	-	-	1	1	1	-	1	1	-	-	-	1
<i>Luzula</i> spp.	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-
<i>Microcachrys tetragona</i>	1	-	-	-	-	-	-	-	-	1	1	-	-	-	1	-	-
<i>Helichrysum acuminatum</i>	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-
<i>Cyathodes straminea</i>	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	1
<i>Olearia ledifolia</i>	-	-	-	-	-	-	-	-	-	1	-	1	-	1	1	-	-
<i>Richea spregeloides</i>	-	-	-	-	-	-	-	-	-	1	-	1	1	1	1	-	1
<i>Senecio leptocarpus</i>	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-
<i>Uncinia compacta</i>	-	-	-	-	1	-	-	-	-	-	1	-	1	1	-	-	-
<i>Nothofagus cunninghamii</i>	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
<i>Deyeuxia monticola</i>	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1
<i>Orites acicularis</i>	1	-	-	1	-	-	-	-	-	-	-	-	1	1	1	1	-
<i>Dichosciadeum ranunculaceum</i>	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
<i>Diselma archeri</i>	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
<i>Heirochloe fraseri</i>	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
<i>Pimelea sericea</i>	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1
<i>Mitrasacme montana</i>	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	1
<i>Telopea truncata</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
<i>Brachycome spathulata</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
<i>Drimys lanceolata</i>	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	1
<i>Coprosma nitida</i>	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	1
<i>Gonocarpus montanus</i>	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1	1
<i>Rubus gunnianus</i>	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	1
<i>Gnaphalium collinum</i>	-	-	-	-	1	1	-	-	-	-	-	1	-	-	-	1	-
<i>Viola hederacea</i>	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
<i>Poa gunnii</i>	-	-	-	1	-	1	1	1	1	1	1	1	1	1	1	1	1
<i>Pentachondra pumila</i>	1	-	-	-	1	1	1	1	1	1	-	-	1	-	1	-	1
<i>Richea scoparia</i>	-	-	-	-	1	-	-	1	-	1	-	1	-	-	-	-	1
<i>Leptospermum rupestre</i>	-	-	-	-	1	-	-	1	1	1	-	1	-	-	1	1	1
<i>Lycopodium fastigiatum</i>	-	-	-	-	-	1	1	1	-	1	1	1	-	-	1	-	-
<i>Orites revoluta</i>	-	-	-	1	1	1	-	1	1	1	-	1	1	-	1	-	1
<i>Oreobolus acutifolius</i>	-	-	-	-	1	-	-	-	1	-	-	-	1	-	1	-	-

Additional species: 27, *Gaimardia fitzgeraldii*, *Milligania lindoniana*; 33, *Cotula alpina*, *Cyathodes petiolaris*, *Hydrocotyle sibthorpioides*, *Juncus* sp.; 41, *Agrostis parviflora*; 35, *Danthonia fortuneae-hibernae*; 34, *Richea pandanifolia*; 40, *Podocarpus lawrencei*; 28, *Abrotanella scapigera*, *Archeria serpyllifolia*; 32, *Helichrysum scorpioides*; 31, *Lagenophora stipitata*, *Senecio gunnii*, *Spyridium gunnii*.

* Species shown in bold letters are the major differentiating species.

