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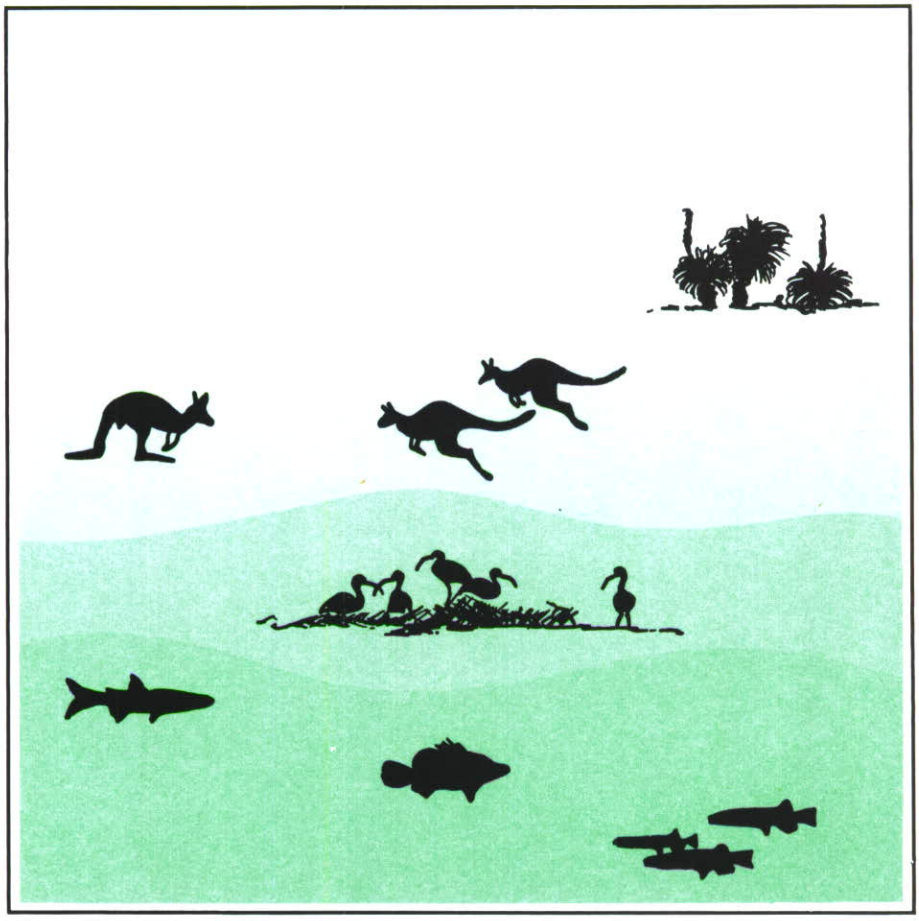
A Vegetation Survey of Tarra-Bulga National Park, Victoria

David A. Ashwell

January 1991



Department of Conservation & Environment - Victoria

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1 INTRODUCTION

Tarra-Bulga National Park is situated on the southerly fall of the Grand Ridge which constitutes the major axis of the eastern Strzelecki Ranges. This area (1500 ha) encompasses the small and formerly separate Tarra Valley and Bulga National Parks (reserved in 1908), the larger Macks Creek Reference Area (reserved 1983), and a relatively broad corridor between these areas (reserved 1986) (fig. 1). The park encloses the headwaters of both the Tarra River and Macks Creek in addition to one other minor catchment south-west of Balook. These are the only catchments on the southerly fall of the range which remain dominated by natural and semi-natural vegetation following the extensive land clearing and logging activities which occurred both prior to this century and during the 1930s.

The primary aim of this report is to classify, describe, and interpret the floristic and structural variation within the park's vegetation so that appropriate management actions may be addressed.

Particular concerns were:

i to classify, map and discuss vegetation units in a manner appropriate to management concerns over the next 20-30 years;

ii to identify areas and appropriate species for revegetation measures;

iii to assess the condition of the indigenous vegetation within the current additions to the park;

iv to determine the extent of severe infestations by introduced species of plants;

v to identify sites of other particular botanical interest or concern;

vi to consider appropriate fire regimes.

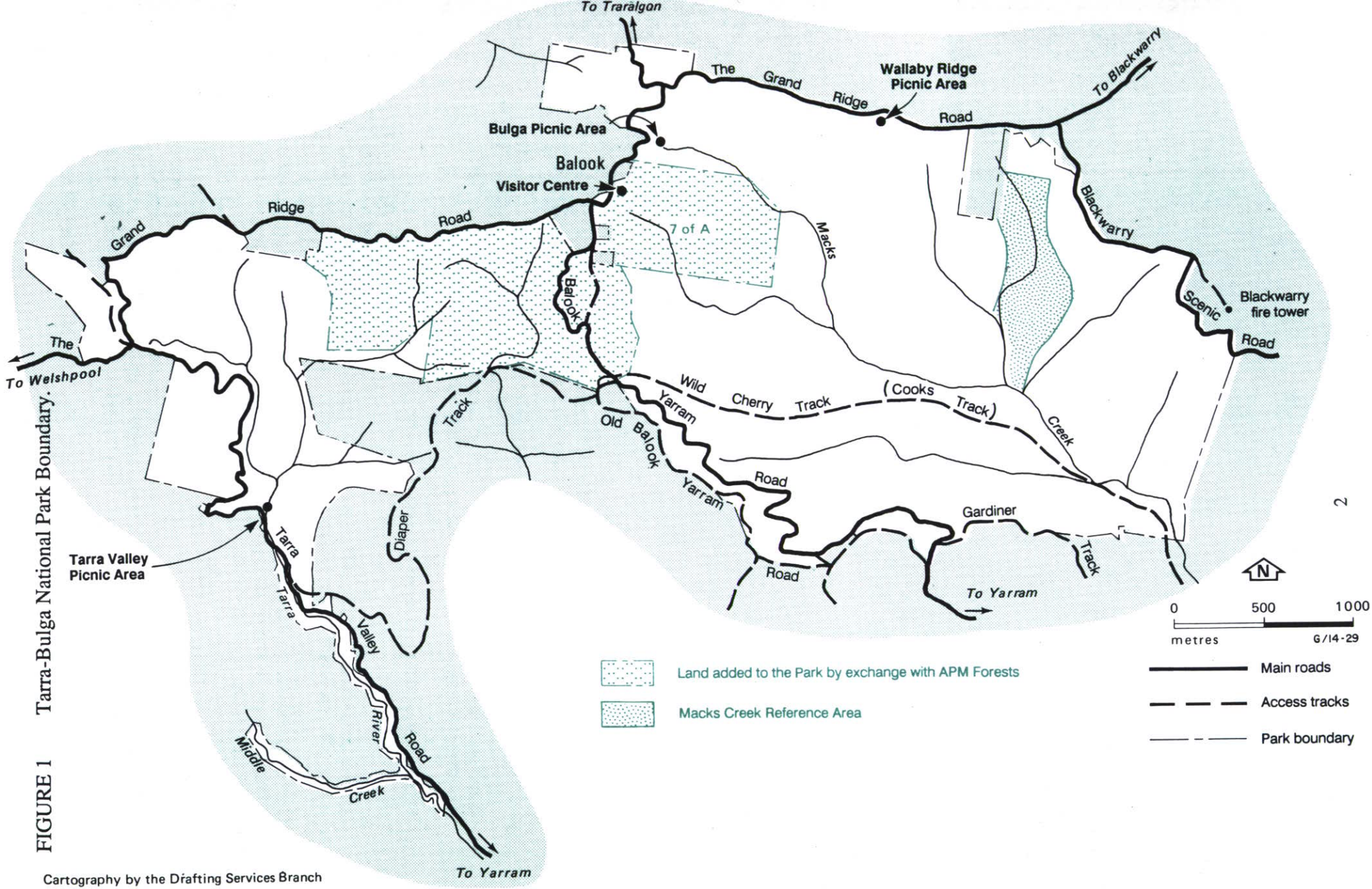


FIGURE 1 Tarra-Bulga National Park Boundary.

Cartography by the Drafting Services Branch

2 THE STUDY AREA

2.1 Geology and physiography

The Strzelecki Ranges are primarily composed of Cretaceous marine sediments which attain elevations in excess of 700 m. Early Tertiary basalts and freshwater conglomerates sometimes occur as thin cappings at elevations greater than 500 m. Basalts also occur at lower elevations as a fringe around the extensive Cretaceous sediments. These sediments underwent recurrent uplift during the middle and late Tertiary resulting in stream rejuvenation, the erosion of much of the basalt, and the subsequent deposition of material in the adjacent lowlands (Geological Survey of Victoria 1978).

The Cretaceous sediments occupy the entire area of the park, however small areas of the porous conglomerates occur along the Grand Ridge Road east of Bulga (Geological Survey of Victoria 1978) where a number of gravel pits are situated. The altitude within the park ranges from 280 m along Macks Creek to 700 m along Grand Ridge. A broad saddle connects Grand Ridge to Mt Tassie, 2.5 km to the north.

The study area is generally characterised by moderate to steep slopes, and narrow ridges which are seldom more than 500 m wide. However the physiography of the Tarra River and Macks Creek catchments differ considerably. This is primarily due to marked differences in their drainage patterns. Whilst both catchments feature only one fourth-order stream (fig. 2) the drainage pattern of Macks Creek is more dendritic, featuring many more first and second-order streams than the Tarra River catchment (table 1). In addition the Macks Creek catchment is characterised by both greater relief and a more pronounced east-west tendency of the third and fourth-order streams than the Tarra River catchment. This appears to be a consequence of the stronger impact of the Macks Creek Fault in this catchment than in nearby areas (Hunter 1972). The implications of this are considered in section 4.1.

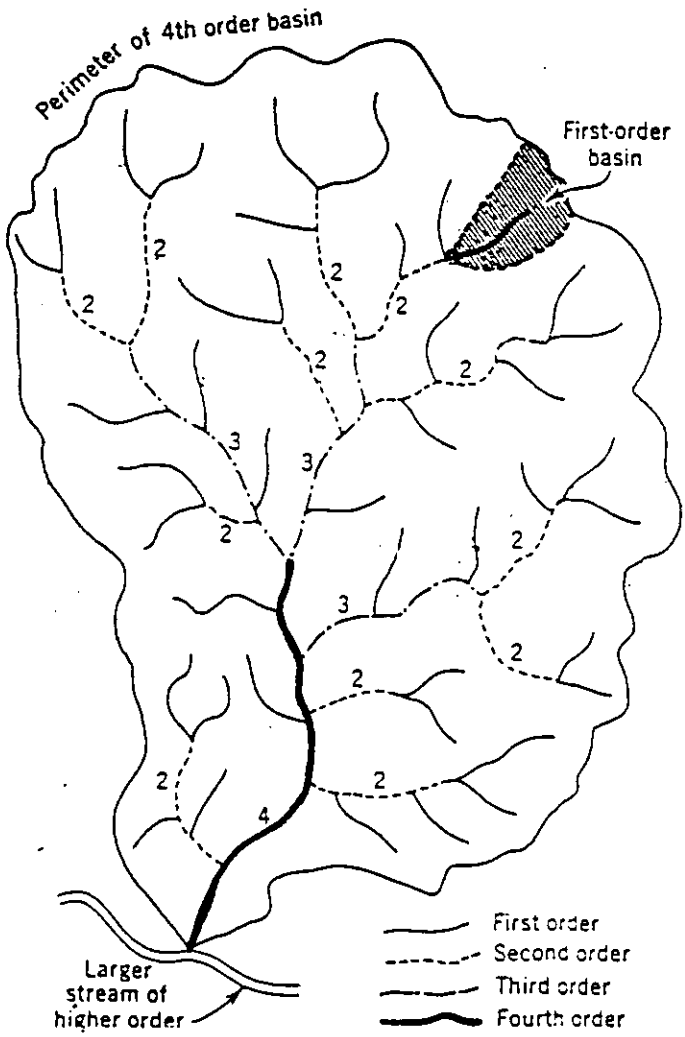
TABLE 1 Number of stream segments for the three catchments within the park.

