

# **Strzelecki Ranges Biodiversity Study**

**November 2001**

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**Report for The Strzelecki  
Ranges Working Group**

**Strzelecki Ranges  
Biodiversity Study**

**November 2001**

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## ABBREVIATIONS

|        |  |
|--------|--|
| ANZECC | Australian and New Zealand Environment and Conservation Council.     |
| AVW    | Atlas of Victorian Wildlife  |
| CAMBA  | China-Australia Migratory Bird Agreement                             |
| EPBC   | <i>Environment Protection and Biodiversity Conservation Act 1999</i> |
| EVC    | Ecological Vegetation Classes  |
| FFG    | <i>Flora and Fauna Guarantee Act 1988</i>                            |
| FIS    | Flora Information System   |
| HVP    | Hancock Victorian Plantations  |
| IUCN   | International Union for the Conservation of Nature                   |
| JAMBA  | Japan-Australia Migratory Bird Agreement                             |
| LGA    | Local Government Authority   |
| NRE    | Department of Natural Resources & Environment                        |
| Spp.   | Species  |

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## 1.0 SUMMARY

Biosis Research Pty. Ltd. was engaged by the Strzelecki Working Group to assess the conservation values of Hancock Victorian Plantations Pty Ltd (HVP) holdings and surrounding areas in the Strzelecki Ranges, and to identify the steps required to maintain and enhance the biodiversity of the area.

This will be the first stage in an evolving process of assessment of the HVP estate within the Strzelecki Ranges and surrounding areas. The purpose of this report is to identify areas of high biodiversity value and recommend management options for protecting these values. These core areas and associated habitat links are identified as focal points for biodiversity although it is acknowledged that all remnant native vegetation within the study area has relatively high conservation value.

The study area is generally confined to areas leased to Hancock Victorian Plantations (HVP) in the Latrobe Forestry Zone, south of the Princes Highway. However, assessment of biodiversity values within the Strzelecki Ranges has also considered land in areas adjacent to the HVP estate. It is generally located in the Strzelecki Ranges Bioregion.

The area of forest currently managed by HVP has been delineated into three basic units, hardwood plantation, softwood plantation and non-harvestable areas of predominantly native vegetation termed Custodial Lands.

This report relies heavily on existing data sets, including the Flora Information System (FIS), Atlas of Victorian Wildlife (AVW) and draft 1:25 000 EVC mapping (NRE 2000c), although some fieldwork to collect data in poorly surveyed areas was conducted. Standard methods and data collection processes were used when undertaking the assessment of the biological values of the area. In addition several individuals were consulted, including local field naturalists, HVP representatives and NRE staff (see Acknowledgements).

Gippsland was recently assessed as part of the wider Gippsland Comprehensive Regional Assessment (CRA) for the Regional Forests Agreement (RFA) process, although this excluded areas leased to HVP. A major component of the CRA was the preparation of a biodiversity assessment (VicRFASC 1999). The CRA biodiversity assessment (VicRFASC 1999) provides information about individual flora and fauna species and their habitats, forest ecosystems and communities, and threatening processes. It reviews existing information and the results of additional studies of priority taxa and communities (VicRFASC 1999). Whilst the CRA only looked at parts of the Strzelecki Ranges in a wider regional context, much of the information contained in VicRFASC also applies to this study.



## Flora

A total of 191 vascular plant species were recorded from thirty quadrat sites collected during the current field survey of which 153 (80%) are indigenous. The remaining 38 are introduced species.

Fifty one vegetation quadrats, 53 Herbarium records and 25 local area plant lists were identified within the HVP estate from the FIS. These records identified approximately 150 additional indigenous flora species and approximately 20 additional introduced flora species. The majority of these additional species are likely to still occur within the study area.

Five hundred and eighteen flora quadrat records, 332 Herbarium records and 184 local area plant lists were identified within a 5km radius of the HVP estate, from the FIS database maintained by NRE. These records identified approximately 500 additional indigenous flora species and approximately 100 additional introduced flora species occurring within the vicinity of the study area.

This data identifies four species of national and eight species of state conservation significance within the HVP Estate and an additional six species of national and 17 of state significance within five kilometres.

Based on the existing vegetation mapping thirteen Ecological Vegetation Classes (EVCs) have been described for the HVP Estate. All of these are threatened within the relevant bioregion with the exception of Wet Forest which is depleted in the Strzelecki Ranges.

## Fauna

During the present survey of HVP estate within the central Strzelecki Ranges, 35 fauna species were recorded including ten mammals (five native), 22 birds (all native) and three amphibians (all native). The VFD (2000) records a further 184 fauna species, including 30 mammal species (25 native), 113 bird species (105 native), 23 reptile species (all native), eight frog species (all native) and ten fish species (all native). This data includes seven species of national and eight of state conservation significance.

East of the Strzelecki Ranges, the VFD records 138 fauna species, including 26 mammal species (22 native), 77 bird species (76 native), 16 reptile species (all native), 12 frog species (all native) and six fish species (all native). No fauna surveys were conducted in these areas during the present assessment. This data includes six species of national and one of state conservation significance.

West of the Strzelecki Ranges, the VFD records 140 fauna species, including 20 mammal species (17 native), 92 bird species (87 native), 13 reptile species (all native), seven frog species (all native) and eight fish species (all native).

No fauna surveys were conducted in these areas during the present assessment. This data includes six species of national and five of state conservation significance.

Overall, this survey and the VFD record 241 fauna species, including 42 mammal species (33 native), 149 bird species (141 native), 25 reptile species (all native), 13 frog species (all native) and 10 fish species (all native) from the entire study area.

### **Mapping**

The spatial data used in this report came from a range of different sources, with non-uniform mapping standards and was collected at a variety of scales. Because data from all sources were utilised to develop the boundaries for core areas and linkages, this reduces the accuracy of the mapping. The EVC data, and topographic information was collected at a scale of 1:25,000, whilst the data supplied by HVP had been collected from original Forestry Commission coupe maps produced at 1:10,000 and aerial photography.

Because of the above-mentioned limitations, linework from different sources that aim to identify the same on-ground feature are unlikely to match and apparently significant discrepancies will occur in the mapping provided. To properly interpret on the ground the intent of the mapping needs to be understood by carefully reading the relevant sections of this report.

### **Threats to Biodiversity**

Inappropriate timber harvesting is a potentially threatening process to the biodiversity of the Strzelecki Ranges. Timber harvesting can have a number of direct and indirect impacts on biodiversity (VicRFASC 1999), including:

- short-term habitat removal,
- habitat fragmentation and creation of edge effects,
- loss of threatened (and non-threatened) flora, fauna and vegetation communities,
- simplification of forest structure in the medium and longer-term by producing even-aged regrowth forests that are less suitable for some species than older forests. Ecologically mature or old-growth forests are generally more structurally and floristically diverse than regrowth forests and provide a greater range of niches for flora and fauna,
- conversion of mature stands to young regrowth stands, and a loss of old growth/hollow-bearing trees,

- soil disturbance resulting in compaction and increased erosion,
- weed invasion,
- alteration of fire regimes,
- siltation of aquatic environments, and
- the spread of plant pathogens such as Myrtle Wilt and Root-rot Fungus,

### **Identifying Areas of High Biodiversity**

The following criteria were used to recognise areas of high biodiversity value and ecological importance:

- The presence of significant EVCs
- The presence of rare or threatened flora and fauna species
- The presence of relatively mature, hollow-bearing trees
- The potential for mature trees to develop
- Relatively large areas of native, non-planted forest
- Areas that link other areas of high biodiversity value
- Assessments by other authors.

Based on the results of this assessment five Core Areas and two Habitat Links in and adjacent to the HVP estate have been identified to be of high biodiversity value and ecological importance (i.e. are high conservation value forests). Delineating these areas (Map 1) recognises their significant contribution to the biodiversity of the region and management within the bioregion needs to recognise these values and tailor actions to maintain them.

The five core areas of biodiversity identified within the central Strzelecki Ranges study area include:

- Gunyah Gunyah
- Jack River
- College Creek
- Tarra-Bulga National Park
- Upper Merriman Creek.

Although both the College Creek and Tarra-Bulga National Park core areas occur outside of the HVP estate, they are critical centres of biodiversity within the Strzelecki Ranges area adjacent to HVP estate.

The two habitat links identified include:

- Ryton Link and Albert River Link (connecting the Gunyah Gunyah, Jack River and College Creek Core Areas).
- Upper Middle Creek Linkage (connection between Jack River Core Area and Tara Bulga National Park).

The five core areas and two corridors described encompass some of the most significant ecological values within the study area. The Strzelecki Ranges and Gippsland Plain bioregions, however, are significantly depleted of native vegetation and all remnants contribute to the biodiversity of these significantly altered environments. Depending on their size and condition, all examples of threatened EVCs have high conservation value.

### **Biodiversity Management**

The values present within Core Areas, including areas of Cool Temperate Rainforest and populations of threatened flora and fauna, are endangered and are vulnerable to disturbances. A precautionary approach is therefore warranted. Over time, such an approach is likely to allow areas of Cool Temperate Rainforest to increase in area, restrict the spread of Mrytle Wilt, increase habitat diversity as forests mature and allow populations of rare and threatened species to stabilise or expand. Managing subcatchment units for biodiversity is seen as the most secure option for achieving these goals. We do not consider that timber harvesting and the maintenance of biodiversity are compatible land uses within these Core Areas. Within the habitat links, the vegetation must be managed to ensure that there is always at least some suitably structured vegetation forming a continuous connection between the Core Areas at either end.

Given that HVP is a private company, leases the estate, and needs to consider social and economic, as well as ecological dimensions, some time may elapse before management changes could be implemented in these areas. Therefore, in the short-term, we propose a moratorium be established on harvesting within 250 metres of Cool Temperate Rainforest and records of any significant flora species, and within 2000 metres of the Spot-tail Quoll record.

Other interim management strategies proposed for both Core Areas and Habitat Links include:

- the retention of mature trees for hollow-dependent fauna
- retiring selected coupes from harvesting
- increasing coupe rotation times
- creating a mosaic of coupe ages
- ensuring adjacent coupes are not harvested concurrently.

Throughout the HVP estate, all the native vegetation associated with Custodial Lands are important for biodiversity and should be clearly delineated on the ground to minimise disturbance from harvesting activities. Current HVP policy dictates that no areas of Custodial Land (native vegetation) are to be cleared for plantation establishment and this policy should be maintained. Other activities associated with harvesting, such as road construction should also avoid areas mapped as native vegetation when ever possible.

While the current HVP policy for the management of Custodial Lands is to retain the values of the existing native vegetation, the ecological values present will generally be retained. If this policy changes the protection of the biodiversity present could best be protected by a change in land tenure.

A series of other management options to manage biodiversity in areas generally available for timber production, including the production of a local Code of Forest Practices, are discussed.

## 2.0 INTRODUCTION

The subject matter of this report involves the use of a number of technical words and terms with which the reader may be unfamiliar. An extensive glossary has been included at the end of the report and reference to this may be of assistance.

### 2.1 Project Background

Biosis Research Pty. Ltd. was engaged by the Strzelecki Working Group to assess the conservation values of Hancock Victorian Plantations Pty Ltd (HVP) holdings and surrounding areas in the Strzelecki Ranges, and to identify the steps required to maintain and enhance the biodiversity of the area.

It is envisaged that this will be the first stage in an evolving process of assessment of the HVP estate within the Strzelecki Ranges and surrounding areas. The purpose of this present stage is to assess the flora, fauna and native vegetation issues and provide recommendations on techniques to preserve biodiversity, regardless of land tenure. Later stages in this process may also consider other important aspects such as social and economic issues and the development of specific management strategies.

The purpose of this report is to identify areas of high biodiversity value and recommend management options for protecting these values. These core areas and associated habitat links are identified as focal points for biodiversity although it is acknowledged that all remnant native vegetation within the study area has relatively high conservation value. The decision to recommend changes in management practices or protect core areas will be made by the Strzelecki Working group and any adoption will require the support and approval of the HVP board, government and their agencies such as NRE and other stakeholders.

### 2.2 Aims

The aims of this study are detailed by the project brief (Appendix 1). In summary the major objectives of the study are to:

- identify and evaluate the occurrence of indigenous flora, fauna, vegetation communities and areas of conservation significance on the land in the Strzelecki Ranges leased to HVP and adjacent areas of native vegetation.
- identify core areas of biodiversity within the study area.
- make recommendations to ensure the biodiversity and conservation values of the HVP estate and surrounding areas are maintained and, where possible, enhanced.

## 2.3 Biodiversity

The recent Gippsland Regional Forest assessment process (VicRFASC 2000) defines and discusses the values of biodiversity. The following discussion distils relevant aspects of that more extensive text.

Biological diversity, or biodiversity, is the variety of all life-forms, the genes they contain, and the ecosystems of which they are a part. Biodiversity is generally considered at three levels: genetic diversity, species diversity, and ecosystem diversity (JANIS 1997). Biodiversity underpins human well being. We rely on clean air to breathe and clean water to drink and enough variety in our environment to provide us with the tools to adapt to change.

To conserve biodiversity, appropriate reservation and/or management actions need to be implemented which will ensure that this variety of life-forms is maintained. Of particular priority is a system that will safeguard endangered and vulnerable species and ecosystems. The National Strategy for the Conservation of Australia's Biodiversity adopts the principle that biological diversity is best preserved in situ.

As identified by Rice (1990) and others, there is a need for care when defining species diversity within timber production areas, ensuring that the debate is not centred upon numbers of species. That is, it is important to distinguish between the raw numbers of species in an area against the species of conservation concern. If *species diversity* is defined as just 'the number of species in an area', then forestry could be said to promote *diversity* as forestry activities often leads to an increase in the number of species within an area. However, these additional species are typically opportunistic, non-threatened species that are attracted to fragmented habitats and complex habitats such as forest edges, while there is usually a decrease in habitat for the forest species and communities dependent on less disturbed sites that are generally more in need of protection.

Similarly, definitions of *species diversity* must not just consider the raw number and range of species in an area, but also their abundance. For example, if four particular species (e.g. Pied Currawong, Superb Lyrebird, Hop Goodenia and Mountain Grey Gum) occur in an area both before and after forestry operations, then 'species diversity' has not changed if only the number of species is considered. However, if Pied Currawongs and Hop Goodenia were rare and Superb Lyrebirds and Mountain Grey Gums were abundant before harvesting, but their abundance's completely reversed in the years following forestry operations, then there has been a change in 'species diversity' if species abundance is also considered.

## 2.4 Study Area

The Strzelecki Ranges are an isolated series of mountains in the southern section of the Gippsland region that are surrounded by the Gippsland Plain. Previously covered in tall forests, most of the native vegetation within this bioregion was progressively cleared for settlement or logged for timber. Today there are significant areas of native forest in the Strzelecki Ranges interspersed with native and exotic plantations managed for timber production (VicRFASC 2000).

The study area is generally confined to areas leased to Hancock Victorian Plantations (HVP) in the Latrobe Forestry Zone, south of the Princes Highway. However, assessment of biodiversity values within the Strzelecki Ranges has also considered land in areas adjacent to the HVP estate. For administrative purposes, the HVP estate is divided into forest blocks, which are named to reflect their locations (Figure 1). The main section of the study area is located in the eastern Strzelecki Ranges and consists of the Turtons, Boolarra, Livingstone, Woorarra, Albert, Jack, Macks, Bodman and Callignee blocks. Almost 98% of HVPs hardwood plantations are located in this area, which also represents 88% of the total study area. There are some smaller blocks to the east (e.g. Won Wron, Mullungdung), west (e.g. Allambee, Childers), north (e.g. Jeeralang, Darlimurla) and south (Alberton West) of the central Strzelecki Ranges area that make up the remainder of the study area.

### 2.4.1 Bioregions

The association of flora and fauna values within a natural system is inherently diverse. At a broad scale (i.e. state or national level), there is a need for simplification of such complex systems into a useable framework, which can allow a more direct assessment of the biological assets and management issues facing a local area. The particular framework recommended by the Department of Natural Resources and Environment are the use of *Biogeographic regions* or *Bioregions* (NRE 1997c). Bioregions describe particular patterns of ecological characteristics across a landscape. Recently, the state of Victoria has been divided into 21 separate Bioregions (NRE 1997c).

The revised map of Victoria's Bioregions (NRE 1997c, Viridans 1999) indicates that the majority of the study area, including most of the hardwood production forests, is located in the **Strzelecki Ranges** Bioregion (Figure 2). This Bioregion represents the elevated land higher than approximately 150-200 metres above sea level (Conn 1993) surrounded by the **Gippsland Plain**, between Moe in the north and Corner Inlet in the south, and between San Remo in the west and Rosedale in the east. The remainder of the study area is located on the Gippsland Plain Bioregion (Figure 2), which surrounds the Strzelecki Ranges and extends from Port Phillip Bay in the west to Lakes Entrance in the east, south of the Great Dividing Range and north of Wilsons Promontory.



## 2.5 Land Use in the Strzelecki Ranges

The Strzelecki Ranges have been subjected to a number of different land uses since Count Strzelecki and his party travelled through the area in 1840. The late 1860s saw the beginnings of settlement in the eastern Strzelecki Ranges with the opening of tracks through this country. Many of the tracks today still bear the names of their builders (e.g. Whitelaws and Turtons). By 1883/4 selectors had entered the hill country in earnest following the survey parties (Adams 1990). Settlements were established at Balook, Blackwarry and Carrajung. Selectors were required to enter into conditional purchase leases. The land was leased from the Crown for a set number of years and subject to conditions regarding residence and improvements such as fencing and land clearing, assessed annually. If the conditions had been met and all monies paid, the lease converted to freehold at the end of the term. Many blocks were forfeited when selectors either failed to fulfil the necessary requirements of selection eg vegetation clearance or circumstance forced them to leave. Many settlers had little or no farming experience before coming to the district.

The work of selection in the Strzelecki Ranges involved cutting scrub mostly by axe, burning off heaped debris and ring-barking trees. The huge trees, one as large as 40 metres circumference at their base were to be a constant problem for settlers (Adams 1990). Clearing took place through winter and spring, in the hope of having good burns in the drier summer weather. The very big trees might be left ring-barked or cut down in stages from the top using scaffolding. The scrub would be burnt and grass sown on the thick ash without ploughing before or after rain (Adams 1990). Basic crops included potatoes, onions and variety of other root crops, pumpkins, peas and beans and grain crops like oats and millet. Dairying also became established.

Selectors took up land in the upper Agnes valley south of Mount Fatigue, Woorarra, Gunyah Gunyah, Womerah, Madalya, Hiawatha, Macks Creek, Christie's, Johnstones Hill and Ryton. By 1900 the country was shown to be rich in pockets but on the fringes of these pockets selectors had to work hard to make their lands pay. Rate books showed the average occupancy of blocks in the Bulga area as nine years. Farmers had to contend with short milking seasons, cold winters, noxious weeds, thick scrub and extreme transport difficulties.

As younger men went away to the First World War, the farms became neglected and many were abandoned. By 1930 about 60,000 hectares of land had been abandoned and a further 64,000 hectares were in a neglected condition (Parks Victoria 1997). A number of attempts at resettlement occurred including a "work for the dole" scheme but all were unsuccessful. A timber mill was established at Balook from 1924 to 1939 but that too was abandoned when the timber was no longer readily available.

After the Second World War, the Victorian Forests Commission began large scale reforestation in the Strzelecki Ranges. The first plantings were pine at Gunyah in 1941. The policy was to replant abandoned properties with pine and hardwood forests, preventing new settlers from taking up those properties. In 1959 the Commission began work, replanting in the Carrajung - Blackwarry area. In the 1960s prison labour was used to clear hill country for plantations. In 1962 work began on replanting areas of the Macks Creek valley. Land at Madayla and at the head of the Albert River were being planted from the late 1960s.

The Tarra-Bulga National Park now covers 1,625 hectares and consists of some of the best examples of the original forests of the Strzelecki Ranges. In 1903 an area of 20 hectares was reserved and called Bulga National Park. Six years later, an area of 303 hectares in the Tarra Valley was temporarily reserved, and 140 hectares of this area was reserved as Tarra National Park. The two separate National Parks were later joined through a land exchange with Australian Paper Mills, following recommendations by the Land Conservation Council. The total area was enlarged to 1,230 hectares and declared the Tarra-Bulga National Park in June 1986 (Parks Victoria 1997).

The Morwell National Park, located approximately 5 kilometres south of the township of Churchill, is intersected by the boundary of the Strzelecki Ranges bioregion and Gippsland Plain bioregion. There is no forest managed by HVP in the vicinity of the Morwell National Park.

The Victorian Plantations Corporation was established out of the Forests Commission in 1993 and the extensive plantations (see CD ROM) were then leased to Hancock Victorian Plantations Pty Ltd, the current land managers in 1998.

## **2.6 Current Management of HVP Leasehold**

The area of forest currently managed by HVP has been delineated into three basic units, hardwood plantation, softwood plantation and non-harvestable areas of predominantly native vegetation termed custodial lands.

Areas of plantation are managed according to the Code of Forest Practices (NRE 1996). Additional conservation measures implemented by HVP, in accordance with their forest stewardship program include:

- No ground based logging over 30 degrees (areas with slopes greater than 30 degrees may be cable logged);
- The retention of all mature, non-plantation trees;

- Minimal snig track construction;
- Marking of hardwood plantation boundaries prior to harvesting with specific instruction to contractors not to log over taped boundaries;
- No logging of hardwood plantation within filter or buffer strips; and
- The preparation of a forest management plan.

## **3.0 COLLECTING INFORMATION ON BIODIVERSITY**

### **3.1 Data Collection Methods**

Standard methods and data collection processes were used when undertaking the assessment of the biological values of the area. These are comprehensively discussed in Appendix 2 for flora and fauna and summarised below. In addition several individuals were consulted, including local field naturalists, HVP representatives and NRE staff (see Acknowledgements). Relevant literature sources were also used.

Gippsland was recently assessed as part of the wider Gippsland Comprehensive Regional Assessment (CRA) for the Regional Forests Agreement (RFA) process, although this excluded areas leased to HVP. A major component of the CRA was the preparation of a biodiversity assessment (VicRFASC 1999). The Comprehensive Regional Assessment (CRA) biodiversity assessment (VicRFASC 1999) provides information about individual flora and fauna species and their habitats, forest ecosystems and communities, and threatening processes. It reviews existing information and the results of additional studies of priority taxa and communities (VicRFASC 1999). Whilst the CRA only looked at parts of the Strzelecki Ranges in a wider regional context, much of the information contained in VicRFASC also applies to this study.

This report relies heavily on existing data sets, including the Flora Information System (FIS), Atlas of Victorian Wildlife (AVW) and draft 1:25 000 EVC mapping (NRE 2000c), although some fieldwork to collect data in poorly surveyed areas was conducted. To summarize these general limitations, it should be acknowledged that this study should be viewed as a part of an on going survey and research effort in an attempt to retain and protect the ecological values of the Strzelecki Ranges, and should not be seen as a conclusive and comprehensive document.

### **3.2 Flora**

#### **3.2.1 Literature Review**

There are few published reports on the botanical values of this region and those that are available (i.e. Gullan et al. 1984 and LCC 1982) are relatively dated. Information from the various databases, such as the FIS, and other sources were collated. A five kilometre radius around the HVP estate was also searched using the FIS. This data has been summarised into an inventory in Appendix 3.

