Vegetation Survey of the Barrington Tops and Mount Royal National Parks for use in Fire Management

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Zoete, T. (ERM, 24 Falcon Street, Crows Nest NSW 2065 Australia) 2000. Vegetation Survey of the Barrington Tops and Mount Royal National Parks for use in Fire Management. Cunninghamia *6(3): 511–578*. This paper reports on a vegetation study undertaken to enable the development of appropriate fire management strategies for the conservation of biodiversity. The approach taken is to relate fire response mechanisms reported for species within the literature to floristic patterns.

Floristic and environmental data were obtained from the National Parks and Wildlife Service. The data set was derived from 262 plots located within and around the study area. Data were analysed using classification, ordination, one way non-parametric analysis of variance, and correlation routines contained within the PATN computer package.

On the basis of this analysis, 14 Vegetation Communities were delineated including 12 non-rainforest communities. There was a strong relationship between the floristic pattern and a number of environmental variables, including altitude, climatic variables, geographic location, and geology. 'Years Since Logging' and 'Years Since Last Fire' were also relatively highly correlated, but much of this data is based on subjective field estimates in relatively few sites, often several years after a fire had occurred and is therefore less reliable.

The relationships between floristic data and known plant fire response mechanisms, were generally weak, though significant. The weakness of the correlation is probably due to the lack of information on fire response for many species. On the basis of the existing data base, preliminary guidelines are provided on the nature of suitable fire regimes. Suggestions are given for further study of the floristic pattern, fire history, and other data required to guide ecological fire management in the future.

Introduction

This vegetation study was conducted to provide information to the National Parks and Wildlife Service (NPWS) for the development of appropriate fire management strategies for the conservation of biodiversity within the Barrington Tops and Mount Royal National Parks. The study area for this project encompasses all of the two National Parks as well as areas adjacent to these Parks for which data were available. Emphasis was on the fire adapted vegetation (i.e. non-rainforest vegetation).

The overall approach taken was to relate fire response mechanisms reported for species within the literature (summarised in the National Plant Fire Response Register — Gill & Bradstock 1992) to floristic patterns.

Study area

The Barrington Tops and Mount Royal National Parks cover an area of approximately 67 530 ha, and are located about 100 km north-west of Newcastle, between the towns of Scone and Gloucester (Fig. 1). The Parks are oriented around two plateaux, including the Barrington Tops and the Gloucester Tops plateaux. Together they occupy the southern end of the Mount Royal Range, which runs from the Great Escarpment and the Liverpool Range towards the south-east. The Tops separate the valleys of the upper Hunter River and its tributaries from the valleys of the Manning River. Altitudes vary from less than 200 m asl in the south-eastern part of Barrington Tops National Park to over 1500 m asl on the main plateau in the northern section of that Park.

Considerable climatic variation exists within the study area, concordant with the rugged topography (CMPS&F 1995). Climate ranges from cool temperate conditions at higher altitudes to warm temperate conditions at lower altitudes. The climate is generally sub-humid, although rainfall varies with altitude and longitude. Areas on the lower slopes are generally drier, with mean annual rainfalls of approximately 1000 mm, while areas in the rain shadow of the plateau further inland are driest with a mean annual rainfall of less than 700 mm. On the other hand, areas over 700 m elevation experience a mean annual precipitation of up to 2000 mm. Much of the precipitation at higher elevations is in the form of heavy moist fogs or snowfalls

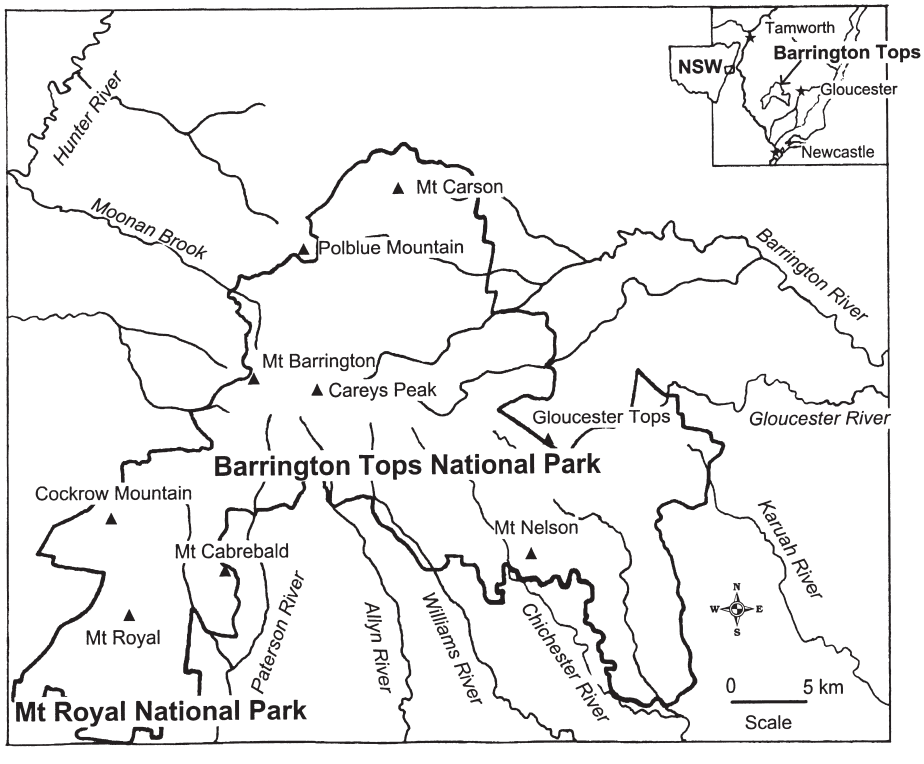

Fig. 1. The study area.

during winter. Up to five snowfalls occur at elevations over 1100 m asl, although most falls are light (10–20 cm depth). Freak snowfalls occur down to 300 m asl approximately once per five years. Rainfall is greatest during the warmer summer months, while late autumn and spring are the driest seasons. Temperatures in surrounding lowland vary from a mean maximum of approximately 23–24°C to a mean minimum of approximately 10–11°C. At higher elevations, temperatures are 5–7 degrees lower than in the valleys, with a minimum of -17°C recorded at 1500 m asl.

Winds tend from the west during July, August and September. Coupled with low rainfall, these winds can provide fire danger conditions in late winter and spring. During October to December winds tend further from the north, resulting in warmer temperatures. If below average rainfalls are experienced during these periods, extreme fire danger conditions can develop. Close to the escarpment, mountain winds (föhn) have a pronounced influence on the behaviour of fire due to their high velocity. Generally, the higher areas of the study area are low fire risks due to the extended cool and moist conditions experienced here (C. Howard, pers. comm.). At lower altitudes, moist conditions in rainforest areas provide barriers to the spread of fire. Generally, fire travels only along the drier ridge lines at lower altitudes, due to moister conditions on the slopes and valleys below.

Three parent rock types with corresponding soil types are found within the boundaries of the study area (Veness & Associates 1995). The oldest rocks date from the Carboniferous Period and consist of an undifferentiated mixture of fine-grained quartz-poor lithic sandstone, conglomerate, siltstone, mudstone, and pyroclastics. This type of rock underlies most of the lower slopes of the study area. Soils developed on these rocks contain friable, usually stony surfaces with abundant organic materials. Both top-soils and sub-soils are generally stony and pedal. Acidity varies from weak to moderate in the top-soil to weak to strong in the sub-soil. Soil depth ranges from 19 cm to over 120 cm.

Granodiorite intruded the landscape in the Middle Permian Period, and presently remain in the Barrington tops area. Soils developed on granodiorite are friable with scattered granodiorite stones. Top-soils are weakly to moderately acid, but sub-soils are moderately to strongly acid. Soil depth varies from 58 cm to over 130 cm.

Intense volcanic activity during the Tertiary resulted in lava flow which settled in the valleys and formed protective caps for the underlying (Carboniferous) sediments. Extensive weathering has since eroded the surrounding hills, resulting in an inverse landscape with the volcanic basalt rocks presently remaining in the highest parts of the plateaux. Soils developed on Tertiary basalt are friable, strongly pedal, and contain organic material and stones. Top-soils are weakly acid and sub-soils are moderately to strongly acid. Soil depth varies from 72 cm to over 100 cm.

Previous flora studies in the study area

The vegetation of the Barrington Tops plateau has been the subject of numerous plant collecting excursions since the early twentieth century. Detailed study of the area commenced around 1915 (Adam 1987). However, it was not until 1937 that Fraser and

Vickery began publishing the first and, so far, only comprehensive published description of the vegetation of the plateau (Fraser & Vickery 1937, 1938, 1939). Other, unpublished, accounts of the vegetation on plateau proper include the study of Mort (1983) on sub-alpine wetland vegetation and Waterhouse (1986, 1988) on broom *(Cytisus scoparius)* infestations. A more recent study of the rare and threatened flora on the plateau is provided by Heinrich and Dowling (1998).

Other surveys and descriptions have primarily focussed on rainforest habitats, which together occupy approximately 25 000 ha (37%) of the study area. Such studies include Turner (1976), Bowden and Turner (1976) and Floyd (1983).

One prominent theme in these studies has been the advance and retreat of the *Nothofagus moorei* dominated forests. Fraser & Vickery (1938) noted that *Nothofagus moorei* dominated forests were advancing into *Eucalyptus* spp. forests at all fronts, but that they lost ground to other rainforest types at lower altitudes. The latter observation was confirmed by Turner (1976) who noted that regeneration of *Nothofagus moorei* under the *Nothofagus moorei*-warm temperate rainforest ecotone did not occur. Floyd (1983) discussed these observations at some length with additional evidence of his own field studies of the existing vegetation. Although his studies showed that there is a clear and ongoing change of vegetation, with one-way boundary shifts of up to an estimated 500 years of age, Floyd was ambivalent about the longer term implications in the absence of further long term evidence.

Such long term evidence was provided for the vegetation on the plateaux several years later through several pollen analyses from the sub-alpine wetlands found on the plateaux. These include papers by Dodson et al. (1986), Dodson and Myers (1986), Dodson et al. (1994), and Sweller and Martin (1997). Results indicate that most present day vegetation communities have been present within the area for over 9000 years, although their relative proportions have changed considerably since then (Dodson et al. 1986). An expansion of wetlands as well as forests dominated by *Nothofagus moorei* (particularly towards the north-west), which commenced approximately 6000 BP is thought to be due to an increase in rainfall and possibly temperature (Dodson et al. 1986, Sweller & Martin 1997).

The State Forest Commission of NSW (now State Forests of NSW) has previously mapped the dominant species (and some structural information) of the canopy vegetation of large parts of the study area. This mapping is known as the 'Royal Milli Forestry Maps', and a compilation of this mapping ('Royal Milli Vegetation Management Mapping') was prepared for the NPWS by McKimmie Jamieson & Partners (Aust.) Pty Ltd (1985).

A floristic analysis of the State Forests of the area, parts of which are now included within the National Park boundaries, is provided by Binns (1995).

Fire responses and the National Plant Fire Response Register

Knowledge of the vegetation response to fire can be employed to determine appropriate fire regimes for the maintenance of the current species composition and structure or to cause a shift in these characteristics, optionally to a predetermined goal.

As fire is an important and often recurring factor in many Australian ecosystems, considerable research has been conducted to qualify and quantify responses within individual species and within vegetation types (e.g. Gill & Bradstock 1992, Bradstock et al. 1995, DEST 1996). The application of this research to the management of the current study area is two-fold:

- To manage different types of vegetation;
- To manage individual species, such as significant species.

The response of vegetation to fire can be described in several ways (Gill & Bradstock 1992):

- Mechanistic descriptions, resulting in classifications of species with similar means of resistance and recovery, such as physical resistance properties of plants to fire (e.g. bark);
- Consequential descriptions, which are concerned with the end result of fire, such as survival or death;
- Strategic descriptions, which place importance on the evolutionary behaviour of species, such as whether plants are fire evaders, fire resisters, or fire endurers.

The National Plant Fire Response Register was established to provide information on each of these aspects of (Gill & Bradstock 1992). Information within the Register is sourced from the published literature, personal communications, personal observations and surveys. The 1997 version of the Register contained information on 2528 species, derived from 45 references. Fire response information is given in the form of 11 nominal categories. These are shown in Table 1.

Table 1. Codes for species' regenerative mechanisms (Source: Gill & Bradstock 1992).

Code	Mechanism
0	Unknown
1	100% scorch kills, regeneration from on-plant viable seed storage
2	100% scorch kills, regeneration from in-soil viable seed storage
3	100% scorch kills, no seed storage in burnt area
4	Survive 100% scorch, root suckers
5	Survive 100% scorch, basal sprouts
6	Survive 100% scorch, epicormics
7	Survive 100% scorch, outgrowth of large apical bud
8	1, 2, or 3 but which is unknown, and includes obligate seed regeneration of McMahon (1987)
9	4, 5, 6, or 7 but which is unknown, and includes facultative resprouters of McMahon (1987)
10	Ferns
11	Obligate resprouters of McMahon (1987)

Those species which are killed by fires and which rely on seed (in seed banks, on plant, or import of propagules from outside the burnt area) would be favoured if fires were sufficiently intense to also kill competing plants which rely primarily on their resprouting capacity for post-fire recovery (Adams & Simmons 1996). In contrast, if fires were relatively cool but frequent, seeders would be disadvantaged, as fragile seeder plant seedlings are destroyed before they can set seed.

Knowledge of the fire response of species which comprise a vegetation community can therefore be used to maintain, promote or suppress particular species or groups of species, and relatively simple deterministic fire regimes can be designed for individual species or small groups of similar species on this basis.

Problems arise when both resprouters and seeders are targeted for maintenance or promotion, as for example in a vegetation community largely consisting of resprouters, but also containing rare seeder plants and vice versa. There are also conflicts when the fire regime is based on requirements of overstorey species only, to the potential detriment of the understorey species (Keith & Bradstock 1994). In addition, desirable outcomes are also dependent on variables such as the size and shape of the area burned, unplanned fires, climatic and seasonal factors, the nature of the seedbank and soil in which it resides, interaction with non-target species, longevity of plants and propagules, age to maturity, fuel load, and regional differences in plant response mechanisms (e.g. Gill et al. 1981, Bradstock et al. 1995, DEST 1996). Data on many of these variables are lacking for most regions (Gill & Bradstock 1995), including the Barrington Tops region. Given the stochasticity of some of these variables (e.g. unplanned fires) it is also doubtful that data will ever be sufficient to design deterministic fire regimes suitable at the landscape scale over the long run.

In order to avoid some of these conflicts, and to precaution against errors made in determining fire intensities and intervals, a number of authors have emphasised the importance of fire regime variability in both space and time (Fox 1983, Lamont et al. 1993, Bradstock et al. 1995, Gill 1996). Bradstock et al. (1995) proposed the concept of a threshold level above which fire regime variability is sufficiently high to conserve full diversity (prevent the extinction of species) and below which diversity declines through fire regime uniformity. Using a model, Keith and Bradstock (1994) provided an example of how the threshold concept can be applied to a heath mosaic in the Royal National Park in which species were classified into a small number of functional groups. Input information used included the types of propagules, post-fire growth, reproductive timing, reproductive mechanism, and the competitive status.

Clearly, much of this information is not available for the vegetation of the Barrington Tops area at this stage. A considerable amount of monitoring will be required in order to generate the data required to develop models such as that by Keith and Bradstock (1994).

The emphasis of the present paper is, therefore, on the provision of floristic information, which, once further information on parameters such as those used by Keith and Bradstock (1994) becomes available, can be used to develop scientific fire regimes and relatively detailed strategies at a later stage. Nevertheless, it is considered that current information available on the regenerative mechanisms could be used as a

rudimentary guide to the formulation of interim fire management strategies, using the principles as outlined above. Monitoring should be an integral part of fire management strategy (Gill & Nicholls 1989), and, hence, guidelines for the establishment of a monitoring program are also provided.

Methods

Data sources and quality

Data on the vegetation of the study area were obtained from a variety of sources and includes plot data from within and surrounding the study area. Most data originate from plots used for the Flora Survey component (Binns 1995) of the Gloucester and Chichester Management Areas Environmental Impact Statement (EIS) (SFNSW 1995). Most of these plots were surveyed in 1991–1992 specifically for the preparation of the EIS (Binns 1995). However, a number of plots were surveyed in 1987–1989 (Binns, unpublished data), and several of these occur within the Whispering Gully part of the present study area.

Plot data from Mount Royal National Park and adjacent areas originate from such sources as the Comprehensive Resource Assessment surveys (post 1995), the North-East Biodiversity Study (1992–1993), but also includes data from older sources, possibly as old as the 1960s (P. Lezaich, State Forests NSW, pers. comm.).

A survey of a further 51 plots within the study area was commissioned by the NPWS specifically for the present project (Horton & Hunter, unpublished data). These plots are mostly located in the central and south-eastern parts of the Barrington Tops National Park.

All data was supplied by NPWS Northern Zone Office. The total number of plots used in the analyses for this project was 262, of which 154 plots were located within the boundaries of the National Parks.

Information obtained from each plot included a list of plant species present and their abundances as expressed in a code based on a modified Braun-Blanquet scale for cover (Table 2).

Table 2. Modified Braun-Blanquet scale for plant species' canopy cover.

Cover Code	Projected Canopy Cover
1	< 5%, few individuals
2	< 5%, any number of individuals
3	6–25%
4	26–50%
5	51–75%
6	75–100%

The availability and consistency of other information, such as structural and environmental data, varied considerably from plot to plot. Some of these data were estimates that may differ from observer to observer. This data was, therefore, sometimes of limited use in the analysis for the present project. Nevertheless, even though some estimates may have been somewhat coarse, data utilised for analyses included data on estimated severity and frequency of fires and past logging, altitude, aspect, slope, landform element, morphology, soil group, and soil depth. Such data was available for 15–120 plots, depending on the variable.

Other environmental information used include data from the NPWS Coffs Harbour Northern Zone office GIS system. This information includes data on climate, terrain, and geology. Data for these variables was available for all plots.

Lists of rare and threatened species and exotic species were obtained from the NPWS Coffs Harbour Northern Zone office. Plant responses to fire were sourced from the National Plant Fire-Response Register held by the Malcolm Gill (CSIRO).

Analysis

Floristic data were analysed using a number of routines provided within the PATN computer package (Belbin 1993). In order to restore the approximate cover ratios encountered in the field, the cover codes supplied in the original data were transformed to the midpoints of the percentage cover intervals represented by the codes, except for code intervals 1 and 2, which were transformed to 1% and 3%, respectively.

Information on the structural characteristics of the vegetation was patchy, preventing the differential weighting of canopy species and understorey species. All species were therefore treated equally within the analyses. Although this introduces distortions with respect to the reflection of the ecological significance of species found in different vegetation strata within the covariance matrix (see below), it should be noted that the emphasis of the current project is on the understorey vegetation of the study area, as this is the vegetation stratum which is of greatest significance for fire management. The dominant influence of the species rich lower strata within the analyses applied is therefore justified.

Data of many environmental variables were originally in a nominal (non-numerical) format. For example, 'values' for variables such as morphology and geology included 'tertiary basalt' and 'hill slope'. Because most of the analyses conducted require ratio type data, nominal variables were converted to binary (presence-absence) variables, resulting in one extra variable for each nominal value. A total number of 54 environmental variables were thus used in the analysis. These are listed in Table 3.

A similar treatment was conducted for data obtained from the National Plant Fire Response Register. As the register is based on 45 literature references from different authors, species are frequently listed with a number of fire response mechanisms, as different authors have observed different mechanisms. To facilitate analysis and data management, only the first (often the only) mechanism observed was used.

Table 3. Environmental variables used in the analysis.

GIS variables

Description	Type
Longitude (AMG)	Ratio
Latitude (AMG)	Ratio
Minimum temperature at the coldest month (°C ×10)	Ratio
Mean annual temperature (°C ×10)	Ratio
Solar radiation (MJm^{-2} day^{-1}	Ratio
Soil fertility (from soil landscape maps, geochemical data modelling)	Interval
Slope (degrees)	Ratio
Soil depth (mm)	Ratio
Mean annual rainfall (mm)	Ratio
Wetness or compound topographic index (derived from terrain variables)	Ratio
Skidmore topographic position — mean difference in elevation	Ratio
Ruggedness index (250 m window)	Ratio
Ruggedness index (500 m window)	Ratio
Ruggedness index (1000 m window)	Ratio
Topographic index (250 m window)	Ratio
Topographic index (500 m window)	Ratio
Topographic index (1000 m window)	Ratio
NEFBS moisture index (from other GIS information)	Ratio
Rainfall in the driest quarter of the year (mm)	Ratio
DLWC geology map units	Nominal
Basic igneous	Binary
Acidic volcanic	Binary
Granite	Binary
Sedimentary rocks (high quartz)	Binary
Sedimentary rocks (low quartz)	Binary

Plot variables

Description	Type
Field estimate of previous fire severity (0–3)	Interval
Estimate or record of years since last fire	Ratio
Altitude (m)	Ratio
Slope (degrees)	Ratio
Aspect (degrees)	Ratio
Landform Element	Nominal
Bench	Binary
Drainage depression	Binary
Foot slope	Binary
Gully	Binary
Hill crest	Binary
Hill slope	Binary
Scarp	Binary
Stream channel	Binary
Swamp	Binary
Valley flat	Binary

Morphology	Nominal
Crest	Binary
Closed depression	Binary
Flat	Binary
Lower slope	Binary
Mid-slope	Binary
Simple slope	Binary
Upper slope	Binary
Open depression	Binary
Soil Type	Nominal
Clay	Binary
Loam	Binary
Sand	Binary
Organic	Binary
Soil depth (in three classes)	Interval
Field estimate of previous logging severity (0–3)	Interval
Estimate or record of years since last logging	Ratio
Field estimate of previous grazing severity (0–3)	Interval
Estimate or record of years since last grazing	Ratio

While this may have introduced some bias, most mechanisms listed for a species were closely related. In order to cancel out some bias, related mechanisms were also amalgamated into two contrasting groups, including one group with species relying on seed regeneration, and another with species relying more on resprouting. All regenerative mechanisms were converted to binary variables

In this paper, it is assumed that species with higher abundance require greater emphasis than less abundant species when the objective is to maintain the species composition of vegetation. 'Present' values (i.e. '1') were, therefore, subsequently weighted by the transformed percentage cover data for each matching species to increase the importance of abundant species. Only native species were used for the fire response analyses.

Gross variables were created by amalgamating all seeder mechanisms and all resprouter mechanisms into two contrasting groups, including one group ('Seeder') with mechanisms 1, 2, 3, and 8, and the other ('Resprouter') with mechanisms 4, 5, 6, 7, 9 and 11 (see Table 1). Mechanism 10 ('Ferns') was not reclassified in this manner, as the affinity of this group of plant for either of the two gross variables is not clear or varies. To eliminate the effect of different species numbers among sites and vegetation communities, a variable 'Resprouter:Seeder' was created by dividing the number of species with the 'Seeder' variable with the number of species with the 'Resprouter' variable. Missing data were coded as -9999.

The Bray and Curtis dissimilarity measure was used as a measure of the differences between the floristic composition of the plots. It has consistently performed well in a variety of tests and simulations on different types of data (Faith et al.1987). The plots were classified using the flexible unweighted pair-groups method using arithmetic averages (UPGMA) (a hierarchical agglomorative procedure), with a default beta

value of -0.1. The number of vegetation communities to be used for subsequent mapping and further analysis was initially determined by taking the root of the total number of plots used for the analysis, thus resulting in 16 communities. However, detailed examination of the 16 communities indicated that two of these communities were not meaningfully different from adjacent communities (Binns, pers. comm.), hence the final group definition level chosen was 14.

A non-parametric one-way Analysis of Variance (ANOVA) was used to determine the importance of individual species, environmental variables, and fire response mechanisms in discriminating between the vegetation communities. The technique yields the Kruskal-Wallis statistic. Within any data set, variables with higher Kruskal-Wallis value are more significant that those with lower values.

The plots were also ordinated, using the detrended correspondence analysis technique (DCA) (Hill & Gauch 1980). This technique allocates most of the variation within the data set into the first dimension, with less variation in each subsequent dimension. Environmental and fire response variables were correlated to the first four (most important) dimensions of the ordination space using the principal axis correlation facility provided in PATN. The significance level of the correlation was approximated with Monte Carlo methods.