Stream Order	Macks Ck (MC)	Tarra Valley (TV)	Balook	MC/TV ratio
1	70	24	12	2.9
2	19	9	4	2.1
3	3	2	1	1.5
4	1	1	-	1.0

2.2 Climate

The region experiences hot dry summers and cool wet winters in concordance with most of southern Victoria. Whilst no climatic data are available for the park itself, it is locally appreciated that the higher parts of the range experience high rainfall from April to October and are considerably cooler than the adjacent lowlands during summer. Days of low cloud and fog may add significantly to total precipitation at altitudes of above 500 m. Snow generally falls (at Balook) only once or twice a year (C. Ralph pers. comm.).

FIGURE 2 Hypothetical catchment showing orders of magnitude which may be assigned to stream segments (after Strahler 1965).



2.3 Vegetation

Three vegetation formations occur in the park - cool temperate rainforest/fern gully, wet sclerophyll forest and damp sclerophyll forest. Although the Tarra-Bulga National Park has long been renown as a reserve for fern gully vegetation and the associated *Nothofagus cunninghamii* (Myrtle Beech), this vegetation is strongly restricted by contour on all but the most sheltered aspects. More generally the park features wet sclerophyll forest communities. These are variously dominated by *Eucalyptus regnans* (Mountain Ash), *Acacia melanoxylon* (Blackwood), *Acacia dealbata* (Silver Wattle) and *Eucalyptus obliqua* (Messmate). Floristic and structural variation within the understorey reflects the influence of topography, fire history and varying degrees of disturbance by human activities. Wet sclerophyll forest grades into damp sclerophyll forests on drier sites where topography restricts the development of an understorey dominated by mesophyllic shrubs and ferns; and to moist fern gully communities where topography and fire history allow. In addition some extensive, modified and heavily modified areas once subject to logging and farming are present (fig. 3).

Whilst a degree of floristic continuity exists between fern gully and wet sclerophyll communities, the two formations have differing evolutionary histories and exhibit important ecological differences. Sclerophyllous forest communities are regarded as part of a peculiarly Australian flora that came into prominence during the Tertiary period when fire and low soil fertility conditioned the flora. In contrast, fern gully communities are dominated by plants belonging to taxa with affinities to an earlier period when Australian vegetation was dominated by rainforest. In particular, they are dominated by ferns and are characterised by a marked absence of the typically Australian plant families such as Myrtaceae (Patton 1933). Of the few tree species present, both *Atherosperma moschatum* (Southern Sassafras) and *Hedycarya angustifolia* (Austral Mulberry) are the only members of the largely tropical family Monimiaceae to occur in Victoria. In contrast, *N. cunninghamii* is a member of a southern (or Antarctic) flora which has been able to persist due to protection from fire afforded by the cool, moist conditions which prevail in gullies (Patton 1933).

An important difference between these two formations relates to their responses to fire. The natural regeneration of wet sclerophyll forests requires recurrent wildfire if they are to persist for more than a few centuries. Associated with this is a process of pyrrhic succession in which increases in the stature, lifespan and leafsize (fig. 5) of the prominent shrubs and trees are general themes in the development of the understorey, as is an increase in the abundance and diversity of ferns. In the years immediately following fire a luxuriant growth of herbs, bracken and sometimes bryophytes is common. These 'fireweed' species are soon superseded by the contemporaneous regeneration of trees and shrubs which have arisen from soil-stored seed or, as in the case of eucalypts, from canopy-stored seed (Ashton 1981). Understorey plants belonging to this group of 'pioneer' species are generally 'short-lived' (<40 years) notophylls (e.g. *Pomaderris aspera*, *Prostanthera lasianthos* and *Olearia lirata*) or microphylls (e.g. *Cassinia aculeata* and *Coprosma quadrifida*). Ferns and longer living (>80 years), shade tolerant mesophyllic species with wind-dispersed seeds (e.g. *Olearia argophylla*, *Bedfordia arborescens*) or animal-dispersed (e.g. *Tasmannia lanceolata*) establish and come to dominate the understorey in succeeding decades. However, both *Olearia* and *Bedfordia* may also regenerate immediately after fires due to the ability of older lignotubers to coppice. In contrast, the fern gully communities are continually regenerating. Their full development requires the absence of fire. Many species are killed by fire (e.g. *A. moschatum*), however *N. cunninghamii* possesses the ability to regenerate a crown from basal coppice following wildfires of lower intensity (Ashton 1981). Tree-ferns generally survive wildfire.

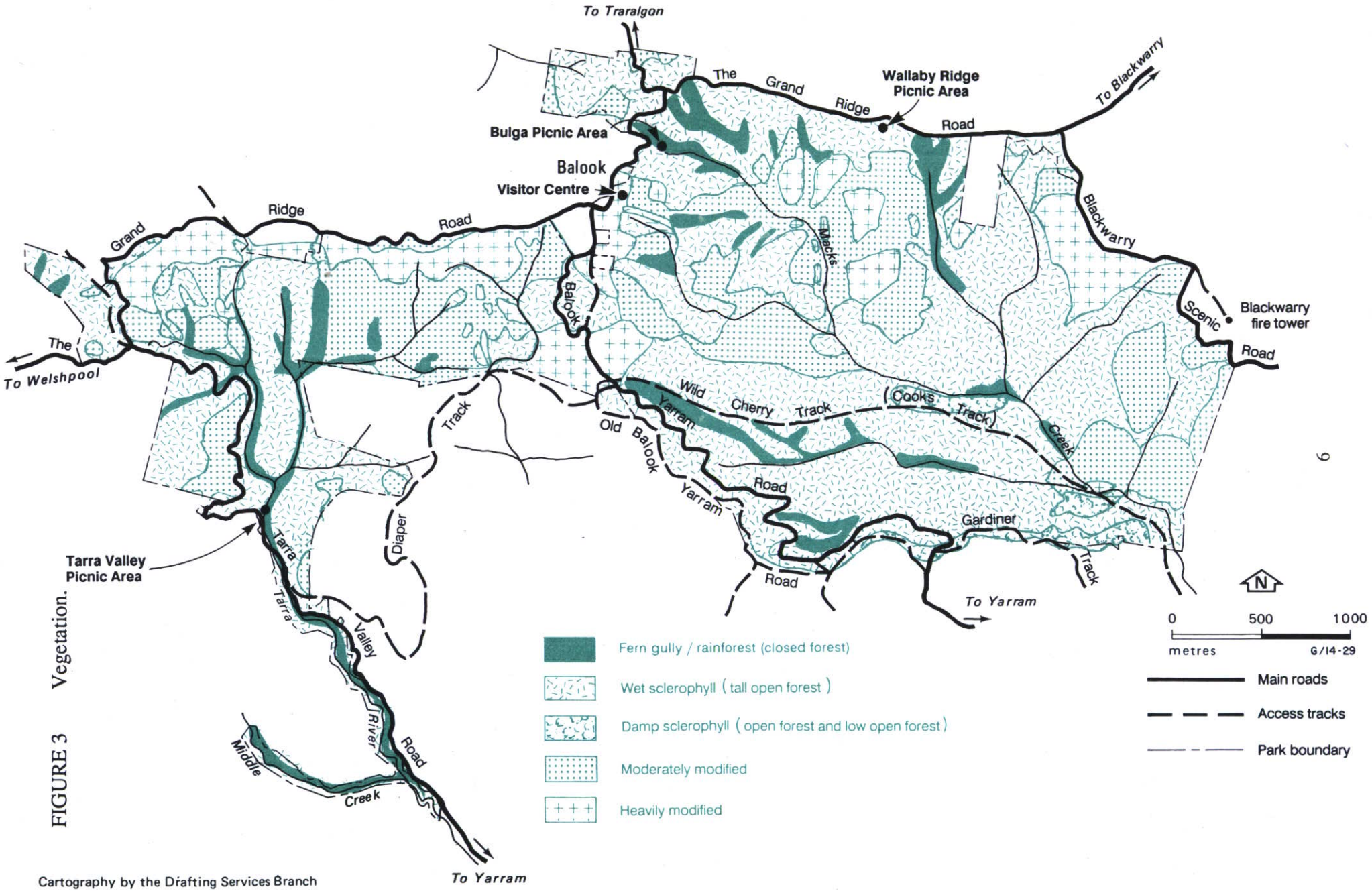


FIGURE 3 Vegetation.

Cartography by the Drafting Services Branch

In the absence of fire, or following double-burns, *E. regnans* dies out and 'wet scrubs' persist. Alternatively, wet sclerophyll communities may culminate in the development of closed forests of *N. cunninghamii* and/or *A. moschatum* providing that other site-related factors such as protection from summer drought and the availability of an adequate seed source are favourable (Ashton 1981). On drier sites, wet sclerophyll forest grades into damp sclerophyll forest. The composition of the latter varies with the frequency and intensity of fire. Mesophyllic shrubs and ferns are not typically present in these areas.

2.4 Land clearing

Land was cleared along Grand Ridge for pastoral settlement during the close of the 19th century and early this century. The bulk of the timber clearing in the park occurred in the 1930s when the timber mill at Balook was operational (H. Fisher, a long-time resident and timber cutter of the region. pers. comm.). Whilst a significant proportion of this cleared land was subsequently used for agriculture, much has been left unattended and now supports scrubs dominated by native subcanopy and understorey species. The vast majority of timber taken from the park was good quality *E. regnans*. Some *N. cunninghamii* was cut from those headwaters immediately to the east of Balook. However, the low incidence of *N. cunninghamii* to the west of Balook is natural (H. Fisher pers. comm.).

2.5 Fire history

The fire history of the study area has not been documented. Mr H. Fisher of Tarra Valley recalls that fires did not start along Grand Ridge but travelled through forest to the ridge from lowland areas. Whilst the widespread stands of *E. regnans* indicate that the entire area has been subjected to fire, some stands, such as the one south of Balook, have established on cleared land by self-seeding (H. Fisher pers. comm.).