The FIS, which contains survey data collected over the past 30 years and a significant proportion of the records available from the National Herbarium in Melbourne, therefore provides the most valuable source of data on the distribution of plants in this area. Even this source, however, contains only relatively sparse data from the study area when compared to much of the rest of Victoria.

### **3.2.2 Taxonomy**

The plant taxonomy (method of classification) used in this report follows Ross (2000), or from subsequent advice from the National Herbarium in Melbourne.

### **3.2.3 Field Assessment**

The flora and vegetation were surveyed by the collection of 30 quadrats (30 metres by 30 metres), within the HVP Strzelecki Ranges estate. The locations of these quadrats within the estate were selected to complement the existing flora data, to sample the range of vegetation communities present and to sample the floristic diversity during different stages of forestry work. General observations were also made on the vegetation throughout the estate, and incidental locations of any rare or threatened species or communities, were also recorded.

Fieldwork took place during 12-16 August and 4-8 September 2000.

Locations of all flora sampling sites are shown in Figure 3 and are available on the accompanying CD ROM.

Details of the flora survey and assessment are given in Appendix 2.

### **3.2.4 Limitations**

The survey was conducted during late winter and early spring, generally a time of the year which is not considered to be optimal for vegetation surveys. Many of the annuals and geophytes (plants with underground storage organs such as tubers) may have been missed due to dormancy and/or the absence of flowers or fruit. Some species could not be identified beyond the genus level, as key taxonomic material was not available for use in identification. More species would have been recorded during late spring/early summer and with more time in the field.

The timing and limited duration of the survey meant that only main roads were utilised, as many of the tracks are impassable during these months. Furthermore, the time constraint limited the location of survey sites to relatively major roads

and not in relatively inaccessible areas such as forested gullies.

The limited resources available to assess and report on such a large study area restricted the amount of time available for the field assessment. For example, the flora survey focused on collecting quadrat data for specific areas within the estate, rather than attempting to record the general condition of the whole estate. It was not possible, therefore to fully describe the attributes of the estate.

## **3.3 Fauna**

### **3.3.1 Literature Review**

Records of fauna species from the study areas and surrounding areas (at least five kilometres away) were obtained from the Victorian Fauna Display System (Figure 6), produced by Viridans (1999) using the baseline data provided by the AVW and maintained by the Department of Natural Resources and Environment. Additional information was also obtained from literature sources (e.g. VicRFASC 1999, Norris et al. 1979) and personal communications with NRE staff and local naturalists.

### **3.3.2 Taxonomy**

The common and scientific names for birds used in this report are from Christidis and Boles (1994). The common and scientific names for mammals follow Menkhorst (1995). The common and scientific names for reptiles, frogs, fish and invertebrates follow the Atlas of Victorian Wildlife (NRE).

### **3.3.3 Field Assessment**

During the present assessment, two field trips were made to areas of the HVP estate within the Strzelecki Ranges Bioregion. Fieldwork was restricted to this area because of time constraints associated with this project. The first trip was conducted between 8 to 12 August 2000, while the second was between the 28 to 31 August 2000. Field assessment was conducted from a vehicle and on foot.

Fauna data collection utilised five main techniques:

- nocturnal call playback;
- spotlighting;
- hairtubing;
- incidental observations; and
- scat collection.

Descriptions of each of these techniques are detailed in Appendix 2. Each of these techniques was used in various intensities throughout the HVP estate within the Strzelecki Ranges Bioregion (Figure 4, Table 1; Appendix A3.2). Fauna survey was primarily focused upon detection of fauna species of national or state significance.

Table 1: Summary of survey methods and effort during the field assessment.

| Survey Technique        | Number of Sites | Total Survey Intensity |
|-------------------------|-----------------|------------------------|
| Nocturnal Call Playback | 11              | 7 hours                |
| Spotlighting            | 7               | 2.2 hours              |
| Hair-tubing             | 13              | 1326 hair tube nights  |
| Incidental Observations | 10              | -                      |
| Scat Analysis           | -               | 2 scats collected      |

### 3.3.4 Limitations

The limited survey resources available to cover the large area of land managed by HVP restricted the amount of time available for the field assessment. The implications of this were:

1. The field assessments were conducted almost wholly within the central HVP leasehold property within the Strzelecki Ranges. Little or no field assessment could be conducted within scattered areas of HVP leasehold property to the east or west of the Strzelecki Ranges.
2. The field assessment had a primary focus upon habitat qualities and broader forestry and management activities, and only a secondary focus upon the collection of additional data on the presence and location of fauna.
3. The present assessment was largely restricted to existing databases and limited field surveys for terrestrial vertebrate fauna. No active survey was conducted for aquatic or invertebrate fauna. There is little available information on the distribution of invertebrates in the Strzelecki Ranges (VicRFASC 1999). With the exception of limited data on the distribution of threatened invertebrate species, there are no readily accessible databases of invertebrate species in Victoria. Invertebrate species are an important component of biological diversity, and their diversity in an area cannot always be extrapolated from the diversity of vertebrates or plants in an area (Oliver et al. 1998). Some scientists consider that invertebrate diversity is more representative of overall species diversity than plants or vertebrate

fauna (Oliver et al. 1998). However, given the limitations of this study and the poor knowledge of invertebrate fauna in the Strzelecki Ranges (and Victoria in general), this assessment is largely confined to vertebrate fauna.

The field assessments were conducted during a time of the year (i.e. late winter) that was inappropriate for the detection of many fauna species, particularly reptiles and bats. Additional fauna species would have been recorded if further surveys were conducted for longer time periods, at a greater intensity and during other times of the year.

The field assessments were conducted during poor weather, with rainfall and strong winds on most days. The poor weather conditions and time of the year enforced many constraints, including:

- Some fauna survey techniques have little success during such conditions as there are fewer fauna species and individuals active during these conditions.
- There are difficulties detecting and observing fauna during wet and windy conditions.
- Harp trapping for bats was not attempted as bats usually engage in little flight/foraging activity in these conditions.
- Rainfall and high wind greatly reduce the effectiveness of nocturnal call playback (Higgins 1996).
- Many of the roads within the study area were impassable due to wet conditions and fallen trees. The field assessment was therefore largely confined to areas accessible by regularly used and well-maintained roads within the study area.

Many of these limitations, however, were at least partially offset by the detailed fauna records available for the local area (Figure 6) in the Atlas of Victorian Wildlife and the recent detailed biodiversity investigation conducted throughout the greater Gippsland area as part of the RFA process (VicRFASC 1999).

### **3.4 Aerial Photograph Interpretation**

Aerial photographs taken in November 1994 and March 1999 were inspected either as stereo-pairs or as single photographs. To determine the vegetation associated with selected phototypes, various locations were ground-truthed. In particular, areas in the vicinity of hair-tube lines and spotlighting/nocturnal call playback sites were inspected but general observations were also made during travel between sites. Areas of 'mature' and 'over-mature' trees were identified on the photographs. In addition, areas likely to contain Cool Temperate



Rainforest (CTR) outside of those areas presently mapped in the Draft 1:25,000 EVC mapping (NRE 2000c) were also identified. These areas were compared to areas of known CTR for similarity in canopy structure and colour.

Central Highlands CTR has a canopy typically dominated by Myrtle Beech, *Nothofagus cunninghamii*, and is generally located in deep gullies. Myrtle Beech has a distinctly dark green canopy when viewed on the aerial photographs. The canopy is not as tall as the surrounding Mountain Ash forest and is more closed. The tree crowns are generally smaller and more regular than eucalypts.

Areas of mature eucalypts were distinguished from younger forest by the lack of uniformity in the crown shapes. Areas of even aged eucalypts, less than 25 years old, generally have an even surface of conical shaped crowns that form a distinctive photo pattern. As the trees mature they develop a more rounded crown, and mature trees have a large, open, spreading crown that, if surrounded by younger regrowth or planted trees, is obviously taller.

In the March 1999 photographs, areas of Silver Wattle, *Acacia dealbata*, were clearly identified by their silvery grey tops, and treeless fern gullies (dominated by tree-ferns) were a luminous green colour.

## 4.0 DEFINING SIGNIFICANT SPECIES AND COMMUNITIES

A number of categories and criteria are formally applied to assess the conservation significance of flora and fauna. The definition and application of these criteria are detailed in Appendix 7 and summarised below.

### 4.1 Flora

#### 4.1.1 Species

The significance of remnant native vegetation and populations of any particular plant species is evaluated on a geographical scale with four levels: **national**, **state**, **regional** and **local**.

A variety of options are available for the evaluating regional significance. This includes, for example, lists of significant species available for the South Gippsland area (Beaglehole 1984). Bioregions have more recently been defined for Victoria (NRE 1997c), and the Department of Natural Resources and Environment (NRE) FIS database has been used to determine the frequency of records for vascular plants in each of these regions.

A species is defined as having regional significance if it occurs in one per cent or less of the known quadrat (a sample of vegetation of defined area and shape) and list records for any particular bioregion. If that region has been substantially cleared or disturbed, a five per cent threshold is applied. The use of bioregions is considered to be the most ecologically sound method to evaluate regional significance. Species considered significant by other authors are also noted. For this study area, a five per cent threshold is used for regional significance as both the Gippsland Plain and the Strzelecki Ranges Bioregion have largely been cleared.

#### 4.1.2 Vegetation Communities

A vegetation community is defined as a group of species that regularly occur together in similar environments. A vegetation community (or group of related communities) is considered significant if it is rare or threatened within a particular geographic context. As is the case with assessing the biological significance for species, a hierarchy of **National**, **State**, **Regional** and **Local** levels of significance is used to assess vegetation community significance.

Due to the depletion and destruction of native vegetation across Victoria, all native vegetation is considered to have at least Local significance.

The significance of the Ecological Vegetation Classes (EVCs) found within the study area follows the listing provided by West Gippsland Catchment Management Authority Draft Vegetation Plan (West Gippsland CMA 2000).

## 4.2 Fauna

### 4.2.1 Species Significance

The significance of fauna species is considered at four levels: **national**, **state**, **regional** and **local**.

**National** significance is assessed using recognised listings: ANZECC (2000), IUCN (1996), species listed under Schedule 1 of the (Commonwealth) *Environment Protection and Biodiversity Conservation Act (EPBC) 1999* and relevant Commonwealth Action Plans. Under the EPBC Act and within ANZECC (2000), nationally threatened faunal species can be placed into one of two threat categories: **endangered** or **vulnerable**. Within the IUCN (1996) and Action Plan listings, nationally threatened fauna can be placed into one of four categories; **critically endangered**, **endangered**, **vulnerable** and **lower risk (near threatened or conservation dependent)**.

**State** significance is assessed using recognised listings. For Victoria, this comprises the listings within *Threatened Vertebrate Fauna in Victoria – 2000* (NRE 2000b), and species listed as threatened under Schedule 2 of the (Victorian) *Flora and Fauna Guarantee Act 1988*. State threatened fauna can also be placed into one of four threat categories: **critically endangered**, **endangered**, **vulnerable** and **lower risk-near threatened** (NRE 2000b). Depending upon a number of variables, species considered lower risk or data deficient on national listings (see above) may also be considered State significant.

**Regional** significance is not assessed through any formal means. Rather, it is assessed by referring to relevant government reports, by consulting experts familiar with the area, referring to the literature (e.g. Robinson 1994), and by drawing upon previous field experience of the consultant. However, species listed as ‘lower risk’ or ‘data deficient’ on national or state listings may also be regarded as regionally significant. Depending upon a number of variables, species considered ‘lower risk-near threatened’ within this document (NRE 2000b) may also be considered regionally significant. As stated earlier, the HVP land lies within two bioregions. The majority of the HVP estate land lies within the **Strzelecki Ranges** bioregion. The scattered areas of HVP estate to the east of the Strzelecki Ranges lie within the **Gippsland Plain** bioregion. Some of the scattered areas of HVP estate to the west of the Strzelecki Ranges lie within the **Strzelecki Ranges** bioregion and some within the

**Gippsland Plain.** As such there are a number of fauna species from the general species list that are of regional conservation significance when they occur in the Strzelecki Ranges, but not where they occur in the Gippsland Plains, and vice versa.

All fauna species indigenous to an area are considered to be of at least *local* conservation significance. A local area is defined as the area within five kilometres of any particular site.

More detailed descriptions of these significance categories are provided in Appendix 7.

#### **4.2.2 Habitat Assessment**

As part of this project, habitat assessment was undertaken for terrestrial vertebrate fauna. Floristic and structural features of the vegetation form a habitat type, providing a set of resources to support a community of fauna species. Habitat types correspond broadly to vegetation communities. Lines drawn around these habitats do not represent rigid boundaries, as many species move between habitats or utilise more than one habitat according to changing conditions or seasons.

The value of a habitat will assist in the final determination of the significance of any particular area of land.

The value of a habitat is determined by a number of features, including:

- Habitat status
- Size/connectivity
- Condition
- The presence of significant species
- Other features

Other habitat features used to assess habitat quality include value as a habitat corridor, the presence of remnant vegetation communities, or unusual ecology or community structure.

## 5.0 RESULTS

A comprehensive list of the flora and fauna species recorded during the assessment are presented in Appendix 3 and 4 (Flora), Appendix 5 (EVCs) and Appendix 6 (Fauna). Relevant data has also been tabulated below.

### 5.1 Flora

#### 5.1.1 Species

A total of 191 vascular plant species were recorded during the current field survey from the study area, of which 153 (80%) are indigenous. The remaining 38 are introduced species (Appendix 3.1). These species were recorded from thirty, 30 metre x 30 metre quadrat sites (Figure 3, FIS Nos. F38195-F38225, Appendix 4). Generally, only naturally occurring species were recorded and planted trees, such as Radiata Pine *Pinus radiata*, were not recorded unless they were spreading naturally. However, for this report, quadrats were taken in areas with a planted eucalypt (Mountain Ash *Eucalyptus regnans*) overstorey. Such overstorey species were recorded where they were considered locally indigenous and had the potential to naturally regenerate.

Fifty one flora quadrat records, 53 Herbarium records and 25 local area plant lists were identified within the HVP estate from the FIS (Appendix 3). These records identified approximately 150 additional indigenous flora species and approximately 20 additional introduced flora species. The majority of these additional species are likely to still occur within the study area.

Five hundred and eighteen flora quadrat records, 332 Herbarium records and 184 local area plant lists were identified within a 5km radius of the HVP estate, from the FIS database maintained by NRE (Figure 5, significant species are listed in Appendix 3.3). These records identified approximately 500 additional indigenous flora species and approximately 100 additional introduced flora species occurring within the vicinity of the study area. Considering that parts of the study area are dominated by indigenous flora species, it is likely that some of these additional species are present within the study area.

#### 5.1.2 Significant Species

##### 5.1.2.1 National

Two plant species of National conservation significance, Sticky Wattle *Acacia howittii* (Rare in Australia) and Green striped Greenhood *Pterostylis chlorogramma* (Vulnerable in Australia) were recorded during the current

survey.

Sticky Wattle is a rounded, small tree that is apparently endemic to Victoria and grows in the moist forests of central Gippsland (Costermans 1994, Walsh and Entwisle 1996). Sticky Wattle was recorded within three quadrats during the current survey (F38215, F38219 and F38222). At each location Sticky Wattle was also observed in the area surrounding the quadrat. This species has also been recorded at a number of other quadrats within a five kilometre radius of the study area (FIS unpublished data), and would be expected to occur in other unrecorded locations across study area, especially in the eastern half.

The Green-striped Greenhood is an orchid that is endemic to Victoria, and is currently known from the south-west and Gippsland regions (Backhouse and Jeanes 1996). Green-striped Greenhood was recorded at one location during the current survey (FIS No. F38214). This species has not been recorded within a five kilometre radius of the study area before (FIS unpublished data), but would be expected to occur at other locations within the HVP estate, particularly in the east on the Gippsland Plain.

Two additional species of National conservation significance, Slender Tree-fern *Cyathea cunninghamii* (Rare in Australia) and Bog Gum *Eucalyptus kitsoniana* (Rare in Australia), have also been recorded from the study area (FIS unpublished data, Appendix 3.2). Both of these species would be expected to occur at other sites within the study area.

Six additional species of National conservation significance were identified from the FIS within a five kilometre radius of the study area (Table 2, Appendix 3.3). Some of these species could also occur within the study area.

| Common Name               | Scientific Name               | Status       |
|---------------------------|-------------------------------|--------------|
| River Swamp Wallaby-grass | <i>Amphibromus fluitans</i>   | Vulnerable   |
| Strzelecki Gum            | <i>Eucalyptus strzeleckii</i> | Vulnerable   |
| Yarra Gum                 | <i>Eucalyptus yarraensis</i>  | Rare         |
| Sharp Midge-orchid        | <i>Genoplesium despectans</i> | Poorly Known |
| Maroon Leek-orchid        | <i>Prasophyllum frenchii</i>  | Endangered   |
| Dwarf Kerrawang           | <i>Rulingia prostrata</i>     | Endangered   |

**Table 2:** Additional plant species of National significance recorded by the FIS within a five kilometre radius of the HVP leasehold.

### 5.1.2.2 State

No flora species of State conservation significance were recorded during the current survey (NRE 2000a).

Eight additional species of State conservation significance were identified within the study area from the FIS and additional sources (see acknowledgements) (Table 3, Appendix 3). All of these species would be expected to occur at other sites within the study area.

| Common Name           | Scientific Name                                  | Status     |
|-----------------------|--|------------|
| Fringed Helmet-orchid | <i>Corybas fimbriatus</i>                        | Rare       |
| Purple Diurus         | <i>Diurus punctata</i> var. <i>punctata</i>      | Vulnerable |
| Broad-lip Leek-orchid | <i>Prasophyllum patens</i>                       | Rare       |
| Rush Lily             | <i>Sowerbaea juncea</i>                          | Rare       |
| Slender Fork-fern*    | <i>Tmesipteris elongata</i> ssp. <i>elongata</i> | Vulnerable |
| River Hook-sedge*     | <i>Uncinia nemoralis</i>                         | Rare       |
| Skirted Tree-fern*    | <i>Cyathea X marcescens</i>                      | Vulnerable |
| Oval Fork-fern*       | <i>Tmesipteris ovata</i>                         | Rare       |

**Table 3:** Plant species of State significance recorded from the FIS and other additional sources (\* - see acknowledgements) within HVP leasehold.

Seventeed additional species of State conservation significance were identified from the FIS within a five kilometre radius of the HVP leasehold (Table 4, Appendix 3). The majority of these species would be expected to occur within the study area.

### 5.1.2.3 Regional

Using the stated significance criteria (see Appendix 7), 78 of the indigenous flora species recorded in the present survey are considered to be of regional significance for conservation (see Appendix 3). Sixty three of these species were recorded within the quadrats from the Strzelecki Ranges Bioregion, and 21 from the quadrats within the Gippsland Plain Bioregion (see Appendix 3).

## 5.1.3 Vegetation Communities

Ecological Vegetation Classes (EVCs) are the basic mapping unit used for forest ecosystem assessments, biodiversity planning and conservation management at the regional scale in Victoria. An EVC consists of one or more floristic communities that exist under a common regime of ecological processes within a particular environment at a regional, state or continental scale. A floristic

(or vegetation) community is a group of species that regularly occur together in similar environments. At the local level, an EVC is usually represented by a single floristic community, and these terms are often interchangeable (NRE in prep.).

| Common Name             | Scientific Name                                     | Status       |
|-------------------------|---|--------------|
| Filmy Maidenhair        | <i>Adiantum diaphanum</i>                           | Endangered   |
| Wetland Blown-grass     | <i>Agrostis avenacea</i> var. <i>perennis</i>       | Poorly Known |
| Shiny Wallaby-grass     | <i>Austrodanthonia induta</i>                       | Poorly Known |
| Fairy Caladenia         | <i>Caladenia alata</i>                              | Poorly Known |
| Orange-tip Caladenia    | <i>Caladenia aurantiaca</i>                         | Rare         |
| Bear's-ears             | <i>Cymbonotus lawsonianus</i>                       | Rare         |
| Slender Tick-trefoil    | <i>Desmodium varians</i>                            | Poorly Known |
| Upright Panic           | <i>Entolasia stricta</i>                            | Poorly Known |
| Southern Blue Gum       | <i>Eucalyptus globulus</i> ssp. <i>globulus</i>     | Rare         |
| Beech Finger-fern       | <i>Grammitis magellanica</i> ssp. <i>nothofagei</i> | Vulnerable   |
| Golden Grevillea        | <i>Grevillea chrysophaea</i>                        | Rare         |
| Blue Mat-rush           | <i>Lomandra glauca</i>                              | Poorly Known |
| Currant-wood            | <i>Monotoca glauca</i>                              | Rare         |
| Ivy Flat-pea            | <i>Platylobium triangulare</i>                      | Poorly Known |
| Fisch's Greenhood       | <i>Pterostylis fischii</i>                          | Rare         |
| Green-striped Greenhood | <i>Pterostylis grandiflora</i>                      | Rare         |
| Naked Sun-orchid        | <i>Thelymitra circumsepta</i>                       | Vulnerable   |

**Table 4:** Additional plant species of State significance recorded by the FIS within a five kilometre radius of the HVP leasehold.

Based on the draft pre -1750 vegetation mapping (NRE 2000c), prepared as part of the Regional Forest Agreement (VicRFASC 1999), thirteen Ecological Vegetation Classes (EVCs) have been described for the HVP leasehold. These are detailed in Appendix 5, summarised in Table 5, and draft mapping is available on the attached CD ROM. Eight EVCs have been identified from the most extensive part of the HVP estate, within the Strzelecki Ranges Bioregion (Table 5). Ten have been identified from the smaller parts of the HVP estate, on the Gippsland Plain, and five EVCs occur in both Bioregions (Table 5).

A description of the EVCs and their total areas within the HVP estate are listed in Appendices 5.1 and 5.2. The areas are based on the draft EVC maps produced for the Gippsland RFA (VicRFASC 1999). Six EVCs are represented by less than 60 hectares, and a further four are represented by less than 260 hectares of vegetation within the estate. From our field investigations and aerial photo interpretation, Central Highlands Cool Temperate Rainforest appears to be under represented by existing mapping. Wet Forest has by far the largest representation within the estate, followed by Damp Forest and then



Lowland Forest (VicRFASC, 2000), but some of these areas are most likely to be in a mosaic with land used for timber production.

| EVC Type                                    | EVC Location | Conservation Status     |
|---|--------------|-------------------------|
| Riparian Scrub Complex                      | SR, GP       | Vulnerable              |
| Lowland Forest                              | SR, GP       | Vulnerable, Vulnerable  |
| Heathy Woodland                             | SR, GP       | Least Concern, Depleted |
| Damp Forest                                 | SR, GP       | Endangered, Vulnerable  |
| Riparian Forest (weedy)                     | GP           | Vulnerable              |
| Wetland Formation                           | GP           | Rare                    |
| Wet Forest                                  | SR, GP       | Depleted, Least Concern |
| Strzeleckis Warm Temperate Rainforest       | SR           | Endangered              |
| Central Highlands Cool Temperate Rainforest | SR           | Endangered              |
| Lowland Herb-rich Forest                    | GP           | Endangered              |
| Swampy Riparian Complex                     | GP           | Endangered              |
| South Gippsland Plains Grassy Forest        | GP           | Vulnerable              |
| Herb-rich Foothill Forest                   | SR           | Endangered              |

Strzelecki Ranges: SR, Gippsland Plain: GP

**Table 5 :** EVCs within the HVP leasehold and their bioregional conservation status (West Gippsland CMA 2000).

#### 5.1.4 Vegetation Condition

The condition of the vegetation within the HVP estate ranges from poor, in areas dominated by plantations of Radiata Pine *Pinus radiata*, to good in areas dominated by indigenous species such as Mountain Ash *Eucalyptus regnans*, Messmate *E. obliqua* and Yellow Stringybark *Eucalyptus muelleriana*. However, in the areas observed, the age of the overstorey varies considerably, and only a few of the areas could be classified as mature. This is generally the case in Victoria, as mature wet sclerophyll forests are uncommon as a result of their utilisation for timber (LCC 1982). These areas of indigenous vegetation, and indeed much of the areas inspected where much of the overstorey has been planted, generally have an understorey of indigenous species. Where introduced species such as Blackberry *Rubus fruticosus* spp. agg., are present they tend to be a co-dominant species in the ground/shrub layer.