Results

Species recorded

A total of 890 species (including 66 species identified to genus level only) were found within the 262 plots, representing a total of 11 538 records. Records do not include plant species found outside the plots. The total number of species is therefore likely to be an underestimate of the true number of species present. In addition, plants such as members of the Orchidaceae and Liliaceae may have been overlooked during plot surveys if surveys were conducted outside growing seasons, further reducing the proportion of plants sampled. Appendix A contains a listing for all species found.

Eight rare or threatened plant species were recorded in the plots surveyed for this project, in 60 records. Half the records (30) were from outside the National Park boundaries, including all records of *Grevillea granulifera*. Only seven species were recorded from within the Park boundaries. Several other rare or threatened plants are also known from the area, or have ranges which overlap the study area. Table 4 contains a list of species found within the area and their conservation status, based on Binns (1995), Heinrich and Dowling (1998) and R. Onfray (NPWS, pers. comm.).

An unusual record is that of *Eucalyptus macrorhyncha* found in some plots in the Stewarts Brook area. This species has not previously been encountered in the area. Samples have, however, been identified as belonging to *Eucalyptus macrorhyncha* by the herbarium of the Royal Botanic Gardens, though the features of the samples were somewhat atypical (Binns, pers. comm.).

Table 4. Rare or threatened plants within data set and their conservation status.

Species Name	Authority	ROTAP*	TSC
Acacia barringtonensis	Tind.	3RCa	
Asperula asthenes	Airy Shaw & Turrill	3VC-	Vulnerable
Chiloglottis palachila	D.L.Jones	3RC-	
Chiloglottis platyptera	D.L.Jones	2KC-	
Chiloglottis sp. aff. *pluricallata*			
Chiloglottis sphyrnoides	D.L.Jones	3KC-	
Chionogentias barringtonensis	L.G.Adams	2RC-	
Corybas sp. A		2RC-	
Cynanchum elegans	(Benth.) Domin	3ECi	
Diuris venosa	Rupp	2VC-	Vulnerable
Eucalyptus largeana	Blakely & Beuzev.	3R	
Euphrasia ciliolata	W.R.Barker	2KC-	
Galium curvihirtum	Ehrend. & McGillivray		
Grevillea granulifera	(McGillivray) R.Olde & N.Marriott	3KCa	
Hibbertia hermanniifolia	DC.	3RC-	
Leptospermum argenteum	J.Thompson	2RC-	
Leucopogon pilifer	Wakef.		
Marsdenia liisae	J.Williams	3 RC-	
Microtis sp. aff. *rara*	suggested by D.L.Jones		
Orthoceras strictum forma virile	suggested by D.L.Jones		
Ozothmanus sp. 1		2KC-t	
Phebalium sp.			
Plantago cladarophylla	B.G.Briggs, Carolin & Pulley	2RC-	
Plantago palustris	L.Fraser & Vick.	2RC-	
Plectranthus suaveolens	S.T.Blake	3KC-	
Pomaderris helianthemifolia	(Reisseck) Wakef.		
Prasophyllum rogersii	suggested by D.L.Jones		
Prasophyllum sp. A			
Prasophyllum sp. aff. *fuscum*	suggested by D.L.Jones		
Prasophyllum sp. aff. *odoratum*	suggested by D.L.Jones		
Pterostylis cucullata (sp. D)	R.Br.	3VCa	Vulnerable
Pterostylis elegans	suggested by D.L.Jones		
Pterostylis falcata (sp.C)	R.S.Rogers		
Pterostylis sp. aff. *cycnocephala*	suggested by D.L.Jones		
Pterostylis sp. aff. *parviflora*			
Senecio macranthus		3RC-	
Senna acclinis	(F.Muell.) Randell	3 RC-	
Tasmannia glaucifolia	J.Williams	3VCi	Vulnerable
Tasmannian purpurascens	(Vick.) A.C.Smith	2VC-t	Vulnerable

* 2: Restricted distribution in Australia (range < 100 km); 3: Range >100 km in Australia but in small, restricted populations;

E: Endangered; V: Vulnerable; R: Rare; K: Poorly known; C: Represented in national park or proclaimed reserve; a: adequately reserved; i: inadequately reserved; -: insufficient data; t: total known population reserved (see Briggs & Leigh 1995).

The incidence of exotic plants was generally low, with most species occurring at less than 5% cover at any plot where present. One exotic species with considerably stronger presence was *Cytisus scoparius*, which dominated the vegetation in some plots on the Barrington Tops plateau. It is one of the characteristic species of Vegetation Community 10, occurring around the edges of the sub-alpine wetlands (see Appendix B). It was introduced into the area in the 1840s, though it was not until the 1950's and 1960's that the species build up to nuisance levels (Waterhouse 1988). With the dedication of the southern end of the plateau as a National Park in 1969, seasonal cattle grazing and burning ceased, resulting in further expansion. By 1988, 10 000 ha were affected by *Cytisus scoparius*, with native undergrowth and overstorey species regrowth affected through shading by *Cytisus scoparius* (Waterhouse 1988). Since then the area affected has been successfully contained using chemical agents and some hand removal for control, though the density within the infestation increased (M. Schroeder pers. comm.).

In order to open up smaller areas known to be populated by rare or threatened plants, *Cytisus scoparius* is removed by hand. It is hoped that biological control agents, released since 1993, will be able to reduce the density across the larger infestation. However, considerable lead time will be required (up to 20 years) before these agents are anticipated to cause an impact (M. Schroeder pers. comm.). Further containment will therefore be necessary.

Another exotic species occurring in a much larger area than *Cytisus scoparius* is *Conyza albida*. It is common in the Mount Royal area as well as in the northern parts of the plateau, but generally occurs at relatively low quantities. No information is available on the history of this species within the study area. It is, however, unlikely that the species will develop into a problem weed, such as Broom, as it is typically a species of disturbed sites only. Most of the remaining exotic species are also typical of disturbed sites, and have a preference for moist conditions, such as gullies, riparian zones, and swamps.

Classification

As noted above, a total of 14 communities were delineated. An abbreviated dendrogram of the UPGMA classification showing the hierarchical arrangement of the 14 vegetation communities is shown in Fig. 2. Appendix B provides vegetation community profiles, detailing species with the highest fidelity (i.e. Kruskal-Wallis statistics), highest mean cover, and highest constancy. Tables 5 and 6 show the values and Kruskal-Wallis statistics respectively of the environmental characteristics of each community. The geographic distribution is shown in Fig. 3.

In brief, the results indicate that Community 1 to 6 represent *Eucalyptus* species dominated forest with species typical of the drier, lower slopes, with Community 3 and 5 at the wetter end of the spectrum and located primarily along clearly defined watercourses. Community 4 is a shrubby type vegetation (occasionally with trees), typical of rocky outcrops throughout the study area (Binns, pers. comm.), although some species found within the plots comprising this vegetation community occur only in areas adjacent to the National Park boundaries (e.g. *Grevillea granulifera* and *Eucalyptus macrorhyncha*).

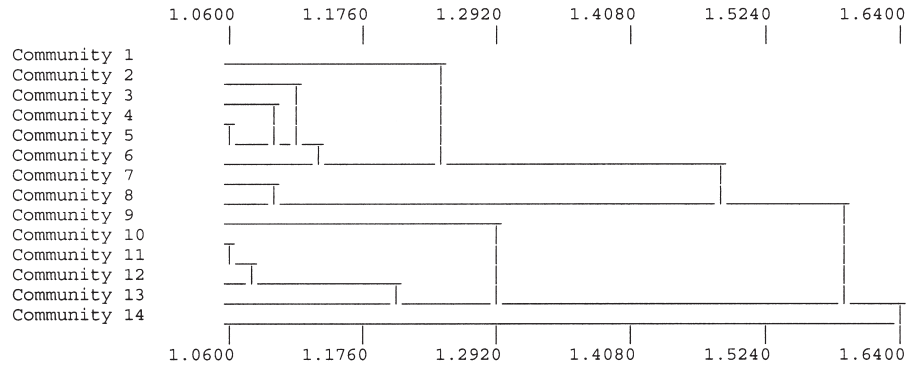

Fig. 2. Abbreviated dendrogram hierachical arrangement of vegetation communities. The relative dissimilarity values are shown alongside the dendrogram.

of 8.918, 6.181, 4.763, and 4.719. This indicates that there is at least one complete species turnover along each of these axes, with two turnovers in the first dimension. Thus, the species composition on the one end of the axis is completely different from that on the other end of the axis, with two such cycles in the first dimension (i.e. the first axis shows most of the variation).

Principal axis correlations for environmental variables are also listed in Table 6. Figs 4 and 5 show the vectors (standard length = 1) for variables with correlations over 0.5 and $p < 0.01$ in relation to the distribution of the plots in the first three dimensions of the species space.

Fig. 4 shows that the major floristic gradient (dimension 1) in the vegetation is from sub-alpine swamp (Community 12) and montane *Eucalyptus* spp. dominated vegetation types (Community 9 to 11) to rainforest (Community 7) and wet sclerophyll forest (Community 8). Another important gradient (dimension 2) is from the *Nothofagus moorei* dominated forests to the drier *Eucalyptus* spp. forests. Both floristic gradients appear to be related to changes in altitude, rainfall, temperature, and latitude, while time since last fire is particularly correlated with the second dimension.

The third floristic gradient is less clear but highlights the distinctiveness of some riparian vegetation types (Communities 5 and 11) at one extreme (Fig. 5). This pattern appears to be correlated to geology, soil fertility, and longitude.

Correlations with fire response mechanisms were weak but mostly significant (Table 8). The only mechanism which was insignificant was mechanism 11 (obligate resprouters). Only three mechanism had correlations over 0.5 ('resprouters', and mechanisms 4 and 5).

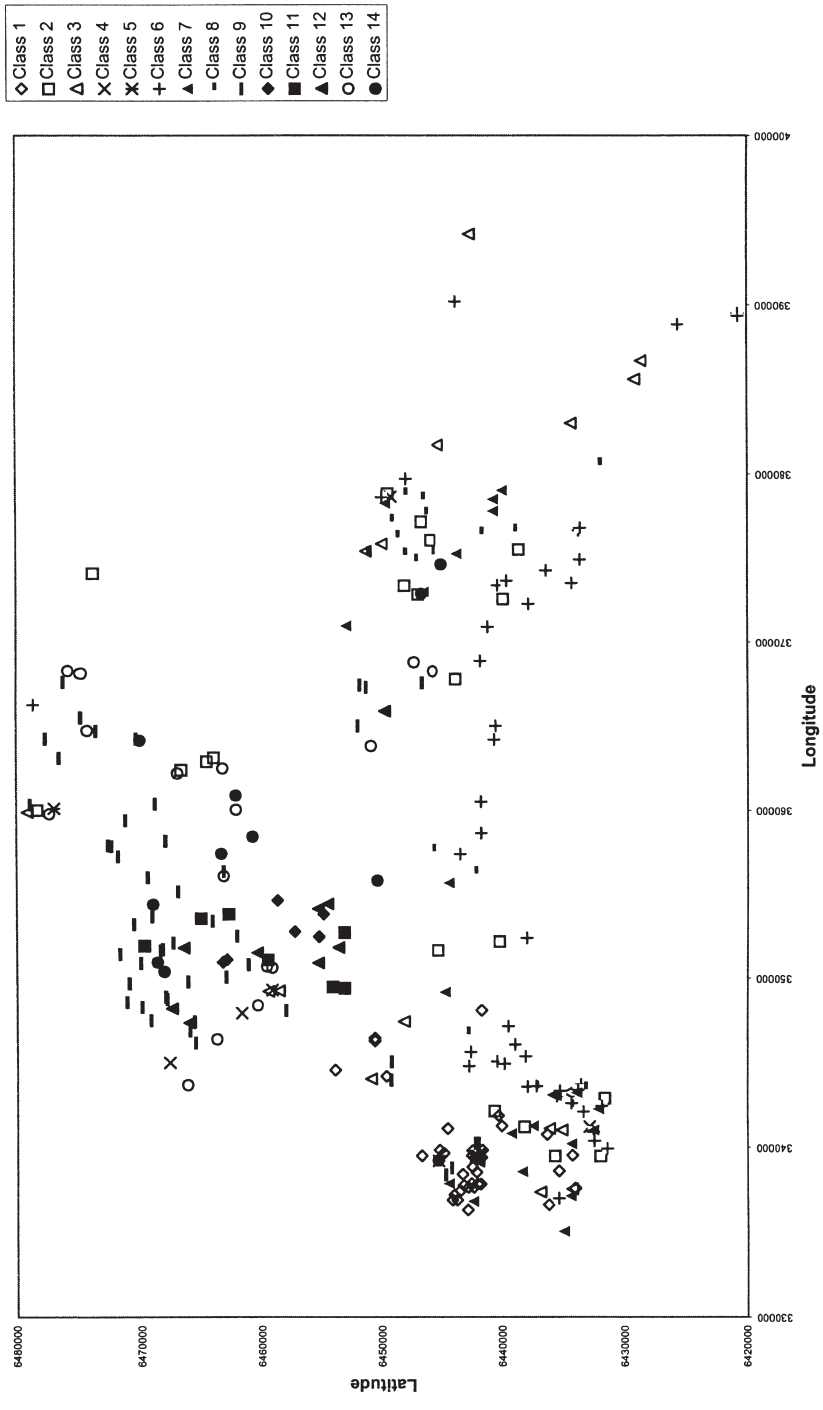

Fig. 3. Diagram showing the distribution of vegetation classes among plots in geographical space.

Table 5. Environmental values of vegeatation communities (the 15 variables with the highest Kruskal-Wallis values are shown only).

Community		Min. temp. (°C)	Mean temp. (°C)	Annual rainfall (mm)	Rainfall in driest quarter (mm)	Moisture index (mm)	Soil depth	Soil fertility	Basic igneous (index) (0=absent 1=present)	Low quartz sedimentary rock (0=absent 1=present)	Rugged-ness rock	Rugged-ness (250m)	Rugged-ness (500m)	Altitude (mm) (1000m)
1	Min.	-1.9	9.9	1172	228	81	959	2	0	0	9	17	35	850
	Max.	1.5	15.1	1852	396	94	1100	5	1	1	55	70	111	850
	Mean	-1.3	12.5	1415	291	90	1028	3.6	0.6	0.4	20.1	36	63.9	850
2	Min.	-2.1	11.6	1038	168	79	920	2	0	0	8	18	47	500
	Max.	2.1	15.2	1852	372	94	1070	5	1	1	41	63	118	1080
	Mean	-0.8	12.8	1415	291	90	1001	2.5	0.2	0.8	24.4	41.7	70.5	855
3	Min.	-2.2	12	1042	162	78	959	2	0	0	7	14	26	240
	Max.	5.8	17	1680	342	94	1139	5	1	1	39	72	121	760
	Mean	0.8	14.2	1343	241	87	1048	2.2	0.1	0.6	21.1	37.4	64.5	482
4	Min.	-1.3	11.2	1168	210	83	819	2	0	0	24	43	75	630
	Max.	1.3	14.9	1500	312	95	1009	2	0	1	41	77	134	1130
	Mean	-0.3	12.7	1376	266	89	952	2	0	0.4	31.6	51.4	91.2	880
5	Min.	-1.7	10.6	1300	270	93	970	2	0	0	8	15	29	-
	Max.	-0.6	12.1	1610	342	93	1080	4	1	1	37	70	105	-
	Mean	-1	11.3	1481	310	93	1040	3.3	0.7	0.3	20	38	70	-
6	Min.	-1.1	13.2	810	168	76	810	2	0	0	8	13	22	140
	Max.	5.6	17	1120	300	92	1120	2	0	1	61	70	94	600
	Mean	2.3	15.3	1023	218	85	1023	2	0	0.7	23.9	38.8	57.5	430
7	Min.	-1.9	12	1132	198	79	990	2	0	0	11	18	27	620
	Max.	3	15.9	1890	342	94	1129	5	1	1	31	57	113	870
	Mean	0.3	13.4	1388	250	88	1061	2.1	0.1	0.8	19.2	33.6	27.5	745

Community		Min. temp. (°C)	Mean rainfall (mm)	Annual driest quarter (mm)	Rainfall in index	Moisture depth (mm)	Soil fertility (index)	Soil igneous rock (0=absent 1=present)	Basic sedimentary rock (0=absent 1=present)	Low quartz (250m)	Ruggedness (500m)	Ruggedness (1000m)	Ruggedness	Altitude (mm)
8	Min.	-1.7	12	1156	180	81	970	2	0	0	9	14	23	400
	Max.	3.6	16.2	1872	324	93	1159	2	0	1	40	68	88	880
	Mean	3.2	14	1523	251	90	1044	2	0	0.9	24.3	41.2	63.9	675
9	Min.	-1.9	8.9	1104	222	82	939	1	0	0	1	3	8	840
	Max.	-0.6	12.8	2298	450	95	1179	5	1	1	38	55	96	1500
	Mean	-1	10.5	1565	325	93	1068	3	0.5	0.2	13.2	23.5	39.6	1258
10	Min.	-1.7	9	1844	390	94	1110	4	0	0	2	2	6	1430
	Max.	-1.3	9.4	2248	468	95	1220	4	1	0	8	16	29	1500
	Mean	-1.5	9.2	2087	440	95	1171	4	0.7	0	5.8	9.8	16.8	1452
11	Min.	-1.7	8.9	1438	306	94	1019	4	0	0	4	10	16	1310
	Max.	-1.1	9.9	2336	486	95	1190	4	1	0	16	25	68	1540
	Mean	-1.4	9.3	1983	418	94.7	1128	4	0.9	0	8	16.1	32.3	1463
12	Min.	-1.6	9	1432	312	93	1049	2	0	0	2	7	17	1200
	Max.	-0.7	10.6	2292	480	95	1190	4	1	0	12	22	24	1460
	Mean	-1.2	9.7	1959	411	95	1143	3.6	0.6	0	5.8	12.1	21.1	1377
13	Min.	-1.7	10	1238	246	91	970	2	0	0	4	10	24	1000
	Max.	-0.6	12.1	2336	468	95	1220	4	1	1	39	63	116	1380
	Mean	-0.9	11	1618	325	93	1063	2.7	0.2	0.6	20.5	35.3	61	1273
14	Min.	-1.3	9.5	1462	312	93	990	2	0	0	7	13	21	1040
	Max.	-0.6	11.8	2280	468	95	1120	4	1	1	40	69	104	1380
	Mean	-1	10.4	1761	356	94	1069	3.3	0.5	0.4	19.3	33.9	59.1	1273

Table 6. Principal axis correlations and Kruskal-Wallis statistics for environmental variables.

Variables	Correlation Coefficient (p)	Kruskal-Wallis statistic (p)
GIS variables		
Acidic volcanic	0.1256 N.S.	12.79 N.S.
Basic Igneous	0.5312 **	85.75 **
Granite	0.4172 **	53.34 **
Sedimentary rocks (high quartz)	0.3061 **	30.96 **
Sedimentary rocks (low quartz)	0.5513 **	83.43 **
Latitude	0.7455 **	151.85 **
Longitude	0.5635 **	80.86 **
Mean annual rainfall	0.5884 **	83.63 **
Mean annual temperature	0.8965 **	207.45 **
Minimum temperature at the coldest month	0.6135 **	110.43 **
NEFBS moisture index	0.7036 **	154.26 **
Rainfall in the driest quarter of the year	0.7704 **	149.33 **
Wetness index	0.2789 **	52.53 **
Solar radiation	0.3832 **	56.89 **
Ruggedness index (1000 m window)	0.3655 **	84.66 **
Ruggedness index (250 m window)	0.4353 **	91.01 **
Ruggedness index (500 m window)	0.4173 **	89.2 **
Skidmore topographic position	0.1522 N.S.	34.34 **
Slope	0.3809 **	73.86 **
Soil depth	0.3822 **	77.41 **
Soil fertility	0.5342 **	91.38 **
Topographic index (1000 m window)	0.2300 **	54.7 **
Topographic index (250 m window)	0.3229 **	19.13 N.S.
Topographic index (500 m window)	0.2844 **	35.11 **
Plot Variables		
Altitude	0.9273 **	92.90 **
Slope	0.4237 **	36.33 **
North facing	0.1158 N.S.	5.98 N.S.
North-east facing	0.2316 N.S.	12.18 N.S.
East facing	0.3562 **	10.61 N.S.
South-east facing	0.0759 N.S.	12.91 N.S.
South facing	0.2420 N.S.	15.86 N.S.
South-west facing	0.1021 N.S.	5.89 N.S.
West facing	0.2342 N.S.	10.42 N.S.
North-west facing	0.1287 N.S.	8.07 N.S.
Field estimate of previous fire severity	0.4291 *	23.07 *
Estimate or record of years since last fire	0.5617 **	33.37 **
Field estimate of previous grazing severity	0.3740 N.S.	14.79 N.S.
Estimate or record of years since last grazing	0.4510 N.S.	7.31 N.S.
Field estimate of previous logging severity	0.3740 N.S.	22.08 *
Estimate or record of time since last logging	0.6205 *	11.14 N.S.
Soil depth	0.2523 N.S.	20.39 N.S.

Variables	Correlation Coefficient (p)	Kruskal-Wallis statistic (p)
Clay	0.1368 N.S.	11.94 N.S.
Loam	0.1605 N.S.	16.94 N.S.
Sand	0.3969 **	28.22 **
Organic soil	0.2842 N.S.	20.24 N.S.
Crest	0.1567 N.S.	16.38 N.S.
Upper slope	0.1154 N.S.	12.13 N.S.
Mid-slope	0.1826 N.S.	15.00 N.S.
Lower slope	0.1924 N.S.	10.94 N.S.
Simple slope	0.3327 *	22.34 *
Flat	0.1940 N.S.	13.25 N.S.
Open depression	0.1449 N.S.	34.15 *
Closed depression	0.1213 N.S.	6.51 N.S.
Hill crest	0.1631 N.S.	16.44 N.S.
Hill slope	0.2701 N.S.	21.85 *
Bench	0.1438 N.S.	8.93 N.S.
Scarp	0.1227 N.S.	6.83 N.S.
Stream channel	0.1716 N.S.	13.25 N.S.
Swamp	0.2067 N.S.	13.25 N.S.
Valley flat	0.1940 N.S.	13.25 N.S.
Drainage depression	0.2072 N.S.	13.25 N.S.
Gully	0.2788 *	18.00 N.S.
Foot slope	0.1886 N.S.	4.72 N.S.

N.S. = $p > 0.05$; * = $p < 0.05$; ** = $p < 0.01$

Community 7 and 8 represent plots in the moister environments on the lower slopes with rainforest (without *Eucalyptus* spp.) and wet sclerophyll (with *Eucalyptus* spp.), respectively.

Community 9 to 13 consist of plots with montane and sub-alpine *Eucalyptus* spp. forest and woodland as well as wetland vegetation typical of the plateaux.

Community 14 consists of *Nothofagus moorei* dominated vegetation, and is primarily located on the sheltered escarpment slopes on the edge of the plateaux as well as in sheltered locations on the plateaux.

Table 7 lists the average number of species per vegetation community for each fire response mechanism. The total number of native species records matching with a known fire response from the National Fire Response Register was 5364. As the total number of plant records was 11 538, not all species found within the study area are therefore accounted for in the averages. Nevertheless, Kruskal-Wallis statistics were significant at $p < 0.01$ for all response mechanisms (Table 8).