TABLE 2
Treeless Subalpine Communities

Species*	010										TWINSPAN										001				
	4	5	1	5			1	1			1	1	1	1	1	1	2	2	2	5	5	1			
	5	2	8	0	9	1	2	2	4	1	3	6	8	9	2	0	1	3	4	5					
<i>Baeckea gunniana</i>	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	1	1	1				
<i>Empodisma minus</i>	1	1	1	-	1	1	1	1	1	1	1	1	1	1	1	-	1	-	1	-	-				
<i>Astelia alpina</i>	1	1	1	1	1	1	1	1	1	1	1	1	1	-	1	1	1	-	1	1	1				
<i>Microleana tasmanica</i>	1	-	-	1	1	1	1	1	-	1	1	1	1	1	1	1	1	1	1	1	1				
<i>Rubus gunnianus</i>	1	-	-	-	1	1	1	1	-	1	1	1	1	-	1	1	1	1	1	1	1				
<i>Poa gunnii</i>	-	1	-	1	1	1	1	1	1	1	-	-	1	1	1	-	1	1	1	1	-				
<i>Richea gunnii</i>	1	1	-	-	-	-	1	-	1	1	1	-	1	1	-	1	1	-	-	-	1				
<i>Sphagnum cristatum</i>	1	1	-	1	-	-	1	-	1	1	1	-	-	-	-	1	1	1	1	-	1				
<i>Gymnoschoenus spherocephalus</i>	-	-	-	1	1	-	-	1	-	-	1	-	-	-	-	-	-	1	-	1	-				
<i>Gleichenia alpina</i>	1	1	1	-	1	1	-	1	1	1	1	1	1	1	1	-	-	-	-	1	-				
<i>Restio australis</i>	1	-	-	1	-	1	1	1	1	1	1	1	-	1	-	-	-	-	-	-	1				
<i>Diplarrena latifolia</i>	-	-	1	1	1	-	1	1	1	-	-	1	1	1	-	-	1	-	-	-	-				
<i>Melaleuca squamea</i>	-	-	1	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-				
<i>Richea scoparia</i>	-	1	1	1	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-				
<i>Oreobolus pumilio</i>	1	1	1	1	1	1	-	-	-	-	-	-	-	-	1	1	-	1	-	-	-				
<i>Erigeron stellatus</i>	1	1	-	1	1	1	-	-	-	-	-	1	1	-	-	-	1	1	-	-	-				
<i>Celmisia longifolia</i>	1	-	-	1	1	1	1	-	-	1	-	-	1	-	-	-	-	-	-	-	-				
<i>Centrolepis monogyna</i>	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
<i>Epacris serpyllifolia</i>	-	1	1	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1				
<i>Mitrasacme montana</i>	-	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
<i>Drosera arcturi</i>	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
<i>Sprengelia incarnata</i>	-	1	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-				
<i>Lepidosperma filiforme</i>	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
<i>Hibbertia procumbens</i>	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
<i>Actinotus moorei</i>	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
<i>Pentachondra pumila</i>	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
<i>Gentianella diemensis</i>	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
<i>Richea pandanifolia</i>	-	-	-	1	-	-	-	-	-	1	-	-	1	1	-	-	-	-	-	1	-				
<i>Carex</i> sp.	1	1	1	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	-				
<i>Oxalis lactea</i>	-	-	-	1	-	-	1	-	-	1	1	-	1	1	1	1	1	1	1	1	1				
<i>Pultenaea subumbellata</i>	-	-	-	-	-	1	-	-	1	-	-	1	1	-	1	-	-	-	-	-	-				
<i>Plantago daltoni</i>	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	1	-	-	-	-				
<i>Leptospermum rupestre</i>	-	-	-	1	-	1	-	1	-	-	-	1	1	1	1	-	1	-	-	1	-				
<i>Diplaspis cordifolia</i>	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	-	-	-	-	-	-				
<i>Helichrysum scorpioides</i>	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	-	-	-	1	-	-				
<i>Viola hedreacea</i>	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	1	-	-	1	-	-				
<i>Asperula gunnii</i>	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-				
<i>Oreomyrrhis ciliata</i>	-	-	-	-	-	-	1	-	-	-	-	1	-	1	1	-	1	1	-	1	1				
<i>Lagenophora stipitata</i>	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	1	1	1	1	1	1				
<i>Hydrocotyle sibthorpioides</i>	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	-	1	-	-	-	-				
<i>Gnaphalium collinum</i>	-	-	-	-	-	-	-	-	-	1	-	1	-	1	-	1	-	-	1	-	-				
<i>Herpolirion novae-zelandiae</i>	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-				
<i>Acaena montana</i>	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-				
<i>Lissanthe montana</i>	-	-	-	1	-	-	-	-	-	-	-	1	1	-	-	-	-	-	1	-	-				
<i>Lycopodium fastigiatum</i>	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	1	-	1	-	1	-				
<i>Acaena novae-zelandiae</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	1	1	1	-				

Species*	TWINSPAN																		
	010							001											
	4	5	1	5		1	1	1	1	1	1	1	2	2	2	5	5	1	
5	2	8	0	9	1	2	2	4	1	3	6	8	9	2	0	1	3	4	5
<i>Epilobium</i> spp.	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-
<i>Gonocarpus micranthus</i>	-	1	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	-	-
<i>Scirpus aucklandicus</i>	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-
<i>Juncus</i> spp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-
<i>Cotula alpina</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-
<i>Agrostis</i> spp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	-
<i>Deyeuxia monticola</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-
<i>Hypericum japonicum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-
<i>Blechnum pennamarina</i>	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	1
<i>Monotoca</i> aff. <i>linifolia</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
<i>Carpha alpina</i>	-	-	-	-	1	-	-	1	-	-	-	1	-	-	-	-	-	-	-
<i>Epacris lanuginosa</i>	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-
<i>Danthonia pauciflora</i>	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
<i>Olearia erubescens</i>	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-
<i>Carex gaudichaudiana</i>	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-
<i>Leptospermum lanigerum</i>	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-