#### 5.1.5 Significant Communities

The bioregional conservation status of the EVCs recorded are presented in Table 5. These vary in significance from endangered within the bioregion to being of least concern (West Gippsland CMA 2000). All of the EVCs listed as rare,

vulnerable or endangered, if present in relatively good condition, would be of at least state conservation significance. The EVCs listed as least concern or depleted, if present in relatively good condition, would be of at least regional conservation significance.

Some of the EVCs present within the study area have also been assigned conservation values in a number of other reports, including VicRFASC (1999) and Peel (1999). Strzeleckis Warm Temperate Rainforest (Strzeleckis WTR) is naturally rare throughout its range, and is entirely restricted to the foothill slopes of the Strzelecki Ranges in South Gippsland where it has been significantly depleted by clearing (Peel 1999). Central Highlands Cool Temperate Rainforest (Central Highlands CTR) is endemic to Victoria and has been significantly depleted in the Strzelecki Ranges, as a result of historic deforestation (Section 2.5).

Both Strzeleckis WTR and Central Highlands CTR are listed on Schedule 2 of the Flora and Fauna Guarantee (FFG) Act, as threatened vegetation communities.

Central Highlands CTR, Strzeleckis WTR, Swampy Riparian Complex and Lowland Herb-rich Forest are classified as endangered in the Gippland CRA, (VicRFASC 1999). Most occurrences (90% of the total area) of these EVCs, exist as small patches less than 100 hectares in size which are subject to ongoing threatening processes. These threatening processes have caused a significant alteration to ecosystem processes and many of these areas are unlikely to persist (VicRFASC 1999).

Riparian Forest has been classified as Vulnerable in the Gippland RFA (VicRFASC 1999). Riparian Forest has experienced significant changes to species composition and significant alteration to ecosystem processes and is subject to continuing threatening processes (VicRFASC 1999).

## 5.2 Fauna

### 5.2.1 Vertebrate Species

During the present assessment of HVP leasehold, fauna species were recorded by a variety of techniques (Table 6, Figure 4). Existing records were collated from the Victorian Fauna Display (VFD) for all areas of the HVP estate in South Gippsland, including a five kilometre buffer (Figure 6). Additional records were obtained from other sources (Norris et al. 1979; Mansergh and Norris 1982a; S. Zent pers. comm.). This data has been divided into three main areas:

- the largely consolidated areas of HVP leasehold within the central Strzelecki Ranges,
- scattered HVP leasehold to the west of the Strzelecki Ranges, and
- scattered HVP leasehold to the east of Strzelecki Ranges.

The fauna records from each of these three areas are summarised below and detailed within Appendix 6.

During the present survey of HVP estate within the central Strzelecki Ranges, 35 fauna species were recorded including ten mammals (five native), 22 birds (all native) and three amphibians (all native). The VFD (2000) records a further 184 fauna species, including 30 mammal species (25 native), 113 bird species (105 native), 23 reptile species (all native), eight frog species (all native) and ten fish species (all native).

East of the Strzelecki Ranges, the VFD records 138 fauna species, including 26 mammal species (22 native), 77 bird species (76 native), 16 reptile species (all native), 12 frog species (all native) and six fish species (all native). No fauna surveys were conducted in these areas during the present assessment.

West of the Strzelecki Ranges, the VFD records 140 fauna species, including 20 mammal species (17 native), 92 bird species (87 native), 13 reptile species (all native), seven frog species (all native) and eight fish species (all native). No fauna surveys were conducted in these areas during the present assessment.

Overall, this survey and the VFD record 241 fauna species, including 42 mammal species (33 native), 149 bird species (141 native), 25 reptile species (all native), 13 frog species (all native) and 10 fish species (all native) from the entire study area (Appendix 6).

**Table 6. Fauna species recorded during the present assessment, their conservation status and the technique by which they were recorded.**

N = National

St = State

R = Regional

L = Local

\* = introduced species

Sn = seen

Hd = heard

Hr = Hair sample collected

F = scat collected

G = remains of animal present within scat

| Status | Common Name                             | Scientific Name                 | Incidental | Predator Scat | Hair-tubing | Owl-call Playback | Spot-lighting |
|--------|---|---------------------------------|------------|---------------|-------------|-------------------|---------------|
|        | <b>MAMMALS</b>                          |                                 |            |               |             |                   |               |
| L      | Unidentified Antechinus                 | <i>Antechinus</i> sp.           | -          | G             | -           | -                 | -             |
| L      | Mountain Brushtail Possum               | <i>Trichosurus caninus</i>      | -          | G             | Hr          | Sn                | Sn            |
| L      | Unidentified Brushtail possum           | <i>Trichosurus</i> sp.          | -          | -             | Hr          | -                 | -             |
| L      | Common Ringtail Possum                  | <i>Pseudochierus peregrinus</i> | -          | -             | -           | -                 | Sn            |
| L      | Sugar Glider                            | <i>Petaurus breviceps</i>       | -          | -             | -           | Hd                | -             |
| L      | Common Wombat                           | <i>Vombatus ursinus</i>         | Sn         | G             | Hr          | -                 | -             |
| L      | Black Wallaby                           | <i>Wallabia bicolor</i>         | Sn         | -             | -           | -                 | Sn            |
| L      | Bush Rat                                | <i>Rattus fuscipes</i>          | -          | -             | Hr          | -                 | -             |
| -      | Unidentified Rat                        | <i>Rattus</i> sp.               | -          | -             | Hr          | -                 | -             |
| *      | European Rabbit                         | <i>Oryctolagus cuniculus</i>    | Sn         | -             | -           | -                 | -             |
| *      | Dingo/Dog (feral)                       | <i>Canis familiaris</i>         | -          | F             | Hr          | -                 | -             |
| *      | Red Fox                                 | <i>Canis vulpes</i>             | -          | F             | -           | -                 | Sn            |
| *      | Cat/Fox                                 | <i>Felis/Canis</i>              | -          | -             | Hr          | -                 | -             |
|        | <b>BIRDS</b>                            |                                 |            |               |             |                   |               |
| L      | Brush Bronzewing                        | <i>Phaps elegans</i>            | Sn         | -             | -           | -                 | -             |
| L      | Pacific Black Duck                      | <i>Anas superciliosa</i>        | Sn         | -             | -           | -                 | -             |
| R      | Wedge-tailed Eagle                      | <i>Aquila audax</i>             | Sn         | -             | -           | -                 | -             |
| L      | Southern Boobook                        | <i>Ninox novaeseelandiae</i>    | Sn         | -             | -           | Hd                | -             |
| N      | Powerful Owl                            | <i>Ninox strenua</i>            | -          | -             | -           | Hd                | -             |
| L      | Yellow-tailed Black-Cockatoo            | <i>Calyptorhynchus funereus</i> | Sn         | -             | -           | -                 | -             |
| L      | Crimson Rosella                         | <i>Platycercus elegans</i>      | Sn         | -             | -           | -                 | -             |
| R      | Tawny Frogmouth                         | <i>Podargus strigoides</i>      | Sn         | -             | -           | -                 | -             |
| L      | Laughing Kookaburra                     | <i>Dacelo novaeguineae</i>      | Sn         | -             | -           | -                 | -             |
| L      | Superb Lyrebird                         | <i>Menura novaehollandiae</i>   | Hd         | -             | -           | -                 | -             |
| L      | White-throated Treecreeper              | <i>Cormobates leucophaeus</i>   | Hd         | -             | -           | -                 | -             |
| L      | Grey Shrike-thrush                      | <i>Colluricincla harmonica</i>  | Sn         | -             | -           | -                 | -             |
| L      | Eastern Whipbird                        | <i>Psophodes olivaceus</i>      | Sn         | -             | -           | -                 | -             |
| L      | White-browed Scrubwren                  | <i>Sericornis frontalis</i>     | Sn         | -             | -           | -                 | -             |
| L      | Superb Fairy-wren                       | <i>Malurus cyaneus</i>          | Sn         | -             | -           | -                 | -             |
| L      | Spotted Pardalote                       | <i>Pardalotus punctatus</i>     | Hd         | -             | -           | -                 | -             |
| L      | Crescent Honeyeater                     | <i>Phylidonyris pyrrhoptera</i> | Sn         | -             | -           | -                 | -             |
| R      | Grey Currawong                          | <i>Strepera versicolor</i>      | Sn         | -             | -           | -                 | -             |
| L      | Australian Magpie                       | <i>Gymnorhina tibicen</i>       | Sn         | -             | -           | -                 | -             |
| L      | Australian Raven                        | <i>Corvus coronoides</i>        | Sn         | -             | -           | -                 | -             |
| L      | Little Raven                            | <i>Corvus mellori</i>           | Sn         | -             | -           | -                 | -             |
|        | <b>AMPHIBIANS</b>                       |                                 |            |               |             |                   |               |
| L      | Victorian Smooth Froglet                | <i>Geocrinia victoriana</i>     | -          | -             | -           | Hd                | -             |
| L      | Common Froglet                          | <i>Crinia signifera</i>         | Hd         | -             | -           | Hd                | Hd            |
| L      | Southern Brown Tree Frog                | <i>Litoria ewingii</i>          | Hd         | -             | -           | Hd                | Hd            |
|        | <b>CRUSTACEANS</b>                      |                                 |            |               |             |                   |               |
| ?      | Crayfish claw ( <i>unidentifiable</i> ) | <i>Euastacus/Engaeus</i> sp.    | Sn         | -             | -           | -                 | -             |

## 5.2.2 Invertebrate Species

No invertebrate surveys were conducted during the present assessment although one crayfish claw was collected from a recently logged coupe (Table 6). However, there was insufficient material to be identified (Gary Poore, Museum of Victoria, pers. comm.). Two crayfish species are listed as occurring within the Strzelecki Ranges, the Strzelecki Burrowing Crayfish and the South Gippsland Spiny Crayfish (VFD 2000).

There is little information available on the distribution and status of invertebrates within Victoria (see Section 3.3.4). Of the invertebrate records that have been assessed from the Gippsland area (VicRFASC 1999), many were collected from forested areas early in the twentieth century. This includes sites now wholly or largely cleared for agricultural or pastoral purposes. For most groups, there has been no recent census of their status in the wider Gippsland area, including the Strzelecki Ranges (VicRFASC 1999).

VicRFASC (1999) indicates there are a number of Gippsland snail species associated with wetter forest habitats (such as those within the Strzelecki Ranges) which are shared with northern Tasmania (e.g. *Prolesophata dyeri* and *Miselaoma* and *Pernagera* species). A regionally endemic species of snail known to occur in South Gippsland is a charopid snail *Allocharopa tarravillensis* (VicRFASC 1999).

A velvet worm endemic to the Gippsland area, *Ooperipatus bulgensis* (first collected in 1988) has only been recorded from the Tarra-Bulga National Park, though probably has a wider distribution in the Strzelecki Ranges (VicRFASC 1999).

The Biodiversity Technical Report produced for the Gippsland area (VicRFASC 1999) has some detail of insect species occurring over this area.

## 5.2.3 Significant Species

### NATIONAL SIGNIFICANCE

Using the stated criteria, one species recorded during the present assessment, the Powerful Owl *Ninox strenua*, is considered to be of national conservation significance. This species was recorded at two separate locations within the Strzelecki Ranges using the Nocturnal Call Playback technique (Appendix 3.2, Figure 4). The species has also been recorded on a number of previous occasions in the Strzelecki Ranges and this area comprises important habitat for this species. The Powerful Owl has also been recorded near HVP leasehold properties to the east and west of the Strzelecki Ranges (VFD 2000). Many of these additional HVP areas are softwood plantations which provide little

habitat value for the Powerful Owl, but narrow remnant strips of native vegetation within these plantations may provide some suitable roosting or feeding resources.

Six other fauna species of national conservation significance have been recently (since 1970) recorded in or within five kilometres of the HVP estate in the central Strzelecki Ranges (Spot-tailed Quoll, Koala, Eastern Bent-wing Bat, Freckled Duck, Australian Grayling, Strzelecki Burrowing Crayfish). Details of their status are provided in Table 7.

Six species of national conservation significance have been recorded in or within five kilometres of the HVP estate to the east of the Strzelecki Ranges (Spot-tailed Quoll, Koala, Powerful Owl, Glossy Black-cockatoo, Warty Bell Frog, Australian Grayling). Details of their status have been provided in Table 7.

Six species of national conservation significance have been recorded in or within five kilometres of the HVP estate to the west of the Strzelecki Ranges (Spot-tailed Quoll, Southern Brown Bandicoot, Koala, Powerful Owl, Warty Bell Frog, Australian Grayling). Details of their status are provided in Table 7.

With three exceptions (Southern Brown Bandicoot, Freckled Duck, Glossy Black Cockatoo), greater details of the habitat requirements, distribution and threats for each of these species is provided in Appendix 6. In summary, of these nine nationally significant fauna species:

- The Spot-tailed Quoll has only recently been recorded from one locality within the Strzelecki Ranges (although there is anecdotal evidence that they have been present for many more years). It is, however, likely that they extend over a larger area of the Strzelecki Ranges given that (a) there appears to be a breeding population present, and (b) females may have a home range of up to 1000 hectares and males up to 4500 hectares (VicRFASC 1999). There is suitable habitat for the Spot-tailed Quoll within HVP leasehold property in the central Strzelecki Ranges.

Single records of the Spot-tailed Quoll to the west and east of the Strzelecki Ranges occur outside but near HVP leasehold. Although these nearby areas are primarily softwood (pine) plantations, the Spot-tailed Quoll is unlikely to be dependent on this component of HVP leasehold to the east and west of the Strzelecki Ranges. The thin strips of native vegetation along creeklines within the softwood plantations are generally of low value, but may occasionally be used as movement corridors between other areas of more extensive native vegetation.

- Scattered records of the koala occur throughout the Strzelecki Ranges and also South Gippsland in general (VFD 2000, Suzie Zent and Elaina Fraser,

unpub. data). For historical reasons, related to the exclusion of this region from programs for the translocation of koalas from over-populated areas, koala populations here are genetically distinctive (Houlden et al. 1999) and are therefore of a higher conservation value. Koalas appear to be uncommon but widespread throughout much of the central Strzelecki Ranges and through areas of HVP leasehold on the Gippsland Plain. There is anecdotal evidence of substantial declines in koala numbers in these areas since approximately the middle of the twentieth century (S. Zent, pers. comm.).

- The Southern Brown Bandicoot has been recorded in the north-west of the Strzelecki Ranges from the vicinity of HVP leasehold near Boolara (VFD 2000). The HVP estate nearby is primarily softwood plantation, which is unsuitable habitat for this species.
- The Eastern Bent-wing Bat has been recorded from the vicinity of HVP leasehold near Mirboo East. As it typically roosts in caves or disused mineshafts, there are no known breeding/roosting colonies in the vicinity of the HVP estate. However, individuals roam widely during non-breeding periods, and as such are likely to move and forage over HVP leasehold. The importance of the HVP leasehold property for the Eastern Bent-wing Bat is unknown but it is unlikely to be of significance.
- There is a single record of the Glossy Black-cockatoo from the vicinity of HVP leasehold to the east of the Strzelecki Ranges, within the Won Wron State Forest. This record is likely to be a vagrant bird, as it is well to the south of its normal distribution. HVP leasehold in the South Gippsland area is unlikely to be of importance for the Glossy Black-cockatoo.
- The Freckled Duck is a waterbird for which there is no suitable habitat within the HVP estate. The Freckled Duck will not be considered further within this assessment.
- The Warty Bell Frog has been recorded on a small number of occasions from the vicinity of HVP leasehold to the east and west of the Strzelecki Ranges, particularly near the Won Wron State Forest and Darlimurla respectively. There have been relatively few records of the Warty Bell Frog in the greater Gippsland area since the early 1980s. Warty Bell Frog may occur within creeklines or rivers running within or near the eastern and western portions of the HVP estate.
- The Australian Grayling has been recorded from waterways within the vicinity of HVP leasehold to the east and west of the Strzelecki Ranges, and also from waterways draining the central Strzelecki Ranges (i.e. Franklin River, Morwell River). The Australian Grayling may occur within creeklines

or rivers running within or near HVP estate.

- The Strzelecki Burrowing Crayfish has been recorded in small numbers throughout the Strzelecki Ranges, including HVP leasehold, from Tarwin East, in the west, to Tarra-Bulga National Park in the east.

#### STATE SIGNIFICANCE

Using the stated criteria, no fauna species of state conservation significance were recorded in the vicinity of the HVP estate during the present field assessment.

Eight fauna species of state conservation significance have been recorded recently (since 1970) from the vicinity of the HVP estate within the central Strzelecki Ranges (Broad-toothed Rat, Gull-billed Tern, Grey Goshawk, Masked Owl, Sooty Owl, Striped Gudgeon, Cox's Gudgeon, South Gippsland Spiny Crayfish). There is an additional unverified record of another state significant species (Yellow-bellied Glider) from within the central Strzelecki Ranges (S. Zent, pers. comm.). Details of their status are provided in Table 7.

One species of state conservation significance have been recorded in the vicinity of HVP leasehold to the east of the Strzelecki Ranges (Magpie Goose). Details of its status is provided in Table 7.

Five species of state conservation significance have been recorded in the vicinity of HVP leasehold to the west of the Strzelecki Ranges (Lewin's Rail, Great Egret, Australian Shoveler, Hardhead, Barking Owl). Details of their status are provided in Table 7.

With the exception of waterbird species and Yellow-bellied Glider, the distribution, habitat requirements, threats and management requirements for these species are provided within Appendix 6. In summary:

- The Broad-toothed Rat has been only rarely recorded within the central Strzelecki Ranges. There are two old records (pre-1977) from English Corner and Olsens Bridge (Norris et al. 1979, Mansergh and Norris 1982a). In 1996, teeth and fur of the Broad-toothed Rat were found in a predator scat collected from English Corner (S. Zent, pers. comm.). The status of the Broad-toothed Rat in the central Strzelecki Ranges is unclear, however, at least a small population is likely to persist in the vicinity of English Corner.
- From the vicinity of College Creek, 'chew balls' potentially produced by Yellow-bellied Gliders have been collected from the vicinity of College Creek (S. Zent, pers. comm.). There have been no previous known occurrences of the Yellow-bellied Glider from the Strzelecki Ranges, despite recent scientific surveys (McNabb et al. 2000). Until the presence of the Yellow-bellied Glider in the Strzelecki Ranges is confirmed or



verified, it must be considered that there is a low likelihood of its occurrence within the Strzelecki Ranges.

**Table 7. Status of fauna species recorded from the vicinity of HVP's South Gippsland estate.**

**Lists of threatened fauna species**

NRE = Threatened Vertebrate Fauna of Victoria (NRE 2000b for vertebrate, CNR 1995 for invertebrates)

FFG = Flora and Fauna Guarantee Act 1988

EPBC = Environmental Protection and Biodiversity Conservation Act 1999

ANZECC = Australian and New Zealand Environmental Conservation Council (ANZECC 2000)

IUCN = International Union for the Conservation of Nature Red list of threatened fauna 1996

**Status**

E = Endangered

R = Rare and/or restricted

V = Vulnerable

A = Listed and Action Statement Prepared

Lc = Lower Risk – Conservation Dependent

Ls = listed

Ln = Lower Risk – Near Threatened

N = nominated for listing

| Common Name                                | Scientific Name                        | NRE | FFG | EPBC | ANZECC | IUCN | Action Plan |
|--|--|-----|-----|------|--------|------|-------------|
| <b>MAMMALS</b>                             |  |     |     |      |        |      |             |
| Spot-tailed Quoll                          | <i>Dasyurus maculatus</i>              | E   | A   | V    | V      | V    | V           |
| Southern Brown Bandicoot                   | <i>Isodon obesulus</i>                 | -   | -   | -    | -      | Ln   | Ln          |
| Koala                                      | <i>Phascolarctos cinereus</i>          | -   | -   | -    | -      | Ln   | Ln          |
| Broad-toothed Rat                          | <i>Mastacomys fuscus</i>               | Ln  | -   | -    | -      | -    | -           |
| Common Bent-wing Bat                       | <i>Miniopterus schreibersii</i>        | V   | Ls  | -    | -      | Ln   | Lc          |
| <b>BIRDS</b>                               |  |     |     |      |        |      |             |
| Lewin's Rail                               | <i>Rallus pectoralis</i>               | E   | N   | -    | -      | -    | Ln          |
| Gull-billed Tern                           | <i>Sterna nilotica</i>                 | E   | N   | -    | -      | -    | -           |
| Great Egret                                | <i>Ardea alba</i>                      | E   | Ls  | -    | -      | -    | -           |
| Magpie Goose                               | <i>Anseranas semipalmata</i>           | E   | -   | -    | -      | -    | -           |
| Australasian Shoveler                      | <i>Anas rhynchotis</i>                 | V   | -   | -    | -      | -    | -           |
| Freckled Duck                              | <i>Stictonetta naevosa</i>             | E   | Ls  | -    | -      | V    | R           |
| Hardhead                                   | <i>Aythya australis</i>                | V   | -   | -    | -      | -    | -           |
| Grey Goshawk                               | <i>Accipiter novaehollandiae</i>       | Ln  | -   | -    | -      | -    | -           |
| Barking Owl                                | <i>Ninox connivens</i>                 | E   | -   | -    | -      | -    | Ln          |
| Powerful Owl                               | <i>Ninox strenua</i>                   | E   | A   | -    | -      | V    | -           |
| Masked Owl                                 | <i>Tyto novaehollandiae</i>            | E   | Ls  | -    | -      | -    | Ln          |
| Sooty Owl                                  | <i>Tyto tenebricosa</i>                | V   | Ls  | -    | -      | -    | -           |
| Glossy Black-Cockatoo (Eastern subspecies) | <i>Calyptorhynchus lathami lathami</i> | V   | Ls  | -    | -      | V    | Lr          |
| <b>FROGS</b>                               |  |     |     |      |        |      |             |
| Warty Bell Frog                            | <i>Litoria raniformis</i>              | V   | N   | V    | V      | E    | V           |
| <b>FISH</b>                                |  |     |     |      |        |      |             |
| Australian Grayling                        | <i>Prototroctes maraena</i>            | V   | Ls  | V    | V      | V    | V           |
| Striped Gudgeon                            | <i>Gobiomorphus australis</i>          | V   | -   | -    | -      | -    | -           |
| Cox's Gudgeon                              | <i>Gobiomorphus coxii</i>              | E   | Ls  | -    | -      | -    | -           |
| <b>CRUSTACEANS</b>                         |  |     |     |      |        |      |             |
| Strzelecki Burrowing Crayfish              | <i>Engaeus rostrigaleatus</i>          | R   | N   | -    | -      | E    | -           |
| South Gippsland Spiny Crayfish             | <i>Euastacus neodiversus</i>           | R   | -   | -    | -      | -    | -           |

- Six of these species are waterbird species (Lewin's Rail, Gull-billed Tern, Great Egret, Magpie Goose, Australian Shoveller, Hardhead). Preferred habitat for each of these species generally includes areas of extensive wetland. Although these species will also occasionally use smaller areas of wetland or wet grassland, there is little or no suitable habitat for these species within the HVP estate. These species may occasionally visit recently cleared land or creeklines within the HVP estate, but this will not provide important or limiting habitat. These species will not be considered further by this biodiversity assessment.
- The Grey Goshawk has been recorded on a small number of occasions near HVP leasehold within the central Strzelecki Ranges. Suitable habitat for the Grey Goshawk within the Strzelecki Ranges includes wet forest and gullies (including those with Mountain Grey Gum *Eucalyptus cypellocarpa*).
- The Barking Owl has been recorded from the ecotone between native forest and softwood plantation near Allambee (scattered HVP leasehold to the west of Strzelecki Ranges). The majority of HVP leasehold in the vicinity of this record is softwood plantation. The Barking Owl is unlikely to depend on this resource, except for occasional foraging expeditions or if there are areas of remnant forest within these wider areas of plantation.
- There is a single record of the Sooty Owl from the southern section of the Strzelecki Ranges, near Gunyah (VFD 2000). Although moderately suitable habitat occurs for this species within the Strzelecki Ranges, this record is outside of its normal range within the greater Gippsland area. This record may be a misidentification. However, there is some possibility of a single or small number of Sooty Owl pairs using forest within or near HVP leasehold in the Strzelecki Ranges.
- The Masked Owl has been recorded from the vicinity of HVP leasehold in the Strzelecki Ranges. It is generally rare in the greater Gippsland area, most often being recorded in the ecotone between two vegetation types (VicRFASC 1999). Little data is available, but there could be a single or small number of pairs of Masked Owls using habitat within the Strzelecki Ranges.
- Cox's Gudgeon has been recorded from a river to the south of the Strzelecki Ranges, while the Striped Gudgeon has been recorded from the Morwell River to the north of the Strzelecki Ranges. There is little known about the habitat requirements of Cox's Gudgeon in Victoria, but it probably requires swift flowing streams. Striped Gudgeon is known to occur in a variety of riverine habitats from swift flowing headwaters to slow-flowing lowland rivers. These two species may occur within creeklines or rivers flowing within or near HVP leasehold.