Ordination

The DCA ordination of plots resulted in eigen values of 0.7979, 0.6558, 0.4155, and 0.3743 for the first four dimensions respectively, with corresponding gradient lengths

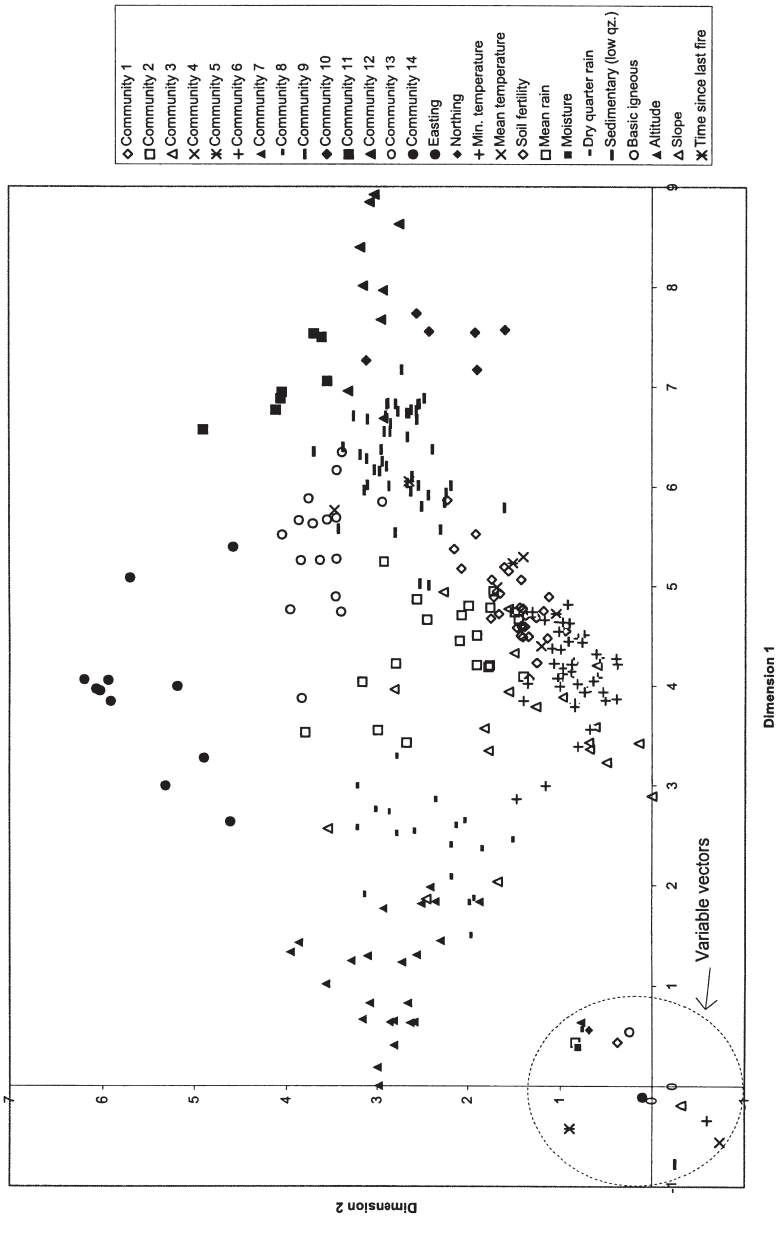

Fig. 4. Ordination of Plots (Dimensions 1 and 2).

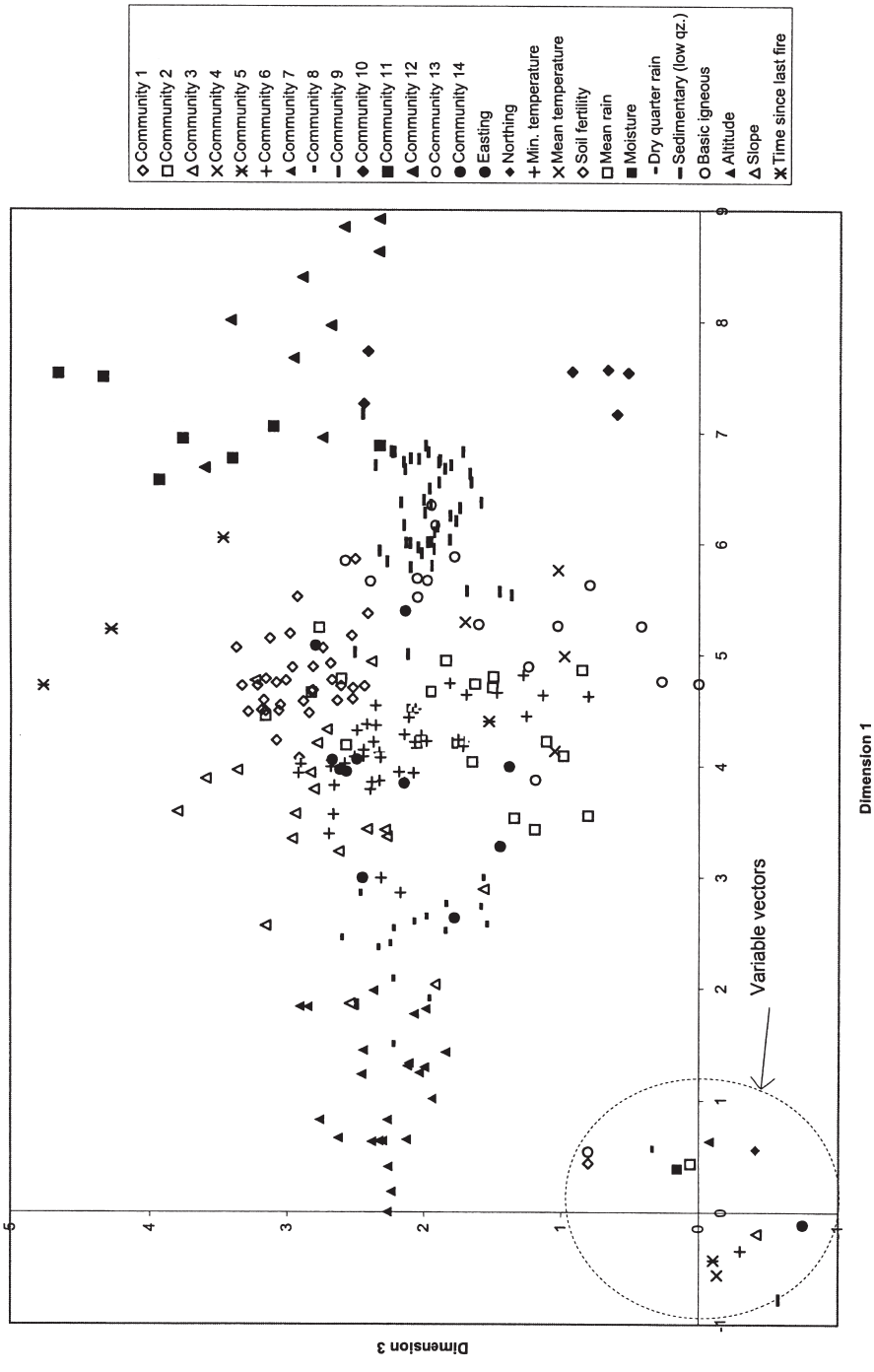

Fig. 5. Ordination of Plots (Dimensions 1 and 3).

Table 7. Average number of species per vegetation community for each plant fire response mechanism (S = Seeder; R = Resprouter; R:S ratio = Resprouter: Seeder ratio; K:U ratio = Known:Unknown fire response ratio).

		Response Mechanism														
Community	**Av. no. species**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**S***	**R* ratio**	**R:S**	**K:U ratio**
1	47.03	0.00	3.00	0.06	2.50	1.44	0.74	0.00	8.56	4.32	2.03	0.94	11.62	9.94	0.86	0.46
2	37.95	0.15	3.65	0.00	2.10	1.65	0.95	0.05	4.90	3.70	1.90	1.10	8.70	9.55	1.10	0.48
3	56.53	0.05	2.89	0.00	2.21	1.37	1.16	0.05	7.47	5.05	2.79	1.47	10.42	11.32	1.09	0.38
4	28.80	0.20	1.60	0.00	2.60	1.20	0.40	0.00	4.20	2.40	0.00	2.20	6.00	8.80	1.47	0.51
5	35.00	0.33	0.67	0.00	1.67	0.00	0.33	0.00	4.67	1.33	1.67	0.67	5.67	4.00	0.71	0.28
6	51.84	0.00	3.79	0.07	3.02	2.60	0.95	0.05	5.95	4.51	1.70	1.40	9.81	12.53	1.28	0.43
7	51.04	0.00	0.91	0.00	0.17	1.30	0.74	0.17	4.13	2.09	3.57	0.35	5.04	4.83	0.96	0.19
8	49.22	0.11	1.39	0.00	0.50	1.61	1.00	0.39	3.72	3.06	2.67	1.22	5.22	7.78	1.49	0.26
9	42.77	0.17	3.38	0.29	1.79	0.79	0.73	0.00	7.92	4.48	1.46	1.29	11.75	9.08	0.77	0.49
10	26.83	0.00	1.33	0.33	0.50	0.17	0.50	0.00	1.67	2.17	0.17	0.17	3.33	3.50	1.05	0.25
11	35.57	0.00	2.00	0.14	1.14	0.29	1.00	0.00	5.29	2.86	1.86	1.14	7.43	6.43	0.87	0.39
12	32.00	0.00	2.00	0.11	0.78	0.33	0.89	0.00	3.44	2.44	0.67	0.22	5.56	4.67	0.84	0.32
13	35.88	0.44	2.69	0.00	1.69	0.56	1.31	0.00	6.06	3.19	2.63	1.94	9.19	8.69	0.95	0.50
14	22.09	0.09	0.64	0.00	0.55	0.00	0.36	0.00	3.09	2.09	2.36	1.09	3.82	4.09	1.07	0.36

Table 8. Principal axis correlations and Kruskal-Wallis statistics for plant fire response mechanisms.

Fire Response Mechanism	Correlation Coefficient (p)	Kruskal-Wallis statistic (p)
Resprouter	0.5202 **	121.28 **
Seeder	0.4344 **	123.33 **
Resprouter:Seeder	0.3387 **	59.88 **
1	0.2745 **	43.12 **
2	0.3944 **	100.09 **
3	0.3354 **	42.17 **
4	0.5932 **	152.32 **
5	0.6291 **	112.74 **
6	0.1995 *	46.68 **
7	0.2372 **	51.67 **
8	0.3922 **	104 **
9	0.3634 **	97.73 **
10	0.4540 **	73.21 **
11	0.1199 N.S.	67.24 **

N.S. = $p > 0.05$; * = $p < 0.05$; ** = $p < 0.01$

Discussion

Environmental relationships

The principal axis correlations for environmental variables suggest that the overall (linear) floristic pattern is most strongly related to topographic, geographic, edaphic, and, particularly, climatic variables. 'Years Since Logging' and 'Years Since Last Fire' were also relatively highly correlated, but it should be recognised that much of this data is based on subjective field estimates, often several years after a fire had occurred. The number of sites for which this data was available was also relatively low, with 95 sites available for 'Years Since Last Fire' and only 29 for 'Years Since Last Logging'. Several other environmental variables also had significant correlations (including 'Fire Severity'), but the relationships were weak (correlation < 0.5).

Those variables with significant correlations generally also had significant Kruskal-Wallis statistics. While rank order broadly corresponds (e.g. the six variables with the highest correlations also had the highest Kruskal-Wallis statistics), differences in the rank order may be related to differences in the linearity of variables. For example, while altitude had the highest correlation, its Kruskal-Wallis value was only sixth highest. Mean annual temperature, on the other hand, had the second highest correlation and the highest Kruskal-Wallis statistic, possibly reflecting the influence of air inversion in depressions, whether at high or at low altitudes.

The significant correlations and Kruskal-Wallis statistics for 'Years Since Last Fire' and 'Fire Severity' suggest that the vegetation composition of the study area is related to the incidence of fire, at least within the timeframe of the existing observations and

records (maximum 70 years). C. Howard (pers.comm.) comments that major fire events in the late 1950's and early 1960's burnt substantial areas of the Barrington Tops National Park. In addition, sections of the boundaries of the National Park have been subject to regular fires (3–10 year intervals) over the last 100 years which have entered the forests from adjoining grazing lands.

Palaeological studies conducted in the area, however, indicate that the longer term effects of fire are less clear. Dodson (1986), in a study of pollen analyses from eight sites and 57 radiocarbon analyses from nine sites across the Barrington Tops plateau, found that, although the incidence and/or intensity of fires increased from low levels around 3000 BP, 'no major vegetation shifts could be directly attributed to fire'. Similarly, in a palaeological study of Burraga Swamp, south-west of Mt Lumeah, Dodson (1994) found that 'there are no close relationships between charcoal and tree pollen abundance providing some indication that fire has been of minor significance in forest tree dynamics during the last 2000 years'. Any changes that have occurred at Burraga Swamp were instead attributed to logging activities within the catchment and to increased use of the area by day trippers.

Dodson and Myers (1986), among others, showed that Australian pollen types travel in quantity only a few tens of metres. Swamp sediments are therefore likely to record predominantly local fire history of the vegetation. However, the similarity of results from several swamps across the plateaux suggests that the pattern was widespread, a least on the plateaux. This would be despite extensive grazing by cattle and associated burning of the plateau prior to becoming part of the National Park.

Whether the situation is similar at lower altitudes is uncertain in the absence of further palaeological data from those environments. Although fire is obviously a prominent feature, it is, however, not clear that fire has had an influence on the long term composition and layout of the vegetation mosaic within the study area.

Fire response mechanisms

As noted above, correlation coefficients and Kruskal-Wallis statistics were significant for all fire response mechanisms, except for mechanism 11 (insignificant correlation only) (Table 8). High values were obtained particularly for mechanisms 4 (survive a 100% scorch, regenerate through root suckers) and 5 (survive a 100% scorch, regenerate through basal resprouting) and for the two composite mechanisms 'Resprouter' and 'Seeder'.

As shown in Table 7, mechanisms 4 and 5 are particularly prevalent in Vegetation Community 6 (characterised by *Eucalyptus saligna*, *Eucalyptus acmenoides*, *Eucalyptus canaliculata*, *Poa labillardieri*, and *Imperata cylindrica*, located in an arch along the southern boundary of the study area — Fig. 3). However, high 'Resprouter' and 'Seeder' values often occur in the same communities (e.g. Communities 1, 2, 3, 6, 9 and 13). This is not a reflection of the importance of either mechanism, but more related to the higher number of species' matches with the listings of the National Plant Fire Response Register within these vegetation communities, which itself is a function of the average number of species recorded per community (Table 7). Clearly, the larger

the number of species recorded, or the number of species' matches with the Register, the higher the average for the fire response mechanisms. In order to neutralise this bias, the 'Resprouter:Seeder' variable was calculated, which had both a significant correlation coefficient and a significant Kruskal-Wallis statistic (Table 8).

Vegetation communities with particularly low 'Resprouter:Seeder' values include Vegetation Communities 5 and 9 (Table 7). The lower values would indicate that, in general, the maintenance of these vegetation communities requires occasional high intensity fires to maintain the predominance of 'Seeders' over 'Resprouters', as only such fires can damage 'Resprouters' sufficiently to diminish their competitive advantage after a fire (see e.g. Adams & Simmons 1996). In order to develop the fuel load required for hot fires, such fires can only be applied infrequently. A similar strategy could be used to develop a predominance of 'Seeders' over 'Resprouters' in vegetation which does not already contain a predominance of 'Seeders'.

Unfortunately, there are no hard data are available to base the approximately length of the fire intervals. As noted above, there are some data on time interval since last fire and intensity for some plots, but these are largely based on field estimates. In addition, there are no data on fire frequencies for larger areas or longer periods of time. However, based on personal experience, local fire management officers consider a period of 12–20 years to be appropriate for areas away from the rainforest (R.Onfray pers.comm.).

In order to maintain or develop the predominance of 'Resprouters' in vegetation communities with high 'Resprouter:Seeder' values (such as Communities 4 and 8), low intensity fires are prescribed. 'Resprouters' quickly regenerate after such fires, providing heavy competition for 'Seeders'. Local fire management officers consider a period of 5–12 years to be appropriate (R. Onfray pers.comm.).

Low intensity fires are particularly effective in this way if often repeated, resulting in a depletion of the soil seed bank. Effectiveness is also enhanced if the low intensity fire is followed by a drought, resulting in the wilting of any seedlings which manage to establish after fire. In the study area, dry periods are common during late autumn and spring (see above). Thus, a low intensity fire during early autumn/late summer or early spring/late winter would be particularly effective in maintaining or effecting a 'Resprouter' dominated community within the study area.

Vegetation communities with intermediate 'Resprouter:Seeder' values could be maintained or developed using intermediate fire regimes. Thus, a moderate fire in autumn/summer would favour 'Seeders' slightly, relative to low intensity fires, while a moderate fire in spring (followed by the main growing season) would increase this trend.

With any of the above strategies, variability in both space and time would required to minimise the risk of extinction of species with differing requirements (e.g. Bradstock et al. 1995). For example, even in Communities 5 and 9, with very low Resprouter: Seeder ratios, there is still a considerable proportion of plants relying on their ability to resprout as a regeneration mechanism. Furthermore, some of these species may be rare or threatened and their requirements may, therefore, have precedence over those of other species. So far, only one threatened species occurring in the Barrington Tops

area *(Acacia barringtonensis)* appears in the National Plant Fire Response Register. Further research is required to confirm the fire response mechanisms for the other species.

The analysis above can be used as a preliminary framework to determine suitable monitoring points for the experimental establishment of appropriate fire regimes. For example, to determine the effect of different fire regimes (frequencies, timing, intensities) on communities dominated by 'Seeders', monitoring points should be established in locations covered by Vegetation Communities 1, 5, 7, 9, 11, or 14. To determine the effect of different regimes on 'Resprouter' dominated communities, monitoring points should be established in Vegetation Communities 4, 8, and 10. Suitable fire regimes for Vegetation Communities with intermediate 'Resprouter:Seeder' values may than be interpolated from the results.

It should be born in mind that the Kruskal-Wallis statistic and the correlation coefficient of the 'Resprouter:Seeder' variable were relatively low (though significant). The framework outlined in the previous paragraphs is therefore preliminary, and its reliability would benefit from further information on response mechanisms of those species for which these mechanisms are presently unknown. In the absence of such knowledge it may therefore be wiser to establish a number of monitoring points in each of the delineated vegetation communities, with a variety of fire regimes applied in each vegetation community. Apart from monitoring fire characteristics and their effect on the vegetation, such plots could also be used to monitor the build up of fuel loads, for example using litter traps. The rate of fuel load build-up would provide, however, only one of a number of indications (as outlined above) required to establish an appropriate fire regime.

When monitoring, care should be taken to determine the age before seeding of 'Seeder' species. In order to maintain the presence of 'Seeder' species, fires should be avoided before seeding has occurred. Thus, those species requiring the longest period for setting seed are those species which determine the minimum time interval between fires.

Limitations

The study has been limited by a number of factors. The implications of missing plot data on environmental variables and problems associated with limited information on plant fire response mechanisms have been outlined before.

The other main data limitation is the relatively restricted number of plots surveyed within the study area. Although the average plot density (438 ha per plot) was intermediate compared to some other surveys which have been conducted within National Parks of the region (e.g. 805 ha per plot in Yengo National Park —Bell et al. 1993; 63 ha per plot in Tomaree National Park — Bell 1997), the distribution of the plots within the study area was very uneven, even when taking into account any uneven variation of environmental characteristics (Fig. 3). Areas well represented by plots include the Royal National Park, the Cockcrow Mountain area, the Whispering Gully

area, and the central Barrington Tops plateau. The large central part of the study area, on the other hand, contained only a handful of plots.

On the other hand, the study has benefited from the availability of plot data from areas adjacent to the National Parks. Notwithstanding the comments made above, it has improved the generality of the analytical results, including the delineation of vegetation communities and the determination of significant environmental and fire response mechanism variables.

Conclusions

This study has resulted in the delineation of fourteen vegetation communities, based on 890 plant species and 262 plots, of which 154 were located within the boundaries of the Mount Royal and Barrington Tops National Parks. Eight rare or threatened species were recorded within these plots, most of which occur on the plateaux.

The floristic pattern is most closely related to topographic, geographic, edaphic, and, particularly, climatic variables. 'Years Since Logging' and 'Years Since Last Fire' were also relatively highly correlated, but it should be recognised that much of this data is based on subjective field estimates in relatively few sites, often several years after a fire had occurred.

Data on plant fire response mechanisms are also limited, though sufficient to establish significant relationships between such mechanisms and delineated vegetation communities. Given these results, preliminary suggestions were made regarding the intensity of fires required to affect particular floristic outcomes. There is a need for a longer and more extensive record of fires within the study area in order to relate the occurrence of fires with the nature of vegetation communities.

The objectivity of the results obtained from such studies (and hence the appropriateness of their application) would improve if they were based on floristic data from a larger number of plots within the study area than those used in the present study. Such extra plots should particularly be placed in areas presently under-represented within the data set, such as the large central and north-eastern parts of the study area.

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vegetation mapping and other relevant literature was obtained from Chris Howard of the NPWS Gloucester District office.

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Appendix A. List of species, showing the percentage of plots per community in which each species is present.

Species	Community Number (No. of Plots)													
	1 (34)	2 (20)	3 (19)	4 (5)	5 (3)	6 (43)	7 (23)	8 (18)	9 (48)	10 (6)	11 (7)	12 (9)	13 (16)	14 (11)
Acacia barringtonensis	0	0	0	0	0	0	0	0	6	0	29	22	6	0
Acacia dealbata	0	0	5	0	0	0	0	0	42	17	29	0	25	9
Acacia elata	0	10	0	0	0	0	0	0	0	0	0	0	19	9
Acacia implexa	3	15	0	0	0	28	0	0	0	0	0	0	0	0
Acacia irrorata subsp. *irrorata*	3	25	58	40	0	49	4	6	2	0	0	0	0	0
Acacia maidenii	44	15	37	0	0	35	0	6	2	0	0	0	0	0
Acacia melanoxylon	21	25	11	20	33	9	4	28	44	17	71	22	38	9
Acacia obtusifolia	0	0	0	0	0	5	0	0	0	0	0	0	13	0
Acacia stricta	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Acacia ulicifolia	0	5	0	20	0	5	0	0	2	0	0	0	6	0
Acaena novae-zelandiae	71	15	26	0	100	7	0	0	42	83	14	56	19	0
Acaena Unknown	0	0	0	0	0	0	0	6	10	0	14	0	6	0
Acianthus exsertus	0	10	0	0	0	0	0	0	2	0	0	0	0	0
Acianthus fornicatus	3	5	0	0	0	9	0	0	10	0	0	0	0	0
Acianthus Unknown	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Acmena smithii	3	5	47	0	0	5	70	83	2	0	0	0	0	9
Acradenia euodiiformis	0	0	5	0	0	2	13	0	0	0	0	0	0	0
Acronychia oblongifolia	0	0	5	0	0	7	9	17	2	0	0	0	0	0
Acrotriche latifolia	0	10	0	0	0	2	0	0	0	0	0	0	0	0
Acrotriche serrulata	0	0	0	0	0	0	0	0	4	0	14	0	0	0
Adiantum aethiopicum	24	0	26	0	0	12	4	0	2	0	0	0	6	0
Adiantum diaphanum	0	5	0	0	0	0	4	6	2	0	0	0	0	0
Adiantum formosum	9	0	42	0	0	12	70	28	0	0	0	0	0	0
Adiantum hispidulum	0	0	5	0	0	9	9	6	0	0	0	0	0	0
Ageratina adenophora	0	5	0	0	0	2	4	0	0	0	0	0	0	0
Ageratina riparia	0	0	11	0	0	0	4	0	0	0	0	0	0	0
Agrostis aemula	6	0	0	0	0	0	0	0	0	0	0	0	0	0
Agrostis avenacea var. *avenacea*	9	0	5	0	33	0	0	0	0	0	0	11	0	0
Ajuga australis	9	5	0	0	0	5	0	0	6	17	0	0	0	0
Alangium villosum subsp. *polyosmoides*	0	0	0	0	0	0	43	0	0	0	0	0	0	0
Alectryon subcinereus	0	0	32	0	0	9	70	33	0	0	0	0	0	0
Allocasuarina littoralis	0	0	0	0	0	5	0	0	0	0	0	0	0	0
Allocasuarina torulosa	53	50	47	0	0	70	0	6	0	0	0	0	0	0
Alocasia brisbanensis	0	0	5	0	0	0	4	6	0	0	0	0	0	0