Additional species: 42, *Plantago tasmanica*; 58, *Leptospermum lanigerum*; 10, *Coprosma moorei*; 59, *Lepyrodiasmanica*, *Restio companatus*, *Stylidium graminifolium*; 1, *Tetatheca procumbens*; 12, *Gonocarpus montanus*; 15, *Athrotaxis cupressoides*, *Cyathodes straminea*, *Drimys lanceolata*, *Pittosporum bicolor*, *Trochocarpa gunnii*; 54, *Microseris scapigera*; 53, *Drosera pygmaea*; 21, *Coprosma nitida*, *Lycopodium laterale*; 20, *Ranunculus* sp.; 18, *Oreobolus acutifolius*, *Helichrysum backhousei*; 16, *Bauera rubioides*, *Bellenden montana*; 11, *Eucalyptus coccifera*.

* Species shown in bold letters are the major differentiating species.

TABLE 3
Quartzite and Forest Communities

Species*	TWINSPAN																							
	101			100									110			111								
	5	4	4	4	4	4	6	4	4	1	5	2	2	6	5	5	5	5						
	0	7	6	4	5	3	7	6	1	9	8	7	7	4	3	3	4	8	9	0	1	2	5	6
<i>Lomatia polymorpha</i>	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
<i>Persoonia gunnii</i>	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
<i>Danthonia diemenica</i>	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Epacris impressa</i>	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Celmisia longifolia</i>	1	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
<i>Deyeuxia monticola</i>	1	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
<i>Blandfordia punicea</i>	1	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Eucalyptus nitida</i>	1	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Oxylobium ellipticum</i>	1	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Acacia mucronata</i>	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Leptospermum glaucescens</i>	1	-	1	1	-	-	-	1	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-
<i>Bauera rubioides</i>	1	1	-	1	1	1	1	1	-	-	1	1	-	-	-	-	-	-	-	-	1	1	-	1
<i>Lepidosperma filiforme</i>	1	1	1	-	-	1	-	1	-	1	1	1	-	1	-	-	-	-	-	-	-	-	-	-
<i>Pentachondra pumila</i>	1	-	-	-	1	1	-	1	1	1	-	1	1	-	1	-	-	-	-	-	-	-	-	-
<i>Cyathodes petiolaris</i>	1	-	1	-	-	1	-	1	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-
<i>Banksia marginata</i>	-	-	1	1	1	1	1	1	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-
<i>Diplarrena latifolia</i>	1	-	1	-	-	1	-	1	1	1	1	1	-	1	-	1	-	1	-	-	-	-	-	-
<i>Leptospermum nitidum</i>	-	1	-	1	1	1	1	1	1	1	-	1	1	-	1	-	1	1	-	1	-	-	-	-
<i>Melaleuca squamea</i>	1	-	-	1	1	1	1	1	1	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-
<i>Gymnoschoenus sphaerocephalus</i>	-	-	-	1	1	1	1	1	1	1	1	1	1	-	1	1	1	1	-	-	-	-	-	-
<i>Lepyrodia tasmanica</i>	-	1	-	-	1	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-
<i>Empodismua minus</i>	-	-	-	1	1	1	1	1	1	1	1	1	-	1	-	-	-	-	-	-	-	-	-	-
<i>Stylidium graminifolium</i>	-	-	-	-	1	1	-	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-
<i>Sprengelia incarnata</i>	-	1	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-
<i>Restio companatus</i>	-	-	-	-	1	1	1	1	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-
<i>Lycopodium laterale</i>	-	-	-	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Boronia citriodora</i>	-	-	-	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tetraria capillaris</i>	1	-	-	1	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Helichrysum pumilum</i>	1	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Drosera arcturi</i>	-	-	-	-	1	1	-	1	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-
<i>Xyris marginata</i>	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Hibbertia procumbens</i>	-	-	-	-	1	-	-	1	-	-	-	-	1	1	-	1	-	-	-	-	-	-	-	-
<i>Schoenus tenuissimus</i>	-	-	-	-	-	1	1	1	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-
<i>Epacris serpyllifolia</i>	-	-	-	-	-	-	1	-	1	1	-	1	1	-	-	-	-	-	-	-	-	-	-	-
<i>Pultenaea subumbellata</i>	-	-	-	-	-	-	1	-	-	1	-	1	-	1	-	-	-	-	-	-	-	-	-	-
<i>Epacris lanuginosa</i>	-	-	-	-	-	-	-	1	-	1	-	-	-	1	-	1	-	-	-	-	-	-	-	-
<i>Gleichenia alpina</i>	-	-	-	-	-	-	-	-	1	-	1	1	1	1	-	-	-	-	-	-	-	-	-	-
<i>Baeckea gunniana</i>	-	-	-	-	-	-	-	-	1	-	1	-	1	-	1	-	1	1	-	-	-	-	-	-
<i>Microlaena tasmanica</i>	-	-	-	1	-	-	-	-	1	-	-	1	-	1	1	1	1	1	-	1	1	-	-	-
<i>Eucalyptus coccifera</i>	-	-	-	-	-	-	1	-	-	-	-	1	1	-	1	1	1	1	-	1	-	-	-	-
<i>Monotoca aff. linofolia</i>	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	1	-	-	-	-	-	-	-
<i>Poa gunnii</i>	1	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-
<i>Actinotus moorei</i>	1	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-
<i>Coprosma moorei</i>	1	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-
<i>Gonocarpus montanus</i>	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	-	-	-	-	-	-	-	-
<i>Rubus gunnianus</i>	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	1	-	-	-	-	-	-	-