The development of fire-sensitive closed-forest at Tarra Valley and Bulga is due to their location within fire shadows and the direction of major fire paths (fig. 4) as hypothesized from the behaviour of the fires of 1939 and 1941. Both of these fires approached the park from the north, travelling up the valley of the Traralgon Creek before turning eastward over the saddle just south of Mt. Tassie and continuing on. (H. Fisher pers. comm.). As 'haze' from the Latrobe Valley presently follows this course it seems reasonable to suggest that this is a major fire path in the region. Some of the stronger fires from this direction may be expected to have continued southwards, burning over the Grand Ridge and through the land exchange area (fig. 4).

The advent of land clearing has increased the risk of fire as the resultant grasslands and shrublands are more conducive to ignition than the original forests. This means that fires may now start either within the park or nearby.

3 VEGETATION SURVEY

3.1 Overview

As the description and mapping of plant communities forms the basis of this report, theories of their nature and utility are discussed here as an aid to the correct interpretation of the following descriptions and accompanying map.

The classical or Clementsian view (Clements 1916) assumes that vegetation exists as discreet 'natural' types, the recognition of which is based upon dominant or diagnostic species. This view has been challenged by the recognition of 'vegetation continua'. This is fundamental to the individualistic concept of plant association proposed simultaneously and independently by Gleason (1926) and Ramensky (1926) and modified by subsequent workers. Adherents to the individualistic concept of plant association point out that definite associations with distinct boundaries do not normally occur and that continuity between groups of species is usually demonstrable.

The two views of the plant community form the basis of differing models of plant succession. In the classical view, community development is seen as universal, orderly change proceeding from diverse pioneer stages through discrete seral stages to a single stable climax. Alternatively, the individualistic concept of plant association relates to more variable pathways of vegetation succession. Here, site factors and the differential growth, survival and reproductive output of the constituent species are important determinants of changes in vegetation composition, particularly in communities subject to disturbance (e.g. fire or flood).

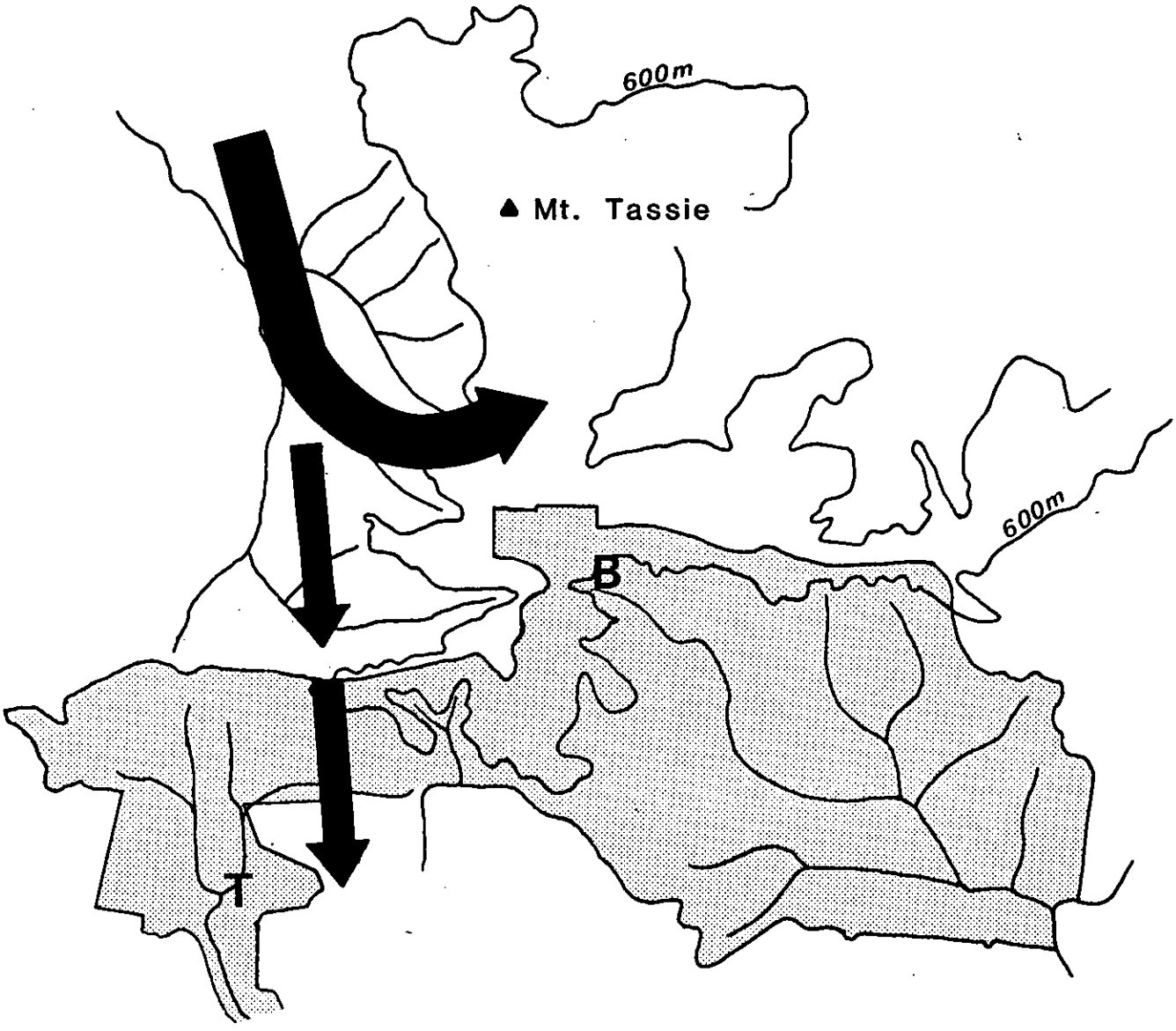
Successional models which emphasise the population processes of the constituent species as the determinants of species availability provide more detailed replacement sequences than those offered by classical successional theory and community definition (Drury & Nesbit 1973; Connell & Slatyer 1977; and Noble & Slatyer 1980, 1981). This does not infer that dependent and interdependent relationships between species do not occur, but simply requires that both the site history and the available flora be the same before two communities can be regarded as identical.

In view of these considerations, communities which are erected from data should not be regarded as rigid, synecological units which exhibit orderly and uniform responses to environmental factors. As Gullan et. al. (1976) point out, they are best regarded as major 'noda' or concentrations of sites within a continuum of intersecting gradients of variation. Discontinuities in vegetation exist only where environmental discontinuities occur or where other factors impinge upon the distribution and abundance of propagules. Thus, the classification of plant communities, i.e. of species assemblages, involves the delineation of abstract units of convenience which reflect the extent and nature of patterns in plant distribution, and so allow the significance of particular sites to be evaluated.

3.2 Community descriptions - methods

In this report communities are primarily defined using the computer-based sorting of floristic data (i.e. presence and absence of species) using the standard programs employed by the flora survey unit (DCE) and based upon a program developed by Gullan (1978). However, additional information from aerial photo-interpretation and on-ground observation of overstorey trees, their size classes, other aspects of vegetation structure, and selected traits of constituent species have been used to modify computer generated groups so as to enhance the utility of the survey. The nomenclature is based on Forbes et al. (1984).

FIGURE 4 Major firepaths inferred from the behaviour of fires in 1939 and 1941, and the localities of mature *N. cunninghamii* stands at Bulga (B) and Tarra Valley (T), shading indicates Tarra-Bulga National Park.



3.2.1 SITE SELECTION AND DATA COLLECTION

Descriptions of vegetation structure and floristics were made for 79 sites between 19 November and 20 December 1987. Site localities were selected following stratification of colour aerial photographs so that the full range of topographic and overstorey variation could be sampled. Whilst good spatial coverage was also ensured, some bias in favour of the land exchange area was deliberate.

Details of the following were collected:

- location (see map)
- general topography, slope inclination and aspect
- vegetation structure
- nature of ground cover (moss, rocks, litter etc.)
- the vascular plant species present and their projective foliage cover values
- supplementary notes on disturbance by lyrebirds, evidence of fire etc.

The altitude, latitude and longitude for each site were subsequently ascertained from maps.

3.2.2 ANALYSIS AND PRESENTATION

The computer-based analysis arranges sites and species into floristic groups presented in the form of a two-way table (see appendices 2 and 3). This method generates broad floristic groups, some comprising a number of smaller groups, which differ in their species compositions and reflect the broader elements of vegetation pattern. As vegetation structure may vary considerably within these groups, both sites and species were then handsorted so as to emphasise floristic and structural variation within the major groups (appendix 2). In addition, those 57 uncommon or sporadically distributed species which were excluded from the classification, as they do not contribute to the definition of pattern, are presented in appendix 3.

Those areas which have obviously been modified by land clearing and logging operations are described separately. This distinction is somewhat arbitrary as some similar 'unmodified' areas may also have been altered (e.g. low-open forests of *Pomaderris* may have originated by the elimination of eucalypts by fires in close succession) by European influence.

The description of unmodified vegetation is given at three levels; formation, community and sub-community. Each of the three formations mentioned are divided into communities on the basis of discontinuities in species composition. Sub-communities are distinguished on the basis of overstorey type and minor differences in understorey structure and floristics. Thus, communities and sub-communities exhibit differences in constituent species, and the range of life-forms and leaf-sizes prominent within the understorey; and as such reflect the differences in site potential and/or history. This information is used to evaluate the status of the park's vegetation as a whole and to identify areas of particular significance.

For the purposes of describing community structure the following were recognised.

Overstorey:

Canopy includes stands of trees more than 25 m tall with continuous cover

Sub-canopy includes open stratum of trees 9-25 m tall.

Understorey:

Small trees includes trees and tree-ferns with aerial renewal buds between 2-9 m above the ground

Shrubs are multi-stemmed woody perennials with renewal buds and aerial shoots from 0.5-2 m above the ground.

Ground stratum:

Graminoids include those species with renewal buds in the upper soil horizons. This broad term includes grass-like monocotyledonous families such as Liliaceae, Gramineae, Cyperaceae but excludes Orchidaceae which have been classified with forbs

Ferns include all members of the flowerless spore producing Pteridophyta excepting the tree-fern genera of *Dicksonia* and *Cyathea* which have been included in the small tree stratum

Forbs are all remaining herbs, chiefly dicotyledons not covered by graminoids.

Graminoids and forbs are collectively termed herbs. Epiphytic ferns and lianes can occur from ground level up into the sub-canopy.

A number of characteristics of the small trees and shrubs of the understorey are also used for descriptive purposes. Species with short (<40 years) lifespans are contrasted with those with long (>80 years) lifespans. This distinction tends to be associated with a decreased reliance upon regeneration from soil-stored seed and an increase in leaf size. Typical leaves of these species were classified using the criteria shown in fig. 5. Shade-tolerant herbs are usually to be contrasted to 'light-demanding' herbs.