Species	Community Number (No. of Plots)													
	1 (34)	2 (20)	3 (19)	4 (5)	5 (3)	6 (43)	7 (23)	8 (18)	9 (48)	10 (6)	11 (7)	12 (9)	13 (16)	14 (11)
Alphitonia excelsa	0	0	5	0	0	2	0	11	0	0	0	0	0	0
Alyxia ruscifolia	0	5	0	0	0	2	13	17	0	0	0	0	0	0
Ambrosia psilostachya	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Ammobium alatum	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Amyema congener subsp. *congener*	9	0	0	0	0	5	0	0	0	0	0	0	0	0
Amyema pendulum subsp. *pendulum*	9	0	5	0	0	2	0	0	0	0	0	0	0	0
Amylotheca dictyophleba	0	0	0	0	0	0	4	6	0	0	0	0	0	0
Anagallis arvensis	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Aneilema acuminatum	0	0	37	0	0	5	30	17	2	0	0	0	0	0
Aneilema biflorum	0	0	0	0	0	0	9	0	0	0	0	0	0	0
Angophora floribunda	41	10	5	0	0	16	0	0	0	0	0	0	0	0
Angophora subvelutina	0	0	0	0	0	16	0	0	0	0	0	0	0	0
Aphanopetalum	0	0	11	0	0	0	26	0	0	0	0	0	0	0
Araujia sericiflora resinosum	0	0	0	0	0	0	0	6	0	0	0	0	0	0
Archirhodomyrtus beckleri	0	30	0	0	0	5	4	56	0	0	0	0	6	18
Aristida vagans	0	0	0	0	0	9	0	0	0	0	0	0	0	0
Arrhenechthites mixta	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Arthropodium	0	0	0	0	0	0	0	0	2	0	14	0	6	0
Arthropodium milleflorum	44	5	5	20	0	21	0	0	40	17	0	33	13	0
Arthropodium minus	9	0	0	0	0	0	0	0	0	0	0	0	0	0
Arthropodium sp. B	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Arthropteris beckleri	0	0	0	0	0	0	4	0	0	0	0	0	0	0
Arthropteris tenella	0	0	0	0	0	2	87	33	0	0	0	0	0	0
Asperula asthenes	0	0	0	0	0	0	0	0	0	17	0	0	0	0
Asperula conferta	0	0	0	0	0	2	0	0	60	0	0	22	13	0
Asperula gunnii	0	5	0	0	0	0	0	0	4	33	57	44	13	0
Asperula scoparia	6	0	0	0	33	0	0	0	4	0	0	0	6	0
Asplenium australasicum	0	0	16	0	0	0	74	39	0	0	0	0	0	0
Asplenium bulbiferum	0	0	0	0	0	0	4	0	0	0	14	0	0	9
Asplenium flabellifolium	18	5	5	0	0	0	4	0	2	0	14	0	6	0
Asplenium polyodon	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Astrotricha latifolia	0	5	5	0	0	5	4	11	0	0	0	0	13	0
Astrotricha longifolia	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Atherosperma	0	0	0	0	0	0	0	0	0	0	29	11	0	27

Species	Community Number (No. of Plots)													
	1 (34)	2 (20)	3 (19)	4 (5)	5 (3)	6 (43)	7 (23)	8 (18)	9 (48)	10 (6)	11 (7)	12 (9)	13 (16)	14 (11)
moschatum														
Australina pusilla	0	0	11	0	0	0	9	0	0	0	0	0	0	9
Austrocynoglossum latifolium	38	15	53	0	33	21	4	6	4	0	0	0	0	0
Austromyrtus acmenoides	0	0	0	0	0	0	9	0	0	0	0	0	0	0
Austromyrtus bidwillii	0	0	0	0	0	0	9	0	0	0	0	0	0	0
Backhousia myrtifolia	0	0	16	0	0	0	4	6	0	0	0	0	0	0
Baeckea Unknown	0	0	0	0	0	0	0	0	0	17	0	0	0	0
Baeckea utilis	0	0	0	0	0	0	0	0	0	0	0	33	0	0
Baloghia inophylla	0	0	5	0	0	0	52	6	0	0	0	0	0	0
Banksia integrifolia	0	25	5	20	33	0	0	11	25	0	0	11	57	9
Baumea Unknown	0	0	0	0	0	0	0	0	0	0	0	11	0	0
Berberidopsis beckleri	0	10	0	0	0	0	0	0	2	0	0	0	0	27
Bidens pilosa	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Bidens subalternans	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Billardiera longiflora	0	0	0	0	0	0	0	0	0	0	14	0	6	0
Billardiera scandens	3	40	5	0	0	19	0	0	8	0	0	0	44	0
Blechnum cartilagineum	0	15	11	0	0	7	17	67	2	0	0	0	19	18
Blechnum minus	0	0	0	0	33	0	0	0	2	0	29	22	6	0
Blechnum nudum	0	0	5	0	33	0	0	0	19	0	43	11	19	9
Blechnum patersonii	0	0	0	0	0	0	22	0	0	0	0	0	0	9
Blechnum penna-marina	0	0	0	0	0	0	0	0	2	17	43	33	0	0
Blechnum wattsii	0	5	0	0	0	0	4	0	4	0	14	0	44	36
Bossiaea neo-anglica	0	5	0	20	0	0	0	0	0	0	0	0	0	0
Botrychium australe	6	5	5	0	0	9	0	0	0	0	0	0	0	0
Brachychiton acerifolius	0	0	5	0	0	2	39	17	0	0	0	0	0	0
Brachychiton populneus	0	0	0	0	0	5	0	0	0	0	0	0	0	0
Brachycome diversifolia subsp. *pendulum*	0	0	0	0	0	0	0	0	0	17	0	0	0	0
Brachycome microcarpa	35	10	0	0	0	9	0	0	52	0	29	22	19	0
Brachycome nova-anglica	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Brachycome Unknown	0	0	0	0	0	0	0	0	10	0	0	0	0	0
Brachyloma daphnoides	0	0	0	0	0	0	0	0	0	0	14	0	0	0
Bracteantha bracteata	0	0	0	0	0	5	0	0	17	0	14	0	0	0
Breynia oblongifolia	6	15	32	0	0	67	9	17	0	0	0	0	0	0
Brunoniella australis	0	0	0	0	0	5	0	0	0	0	0	0	0	0
Bulbine bulbosa	0	0	0	0	33	0	0	0	2	0	0	0	0	0

Species	Community Number (No. of Plots)													
	1 (34)	2 (20)	3 (19)	4 (5)	5 (3)	6 (43)	7 (23)	8 (18)	9 (48)	10 (6)	11 (7)	12 (9)	13 (16)	14 (11)
Bulbophyllum exiguum	0	0	5	0	0	0	0	6	0	0	0	0	0	0
Bulbophyllum shepherdii	0	0	5	0	0	0	4	11	0	0	0	0	0	0
Bulbophyllum Unknown	0	0	0	0	0	0	0	6	0	0	0	0	0	0
Bulbostylis densa	0	0	0	0	0	0	0	0	0	0	0	0	6	0
Bursaria longisepala	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Bursaria spinosa	0	5	0	0	0	0	4	17	0	17	0	0	0	0
Caesia parviflora	3	0	0	20	0	0	0	0	0	0	0	0	0	0
Caladenia carnea	0	0	0	0	0	0	0	0	4	0	0	0	0	0
Calanthe triplicata	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Caldcluvia paniculosa	3	25	5	0	0	0	61	83	0	0	0	0	13	18
Callicarpa pedunculata	0	0	0	0	0	0	0	0	0	0	14	0	0	0
Callicoma serratifolia	0	10	11	0	0	0	4	22	0	0	0	0	13	9
Callistemon pallidus	0	0	0	0	0	0	0	0	0	0	29	22	0	0
Callistemon salignus	0	0	11	20	0	12	0	17	0	0	0	0	0	0
Callitriche muelleri	0	0	5	0	0	0	4	0	0	0	0	0	0	0
Callitris macleayana	0	0	0	0	0	2	0	6	0	0	0	0	0	0
Calochlaena dubia	15	30	26	0	0	19	4	11	6	0	0	0	19	0
Canthium coprosmoides	0	0	0	0	0	0	9	0	0	0	0	0	0	0
Cardamine gunnii	0	0	0	0	0	0	0	0	0	0	14	0	0	0
Cardamine lilacina	0	0	0	0	0	0	0	0	4	0	0	0	0	0
Cardamine paucijuga	15	0	0	0	0	0	0	0	8	0	0	22	6	9
Cardamine sp. Y	9	0	0	0	0	0	0	0	4	0	0	22	0	0
Carduus Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Carex appressa	32	0	26	0	100	7	4	0	15	17	14	22	6	9
Carex breviculmis	12	15	5	40	0	16	0	0	29	0	0	0	25	0
Carex brunnea	0	0	16	0	0	0	22	0	0	0	0	0	0	0
Carex declinata	3	0	5	0	0	0	0	6	2	33	0	0	0	0
Carex fascicularis	0	0	0	0	33	0	0	0	0	0	0	22	0	0
Carex gaudichaudiana	0	0	0	0	0	0	0	0	0	0	0	22	0	0
Carex incomitata	3	0	0	0	0	0	0	0	6	0	14	0	19	0
Carex inversa	53	5	16	0	67	7	4	0	13	17	0	0	0	9
Carex lobolepis	0	0	0	0	67	0	0	0	0	0	0	0	0	0
Carex longebrachiata	21	0	21	0	33	5	9	0	0	0	0	0	0	0
Carex Unknown	0	0	0	0	0	0	0	0	0	0	0	22	0	0
Cassia Unknown	0	0	0	0	0	0	4	0	0	0	0	0	0	0
Cassine australis	0	0	0	0	0	0	26	11	0	0	0	0	0	0
Cassinia arcuata	0	0	0	20	0	0	0	0	0	0	0	0	0	0

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Cassinia compacta	15	0	11	0	0	2	0	0	0	0	0	0	0	0
Cassinia leptocephala	0	5	11	20	0	0	0	0	0	0	0	0	6	0
Cassinia quinquefaria	0	0	5	20	0	0	0	0	0	0	0	0	0	0
Cassinia trinerva	0	0	11	0	0	2	0	0	0	0	0	0	0	0
Casuarina cunninghamiana	0	0	0	0	0	0	9	0	0	0	0	0	0	0
Cayratia clematidea	3	0	26	0	0	23	0	6	0	0	0	0	0	0
Cayratia eurynema	0	0	0	0	0	2	4	0	0	0	0	0	0	0
Celastrus australis	3	0	5	0	0	2	13	0	0	0	0	0	0	0
Celastrus subspicata	0	10	11	0	0	5	0	22	0	0	0	0	0	0
Centaurium erythraea	3	0	0	0	0	2	0	0	0	0	0	0	0	0
Centaurium tenuiflorum	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Centella asiatica	6	0	0	0	0	5	0	0	0	0	0	0	0	0
Centipeda Unknown	0	0	0	0	0	0	0	0	0	17	0	0	0	0
Cephalaralia cephalobotrys	3	5	16	0	0	0	26	56	0	0	0	0	6	9
Cerastium fontanum	0	0	0	0	0	0	0	0	2	17	0	0	0	0
Cerastium glomeratum	3	0	0	0	0	0	0	0	6	0	0	0	0	0
Cerastium semidecandrum	0	0	0	0	0	0	0	0	0	17	0	0	0	0
Ceratopetalum apetalum	0	0	5	0	0	0	0	0	0	17	0	0	0	0
Cheilanthes austrotenuifolia	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Cheilanthes distans	0	0	0	20	0	2	0	0	2	0	0	0	0	0
Cheilanthes sieberi subsp. *sieberi*	0	0	0	60	0	14	0	0	0	0	0	0	0	0
Chiloglottis diphylla	0	0	0	0	0	5	0	0	0	0	0	0	0	0
Chiloglottis pluricallata	0	0	0	0	0	0	0	0	2	33	14	0	6	0
Chiloglottis trilabra	0	5	5	0	0	2	0	0	31	0	14	0	31	0
Chiloglottis Unknown	0	0	0	0	0	0	0	0	15	0	29	11	19	0
Chorizema parviflorum	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Christella dentata	0	0	0	0	0	0	4	0	0	0	0	0	0	0
Cinnamomum oliveri	0	0	0	0	0	0	9	0	0	0	0	0	0	0
Cirsium vulgare	50	15	11	0	67	16	0	6	25	17	0	0	6	0
Cissus antarctica	6	10	47	0	0	51	78	56	0	0	0	0	0	0
Cissus hypoglauca	9	10	58	0	0	49	65	50	0	0	0	0	6	0
Cissus opaca	0	0	5	0	0	2	0	0	0	0	0	0	0	0
Citriobatus pauciflorus	3	5	53	0	0	14	100	83	2	0	0	0	0	9

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Citronella moorei	0	0	5	0	0	0	30	0	0	0	0	0	0	0
Claoxylon australe	0	0	11	0	0	5	39	6	0	0	0	0	0	0
Clematis aristata	44	55	63	20	0	63	4	17	77	17	43	0	50	55
Clematis glycinoides	0	5	16	0	0	12	4	17	0	0	0	0	0	0
Clerodendrum floribundum	0	0	0	0	0	0	0	6	0	0	0	0	0	0
Clerodendrum tomentosum	3	0	11	0	0	16	0	6	0	0	0	0	0	0
Comesperma ericinum	0	0	0	0	0	0	0	0	0	0	0	11	0	0
Comesperma volubile	0	0	0	20	0	0	0	0	0	0	0	0	0	0
Commelina cyanea	6	0	5	0	0	2	4	0	0	0	0	0	0	0
Commersonia fraseri	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Convolvulus erubescens	0	0	0	0	0	7	0	0	0	0	0	0	0	0
Conyza albida	32	10	0	0	0	21	0	0	8	0	0	0	6	0
Conyza bonariensis	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Coprosma hirtella	0	0	0	0	0	0	0	0	4	17	29	0	6	0
Coprosma nitida	0	0	0	0	0	0	0	0	2	0	57	0	6	0
Coprosma quadrifida	18	15	32	0	0	0	0	0	40	0	29	22	63	64
Correa reflexa var. *reflexa*	0	0	5	60	0	0	0	0	0	0	0	0	0	0
Corybas aconitiflorus	0	5	0	0	0	5	0	0	0	0	0	0	0	0
Corybas fimbriatus	0	5	5	0	0	0	0	0	0	0	0	11	0	0
Corybas pruinosus	0	0	5	0	0	5	0	0	0	0	0	0	0	0
Corymbia intermedia	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Corymbia maculata	0	0	5	0	0	7	0	0	0	0	0	0	0	0
Craspedia variabilis	0	0	0	0	0	0	0	0	0	33	14	11	0	0
Crassula sieberiana	9	0	5	20	0	5	0	0	4	0	0	0	0	0
Crepis capillaris	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Croton verreauxii	0	0	11	0	0	2	4	11	0	0	0	0	0	0
Cryptocarya erythroxylon	0	0	0	0	0	0	30	11	0	0	0	0	0	0
Cryptocarya foveolata	0	0	0	0	0	0	22	0	0	0	0	0	0	0
Cryptocarya glaucescens	0	15	26	0	0	9	48	83	0	0	0	0	0	0
Cryptocarya meissneriana	0	10	11	0	0	0	26	22	0	0	0	0	0	0
Cryptocarya microneura	0	0	21	0	0	9	26	50	0	0	0	0	0	0
Cryptocarya obovata	0	0	5	0	0	0	43	22	0	0	0	0	0	0
Cryptocarya rigida	0	15	16	0	0	14	9	56	0	0	0	0	0	0

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Cyathea australis	3	35	5	0	0	2	0	33	6	0	0	0	19	18
Cyathea leichhardtiana	0	0	0	0	0	0	39	17	0	0	0	0	0	9
Cymbidium suave	0	10	16	0	0	35	0	11	0	0	0	0	0	0
Cymbonotus lawsonianus	0	0	0	0	0	0	0	0	2	0	14	0	0	0
Cymbonotus preissianus	0	0	0	0	0	0	0	0	4	17	0	0	0	0
Cymbopogon refractus	6	5	0	40	0	16	0	0	0	0	0	0	0	0
Cynoglossum australe	6	0	0	0	0	0	0	0	2	0	0	0	0	0
Cynoglossum suaveolens	3	0	0	0	33	0	0	0	0	0	0	0	0	0
Cyperus enervis	3	0	0	0	0	2	4	0	0	0	0	0	0	0
Cyperus flaccidus	6	0	5	0	0	0	0	0	0	0	0	0	0	0
Cyperus gracilis	0	0	0	0	0	2	0	0	0	0	0	0	6	0
Cyperus imbecillis	24	0	16	0	0	2	0	0	0	0	0	0	0	0
Cyperus laevis	0	0	5	0	0	12	0	0	0	0	0	0	0	0
Cyperus lhotskyanus	3	0	0	0	33	0	0	0	0	0	0	0	0	0
Cyperus lucidus	6	0	0	0	67	0	4	0	0	0	0	0	6	0
Cyperus sphaeroideus	0	0	0	0	33	0	0	0	0	0	0	11	0	0
Cyperus tetraphyllus	0	0	26	0	0	7	22	17	0	0	0	0	0	0
Cyperus Unknown	3	5	0	0	0	0	4	0	4	0	0	0	0	0
Cytisus scoparius var. *scoparius*	0	0	0	0	0	0	0	0	10	100	0	33	0	0
Danthonia laevis	3	0	0	0	0	0	0	0	2	0	0	0	0	0
Danthonia longifolia	0	5	0	20	0	5	0	0	0	0	0	0	0	0
Danthonia pilosa	34	5	0	0	0	0	0	0	6	17	0	0	0	0
Danthonia tenuior	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Daphnandra sp. A	9	5	26	0	0	5	74	61	0	0	0	0	0	0
Daucus glochidiatus	6	0	5	0	0	9	0	0	0	0	0	0	0	0
Davallia pyxidata	3	0	5	0	0	7	13	11	0	0	0	0	0	0
Daviesia acicularis	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Daviesia genistifolia	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Daviesia ulicifolia	0	0	0	0	0	0	0	0	8	0	0	0	0	0
Deeringia amaranthoides	0	0	11	0	0	0	4	0	0	0	0	0	0	0
Dendrobium fairfaxii	0	0	0	0	0	0	9	17	0	0	0	0	0	0
Dendrobium falcorostrum	0	5	0	0	0	0	0	0	0	0	0	0	6	18
Dendrobium gracilicaule	0	0	0	0	0	0	13	0	0	0	0	0	0	0

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Dendrobium mortii	0	0	0	0	0	0	9	0	0	0	0	0	0	0
Dendrobium pugioniforme	0	0	5	0	0	0	35	22	0	0	0	0	0	18
Dendrobium schoeninum	0	0	0	0	0	0	4	0	0	0	0	0	0	0
Dendrobium tarberi	0	0	0	0	0	0	26	0	0	0	0	0	0	0
Dendrobium tetragonum	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Dendrocnide excelsa	0	5	16	0	0	2	57	11	0	0	0	0	0	0
Dendrophthoe vitellina	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Dennstaedtia davallioides	0	0	26	0	0	0	17	17	0	0	0	0	0	9
Derris involuta	0	0	0	0	0	2	0	0	0	0	0	0	6	0
Desmodium brachypodum	0	10	0	0	0	9	0	0	0	0	0	0	0	0
Desmodium rhytidophyllum	0	15	0	0	0	40	0	0	0	0	0	0	0	0
Desmodium varians	91	45	68	40	33	88	0	0	46	0	0	0	25	0
Deyeuxia acuminata	0	0	0	0	0	0	0	0	0	0	0	0	6	0
Deyeuxia gunniana	0	0	0	0	0	0	0	0	0	0	0	22	6	0
Deyeuxia mesathera	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Deyeuxia monticola	0	0	0	0	0	0	0	0	6	17	0	0	0	0
Deyeuxia parviseta	0	5	0	0	0	0	0	0	2	0	14	0	13	0
Deyeuxia quadriseta	3	0	0	0	0	0	0	0	2	0	0	0	0	0
Deyeuxia reflexa	0	0	0	0	0	0	0	0	2	17	0	0	0	0
Deyeuxia rodwayi	0	0	0	0	0	0	0	0	0	0	0	0	6	0
Dianella caerulea	79	60	74	20	0	83	4	17	35	0	29	0	63	27
Dianella longifolia	3	5	0	0	0	14	0	0	0	0	0	11	0	0
Dianella revoluta	6	0	0	20	0	9	0	6	8	0	0	0	0	0
Dianella tasmanica	15	10	0	0	33	0	0	0	25	0	14	0	31	0
Dichelachne inaequiglumis	0	0	0	0	0	2	0	0	4	0	0	0	0	0
Dichelachne micrantha	18	5	0	20	0	2	0	0	17	0	0	0	0	0
Dichelachne rara	9	10	0	0	0	2	0	0	35	17	0	0	19	0
Dichondra repens	85	15	47	20	0	56	0	0	71	17	0	22	31	18
Dichopogon fimbriatus	0	0	0	0	0	0	0	0	0	17	14	11	0	0
Dichopogon strictus	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Dicksonia antarctica	0	5	11	0	0	0	17	0	10	17	86	0	38	82
Dictymia brownii	0	0	11	0	0	0	43	28	0	0	0	0	0	0
Digitaria parviflora	0	0	5	0	0	14	0	0	0	0	0	0	0	0

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Digitaria ramularis	0	0	0	0	0	5	0	0	0	0	0	0	0	0
Dillwynia juniperina	0	0	0	0	0	0	0	0	0	17	0	0	0	0
Dioscorea transversa	6	5	47	0	0	19	39	56	0	0	0	0	6	0
Diospyros australis	6	15	47	0	0	26	57	78	0	0	0	0	0	0
Diospyros fasciculosa	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Diospyros pentamera	0	0	5	0	0	0	48	11	0	0	0	0	0	0
Diplazium assimile	0	0	0	0	0	0	9	0	0	0	0	0	0	0
Diploglottis australis	0	0	16	0	0	16	74	28	0	0	0	0	0	9
Dipodium punctatum	15	5	0	0	0	2	0	0	0	0	0	0	0	0
Dipodium Unknown	0	0	0	0	0	0	0	0	0	0	0	0	6	0
Diuris sulphurea	0	0	0	0	0	0	0	0	6	0	0	0	0	0
Diuris venosa	0	0	0	0	0	0	0	0	0	17	0	0	0	0
Dodonaea megazyga	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Dodonaea viscosa subsp. *angustifolia*	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Doodia aspera	47	10	74	0	0	40	39	33	6	0	0	0	0	9
Doodia caudata	3	0	0	0	0	5	0	0	0	0	0	0	0	0
Doodia media	3	0	5	0	0	0	4	0	0	0	0	0	0	0
Doryphora sassafras	0	15	26	0	0	0	74	28	2	0	0	0	19	82
Drymophila moorei	0	0	0	0	0	0	0	6	0	0	0	0	0	0
Dysoxylum fraserianum	0	10	5	0	0	14	74	50	0	0	0	0	0	0
Echinopogon caespitosus	0	0	0	0	0	14	0	0	0	0	0	0	0	0
Echinopogon ovatus	65	30	37	0	0	12	4	0	48	0	14	0	6	0
Ehretia acuminata	0	0	5	0	0	5	17	12	0	0	0	0	0	0
Einadia hastata	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Elaeocarpus holopetalus	0	0	0	0	0	0	0	0	8	0	57	11	25	27
Elaeocarpus kirtonii	0	0	5	0	0	0	17	0	0	0	0	0	0	0
Elaeocarpus obovatus	0	0	11	0	0	2	0	0	0	0	0	0	0	0
Elaeocarpus reticulatus	6	20	11	0	0	5	4	56	2	0	0	0	0	0
Elatine gratioloides	0	0	0	0	0	0	0	0	0	0	14	0	0	0
Elatostema reticulatum	0	0	5	0	0	0	35	0	0	0	0	0	0	0
Elattostachys nervosa	0	0	0	0	0	0	4	0	0	0	0	0	0	0
Eleocharis gracilis	0	0	0	0	0	0	0	0	0	0	0	22	0	0
Eleocharis sphacelata	0	0	0	0	0	0	0	0	0	0	0	11	0	0
Elymus scaber	24	0	5	20	0	2	0	0	8	0	0	0	0	0
Embelia australiana	0	0	0	0	0	0	13	17	0	0	0	0	0	0
Empodisma minus	0	0	0	0	0	0	0	0	0	33	0	44	0	0