Species*	TWINSpan																					
	101			100												110			111			
	5	4	4	4	4	4	6	4	4	1	5	2	2	6	5	5	5	5				
0	7	6	4	5	3	7	6	1	9	8	7	4	3	3	4	8	9	0	1	2	5	6
<i>Lagenophora stipitata</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-
<i>Coprosma nitida</i>	1	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1	-	-	-
<i>Cyathodes parvifolia</i>	1	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-
<i>Drimys lanceolata</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	1	1	-	-	-
<i>Phyllocladus aspleniifolius</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	-	-	-
<i>Trochocarpa cunninghamii</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	1	1	1	1
<i>Eucalyptus subcrenulata</i>	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	1	-	-	1	1	1	1
<i>Nothofagus cunninghamii</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1
<i>Richea scoparia</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-
<i>Astelia alpina</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	1	-	-	-
<i>Gahnia grandis</i>	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	1	1	1	1	-
<i>Blechnum watsii</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1	1	1	-
<i>Richea pandanifolia</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	1	1	-	-
<i>Tetracarpaea tasmanica</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-
<i>Trochocarpa gunnii</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-
<i>Leptospermum langierum</i>	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	1	-	1
<i>Oxalis lactea</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	1	1
<i>Hymenophyllum cupressiforme</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-
<i>Grammitis magellanica</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
<i>Cyathodes juniperina</i>	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	1
<i>Hakea epiglottis</i>	-	1	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-
<i>Mitrasacme montana</i>	-	-	-	-	1	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
<i>Campynaema lineare</i>	1	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
<i>Exocarpos humifusus</i>	1	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
<i>Lindsaya linearis</i>	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Monotoca submitica</i>	-	-	1	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-
<i>Restio australis</i>	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-
<i>Histiopteris incisa</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
<i>Uncinia compacta</i>	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
<i>Drites revoluta</i>	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-

Additional species: 50, *Carpha alpina*, *Erigeron stellatus*; 47, *Eucryphia milliganii*, *Gnaphalium collinum*; 46, *Comesperma retusum*, *Callistemon viridiflorus*; 44, *Agastachys odorata*; 45, *Xyris muelleri*; 61, *Actinotus suffocata*; 57, *Gentianella dimensis*, *Oreobolus acutifolius*; 4, *Tetratheca procumbens*; 23, *Gaultheria hispida*, *Lissanthe montana*, *Scirpus aucklandicus*; 8, *Monotoca glauca*, *Leptospermum rupestre*; 9, *Athrotaxis cupressoides*; 51, *Aristotelia peduncularis*, *Drymophila cyanocarpa*, *Olearia persoonioides*; 52, *Anodopetalum biglandulosum*, *Atherosperma moschatum*, *Eucryphia lucida*, *Grammitis billardieri*, *Telopea truncata*; 55, *Uncinia tenella*; 56, *Pimelea drupacea*.

* Species shown in bold letters re the major differentiating species.