The plant communities are named according to the species which are most common in those strata which distinguish the community. Community boundaries were extrapolated from the point localities according to the topographic and overstorey affinities revealed by the analysis and supplementary observations made in the field. Modified communities are mapped along with those unmodified communities with which they have recognisable affinities based upon vegetation structure and site factors.

The following descriptions indicate the dominant environmental gradients believed to influence community distribution. Diagnostic and characteristic species are listed for both the formations and the communities.

3.3 Community descriptions - results

A total of 137 vascular plant taxa including two sub-species of *Eucalyptus globulus* were recorded from the 79 quadrats (appendix 1). Twelve of these species, including *Pittosporum undulatum* from eastern Victoria, are introduced to the park.

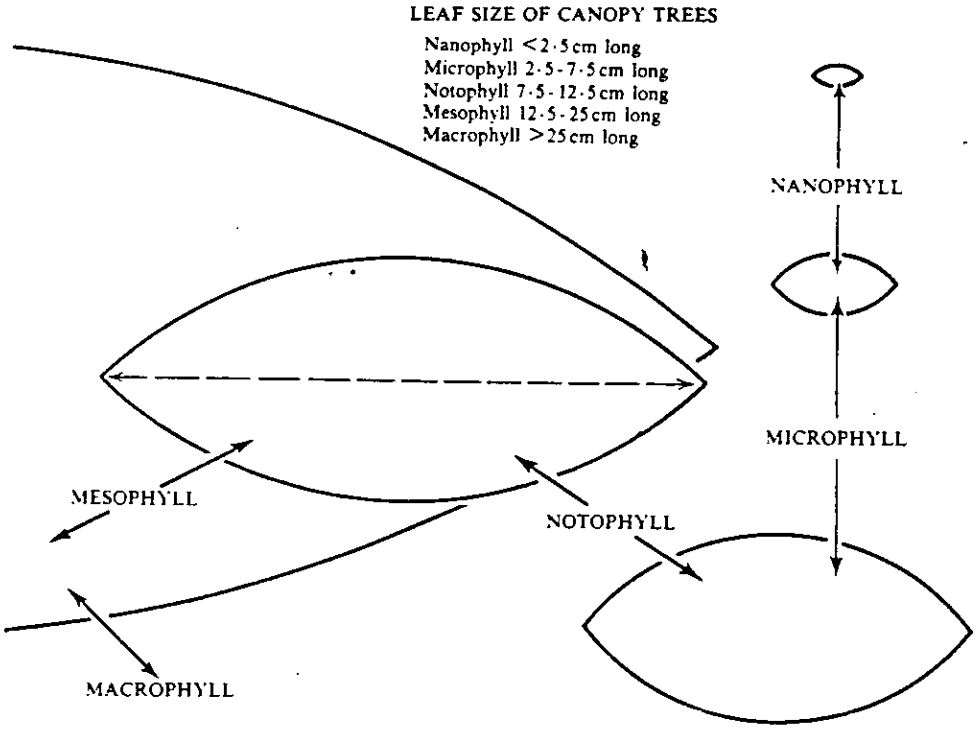
Nine unmodified and five modified communities may be recognised (appendix 2). Distribution of these communities is shown in appendix 5. The unmodified communities contain the large majority of sites and together indicate the existence of a primary floristic gradient from the moist fern gully communities to drier messmate open forest and scrub communities. A similar trend is evident amongst those species omitted from the classification (appendix 3) and is discernible within the structure of the modified communities (appendix 2). Species which characterise modified areas tend to be either introduced or exhibit broad environmental tolerances and thus also occur across a range of unmodified communities (appendices 2 and 3). The relationships of these communities is summarised in table 2.

Mosses and liverworts were not collected. Those known to occur in the Park are included in appendix 4.

TABLE 2 Relationships of unmodified and modified communities.

	Unmodified	Modified
Wetter, less fire prone	1, 2	-
	3	11, [12?]
	4	13
	5	-
	6	[14?]
	7	-
Drier, more fire prone	8	-
	9	

FIGURE 5 Leaf-size diagram after Raunkier from Tracey (1982).



3.3.1 COOL TEMPERATE RAINFOREST/FERN GULLY COMMUNITIES

These distinctive communities are typically restricted to cool moist sites along stream courses and the lower portions of adjacent slopes. Well developed overstoreys are frequently absent, but where present may feature *N. cunninghamii*, *A. moschatum* and *Acacia melanoxylon*. The formation as a whole is characterised by a dense understorey dominated by *Dicksonia antarctica* and features the small mesophyllic tree, *H. angustifolia*; the epiphytes, *Fieldia australis*, *Asplenium bulbiferum*, *Grammitis billardieri*, *Hymenophyllum flabellatum*, *Microsorium diversifolium*, *Polyphlebium venosum*; and the shade tolerant herb, *Australina pusilla* ssp. *muelleri*.

Two structurally distinct communities exhibiting minor differences in floristic composition and topographic disposition are evident.

Community 1: *Nothofagus cunninghamii - Atherosperma moschatum - Dicksonia antarctica*

This fern rich community describes open and closed-forests dominated by *N. cunninghamii* ranging from 8-32 m in height, and 8-135 cm DBH. *Atherosperma moschatum* and *A. melanoxylon* may also occur. *Dicksonia antarctica* forms a dense understorey over a typically open ground stratum featuring scattered ferns and numerous bryophtyes. This community is distinguished from Community 2 by the frequent presence of the longevous, mesophyllic small tree, *Olearia argophylla*; the ferns *Cyathea cunninghamii*, *Lastreopsis acuminata*, *Hymenophyllum cupressiforme*; and the liane, *Parsonsia brownii*.

Although generally closely restricted to stream courses, more extensive stands (>50 m wide) occur in both the Tarra River and Macks Creek catchments. These forests tend to occur on sheltered aspects associated with third-order streams in the Tarra Valley but are generally associated with first and second-order streams in the Macks Creek catchment. The reason for this disparity are discussed in section 4.2.

The following sub-communities are mapped:

1a Open-forest of *A. moschatum*;

1b Open and closed-forests dominated by *N. cunninghamii* and sometimes featuring *A. moschatum* and *A. melanoxylon.*

Community 2: *Dicksonia antarctica - Hedycarya anqustifolia.*

This dense fern gully community occurs as a narrow ribbon along most streams and lacks a true overstorey. Scattered trees of *E. regnans* and *A. dealbata* are sometimes present and indicate a more recent incidence of fire than that experienced by Community 1. This community is also distinguished by the presence of *C.australis* and a moderately dense ground stratum featuring *Polysticum proliferum*, scattered *Blechnum chambersii, B. patersonii* and along the stream banks, *B. fluviatile.*

3.3.2 WET SCLEROPHYLL FORESTS

Wet sclerophyll forests constitute the most extensive formation within the study area. They occur throughout the altitudinal range present and extend from riparian localities to drier ridgetops where they sometimes grade into damp sclerophyll forest. Five wet sclerophyll forest communities occur within the study area. These encompass both open and tall open-forest dominated by *E. regnans, A. melanoxylon* and/or *E.obliqua*; and low open forests of *A. melanoxylon* and *P. aspera.* The five communities also possess differing topographic affinities and degrees of overstorey maturity. They are arranged here from the wettest to the driest. This series features some decrease in canopy height, an increase in light penetration to the floor; and accompanying reductions in the abundance and diversity of ferns and the life span, statue and leaf-size of the small tree and shrub component.

This formation is to be compared to Community SCG7 described by Gullan et al. (1985) and characteristically features both mesophyllic and notophyllic shrubs and small trees. As the five communities together constitute a major part of the total floristic gradient, no single species other than *E. regnans* is characteristic of all five communities; however *A. dealbata, Coprosma quadrifida, Pomaderris aspera, Olearia lirata, Cyathea australis, Sambucus gaudichaudiana* and *Tetrarrhena juncea* may be said to characterise the formation as whole. Community 3 contrasts strongly with Communities 4 to 7 due to the high incidence of species which it shares with fern gully communities because of its location and maturity.

Community 3: *Eucalyptus regnans - Acacia melanoxylon - Dicksonia antarctica - Olearia argophylla.*

This community is the only mature, wet sclerophyll community in the park. It features the maximum development of ferns and mesophyllous trees within the park's wet sclerophyll forest and is typically associated with steep sheltered slopes, lower slope portions and mature *E. regnans* stands. The community occurs as tall-open forests of mature *E. regnans* exceeding 50 m with a sub-canopy of *A. melanoxylon.* However, *E. regnans* is absent from some sites and *A. melanoxylon* forms an open-forest to 30 m in height. Scattered *N. cunninghamii* trees (<70 cm DBH) may also occur. They are rarely of sufficient size or density to form the developing mixed forest

described by Howard (1981) as the 'forest within a forest' scenario. Mixed forest indicates potential cool temperate rainforest given a sufficient fire free period (see Sub-community 3b). *Acacia dealbata* is not a common component of this community although it may be present in the soil seed bank.

The dense, well developed understorey is characterised by the shared dominance of *D. antarctica* and the longer living, mesophyllic small trees *O. argophylla, Bedfordia arborescens* and *H. angustifolia*. A diverse array of epiphytes, notably *A. bulbiferum, G. billardieri, H. cupressiforme, F. australis* and *Rumohra adiantiformis* are generally present. Frequently *P. proliferum* provides dense ground cover in addition to more scattered occurrences of the shade tolerant herbs *S. gaudichaudiana* and *A. pusilla* ssp. *muelleri*.

Four sub-communities with differing overstorey types are mapped. These are:

3a *Eucalyptus regnans* dominated areas with or without a sub-canopy of *A. melanoxylon*;

3b *Eucalyptus regnans* dominated areas with a sub-canopy of *N. cunninghamii*. Mixed forest or forest within a forest scenario;

3c *Acacia melanoxylon* overstoreys, *E. regnans* either absent or occurring as scattered emergents;

3d *Olearia - Pomaderris* scrub (site 34 only) with occasional, emergent *A. dealbata*.

Community 4: *Eucalyptus regnans - Pomaderris aspera - Cyathea australis.*

This is the most extensive community within the park and consists primarily of open forests (40 m high) of spar-stage *E. regnans* stands and associated low open-forests dominated by *A. melanoxylon* and/or *P. aspera*. *Acacia dealbata* occurs throughout this community which generally occurs on moderately steep slopes but also extends to those ridgelines where older ash predominates (e.g. Sub-community 4b). The small tree stratum is characterised by notophylls (*P. aspera, O. lirata*) and *C. australis* though scattered mesophylls (*O. argophylla* and *B. arborescens*) may also occur. A dense cover of *P. proliferum* generally dominates the ground stratum except in older stands where *B. wattsii* occurs. *Histiopteris incisa* and *T. juncea* are scattered through this community.

Important sub-communities are mapped as follows:

4a Younger (mostly spar-stage) *E. regnans* with a *Pomaderris* dominated understorey;

4b Older *E. regnans* with a *Blechnum* dominated ground stratum (fig. 6);

4c *Acacia melanoxylon* overstorey; *E. regnans* either absent or occurring only as scattered emergents;

4d *Pomaderris aspera - A. dealbata* scrubs and low open-forests.