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Endiandra muelleri	0	0	0	0	0	0	4	0	0	0	0	0	0	0
Endiandra sieberi	0	5	5	0	0	5	17	39	0	0	0	0	0	0
Entolasia marginata	3	10	16	0	0	30	0	0	0	0	0	0	0	0
Entolasia stricta	3	0	0	60	0	21	4	0	0	0	0	0	0	0
Epacris breviflora	0	0	0	0	0	0	0	0	0	33	0	0	0	0
Epacris microphylla var. *rhombifolia*	0	0	0	0	0	0	0	0	0	0	0	33	0	0
Epacris Unknown	0	0	0	0	0	0	0	0	0	33	0	22	0	0
Epilobium billardierianum	6	0	0	0	33	2	0	0	6	0	0	44	0	0
Epilobium gunnianum	0	0	0	0	33	0	0	0	0	0	0	22	0	9
Eragrostis benthamii	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Eragrostis brownii	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Eragrostis leptostachya	0	0	0	20	0	7	0	0	0	0	0	0	0	0
Erigeron pappocromus var. *gunnii*	0	0	0	0	0	0	0	0	0	33	0	0	0	0
Eriochilus cucullatus	0	0	0	0	0	0	0	0	8	0	0	0	0	0
Eucalyptus acmenoides	0	5	16	20	0	56	0	22	0	0	0	0	0	0
Eucalyptus amplifolia	0	0	0	0	0	4	0	0	0	0	0	0	0	0
Eucalyptus biturbinata	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus bridgesiana	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Eucalyptus cameronii	0	5	0	0	0	0	0	6	10	0	0	0	13	0
Eucalyptus campanulata	18	90	21	20	0	30	0	39	8	0	0	0	19	0
Eucalyptus canaliculata	24	0	11	0	0	58	0	0	0	0	0	0	0	0
Eucalyptus carnea	0	0	0	0	0	12	0	0	0	0	0	0	0	0
Eucalyptus cypellocarpa	0	0	5	20	0	0	0	0	0	0	0	0	0	0
Eucalyptus dalrympleana	0	0	0	0	33	0	0	0	50	17	29	44	0	9
Eucalyptus eugenioides	21	5	0	0	0	19	0	0	0	0	0	0	0	0
Eucalyptus fastigata	0	5	0	0	0	0	0	0	48	0	29	11	38	18
Eucalyptus globoidea	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Eucalyptus laevopinea	82	25	42	0	0	19	9	22	19	0	0	0	0	0
Eucalyptus macrorhyncha	0	0	0	20	0	0	0	0	0	0	0	0	0	0
Eucalyptus melliodora	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Eucalyptus microcorys	0	5	21	0	0	16	4	11	0	0	0	0	0	0
Eucalyptus moluccana	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Eucalyptus nitens	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Eucalyptus nobilis	15	0	5	20	67	0	0	0	27	0	14	11	13	9
Eucalyptus obliqua	18	5	5	0	0	0	0	6	33	0	14	22	88	27

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Eucalyptus paniculata	0	0	5	0	0	2	0	0	0	0	0	0	0	0
Eucalyptus pauciflora	3	0	0	0	33	0	0	0	29	50	71	56	0	0
Eucalyptus propinqua	0	0	11	0	0	5	0	0	0	0	0	0	0	0
Eucalyptus punctata	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Eucalyptus quadrangulata	18	10	11	20	0	9	4	6	0	0	0	0	0	0
Eucalyptus radiata	0	0	5	0	0	0	0	0	4	0	14	0	6	0
Eucalyptus resinifera	0	0	0	0	0	2	4	0	0	0	0	0	0	0
Eucalyptus saligna	59	50	53	0	0	58	17	89	4	0	0	0	6	9
Eucalyptus siderophloia	0	0	0	0	0	7	0	0	0	0	0	0	0	0
Eucalyptus stellulata	0	0	0	0	0	0	0	0	0	83	0	22	0	0
Eucalyptus tereticornis	6	0	0	20	0	12	0	0	0	0	0	0	0	0
Eucalyptus viminalis	0	0	0	0	0	0	0	0	2	0	14	0	0	0
Euchiton gymnocephalum	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Euchiton sphaericum	3	0	0	0	0	2	0	0	2	0	0	0	0	0
Euphrasia ciliolata	0	0	0	0	0	0	0	0	0	17	0	0	0	0
Eupomatia laurina	0	5	16	0	0	7	57	72	0	0	0	0	0	0
Euroschinus falcata	0	0	0	0	0	4	0	6	0	0	0	0	0	0
Eustrephus latifolius	50	25	58	0	0	33	0	22	4	0	0	0	19	9
Exocarpos cupressiformis	3	5	0	40	0	5	0	0	0	0	0	0	0	0
Exocarpos strictus	0	0	5	20	0	2	0	0	0	0	0	0	0	0
Facelis retusa	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Ficus coronata	0	0	11	0	0	0	43	0	0	0	0	0	0	0
Ficus obliqua var. *obliqua*	0	0	0	0	0	0	9	0	0	0	0	0	0	0
Fieldia australis	0	0	0	0	0	0	4	0	0	0	0	0	0	0
Fimbristylis dichotoma	0	0	0	0	0	5	0	0	0	0	0	0	0	0
Gahnia aspera	0	5	0	0	0	5	0	11	0	0	0	0	0	0
Gahnia melanocarpa	9	10	26	0	0	16	9	28	6	0	0	11	0	9
Gahnia sieberiana	0	0	0	20	0	5	0	0	8	0	0	0	44	9
Galium binifolium	9	10	11	20	0	0	4	0	10	0	0	0	25	0
Galium ciliare	0	0	0	0	0	0	0	0	4	0	0	0	0	0
Galium curvihirtum	0	0	0	20	0	0	0	0	6	0	0	0	0	0
Galium gaudichaudii	3	0	0	0	0	2	0	0	2	0	14	0	0	0
Galium migrans	3	0	0	0	0	0	0	0	6	0	0	0	6	0
Galium propinquum	0	10	5	0	0	5	0	0	21	17	29	11	13	18
Galium Unknown	3	0	0	0	0	0	0	0	0	0	0	0	0	0

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Gaultheria appressa	0	0	0	0	0	0	0	0	2	0	43	11	0	0
Geijera latifolia	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Geitonoplesium cymosum	38	30	63	0	0	40	13	50	0	0	0	0	0	0
Gentianella diemensis	0	0	0	0	0	0	0	0	4	0	0	0	0	0
Geranium molle	0	0	0	0	0	0	0	0	0	0	14	0	0	0
Geranium neglectum	0	0	0	0	33	0	0	0	2	0	0	22	0	0
Geranium potentilloides	77	30	37	0	100	49	9	0	86	0	28	0	51	18
Geranium solanderi	15	5	5	0	0	7	0	0	4	17	0	11	6	0
Geranium Unknown	0	5	0	0	0	0	0	0	4	0	14	0	0	0
Gleichenia dicarpa	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Glochidion ferdinandi	0	0	11	0	0	7	0	12	0	0	0	0	0	0
Glyceria australis	0	0	0	0	33	0	0	0	0	0	0	0	0	0
Glycine clandestina	88	60	68	40	0	74	4	0	83	0	0	0	25	0
Glycine microphylla	0	0	0	0	0	2	0	0	2	0	0	0	0	0
Glycine sp. A	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Glycine tabacina	0	0	0	0	0	2	0	0	2	0	14	0	0	0
Glycine Unknown	0	0	0	0	0	0	4	0	2	0	0	0	0	0
Gmelina leichhardtii	0	0	0	0	0	2	4	6	0	0	0	0	0	0
Gnaphalium coarctatum	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Gnaphalium gymnocephalum	47	10	11	20	33	16	0	0	33	0	0	33	6	0
Gnaphalium involucratum	0	0	5	0	33	0	0	0	4	17	0	0	0	0
Gnaphalium Unknown	0	0	0	0	0	2	0	0	13	0	0	22	0	0
Gomphocarpus Unknown	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Gomphocarpus fruticosus	0	0	5	0	0	14	0	0	0	0	0	0	0	0
Gonocarpus humilis	12	5	5	20	0	19	0	0	38	0	14	0	38	0
Gonocarpus micranthus	0	0	0	0	0	0	0	0	0	0	14	33	0	0
Gonocarpus montanus	0	0	0	0	0	0	0	0	0	0	14	0	0	0
Gonocarpus oreophilus	0	0	0	20	0	0	4	0	8	0	0	0	6	9
Gonocarpus tetragynus	35	20	11	0	0	19	0	0	23	0	0	0	6	0
Gonocarpus teucrioides	3	20	0	0	0	12	0	6	19	0	14	33	25	9
Gonocarpus Unknown	0	0	0	0	0	0	0	0	2	0	14	0	0	0
Goodenia hederacea	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Goodenia heterophylla	3	5	0	0	0	14	0	0	0	0	0	0	0	0
Goodenia ovata	0	0	5	0	0	0	0	0	0	0	0	0	13	0

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Grammitis billardieri	0	0	5	0	0	0	0	0	0	0	14	0	0	36
Gratiola pedunculata	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Gratiola peruviana	0	0	5	0	67	0	4	0	2	0	29	11	0	9
Gratiola Unknown	0	0	0	0	0	0	0	0	0	0	14	0	0	0
Grevillea arenaria	0	0	5	20	0	0	0	0	0	0	0	0	0	0
Grevillea granulifera	0	0	0	20	0	0	0	0	0	0	0	0	0	0
Guioa semiglauca	0	0	26	0	0	35	39	50	2	0	0	0	0	0
Gymnostachys anceps	9	15	53	0	0	30	65	67	2	0	0	0	0	9
Hakea eriantha	0	0	5	0	0	0	0	0	8	0	0	0	19	0
Hakea microcarpa	0	0	0	0	0	0	0	0	2	67	0	67	0	0
Hakea salicifolia	0	15	5	20	0	0	0	0	0	0	0	0	13	0
Haloragis heterophylla	38	0	11	0	67	0	0	0	2	0	0	0	0	0
Haloragis serra	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Hardenbergia violacea	41	50	11	20	0	65	0	0	19	0	0	0	6	0
Hedycarya angustifolia	6	25	26	0	0	0	0	6	4	0	0	0	6	18
Helichrysum apiculatum	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Helichrysum bracteatum	6	10	5	0	0	12	0	0	19	0	0	0	6	0
Helichrysum dendroideum	0	0	0	0	0	0	0	0	2	0	0	11	0	0
Helichrysum elatum	0	0	0	40	0	2	0	0	0	0	0	0	0	0
Helichrysum scorpioides	9	0	0	0	0	0	0	0	46	33	14	0	0	0
Helichrysum Unknown	0	0	0	0	0	0	0	0	6	0	0	0	0	0
Helicia glabriflora	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Hibbertia acicularis	0	0	0	40	0	0	0	0	0	0	0	0	0	0
Hibbertia aspera	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Hibbertia dentata	29	50	37	0	0	30	0	28	6	0	0	0	13	0
Hibbertia empetrifolia	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Hibbertia linearis	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Hibbertia obtusifolia	6	0	5	20	0	0	0	0	10	0	0	0	0	0
Hibbertia scandens	56	90	68	0	0	79	0	17	10	0	0	0	6	9
Hibiscus heterophyllus	0	0	0	20	0	4	0	0	0	0	0	0	0	0
Histiopteris incisa	3	5	0	0	0	0	0	6	2	0	0	0	19	45
Holcus lanatus	0	0	0	0	33	0	0	0	0	0	0	0	6	0
Hovea linearis	0	0	0	0	0	0	0	0	4	0	0	22	0	0
Hovea longifolia	0	0	0	20	0	0	0	0	0	0	0	0	6	0
Hovea rosmarinifolia	0	0	0	0	0	0	0	0	0	0	0	11	0	0
Hybanthus enneaspermus	0	0	0	0	0	2	0	0	0	0	0	0	0	0

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Hybanthus monopetalus	0	0	0	0	0	0	0	0	13	0	0	11	0	0
Hybanthus stellarioides	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Hydrocotyle acutiloba	62	5	47	0	0	26	0	0	27	17	0	0	0	0
Hydrocotyle geraniifolia	0	0	11	0	0	5	0	0	4	0	0	0	13	0
Hydrocotyle laxiflora	15	20	21	20	0	12	0	6	60	17	71	11	69	27
Hydrocotyle pedicellosa	0	0	0	0	0	0	0	0	0	0	14	0	0	0
Hydrocotyle pedunculariis	9	15	5	20	100	16	0	6	19	33	0	22	6	0
Hydrocotyle tripartita	3	0	0	0	0	2	9	0	0	17	0	22	0	0
Hydrocotyle Unknown	0	0	0	0	0	0	0	0	4	17	0	0	0	0
Hymenanthera dentata	18	0	21	0	0	2	13	0	0	0	0	0	13	0
Hymenophyllum australe	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Hymenophyllum cupressiforme	0	0	0	0	0	0	4	6	0	0	0	0	0	36
Hymenosporum flavum	0	0	32	0	0	5	30	11	0	0	0	0	0	0
Hypericum gramineum	24	15	11	80	0	19	0	0	13	33	14	33	0	0
Hypericum japonicum	6	10	0	0	33	2	0	0	10	0	0	22	0	9
Hypochoeris radicata	53	15	0	0	33	14	0	0	40	33	0	56	6	0
Hypolepis glandulifera	9	0	26	0	33	0	0	6	0	0	0	0	0	0
Hypolepis muelleri	0	0	0	0	0	2	4	0	0	0	0	0	0	0
Hypoxis hygrometrica	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Imperata cylindrica	41	55	37	40	67	90	0	0	0	0	0	0	0	0
Indigofera australis	21	20	26	0	0	23	0	0	2	0	0	0	0	0
Isolepis crassiuscula	0	0	0	0	0	0	0	0	0	0	0	22	0	0
Isolepis habra	0	0	0	0	0	0	0	0	0	0	14	11	6	0
Jacksonia scoparia	0	0	5	0	0	2	0	0	0	0	0	0	0	0
Jasminum volubile	0	0	0	0	0	0	4	0	0	0	0	0	0	0
Juncus alexandri subsp. *melanobasis*	0	0	0	0	33	0	0	0	4	0	0	0	0	0
Juncus articulatus	0	0	0	0	33	0	0	0	0	0	0	0	0	0
Juncus australis	0	0	0	0	0	0	0	0	0	0	0	11	0	0
Juncus filicaulis	3	0	0	0	33	0	0	0	0	0	0	0	0	0
Juncus homalocaulis	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus laeviusculus subsp. *laeviusculus*	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Juncus pauciflorus	21	0	16	0	67	2	9	0	0	0	0	11	0	0
Juncus phaeanthus m.s.	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Juncus prismatocarpus	0	0	0	0	33	0	0	0	0	0	0	0	0	0

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Juncus sandwithii	0	0	0	0	0	0	0	0	0	0	0	11	0	0
Juncus sarophorus	9	0	5	0	67	0	0	0	0	0	0	0	0	0
Juncus Unknown	0	10	0	0	0	0	0	0	2	0	14	0	0	9
Juncus usitatus	0	0	0	0	0	2	0	6	0	0	0	0	0	0
Juncus vaginatus	0	0	0	0	0	0	0	0	0	0	0	11	0	0
Kennedia rubicunda	6	20	0	0	0	16	0	0	0	0	0	0	0	0
Kennedia Unknown	0	0	0	0	0	0	0	0	0	0	0	0	6	0
Lagenaria Unknown	0	0	0	0	0	0	0	0	0	0	0	11	0	0
Lagenifera gracilis	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Lagenifera stipitata	21	15	16	20	0	19	0	0	38	0	29	0	44	18
Lantana camara	0	0	5	0	0	7	0	0	0	0	0	0	0	0
Lastreopsis acuminata	3	0	0	0	0	2	30	6	0	0	0	0	0	0
Lastreopsis decomposita	0	0	11	0	0	0	43	22	0	0	0	0	0	0
Lastreopsis microsora	0	0	11	0	0	0	57	6	0	0	0	0	6	0
Lastreopsis munita	0	0	0	0	0	0	4	0	0	0	0	0	0	0
Lastreopsis Unknown	0	0	0	0	0	0	0	11	2	0	0	0	0	0
Legnephora moorei	0	0	0	0	0	0	0	6	0	0	0	0	0	0
Lepidosperma elatius	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Lepidosperma laterale	50	25	42	100	0	44	0	6	15	0	0	0	63	9
Lepidosperma tortuosum	0	0	0	20	0	0	0	0	0	0	0	0	0	0
Leptinella filicula	0	0	0	0	0	0	0	0	35	0	43	0	19	9
Leptospermum argenteum	0	0	0	0	0	0	0	0	2	0	0	44	0	0
Leptospermum polygalifolium	3	0	0	0	0	0	0	0	4	0	43	22	19	0
Leptospermum variabile	0	0	0	40	0	0	0	0	2	0	0	0	0	0
Leucopogon fraseri	6	0	0	0	0	0	0	0	0	0	0	0	0	0
Leucopogon hookeri	0	0	0	0	0	0	0	0	58	67	71	44	13	0
Leucopogon juniperinus	0	0	5	20	0	9	0	0	0	0	0	0	0	0
Leucopogon lanceolatus	29	35	16	40	0	0	0	0	67	0	0	22	69	9
Libertia paniculata	3	0	5	0	0	0	0	0	6	0	0	0	6	0
Libertia pulchella	0	0	0	0	0	0	0	0	0	0	14	11	6	0
Lilaeopsis polyantha	0	0	0	0	0	0	0	0	0	0	14	0	0	0
Lindsaea linearis	0	0	0	0	0	0	0	0	10	0	0	11	0	0
Lindsaea Unknown	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Lissanthe strigosa	0	0	0	20	0	0	0	0	0	0	0	0	0	0
Litsea reticulata	0	10	5	0	0	7	26	44	0	0	0	0	0	0
Livistona australis	0	0	0	0	0	2	4	0	0	0	0	0	0	0

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Lobelia gibbosa	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Lobelia trigonocaulis	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Logania albiflora	0	0	0	40	0	2	0	0	0	0	0	0	0	0
Lomandra confertifolia	0	5	0	0	0	0	0	6	2	0	0	0	0	0
Lomandra filiformis	0	5	0	0	0	18	0	0	4	0	0	0	0	0
Lomandra hystrix	0	0	11	0	0	0	4	6	0	0	0	0	0	0
Lomandra longifolia	97	90	74	80	100	93	0	33	90	0	28	33	88	27
Lomandra multiflora	0	0	0	20	0	7	0	0	2	0	0	0	0	0
Lomandra spicata	0	0	21	0	0	0	87	44	0	0	0	0	0	27
Lomatia arborescens	0	15	0	0	0	0	0	17	10	0	14	11	44	0
Lomatia fraseri	0	10	0	0	0	0	0	0	4	0	14	11	6	0
Lophostemon confertus	0	0	0	0	0	5	0	6	0	0	0	0	0	0
Lotus corniculatus	0	0	0	0	0	0	0	0	4	0	0	0	0	0
Luzula densiflora	0	0	0	0	0	0	0	0	10	17	14	0	0	0
Luzula flaccida	0	0	0	0	0	0	0	0	17	17	14	0	6	0
Luzula ovata	0	0	0	0	0	0	0	0	0	17	0	0	0	0
Luzula Unknown	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Lycopodium deuterodensum	0	0	0	0	0	0	0	0	0	0	0	22	6	0
Lycopodium fastigiatum	0	0	0	0	0	0	0	0	0	33	0	0	0	0
Maclura cochinchinensis	0	0	5	0	0	5	9	6	0	0	0	0	0	0
Malaisia scandens	0	0	0	0	0	2	26	11	0	0	0	0	0	0
Mallotus philippensis	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Marsdenia flavescens	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Marsdenia lloydii	0	0	0	0	0	2	4	6	0	0	0	0	0	0
Marsdenia rostrata	6	5	5	0	0	5	30	6	0	0	0	0	0	9
Maytenus silvestris	21	0	47	20	0	42	0	6	4	0	0	0	0	0
Medicago polymorphua	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Melaleuca styphelioides	6	0	5	0	0	5	0	0	0	0	0	0	0	0
Melia azedarach var. *australasica*	0	0	0	0	0	9	0	0	0	0	0	0	0	0
Melichrus urceolatus	0	0	0	40	0	0	0	0	4	0	0	0	0	0
Melicope micrococca	0	5	16	0	0	16	17	28	0	0	0	0	0	0
Melodinus australis	0	0	5	0	0	0	13	0	0	0	0	0	0	0
Mentha diemenica	24	5	0	0	0	5	0	0	0	0	0	0	0	0
Mentha satureioides	0	0	0	0	0	2	0	0	0	17	0	0	0	0
Micrantheum hexandrum	0	0	0	20	0	0	0	0	0	0	0	0	0	0
Micrantheum Unknown	0	0	0	0	0	0	0	0	2	0	0	0	0	0

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Microlaena stipoides	44	30	37	20	0	33	0	0	42	17	29	0	56	9
Microsorum diversifolium	0	0	0	0	0	0	4	6	0	0	14	0	0	9
Microsorum scandens	0	5	11	0	0	0	65	17	0	0	0	0	0	9
Microtis parviflora	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Microtis unifolia	0	0	0	0	0	0	0	0	4	0	0	0	0	0
Mischocarpus australis	0	0	0	0	0	0	48	22	0	0	0	0	0	0
Mischocarpus pyriformis	0	0	0	0	0	0	0	6	0	0	0	0	0	0
Monotoca scoparia	0	0	0	20	0	0	0	0	0	0	0	22	6	0
Morinda jasminoides	0	5	21	0	0	5	74	44	0	0	0	0	0	9
Muellerina celastroides	3	5	0	0	0	5	0	0	0	0	0	0	0	0
Muellerina eucalyptoides	0	0	0	0	0	7	0	0	0	0	0	0	0	0
Myoporum montanum	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Myoporum Unknown	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Myosotis australis	0	0	0	0	0	0	0	0	19	0	0	11	6	0
Myosotis exarrhena	3	0	0	0	0	0	0	0	2	0	0	0	0	0
Myriophyllum crispatum	0	0	0	0	33	0	0	0	0	0	14	33	0	0
Neolitsea australiensis	0	0	5	0	0	2	4	22	0	0	0	0	0	0
Neolitsea dealbata	0	0	16	0	0	5	61	33	0	0	0	0	0	0
Notelaea longifolia	0	5	21	0	0	4	4	17	8	0	0	0	19	27
Notelaea neglecta	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Notelaea ovata	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Notelaea sp. A	0	0	0	0	0	0	0	0	4	0	0	0	13	0
Notelaea venosa	3	5	5	0	0	0	0	0	6	0	0	0	31	27
Nothofagus moorei	0	15	0	0	0	0	0	0	15	0	14	0	44	100
Olearia alpicola	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Olearia chrysophylla	6	0	5	0	0	0	0	0	0	0	14	33	0	0
Olearia covenyi	0	0	0	0	0	0	0	0	4	0	0	0	19	0
Olearia nernstii	0	5	0	0	0	2	0	0	0	0	0	0	0	0
Olearia oppositifolia	0	0	0	0	0	0	0	0	17	33	57	22	6	0
Olearia phlogopappa	0	0	0	0	0	0	0	0	2	0	14	11	0	0
Olearia Unknown	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Olearia viscidula	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Omalanthus populifolius	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Opercularia aspera	0	0	0	20	0	23	0	0	0	0	0	0	0	0
Opercularia diphylla	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Opercularia hispida	0	10	0	20	0	2	0	0	0	0	0	11	0	0

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Oplismenus aemulus	0	5	5	0	0	37	0	0	0	0	0	0	0	0
Oplismenus imbecillis	41	15	63	20	0	44	17	11	0	0	0	0	6	0
Oreomyrrhis ciliata	0	0	0	0	0	0	0	0	0	17	14	0	0	0
Oreomyrrhis eriopoda	6	0	0	0	0	0	0	0	56	50	43	33	13	0
Orites excelsa	0	0	11	0	0	0	48	39	0	0	0	0	0	27
Oxalis chnoodes	3	20	26	0	0	19	0	0	8	0	0	0	0	0
Oxalis exilis	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Oxalis perennans	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Oxalis radicosa	0	0	0	0	0	0	0	0	0	0	14	0	0	0
Oxalis Unknown	3	0	0	0	0	0	0	0	0	0	0	0	6	0
Oxylobium ilicifolium	3	50	0	20	0	14	0	0	15	0	0	0	25	0
Ozothamnus diosmifolius	6	5	0	20	0	19	0	0	2	0	0	0	0	0
Ozothamnus ferrugineus	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Ozothamnus rufescens	15	0	21	0	0	7	9	0	0	0	0	0	0	0
Ozothamnus Unknown	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Palmeria scandens	0	10	5	0	0	0	70	50	0	0	0	0	6	0
Pandorea jasminoides	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Pandorea pandorana	44	10	58	0	0	35	70	44	4	0	0	0	13	9
Panicum effusum	0	0	0	0	0	5	0	0	0	0	0	0	0	0
Panicum simile	0	5	0	0	0	12	0	0	0	0	0	0	0	0
Papillilabium beckleri	0	0	5	0	0	2	4	11	0	0	0	0	0	0
Pararchidendron pruinosum	0	0	0	0	0	0	9	0	0	0	0	0	0	0
Parsonsia brownii	0	0	0	0	0	0	0	0	0	0	29	0	19	64
Parsonsia induplicata	0	0	5	0	0	2	0	0	0	0	0	0	0	0
Parsonsia sp. A	0	5	0	20	0	2	13	17	0	0	0	0	0	0
Parsonsia straminea	15	15	47	0	0	21	52	61	2	0	0	0	6	9
Parsonsia velutina	0	0	0	0	0	0	39	0	0	0	0	0	0	0
Paspalidium distans	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Paspalum dilatatum	0	0	0	0	33	0	0	0	0	0	0	0	0	0
Passiflora herbertiana	0	0	0	0	0	14	0	0	0	0	0	0	0	0
Passiflora subpeltata	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Patersonia fragilis	0	0	0	0	0	0	0	0	0	0	0	0	6	0
Patersonia glabrata	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Pellaea falcata	38	5	63	0	0	35	43	40	2	0	0	0	0	0
Pellaea paradoxa	0	5	11	0	0	2	0	0	0	0	0	0	0	0