APPENDIX
Species Observed in the Study Area by Environment

Species*	Aquatic	Open	Scrub/ Forest	Herb	Eld. alpine	Dome alpine
<i>Abrotanella scapigera</i> (rh)	-	-	-	-	X	-
<i>Acacia mucronata</i> (s)	-	-	X	-	-	-
<i>Acaena montana</i> (rh)	-	-	-	X	X	-
<i>Acaena novae-zelandiae</i> (h)	-	-	X	X	-	-
<i>Actinotus bellidioides</i> (rh)	-	X	-	-	-	-
<i>Actinotus moorei</i> (rh)	-	X	-	-	-	-
<i>Actinotus suffocata</i> (rh)	-	X	-	-	X	X
<i>Agastachys odorata</i> (s/t)	-	X	X	-	-	-
<i>Agrostis billardieri</i> (g)	-	-	-	X	-	-
<i>Agrostis parviflora</i> (g)	-	-	-	X	-	X
<i>Agrostis meionectes</i> (g)	X	-	-	-	-	-
<i>Agrostis venusta</i> (g)	-	-	-	X	-	X
<i>Apteropteris applanata</i> (f)	-	-	X	-	-	-
<i>Archeria serpyllifolia</i> (s)	-	-	-	-	X	-
<i>Aristotelia peduncularis</i> (s)	-	-	X	-	-	-
<i>Asperula gunnii</i> (h)	-	X	-	X	-	-
<i>Astelia alpina</i> (gr)	-	X	X	X	X	X
<i>Atherosperma moschatum</i> (t)	-	-	X	-	-	-
<i>Athrotaxis cupressoides</i> (t)	-	-	X	-	-	-
<i>Athrotaxis selaginoides</i> (t)	-	-	X	-	-	X
<i>Baeckea gunniana</i> (s)	-	X	-	-	X	X
<i>Banksia marginata</i> (s)	-	-	X	-	-	-
<i>Baumea arthropphylla</i> (gr)	X	-	-	-	-	-
<i>Bauera rubioides</i> (ss)	-	X	X	-	-	X
<i>Bellenden montana</i> (s)	-	X	X	-	X	X
<i>Billardiera longiflora</i> (ss)	-	-	X	-	-	-
<i>Blandfordia punicea</i> (gr)	-	X	-	-	-	X
<i>Blechnum chambersii</i> (f)	-	X	X	-	-	X
<i>Blechnum penna-marina</i> (f)	-	X	X	-	X	-
<i>Blechnum wattsii</i> (f)	-	-	X	-	-	-
<i>Boronia citriodora</i> (s)	-	X	X	-	-	-
<i>Brachycome spathulata</i> (rh)	-	-	-	-	X	-
<i>Caladenia</i> sp. (gr)	-	-	X	-	-	-
<i>Campynema lineare</i> (gr)	-	X	-	X	X	X
<i>Carex</i> aff. <i>appressa</i> (gr)	-	X	-	X	X	X
<i>Carex gaudichaudiana</i> (gr)	X	-	-	X	-	-
<i>Carpha alpina</i> (gr)	-	X	-	X	X	X
<i>Carpha curvata</i> (gr)	-	-	-	-	X	X
<i>Carpha rodwayi</i> (gr)	-	-	-	-	X	-
<i>Celmisia longifolia</i> (rh)	-	X	-	-	-	X
<i>Celmisia saxifraga</i> (rh)	-	-	-	-	X	-

* Key: c — cushion, f — fern, g — grass, gr — graminoid, h — herb, m — moss, rh — rosette, s — shrub, ss — scrambling shrub, s/t — shrub/tree, t — tree