Community 5: *Eucalyptus regnans - Olearia lirata - Cyathea australis - Prostanthera lasianthos.*

This community describes pole and spar stage *E. regnans* stands (30 - 40 m high) generally located on ridge tops, associated spurs and the upper portions of slopes. The mid-dense understorey is dominated by relatively short-lived notophylls (primarily *O. lirata* and *P. lasianthos*) and may feature *C. australis*, *Pittosporum bicolor* and the mesophyll, *H. angustifolia*. Other components of this community tend to vary according to the density of the shrub layer. On sheltered sites, and wherever the shrub layer is dense, heavy ground fern cover often occurs and light-demanding herbs are suppressed. On some more exposed sites, and wherever shrub densities are lower, more light penetrates to the ground and herbs such as *T. juncea*, *Hydrocotyle hirta* and *Viola hederacea* form a sparse ground stratum with the rhizomic ferns *P. esculentum* and *H. incisa*. This ground cover may indicate areas that have been previously modified by logging. Community 5 is not divided into sub-communities for the purposes of mapping.

FIGURE 6 Mountain Ash dominated Sub-community 4a in Tarra Valley.

Community 6: *Eucalyptus regnans - Zieria arborescens - Goodenia ovata*

This vegetation is uncommon, being restricted towards the top of moderately steep slopes and to one narrow ridgeline. Together with Community 7 it describes the driest and most frequently burnt of the wet sclerophyll communities. Community 6 features tall open-forests of *E. regnans*, sometimes with *E. cypellocarpa* and a sparse sub-canopy of *A. obliquinervia* and *A. dealbata*. The low (<3 m), moderately dense understorey is dominated by notophyllous small trees, *Zieria arborescens* and *O. lirata* but also features *P. aspera, O. phlogopappa* and scattered tree-ferns of *C. australis*. Dense *Goodenia ovata* dominates the ground stratum which also features scattered *P. esculentum* and the light-demanding herbs *T. juncea, H. hirta* and *V. hederacea*.

Community 7: *Eucalyptus obliqua - Pomaderris aspera - Olearia lirata.*

These open-forests occur on relatively exposed sites of northerly and westerly aspects and along ridge-lines where soils are often shallow. They sometimes form a broad ecotone, where *E. regnans* may attain codominance between the mixed species damp sclerophyll forest and *E. regnans* dominated wet sclerophyll forests, e.g Cooks track and areas to the east. The open understorey features both notophylls and microphylls though some mesophylls occur on the wetter sites. The ground stratum features mid-dense *G. ovata*, scattered *P. esculentum* and light-demanding herbs. Other species typical of drier areas may also be present (appendix 5). On rockier sites in the east of the park (sites 73, 74 and 76), canopy height is reduced and herbs are either uncommon or absent.

Two sub-communities are mapped:

7a Taller (30 - 40 m), ecotonal *E. obliqua* forest (fig. 7), sometimes mixed with *E. regnans* and *E. cypellocarpa* or containing scattered emergents of these species up to 50 m in height;

7b Open-forests of rocky sites.

3.3.3 DAMP SCLEROPHYLL FORESTS

This formation consists of two relatively uncommon communities. Whilst these differ in vegetation structure and environmental affinities, they are described together as they feature a number of herbs in common, and alone possess only microphyllous and nanophyllous shrubs. The development of the shrub layer varies considerably between the two communities however herbs held in common tend to occur with equal abundance.

Community 8: *Eucalyptus obliqua - Acacia howittii - Goodenia ovata.*

This community consists of open-forest to 35 m in height dominated by *E. obliqua* but also features *E. cypellocarpa, E. globulus* ssp. *globulus, E. globulus* ssp. *bicostata* and *Eucalyptus muelleriana* some of which attain codominance on some sites. These forests are restricted to some ridge-top sites. *E. muelleriana* appears to be rare. The sparse, low (8 m) sub-canopy features the nanophyll, *A. howittii*, and the leafless *Exocarpos cupressiformis*. The sparse understorey features scattered notophylls and microphylls (primarily *O. lirata, C. quadrifida* and *P. lasianthos*) and the ground stratum consists of patchy *G. ovata* with both tufted and rhizomic herbs scattered in the intervening ground.

Three sub-communities are mapped:

8a *Eucalyptus obliqua* stands with or without *E. regnans*;

8b *Eucalyptus obliqua* - *E. cypellocarpa* - *Eucalyptus globulus* mixtures;

8c *Acacia howittii* dominated low open-forests and scrubs.

FIGURE 7 Wet sclerophyll ecotone dominated by Messmate (Sub-community 7a), current reference area.

Community 9: *Kunzea ericoides - Cassinia longifolia*

This dense nanophyll scrub community is restricted to a single, steep (30° to 60°), rocky north-facing slope located along Cooks Track. *Cassinia longifolia* dominates on the upper portion of the slope (adjacent to Community 8) but *Kunzea ericoides* dominates the steeper and rockier middle and lower slope portions. *Goodenia ovata* is the only other shrub present except for scattered individuals of *P. undulatum*. Altered fire regimes and introduced birds e.g. blackbirds are believed to be a factor contributing to the dispersion of this predominantly East Gippsland species. A mid-dense ground stratum of *Senecio linearifolius*, tussock grasses and numerous herbs (appendix 5) occurs where sufficient soil and/or litter is present.

3.3.4 MODIFIED AREAS

Modified areas occupy significant portions of gently to moderately sloping land, and may be considered according to the nature of disturbance. Moderately modified areas are those from which eucalypts have been removed by logging operations and in which the regeneration of native sub-canopy and understorey species, principally *A. dealbata* and *O. phlogopappa*, now forms a mosaic of low open-forests and scrubs. Heavily modified areas are those that were at one stage converted to pasture or potato farms. Whilst these areas have undergone subsequent recolonisation by native shrubs and trees, they remain with an open character and are frequently dominated by pasture species, bracken and blackberries.

Moderately modified communities

These four communities generally occur downslope from heavily modified areas but themselves possess discernible topographic similarities and can be equated with particular unmodified wet sclerophyll communities described above. The four communities include one moist, *A. melanoxylon* dominated community with a poorly developed shrub layer, two *A. dealbata* dominated communities featuring notophyllous small trees of contrasting life spans, and one community lacking sub-canopy species. The long living mesophyll species which characterise mature understoreys are either absent or restricted to drainage lines. The differences between these communities are due to the influence of topography and the composition of the soil seed banks which are effected by fire history.

Community 10: *Acacia melanoxylon - Microsorium diversifolium - Polystichum proliferum.*

Open-forests of *A. melanoxylon* occur in the lower portions of moderately steep slopes and the heads of some gullies. The canopy is frequently dense and trees are generally 15 - 25 m high with spreading crowns in which the epiphyte *M. diversifolium* is commonly found. The understorey features scattered *C. australis*, *O. lirata* and *C. quadrifida* over a dense ground stratum of *P. proliferum* with scattered *P. esculentum*. The structure and habitat of this community indicate that it represents a disturbed facies of Community 3 from which it differs by its high abundance of *A. melanoxylon*, and the absence of *D. antarctica*, mesophyllic shrubs and a number of epiphytes.

Community 11: *Acacia dealbata - Pomaderris aspera - Polystichum proliferum*

Low open-forests of *A. dealbata*, and on occasion *A. melanoxylon*, 8 - 15 m high, are associated with an understorey dominated by *P. aspera* and featuring a sparse notophyll shrub layer (*Z. arborescens, P. lasianthos* and occasionally *Correa lawrenciana*) over an open ground stratum of scattered *P. proliferum, P. esculentum, Rubus fruticosus* spp. agg., *V. hederacea, H. hirta* and *Acaena anserinifolia*. This community primarily occurs on the middle and lower slope portions but may extend further upslope on more sheltered aspects. It is regarded as a disturbed facies of Community 4 from which it differs by the high abundance of *A. dealbata*; the lower incidence of tree-ferns, lack of mesophyll shrubs and the substitution of wet forest herbs (*Australina* and *Sambucus*) by *P. esculentum, H. hirta* and *V. hederacea*.

Community 12: *Cyathea australis - Olearia lirata - Coprosma quadrifida*

This community represents a disturbed facies of either Community 4 or 5 in which species with soil stored seed have low prominence. It has similar topographic affinities to Community 13 although it tends to occur on more sheltered aspects. *Acacia dealbata* is either absent or occurs as emergents from mid-dense to dense *C. australis*, the (occasionally dominant) nanophyll *C. quadrifida* and *O. lirata*. The sparse ground stratum may feature scattered *P. proliferum, P. esculentum* and/or the more common herbs of wet sclerophyll communities. *Acacia melanoxylon* is currently establishing on some sites.

Community 13: *Acacia dealbata - Olearia lirata - Prostanthera lasianthos*

This community (fig. 8) is similar to Community 11 in most respects but features a moderately dense shrub layer dominated by either *O. lirata* or *P. lasianthos* in which the longer living *P. aspera* is generally uncommon. The sparse ground stratum features scattered herbs. *Polystichum proliferum* is again present though is less common than in Community 11 except on sites of sheltered aspect. Some introduced species are also common (appendix 5). This community is regarded as a disturbed facies of Community 5 and is generally distributed closer to heavily modified areas and upslope from Community 11.

Heavily modified community

The large areas of the park which were once used for agricultural and pastoral activities now possess a range of both exotic and native species. Whilst vegetation structure varies dramatically, sufficient floristic unity exists to warrant the recognition of only one community.

Community 14: *Olearia phlogopappa - Anthoxanthum odoratum**

This extensive community includes a relatively wide variety of both introduced and native herbs (appendices 2 and 3) *Rubus* spp., and *P. esculentum* over which *A. dealbata, C. aculeata, O. phlogopappa, O. lirata* and *P. lasianthos* sometimes form an open shrub stratum (fig. 8). No clear relationship between this community and unmodified vegetation is evident, as all of the high ground of gentle to moderate slope to which this community is restricted has been cleared. However Mr. H. Fisher recollects that it was all covered with mature *E. regnans* in the 1930s.
The following sub-communities are mapped:

14a The *Anthoxanthum** - *Senecio* - *Rubus** sub-community consists of a vegetation mosaic in which dominance shifts between *A. odoratum**, *S. linearifolius, R. fruticosus* spp. agg.* and *P. esculentum.* In particular, *Rubus* tends to dominate the heads of gullies and other low lying sites to the exclusion of other species.

14b The *A. dealbata* - *A. odoratum** sub-community describes low open-forests of *A. dealbata* over an *A. odoratum** dominated herb layer.

14c The *E. regnans* - *R. fruticosus** - *A. odoratum** sub-community occupies abandoned farmland upon which *E. regnans* has been replanted. *Rubus** and *Anthoxanthum** dominate the sparse ground stratum.