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Pennantia cunninghamii	0	0	5	0	0	0	83	0	0	0	0	0	0	0
Pennisetum alopecuroides	0	0	0	0	33	0	0	0	0	0	0	0	0	0
Peperomia tetraphylla	0	0	0	0	0	0	9	0	0	0	0	0	0	0
Persicaria decipiens	3	0	0	0	33	0	0	0	0	0	0	0	0	0
Persicaria hydropiper	0	0	0	0	0	0	4	0	0	0	0	0	0	0
Persoonia acuminata	0	0	0	0	0	0	0	0	10	0	0	0	6	0
Persoonia chamaepeuce	0	0	0	0	0	0	0	0	0	0	0	22	0	0
Persoonia linearis	9	60	26	20	0	56	0	0	4	0	0	11	38	0
Persoonia media	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Persoonia oleoides	0	5	0	0	0	2	0	0	8	0	0	0	13	0
Persoonia Unknown	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Phalaris canariensis	0	5	0	0	0	0	0	6	0	0	0	0	0	0
Phebalium squameum	0	0	0	0	0	0	0	0	0	0	14	0	0	9
Phragmites australis	0	0	0	0	33	0	0	0	0	0	0	0	0	0
Phyllanthus gasstroemii	0	10	11	20	0	2	4	0	0	0	0	0	0	0
Phyllanthus gunnii	0	0	0	20	0	0	0	0	0	0	0	0	0	0
Phyllanthus similis	3	0	11	0	0	5	0	6	0	0	0	0	0	0
Phyllanthus Unknown	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Physalis minima	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Phytolacca octandra	3	0	0	0	0	0	4	0	0	0	0	0	0	0
Picris hieracioides	29	5	5	0	0	5	0	0	17	0	0	0	0	0
Pimelea curviflora var. *curviflora*	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Pimelea glauca	0	0	0	0	0	0	0	0	0	33	0	0	0	0
Pimelea ligustrina	0	0	5	0	0	0	0	12	8	0	14	0	19	9
Pimelea linifolia	0	5	0	0	0	0	0	0	0	34	0	22	0	0
Pimelea neo-anglica	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Piper novae-hollandiae	0	0	5	0	0	0	39	11	0	0	0	0	0	0
Pittosporum revolutum	15	10	21	0	0	16	4	33	0	0	0	0	0	0
Pittosporum undulatum	12	35	21	20	0	12	9	33	0	0	0	0	0	0
Planchonella australis	0	0	0	0	0	2	13	17	0	0	0	0	0	0
Plantago cladarophylla	0	0	0	0	0	0	0	0	0	0	0	22	0	0
Plantago debilis	65	15	37	0	0	26	0	0	33	0	0	0	25	0
Plantago Unknown	0	0	0	0	0	0	0	0	2	33	0	0	0	0
Platycerium bifurcatum	9	0	16	0	0	12	43	45	0	0	0	0	0	0
Platysace lanceolata	0	5	0	20	0	2	0	0	0	0	0	0	0	0
Plectorrhiza tridentata	0	0	5	0	0	2	13	6	0	0	0	0	0	0

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Plectranthus graveolens	0	0	0	20	0	2	4	0	0	0	0	0	0	0
Plectranthus parviflorus	41	10	42	40	0	67	13	0	2	0	0	0	0	0
Plectranthus Unknown	0	0	5	0	0	0	0	0	0	0	0	0	0	0l
Poa Costiniana	0	0	0	0	0	0	0	0	2	0	0	33	0	0
Poa labillardieri	100	20	42	20	100	74	4	0	15	33	0	0	6	0
Poa queenslandica	0	5	0	0	0	5	4	0	2	0	0	0	0	0
Poa sieberiana	3	25	26	40	0	24	0	0	100	50	71	55	81	18
Poa Unknown	0	0	0	0	0	0	0	0	0	17	29	0	0	0
Podocarpus elatus	0	0	0	0	0	0	0	6	0	0	0	0	0	0
Pollia crispata	0	0	0	0	0	0	30	11	0	0	0	0	0	0
Polygala japonica	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Polymeria calycina	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Polyosma cunninghamii	0	10	5	0	0	0	61	44	0	0	0	0	0	9
Polyphlebium venosum	0	0	0	0	0	0	0	0	0	0	0	0	0	18
Polyscias elegans	0	0	5	0	0	2	4	22	0	0	0	0	0	0
Polyscias murrayi	0	0	5	0	0	0	9	6	0	0	0	0	0	0
Polyscias sambucifolia	18	40	11	0	0	19	0	0	33	0	0	11	50	0
Polystichum australiense	0	0	0	0	0	0	4	0	8	0	14	0	13	36
Polystichum fallax	24	0	26	0	33	0	0	0	0	0	0	0	0	0
Polystichum proliferum	0	5	0	0	0	0	0	0	10	0	43	11	13	18
Pomaderris andromedifolia	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Pomaderris argyrophylla	0	0	0	20	0	0	0	0	0	0	14	0	13	0
Pomaderris eriocephala	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Pomaderris helianthemifolia	0	0	5	20	0	0	0	0	0	0	0	0	0	0
Pomaderris ligustrina	0	0	5	20	0	0	0	0	2	0	0	0	6	0
Poranthera microphylla	38	15	5	20	0	21	0	0	81	33	14	11	25	0
Prasophyllum fuscum	0	0	0	0	0	0	0	0	0	17	0	11	0	0
Pratia pedunculata	15	10	0	0	33	0	0	0	69	17	71	44	44	9
Pratia purpurascens	76	30	21	20	67	51	0	0	29	0	14	0	6	0
Pratia surrepens	0	0	0	0	0	0	0	0	0	0	14	0	0	0
Prostanthera incisa	0	10	0	0	0	0	0	6	0	0	0	0	6	0
Prostanthera lasianthos	0	0	0	0	0	0	0	0	4	0	43	11	19	18
Prunella vulgaris	9	5	0	0	100	2	0	0	2	17	0	22	6	0
Pseuderanthemum variabile	0	5	21	0	0	26	0	11	2	0	0	0	0	0
Psychotria loniceroides	3	35	47	0	0	51	43	72	0	0	0	0	0	0

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Pteridium esculentum	85	90	74	0	100	56	0	6	92	17	29	0	94	9
Pteris tremula	9	0	26	0	0	23	4	17	0	0	0	0	0	0
Pteris umbrosa	0	0	0	0	0	0	52	11	0	0	0	0	0	0
Pterostylis abrupta	0	0	0	0	0	0	0	0	13	0	14	11	19	0
Pterostylis coccina	6	0	0	0	0	0	0	0	35	0	0	0	0	9
Pterostylis curta	12	0	0	0	0	0	0	0	2	0	0	0	0	0
Pterostylis decurva	12	10	0	0	0	0	0	0	13	0	14	0	0	0
Pterostylis furcata	0	0	0	0	0	0	0	0	0	0	14	22	0	0
Pterostylis hispidula	0	0	0	0	0	0	0	0	0	0	0	0	6	0
Pterostylis longifolia	0	10	0	20	0	2	0	0	2	0	0	0	0	0
Pterostylis nutans	0	0	0	0	0	9	0	0	4	0	0	0	0	0
Pterostylis obtusa	0	5	0	0	0	2	0	0	0	0	0	0	0	0
Pterostylis parviflora	0	5	0	20	0	0	0	0	0	0	0	0	0	0
Pterostylis Unknown	0	0	0	0	0	0	0	0	4	0	0	0	0	0
Pultenaea fasciculata	0	0	0	0	0	0	0	0	0	17	0	11	0	0
Pultenaea microphylla	0	0	0	20	0	0	0	0	0	0	0	0	0	0
Pultenaea villosa	0	0	0	0	0	7	0	0	0	0	0	0	0	0
Pyrrosia confluens	0	5	21	0	0	2	61	44	4	0	0	0	6	0
Pyrrosia rupestris	35	15	37	20	0	12	17	67	4	0	14	0	13	55
Pyrrosia Unknown	0	0	5	0	0	0	0	6	2	0	0	0	0	0
Quintinia sieberi	0	5	0	0	0	2	0	6	0	0	0	0	0	18
Ranunculus inundatus	3	10	0	0	0	2	0	0	2	0	0	11	0	0
Ranunculus lappaceus	12	0	0	0	33	5	0	0	35	33	14	11	6	0
Ranunculus pimpinellifolius	0	0	0	0	0	0	0	0	0	17	0	56	0	0
Ranunculus plebeius	41	10	5	0	67	2	0	0	10	17	14	11	0	0
Ranunculus pumilio	0	0	0	0	0	0	0	0	0	17	0	0	0	0
Ranunculus Unknown	0	0	0	0	0	0	0	0	8	0	14	0	0	0
Rapanea howittiana	9	0	53	0	0	14	13	17	0	0	0	0	6	0
Rapanea variabilis	6	15	47	20	0	35	4	56	0	0	0	0	0	0
Restio stenocoleus	0	0	0	0	0	0	0	0	0	33	0	78	0	0
Rhagodia spinescens	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Rhinerrhiza divitiflora	0	0	0	0	0	0	0	6	0	0	0	0	0	0
Rhodamnia rubescens	0	0	16	0	0	21	0	56	0	0	0	0	0	0
Rhodanthe anthemoides	6	0	0	0	0	0	0	0	2	0	0	0	0	0
Rhodomyrtus psidioides	0	0	0	0	0	0	0	6	0	0	0	0	0	0
Ripogonum album	0	0	5	0	0	0	30	11	0	0	0	0	0	0
Ripogonum discolor	0	0	0	0	0	0	4	0	0	0	0	0	0	0

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Ripogonum fawcettianum	0	0	0	0	0	0	4	0	0	0	0	0	0	0
Rostellularia adscendens subsp. *adscendens*	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Rubus hillii	3	0	5	0	0	5	22	6	0	0	0	0	0	0
Rubus moorei	0	5	0	0	0	0	4	6	0	0	0	0	0	0
Rubus parvifolius	74	40	37	0	67	67	0	6	67	0	14	22	25	0
Rubus rosifolius	21	25	53	0	33	35	9	28	4	0	0	0	0	0
Rubus sp. A	0	0	5	0	0	0	13	6	0	0	0	0	0	0
Rumex brownii	26	0	16	0	67	0	0	0	2	17	14	0	0	0
Sambucus australasica	0	0	0	0	0	0	9	0	0	0	0	0	0	0
Sambucus gaudichaudiana	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Santalum obtusifolium	0	0	11	0	0	2	0	0	2	0	0	0	0	0
Sarcochilus australis	0	0	5	0	0	0	4	0	0	0	0	0	0	0
Sarcochilus falcatus	3	10	16	0	0	7	57	67	0	0	0	0	0	18
Sarcochilus hillii	0	0	0	0	0	0	0	6	0	0	0	0	0	0
Sarcochilus olivaceus	0	0	5	0	0	0	17	6	0	0	0	0	0	0
Sarcochilus spathulatus	0	0	0	0	0	0	4	11	0	0	0	0	0	0
Sarcochilus Unknown	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Sarcomelicope simplicifolia	0	0	0	0	0	2	4	6	0	0	0	0	0	0
Sarcopetalum harveyanum	3	0	16	0	0	2	22	22	0	0	0	0	0	0
Scaevola albida	3	0	0	0	0	2	0	0	0	0	0	0	0	0
Scaevola hookeri	0	0	0	0	0	0	0	0	0	17	0	22	0	0
Schizomeria ovata	3	25	16	0	0	7	39	72	0	0	0	0	6	18
Schoenus apogon	9	0	0	0	67	5	0	0	6	0	0	11	0	9
Scirpus polystachyus	0	0	0	0	0	0	0	0	0	0	0	22	0	0
Scirpus Unknown	0	0	0	0	0	0	0	0	0	17	0	0	0	0
Scleranthus biflorus	6	0	0	0	0	0	0	0	17	33	0	0	13	0
Scleria mackaviensis	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Scutellaria humilis	9	0	11	20	0	0	0	0	0	0	0	0	0	0
Scutellaria mollis	0	5	21	0	0	5	0	0	4	0	0	0	19	9
Senecio amygdalifolius	24	15	47	0	0	14	4	6	0	0	0	0	0	0
Senecio bipinnatisectus	0	0	5	0	0	0	4	0	0	0	0	0	0	0
Senecio biserratus	3	5	0	0	0	0	0	0	23	0	0	0	19	0
Senecio diaschides	3	10	0	0	0	7	0	0	29	0	0	0	6	0
Senecio gunnii	0	0	0	0	0	0	0	0	2	0	0	0	0	0

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	1 (34)	2 (20)	3 (19)	4 (5)	5 (3)	6 (43)	7 (23)	8 (18)	9 (48)	10 (6)	11 (7)	12 (9)	13 (16)	14 (11)
Senecio hispidulus	24	5	5	0	0	0	0	0	2	0	0	0	0	0
Senecio lautus	6	0	0	0	0	7	0	0	29	33	14	11	0	0
Senecio linearifolius	21	25	32	0	0	5	0	0	6	0	0	0	13	0
Senecio macranthus	9	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio madagascariensis	0	0	5	0	0	5	0	0	0	0	0	0	0	0
Senecio minimus	9	0	11	0	33	0	0	0	2	0	0	0	13	0
Senecio sp. aff. *apargiifolius*	47	10	11	0	0	5	0	0	31	0	0	0	6	0
Senecio sp. E	0	0	0	0	0	0	0	0	2	0	14	22	6	0
Senecio squarrosus	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Senecio Unknown	0	0	0	0	0	7	0	0	8	17	29	0	0	0
Senecio vagus	6	0	5	0	0	0	4	0	0	0	0	0	12	0
Senecio velleioides	0	0	0	0	0	0	0	0	0	0	14	0	0	0
Senna odorata	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Setaria pumila	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Sigesbeckia orientalis	47	15	42	0	0	65	0	6	4	0	0	0	13	0
Sloanea australis	0	0	5	0	0	0	39	22	0	0	0	0	0	0
Sloanea woollsii	0	0	0	0	0	0	30	6	0	0	0	0	0	0
Smilax australis	6	30	68	0	0	28	26	89	60	17	100	11	88	91
Smilax glyciphylla	0	10	5	0	0	0	0	17	0	0	0	0	0	0
Solanum aviculare	3	0	16	0	0	0	4	6	0	0	0	0	6	0
Solanum brownii	12	10	21	20	0	16	0	0	0	0	0	0	0	0
Solanum elegans	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Solanum nigrum	0	0	0	0	0	5	0	0	0	0	0	0	0	0
Solanum opacum	0	0	0	0	0	5	0	0	0	0	0	0	0	0
Solanum prinophyllum	15	0	16	20	0	26	4	6	2	0	0	0	0	0
Solanum pseudocapsicum	0	0	0	0	0	0	0	6	0	0	0	0	0	0
Solanum pungetium	0	0	0	20	0	2	4	0	0	0	0	0	0	0
Solanum stelligerum	6	5	21	20	0	47	4	11	2	0	0	0	0	0
Solanum Unknown	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Solenogyne gunnii	0	0	0	0	0	0	0	0	4	0	0	0	0	0
Sonchus asper subsp. *glaucescens*	3	0	0	0	33	0	0	0	2	0	0	0	0	0
Sonchus oleraceus	3	0	0	0	0	2	0	0	0	0	0	0	0	0
Sorghum leiocladum	12	0	5	0	0	23	0	0	2	0	0	0	0	0
Sparganium subglobosum	0	0	0	0	0	0	0	0	0	0	0	11	0	0
Spiranthes sinensis	0	0	0	0	0	0	0	0	2	0	0	11	0	0

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Sporobolus elongatus	0	0	0	0	0	5	0	0	0	0	0	0	0	0
Sporobolus pyramidalis	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Stackhousia viminea	0	0	0	0	0	5	0	0	0	0	0	0	0	0
Stellaria flaccida	44	10	32	0	0	21	0	0	13	0	57	22	6	9
Stellaria media	6	0	0	0	0	0	0	0	0	0	14	0	0	0
Stellaria pungens	0	0	5	20	0	0	0	0	21	0	0	0	6	0
Stenocarpus salignus	0	10	5	0	0	5	9	17	0	0	0	0	0	0
Stephania japonica	0	0	5	0	0	12	4	0	0	0	0	0	0	0
Sticherus lobatus	0	15	0	0	0	0	0	11	0	0	0	0	31	27
Stipa ramosissima	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Stipa rudis subsp. *nervosa*	0	10	0	20	0	5	0	0	0	0	0	0	0	0
Streblus brunonianus	0	0	5	0	0	0	48	0	0	0	0	0	0	0
Stylidium graminifolium	0	5	0	20	0	0	0	0	6	33	29	22	0	0
Stypandra glauca	0	0	0	20	0	0	0	0	0	0	0	0	0	0
Swainsona galegifolia	3	10	5	0	0	28	0	0	2	0	0	0	0	0
Swainsona Unknown	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Symplocos stawellii	0	0	5	0	0	0	9	0	0	0	0	0	0	0
Symplocos thwaitesii	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Syncarpia glomulifera	0	5	16	20	0	33	0	6	0	0	0	0	0	0
Synoum glandulosum	26	25	58	0	0	44	35	94	2	0	0	0	0	0
Syzygium australe	0	0	0	0	0	0	57	6	0	0	0	0	0	0
Syzygium oleosum	0	0	0	0	0	0	0	6	0	0	0	0	0	0
Taraxacum officinale	12	0	0	0	0	2	0	0	4	0	0	0	0	0
Tasmannia glaucifolia	0	0	0	0	0	0	0	0	2	17	29	22	0	0
Tasmannia insipida	0	10	21	0	0	0	57	83	0	0	0	0	0	9
Tasmannia purpurascens	3	0	0	0	0	0	0	0	27	17	100	22	13	45
Tasmannia stipitata	0	5	0	0	0	0	4	0	10	0	0	0	25	0
Tetrastigma nitens	0	25	11	0	0	35	13	6	0	0	0	0	6	0
Thelymitra circumsepta	0	0	0	0	0	0	0	0	0	0	0	11	0	0
Thelymitra cyanea	0	0	0	0	0	0	0	0	0	0	0	11	0	0
Thelymitra pauciflora	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Themeda australis	12	10	0	20	0	33	0	0	2	0	0	0	0	0
Todea barbara	0	0	0	0	0	0	0	0	0	0	14	0	0	0
Toona ciliata	0	0	11	0	0	2	26	17	0	0	0	0	0	0
Trema aspera	0	0	0	0	0	5	13	0	0	0	0	0	0	0
Tricoryne elatior	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Trifolium repens	35	5	0	0	67	2	0	0	17	50	0	44	0	0

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Trifolium Unknown	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Trimenia moorei	0	0	0	0	0	0	4	0	0	0	0	0	0	0
Tripladenia cunninghamii	0	0	11	0	0	0	0	0	0	0	0	0	0	0
Tristaniopsis collina	3	30	11	0	0	2	9	67	8	0	0	0	0	9
Tristaniopsis laurina	0	0	11	0	0	0	0	6	0	0	0	0	0	0
Trochocarpa laurina	0	30	11	0	0	12	9	67	4	0	0	0	6	18
Trochocarpa sp. A	3	10	0	0	0	0	0	0	17	0	14	0	44	9
Trochocarpa sp. nov.	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Trochocarpa Unknown	0	0	0	0	0	0	0	0	0	0	14	0	0	0
Tylophora barbata	9	15	5	0	0	19	0	6	4	0	0	0	6	0
Tylophora paniculata	0	5	16	0	0	14	0	17	0	0	0	0	6	9
Typha orientalis	0	0	0	0	33	0	0	0	0	0	0	0	0	0
Typhonium brownii	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Uncinia nemoralis	0	0	0	0	0	0	0	0	0	0	14	0	0	9
Urtica incisa	38	5	53	0	67	5	17	28	6	17	14	11	13	45
Utricularia dichotoma	0	0	0	0	0	0	0	0	0	0	0	44	0	0
Verbena bonariensis	0	0	0	0	33	2	0	0	0	0	0	0	0	0
Verbena officinalis	3	0	0	0	33	0	0	0	0	0	0	0	0	0
Verbena rigida	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Vernonia cinerea	6	15	5	0	0	40	0	0	0	0	0	0	0	0
Veronica calycina	50	5	16	0	0	2	0	0	29	17	0	0	6	0
Veronica notabilis	0	5	11	0	0	0	0	6	17	0	43	22	19	64
Veronica persica	0	0	0	0	0	0	0	0	0	17	14	0	0	0
Veronica plebeia	6	5	0	0	0	19	0	0	2	0	0	0	0	0
Veronica sp.C	0	0	5	0	0	5	0	6	6	0	0	0	13	0
Veronica sp. B	0	0	5	0	0	0	0	0	27	33	43	11	38	9
Veronica Unknown	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Vesselowskya rubifolia	0	0	0	0	0	0	9	0	0	0	0	0	0	0
Viola betonicifolia	50	30	0	0	0	30	0	0	75	33	29	11	0	0
Viola hederacea	50	40	63	0	33	30	9	17	79	67	100	33	63	18
Viola sp. A	0	0	0	0	0	0	0	0	0	17	0	11	0	0
Vittadinia cuneata	0	0	0	20	0	0	0	0	0	0	0	0	0	0
Vittadinia dissecta	0	0	0	20	0	0	0	0	0	0	0	0	0	0
Vittadinia tenuissima	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia ceracea	0	0	0	0	0	0	0	0	25	33	0	22	0	0
Wahlenbergia gracilis	0	5	0	0	0	2	0	0	0	0	14	0	0	0

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Wahlenbergia littoricola	0	10	0	0	0	2	0	0	2	0	0	0	0	0
Wahlenbergia stricta	65	15	11	0	33	10	0	0	42	17	14	33	19	0
Wahlenbergia Unknown	0	0	0	0	0	0	0	0	6	0	0	0	0	0
Waterhousea floribunda	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Westringia eremicola	0	0	0	20	0	0	0	0	0	0	0	0	0	0
Wilkiea huegeliana	0	0	5	0	0	2	9	33	0	0	0	0	0	0
Xanthorrhoea glauca	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Xanthorrhoea Unknown	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Youngia japonica	0	0	0	0	0	0	0	0	4	0	0	0	0	0
Zanthoxylum brachyacanthum	0	0	0	0	0	0	0	6	0	0	0	0	0	0
Ziera smithii subsp. A	0	0	0	0	0	0	0	0	0	0	0	0	6	0
Zieria arborescens	0	0	0	0	0	0	0	6	0	0	0	0	0	0
Zieria pilosa	0	0	0	20	0	0	0	0	0	0	0	0	0	0
Zieria smithii	0	0	5	20	0	5	4	0	0	0	0	0	0	0
Zieria sp. K	0	5	0	0	0	2	0	0	2	0	0	0	6	0

Community 1: *Eucalyptus laevopinea –Eucalyptus saligna* open forest over *Poa labillardieri* grass and herbland

Description

20 Species With Highest Mean Cover and/or Species Common To > 50% of Plots

- Trees *Eucalyptus laevopinea, Eucalyptus saligna, Allocasuarina torulosa, Eucalyptus obliqua, Eucalyptus campanulata, Eucalyptus canaliculata, Angophora floribunda*
- Vines *Desmodium varians, Glycine clandestina, Rubus parvifolius, Hibbertia scandens, Eustrephus latifolius*
- Herbs *Lomandra longifolia, Dichondra repens, Dianella caerulea, Pratia purpurascens, Acaena novae-zelandiae, Geranium potentilloides, Plantago debilis, Hydrocotyle acutiloba, Wahlenbergia stricta, Carex inversa, Hypochoeris radicata, Cirsium vulgare, Lepidosperma laterale, Viola betonicifolia, Viola hederacea*
- Grasses *Poa labillardieri Echinopogon ovatus, Oplismenus imbecillis, Imperata cylindrica, Microlaena stipoides*
- Ferns *Pteridium esculentum*

Rare and Endangered Species

Senecio macranthus, Tasmannia purpurascens.