- South Gippsland Spiny Crayfish has been recorded along the Tarra River within the Tarra-Bulga National Park (VFD, unpub. data). It has also been recently recorded near the headwaters of the Albert River (S. Zent, pers. comm.). It is likely to have a wider distribution through the Strzelecki Ranges along rivers, but there is a paucity of survey data to confirm this.

Recorded locations of National and State significant fauna species are shown on Map 1 and available on the accompanying CD-ROM.

#### REGIONAL SIGNIFICANCE

Three species recorded from the vicinity of HVP leasehold in the central Strzelecki Ranges during the present assessment satisfy the criteria for regional significance (Wedge-tailed Eagle, Tawny Frogmouth, Grey Currawong). Although these species are likely to be widely distributed within the Strzelecki Ranges, they have been identified as woodland birds that are declining within the Victorian landscape (Robinson 1994). An additional 42 species recently (post 1970) recorded from the vicinity of the HVP leasehold in the central Strzelecki Ranges area are considered to be of regional conservation significance (Appendix 6).

Fourteen fauna species recorded to the east and fifteen species to the west of the Strzelecki Ranges, within a five kilometre radius of scattered HVP leasehold, are considered to be of regional conservation significance (Appendix 6).

#### LOCAL SIGNIFICANCE

All other fauna species indigenous to the local area, that are not of national state or regional significance, are considered to be of local conservation significance.

#### NEGLIGIBLE or NO SIGNIFICANCE

All fauna species that are not indigenous to the local area are considered to be of negligible or no conservation significance. This includes both species which are introduced to Australia (e.g. Red Fox, European Rabbit) and Australian native species which do not naturally occur in the local area (e.g. aviary escapees).

## 5.2.4 Habitat Types

Based on the field assessment three very broad habitat types have been defined:

- native vegetation,
- planted hardwood forest, and
- softwood plantation.

### *Native vegetation*

Areas of native vegetation cover a range of vegetation types including sites dominated by Silver Wattle *Acacia dealbata*, wet forest and rainforest. The importance of these areas varies throughout the Strzelecki Ranges, depending on a range of habitat features. Some of these habitat features includes the presence and abundance of hollow-bearing trees for a large range of hollow-dependent fauna such as owls, possums, gliders and bats (i.e. nesting and roosting), mature forest for foraging by significant species such as owls or quolls, intact vegetation structure providing many microhabitats and niches, the presence of koala food trees, fallen timber (i.e. logs) and other ground litter and flowering plants for nectar-feeding birds and insects

Remnant native vegetation generally has a complex structure, providing a variety of potential foraging and sheltering microhabitats and potential food resources, attracting a greater diversity of fauna species. Native forest generally has more than one tree species, and includes a variety of overstorey age classes and scattered mature trees.

### *Planted Hardwood (Eucalypt) Forest*

Planted hardwood forest typically comprise extensive areas dominated by dense, evenly spaced planted eucalypts (mostly Mountain Ash). Planted hardwood forests varied in their structure throughout the Strzelecki Ranges, largely dependent on their age. They ranged from:

- Older forests (30-40 years), containing eucalypts up to 30-40 metres in height and diameters at breast height of up to 50-60 centimetres. These older forests usually contained an open to sparse native midstorey up to 15-20 metres in height (predominantly of *Acacia* spp.) and a thick shrubby groundlayer. These trees are too young to contain hollows. However, hollow-dependent fauna (e.g. owls, possums) may move into these areas from adjacent remnant mature forest areas for foraging activities. A range of wet forest fauna species are also likely to use this habitat for foraging and sheltering activities (e.g. Superb Fairy Wren, Superb Lyrebird, Common Wombat, wallabies).
- Small to mid sized trees in younger forests, with a scattered midstorey of acacias and dense understorey. Largely the same fauna as above but

this habitat is likely to be used to a lesser degree. Some other fauna species may be preferentially attracted to these areas (e.g. rodents and *Antechinus* sp.).

### *Softwood Plantation*

Softwood Plantations typically comprised large areas dominated by closely spaced pines at various stages of growth. These areas range from:

- Older, taller trees with little or no midstorey or understorey,
- Small to mid-sized trees with an understorey comprising high shrub/weed densities,
- Recently cleared areas, with no trees or just saplings, no understorey or midstorey, and large isolated piles of fallen timber.

While they are an artificial vegetation type within the Strzelecki Ranges, Softwood Plantations are not biological ‘deserts’ for fauna. Softwood Plantations are designed to maximise wood production and should be considered depauperate ecosystems which lack certain species of fauna otherwise present in a mature native forest community (Friend 1980). The number and type of animals varies with the age of the stand. Some native fauna species, which normally obtain their food and other habitat requirements within stands of eucalypt woodland or forest, display versatility in colonising softwood plantations. This includes arboreal mammals (e.g. Common Ringtail Possums, Mountain Brushtail Possums, Common Brushtail Possums), nectar-feeding and insect-feeding birds (e.g. Yellow-faced Honeyeater, White-eared Honeyeater) and seed-eating birds (Yellow-tailed Black-cockatoos, Crimson Rosellas). These species only appear to visit softwood plantations that have developed an overstorey. High population densities of these species in adjacent native vegetation may also be an important factor. It is doubtful whether many of these fauna species could survive in areas of softwood plantation without nearby native vegetation to provide food or refuge. Other species that use softwood plantations include wombats and wallabies, and appear to use these areas primarily for refuge, and feed on the low weedy grasses growing alongside many of the logging tracks. Generally, only a few hardy (and usually common) native species flourish in softwood plantations while most others are unable to survive in this artificial environment.

## 5.3 GIS Mapping

### 5.3.1 Digital Data Collation

Digital data for the GIS mapping was collated from various sources including

- NRE Parks Flora and Fauna data from the FIS, AVW(VFD), and Draft EVC mapping at 1:25,000
- NRE Land Victoria through a reseller, for the VicMap topographic data
- HVP for hardwood and softwood resource areas and leasehold data.

Data was translated into the appropriate format and brought together using GIS (MapInfo) allowing the spatial relationship between all the elements included in the study to be evaluated (see CDROM).

### 5.3.2 Mapping

Areas identified as Central Highlands Cool Temperate Rainforest (CTR) were first extracted from the draft EVC mapping and then augmented from observations and hand mapping by field staff and naturalists (Elaina Fraser). These additions were then enhanced with the results of the aerial photograph interpretation.

A minimum buffer zone of 250 metres on areas of CTR was identified as a minimum protection measure for the rainforest (see Section 6.2.7). The spatial extent of this buffer zone was mathematically generated using the GIS and based on a horizontal plane.

Key mapping outputs for this study (core areas and habitat links) were defined spatially using a number of different data elements. Sub-catchments, identified from the 1:25,000 topographic data, were used as a starting point. Roads were generated from the topographic data, plantation edges as defined by HVP and buffers applied to areas identified as CTR were also used.

### 5.3.3 Limitations

The spatial data used came from a range of different sources, with non-uniform mapping standards and was collected at a variety of scales. Because data from all sources were utilised to develop the boundaries for core areas and linkages, this reduces the accuracy of the mapping. The EVC data, and topographic information was collected at a scale of 1:25,000, whilst the data supplied by HVP had been collected from original Forestry Commission coupe maps produced at

1:10,000 and aerial photography.

The accuracy of the draft EVC data was limited by a lack of available, quality aerial photography at the time it was prepared (John Davies, pers. comm.), the most notable inaccuracy being the lack of CTR identified in the Tarra Valley section of Tarra Bulga National Park.

Because of the above-mentioned limitations, linework from different sources that aim to identify the same on-ground feature are unlikely to match and apparently significant discrepancies will occur in the mapping provided. To properly interpret on the ground the intent of the mapping needs to be understood by carefully reading the relevant sections of this report.

## 6.0 THREATS TO BIODIVERSITY

### 6.1 General

Inappropriate timber harvesting is a potentially threatening process to the biodiversity of the Strzelecki Ranges. Timber harvesting can have a number of direct and indirect impacts on biodiversity (VicRFASC 1999), including:

- short-term habitat removal,
- habitat fragmentation and creation of edge effects,
- loss of threatened (and non-threatened) flora, fauna and vegetation communities,
- simplification of forest structure in the medium and longer-term by producing even-aged regrowth forests that are less suitable for some species than older forests. Ecologically mature or old-growth forests are generally more structurally and floristically diverse than regrowth forests and provide a greater range of niches for flora and fauna,
- conversion of mature stands to young regrowth stands, and a loss of old growth/hollow-bearing trees,
- soil disturbance resulting in compaction and increased erosion,
- weed invasion,
- alteration of fire regimes,
- siltation of aquatic environments, and
- the spread of plant pathogens such as Myrtle Wilt and Root-rot Fungus,

### 6.2 Threats to Flora

Threats to plant biodiversity are briefly discussed below (this text has been adapted from West Gippsland CMA 2000). It should be noted that these threats can work synergistically and one threat can compound or magnify the effect of other threats to cause significant disturbances to biodiversity (Environment Sports and Territories 1995). Some examples of these synergistic effects are also given below.



### **6.2.1 Loss of Threatened Species and Vegetation Communities**

The loss of native vegetation through vegetation removal, such as timber harvesting, has the potential to cause losses to significant areas of vegetation and influence the distribution and abundance of plants. For some species, particularly those largely dependent on vegetative reproduction, repeated physical disturbance could lead to local extinction (Ough and Ross 1992).

### **6.2.2 Loss of Habitat**

Habitat loss occurs when an area of native vegetation is either cleared or degraded to such an extent that its composition or structure is altered (West Gippsland CMA 2000). Land clearance, timber harvesting and grazing are major causes of habitat loss, and the impacts generated can be exacerbated by weed invasion, altered fire regimes and further fragmentation.

### **6.2.3 Fragmentation and Edge Effects**

Fragmentation arises when the connections between vegetation of the same or different types is severed (West Gippsland CMA 2000). This severing can occur through processes such as weed invasion or vegetation removal, to the point where the vegetation becomes physically isolated from neighbouring areas of vegetation. Fragmentation is nationally recognised as a major cause of biodiversity loss (SOE 1995).

### **6.2.4 Loss/Depletion of Vegetation**

Disturbance to vegetation, such as the selective harvesting of a single species, gradually changes the structure of the forest which may result in the removal of understorey vegetation and the destruction of replacement seedlings (West Gippsland CMA 2000). Harvesting rotations which stop the development of old growth forests may cause losses of essential resources such as hollows, which are vital habitat requirements of many species of bird and mammal.

### **6.2.5 Weed Invasion**

The mechanisms of weed invasion include soil disturbance, fragmentation and exposure, edge effects, loss or suppression of native species and the collapse of ecological processes such as natural triggers for native species regeneration and altered fire or hydrological regimes (West Gippsland CMA 2000). Weed invasion has the capacity to lead to species extinctions and a severe and often rapid decline in the diversity of native species.

### 6.2.6 Altered Fire Regimes

Many species rely on the timing, intensity, frequency or absence of fire for regeneration. Plants have adapted by growing in particular parts of the landscape that have specific fire regimes. Changes in this regime can lead to the simplification of the species composition and structure of the vegetation. When key species are removed the disturbance to the vegetation structure can be magnified.

### 6.2.7 Plant Pathogens

Myrtle Wilt is a fatal disease of Myrtle Beech *Nothofagus cunninghamii*, the structural dominant of CTR. It is caused by the fungal pathogen *Chalara australis*. Initially the disease develops in a stand of Beech through the infection of stem or root wounds, and will first cause wilt symptoms and ultimately death. As fungal spores are wind dispersed, rainforest near edges created by clearfelling may be exposed to elevated levels of inoculum, and any forest activity that causes wounds to Myrtle Beech trees also has the potential to elevate disease incidence rates (SAC 1998).

Cameron and Turner (1996) discuss the implications of Myrtle Wilt for the Myrtle Beech *Nothofagus cunninghamii* dominated Cool Temperate Rainforests of Victoria. In particular they note that because of the isolated nature of stands of CTR in the Strzelecki Ranges current levels of infection in this area may be ecologically sustainable in the absence of significant disturbance raising the level of stand vulnerability.

In Tasmania, Packham (1991) observed the spread of Myrtle Wilt from damage due to roading or logging activities and recommended a minimum buffer zone of 250 metres to control its spread. Placing this in context, Cameron and Turner (1996) note that for CTR Victoria is climatically marginal and more fire prone. The occurrence of CTR as a series of small isolated patches in Victoria leave this community particularly vulnerable to local and possibly regional extinction if the infection level of Myrtle Wilt is raised above existing levels. Therefore, the effects of exogenous disturbance are likely to be more marked and longer lasting. Myrtle Wilt therefore needs to be managed as a threatening process at a landscape scale as well as an edge effect in a local context.

Cameron and Turner (1996) do not directly recommend a buffer width for CTR, however, by noting that this community is more vulnerable than CTR in Tasmania, they imply a minimum buffer of 250 metres is required to minimise the extinction threat to this EVC. Current Code of Forest Practices buffer widths for rainforest are described in Section 7.2.4.

“Human activity which results in artificially elevated or epidemic levels of Myrtle Wilt within *Nothofagus* – dominated Cool Temperate Rainforest” is now listed as a potentially threatening process on Schedule 3 of the Flora and Fauna Guarantee Act 1988.

Cinnamon Fungus *Phytophthora cinnamomi* is an introduced soil borne, root rot fungus that attacks and destroys both the fine feeder roots and the main roots of many native and introduced plants. The loss of roots limits the ability of plants to absorb water and nutrients effectively and as such visible symptoms of infection resemble chronic drought stress, ranging from slight yellowing of foliage through to leaf wilt and massive leaf fall, dead branches and plant death (Marks and Smith 1991).

The Cinnamon Fungus is widespread but not uniformly spread throughout the forests of the Mullungdung and Won Wron State Forests where it causes sporadic patches of dieback. As HVP has pine plantations in these areas their operations have the potential to spread this pathogen through the surrounding forest. Eucalypt species recorded in the area to be affected by dieback include Yertchuk *Eucalyptus considaniana*, Messmate *E. obliqua*, and Yellow Stringybark *E. muelleriana*. Radiata Pine can also be adversely affected by this disease (Ian Smith, NRE, Plant Pathologist, pers. comm.).

The infection process is dependent on high soil moisture levels and warm soil temperatures (e.g. following rain in spring and summer). Under these conditions the increased inoculum in the soil and its high moisture content, provide a greater chance of accidental spread through soil adhering to a potential vector such as earth moving equipment. The incorrect placement of culverts or water run-off from roads can also result in enhanced conditions for local disease spread through increased spore movement in the soil.

Contamination of presently uninfected sites may result from construction works, through the movement of infected soil by road making, and traces of soil on earthmoving machinery and other vehicles.

### **6.3 Threats to Fauna**

While not a comprehensive literature review of the potential impacts of forestry operations on biodiversity, there are many relevant threats documented in recent government reports (e.g. VicRFASC 1999, West Gippsland CMA 2000) and in the scientific literature. Many of these threats have been summarised below.

### 6.3.1 Overall

A number of processes operating in the wider Gippsland area potentially impact upon threatened fauna (VicRFASC 1999) including clearing, fuel reduction burning, weed invasion, grazing, pest control works and timber harvesting. Timber harvesting activities are considered a moderate to major threat for many threatened species such as the Spot-tailed Quoll, bats and forest owls (VicRFASC 1999).

Many threatened fauna species found within Strzelecki Ranges are poorly protected within existing conservation reserves in the Gippsland area (Table 8, VicRFASC 1999).

Many other indigenous fauna species, although considered secure at the national or state level, are at risk of decline or extinction from within parts of the Strzelecki Ranges due to a range of threatening processes, including timber harvesting.

### 6.3.2 Loss of mature forest and hollow-bearing trees

A large number of the fauna species within the Strzelecki Ranges study area are either partially (e.g. Common Ringtail Possum) or totally dependent (e.g. owls, cockatoos, gliders) upon the availability of hollow-bearing trees for at least some part of their life-cycle. The importance of hollow-bearing trees in the Strzelecki Ranges is highlighted by the relatively high proportion of identified threatened species that are hollow-dependent.

Mountain Ash trees do not begin to form hollows until they are at least 120 years old, possibly older. Managing the HVP hardwood resource on a 28 year rotation therefore, has the potential to generate negative effects on hollow-dependent fauna. Hollow dependant species within the study area are therefore dependent on sympathetic management of the native vegetation retained within the HVP estate.

Additional management difficulties arise as different fauna species have different preferred hollow dimensions for their roosting and nesting activities (requiring a range of different-sized hollows). Many arboreal mammals also require more than one hollow within a home range. Estimates of typical home ranges and numbers of hollows used by a range of arboreal mammals from the vicinity of HVP land has been provided in Table 9 (developed from Gibbon & Lindenmayer 1997).

**Table 8: Distribution of recent records of selected threatened fauna within various forms of land tenure in the larger Gippsland area (VicRFASC 1999).**

| <b>Species Name</b>   | <b>Total number of records</b> | <b>Records within Conservation reserves</b> | <b>Records within State Forests and Other Public Land</b> | <b>Records within Private Land including plantation leasehold</b> | <b>Records within Water bodies</b> |
|-----------------------|--------------------------------|---|---|---|------------------------------------|
| <b>Mammals</b>        |                                |   |   |   |                                    |
| Spot-tailed Quoll     | 3                              | 0 (0%)                                      | 3 (100%)  | 0 (0%)  | 0 (0%)                             |
| Eastern Bent-wing Bat | 28                             | 5 (18%)                                     | 9 (32%)   | 5 (18%)   | 9 (32%)                            |
| <b>Birds</b>          |                                |   |   |   |                                    |
| Grey Goshawk          | 85                             | 26 (31%)                                    | 0 (0%)  | 34 (40%)  | 25 (29%)                           |
| Barking Owl           | 5                              | 0 (0%)                                      | 2 (40%)   | 3 (60%)   | 0 (0%)                             |
| Powerful Owl          | 182                            | 23 (13%)                                    | 124 (68%)   | 33 (18%)  | 2 (1%)                             |
| Masked Owl            | 20                             | 0 (0%)                                      | 9 (45%)   | 10 (50%)  | 1 (5%)                             |
| Sooty Owl             | 89                             | 5 (6%)                                      | 80 (90%)  | 4 (4%)  | 0 (0%)                             |

**Table 9: Number of hollows observed to be used by individuals or groups of selected hollow-dependent fauna (Gibbon and Lindenmayer 1997).**

| <b>Common Name</b>        | <b>Number of nest trees used within home range</b> | <b>Home range of individuals or family groups (hectares)</b> |
|---------------------------|--|--|
| Common Ringtail Possum    | Up to 5  | 0.07 – 1.9   |
| Greater Glider            | 2 to 18  | 0.8 to 4   |
| Sugar Glider              | Up to 5  | 0.5 – 5  |
| Feathertail Glider        | No data  | Several  |
| Mountain Brushtail Possum | Up to 13-23  | 5 – 7  |
| Common Brushtail Possum   | 2 to 8   | 0.7 – 1.1  |
| Eastern Pygmy Possum      | Up to 9  | 0.2 – 1.7  |

Current hardwood harvesting operations may result in the loss of the relatively few mature hollow-bearing trees that currently occur within areas designated for harvesting. While this may not impact significantly on the overall number of hollows, it is likely to impact on their spatial arrangements and reduce the ability of some fauna to utilise replanted sites. Harvesting may also impact on the longevity of hollows within adjacent retained native vegetation as newly exposed edges have nearby trees vulnerable to windthrow. This is particularly true if large, contiguous areas are harvested and native vegetation is retained as networks of relatively narrow buffer strips.

The loss of hollow-bearing trees is a significant threatening process largely because hollows take so long to develop (120+ years) in this environment. At least seven threatened species from the study area have a relatively high *potential* to recolonise areas where local extinctions have occurred in the past (Table 10). However, recolonisation is not possible in the absence of suitable habitat.

Some other species from the study area are likely to have substantially lesser ability to recolonise fragmented areas after local extinctions (e.g. koalas, crayfish).

Table 10: Life history characteristics of various threatened species, known to occur within the study area (VicRFASC 1999).

| Species               | Rarity Ratings   |           |                     | Spatial Dynamics Ratings |                     | Life History Parameter Ratings |           |
|-----------------------|------------------|-----------|---------------------|--------------------------|---------------------|--------------------------------|-----------|
|                       | Geographic Range | Abundance | Habitat Specificity | Population Variability   | Powers of Dispersal | Reproductive Output            | Longevity |
| <b>Mammals</b>        |                  |           |                     |                          |                     |                                |           |
| Spot-tailed Quoll     | Large            | Low       | wide                | Low                      | *high               | Medium                         | unknown   |
| Eastern Bent-wing Bat | Large            | Low       | narrow              | Low                      | high                | Low                            | long      |
| <b>Birds</b>          |                  |           |                     |                          |                     |                                |           |
| Grey Goshawk          | Medium           | Low       | narrow              | Unknown                  | high                | Low                            | *long     |
| Barking Owl           | Medium           | Low       | narrow              | Low                      | high                | Low                            | *long     |
| Powerful Owl          | Large            | Low       | wide                | Low                      | high                | Low                            | long      |
| Masked Owl            | Medium           | Low       | medium              | Unknown                  | high                | Low                            | long      |
| Sooty Owl             | Medium           | Low       | narrow              | Low                      | high                | Low                            | long      |

\* Unknown, but most likely classification.