3.4 Incidence of introduced species

Most introduced species are restricted to the modified communities (see appendices 2 and 3). Species which are currently of greatest concern are *R. fruticosus* spp. agg.*, *Fuchsia* sp.*, *Acer* sp.* and *P. undulatum.* These species have either successfully colonised native plant communities or have become established in high densities within small areas. Numerous trackside weeds such as *Senecio jacobaea** and *Cirsium* sp. also occur (notably towards the junction of Cooks Track and Macks Creek) but are not considered here.

Rubus fruticosus spp. agg.* is by far the most widespread and vigorous weed in the park. It forms extensive thickets (fig. 9) in the low lying areas within Community 14 along the lower reaches of the Tarra River, and other isolated patches along Macks Creek and near Balook where land was once cleared (fig. 10). Individual plants also occur in Communities 7 and 8 where light penetration to the ground is relatively high; and are scattered throughout the modified communities within the land exchange area. Both *Fuchsia** and *Acer** are restricted to the lower reaches of the Tarra River where they form dense thickets (fig. 10).

Pittosporum undulatum generally occurs as scattered (though sometimes mature) trees in the drier Communities 7, 8 and 9 but is occasionally found on wetter, more shaded sites. Although not currently forming dense thickets, this fire-sensitive species has the capacity to do so and to then interfere with the character of the understorey (Gleadow & Ashton 1981). Hybridisation between this species and the naturally occurring *P. bicolor* occurs along the Grand Ridge Road, and threatens to pollute the gene pool of *P. bicolor.*

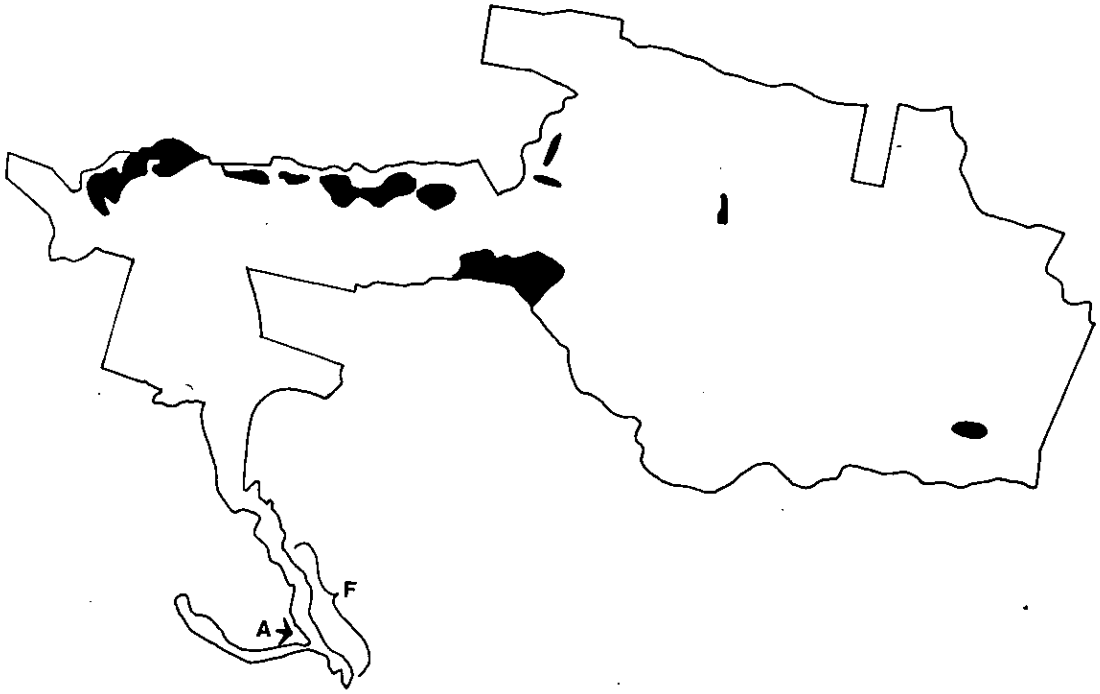
A range of introduced species occur on abandoned farmland (see appendices 2 and 3). Of these *Hypochoeris radicata*, Rubus laciniatus** and *S. jacobaea** are also scattered through the moderately modified communities, notably Community 13. The introduced herbs *Centaureum erythraea** and *Gnaphalium purpureum** occur on the drier slopes of Community 9 but are uncommon there. The planting of *E. regnans* on abandoned farmland (e.g. site 29) has dramatically suppressed the abundance, though not the diversity, of introduced species.

FIGURE 8 The modified vegetation of Community 13 (middle ground, and Sub-community 14a (foreground) lack eucalypts.

FIGURE 9 Dense thicket of *Rubus fruticosus* sp. agg. near Balook.

In addition to those areas mentioned above, a number of garden species occur at the previous site of Mrs Healey's house (fig. 10). Of these *Hedera helix** (English Ivy), is a potentially serious weed for wet sclerophyll plant communities. The occurrence of large seed-bearing trees of *Prunus* sp.* and *Salix* sp.* at the site of Will's homestead is also cause for concern.

FIGURE 10 Extent of dense *Rubus** (shown by black areas), *Fuchsia** (F) and *Acer** (A).



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APPENDIX 1 VASCULAR PLANTS FOUND ON QUADRATS

Nomenclature follows Forbes et al. (1984)

PTERIDOPHYTA (Ferns)

ADIANTACEAE	*Pellaea falcata*	Sickle Fern
	Pteris tremula	Tender Brake
ASPIDIACEAE	*Lastreopsis acuminata*	Shiny Shield-fern
	Polystichum proliferum	Mother Shield-fern
	Rumohra adiantiformis	Leathery Shield-fern
ASPLENIACEAE	*Asplenium bulbiferum*	Mother Spleenwort
	Asplenium flabellifolium	Necklace Fern
	Asplenium flaccidum	Weeping Spleenwort
ATHYRIACEAE	*Allantodia australis*	Austral Lady-fern
BLECHNACEAE	*Blechnum chambersii*	Lance Water Fern
	Blechnum fluviatile	Ray Water Fern
	Blechnum nudum	Fishbone Water Fern
	Blechnum patersonii	Strap Water Fern
	Blechnum wattsii	Hard Water Fern
CYATHEACEAE	*Cyathea australis*	Rough Tree-fern
	Cyathea cunninghamii	Slender Tree-fern
	Cyathea marcescens	Skirted Tree-fern
DENNSTAEDTIACEAE	*Histiopteris incisa*	Bat's-wing Fern
	Hypolepis muelleri	Marsh Ground Fern
	Hypolepis glandulifera	Downy Ground Fern
	Hypolepis rugosula	Ruddy Ground Fern
	Pteridium esculentum	Austral Bracken
DICKSONIACEAE	*Dicksonia antarctica*	Soft Tree-fern
GRAMMITIDACEAE	*Ctenopteris heterophylla*	Gipsy Fern
	Grammitis billardieri	Common Finger-fern
HYMENOPHYLLACEAE	*Hymenophyllum australe*	Austral Filmy-fern
	Hymenophyllum cupressiforme	Common Filmy-fern
	Hymenophyllum flabellatum	Shiny Filmy-fern
	Polyphlebium venosum	Veined Filmy-fern
POLYPODIACEAE	*Microsorium diversifolium*	Kangaroo Fern

ANGIOSPERMAE (Flowering Plants)

MONOCOTYLEDONEAE (Monocotyledons)

CYPERACEAE	*Carex appressa*	Tall Sedge
	Lepidosperma elatius	Tall Sedge
	Lepidosperma laterale	Variable Sedge
	Uncinia compacta	Mountain Hook-sedge
LILIACEAE	*Dianella tasmanica*	Tasman Flax-lily
ORCHIDACEAE	*Chiloglottis sp.*	Bird-orchid
	Pterostylis pedunculata	Maroon-hood
POACEAE	*Anthoxanthum odoratum* *	Sweet Vernal-grass
	Chionochloa pallida	Silver-top Wallaby-grass
	Dactylis glomerata *	Cocksfoot
	Danthonia pilosa	Velvet Wallaby-grass
	Deyeuxia rodwayi	Bent-grass
	Echinopogon ovatus	Common Hedgehog-grass
	Holcus lanatus *	Yorkshire Fog
	Microlaena stipoides	Weeping Grass
	Poa ensiformis	Tussock-grass
	Poa labillardieri	Tussock-grass
	Poa sieberiana	Tussock-grass
	Poa tenera	Slender Tussock-grass
	Tetrarrhena juncea	Forest Rice-grass

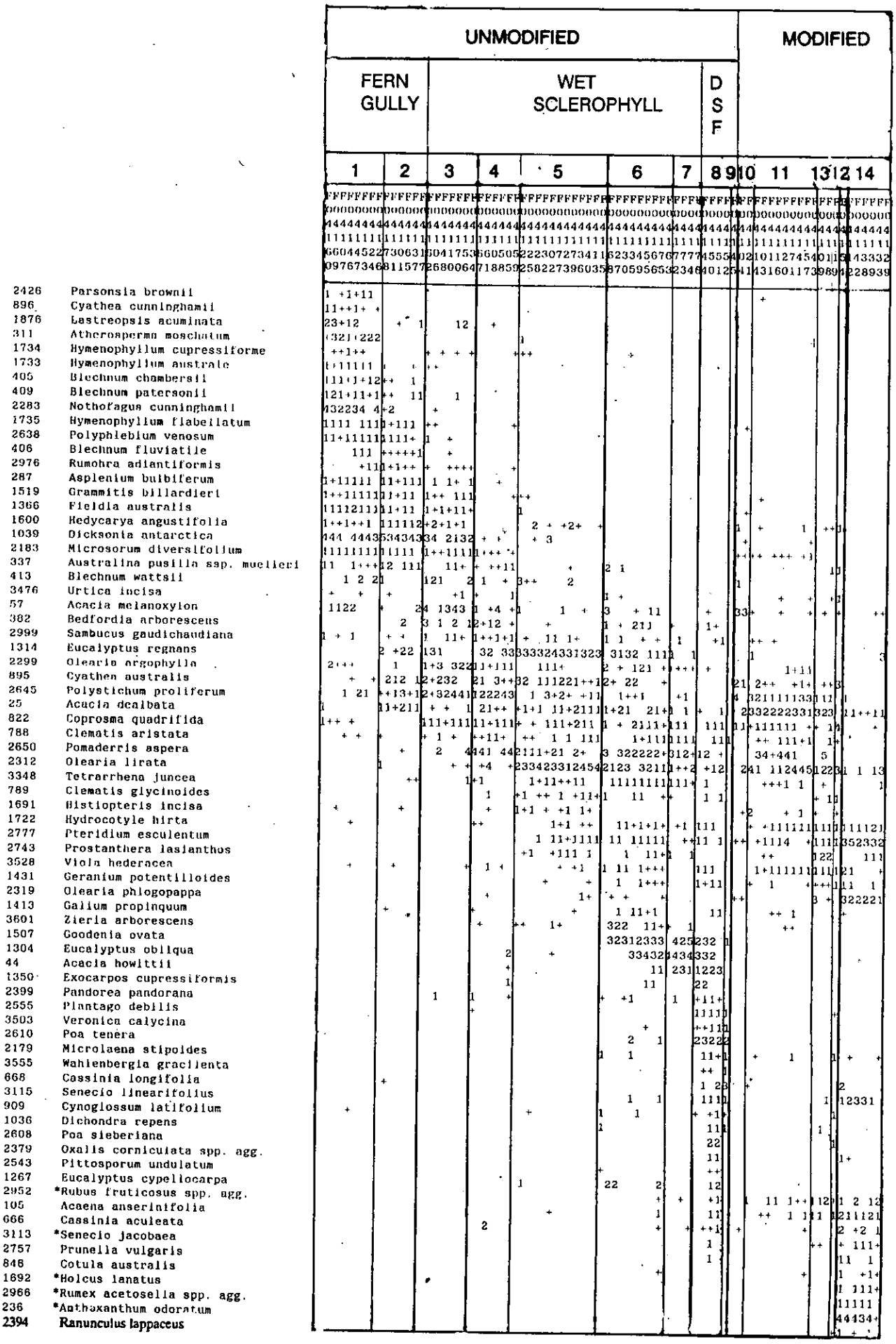
DICOTYLEDONEAE (Dicotyledons)