Relationship to Other Communities

Related to Vegetation Community 2–6 (*Eucalyptus* spp. forest of lower altitudes), but the most distinctive of these communities.

Equivalent Vegetation Types

This Vegetation Community contains elements of the following types:

Binns (1996):

BARov 10.1 (E.saligna)
BARov 17.1 *(E.laevopinea)*
BARov 18 *(E.obliqua)*
BARus 16 *(Acacia irrorata-Doodia aspera)*
BARus 17 *(Imperata cylindrica-Desmodium varians)*

Hager & Benson (1994)

EF011e *(E.saligna-E.quadrangulata)*
EF475g *(E.obliqua-E.laevopinea)*
EF479a *(E.laevopinea)*
EF479e *(E.saligna-E.laevopinea)*
Specht et al. (1995)
199 *(E. laevopinea)*

Distribution

Inside National Park boundaries

Very common in Mount Royal National Park and Cockcrow Mountain areas.

Outside National Park Boundaries

Occurs on well drained, fertile soils on eastern escarpment of the Northern Tablelands.

Environmental Correlates

Occurs on lower slopes, in moderately moist, fertile soils, in moderately steep terrain.

Threats

Exotic Species

Centaurium erythraea, Centella asiatica, Conyza albida, Phytolacca octandra, Sonchus asper, Taraxacum officinale, Verbena officinalis.

Fire

Subject to fires from adjacent farm properties.

Information for Fire Management

Average Total Number of Species: 47.03	Species With Known Plant Responses: 46%	Resprouter: Seeder Ratio: 0.86

Known Seeder Species (including exotics)

Acacia maidenii
Acacia melanoxylon
Asperula scoparia
Billardiera scandens
Breynia oblongifolia
Centaurium erythraea
Cerastium glomeratum
Cirsium vulgare
Clematis aristata
Crassula sieberiana
Daucus glochidiatus
Davallia pyxidata
Dichondra repens
Echinopogon ovatus
Galium binifolium
Galium gaudichaudii
Geranium potentilloides
Glycine clandestina
Gnaphalium gymnocephalum
Gonocarpus tetragynus
Sonchus oleraceus
Helichrysum bracteatum
Hibbertia scandens
Hydrocotyle laxiflora
Hypericum gramineum
Hypochaeris radicata
Hypolepis glandulifera
Indigofera australis
Kennedia rubicunda
Lagenifera stipitata
Oxylobium ilicifolium
Pandorea pandorana
Phytolacca octandr
Pittosporum undulatum
Poranthera microphylla
Pyrrosia rupestris
Rapanea howittiana
Scaevola albida
Schoenus apogon
Senecio diaschides
Senecio hispidulus
Senecio linearifolius
Senecio minimus
Sigesbeckia orientalis
Solanum aviculare
Solanum prinophyllum
Gonocarpus teucrioides
Stellaria flaccida
Stellaria media
Viola hederacea
Wahlenbergia stricta

Community 2: *Eucalyptus campanulata-Eucalyptus saligna* open forest over *Lomandra longifolia*-fern herbland

Description

20 Species With Highest Mean Cover and/or Species Common To > 50% of Plots

- Trees *Eucalyptus campanulata, Eucalyptus laevopine, Allocasuarina torulosa, Eucalyptus saligna, Caldcluvia paniculosa, Callicoma serratifolia, Tristaniopsis collina, Synoum glandulosum*
- Shrubs *Oxylobium ilicifolium, Persoonia linearis, Indigofera australis*
- Vines *Hibbertia scandens, Glycine clandestina, Clematis aristata*
- Herbs *Lomandra longifolia, Prostanthera incisa, Dianella caerulea*
- Ferns *Calochlaena dubia, Pteridium esculentum*

Rare and Endangered Species

None

Relationship to Other Communities

Related to Vegetation Community 1–6 (*Eucalyptus* spp. forest of lower altitudes).

Equivalent Vegetation Types

This Vegetation Community contains elements of the following types:

Binns (1996):
BARov 21 (*E.campanulata*)
BARus 6 *(Tristianopsis collina-Cryptocarya rigida)*
BARus 8 *(Nothofagus moorei)*
BARus 17 *(Imperata cylindrica-Desmodium varians)*

Hager & Benson (1994)
EF505a *(E.campanulata)*
EF505e *(E.campanulata-E.laevopinea)*

Specht *et* al. (1995)
158 *(E.campanulata-E.laevopinea-E.cypellocarpa -E.obliqua)*

Distribution

Inside National Park boundaries

Throughout eastern and southern parts of the study area. Particularly common on eastern slopes.

Outside National Park Boundaries

Widespread on the Northern Tablelands, extending to North Coast district on high ridges.

Environmental Correlates

Common on moderately steep slopes from 500–1080 m altitude, in moderately moist and fertile soils mostly derived from low quartz sedimentary rock.

Threats

Exotic Species

Ageratina adenophera, Conyza albida, Verbena rigida.

Fire

Subject to fires from adjacent farm properties.

Information for Fire Management

Average Total Number of Species: 37.95	Species With Known Plant Responses: 48%	Resprouter: Seeder Ratio: 1.10

Known Seeder Species (including exotics)

Acacia maidenii
Acacia melanoxylon
Acacia ulicifolia
Adiantum diaphanum
Astrotricha latifolia
Astrotricha longifolia
Banksia integrifolia
Billardiera scandens
Breynia oblongifolia
Cirsium vulgare
Clematis aristata
Desmodium rhytidophyllum
Dichondra repens
Echinopogon ovatus
Galium binifolium
Geranium potentilloides
Glycine clandestina
Gnaphalium gymnocephalum
Gonocarpus tetragynus
Gonocarpus teucrioides
Helichrysum bracteatum
Hibbertia scandens
Hydrocotyle laxiflora
Hypericum gramineum
Indigofera australis
Kennedia rubicunda
Lagenifera stipitata
Leucopogon lanceolatus
Oxylobium ilicifolium
Pandorea pandorana
Pimelea linifolia
Pittosporum undulatum
Poranthera microphylla
Pyrrosia confluens
Pyrrosia rupestris
Senecio diaschides
Senecio hispidulus
Senecio linearifolius
Sigesbeckia orientalis
Stellaria flaccida
Veronica notabilis
Viola hederacea
Wahlenbergia stricta

Community 3: *Eucalyptus saligna-Eucalyptus laevopineaa-Eucalyptus microcorys-Eucalyptus acmenoides* open forest over *Acacia irrorata* shrubland over *Doodia aspera -Oplismenus imbecillus-Lomandra longifolia* herbland

Description

20 Species With Highest Mean Cover and/or Species Common To > 50% of Plots

- Trees *Eucalyptus laevopinea, Eucalyptus microcorys, Eucalyptus saligna, Doryphora sassafras, Backhousia myrtifolia, Eucalyptus acmenoides, Waterhousea floribunda, Synoum glandulosum, Allocasuarina torulosa*
- Shrubs *Acacia irrorata, Citriobatus pauciflorus, Rapanea howittiana*

- Vines *Desmodium varians, Glycine clandestina, Hibbertia scandens, Smilax australis, Clematis aristata, Geitonoplesium cymosum, Viola hederacea, Cissus hypoglauca, Eustrephus latifolius, Pandorea pandorana, Rubus rosifolius*
- Herbs *Dianella caerulea, Lomandra longifolia, Austrocynoglossum latifolium, Gymnostachys anceps, Urtica incisa, Senecio amygdalifolius, Carex longebrachiata*
- Grasses *Oplismenus imbecillis, Poa labillardieri*
- Ferns *Doodia aspera, Pteridium esculentum, Pellaea falcata, Hypolepis glandulifera, Calochlaena dubia*

Rare and Endangered Species

None

Relationship to Other Communities

Related to Vegetation Community 1–6 *(Eucalyptus* spp. forest of lower altitudes).

Equivalent Vegetation Types

This Community has elements of the following types:

Binns (1996):

BARov 3 (Waterhousia floribunda)
BARov 5 *(Backhousia myrtifolia-Tristianopsis laurina)*
BARov 11.1 *(E.acmenoides-Allocasuarina torulosa)*
BARov 17.1 *(E.laevopinea)*
BARus 2 *(Waterhousia floribunda)*
BARus 5 *(Backhousia myrtifolia)*
BARus 16 *(Acacia irrorata-Doodia aspera)*
BARus 17 *(Imperata cylindrica-Desmodium varians)*
BARus 18 *(Poa sieberiana-Desmodium varians)*
BARus 19 *(Poa sieberiana-Lomandra longifolia)*

Hager & Benson (1994)

EF479a *(E.laevopinea)*
EF505e *(E.campanulata)*
EF011e *(E.saligna-E.laevopinea)*
EF479f *(E.laevopinea-E.microcorys)*
RF 208 *(Backhousia myrtifolia-Lophostemon confertus-Tristianopsis laurina)*
RF205 *(Waterhousia floribunda-Tristianopsis laurina)*

Specht et al. (1995)

104 *(Choricarpia leptopetala-Backhousia myrtifolia)*

200 (*E.acmenoides-E.pilularis-E.microcorys- Syncarpia glomulifera)*

Distribution

Inside National Park boundaries

Not common. Occurs on eastern and western slopes, with *E.laevopinea, E.saligna, Lomandra longifolia* common in the west, *and E.microcorys, Backhousia myrtifolia, Waterhousia floribunda, Doodia aspera* more common in the east.

Outside National Park Boundaries

Widespread, but not extensive. Located primarily in riparian zones.

Environmental Correlates

Occurs at lower latitudes (240–760 m), in warm and moderately moist and rugged locations in riparian zones.

Threats

Exotic Species

Ageratina riparia, Lantana camara

Fire

Due to the small areas covered by this community, it is subject to local extinction through fires, particularly if repeated. The moist conditions in which this community occurs, however, suggest that fires do not progress rapidly and are likely to be uncommon.

Information for Fire Management

Average Total Number of Species: 56.53	Species With Known Plant Responses: 38%	Resprouter: Seeder Ratio: 1.09

Seeder Species (including exotics)

Acacia maidenii
Acacia melanoxylon
Asplenium australasicum
Astrotricha latifolia
Banksia integrifolia
Billardiera scandens
Breynia oblongifolia
Cirsium vulgare
Clematis aristata
Crassula sieberiana
Daucus glochidiatus
Davallia pyxidata
Dichondra repens
Dictymia brownii
Echinopogon ovatus
Galium binifolium
Glycine clandestina
Gnaphalium gymnocephalum
Gnaphalium involucratum
Gonocarpus tetragynus
Goodenia ovata
Gratiola peruviana
Hakea eriantha
Helichrysum bracteatum
Hibbertia scandens
Hydrocotyle laxiflora
Hypericum gramineum
Hypolepis glandulifera
Indigofera australis
Lagenifera stipitata
Omalanthus populifolius
Pandorea pandorana
Pittosporum undulatum
Poranthera microphylla
Pyrrosia confluens
Pyrrosia rupestris
Rapanea howittiana
Senecio hispidulus
Senecio linearifolius
Senecio madagascariensis
Senecio minimus
Sigesbeckia orientalis
Solanum aviculare
Solanum prinophyllum
Stellaria flaccida
Veronica notabilis
Viola hederacea

Community 4: *Lepidosperma laterale* — mixed species shrubland (occasionally some trees)

Description

20 Species With Highest Mean Cover and/or Species Common To > 50% of Plots

- Trees *Eucalyptus cypellocarpa, Eucalyptus macrorhyncha* (not in National Park), *Eucalyptus acmenoides*
- Shrubs *Grevillea granulifera* (not in National Park), *Pomaderris helianthemifolia, Westringia eremicola, Acacia irrorata, Gonocarpus oreophilus, Micrantheum hexandrum, Ozothamnus diosmifolius, Pomaderris argyrophylla, Zieria smithii, Correa reflexa, Leptospermum variabile*
- Herbs *Lepidosperma laterale, Carex breviculmis, Hypericum gramineum*
- Grasses *Entolasia stricta, Imperata cylindrica var major*
- Ferns *Cheilanthes sieberi*

Rare and Endangered Species

Grevillea granulifera (not in National Park)

Relationship to Other Communities

Related to Vegetation Community 1–6 (*Eucalyptus* spp. forest of lower altitudes). Very closely related to Vegetation Community 5.

Equivalent Vegetation Types

This Vegetation Community contains elements of the following types:

Binns (1996):

BARus 11 (*Ozothamnus diosmifolius-Gonocarpus oreophilus*)
BARus 20 *(Leptospermum variabile-Pomaderris argyrophylla)*
BARus 22 *(Pomaderris helianthemifolia-Westringia eremicola)*

Hager & Benson (1994)

EF418a *(E.cypellocarpa)*
Specht et al. (1995)
285 *(E.cypellocarpa-E.obliqua-E.radiata)*
290 *(E.fastigata-E.viminalis-E.obliqua-E.cypellocarpa)*

Distribution

Inside National Park boundaries

Rare, on eastern (e.g. Karuah River) and western (Moonan Brook, Carrow Brook) slopes.

Outside National Park Boundaries

Occurs more extensively on the slopes north-west of the National Park boundaries, but only in small patches.

Environmental Correlates

Occurs on relatively dry, rocky, infertile, and rugged sites away from basic igneous rock (tertiary basalt) at altitudes from 630–1130 m.

Threats

Exotic Species

None

Fire

Due to the small areas covered by this community, it is subject to local extinction through fires, particularly if repeated. The rocky substrate on which this community occurs, however, suggest that fires do not progress well.

Information for Fire Management

Average Total Number of Species: 28.80	Species With Known Plant Responses: 51%	Resprouter: Seeder Ratio: 1.47

Seeder Species (including exotics)

Acacia melanoxylon
Acacia ulicifolia
Banksia integrifolia
Clematis aristata
Comesperma volubile
Crassula sieberiana
Dichondra repens
Galium binifolium
Glycine clandestina
Gnaphalium gymnocephalum
Hibbertia acicularis
Hydrocotyle laxiflora
Hypericum gramineum
Lagenifera stipitata
Monotoca scoparia
Opercularia aspera
Oxylobium ilicifolium
Phyllanthus gunnii
Pittosporum undulatum
Poranthera microphylla
Pyrrosia rupestris
Solanum prinophyllum
Solanum pungetium

Community 5: *Eucalyptus nobilis* — mixed sedgeland

Description

20 Species With Highest Mean Cover and/or Species Common To > 50% of Plots

- Trees *Eucalyptus nobilis*
- Vines *Rubus parvifolius*
- Herbs *Acaena novae-zelandiae, Carex appressa, Geranium potentilloides, Hydrocotyle peduncularis, Lomandra longifolia, Prunella vulgaris, Carex inversa, Carex lobolepis, Cirsium vulgare, Cyperus lucidus, Gratiola peruviana, Haloragis heterophylla, Juncus pauciflorus, Juncus sarophorus, Pratia purpurascens, Ranunculus plebeius, Rumex brownii, Schoenus apogon,*

Trifolium repens, Urtica incisa, Carex longebrachiata, Juncus alexandri, Hydrocotyle peduncularis, Bulbine bulbosa, Carex fascicularis, Carex appressa

- Grasses *Poa labillardieri, Imperata cylindrica*
- Ferns *Pteridium esculentum*

Rare and Endangered Species

None

Relationship to Other Communities

Related to Vegetation Community 1–6 (*Eucalyptus* spp. forest of lower altitudes). Very closely related to Vegetation Community 4.

Equivalent Vegetation Types

This Vegetation Community contains elements of the following types:

Binns (1996):

BARus 13 (*Lomandra longifolia-Juncus alexandri*)

Hager & Benson (1994)

EF479d (E.*laevopinea-E.nobilis*)
Specht et al. (1995)
No equivalent

Distribution

Inside National Park boundaries

Rare, in small areas in Mount Cockrow area.

Outside National Park Boundaries

Locally abundant on fertile loamy soils on the eastern slopes of the Northern Tablelands.

Environmental Correlates

Occurs on fertile, moist, moderately steep sites, mostly on soils derived from basic igneous rock.

Threats

Exotic Species

Holcus lanatus, Sonchus asper spp glaucescens, Verbena bonariensis, V.officinalis.

Fire

Due to the small areas covered by this community, it is subject to local extinction through fires, particularly if repeated.

Information for Fire Management

Average Total Number of Species: 35.00	Species With Known Plant Responses: 28%	Resprouter: Seeder Ratio: 0.71

Seeder Species (including exotics)

Acacia melanoxylon	Gratiola peruviana
Asperula scoparia	*Hypolepis glandulifera*
Banksia integrifolia	*Schoenus apogon*
Cirsium vulgare	*Senecio minimus*
Gnaphalium gymnocephalum	*Viola hederacea*
Gnaphalium involucratum	

Community 6: Eucalyptus canaliculata -Eucalyptus acmenoides -Eucalyptus saligna open forest over Imperata cylindrica-Poa labillardieri grassland

Description

20 Species With Highest Mean Cover and/or Species Common To > 50% of Plots

- Trees *Eucalyptus acmenoides, Eucalyptus saligna, Eucalyptus canaliculata, Allocasuarina torulosa, Eucalyptus campanulata, Syncarpia glomulifera, Eucalyptus carnea, Eucalyptus laevopinea*
- Shrubs *Acacia irrorata, Swainsona galegifolia, Breynia oblongifolia, Persoonia linearis, Psychotria loniceroides*
- Vines *Desmodium varians, Dianella caerulea, Rubus parvifolius, Hardenbergia violacea, Clematis aristata, Cissus antarctica, Hibbertia scandens*
- Herbs *Glycine clandestina, Sigesbeckia orientalis, Dichondra repens, Lomandra longifolia, Pratia purpurascens*
- Grasses *Imperata cylindrica, Poa labillardieri, Plectranthus parviflorus, Themeda australis*
- Ferns *Pteridium esculentum*

Rare and Endangered Species

None

Relationship to Other Communities

Related to Vegetation Community 1–5 (*Eucalyptus* spp. forest of lower altitudes).

Equivalent Vegetation Types

This Vegetation Community contains elements of the following types:

Binns (1996):

BARov 13.1 (E.carnea-Allocasuarina torulosa)
BARov 13.2 *(E.carnea-E.maculata)*
BARov 14 *(A.torulosa-E.tereticornis-E.eugenioides)*
BARov 15 *(E.melliodora-E.eugenioides-E.tereticornis)*
BARov 21 *(E.campanulata)*
BARus 17 *(Imperata cylindrica-Desmodium varians)*

Hager & Benson (1994)

EF095a *(E.acmenoides)*
EF095d *(E.acmenoides-E.tereticornis-A.torulosa)*
EF077b *(E.canaliculata-E.eugenioides-A.torulosa)*

Specht et al. (1995)

No equivalent

Distribution

Inside National Park boundaries

Widespread in an arc along the southern edge of the study area.

Outside National Park Boundaries

Elements of this community occur along the North and Central Coast regions at altitudes over 300 m.

Environmental Correlates

Occurs on lower slopes (140–600 m) in warm but dry sites on soils with low fertility derived mostly from low quartz sedimentary rock.

Threats

Exotic Species

Ageratina adenophora, Bidens pilosa, Centaurium erythraea, Centella asiatica, Conyza albida, Conyza bonariensis, Lantana camara, Passiflora subpeltata, Setaria pumila, Solanum nigrum, Sporobolus pyramidalis, Taraxacum officinale, Verbena bonariensis

Fire

Subject to fires from adjacent farm properties.

Information for Fire Management

Average Total Number of Species: 51.84	Species With Known Plant Responses:43 %	Resprouter: Seeder Ratio: 1.28

Seeder Species (including exotics)

Acacia maidenii
Acacia melanoxylon
Acacia obtusifolia
Acacia ulicifolia
Anagallis arvensis
Arthropteris tenella
Astrotricha latifolia
Billardiera scandens
Breynia oblongifolia
Callitris macleayana
Centaurium erythraea
Cirsium vulgare
Clematis aristata
Convolvulus erubescens
Conyza bonariensis
Crassula sieberiana
Daucus glochidiatus
Davallia pyxidata
Desmodium rhytidophyllum
Dichondra repens
Dichopogon strictus
Echinopogon ovatus
Galium gaudichaudii
Geranium potentilloides
Geranium solanderi
Glycine clandestina
Gnaphalium gymnocephalum
Gonocarpus tetragynus
Gonocarpus teucrioides
Helichrysum bracteatum
Hibbertia aspera
Hibbertia linearis
Hibbertia scandens
Hydrocotyle laxiflora
Hypericum gramineum
Hypochaeris radicata
Indigofera australis
Kennedia rubicunda
Lagenifera stipitata
Opercularia aspera
Opercularia diphylla
Oxylobium ilicifolium
Pandorea pandorana
Pittosporum undulatum
Poranthera microphylla
Pyrrosia confluens
Pyrrosia rupestris
Rapanea howittiana
Scaevola albida
Schoenus apogon
Senecio diaschides
Senecio lautus
Senecio linearifolius
Senecio madagascariensis
Sigesbeckia orientalis
Solanum nigrum
Solanum prinophyllum
Solanum pungetium
Sonchus oleraceus
Stackhousia viminea
Stellaria flaccida
Tricoryne elatior
Viola hederacea
Wahlenbergia stricta

Community 7: Rain Forest (Eucalyptus species absent)

Description

20 Species With Highest Mean Cover and/or Species Common To > 50% of Plots

- Trees *Pennantia cunninghamii, Daphnandra species A, Diploglottis australis, Doryphora sassafras, Dysoxylum fraserianum, Acmena smithii, Alectryon subcinereus, Caldcluvia paniculosa, Neolitsea dealbata, Polyosma cunninghamii, Dendrocnide excelsa, Diospyros australis, Syzygium australe, Baloghia inophylla, Acradenia euodiiformis, Schizomeria ovata, Orites excelsa, Sloanea woollsii*
- Shrubs *Citriobatus pauciflorus, Eupomatia laurina, Tasmannia insipida*
- Vines *Cissus antarctica, Morinda jasminoides, Palmeria scandens, Pandorea pandorana, Cissus hypoglauca, Parsonsia straminea*
- Herbs *Lomandra spicata, Gymnostachys anceps, Sarcochilus falcatus*
- Ferns *Arthropteris tenella, Asplenium australasicum, Adiantum formosum, Microsorum scandens, Pyrrosia confluens, Lastreopsis microsora, Pteris umbrosa*, *Lastreopsis decomposita*

Rare and Endangered Species

Daphnandra sp. A

Relationship to Other Communities

Related to Vegetation Community 8 (*Eucalyptus saligna* dominated wet sclerophyll)

Equivalent Vegetation Types

This Vegetation Community contains elements of the following types:

Binns (1996):

BARov 2.1 (*Acradenia eudiiformis*)
BARov 2.2 *(Sloanea woollsii-Pennantia cunninghamii)*
BARov 6.1 *(Caldcluvia paniculosa-Doryphora sassafras-Schizomeria ovata)*
BARov 6.2 *(Sloanea woollsia-Doryphora sassafras)*
BARov 6.3 *(Sloanea woollsia-Schizomeria ovata-Caldcluvia paniculosa)*
BARov 10.1 *(E.saligna)*
BARus 1 *(Cissus antarctica-Lastreopsis microsora)*
BARus 4 *(Doryphora sassafras)*
BARus 6 *(Tristianopsis collina-Cryptocarya rigida)*
BARus 7 *(Guioa semiglauca-Croton verreauxii)*

Hager & Benson (1994)

RF111 *(Sloanea woolsii-Dysoxylum fraserianum-Heritiera actinophylla-Caldcluvia paniculata)*
RF112 *Schizomeria ovata-Doryphora sassafras-Caldcluvia paniculata-Cryptocarya glaucescens*
RF113 *(Doryphora sassafras-Daphnandra micrantha -Dendrocnide excelsa-Ficus spp.–Toona australis)*

Floyd (1990)

A III 12 (=RF111 of Hager & Benson1994)
A III 13 (=RF112 of Hager & Benson1994)
A III 12 (=RF113 of Hager & Benson1994)
B X 39 *(Schizomeria-Doryphora-Caldcluvia-Orites)*

Distribution

Inside National Park boundaries

Throughout southern parts of the study area.