Bat activity in logging coupes which have been clearfelled may decline because the lack of roosting sites, but may also be lower because of lack of understorey flora species to support an insect food supply (Glass 1993). Other studies have found an increase in bat activity following small scale harvesting, possibly related to the maintained insect levels in the shrubby regrowth (Grindal and Brigham 1998).

### 6.3.3 Changes to habitat composition and structure

Potential impacts on particular species or species groups are discussed separately.

**Koala** densities within the Strzelecki Ranges are lower than for most other Victorian populations. This may be at least partially attributable to the lower densities of preferred food trees. Although koalas will consume Mountain Ash leaves (Blanchard 1994), it has not been documented as a preferred food source (Lee & Martin 1988). Extensive monocultures of Mountain Ash are therefore unlikely to benefit koala populations.

Planted trees must also reach a certain size before they are sufficiently established to support the weight of a koala. The size and structure of young Mountain Ash may also discourage or prevent koalas from utilising this species as a feed tree (i.e. a tall flexible trunk with a conical crown consisting of small, weak side branches with leaves only at the tips of those branches).

**Spot-tailed Quolls** have large home ranges and require extensive areas of habitat to sustain populations. Major threats to this species in the Gippsland area relate to the fragmentation of habitat and reduction of suitable foraging habitat and den sites (VicRFASC 1999). Fragmentation, degradation and loss of Spot-tailed Quoll habitat may result in a disjunct distribution, with populations more prone to extinction as recolonisation is more difficult and gene flow between populations retarded (VicRFASC 1999). Continued forestry operations in the Agnes River subcatchment may have an adverse impact on available habitat for Spot-tailed Quolls.

The reservation of Spot-tailed Quoll habitat was addressed within the Gippsland RFA process (VicRFASC 1999):

*“Design of the CAR reserve system addressed the conservation of habitat for Spot-tailed Quolls through the protection of approximately 1000 hectares of suitable habitat for records categorised as acceptable in the Atlas of Victorian Wildlife. Protection afforded by existing parks and reserves was considered and where necessary, new reserves were established in State Forest. For each record located in State Forest, 500 hectares of suitable habitat is protected in the CAR reserve system (including adjacent formal reserves where possible). Unless otherwise protected, a further 1000 hectares will be maintained within Special Management Zones contiguous within the CAR reserve, of which 500 hectares is maintained as suitable prey habitat at any point in time. These measures address the potential sensitivity of the Quoll to disturbance associated with timber production and supplement the requirements of the Action Statement, by taking account of the new information that has become available since its publication.”*

The Action Statement for the Spot-tailed Quoll (Mansergh and Belcher 1992) does not specify any buffer zones around known Spot-tailed Quoll populations. However it does refer to sites of scientific interest for the Spot-tailed Quoll:

*“Sites of importance for scientific research, i.e. latrine and den sites, will be protected by a minimum 200 m interim buffer zone pending formal management prescriptions. Any new activities inconsistent with maximum conservation of the Tiger Quoll will be precluded. Any predator control operations in the vicinity will be reviewed. In areas of forestry operations the width of the buffer and its effectiveness will be monitored under*

*the research program. If the number of these sites located exceeds that required for scientific study the extent of buffer zone around subsequent sites will be reviewed.”*

The national marsupial and monotreme Action Plan does not provide suggested buffer zones around known Spot-tailed Quoll records (Maxwell et al. 1996). However, it does highlight the need to minimise habitat loss and to establish broad wildlife corridors between conservation areas.

**Forest Birds** nesting along a habitat edge created by clearfelling have a higher probability of failure as they are subjected to significantly higher levels of nest predation (King et al. 1998, but also see Bayne and Hobson 1997).

A study in NSW on the impact of logging activities on forest bird species found populations were smaller and species were fewer in logged areas compared with unlogged areas and that these impacts were greatest immediately after logging, when all vegetation structure is removed (Kavanagh et al. 1985). They also found that there was a particular reduction in birds requiring tree hollows. However some bird species, benefited and increased in number following logging activity, particularly those specialising in open disturbed habitats or requiring dense ground cover (Kavanagh et al. 1985).

**Ground-dwelling fauna** such as rodents and antechinus species demonstrate little, if any, response in their numbers before and after logging activity (Lunney et al. 1987). However, there must be sufficient refuges in the surrounding areas adjacent to the logging areas for the species to migrate from into the recently logged areas. Larger ground-dwelling species such as wallabies may be unable to persist in years immediately following timber harvesting due to dense regrowth making the habitat unsuitable.

**Herpetofauna** in the montane forests of New South Wales had five of eight species of lizard with a greater abundance in logged plots than in non-logged plots, with the other three lizard species displaying no real difference between logged plots and unlogged plots (Goldingay et al. 1996). Sampling in this environment, however, is difficult because many reptile and frog species are cryptic and occur at low densities. Many species in this study were patchy in their distribution across a site (particularly frogs and snakes), preventing a resolution over whether they have been effected by logging operations or not.

From a study in northern NSW, Lemckert (1999) found that five frog species generally increased their populations following logging events, while three others displayed a decline.

A recent review of the North American literature, de Maynadier and Hunter (1995) found that clear cutting and plantations were more likely to be detrimental



to amphibians than less intensive forms of forestry, but this was partially dependent on the level of retained features of the forest (e.g. woody debris). They also found that amphibians were typically, but not always, more diverse and abundant in unlogged or old-growth forest.

**Spiders.** A study by Curry et al. (1985) found that although there was little evidence of a change in the numbers of arachnid species in areas which had been clearfelled, burnt and replanted compared with mature forest. There was, however, evidence of changes to the composition of arachnid communities.

**Snails.** Most species of regionally indigenous snail are highly sensitive to disturbances such as removal or modification of native vegetation and fire. Many are dependent on fallen timber for the maintenance of microhabitat (VicRFASC 1999).

#### **6.3.4 Damage to aquatic environments**

Timber harvesting activities have the potential to impact aquatic habitats by destroying sheltering sites, affecting prey abundance, altering micro-climates, fragmenting habitat and allowing the invasion of exotic weeds and predators (VicRFASC 1999). Altered stream conditions as a result of timber harvesting operations may also indirectly impact on fauna species that feed upon aquatic insects and fish (VicRFASC 1999).

Other environmental changes caused by timber harvesting activities in the catchments include increased sedimentation, turbidity and nutrient input to rivers and streams. Increased levels of sediment reduce water quality and degrade or destroy aquatic habitats. Increased turbidity or suspended sediment can have adverse physical, physiological and behavioural effects on stream-dwelling flora and fauna. Increased nutrient content can promote growth of excessive levels of algal species, often leading to toxic and/or eutrophic conditions.

There is a large body of literature detailing the impacts of forestry practices upon other groups, including fish and aquatic macroinvertebrates (Doeg & Koehn 1990a, 1990b). Doeg & Koehn (1990a, 1990b) identified a paucity of Australian studies assessing the effect of clearfelling on aquatic fauna species, compared to a number of studies on the effect upon water quantity and quality. Their review of previous studies found some evidence of deleterious impacts upon aquatic fauna, however more studies were required before strong conclusions could be made.

## 7.0 IDENTIFYING AREAS OF HIGH BIODIVERSITY VALUE AND IMPORTANCE

Based on the results of this assessment several areas in and adjacent to the HVP estate have been identified to be of high biodiversity value and ecological importance (i.e. are high conservation value forests). These areas have been defined as core areas and habitat links. Delineating these areas (Map 1) recognises their significant contribution to the biodiversity of the region and management within the bioregion needs to recognise these values and tailor actions to maintain them. The approximate sizes of these core areas and habitat links are listed in Table 11.

**Table 11:** Approximate sizes of the Core Areas in (C) and outside (OC) the HVP Estate and Habitat Links (L) within the study area.

| Name                                       | Core or link | Hardwood | Softwood | Awaiting planting | Custodial Lands | Total area | % planted |
|--|--------------|----------|----------|-------------------|-----------------|------------|-----------|
| Gunyah Gunyah                              | C            | 1,100.99 | 14.70    | 11.58             | 2,715.16        | 3,842.44   | 29.34%    |
| Gunyah Gunyah                              | OC           | 0.00     | 0.00     | 0.00              | 762.55          | 762.55     | 0.00%     |
| Jack River                                 | C            | 347.69   | 12.17    | 0.02              | 699.21          | 1,059.08   | 33.98%    |
| College Creek                              | OC           | 9.88     | 0.00     | 0.00              | 861.29          | 871.16     | 1.13%     |
| Tarra-Bulga                                | OC           | 0.00     | 0.73     | 0.00              | 1,717.24        | 1,717.97   | 0.04%     |
| Upper Merriman Creek                       | C            | 65.99    | 3.59     | 0.00              | 125.64          | 195.22     | 35.64%    |
| Albert River Link                          | L            | 109.58   | 25.58    | 3.43              | 450.30          | 588.89     | 23.53%    |
| Ryton link                                 | L            | 482.99   | 32.12    | 3.79              | 1,275.98        | 1,794.88   | 28.91%    |
| Upper Middle Creek                         | L            | 60.82    | 3.78     | 0.00              | 357.25          | 421.85     | 15.31%    |
| Total core areas                           |              | 1,514.67 | 30.47    | 11.60             | 3,540.01        | 5096.74    | 30.54%    |
| Total core areas (technically outside HVP) |              | 9.88     | 0.73     | 0.00              | 3,341.08        | 3,351.68   | 0.32%     |
| Total links                                |              | 653.39   | 61.48    | 7.22              | 2083.54         | 2085.62    | 25.74%    |
| Grand total                                |              | 2,177.94 | 92.68    | 18.81             | 8,964.63        | 11,254.1   | 20.34%    |

Although not within the HVP estate, Tarra-Bulga National Park is of State conservation significance (Cameron 1990, Peel 1999), Gunyah Gunyah (Cameron 1990, Peel 1999) and College Creek are of National conservation significance, and they all have high biodiversity values and importance. As core areas of biodiversity within the Strzelecki Ranges, the linking of these areas and to other core areas in and around the HVP estate is seen as a critical conservation goal in this region. In addition, the retention and therefore protection of all remnant native vegetation is also seen as a critical conservation goal in this

region. For example the relatively expansive areas of native vegetation (mapped as yellow on Map 1) to the east of Tarra Bulga National Park are areas that should be protected because no areas mapped as native vegetation are proposed to be cleared for plantation establishment (Simon Penfold, HVP, pers. comm.).

### 7.1.1 Criteria

The following criteria were used to recognise areas of high biodiversity value and ecological importance:

- The presence of significant EVCs
- The presence of rare or threatened flora and fauna species
- The presence of relatively mature, hollow-bearing trees
- The potential for mature trees to develop
- Relatively large areas of native, non-planted forest
- Areas that link other areas of high biodiversity value
- Assessments by other authors.

### 7.1.2 Core areas

Five core areas of biodiversity were identified within the central Strzelecki Ranges study area (Map 1, CD ROM):

- Gunyah Gunyah
- Jack River
- College Creek<sup>1</sup>
- Tarra-Bulga National Park<sup>1</sup>
- Upper Merriman Creek.

Although both the College Creek and Tarra-Bulga National Park core areas occur outside of the HVP estate, they are critical centres of biodiversity within the Strzelecki Ranges area adjacent to HVP estate.

A brief description of the ecological values within these core areas follows:

1. Gonyah Gonyah Core Area (incorporating the Gonyah Gonyah block, Dingo Creek block, Mount Fatigue block, Turtons Creek block and Morwell River West Branch block)

Somewhat dated ecological assessments of this region identified Gonyah Gonyah and Ryton to be of State botanical significance (Gullan et al. 1984), and of local or scientific zoological interest (Mansergh and Norris 1982a). The headwaters of the West Morwell, Dingo, Franklin and Agnes Rivers have been recommended for protection by the creation of reserves or management prescriptions (LCC 1982). More recently, the *Central Highlands* Cool Temperate Rainforest of Gonyah Gonyah was recognised as an area of National conservation significance (Cameron 1990, Peel 1999). This floristic community of CTR is endemic to Victoria and its occurrence within the Strzelecki Ranges is a major outlier of this community (Peel 1999).

Other EVCs within this core area include Damp Forest (state significance) and Wet Forest (regional significance). Under conservation targets nominated by the draft Native Vegetation Plan (West Gippsland CMA) both Damp Forest and *Central Highlands* CTR are EVCs which have a target of ‘all remaining remnants needed for conservation’ to provide adequate reservation (Table 11).

The presence of mature stands of Mountain Ash was also considered significant by Gullan et al. (1984).

Significant species recorded within the Gonyah Gonyah Core Area include:

- Slender Tree-fern (National)
- Spot-tailed Quoll (National)
- Powerful Owl (National)
- Strzelecki Burrowing Crayfish (National)
- River Hook-Sedge (State)
- Slender Forked-fern (State)

Other significant species recorded in the vicinity of the Core Area include:

- Koala (National)
- Currant-wood (State)
- Skirted Tree-fern (State)
- Sooty Owl (State)
- South Gippsland Spiny Crayfish (State)

## 2. Jack River Core Area

Significant EVCs within the Jack River Core Area include Central Highlands CTR, Damp Forest (both of state significance), and Wet Forest (regionally significant). This floristic community of CTR is endemic to the state and its occurrence within the Strzelecki Ranges is a major outlier (Peel 1999). Under conservation targets nominated by the draft Native Vegetation Plan (West Gippsland CMA) both Damp Forest and *Central Highlands CTR* are EVCs which have a target of ‘all remaining remnants needed for conservation’ to provide adequate reservation (Table 11).

One nationally significant fauna species, Koala, has been recorded from this core area while suitable habitat exists for two others, Powerful Owl and Strzelecki Burrowing Crayfish, that have been recorded in adjacent areas.

While there are no records of any significant flora from this site, there is potential habitat for Nationally significant flora species, such as Slender Tree-fern *Cyathea cunninghamii* (rare in Australia) and State significant flora species, such as River Hook-sedge *Uncinia nemoralis* (rare in Victoria) and Beech Finger-fern *Grammitis magellanica* ssp. *Nothofageti* (vulnerable in Victoria), which have been recorded in adjacent areas. Suitable habitat also exists for Currant-wood *Monotoca glauca*.

## 3. College Creek Core Area

Most of this core area is outside but adjacent to HVP leasehold. It is, however, a site of national significance (Cameron 1990 previously called it a site state significance), and maintaining its continuity with other significant vegetation is a key component of maintaining biodiversity within the region.

Significant species recorded within the College Creek Core Area include:

- Slender Tree-fern (National)
- Koala (National)
- Powerful Owl (National)
- Strzelecki Burrowing Crayfish (National)
- Broad-toothed Rat (State)
- Slender Forked-fern (State)
- Skirted Tree-fern (State)
- Oval Fork-fern (State)
- River Hook-Sedge (State)

Other significant species recorded in the vicinity of the site include:

- Currant -wood (State)

English's Corner and the headwaters of Traralgon Creek have been identified as a site of 'local or scientific zoological interest' (Mansergh and Norris 1982a), primarily as it was one of the few known locations of the Broad-toothed Rat south of the Princes Highway.

#### 4. Tarra Bulga National Park Core Area

Most of this core area is outside but adjacent to HVP leasehold. It is, however, a site of national significance, and maintaining its continuity with other significant vegetation is a key component of maintaining biodiversity within the region. Its currant status is considered secure, as it is a national park.

Significant species recorded within the Tarra Bulga core area include:

- Slender Tree-fern (National)
- Sticky Wattle (National)
- Koala (National)
- Powerful Owl (National)
- Strzelecki Burrowing Crayfish (National)
- South Gippsland Spiny Crayfish (State)

Other significant species recorded in the vicinity of the site include:

- Currant -wood (State)
- Skirted Tree-fern (State)
- River Hook-Sedge (State)
- Slender Forked-fern (State)
- Beech Finger-fern (State)

Significant habitat values within this Core Area include mature Wet Forests and the associated abundance of hollow bearing trees (LCC 1982).

Somewhat dated ecological assessments of this region identified Tarra Valley and Bulga National Parks (before their amalgamation) as sites of international botanical significance (Gullan et al. 1984). An area, approximately bound by a line between Womerah and Panorma Hill in the south and the Grand Ridge Road in the north, was considered of Regional zoological significance (Mansergh and Norris 1982a). This area encompasses the Tarra section of the National Park and

part of the Bulga section of the National Park, as well as areas of HVP estate.

More recently, the Central Highlands CTR of Tarra Valley and Bulga was recognised as an area of State conservation significance (Cameron 1990, Peel 1999). This floristic community of Cool Temperate Rainforest is endemic to Victoria and the occurrence within the Strzelecki Ranges is a major outlier of this community (Peel 1999).

### 5. Upper Merriman Creek Core Area

Significant EVCs within the Upper Merriman Creek\_Core Area include Central Highlands CTR, Damp Forest (both of state significance), and Wet Forest (regionally significant). Central Highlands CTR is endemic to the state and its occurrence within the Strzelecki Ranges is a major outlier (Peel 1999). Under conservation targets nominated by the draft Native Vegetation Plan (West Gippsland CMA) both Damp Forest and *Central Highlands* CTR are EVCs which have a target of ‘all remaining remnants needed for conservation’ to provide adequate reservation (Table 11).

Two species of national significance, Strzelecki Burrowing Crayfish and Slender Tree-fern, have been recorded from this Core Area. The site, however, provides suitable habitat for species, such as Koala, Powerful Owl, River Hook-sedge *Uncinia nemoralis*, Beech Finger-fern *Grammitis magellanica* ssp. *nothofagei* and Currant-wood *Monotoca glauca*, most of which have been recorded in adjacent areas.

The Upper Merriman Creek Core Area is adjacent to and forms a large border with the Tara–Bulga National Park.

### **7.1.3 Linkages (Corridors)**

Habitat linkages or corridors are continuous or near-continuous habitats that connect larger habitat areas. Corridors provide opportunities for the dispersal of flora and fauna between larger areas of habitat. They provide continuity between otherwise isolated areas of habitat. They facilitate the low rates of gene flow between remote populations required to reduce detrimental demographic effects and genetic effects of long term isolation of populations. Habitat corridors can also have intrinsic habitat values for native flora and fauna. The values and uses of linkages are explained in detail by Bennett (1999).

Clearfelled coupes can pose significant barriers for some species, such as small ground-dwelling animals. These barriers, despite their temporary nature, may have genetic and demographic effects on populations (demographic effects are those which alter birth and death rates and other factors such as life-span), some of which may ultimately lead to the extinction of sub-populations.

Habitat corridors occur across much of the study area on various scales, from more extensive areas of vegetation associated with waterways, to small patches and short strips of vegetation along roadsides and between plantations. The main habitat linkages (Map 1, CD ROM layer) aim to maintain habitat continuity between the core areas of biodiversity that could otherwise become isolated.

The significant habitat linkages, which are considered integral to maintaining biodiversity, are described below.

1. Ryton Link and Albert River Link (connecting the Gonyah Gonyah, Jack River and College Creek core areas).

These links facilitate fauna movement between core areas of habitat, particularly for species with poorer dispersal and recolonisation abilities such as small insectivorous forest birds, koalas, gliders, many invertebrates and small ground-dwelling species. They also support good quality (i.e. low level of weeds, high level of indigenous flora species and little physical disturbance) Wet Forest (Gullan et al. 1984) which is depleted with this bioregion.

These links also provide habitat for threatened fauna species, such as the Koala and Strzelecki Burrowing Crayfish, and for prey species of threatened fauna, such as the possum and glider prey large forest owls.

Somewhat dated ecological assessments of this region identified part of the Ryton Linkage near Gonyah Gonyah, called 'Ryton', as a site of State Botanical Significance (Gullan et al. 1984).

The Central Highlands CTR within this link, nominated as 'Ryton Junction', has been identified as an area of Regional Significance (Cameron 1990, Peel 1999).

Significant EVCs within the Ryton and Albert River Links include Central Highlands CTR, Damp Forest (both of state significance), and Wet Forest (regionally significant). This floristic community of CTR is endemic to the state and its occurrence within the Strzelecki Ranges is a major outlier (Peel 1999). Under conservation targets nominated by the draft Native Vegetation Plan (West Gippsland CMA) both Damp Forest and *Central Highlands CTR* are EVCs which have a target of 'all remaining remnants needed for conservation' to provide adequate reservation (Table 11).

While existing data does not record any significant flora from this link, there is suitable habitat for significant flora such as Slender Tree-fern *Cyathea cunninghamii* (rare in Australia), River Hook-sedge *Uncinia nemoralis* (rare in Victoria) and Beech Finger-fern *Grammitis magellanica* ssp. *Nothofageti* (vulnerable in Victoria), which have been recorded in adjacent areas. Suitable habitat also exists for Currant-wood *Monotoca glauca*.



## 2. Upper Middle Creek Linkage (connection between Jack River Core Area and Tara Bulga National Park).

This link facilitates fauna movement between core areas of habitat, particularly for species with poorer dispersal and recolonisation abilities such as small insectivorous forest birds, koalas, gliders, many invertebrates and small ground-dwelling species. The link also provides habitat for threatened fauna species, such as the Koala and Strzelecki Burrowing Crayfish, and for prey species of threatened fauna, such as the possum and glider prey large forest owls.

Significant EVCs within the Upper Middle Creek Link include Central Highlands CTR, Damp Forest (both of state significance), and Wet Forest (regionally significant). This floristic community of CTR is endemic to the state and its occurrence within the Strzelecki Ranges is a major outlier (Peel 1999). Under conservation targets nominated by the draft Native Vegetation Plan (West Gippsland CMA) both Damp Forest and *Central Highlands* CTR are EVCs which have a target of ‘all remaining remnants needed for conservation’ to provide adequate reservation (Table 11).

While existing data does not record any significant flora from this link, there is suitable habitat for significant flora such as Slender Tree-fern *Cyathea cunninghamii* (rare in Australia), Sticky Wattle *Acacia howittii*, (rare in Australia), River Hook-sedge *Uncinia nemoralis* (rare in Victoria) and Beech Finger-fern *Grammitis magellanica* ssp. *Nothofageti* (vulnerable in Victoria), which have been recorded in adjacent areas. Suitable habitat also exists for Currant-wood *Monotoca glauca*.

### **7.1.4 Additional areas**

The five core areas and two corridors described encompass some of the most significant ecological values within the study area. The Strzelecki Ranges and Gippsland Plain bioregions, however, are significantly depleted of native vegetation and all remnants contribute to the biodiversity of these significantly altered environments. Depending on their size and condition, all examples of the following EVCs have high conservation value:

- Herb-rich Foothill forest
- Cool Temperate Rainforest
- Warm Temperate Rainforest
- Riparian Scrub Complex
- Lowland Forest
- Damp Forest

- Riparian Forest
- Wetland Formation
- Tussocky Herb-rich Foothill Forest
- Swampy Riparian Complex
- South Gippsland Plains Grassy Forest.

#### *Remnants of Central Highlands Cool Temperate Rainforest*

Smaller isolates of CTR mapped at 1:25000 (generally covering greater than 2 hectares) are all important occurrences of this state significant EVC. Depending on an isolates size and condition, these remnants are of at least high regional conservation significance. This floristic community of CTR is endemic to the state (Peel 1999) and all remnants are of high value for the regional conservation of this endangered EVC.