APIACEAE	*Hydrocotyle hirta*	Hairy Pennywort
APOCYNACEAE	*Parsonsia brownii*	Twining Silkpod
ARALIACEAE	*Polyscias sambucifolius*	Elderberry Panax
ASTERACEAE	*Bedfordia arborescens*	Blanket-leaf
	Bellis perennis *	Common Daisy
	Cassinia aculeata	Common Casssinia
	Cassinia longifolia	Shiny Cassinia
	Cassinia trinerva	Three-nerved Cassinia
	Cirsium vulgare *	Spear Thistle
	Cotula australis	Common Cotula
	Gnaphalium gymnocephalum	Creeping Cudweed
	Gnaphalium purpureum *	Purple Cudweed
	Hypochoeris glabra *	Smooth Cat's-ear
	Hypochoeris radicata	Cat's ear
	Olearia argophylla	Musk Daisy-bush
	Olearia lirata	Snow Daisy-bush
	Olearia phlogopappa	Dusty Daisy Bush
	Senecio jacobaea *	Ragwort
	Senecio lautus	Variable Groundsel
	Senecio linearifolius	Fireweed Groundsel
	Sigesbeckia orientalis	Indian Weed

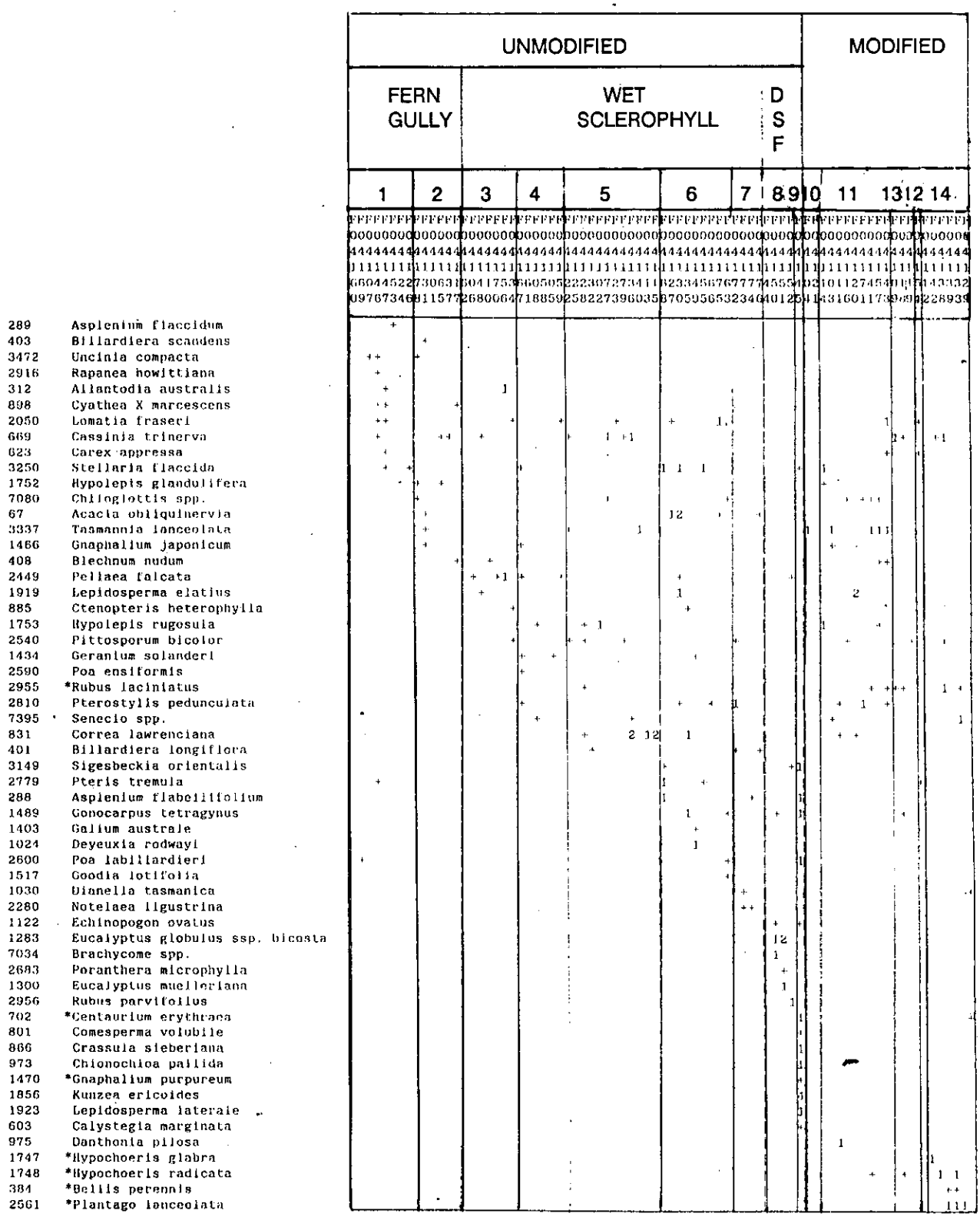
BIGNONIACEAE	*Pandorea pandorana*	Wonga Vine
BORAGINACEAE	*Cynoglossum latifolium*	Forest Hound's-tongue
CAMPANULACEAE	*Wahlenbergia gracilenta*	Annual Bluebell
CAPRIFOLIACEAE	*Sambucus gaudichaudiana*	White Elderberry
CARYOPHYLLACEAE	*Stellaria flaccida*	Forest Starwort
CONVOLVULACEAE	*Calystegia marginata*	Forest Bindweed
	Dichondra repens	Kidney-weed
CRASSULACEAE	*Crassula sieberiana*	Sieber Crassula
EUPHORBIACEAE	*Poranthera microphylla*	Small Poranthera
FABACEAE	*Goodia lotifolia*	Golden-tip
FAGACEAE	*Nothofagus cunninghamii*	Myrtle Beech
GENTIANACEAE	*Centaurium erythraea* *	Common Centaury
GERANIACEAE	*Geranium potentilloides*	Cinquefoil
	Geranium solanderi	Austral Crane's-bill
GESNERIACEAE	*Fieldia australis*	Fieldia
GOODENIACEAE	*Goodenia ovata*	Hop Goodenia
HALORAGACEAE	*Gonocarpus tetragynus*	Common Raspwort
LAMIACEAE	*Prostanthera lasianthos*	Victorian Christmas-bush
	Prostanthera melissifolia	Balm Mint-bush
	Prunella vulgaris	Self-heal
MIMOSACEAE	*Acacia dealbata*	Silver Wattle
	Acacia howittii	Sticky Wattle
	Acacia melanoxylon	Blackwood
	Acacia obliquinervia	Mountain Hickory Wattle
	Acacia verniciflua	Varnish Wattle
MONIMIACEAE	*Atherosperma moschatum*	Southern Sassafras
	Hedycarya angustifolia	Austral Mulberry
MYRSINACEAE	*Rapanea howittiana*	Mutton-wood
MYRTACEAE	*Eucalyptus cypellocarpa*	Mountain Grey Gum
	Eucalyptus globulus ssp. *bicostata*	Eurabbie
	Eucalyptus globulus spp. *globulus*	Southern Blue Gum
	Eucalyptus muelleriana	Yellow Stringybark
	Eucalyptus obliqua	Messmate Stringybark
	Eucalyptus regnans	Mountain Ash
	Kunzea ericoides	Burgan

OLEACEAE	*Nestegis ligustrina*	Privet Mock-olive
OXALIDACEAE	*Oxalis corniculata* spp. agg.	Wood-sorrel
PITTOSPORACEAE	*Billardiera longiflora*	Purple Apple-berry
	Billardiera scandens	Common Apple-berry
	Pittosporum bicolor	Banyalla
	Pittosporum undulatum	Sweet Pittosporum
PLANTAGINACEAE	*Plantago coronopus* *	Buck's-horn Plantain
	Plantago debilis	Shade Plantain
	Plantago lanceolata *	Ribwort
POLYGALACEAE	*Comesperma volubile*	Love Creeper
POLYGONACEAE	*Acetosella vulgaris* *	Sheep Sorrel
	Rumex bidens	Mud Dock
PROTEACEAE	*Lomatia fraseri*	Tree Lomatia
RANUNCULACEAE	*Clematis aristata*	Australian Clematis
	Clematis glycinoides	Forest Clematis
	Ranunculus lappaceus	Australian Buttercup
RHAMNACEAE	*Pomaderris aspera*	Rough Hazel
ROSACEAE	*Acaena anserinifolia*	Bidgee-widgee
	Rubus laciniatus *	Cut-leaf Bramble
	Rubus parvifolius	Small-leaf Bramble
RUBIACEAE	*Coprosma quadrifida*	Prickly Coprosma
	Galium australe	Tangled Bedstraw
	Galium propinquum	Maori bedstraw
RUTACEAE	*Correa lawrenciana*	Mountain Correa
	Zieria arborescens	Stinkwood
SANTALACEAE	*Exocarpos cupressiformis*	Cherry Ballart
SCROPHULARIACEAE	*Australina pusilla* ssp. *muelleri*	Shade Nettle
	Veronica calycina	Hairy Speedwell
	Urtica incisa	Scrub Nettle
VIOLACEAE	*Viola hederacea*	Ivy-leaf Violet
WINTERACEAE	*Tasmannia lanceolata*	Mountain Pepper

APPENDIX 2 TWO-WAY TABLE OF CLASSIFIED SPECIES



APPENDIX 3 TWO-WAY TABLE OF ADDITIONAL SPECIES



APPENDIX 4 MOSSES AND LIVERWORTS

Species recorded by Mrs Healey in the 1960s. Nomenclature follows Scott et al. (1976) and Scott (1985).