Species	Aquatic	Open	Scrub/ Forest	Herb	Eld. alpine	Dome alpine
<i>Cenarrhenes nitida</i> (s)	-	X	X	-	-	-
<i>Centrolepis monogyna</i> (c)	-	X	-	-	X	X
<i>Coprosma moorei</i> (ss)	-	X	-	-	-	-
<i>Coprosma nitida</i> (s)	-	X	X	-	X	X
<i>Coprosma perpusilla</i> (ss)	-	-	-	-	X	-
<i>Cotula alpina</i> (rh)	-	-	-	X	X	-
<i>Cyathodes dealbata</i> (ss)	-	-	-	-	X	X
<i>Cyathodes parvifolia</i> (s)	-	X	X	-	-	-
<i>Cyathodes petiolaris</i> (s)	-	X	-	-	X	-
<i>Cyathodes straminea</i> (s)	-	X	X	-	X	X
<i>Danthonia fortunae-hibernae</i> (g)	-	-	X	-	X	X
<i>Danthonia pauciflora</i> (g)	-	-	-	-	X	X
<i>Danthonia diemenica</i> (g)	-	X	-	-	-	-
<i>Deyeuxia monticola</i> (g)	-	X	-	X	X	X
<i>Dichosciadium ranunculaceum</i> (rh)	-	-	-	-	X	-
<i>Diplarrena latifolia</i> (gr)	-	X	X	X	X	X
<i>Diplaspis cordifolia</i> (rh)	-	X	-	X	X	X
<i>Diselma archeri</i> (s)	-	-	-	-	X	-
<i>Donatia novae-zelandiae</i> (c)	-	-	-	-	X	-
<i>Dracophyllum minimum</i> (c)	-	-	-	-	X	-
<i>Drimys lanceolata</i> (s)	-	-	X	-	X	X
<i>Drosera arcturi</i> (h)	-	X	X	-	X	X
<i>Drosera pygmaea</i> (rh)	-	-	-	X	-	-
<i>Drymphila cyanocarpa</i> (h)	-	-	X	-	-	-
<i>Eleocharis acuta</i> (gr)	X	-	-	-	-	-
<i>Eleocharis pusilla</i> (gr)	X	-	-	-	-	-
<i>Empodisma minus</i> (gr)	-	X	X	-	X	X
<i>Epacris impressa</i> (s)	-	X	-	-	-	-
<i>Epacris lanuginosa</i> (s)	-	X-	-	-	-	-
<i>Epacris serpyllifolia</i> (s)	-	X	X	-	X	X
<i>Epilobium</i> spp. (h)	-	-	-	X	-	-
<i>Erigeron stellatus</i> (rh)	-	X	-	-	X	X
<i>Eucalyptus coccifera</i> (t)	-	-	X	-	-	-
<i>Eucalyptus delegatensis</i> (t)	-	-	X	-	-	-
<i>Eucalyptus nitida</i> (t)	-	X	X	-	-	-
<i>Eucalyptus subcrenulata</i> (t)	-	-	X	-	-	-
<i>Eucryphia lucida</i> (t)	-	-	X	-	-	-
<i>Eucryphia milliganii</i> (t)	-	-	X	-	-	-
<i>Euphrasia gibbsiae</i> (h)	-	-	-	-	X	-
<i>Euphrasia striata</i> (h)	-	-	-	-	X	X
<i>Ewartia meredithae</i> (c)	-	-	-	-	X	-
<i>Exocarpos humifusus</i> (ss)	-	X	-	-	X	X
<i>Gahnia grandis</i> (gr)	-	-	X	-	-	-
<i>Gaimardia fitzgeraldii</i> (c)	-	-	-	-	X	-
<i>Gaultheria hispida</i> (s)	-	-	X	-	X	X
<i>Gentianella diemensis</i> (h)	-	X	-	-	X	X
<i>Geranium potentilloides</i> (h)	-	-	X	-	X	-