#### *Remnants of Strzeleckis Warm Temperate Rainforest*

Small isolated occurrences of Warm Temperate Rainforest are of National conservation significance. This floristic community of Warm Temperate Rainforest community is endemic to the state and is restricted to the lowland valleys of the Strzelecki Ranges (Peel 1999). These sites also provide habitat for the nationally rare Sticky Wattle *Acacia howittii*, which is a common gap and ecotone species of this EVC (Peel 1999).

#### *Other remnants of native vegetation*

The remaining areas of vegetation, mapped as native vegetation within the HVP estate within the Strzelecki Ranges and Gippsland Plain Bioregions, are represented by some of the EVCs listed above. These areas include the large areas to the east and north east of Tarra-Bulga National Park. These sites also provide habitat for significant flora species listed in Table 4, including Sticky Wattle *Acacia howittii* and Bog Gum *Eucalyptus kitsoniana*.

Many of these EVCs are threatened, rated as endangered or vulnerable, and require significant amounts of vegetation, if not all remnants, to be conserved to meet the target levels for protection nominated in the draft Native Vegetation Plan for West Gippsland (West Gippsland CMA 2000, Tables 11 and 12) and the JANIS biodiversity criteria (JANIS 1997).

#### *Riparian vegetation*

Thin remnants of riparian vegetation, represented by EVCs such as Wet Forest in the Strzelecki Ranges, and Swampy Riparian Complex and Riparian Forest in the Gippsland Plain, contribute to biodiversity conservation in these altered

environments. These sites also provide habitat for significant flora species (Table 4), and species including Sticky Wattle *Acacia howittii* and Bog Gum *Eucalyptus kitsoniana*. The beds and banks of streams, particularly smaller stream tributaries, are important areas for the Strzelecki Burrowing Crayfish (van Praagh and Hinkley 1999), and deep gullies may provide important refuge habitat for gliders and possums following logging activities (Lunney 1987). Removal of trees from gullies greatly reduces the habitat value of these areas.

## 7.2 Conservation strategies to maintain biodiversity

Although human management has, at least in part, recreated the forest environment of the Strzelecki Ranges, in many instances the hardwood “plantation” resource is often floristically indistinguishable from the indigenous forests of this bioregion. This does not imply that past management, which included logging, has had no impact, as the ecological impacts of this management has significantly degraded the overall ecological integrity of the Strzeleckii Ranges. The overstorey may have been planted and its species composition modified or simplified, but it is still functionally native vegetation capable of regenerating many of its depleted characteristics in the longer term.

The initial clearing of the Strzelecki Ranges had a significant impact on the structure and habitat characteristics of the Wet Forest environment, largely impacting on sensitive/hollow dependant fauna and reducing the extent of Cool Temperate Rainforest. Most Wet Forest plants, however, probably re-established after this disturbance. Once these replanted forests pass through their first rotation however, the disturbance associated with harvesting has a more obvious impact on the floristic composition of this environment. The replanted vegetation of the third rotation is more obviously a “plantation” as many native species unable to cope with the frequency of such a major disturbance (i.e. two or three events in thirty years) are unable to regenerate in this environment. This simplification of the biodiversity needs to be managed if the significant ecological values of this bioregion are to be retained in perpetuity.

The following strategies have been developed from some of the existing literature and the authors’ experiences and knowledge. It does not represent a comprehensive review of the relevant literature as this is well beyond the scope of this exercise.

The Gippsland Comprehensive Regional Assessment (VicRFASC 1999) documents several principles for ecologically sustainable forest management, including the need to protect and maintain biodiversity. Strategies include identifying special management areas and reserves to protect biodiversity, while regional and local harvesting prescriptions are designed to limit the impacts of timber harvesting on other ecological values need to be put in place (VicRFASC 1999).

Similarly in a review of the Code of Forest Practices for timber production by the CSIRO (1995), the conservation of flora and fauna values is set out as a clear goal. This review suggests that objectives of management for flora and fauna values must be explicitly stated in Forest Management Area Plans and lead to zoning of the production estate into:

- unharvested areas,
- specially managed areas where harvesting is modified to accommodate stated conservation goals, and
- the remaining forest where harvesting must conform to the requirements of the local Code of Forest Practices.

West Gippsland CMA (2000) sets out priorities and principles for native vegetation management in this region. These include the priorities for protecting remnant vegetation, and management principles identifying the retention and management of remnant native vegetation as the principal means available for conservation of natural terrestrial biodiversity across the landscape. Large areas of remnant vegetation are of fundamental importance for nature conservation and are irreplaceable. All other things being equal, large remnants are inherently more valuable than the same area contained in smaller patches.

There are also several criteria developed to guide the establishment of a Comprehensive, Adequate and Representative (CAR), forest reserve system (JANIS 1997). These recognise that a certain percentage of the pre -1750 distribution of each forest ecosystem should be protected in the CAR reserve system (VicRFASC 1999). Briefly these are 15% for each forest ecosystem, 60% where the forest ecosystem is vulnerable, and where the forest ecosystem is rare and endangered, all remnants should be protected (VicRFASC 1999).

Studies of fauna species have also been undertaken to address current land use practices. Lindenmayer and Possingham (1995) used models to predict the survival of an arboreal mammal, Leadbeaters Possum *Gymnobelidus leadbeateri*, under three timber harvesting practices designed to conserve this species:

- extending rotation time between logging operations
- increasing the amount of forest retained within each harvested coupe and
- permanently withdrawing areas from wood production.

Although Leadbeaters Possum is not known to occur within the Strzelecki Ranges, its range within the Victoria's Central Highlands contains many habitat features in common with the Strzelecki Ranges (e.g. Wet Forest dominated by

Mountain Ash) and its habitat requirements (e.g. large, old trees with suitable nesting hollows) are similar to arboreal mammals found within the study area, such as the gliders and possums. They found that all three conservation-oriented timber harvesting practices increased survival rates of the possum. However, they concluded that the *permanent withdrawal of areas from wood production* to be the most efficient approach to conserve this possum. The main problem identified with *extending the rotation time between logging operations*, was that the rotation rates required to develop suitable habitat (including hollow-bearing trees) is substantially greater than the current harvesting rotation time. For example, Mountain Ash trees require more than 120 years of growth before hollows develop, while the current harvesting rotation times in the Strzelecki Ranges are about 30 years. The main problems identified with *increasing the amount of forest retained within each coupe* were the logistical problems involved with ensuring long-term survival of retained areas within coupes, and also the human safety issues arising when implementing this practice of retaining areas within logging coupes. Thus, in terms of hollow-dependent arboreal mammals, *the permanent withdrawal of large areas of forest* is probably the best practice for conserving these species. This conclusion can probably be extended to other hollow-dependent fauna such as owls, cockatoos and bats.

The protection of Cool Temperate Rainforest from the impacts of timber harvesting is one of the main objectives of this biodiversity conservation plan within the Strzelecki Ranges Bioregion. The floristic community of this EVC present within the study area is endemic to Victoria, endangered, requires all remaining remnants to be protected (West Gippsland CMA 2000) and is vulnerable to edge effects and Myrtle Wilt (Gell and Mercer 1992). Measures to protect Cool Temperate Rainforest from the impacts of timber harvesting have been reviewed by Burgman and Ferguson (1995).

Following the assessment of sites of zoological significance in central Gippsland (Mansergh and Norris 1982a), Mansergh and Norris (1982b) provided a number of recommendations for the protection and conservation of indigenous vertebrate fauna throughout central Gippsland. This included a number of general recommendations relating to reservation of important areas, buffer zones and corridors, timber harvesting, revegetation and weed management, as well as targeted recommendations relating specifically to each of those sites of significance within the Strzelecki Ranges (Mansergh and Norris 1982b). For sites identified by Mansergh and Norris (1982a) from within the present study area, the following targeted recommendations were made (Mansergh and Norris 1982b):

- Tarra Valley (site of regional significance) – “It should be recognised that the present areas of Tarra Valley and Bulga National Parks are inadequate for the conservation of fauna and adjacent areas of mature and regenerating forest

should be included in the Park(s).

- English Corner, Olsens Bridge, Gonyah Gonyah (sites of local and/or scientific interest) – Wildlife conservation should be given high priority in the management of these areas, and native vegetation in these areas should be retained.

### **7.2.1 Management of Core Areas**

The distribution of significant biodiversity values have been used to identify Core Areas (Map 1, CDROM) and conservation oriented management is required to maintain these values. We do not consider that timber harvesting and the maintenance of biodiversity are compatible land uses within core areas.

The values present, including areas of Cool Temperate Rainforest and populations of threatened flora and fauna, are endangered and are vulnerable to disturbances. A precautionary approach is therefore warranted. Over time, such an approach is likely to allow areas of Cool Temperate Rainforest to increase in area, restrict the spread of Myrtle Wilt, increase habitat diversity as forests mature and allow populations of rare and threatened species to stabilise or expand. Managing subcatchment units for biodiversity is seen as the most secure option for achieving these goals.

Proposed management strategies, both for each Core Area and at the local level, should be put in place as soon as possible, for the long-term protection of biodiversity within the HVP estate. However, given that HVP is a private company, leases the estate, and needs to consider social and economic, as well as ecological dimensions, some time may elapse before management changes could be implemented in these areas. Therefore, in the short-term, we propose a moratorium be established on harvesting within 250 metres of Cool Temperate Rainforest and records of any significant flora species, and within 2000 metres of the Spot-tail Quoll record (Map 1).

Note that some of the 250 metre buffers around CTR fall outside of the HVP estate. This is a function of the mapping algorithm use to generate the buffer rather than a prescription on adjacent land. During this transition period it is also preferable that harvesting be focused outside core areas and habitat links. Where this cannot be avoided, harvesting should also adhere to the local level strategies defined in this report (Section 7.2.4).

#### 1. Gonyah Gonyah Core Area

Some of the Gonyah Gonyah core area includes the 650 ha. Gonyah Gonyah rainforest reserve which are not part of the HVP leasehold. Management strategies for this section are not discussed.

The remaining area in this core is leased to HVP. Ideally, timber harvesting would be excluded from these sections of the Gunyah Gunyah core area, which would be managed to maintain biodiversity. Given that this may not be feasible, other options to minimise the impact upon biodiversity include:

- the retention of mature trees for hollow-dependent fauna
- retiring selected coupes from harvesting
- increase coupe rotation time
- ensure at least >50% of the coupes within the core area are greater than 15 years in age (not including coupe area within the 250 metre buffer around the Cool Temperate Rainforest)
- ensuring adjacent coupes are not harvested concurrently.

A minimum of 250 metre buffers around areas of Cool Temperate Rainforest should be retained.

Given the Spot-tail Quolls nationally threatened status, previously unsubstantiated occurrence in the Strzelecki Ranges (potentially unique genetically), unknown distribution over the Strzelecki Ranges, and typically large home range, we recommend that all logging within 2000 metres of the Spot-tailed Quoll record be suspended until further information is obtained. Recommendations provided within this report may require revision once greater information on the status of the Spot-tailed Quoll in the Strzelecki Ranges is available. Experts in Spot-tailed Quoll biology and ecology will be commencing more detailed studies of this species in the Strzelecki Ranges in 2001.

## 2. Jack River Core Area

A minimum of 250 metre buffers around areas of Cool Temperate Rainforest should be retained.

Ideally, timber harvesting would be excluded from the Jack River Core Area which would be managed to maintain biodiversity. Given that this may not be feasible, other options to minimise the impact upon biodiversity include:

- the retention of mature trees for hollow-dependent fauna
- retiring selected coupes from harvesting
- increase coupe rotation time
- ensure at least >50% of the coupes within the core area are greater than 15 years in age (not including coupe area within the 250 metre buffer around the

Cool Temperate Rainforest)

- ensuring adjacent coupes are not harvested concurrently.

### 3. College Creek-English Corner Core Area

Most of this core area lies outside the boundaries of HVP leasehold and therefore management strategies are not discussed. However, the relatively small area of HVP leasehold within the College Creek-English Corner Core Area (both harvestable and non-harvestable vegetation) should be retained.

### 4. Tarra Bulga National Park Core Area

As these core areas occur within a National Park and are outside of HVP leasehold, management of this core area is the responsibility of Parks Victoria.

### 5. Upper Merriman Creek Core Area

A minimum of 250 metre buffers around areas of Cool Temperate Rainforest should be retained.

Ideally, timber harvesting would be excluded from the Upper Merriman Creek Core Area that would be managed to maintain biodiversity. Given that this may not be feasible, other options to minimise the impact upon biodiversity include:

- the retention of mature trees for hollow-dependent fauna
- retiring selected coupes from harvesting
- increase coupe rotation time
- ensure at least >50% of the coupes within the core area are greater than 15 years in age (not including coupe area within the 250 metre buffer around the Cool Temperate Rainforest)
- ensuring adjacent coupes are not harvested concurrently.

## **7.2.2 Management of Habitat Links**

These areas have been identified to significantly contribute to the goal of conserving biodiversity within the HVP estate, by providing a more or less continuous habitat link between the otherwise isolated core areas of biodiversity. Linkages between larger areas of biodiversity increase population viability, reduce inbreeding and other genetic problems, as well as have other beneficial outcomes for native flora and fauna (Bennett 1999).



The habitat linkages need to remain functionally connected along their entire length. In the Strzelecki Ranges, habitats suitable for a linkage to be considered functionally connected will contain a complex structure of indigenous vegetation with mature trees, shrubs and understorey plants. All of the areas identified as linkage areas within Map 1 should be generally retained. Within these links, the vegetation must be managed to ensure that there is always at least some suitably structured vegetation forming a continuous connection between the core areas at either end.

### 1. Ryton Linkage and Albert River Linkage

Throughout the area mapped as the Ryton Linkage and Albert River Linkage, all the non-harvestable area and areas up to 250 metres from Cool Temperate Rainforest, should be managed for conservation.

There are three ‘bottleneck’ areas (labelled R1, R2 and R3) that need to remain functionally connected for the Ryton link to remain a viable linkage. Harvestable and non-harvestable vegetation within these bottleneck areas should be managed for conservation, primarily by retiring the hardwood resource in these areas.

In the other sections of the linkage, standard procedures may proceed to some degree within the areas marked as harvestable. However, management prescriptions to assist in the maintenance of biodiversity in these areas could include:

- All narrow and isolated areas mapped as harvestable within the linkage be retired from hardwood production.
- Coupe rotations should be modified to ensure that >50% of the harvestable area within this linkage is greater than 15 years in age.
- Coupes to be harvested should be systematically planned, but adjacent coupes should not be harvested within five years of each other.
- Adhere to local ‘Timber Harvesting Strategies’ (see section 7.2.4.).
- Replace any conifer plantations with Mountain Ash *Eucalyptus regnans* and other suitable locally indigenous tree species.
- Enhancement plantings of preferred koala feed trees alongside corridor (see Figure 7).

### 2. Upper Middle Creek Linkage

Throughout the area mapped as Middle Creek Linkage, all the non-harvestable areas should be retained.

Of the remaining harvestable areas within the Upper Middle Creek Linkage, the following special management prescriptions should be adhered to:

- Coupes rotations should be staggered to ensure that >50% of the harvestable area within this linkage is greater than 15 years in age.
- Coupes to be harvested should be systematically planned, but adjacent coupes should not be harvested within five years of each other.
- All narrow and isolated areas mapped as harvestable within the linkage should be retained.
- Adhere to ‘Timber Harvesting Strategies at the local level’ (Section 8.2.4.).
- Replace any conifer plantations with Mountain Ash *Eucalyptus regnans* and other suitable locally indigenous tree species.
- Enhancement plantings of palatable koala trees alongside corridor (Figure 7).

### 7.2.3 Additional Areas

#### Retention of Custodial Lands

Throughout the HVP estate, all the native vegetation associated with Custodial Lands are important for biodiversity (areas displayed as yellow on Map 1) and should be clearly delineated on the ground to minimise disturbance from harvesting activities. No areas mapped as Custodial Lands (native vegetation) are proposed to be cleared for plantation establishment (Simon Penfold, HVP, pers. comm.) and this policy should be maintained. Other activities associated with harvesting, such as road construction should also avoid areas mapped as native vegetation when ever possible.

While the current HVP policy for the management of Custodial Lands to retain the values of the existing native vegetation remains, the ecological values present will generally be retained. If this policy changes the protection of the biodiversity present could best be protected by a change in tenure, with one model proposed by Constable et al. (1998).

#### Buffer zones

A buffer zone comprises an area of land around a key environmental feature that should be excluded from forestry activities. While buffer strips have traditionally been utilised in forestry operations around riparian areas to minimise declines in water quality (Clinnick 1985), buffer zones can also be placed around features such as known locations of threatened flora, fauna and vegetation communities to protect these areas against damage or loss of

biodiversity (Meffe and Carroll 1997). Buffers zone provide some protection for the core biological features by preventing major (and minimising minor) environmental changes such as altered humidity, light levels and weed invasion (Meffe and Carroll 1997).

Within the study area, buffer zones would be beneficial at the following locations:

#### Central Highlands Cool Temperate Rainforest Isolates

Two hundred and fifty metre buffer 'no go zones' should be placed around the edge of these isolated communities.

In any areas within the proposed 250 metre buffer that have been recently cleared, or where natural regeneration is poor, revegetation works should be undertaken.

#### Strzeleckis Warm Temperate Rainforest Isolates

One hundred metre buffer 'no go zones' should be placed around the edge of these isolated communities.

In any areas within the proposed 100 metre buffer that have been recently cleared, or where natural regeneration is poor, revegetation works should be undertaken.

#### Riparian Vegetation/Habitat

A minimum buffer of thirty metres on either side of the centre of any waterway should be placed around riparian vegetation/habitat throughout the HVP estate. Thirty metres was found to be the minimum buffer distance to *reduce* the impact of logging on streams for the Strzelecki Burrowing Crayfish by van Praagh and Hinkley (1999). Thirty to 100 meters buffer may be required to provide protection from short term impacts (van Praagh and Hinkley 1999). It is recommended that buffer zones incorporate at least a strip of the closest trees (preferably eucalypts) to the waterway, which may widen some buffer zones beyond the 30 metre minimum level.

Minor drainage lines that only carry an intermittent overland flow are currently protected during harvesting operations by a filter strip (generally five or ten metres on each side of the drainage line). Currently the trees within these areas may be harvested however, machinery movement is restricted to prevent excessive soil disturbance and subsequent erosion. The biodiversity and corridor values would be enhanced by converting these areas to buffer strips (i.e. retained the trees) of a minimum of 20 metres wide (10 metres on each side of the drainage line).

### Spot-tailed Quoll

A minimum buffer of 2000 metres should be placed around the Spot-tailed Quoll record until further information is known about the status of this species within the Strzelecki Ranges is known. This buffer may need to be altered once more information is available, but would otherwise exclude the harvesting of hardwood plantations in this area.

## **7.2.4 Local Timber Harvesting Strategies**

The Code of Forest Practices is a series of prescriptions that are generic, and have minimum requirements designed for soil and water conservation under the most benign conditions. If these prescriptions are applied uniformly they will also generally be inadequate for this purpose as site conditions are generally a greater erosion hazard than assumed by the minimum standards. These prescriptions are also inadequate for the conservation of biodiversity at a coupe or subcatchment level where clearfelling is the dominant silvicultural system used. The width of filter strips and buffer strips allocated by the Code of Forest Practices provide little useable habitat for many fauna groups even though the total area of these strips may be considered to be quite large when tallied over a catchment or forest block.

To protect rainforest, the Code of Forest Practices for native forests recommends that significant stands be given a 60 metre buffer, or a 40 metre buffer and a further 40 metres of lower intensity harvesting. While this is a significant improvement from the standard buffer widths prescribed for soil and water conservation, we do not consider this prescription to be an adequate precaution for these significant and sensitive stands of vegetation (see also Burgman and Ferguson 1995). From an ecological perspective, a buffer of two tree heights or about 100 metres is necessary to provide the minimum protection for this threatened community and its ecotone. While the most significant stands of Cool Temperate Rainforest have been placed in Core Areas, buffers of 250 metres have been applied to all remnants of rainforest mapped at 1:25,000 (Map 1, CDROM). This is a precautionary management strategy to protect this endangered community from the spread of Myrtle Wilt, to allow the natural ecosystem processes to operate and to allow this rainforest to expand its current extent.

The Code of Forest Practices prohibits harvesting on slopes steeper than 30 degrees (on private land slopes can be steeper than 30 degrees). As the soils within the Strzelecki Ranges are generally considered to be prone to mass movement (Neville Rosengren, Geomorphologist, LaTrobe University, pers. comm.) the minimum standard is presumed to be inadequate. As an initial precaution, harvesting should initially be excluded on slopes over 25 degrees

until an assessment by an appropriately qualified soil scientist has been completed.

At present, numerous adjacent coupes are being harvested either at the same time or in succession on a relatively short time-frame. The relatively thin strips of vegetation retained in gullies are designed for water quality issues and not as fauna movement corridors. These gullies are often dominated by tree ferns with little or no eucalypts remaining. These remnant gully strips often do not contain eucalypts and where eucalypts do occur, there is generally only a narrow strip consisting of a single line of widely spaced individuals. These remnant strips along gullies usually do not extend beyond the gullies. During field assessments, it was observed that many of these buffers, stopped 50-60 metres short of the ridgetops. There would be ecological value in extending these strips up the hillslope to connect to remaining vegetation on the other side of the ridge (Figure 8). There would also be ecological value in widening strips to retain more eucalypts.

Throughout the HVP estate all the non-harvestable areas should be retained and coupe boundaries should be marked to clearly identify this vegetation where any ambiguities occur.

The planting of Mountain Ash should be encouraged for any replanting, and areas of harvestable hardwood and non-harvestable vegetation should not be replaced by pine trees or any other non-indigenous species eg Shinning Gum.

In large areas that have recently been harvested, there would be benefits for biodiversity by planting suitable areas with a mix of other locally indigenous tree species, particularly species that are palatable to koalas.

It is important that the habitat linkages contain suitable food trees for koalas. Some of the linkages recommended may currently lack suitable trees. In conjunction with harvesting operations or other works the edges of these corridors (Figure 7) could be planted with a 10 to 30 metre wide strip of koala feed trees, such as Mountain Grey Gum *E. cypellocarpa* and Messmate *E. obliqua*.

Roads, tracks, snig tracks etc. need to be located with biodiversity protection in mind. In particular, crossing areas of retained vegetation should be avoided.

All narrow and isolated areas mapped as harvestable within the linkage should be retired.

Harvesting needs to be planned to produce a dispersed array of regenerating coupes that contribute to habitat continuity.

New forestry roads should aim to avoid threatened species habitat, minimise environmental damage and provide high standard stream crossings (VicRFASC 1999). The existing network should also be inspected to ensure they are maintained to current standards.

If necessary, only minimal amounts of herbicide should be used in any coupe preparation works and spray drift must be avoided. These herbicides should also be relatively non-residual.

### 7.2.5 Additional Biodiversity Strategies

The State Government is developing new policies on native vegetation protection in Victoria. Where removal of remnant native vegetation is proposed, the goal of 'no net loss' described by the *Victorian Biodiversity Strategy* (NRE 1997c) is relevant. As part of a current policy review the *Draft Native Vegetation Management Framework* (NRE 2000d) proposes that no net loss be replaced by a policy of achieving a net gain in the quality and extent of native vegetation in Victoria. The primary goal of the Draft Framework policy is to ensure that there is 'a reversal, across the entire landscape, of the long-term decline in the extent and quality of native vegetation, leading to a 'Net Gain'. The Draft Framework refers to gains in terms of extent and quality.