BRYOPHYTA

BRYOPSIDA (Mosses)

AMBLYSTEGIACEAE	*Acanthocladium extenuatum*
AULACOMNIACEAE	*Leptotheca gaudichaudii*
BARTRAMIACEAE	*Breutelia affinis* *Philonotis scabrifolia* *Philonotis tenellus*
BRACHYTHECIACEAE	*Brachythecium salebrosum* *Eurhynchium muriculatum*
BRYACEAE	*Bryum argenteum* *Mielichoferia bryoides*
DICRANACEAE	*Campylopus introflexus* *Dicranoloma dicarpum* *Dicranoloma menziesii* *Leucobryum candidum*
DITRICHACEAE	*Ditrichum difficile*
ECHINODIACEAE	*Echinodium hispidum*
FISSIDENTACEAE	*Fissidens leptocladus* *Fissidens oblongifolius* *Fissidens rigidulus*
HOOKERIACEAE	*Achrophyllum dentatum* *Distichophyllum microcarpum* *Sauloma tenella*
HYPNACEAE	*Hypnum cupressiforme*
HYPNODENDRACEAE	*Hypnodendron vitiense*
HYPOPTERYGIACEAE	*Cyathophorum bulbosum* *Lopidium concinnum* *Thuidium furfurosum* *Thuidium laeviusculum*
METEORIACEAE	*Papillaria flavolimbata* *Weymouthia mollis*
MITTENIACEAE	*Mittenia plumula*

NECKERACEAE	*Thamnobryum pumilum*
ORTHOTRICHACEAE	*Orthotrichum tasmanicum* *Zygodon intermedius*
PLAGIOTHECIACEAE	*Catagonium politum* *Plagiothecium denticulatum*
POLYTRICHACEAE	*Atrichum androgynum* *Polytrichum commune*
PTEROBRYACEAE	*Trachyloma planifolium*
PTYCHOMNIACEAE	*Glyphothecium sciuroides* *Ptychomnion aciculare*
RHACOPILACEAE	*Rhacopilum convolutaceum*
RHIZOGONIACEAE	*Goniobryum subbasilare* *Hymenodon pilifer* *Rhizogonium distichum* *Rhizogonium mnioides*

HEPATICAE (Liverworts)

THALLOSE

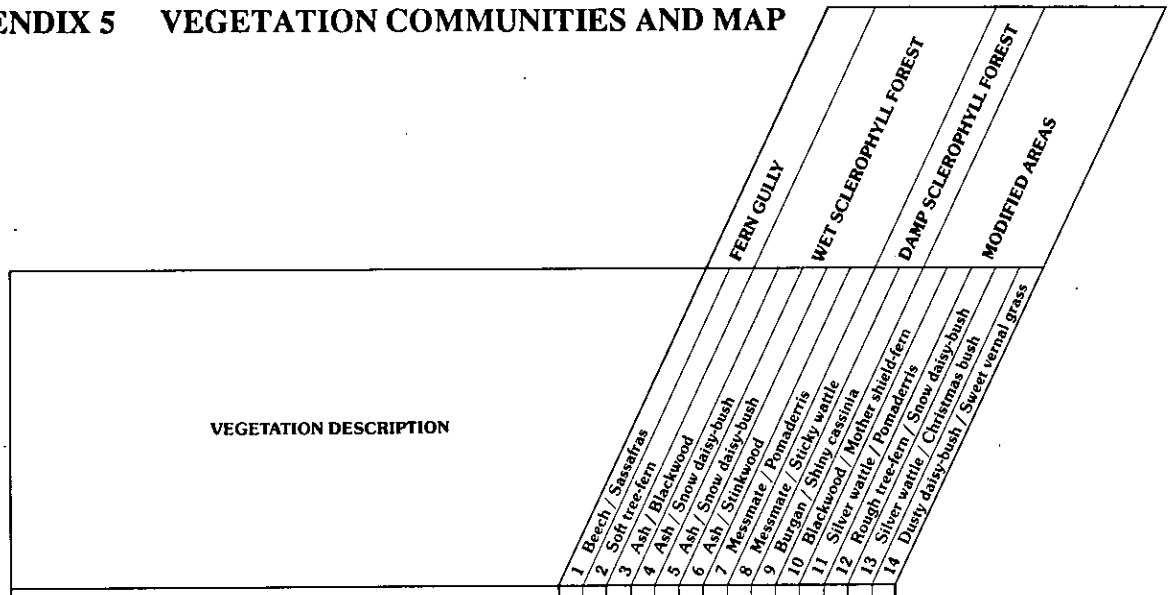
ANEURACEAE	*Riccardia* sp. (close to *R. polymorpha*)
HYMENOPHYTACEAE	*Hymenophyton flabellatum*
METZGERIACEAE	*Metzgeria furcata*

LEAFY

ACROBOLBACEAE	*Radula buccinifera* *Tylimanthus saccatus/pseudosaccatus*
BALLANTIOPSIDACEAE	*Balantiopsis diplophylla* *Isotachis intortifolia*
FRULLANIACEAE	*Frullania pentapleura*
LEJEUNEACEAE	*Lejuenea* sp.
LEPIDOLAENACEAE	*Gackstroemia weindorferi*
LEPIDOZIACEAE	*Acromastigum colensolanum* *Bazzania adnexa* *Lepidozia glaucophylla* *Lepidozia laevifolia* *Lepidozia ulothrix* *Zoopsis argentea*

LOPHOCOLEACEAE	*Chiloscyphus fissistipus* *Lophocolea bidentata*
PLAGIOCHILACEAE	*Plagiochila fasciculata*
SCHISTOCHILACEAE	*Schistochila lehmanniana*
TRICHOLEACEAE	*Tricholea mollissima*

APPENDIX 5 VEGETATION COMMUNITIES AND MAP



	SPECIES	COMMON NAME
	Lastreopsis acuminata	Shiny Shield-fern
	Parsonsia brownii	Twining Silkpod
	Cyathea cunninghamii	Slender Tree-fern
	Atherosperma moschatum	Southern Sassafras
	Nothofagus cunninghamii	Myrtle Beech
	Blechnum chambersii	Lance Water-fern
	Blechnum patersonii	Strap Water-fern
	Hymenophyllum australe	Austral Filmy Fern
	Hymenophyllum flabellatum	Shiny Filmy Fern
	Polyphlebium venosum	Veined Bristle Fern
	Asplenium bulbiferum	Mother Spleenwort
	Blechnum fluviatile	Ray Water-fern
	Australina pusilla ssp. muelleri	Shade Nettle
	Grammitis billardieri	Common Finger-fern
	Fieldia australis	Fieldia
	Dicksonia antarctica	Soft Tree-fern
	Microsorum diversifolium	Kangaroo Fern
Ms	*Hedycarya angustifolia*	Austral Mulberry
	Rumohra adiantiformis	Leathery Shield-fern
	Blechnum wattsii	Hard Water-fern
	Urtica incisa	Scrub Nettle
	Acacia melanoxylon	Blackwood
Ms	*Olearia argophylla*	Musk Daisy-bush
	Sambucus gaudichaudiana	White Elderberry
	Polystichum proliferum	Mother Shield-fern
	Cyathea australis	Rough Tree-fern
	Eucalyptus regnans	Mountain Ash
Nn	*Coprosma quadrifida*	Prickly Coprosma
	Acacia dealbata	Silver Wattle
Ms	*Bedfordia arborescens*	Blanket-leaf
Nt	*Pomaderris aspera*	Rough Hazel Pomaderris
	Clematis aristata	Australian Clematis
Nt	*Olearia lirata*	Snow Daisy-bush
	Tetrarrhena juncea	Forest Wire-grass
	Histiopteris incisa	Bat's Wing Fern
Nt	*Correa lawrenciana*	Mountain Correa
	Clematis glycinoides	Forest Clematis
	Hydrocotyle hirta	Hairy Pennywort
	Viola hederacea	Ivy-leaf Violet
	Pteridium esculentum	Austral Bracken
	Geranium potentilloides	Cinquefoil
Nt	*Prostanthera lasianthos*	Victorian Christmas-bush
	Eucalyptus cypellocarpa	Mountain Grey Gum
	Galium propinquum	Maori Bedstraw
	Acacia obliquinervia	Mountain Hickory Wattle
Nt	*Zieria arborescens*	Stinkwood
Mc	*Goodenia ovata*	Hop Goodenia
	Eucalyptus obliqua	Messmate Stringybark
Nn	*Acacia howittii*	Sticky Wattle
	Exocarpos cupressiformis	Cherry Ballart
	Pandorea pandorana	Wonga Vine
	Cynoglossum latifolium	Forest Hound's-tongue
	Dichondra repens	Kidney-weed
	Microlaena stipoides	Weeping Grass
	Plantago debilis	Shade Plantain
	Poa sieberiana	Tussock-grass
	Poa tenera	Slender Tussock-grass
	Veronica calycina	Hairy Speedwell
	Wahlenbergia gracilenta	Annual Bluebell
Ms	*Oxalis corniculata sp. agg.*	Yellow Wood-sorrel
Ms	*Pittosporum undulatum*	Sweet Pittosporum
Ms	*Eucalyptus globulus ssp. bicostata*	Southern Blue Gum
Nn	*Cassinia aculeata*	Common Cassinia
	Senecio linearifolius	Fireweed Groundsel
	Cassinia longifolia	Shiny Cassinia
Nn	*Kunzea ericoides*	Burgan
	Lepidosperma laterale	Variable Sword-sedge
	Crassula sieberiana	Sieber Crassula
	Chlonchloa pallida	Wallaby Grass
*	*Centaurium erythraea*	Common Centaury
*	*Rubus lacintatus*	Cut-leaf Bramble
*	*Rubus fruticosus sp. agg.*	Blackberry
	Acaena anserinifolia	Bidgee-widgee
	Olearia phlogopappa	Dusty Daisy-bush
*	*Senecio jacobaea*	Ragwort
*	*Hypochoeris radicata*	Cat's Ear
	Cotula australis	Common Cotula
*	*Holcus lanatus*	Yorkshire Fog
*	*Rumex acetosella sp. agg.*	Sheep Sorrel
*	*Anthoxanthum odoratum*	Sweet Vernal-grass
	Ranunculus lappaceus	Australian Buttercup
*	*Plantago lanceolata*	Ribwort
*	*Bellis perennis*	Have a nice day
	Prunella vulgaris	Self-heal

* denotes introduced species.

Nn = nanophyll
Mc = microphyll
Nt = notophyll
Ms = mesophyll

Table Symbol	Frequency (percentage of occurrence)
·	25 - 50
•	50 - 75
●	75 - 100

Vegetation Map of
The Tarra - Bulga National Park

SCALE 1: 10 000

METRES 200 100 0 200 400 600 800 1000 METRES

CONTOUR INTERVAL 25 METRES

G/1948

ROAD CLASSIFICATION

- Sealed Road
- Surfaced Road
- Earth Road
- Track

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