Species	Aquatic	Open	Scrub/ Forest	Herb	Eld. alpine	Dome alpine
<i>Gleichenia alpina</i> (f)	-	X	X	-	-	X
<i>Gnaphalium collinum</i> (h)	-	X	-	X	X	X
<i>Gnaphalium traversi</i> (h)	-	-	-	-	X	-
<i>Gnaphalium umbricola</i> (h)	-	-	X	-	-	X
<i>Gonocarpus micranthus</i> (h)	X	-	-	X	-	X
<i>Gonocarpus montanus</i> (h)	-	X	X	-	X	X
<i>Grammitis billardieri</i> (f)	-	-	X	-	-	-
<i>Grammitis magellanica</i> (f)	-	-	X	-	-	-
<i>Gymnoschoenus sphaerocephalus</i> (gr)	-	X	X	-	-	-
<i>Hakea epiglottis</i> (s)	-	X	X	-	-	-
<i>Helichrysum acuminatum</i> (rh)	-	-	-	-	-	X
<i>Helichrysum backhousii</i> (s)	-	-	-	-	X	X
<i>Helichrysum hookeri</i> (s)	-	X	-	-	-	-
<i>Helichrysum milliganii</i> (rh)	-	-	-	-	X	X
<i>Helichrysum pumilum</i> (rh)	-	X	-	-	-	-
<i>Helichrysum scorpioides</i> (h)	-	X	-	X	X	X
<i>Herpolirion novae-zelandiae</i> (gr)	-	-	-	X	-	-
<i>Hibbertia procumbens</i> (ss)	-	X	-	-	-	X
<i>Hierochloa fraseri</i> (g)	-	-	-	-	X	-
<i>Histiopteris incisa</i> (f)	-	-	X	-	-	-
<i>Hydrocotyle sibthorpioides</i> (h)	-	-	X	X	X	-
<i>Hypericum japonicum</i> (h)	-	-	-	X	-	-
<i>Hymenophyllum australe</i> (f)	-	-	X	-	-	-
<i>Hymenophyllum cupressiforme</i> (f)	-	-	X	-	-	-
<i>Isoetes gunnii</i> (f)	X	-	-	-	-	-
<i>Juncus</i> spp. (gr)	X	-	X	X	X	-
<i>Lagenophora stipitata</i> (rh)	-	X	X	-	X	-
<i>Lepidosperma filiforme</i> (gr)	-	X	X	-	-	-
<i>Lepidosperma inops</i> (gr)	-	-	-	-	X	-
<i>Leptomeria glomerata</i> (ss)	-	X	-	-	X	X
<i>Leptospermum glaucescens</i> (s)	-	X	X	-	-	-
<i>Leptospermum lanigerum</i> (s)	-	-	X	-	-	-
<i>Leptospermum nitidum</i> (s)	-	X	X	-	-	-
<i>Leptospermum rupestre</i> (ss)	-	X	X	-	X	X
<i>Lepyrodia tasmanica</i> (gr)	-	X	X	-	-	-
<i>Lindsaya linearis</i> (f)	-	X	-	-	-	-
<i>Lissanthe montana</i> (s)	-	X	-	-	-	-
<i>Lomatia polymorpha</i> (s)	-	-	X	-	-	-
<i>Luzula</i> spp. (gr)	-	X	-	-	X	X
<i>Lycopodium australianum</i> (f)	-	-	-	-	X	-
<i>Lycopodium fastigiatum</i> (f)	-	X	X	X	X	X
<i>Lycopodium laterale</i> (f)	-	X	-	-	-	X
<i>Lycopodium scariosum</i> (f)	-	-	-	-	-	X
<i>Melaleuca squamea</i> (s)	-	X	X	-	-	-
<i>Microcachrys tetragona</i> (ss)	-	-	-	-	X	X
<i>Microlaena tasmanica</i> (g)	-	X	X	X	X	X
<i>Microseris scapigera</i> (rh)	-	X	-	-	-	-

Species	Aquatic	Open	Scrub/ Forest	Herb	Eld. alpine	Dome alpine
<i>Microtis unifolia</i> (gr)	-	x	-	-	-	-
<i>Milligania densiflora</i> (gr)	-	x	-	-	x	x
<i>Milligania lindoniana</i> (gr)	-	-	-	-	x	-
<i>Mitrasacme archeri</i> (c)	-	-	-	-	x	-
<i>Mitrasacme montana</i> (h)	-	x	-	-	x	x
<i>Monotoca glauca</i> (s)	-	-	x	-	-	-
<i>Monotoca linifolia</i> (s)	-	-	x	-	x	x
<i>Monotoca submutica</i> (s)	-	-	x	-	-	-
<i>Myriophyllum aquatica</i> (h)	x	-	-	-	-	-
<i>Myriophyllum pedunculatum</i> (h)	x	-	-	-	x	-
<i>Nothofagus cunninghamii</i> (t)	-	-	x	-	x	x
<i>Nymphoides exigua</i> (h)	x	-	-	-	-	-
<i>Olearia erubescens</i> (s)	-	x	x	-	-	-
<i>Olearia ledifolia</i> (s)	-	-	-	-	x	x
<i>Olearia obcordata</i> (s)	-	x	-	-	-	-
<i>Olearia persoonioides</i> (s)	-	-	x	-	-	-
<i>Olearia pinifolia</i> (s)	-	-	x	-	x	-
<i>Oreobolus acutifolius</i> (c)	-	x	-	-	x	x
<i>Oreobolus pumilio</i> (c)	-	x	-	x	x	x
<i>Oreomyrrhis ciliata</i> (rh)	-	x	-	-	-	-
<i>Orites acicularis</i> (s)	-	-	-	-	x	-
<i>Orites revoluta</i> (s)	-	x	x	-	x	x
<i>Ourisia integrifolia</i> (h)	-	-	-	-	x	-
<i>Oxalis lactea</i> (rh)	-	x	x	-	x	-
<i>Oxylobium ellipticum</i> (s)	-	x	-	-	-	x
<i>Pentachondra pumila</i> (ss)	-	x	-	-	x	x
<i>Persoonia gunnii</i> (s)	-	x	x	-	x	x
<i>Persoonia muelleri</i> (s)	-	x	-	-	-	-
<i>Phyllocladus aspleniifolius</i> (t)	-	-	x	-	-	x
<i>Pimelea drupacea</i> (s)	-	-	x	-	-	-
<i>Pimelea lindleyana</i> (s)	-	x	x	-	-	-
<i>Pimelea sericea</i> (s)	-	-	x	-	x	-
<i>Plantago daltonii</i> (rh)	-	-	x	x	-	-
<i>Plantago paradoxa</i> (rh)	-	-	-	-	-	x
<i>Plantago tasmanica</i> (rh)	-	-	-	-	x	x
<i>Poa gunnii</i> (g)	-	x	-	x	x	x
<i>Podocarpus lawrencei</i> (ss)	-	-	x	-	x	x
<i>Polystichum proliferum</i> (f)	-	-	x	-	x	-
<i>Prasophyllum</i> sp. (gr)	-	-	-	-	-	x
<i>Pterygopappus lawrencei</i> (c)	-	-	-	-	x	-
<i>Pultenaea dentata</i> (s)	-	x	-	-	-	-
<i>Pultenaea subumbellata</i> (s)	-	x	-	-	-	-
<i>Ranunculus</i> sp. (rh)	-	-	-	x	-	-
<i>Ranunculus collinus</i> (rh)	-	-	-	x	-	-
<i>Ranunculus rivularis</i> (h)	x	-	-	-	-	-
<i>Restio australis</i> (gr)	-	x	-	-	-	-
<i>Restio complanatus</i> (gr)	-	x	-	-	-	x