Outside National Park Boundaries

Not investigated

Environmental Correlates

Occurs in relatively warm sites on lower slopes and in riparian zones on soils with low fertility, derived primarily from low quartz sedimentary rock.

Threats

Exotic Species

Ageratina adenophora, A.riparia, Phytolacca octandra

Fire

Sensitive to fire. However, given the moist conditions in which this community is found, it is unlikely that fire poses a threat, except at the edges.

Information for Fire Management

Average Total Number of Species: 51.04	Species With Known Plant Responses: 19%	Resprouter: Seeder Ratio: 0.96

Seeder Species (including exotics)

Acacia melanoxylon	Gratiola peruviana
Adiantum diaphanum	*Pandorea pandorana*
Arthropteris tenella	*Phytolacca octandra*
Asplenium australasicum	*Pittosporum undulatum*
Astrotricha latifolia	*Pyrrosia confluens*
Breynia oblongifolia	*Pyrrosia rupestris*
Clematis aristata	*Rapanea howittiana*
Davallia pyxidata	*Solanum aviculare*
Dictymia brownii	*Solanum prinophyllum*
Echinopogon ovatus	*Solanum pungetium*
Galium binifolium	*Viola hederacea*
Glycine clandestina	

Community 8: *Eucalyptus saligna* open forest over rainforest understorey

Description

20 Species With Highest Mean Cover and/or Species Common To > 50% of Plots

- Trees *Synoum glandulosum, Eucalyptus saligna, Acmena smithii, Caldcluvia paniculosa, Cryptocarya glaucescens, Diospyros australis, Schizomeria ovata, Tristaniopsis collina, Daphnandra species A, Cryptocarya rigida, Elaeocarpus reticulatus, Rapanea variabilis, Rhodamnia rubescens, Dysoxylum fraserianum, Guioa semiglauca, Eucalyptus campanulata, Endiandra sieberi, Acacia melanoxylon, Neolitsea australiensis, Cryptocarya meissneriana*
- Shrubs *Citriobatus pauciflorus, Tasmannia insipida, Eupomatia laurina, Psychotria loniceroides, Trochocarpa laurina, Archirhodomyrtus beckleri*
- Vines *Smilax australis, Parsonsia straminea, Cephalaralia cephalobotrys, Cissus antarctica, Dioscorea transversa, Cissus hypoglauca, Geitonoplesium cymosum, Palmeria scandens*
- Herbs *Gymnostachys anceps, Sarcochilus falcatus*
- Ferns *Blechnum cartilagineum, Pyrrosia rupestris*

Rare and Endangered Species

None

Relationship to Other Communities

Related to Vegetation Community 7 (rain forest)

Equivalent Vegetation Types

This Vegetation Community contains elements of the following types:

Binns (1996):

BARov 10.1 (*E. saligna*)
BARov 21 *(E. campanulata)*
BARus 6 *(Tristianopsis collina-Cryptocarya rigida)*
BARus 8 *(Nothofagus moorei)*
Hager & Benson (1994)
EF011a *(E. saligna)*
EF011c *(E. saligna-E. laevopinea)*
EF011e *(E. saligna-E. quadrangulata)*

Specht et al. (1995)

159 *(E. saligna-E. microcorys)*

Distribution

Inside National Park boundaries

Throughout the southern parts of the study area. Particularly common in the Whispering Gully area

Outside National Park Boundaries

Occurs along the coastal and escarpment zones northward from the central South Coast.

Environmental Correlates

Occurs in warm, riparian, and other moist locations, on relatively steep slopes and in gullies with moderately fertile soils mostly derived from low quartzose sedimentary rock.

Threats

Exotic Species

None

Fire

Many species within this community are sensitive to fire. Episodic fires are, however, required for the maintenance of this community.

Information for Fire Management

Average Total Number of Species: 49.22	Species With Known Plant Responses: 26%	Resprouter: Seeder Ratio: 1.49

Known Seeder Species (including exotics)

Acacia maidenii
Acacia melanoxylon
Adiantum diaphanum
Arthropteris tenella
Asplenium australasicum
Astrotricha latifolia
Banksia integrifolia
Breynia oblongifolia
Callitris macleayana
Cirsium vulgare
Clematis aristata
Davallia pyxidata
Dictymia brownii
Gonocarpus teucrioides
Hibbertia scandens
Hydrocotyle laxiflora
Hypolepis glandulifera
Pandorea pandorana
Pittosporum undulatum
Pyrrosia confluens
Pyrrosia rupestris
Rapanea howittiana
Sigesbeckia orientalis
Solanum aviculare
Solanum prinophyllum
Veronica notabilis
Viola hederacea

Community 9: *Eucalyptus fastigata-Eucalyptus obliqua-Eucalyptus dalrympleana-Eucalyptus laevopinea-Eucalyptus pauciflora* open forest over *Poa sieberiana* grassland

Description

20 Species With Highest Mean Cover and/or Species Common To > 50% of Plots

- Trees *Eucalyptus fastigata, Eucalyptus obliqua, Eucalyptus dalrympleana, Eucalyptus laevopinea, Eucalyptus pauciflora, Acacia melanoxylon, Eucalyptus nobilis, Eucalyptus dalrympleana ssp heptantha*
- Shrubs *Leucopogon hookeri, Acacia dealbata, Coprosma quadrifida*
- Vines *Glycine clandestina, Clematis aristata, Rubus parvifolius, Smilax australis*
- Herbs *Poranthera microphylla, Viola hederacea, Viola betonicifolia, Dichondra repens, Pratia pedunculata, Asperula conferta, Hydrocotyle laxiflora, Oreomyrrhis eriopoda, Brachycome microcarpa, Lomandra longifolia, Hydrocotyle acutiloba, Wahlenbergia ceracea*
- Grasses *Poa sieberiana*
- Ferns *Pteridium esculentum*

Rare and Endangered Species

Acacia barringtonensis, Tasmannia glaucifolia, Tasmannia purpurascens

Relationship to Other Communities

Related to Vegetation Community 10–13 (*Eucalyptus* spp. forest of higher altitudes)

Equivalent Vegetation Types

This Vegetation Community contains elements of the following types:

Binns (1996):

BARov 18 (E.obliqua)
BARov 19.1 *(E.fastigata)*
BARov 20 *(E.nobilis)*
BARov 21 *(E.campanulata)*
BARov 22 *(E.dalrympleana-Epauciflora)*
BARus 18 *(Poa sieberiana-Desmodium varians)*
BARus 19 *(Poa sieberiana-Lomandra longifolia)*

Hager & Benson (1994)

EF475a *(E.obliqua)*
EF475e*(E.obliqua-E.fastigata)*
EF477a *(E.fastigata)*
EF477c*(E.fastigata-E.nobilis)*
EF414a *(E.nobilis)*
EF413a *(E.dalrympleana)*
EF411a *(E.pauciflora)*

Specht et al. (1995)

290 *(E. fastigat-E. viminalis-E. obliqua-E. cypellocarpa)*

Distribution

Inside National Park boundaries

Common on the plateaux. Extensive north of the study area.

Outside National Park Boundaries

Found primarily on the eastern side of the Tablelands, in moist locations.

Environmental Correlates

Occurs in moderately flat situations between 840–1500 m altitude on soils of moderate fertility.

Threats

Exotic Species

Centaurium tenuiflorum, Conyza albida, Cytisus scoparius var. scoparius, Lotus corniculatus, Sonchus asper spp. glaucescens, Taraxacum officinale

Fire

Subject to wild fires from the west during late winter in dry years

Information for Fire Management

Average Total Number of Species: 42.77	Species With Known Plant Responses: 49%	Resprouter: Seeder Ratio: 0.77

Known Seeder Species (including exotics)

Acacia dealbata
Acacia maidenii
Acacia melanoxylon
Acacia ulicifolia
Adiantum diaphanum
Arrhenechthites mixta
Asperula scoparia
Banksia integrifolia
Billardiera scandens
Cerastium glomeratum
Cirsium vulgare
Clematis aristata
Coprosma nitida
Crassula sieberiana
Dichondra repens
Echinopogon ovatus
Galium binifolium
Galium gaudichaudii
Geranium potentilloides
Geranium solanderi
Glycine clandestina
Gnaphalium gymnocephalum
Gnaphalium involucratum
Gonocarpus tetragynus
Gonocarpus teucrioides
Gratiola peruviana
Hakea eriantha
Helichrysum apiculatum
Helichrysum bracteatum
Helichrysum dendroideum
Hibbertia scandens
Hybanthus monopetalus
Hydrocotyle laxiflora
Hypericum gramineum
Hypochaeris radicata
Indigofera australis
Lagenifera stipitata
Leucopogon lanceolatus
Lobelia gibbosa
Olearia phlogopappa
Oxylobium ilicifolium
Pandorea pandorana
Poranthera microphylla
Prostanthera lasianthos
Pyrrosia confluens
Pyrrosia rupestris
Schoenus apogon
Senecio diaschides
Senecio hispidulus
Senecio lautus
Senecio linearifolius
Senecio minimus
Sigesbeckia orientalis
Solanum prinophyllum
Stellaria flaccida
Veronica notabilis
Viola hederacea
Wahlenbergia stricta

Community 10: *Eucalyptus stellulata* open forest over *Cytisus scoparius* var. *scoparius* shrubland over *Poa sieberiana* grassland

Description

20 Species With Highest Mean Cover and/or Species Common to > 50% of Plots

- Trees *Eucalyptus stellulata, Eucalyptus pauciflora*
- Shrubs *Cytisus scoparius, Hakea microcarpa, Leucopogon hookeri, Epacris breviflora, Tasmannia purpurascens, Hakea microcarpa*
- Herbs *Acaena novae-zelandiae, Viola hederacea, Oreomyrrhis eriopoda, Trifolium repens, Dichondra repens, Senecio lautus, Chiloglottis pluricallata, Asperula gunnii, Empodisma minus*
- Grasses *Poa sieberiana, Poa labillardieri*

Rare and Endangered Species

Asperula asthenes, Euphrasia ciliolata, Tasmannia glaucifolia, Tasmannia purpurascens

Relationship to Other Communities

Related to Vegetation Communities 9–13 (*Eucalyptus* spp. forest of higher altitudes)

Equivalent Vegetation Types

This Vegetation Community contains elements of the following types:

Binns (1996):

No equivalent

Hager & Benson (1994)

EF411b *(E.pauciflora-E.stellulata)*

Specht et al. (1995)

247 *(E.paucifflora-E.stellulata-E.camphora)*

Distribution

Inside National Park boundaries

Restricted to riparian zones and edges of sub-alpine swamps on plateaux

Outside National Park Boundaries

Throughout cold and frosty sites on the Tablelands.

Environmental Correlates

Occurs on cold, flat, and damp sites at high altitudes (1430-1500 m), on fertile soils derived primarily from basic igneous rock

Threats

Exotic Species

Cytisus scoparius

Fire

Subject to wild fires from the west during late winter in dry years

Information for Fire Management

Average Total Number of Species: 26.83	Species With Known Plant Responses: 25%	Resprouter: Seeder Ratio: 1.05

Known Seeder Species (including exotics)

Acacia dealbata	*Hydrocotyle laxiflora*
Acacia melanoxylon	*Hypericum gramineum*
Cerastium semidecandrum	*Hypochaeris radicata*
Cirsium vulgare	*Pimelea linifoli*
Clematis aristata	*Poranthera microphylla*
Dichondra repens	*Viola hederacea*
Geranium solanderi	*Wahlenbergia stricta*
Gnaphalium involucratum	

Community 11: *Eucalyptus pauciflora* open forest over *Tasmannia purpurescens* shrubland over mixed herbland

Description

20 Species With Highest Mean Cover and/or Species Common To > 50% of Plots

- Trees *Eucalyptus pauciflora, Elaeocarpus holopetalus, Eucalyptus dalrympleana, Eucalyptus viminalis*
- Shrubs *Acacia melanoxylon, Tasmannia purpurascens, Leucopogon hookeri, Coprosma nitida, Olearia oppositifolia, Acacia dealbata, Elaeocarpus holopetalus, Leptospermum polygalifolium, Callistemon pallidus,*
- Vines *Smilax australis*
- Herbs *Viola hederacea, Hydrocotyle laxiflora, Pratia pedunculata, Asperula gunnii, Stellaria flaccida, Gaultheria appressa*
- Grasses *Poa sieberiana*
- Ferns *Polystichum proliferum, Dicksonia antarctica*

Rare and Endangered Species

Acacia barringtonensis, Tasmannia glaucifolia, Tasmannia purpurascens

Relationship to Other Communities

Related to Vegetation Communities 9–13 (*Eucalyptus* spp. forest of higher altitudes). Closely related to Vegetation Community 12, which tends to occur adjacent to it.

Equivalent Vegetation Types

This Vegetation Community contains elements of the following types:

Binns (1996):

BARov 9 (*Elaeocarpus holopetalus-Atherosperma moschatum-Leptospermum polygalifolium)*
BARov 19.2 *(Acacia dealbata-E.fastigata)*
BARus 10 *(Acacia dealbata-Prostanthera lasianthos)*
BARus 12 *(Leptospermum polygalifolium-Elaeocarpus holopetalus)*

Hager & Benson (1994)

EF411c *(E. pauciflora-E. dalrympleana)*
EF411d *(E. pauciflora-E. viminalis)*
RF 410 *(Elaeocarpus holopetalus)*

Specht et al. (1995)

237 *(E.delegatensis-E.pauciflora-E.rodwayi)*
242 *(E.pauciflora-E.rubida)*
251 *(E.nova-anglica-E.pauciflora-E.dalrympleana)*

Distribution

Inside National Park boundaries

Restricted to riparian/moist zones in highest parts of the Barrington Tops plateau.

Outside National Park Boundaries

Occurs throughout the Tablelands region.

Environmental Correlates

Occurs on cold, flat, and damp sites at high altitudes (1310-1540 m), on fertile soils almost always derived from basic igneous rock

Threats

Exotic Species

None

Fire

Subject to wild fires from the west during late winter in dry years

Information for Fire Management

Average Total Number of Species: 35.57	Species With Known Plant Responses: 39%	Resprouter: Seeder Ratio: 0.87

Seeder Species (including exotics)

Acacia dealbata	*Lagenifera stipitata*
Acacia melanoxylon	*Olearia phlogopappa*
Clematis aristata	*Poranthera microphylla*
Coprosma nitida	*Prostanthera lasianthos*
Echinopogon ovatus	*Pyrrosia rupestris*
Galium gaudichaudii	*Senecio velleioides*
Geranium potentilloides	*Stellaria flaccida*

Gonocarpus teucrioides *Stellaria media*
Gratiola peruviana *Veronica notabilis*
Hydrocotyle laxiflora *Viola hederacea*
Hypericum gramineum *Wahlenbergia stricta*

Community 12: Sedgeland

Description

20 Species With Highest Mean Cover and/or Species Common To > 50% of Plots

- Trees *Eucalyptus pauciflora, Eucalyptus dalrympleana*
- Shrubs *Leptospermum argenteum, Epacris* Unknown*, Cytisus scoparius, Baeckea utilis, Persoonia chamaepeuce, Hakea microcarpa*
- Herbs *Restio stenocoleus, Empodisma minus, Lomandra longifolia, Carex gaudichaudiana, Eleocharis sphacelata, Isolepis habra, Scirpus polystachyus, Hypericum gramineum, Acaena novae-zelandiae, Hypochoeris radicata, Ranunculus pimpinellifolius*
- Grasses *Poa costiniana, Poa sieberiana, Deyeuxia gunniana*

Rare and Endangered Species

Acacia barringtonensis, Plantago cladarophylla, Tasmannia glaucifolia, Tasmannia purpurascens

Relationship to Other Communities

Related to Vegetation Community 9–13 (*Eucalyptus* spp. forest of higher altitudes). Closely related to Vegetation Community 11, which tends to occur adjacent to it

Equivalent Vegetation Types

This Vegetation Community contains elements of the following types:

Binns (1996):

BARov 17.1 (E.laevopinea)
BARov 18 *(E.obliqua)*
BARus 18 *(Poa sieberiana-Desmodium varians)*
BARus 19 *(Poa sieberiana-Lomandra longifolia)*
BARus 23 *(Restio stenocoleus-Leptospermum argenteum)*

Hager & Benson (1994)

EF411c *(E.pauciflora-E.dalrympleana)*

Specht et al. (1995)

No equivalent

Distribution

Inside National Park boundaries

Restricted to wetlands on the plateaux

Outside National Park Boundaries

Occurs throughout frost flats in the Tableland region

Environmental Correlates

Occurs on cold, flat, damp, partially inundated sites at high altitudes (1200–1460 m), on fertile soils often derived from basic igneous rock

Threats

Exotic Species

Cytisus scoparius var. *scoparius*

Fire

Subject to wild fires from the west during late winter in dry years, though hindered by the wet conditions of this vegetation community

Information for Fire Management

Average Total Number of Species: 32.00	Species With Known Plant Responses: 32%	Resprouter: Seeder Ratio: 0.84

Known Seeder Species (including exotics)

Acacia melanoxylon
Comesperma ericinum
Dichondra repens
Gnaphalium gymnocephalum
Gonocarpus micranthus
Gonocarpus teucrioides
Gratiola peruviana
Helichrysum dendroideum
Hybanthus monopetalus
Hydrocotyle laxiflora
Hypericum gramineum
Hypochaeris radicata
Leucopogon lanceolatus
Monotoca scoparia
Olearia phlogopappa
Pimelea linifolia
Poranthera microphylla
Prostanthera lasianthos
Schoenus apogon
Senecio lautus
Stellaria flaccida
Utricularia dichotoma
Veronica notabilis
Viola hederacea
Wahlenbergia stricta

Community 13: *Eucalyptus obliqua* open forest over *Poa sieberiana* — mixed ferns herbland

Description

20 Species With Highest Mean Cover and/or Species Common To > 50% of Plots

- Trees *Eucalyptus obliqua, Eucalyptus fastigata, Eucalyptus campanulata*
- Shrubs *Coprosma quadrifida, Banksia integrifolia, Tasmannia stipitata, Acacia dealbata, Leucopogon lanceolatus, Astrotricha latifolia, Acacia elata*
- Vines *Smilax australis, Clematis aristata*
- Herbs *Lomandra longifolia, Hydrocotyle laxiflora, Dianella caerulea, Lepidosperma laterale, Viola hederacea*
- Grasses *Poa sieberiana, Microlaena stipoides*

- Ferns *Sticherus lobatus, Blechnum wattsii, Polystichum proliferum, Calochlaena dubia, Cyathea australis, Pteridium esculentum*

Rare and Endangered Species

Tasmannia purpurascens, Acacia barringtonensis

Relationship to Other Communities

Related to Vegetation Communities 10–13 (*Eucalyptus* spp. forest of higher altitudes)

Equivalent Vegetation Types

This Vegetation Community contains elements of the following types:

Binns (1996):

BARov 18 (E.obliqua)
BARov 19.1 *(E.fastigata)*
BARus 18 *(Poa sieberiana-Desmodium varians)*
BARus 19 *(Poa sieberiana-Lomandra longifolia)*
Hager & Benson (1994)
EF475a *(E.obliqua)*
EF475e *(E.obliqua-E.fastigata)*
EF425f *(E.obliqua-E.campanulata)*

Specht et al. (1995)

290 *(E.fastigat-E.viminalis-E.obliqua-E.cypellocarpa)*
158 *(E.campanulata-E.laevopinea-E.cypellocarpa-E.obliqua)*

Distribution

Inside National Park boundaries

Common at higher altitudes in central and northern parts of the study area

Outside National Park Boundaries

Found throughout the Central and Southern New England Tableland bioregion above 600-900 m.

Environmental Correlates

Occurs on moderately steep slopes from 1000 - 1380 m altitude, on soils of medium fertility derived primarily from low quartzose sedimentary rock.

Threats

Exotic Species

Conyza albida, Holcus lanatus

Fire

Not threatened by fire

Information for Fire Management

Average Total Number of Species: 35.88	Species With Known Plant Responses: 50%	Resprouter: Seeder Ratio: 0.95

Known Seeder Species (including exotics)

Acacia dealbata
Acacia melanoxylon
Acacia obtusifolia
Acacia ulicifolia
Asperula scoparia
Astrotricha latifolia
Banksia integrifolia
Billardiera scandens
Cirsium vulgare
Clematis aristata
Coprosma nitida
Dichondra repens
Echinopogon ovatus
Galium binifolium
Geranium potentilloides
Geranium solanderi
Glycine clandestina
Gnaphalium gymnocephalum
Gonocarpus tetragynus
Gonocarpus teucrioides
Goodenia ovata
Hakea eriantha
Helichrysum bracteatum
Hibbertia scandens
Hydrocotyle laxiflora
Lagenifera stipitata
Leucopogon lanceolatus
Monotoca scoparia
Oxylobium ilicifolium
Pandorea pandorana
Poranthera microphylla
Prostanthera lasianthos
Pyrrosia confluens
Pyrrosia rupestris
Rapanea howittiana
Senecio diaschides
Senecio linearifolius
Senecio minimus
Sigesbeckia orientalis
Solanum aviculare
Stellaria flaccida
Veronica notabilis
Viola hederacea
Wahlenbergia stricta

Community 14: *Nothofagus moorei* closed forest

Description

20 Species With Highest Mean Cover and/or Species Common To > 50% of Plots

- Trees *Nothofagus moorei, Doryphora sassafras, Eucalyptus fastigata, Schizomeria ovata, Caldcluvia paniculosa, Quintinia sieberi, Elaeocarpus holopetalus, Eucalyptus obliqua, Callicoma serratifolia, Eucalyptus dalrympleana,*
- Shrubs *Acacia elata, Trochocarpa sp. nov., Coprosma quadrifida*
- Vines *Smilax australis, Parsonsia brownii, Clematis aristata*
- Herbs *Prostanthera lasianthos, Veronica notabilis*
- Ferns *Dicksonia antarctica, Blechnum wattsii, Blechnum cartilagineum, Pyrrosia rupestris*

Rare and Endangered Species

Tasmannia purpurascens

Relationship to Other Communities

Most distinctive Vegetation Community of all communities delineated. Usually adjacent to any of Vegetation Communities 9–13, 7 or 8

Equivalent Vegetation Types

This Vegetation Community contains elements of the following types:

Binns (1996):

BARov 8 (Nothofagus moorei-Doryphora sassafras)
BARov 18 *(E.obliqua)*
BARus 8 *(Nothofagus moorei)*

Hager & Benson (1994)

RF 404 *(Nothofagus moorei-Elaeocarpus holopetalus)*
RF403 *(Nothofagus moorei-Doryphora sassafras-Orites excelsa-Caldcluvia paniculata)*

Specht et al. (1995)

38 *(Nothofagus moorei-Cryptocarya foveolata-Orites excelsa)*

Distribution

Inside National Park boundaries

Common on slopes at higher altitudes in central and northern parts of the study area

Outside National Park Boundaries

Found in restricted areas from the Barrington Tops to the Border Ranges.

Environmental Correlates

Occurs slopes or depressions at high altitudes (1040–1380 m), on moderately fertile soils and in moist conditions

Threats

Exotic Species

None

Fire

The edges of stands on the plateau are subject to wild fires in late winter during dry years.

Information for Fire Management

Average Total Number of Species: 22.09	Species With Known Plant Responses: 36%	Resprouter: Seeder Ratio: 1.07

Seeder Species (including exotics)

Acacia dealbata	*Lagenifera stipitata*
Acacia melanoxylon	*Leucopogon lanceolatus*
Banksia integrifolia	*Pandorea pandorana*
Clematis aristata	*Prostanthera lasianthos*
Dichondra repens	*Pyrrosia rupestris*
Geranium potentilloides	*Schoenus apogon*
Gonocarpus teucrioides	*Stellaria flaccida*
Gratiola peruviana	*Veronica notabilis*
Hibbertia scandens	*Viola hederacea*
Hydrocotyle laxiflora	