Species	Aquatic	Open	Scrub/ Forest	Herb	Eld. alpine	Dome alpine
<i>Richea gunnii</i> (s)	-	x	-	-	-	-
<i>Richea pandanifolia</i> (s)	-	x	x	-	x	x
<i>Richea scoparia</i> (s)	-	x	x	-	x	x
<i>Richea sprengelioides</i> (s)	-	-	-	-	x	x
<i>Rubus gunnianus</i> (rh)	-	x	-	-	x	x
<i>Scaevola hookeri</i> (h)	-	-	x	-	x	-
<i>Schoenus calypttratus</i> (gr)	-	-	-	-	x	x
<i>Schoenus fluitans</i> (gr)	x	-	-	-	-	-
<i>Schoenus tenuissimus</i> (gr)	-	x	x	-	-	-
<i>Scirpus aucklandicus</i> (gr)	-	x	-	x	-	-
<i>Scirpus crassiusculus</i> (gr)	x	-	-	-	-	-
<i>Scirpus fluitans</i> (gr)	x	-	-	-	-	-
<i>Senecio gunnii</i> (h)	-	-	x	-	x	-
<i>Senecio leptocarpus</i> (rh)	-	-	-	-	-	x
<i>Senecio pectinatus</i> (rh)	-	x	-	-	x	x
<i>Sphagnum cristatum</i> (m)	x	x	-	-	-	-
<i>Sprengelia incarnata</i> (s)	-	x	x	-	x	x
<i>Spyridium gunnii</i> (s)	-	-	x	-	x	-
<i>Sticherus tener</i> (f)	-	-	x	-	-	-
<i>Stylidium graminifolium</i> (rh)	-	x	x	-	-	x
<i>Telopea truncata</i> (s)	-	-	x	-	x	x
<i>Tetracarpea tasmanica</i> (s)	-	-	x	-	-	-
<i>Tetraria capillaris</i> (gr)	-	x	x	-	-	-
<i>Tetrateca procumbens</i> (s)	-	x	-	-	-	-
<i>Thelymitra venosa</i> (gr)	-	x	-	-	-	-
<i>Trithuria submersa</i> (gr)	x	-	-	-	-	-
<i>Trochocarpa cunninghamii</i> (ss)	-	-	x	-	-	-
<i>Trochocarpa gunnii</i> (s)	-	-	x	-	-	-
<i>Uncinia compacta</i> (gr)	-	x	-	-	x	x
<i>Uncinia tenella</i> (gr)	-	-	x	-	-	-
<i>Utricularia dichotoma</i> (h)	x	-	x	-	-	-
<i>Viola hederacea</i> (rh)	-	x	-	-	x	x
<i>Wahlenbergia saxicola</i> (rh)	-	-	-	-	x	-
<i>Xyris marginata</i> (gr)	-	x	-	-	-	-
<i>Xyris muelleri</i> (gr)	-	x	-	-	-	-