Gains in extent include:

- New areas of revegetation primarily for biodiversity conservation.
- New areas of revegetation for land protection or greenhouse which have included sufficient locally indigenous species to be considered part of the native vegetation estate.

Gains in quality include:

- Improved management of threatening processes within existing native vegetation through voluntary efforts.
- Improved management of threatening processes within existing native vegetation through funded projects.
- Supplementary plantings into depleted existing native vegetation.

No Net Loss or Net Gain criteria may be applicable to operations in areas mapped as native vegetation (i.e. roading). The *Draft West Gippsland Native Vegetation Plan* (West Gippsland CMA 2000) provides a guide for local government in assessing applications for native vegetation removal and net gain requirements and in determining permit conditions.

Most of the EVCs recorded within the HVP estate have a high to very high 'Strategic Regional Priority' rating for conservation within the Strzelecki Ranges Bioregion (West Gippsland CMA 2000). At a minimum, the high rating requires that all remaining remnants are needed for conservation, to meet the 'target levels required for protection, rehabilitation and revegetation' (West Gippsland CMA 2000). Below in Section 7.2.6 is a summary of the bioregional priorities for each EVC identified within the HVP estate, in West Gippsland.

A recent publication entitled the Nature Conservation Review 2001 (Trail and Porter 2001) also addresses targets for protection of EVC's within the Strzelecki Ranges Bioregion, and this reflects the importance of retaining all native vegetation within the study area.

### **7.2.6 West Gippsland CMA Strategic Regional Priority**

The Strategic Regional Priority of the EVC's recorded within the study area are listed below in Tables 12 and 13. As mentioned above most of the EVCs have a high to very high priority rating, and therefore the target for these EVCs is to protect all remaining remnants for conservation. It should be noted that the West Gippsland Native Vegetation Plan is a draft document and the current target levels for protection are under review (Martin Fuller, West Gippsland CMA, pers. comm.).

The Core Areas and Links predominantly consist of Wet Forest, Damp Forest and to a lesser extent Central Highlands Cool Temperate Rainforest. Substantial areas are also mapped as HVP's hardwood resource, which highlights the difficulty in resolving the difference between plantation and native forest. Both Damp Forest and Central Highlands Cool Temperate Rainforest are EVCs which have a target of 'all remaining remnants needed for conservation' within the draft Native Vegetation Plan (West Gippsland CMA 2000). Wet Forest has a depleted conservation status and requires additional areas to be reserved within the Strzelecki Ranges Bioregion (West Gippsland CMA 2000).

**Table 12:** EVCs in HVP leasehold within the Strzelecki Ranges bioregion and their strategic regional priority, bioregional conservation status and target levels for protection (West Gippsland CMA 2000).

| <b>EVC Type</b>                             | <b>Priority; Conservation Status</b> | <b>Target levels for protection</b> |
|---|--------------------------------------|-------------------------------------|
| Lowland Forest                              | Very High, Vulnerable                | A, B                                |
| Heathy Woodland                             | High; Least Concern                  | C, D                                |
| Damp Forest                                 | Very High, Endangered                | All remaining remnants              |
| Wet Forest                                  | High, Depleted                       | C, D                                |
| Strzeleckis Warm Temperate Rainforest       | Very High, Endangered                | All remaining remnants              |
| Central Highlands Cool Temperate Rainforest | Very High, Endangered                | All remaining remnants              |
| Herb-rich Foothill Forest                   | Very High, Endangered                | All remaining remnants              |

A=Minimum of 60% of the remaining extent to be protected

B=Up to 90% or remaining extent to be retained across each EVCs geographic range in fragmented landscapes

C=15% of pre-European extent protected

D=35% of remaining extent retained across each EVCs geographic range in fragmented landscapes

**Table 13:** EVCs in HVP leasehold within the Gippsland Plain bioregion and their strategic regional priority, bioregional conservation status and target levels for protection (West Gippsland CMA 2000).

| <b>EVC Type</b>                      | <b>Priority; Conservation Status</b> | <b>Target levels for protection</b> |
|--------------------------------------|--------------------------------------|-------------------------------------|
| Riparian Scrub Complex               | Very High; Vulnerable                | A, B                                |
| Swampy Riparian Complex              | Very High; Endangered                | All remaining remnants              |
| Lowland Forest                       | Very High, Vulnerable                | A, B                                |
| Heathy Woodland                      | Medium; Depleted                     | C, D                                |
| South Gippsland Plains Grassy Forest | Very High, Vulnerable                | A, B                                |
| Damp Forest                          | Very High, Vulnerable                | A, B                                |
| Riparian Forest                      | Very High; Vulnerable                | A, B                                |
| Wetland Formation                    | High; Rare                           | All remaining remnants              |
| Wet Forest                           | High, Least Concern                  | C, D                                |
| Lowland Herb-rich Forest             | Very High; Endangered                | All remaining remnants              |

A=Minimum of 60% of the remaining extent to be protected

B=Up to 90% or remaining extent to be retained across each EVCs geographic range in fragmented landscapes

C=15% of pre-European extent protected

D=35% of remaining extent retained across each EVCs geographic range in fragmented landscapes



## 8.0 CONCLUSION

All existing remnant native vegetation within the HVP estate contributes to biodiversity conservation within the highly modified bioregions present.

Using the available ecological data and the results of new survey work, the combination of which still only provides a limited data set, Core Areas of biodiversity and appropriate habitat links were defined for the HVP estate in West Gippsland. There is a need for further on-ground research and the development of Management Plans should be considered.

Our terms of reference do not include taking into account the social and economic impacts with respect to a sustainable timber industry in the region. From an environmental perspective, the Core Areas are particularly sensitive to disturbance and the high biodiversity values of the Core Areas would be substantially enhanced if these areas (and also habitat links) were excluded from timber production. A range of stakeholders will need to support and agree to the exclusion of timber harvesting in these areas and in the event that it is decided to continue timber harvesting, a range of management options to improve biodiversity have been recommended.

# FIGURES

**Figure 1:** The study area, divided into forestry blocks.

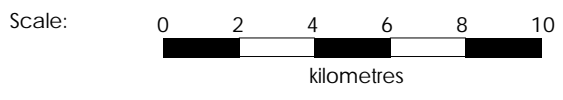
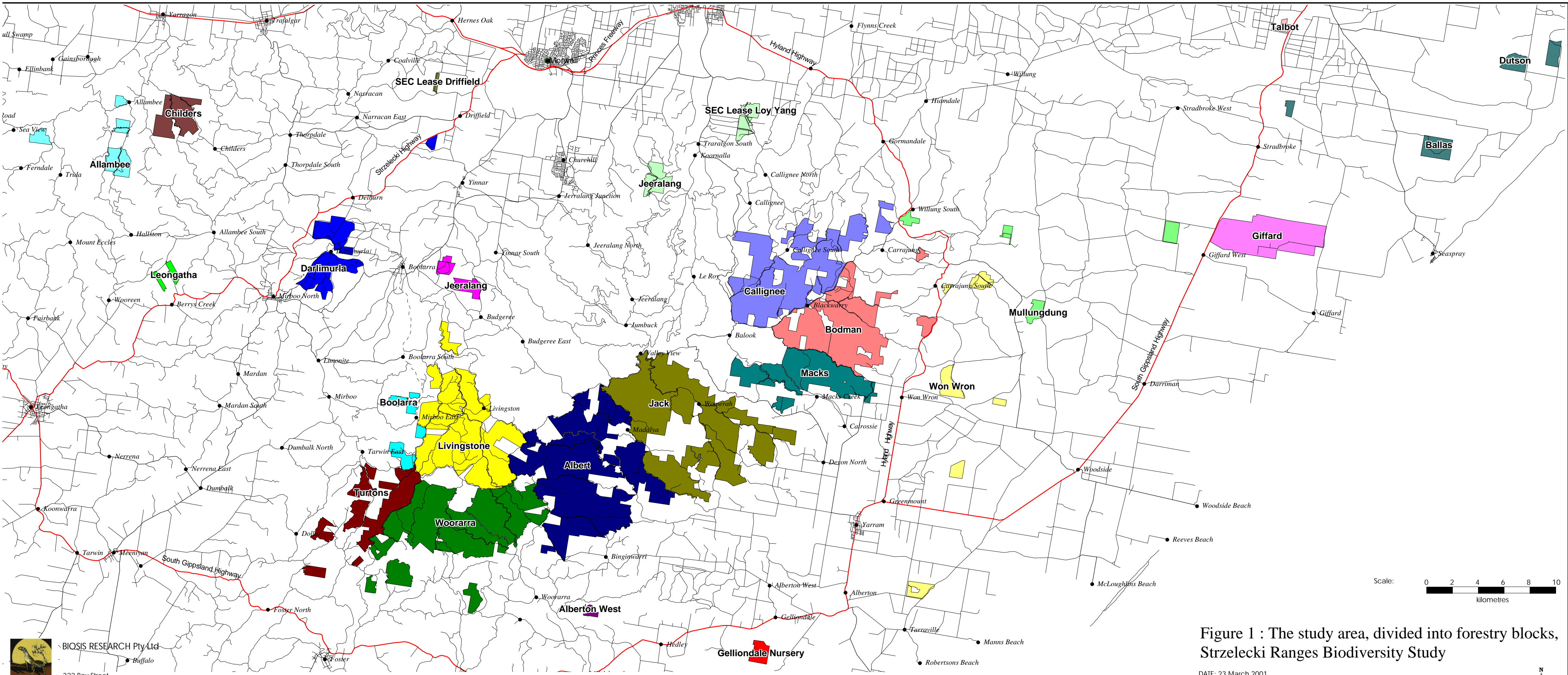
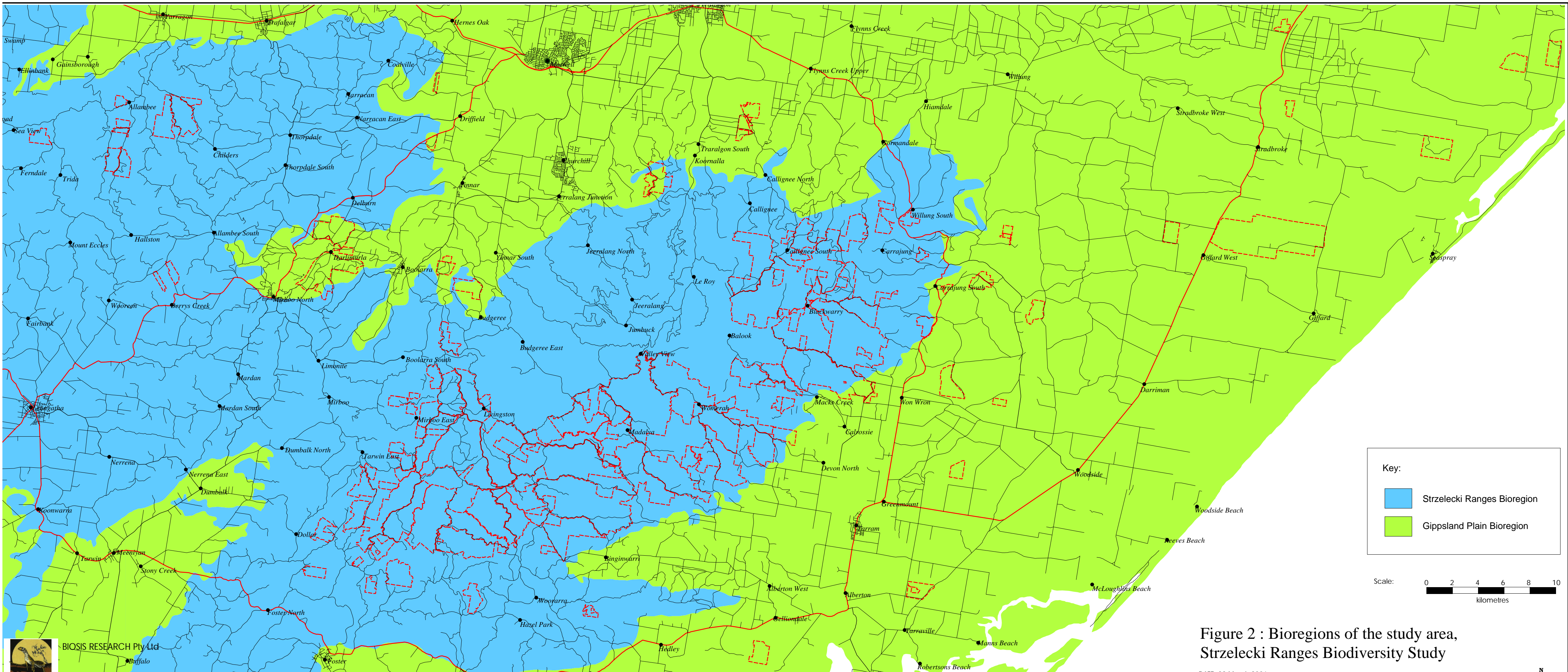


Figure 1 : The study area, divided into forestry blocks, Strzelecki Ranges Biodiversity Study

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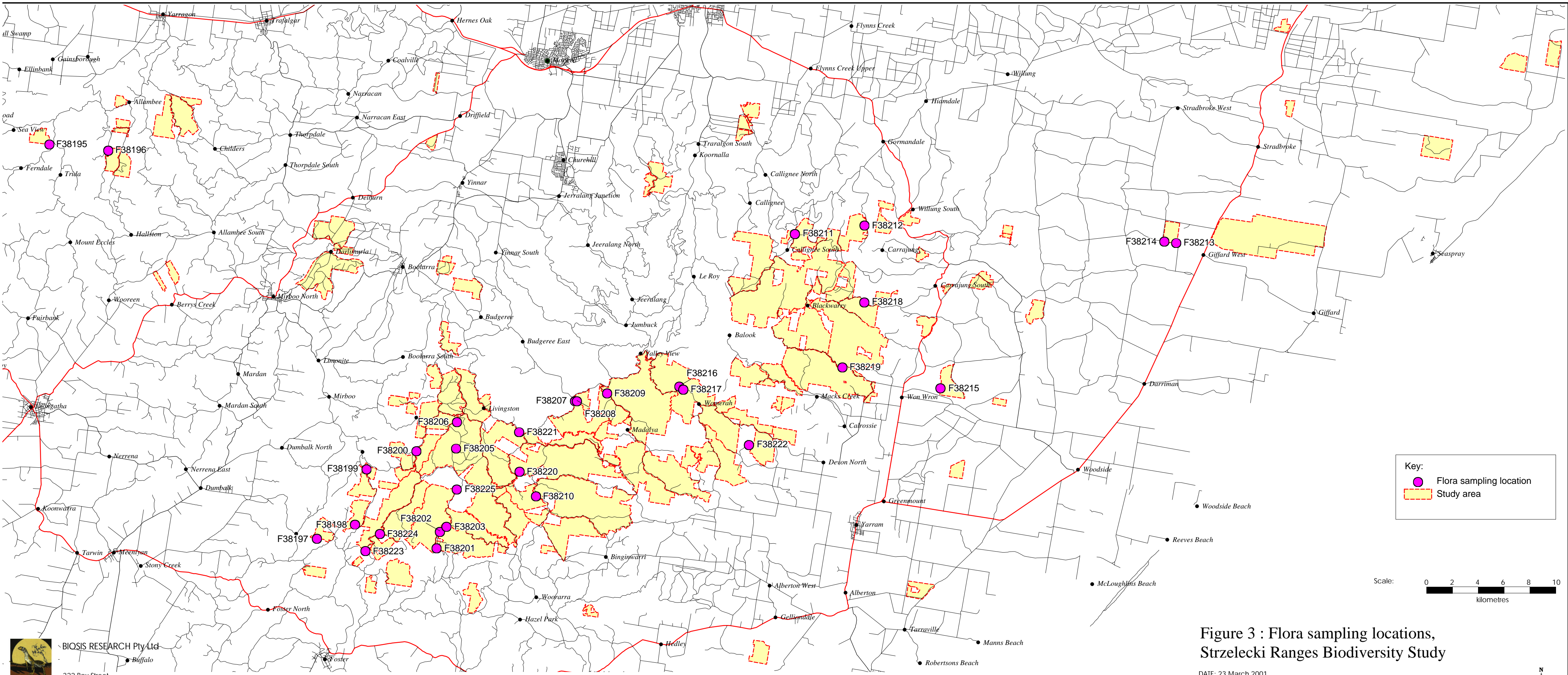
**Figure 2:** Bioregions of the study area.



**Figure 2 : Bioregions of the study area, Strzelecki Ranges Biodiversity Study**

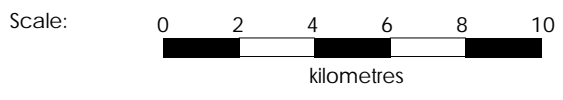
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**Figure 3:** Flora sampling locations



Key:

- Flora sampling location
- Study area

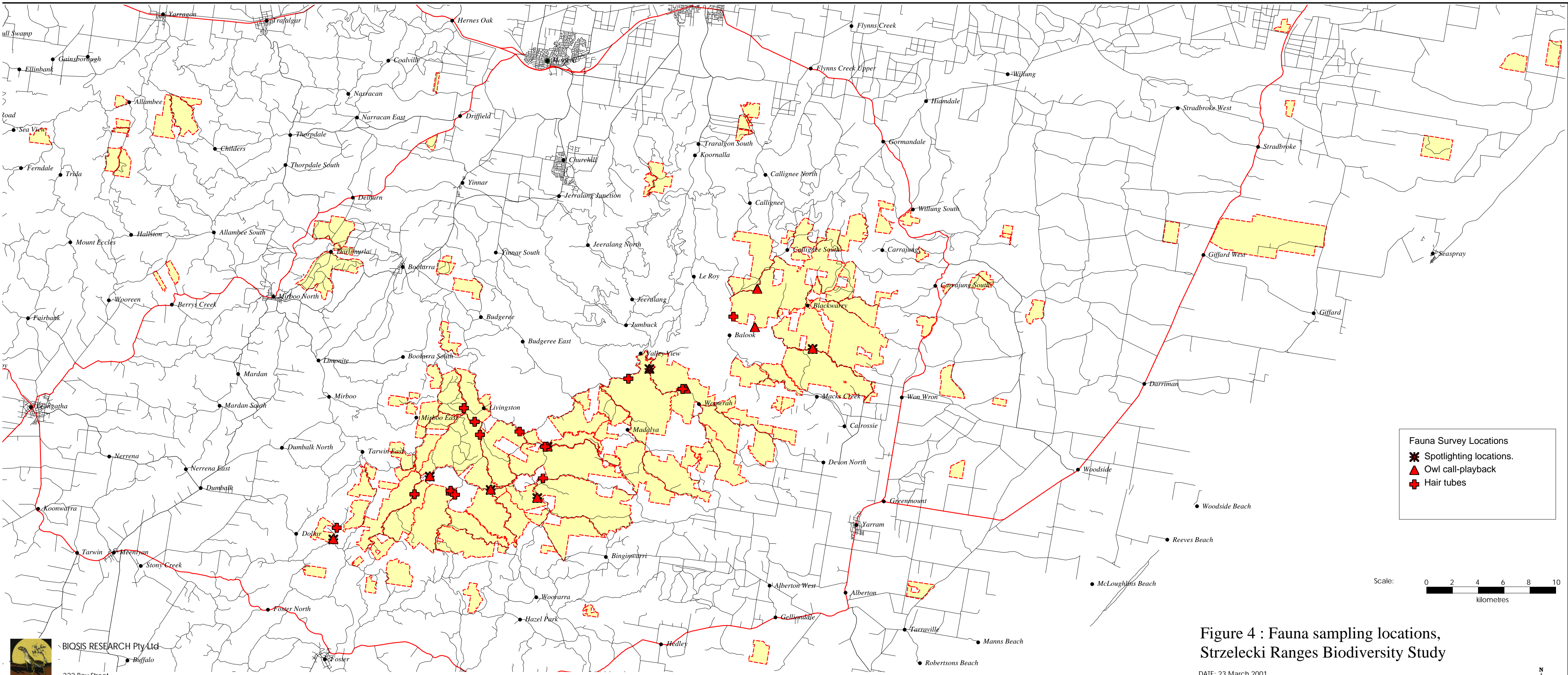


**Figure 3 : Flora sampling locations, Strzelecki Ranges Biodiversity Study**



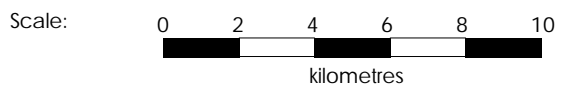


**Figure 4:** Fauna sampling locations.



Fauna Survey Locations

- ✱ Spotlighting locations.
- ▲ Owl call-playback
- ✚ Hair tubes

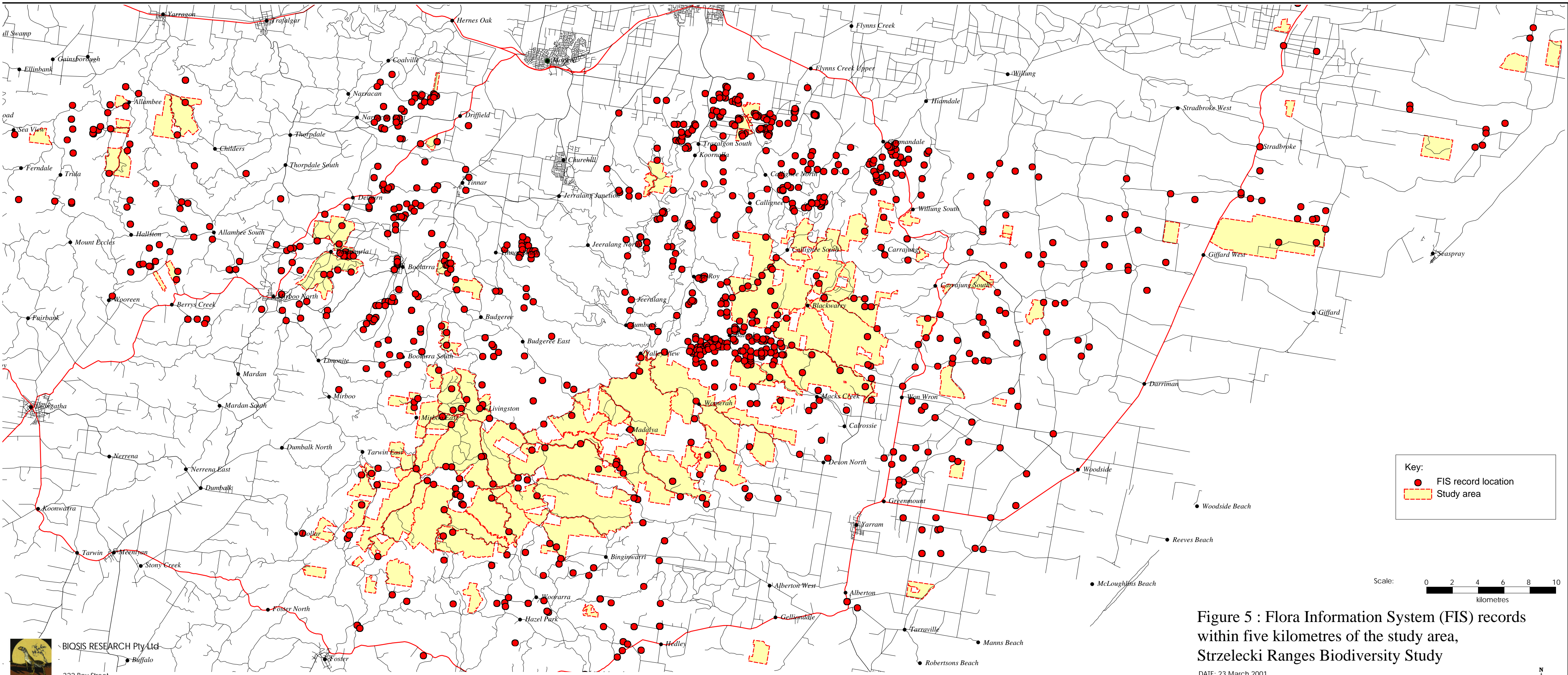


**Figure 4 : Fauna sampling locations, Strzelecki Ranges Biodiversity Study**

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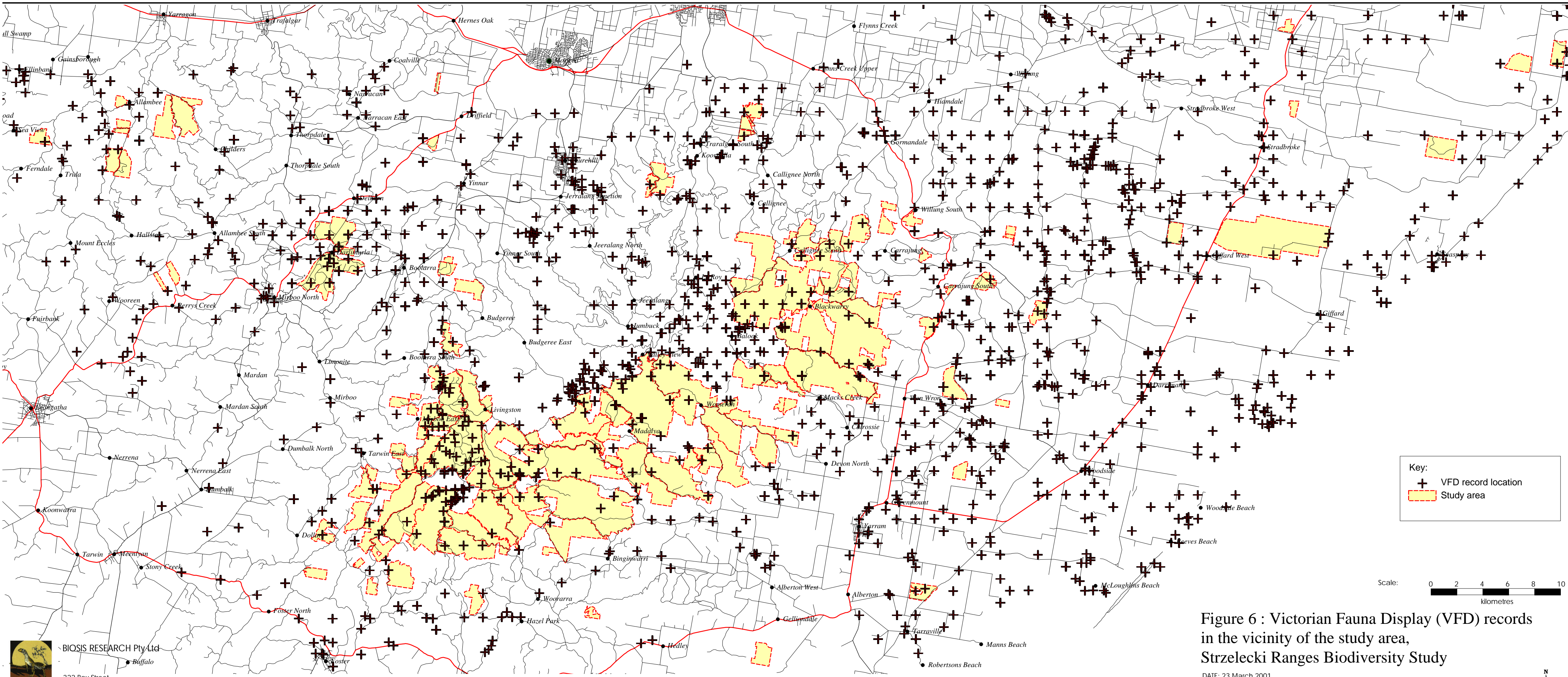
**Figure 5:** Flora Information System (FIS) records within five kilometres of the study area.



**Figure 5 : Flora Information System (FIS) records within five kilometres of the study area, Strzelecki Ranges Biodiversity Study**

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**Figure 6:** Victorian Fauna Display (VFD) records in the vicinity of the study area.



Key:

- + VFD record location
- Study area

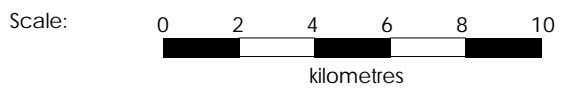
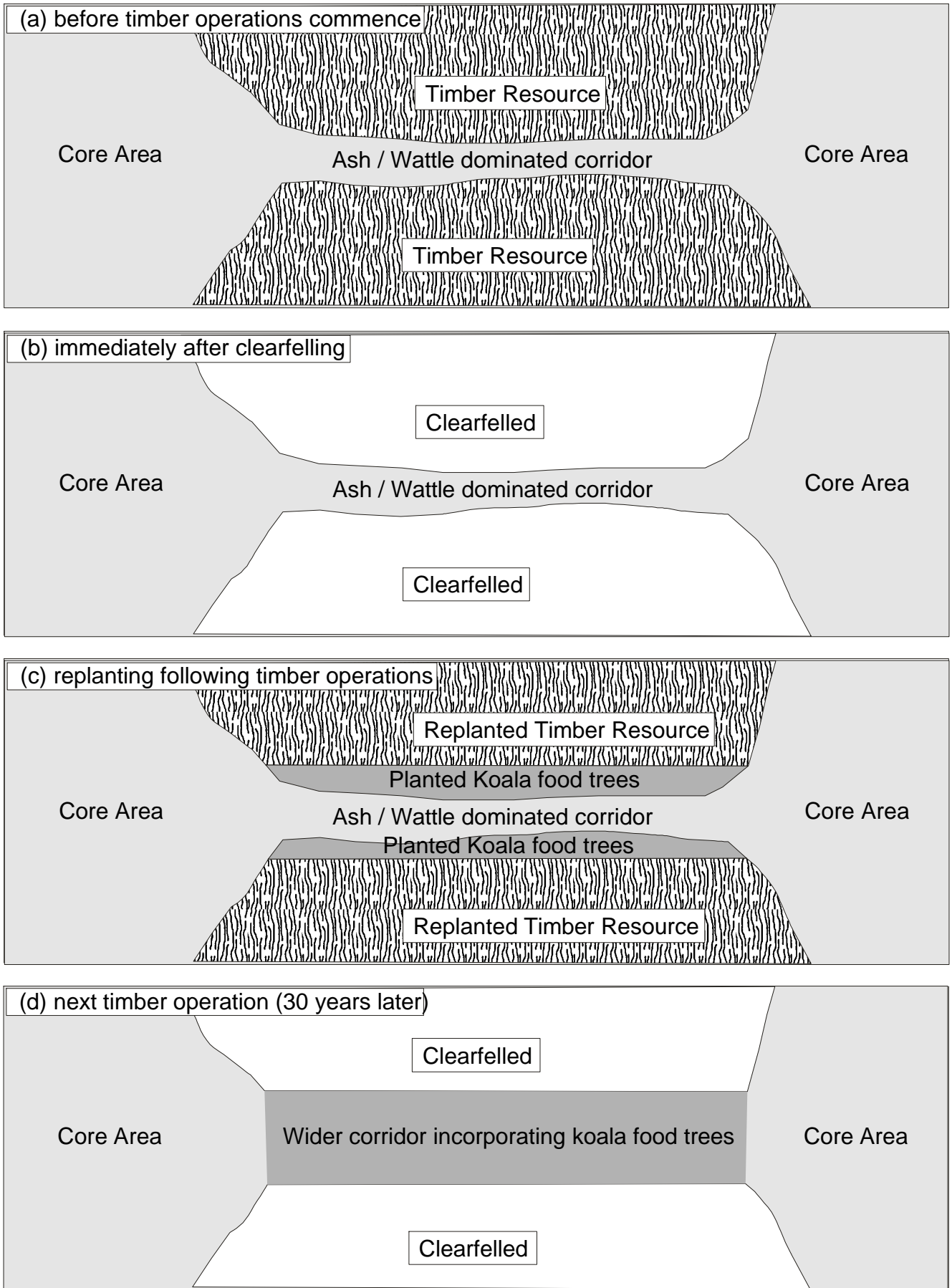


Figure 6 : Victorian Fauna Display (VFD) records in the vicinity of the study area, Strzelecki Ranges Biodiversity Study

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**Figure 7:** Conceptual diagram of proposed technique to enhance koala use of wildlife habitat corridors.



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Port Melbourne  
VICTORIA 3207

Figure 7: Conceptual diagram of proposed technique to enhance Koala use of wildlife habitat corridors

DATE: 23 March 2001

Checked by: CT

File number: 1482

Location: -\projects\1400s\1482\Mapping\1482 Fig 7.cdr





**Figure 8:** Conceptual diagram of current and proposed techniques to retain gullies.

# APPENDICES

# APPENDIX 1

## A1. PROJECT BRIEF

### STRZELECKI WORKING GROUP

### STRZELECKI RANGES BIODIVERSITY STUDY

### PROJECT BRIEF

#### INTRODUCTION

The purpose of the Strzelecki Ranges Biodiversity Study (SRBS) is to collate existing biodiversity data and obtain data where shortfalls in information currently exist. The Study will identify and evaluate the occurrence of indigenous flora, fauna, communities and areas of conservation significance on the land in the Strzelecki Ranges, Gippsland leased to Hancock Victorian Plantations Pty Ltd (HVP). The principle focus of the study is non-plantation areas and their interface with plantation areas. The study will also include any holdings immediately adjacent to land under HVP's control. The consultant will be required to make recommendations to ensure the biodiversity and conservation value of the area is protected and enhanced. These recommendations may include the setting aside of areas as reserves, corridors and buffer strips, and must take into account that HVP intends to continue the harvesting of timber from their plantations in accordance with the Code of Forest Practices for Timber Production.

#### BACKGROUND

##### The Strzelecki Working Group

In 1999 South Gippsland Shire Council convened a working group to address conservation issues on land leased to HVP in the Strzelecki Ranges. The Group is to develop proposals to identify and provide management regimes for non-plantation and ecologically significant areas and their interface with areas subject to harvesting. The Group includes:

- South Gippsland Shire Council (SGSC)
- La Trobe Shire Council
- Wellington Shire Council
- Hancock Victorian Plantations (HVP)
- South Gippsland Conservation Society
- West Gippsland Catchment Management Authority (WGCMA)
- Department of Natural Resources & Environment (DNRE)
- Friends of the Gippsland Bush (FOGB)
- Kim Devenish & Julie Constable

## Strzelecki Biodiversity

The Strzeleckis have a legacy of failed settlement and subsequent reforestation and regeneration. This has created a patchwork of vegetation including:

- land that was never cleared with old growth forest
- cool temperate rain forest
- cleared areas which have naturally regenerated into scrub
- forest and plantations of mountain ash and pine
- areas of natural regeneration where plantations have failed
- areas which provide the habitat for rare and threatened species of flora and fauna

## Basis for the Study

This Working Group has identified the need for a focused study to assess the conservation values of the area and the steps required to maintain and enhance its biodiversity. The area in question includes all land managed by HVP.

## Terms of reference

The consultancy will cover HVP's holdings in the Strzelecki Ranges, (see attached map) but it must also take into account the potential relevance of any immediately adjacent land of significance for biodiversity, including roadside reserves and vegetation along watercourses. (The consultant will have access to HVP - maps/photos/historical records and DNRE – Ecological Vegetation Class (EVC) mapping)

The study will include all the following elements, unless otherwise agreed with the Client. Alternative or additional suggestions from the consultants will be considered.

### A. Review of existing data

Identify and review existing published and unpublished data and assess its accuracy and current relevance given changes that may have occurred since data was collated.

### B. Survey the area

Where significant shortfalls exist in available data, the consultant must detect and map (at 1:25000) significant species, floristic communities and ecological vegetation classes, including:

- cool temperate rainforest
- habitat for forest dependent fauna including hollow dependent arboreal mammals
- sites with rare or threatened flora and fauna

In addition the consultant may need to survey and map the occurrence of:

- old growth forest
- natural regrowth
- any other areas contributing to the overall biodiversity

This process will require analysis of recent aerial photographs and may also require aerial reconnaissance and supplementary ground surveys of flora and fauna habitat, floristic communities and EVC's.

### **C. Evaluate its biological significance**

Evaluate the biological significance of the area and sites within the study area. This should include the proportion of different ecological vegetation classes, the occurrence of rare or threatened communities and species, areas important for the conservation of arboreal mammals, and any other areas of importance for the conservation of the overall biodiversity of the region. This evaluation should clearly indicate whether features are of local, regional, state or national significance using accepted criteria.

### **D. Identification and evaluation of threats**

Identify and evaluate threats to the area's biodiversity, including the impact of current forestry activities.

### **E. Develop conservation strategies**

Outline management options for plantation and non-plantation areas and indicate alternative strategies for the conservation of the area's biodiversity alongside HVP's operations, and present these along with an assessment of their likely effectiveness.

If recommended conservation strategies include; reserves, corridors, buffers the consultant is to provide details of:

- their locations and other management requirements
- and strategies considered necessary for the conservation of the area's Biodiversity

### **Further Guidelines**

#### **Liaison with members of the Strzelecki Working Group**

The consultants will be expected to consult extensively with the representatives and organizations represented on the Strzelecki Working Group during the course of this study.

#### **Timber Harvesting Practices**

The consultants should be familiar with the Code of Forest Practices for Timber Production. They should familiarise themselves with HVP's timber production and harvesting practices and take into consideration the constraints this imposes and opportunities this provides for biodiversity conservation.

## Department of Natural Resources & Environment Information

The study should take account of:

- Victoria's Biodiversity, Directions In Management, 1997 Victoria's Biodiversity Strategy
- Flora & Fauna Guarantee Act 1988 (including relevant listed species, communities and threatening processes)
- Lists, prepared by DNRE of other species and communities considered rare or threatened but not yet nominated or listed under the Act
- DNRE, 1998, 1:25000 Draft Gippsland Ecological Vegetation Class Maps (and the associated background data)
- Department of Conservation Forests & Lands, Environmental Studies Program, Sites of Botanical Significance in Central Gippsland, P.K. Gullan, G.E. Earl, S.J. Forbes, R.H. Barley & N.G. Walsh, 1984.

### Other

Reference should also be made to the Strzelecki National Park Proposal written by Julie Constable and Kim Devenish; to studies undertaken by FOGB and to any other relevant material.

## OUTPUT FROM THE CONSULTANCY

### Output

- Preliminary & Final Draft Reports (1 copy, ready for photographic reproduction and 1 copy on 3.5" disk, Format-Microsoft Word)
- 1 Final Report (1 copy, ready for photographic reproduction) responding to the Terms of Reference
- the Final Report on CD Rom (Format-Microsoft Word) prior to the Final Report presentation
- a complete map base on CD Rom (Format-Arc Info) (Refer to Terms of Reference, B. Field Survey) prior to the Final Report presentation

### Personal presentations

The consultants will be expected to submit a Preliminary Draft, Final Draft and a Final Report for discussion and conduct 3 presentations in person upon completion of each report. The presentations are to be scheduled by the Strzelecki Working Group.

### Report format

The final report will be typed, in A4 portrait format. Photographs, maps and drawings shall be of a suitable quality to enable reproduction. All graphic material shall be fully captioned and include the source and copyright status. Drawings shall conform to accepted drafting practice standards and shall be capable of reduction to A4 size. Where necessary, drawings of a size larger than A4 shall be attached separately to the report and folded to A4 size.

## Report contents

The report must include:

- name of the client
- names of the authors of the report including brief CVs
- date of completion
- project brief
- names of all the practitioners engaged in the task and the work they undertook including any separate reports they prepared

## Report contents (cont)

- information on any constraints or limitations experienced (e.g. money, time, access to information, expertise)
- executive summary
- table of contents (including page numbers)
- index
- table of all areas identified as high conservation value with a brief description of each
- map or maps of the area and all sites mentioned

**The main body of the report should include chapters on each of the main areas required by the brief, including:**

- a review of existing studies
- methods utilised and results of survey work undertaken
- evaluation of biological significance
- evaluation of threats to biodiversity
- evaluation of conservation strategies to conserve biodiversity
- specifications for conservation areas.

A comprehensive summary of all the data collected should be included in appendices, which may be incorporated into the report or bound separately.

## References

The report must include full references to both published and unpublished sources, including oral and other personal communications. Permission should be sought to quote these. In such cases, and in the case of material privately held, the name, position if relevant (e.g. chairperson of a local naturalist club), and address of the owner or source should be given, but only with their consent.

## TIMELINES

Any changes to this timetable must first be agreed to by the Client.

- 29 Oct 1999 Tenders Due
- 01 Dec 1999 Successful Tenderer Selected
- Mid Dec 1999 Initial Meeting With Working Group
- 01 Mar 2000 Preliminary Draft (including presentation to SWG )
- 01 April 2000 Draft Report Submitted
- 15 April 2000 Presentation and discussion of the draft report at a meeting between the Strzelecki Working Group and the consultants
- 01 May 2000 Final date for comments on the draft report to be returned to the consultants
- 01 June 2000 Final report presented at a meeting between the consultant and the Strzelecki Working Group

## PROJECT BUDGET

The Strzelecki Ranges Biodiversity Study Budget will be in the order of \$50,000. Consultants submitting project proposals need to ensure their proposals are within the Project Budget parameters.

## PROJECT MANAGEMENT

### Management and contact

The client for this study will be: West Gippsland Catchment Management Authority

The client shall on the advice of the Strzelecki Working Group appoint the consultant to undertake the Strzelecki Ranges Biodiversity Study. A Project Coordinator appointed by the Client will oversee the day-to-day management of the project. Assistance will be provided by an advisory group made up of Environment Officers from South Gippsland Shire Council, La Trobe Shire, Wellington Shire, a representative from Hancock's Victorian Plantations, a community representative, and a representative of the West Gippsland Catchment Management Authority. The Consultants will be expected to liaise closely with the advisory group and the Working Group Chairperson throughout the consultancy, and are free to contact any members of the Strzelecki Working Group for the purposes of pursuing their research.

### Insurance and liability

The consultants shall be fully responsible for obtaining all necessary insurance. No liability is accepted by the Client, or any other members of the Strzelecki Working Group, in respect of actions or commitments entered into by the consultant, or for the loss, damage or injury sustained by the consultants or third parties.

### Submission of report

The Draft Report and Final Report must be presented as described in this brief, on the due date.



### **Ownership of intellectual property**

Material produced by the consultancy may be reproduced and distributed in whole or in part to others at the discretion of the Strzelecki Working Group.

### **Changes to the brief**

Where it becomes clear some aspect of the task requires more investigation or expertise than allowed within the budget or the terms of the agreement, the consultant shall advise the client immediately

### **Termination of contract**

Should progress of the work be considered unsatisfactory, the Strzelecki Working Group may decide to dismiss the consultant and appoint another consultant to complete the study. Grounds for dismissal will include failure to meet agreed dates provided that such failure is not the fault of the Strzelecki Working Group or deliberate failure to undertake the work or portions of it as agreed to. In the event of dismissal, the client shall retain all unpaid fees to which the consultant would otherwise have been entitled.

### **Payment**

Upon appointment the consultant shall be entitled to a starting allowance of 10% of the budget. A progress payment of 40% shall be made upon the completion of the Draft Report. The client shall retain 50% of the study budget to be handed over on acceptance of the Final Report.

## **RESPONSES TO THIS BRIEF**

### **Deadline**

Consultant's intending to respond to this brief are to forward a Project Proposal with a fixed cost fee quotation, by: Friday, 29 October, 1999.

### **Inclusions**

The Proposal should include:

- consultants' CVs
- information on any similar projects conducted
- the proposed general approach to the project
- details of the extent and type of flora and fauna surveys to be undertaken
- any clarification or proposed changes to the brief
- an overview of the costing of different components of the project
- an overview of the structure of the report if different from the structure described in the brief (including the integration of text and graphics).

## Contact

Proposals may be forwarded by post or email to:

Strzelecki Ranges Biodiversity Study

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# APPENDIX 2

## A2. METHODOLOGY

### A2.1 Flora Methods

Vascular plant species were recorded using quadrat divisions (a **quadrat** is defined as a sample of vegetation, of defined area and shape, commonly between 100 and 1000 sq. metres). All vascular plant species (ferns, conifers and flowering plants) observed in or overhanging the quadrat were recorded and assigned a visually estimated **cover-abundance value** based on a system modified from Braun-Blanquet (1928). These are:

|   |               |
|---|---------------|
| + | cover < 1%    |
| 1 | cover 1–5%    |
| 2 | cover 5–25%   |
| 3 | cover 25–50%  |
| 4 | cover 50–75%  |
| 5 | cover 75–100% |

Information on vegetation structure, vegetation condition, site aspect and topography was also recorded.

#### Data Storage and Analysis

Quadrat data (floristics, locality and sampling date) and defined-area species lists are stored permanently on computer disk. Analysis of the quadrat data is in the form of a computer-based, numerical classification procedure followed by a hand-sorting procedure, as outlined by Gullan (1978). This produces a floristic table with the data in sorted form to display the composition and relationships between the vegetation communities.

The computer-based analysis uses a software package, the Flora Information System. The Flora Information System allows quadrat data to be stored, retrieved, analysed and manipulated. The software was developed in Victoria and has been used by the Department of Natural Resources and Environment for the past 20 years. Biosis Research has utilised the Flora Information System since 1987. The Flora Information System provides the following output:

- field data sheets
- representation of data as a floristic (two-way) table that delineates communities through association of similar species and cover abundance
- electronic data output, including quadrat data and aggregate species lists for defined data sets.

#### Plant and Vegetation Community Classification

Plant taxonomy and common names used in this report follow Ross (2000), or subsequent advice from the National Herbarium in Melbourne.

Vegetation community classification follows the community descriptions of NRE (in prep).

#### Terminology

Terms used in the vegetation classification are briefly defined as:

**Community:** a group of vegetation quadrats of similar floristic (species) composition.

**Character species:** occur frequently in the quadrats of a community (in at least 50 per cent of quadrats). It is a useful indicator of that community.

**Community name:** a descriptive term applied to a community to convey an impression of its dominant species, structure and environment. Community nomenclature follows the description of vegetation communities in NRE (in prep).

## A2.2 Fauna Methods

Fauna survey was conducted under the terms of Research Permit No 1000816., issued by the Department of Natural Resources and Environment. Field work took place on 8 to 12 August 2000 and between the 28 to 31 August 2000.

A number of standard practices are used to collect data relating to the fauna and these are outlined below.

### Incidental observations

Incidental observations are made while undertaking all aspects of field work and include the detection of scratch marks on trees, diggings, scats and observations of any bird, mammal, amphibian or reptile species. Not all fauna species observed incidentally were recorded, only when less common species were seen or larger numbers of species were seen (see Limitations).

The ten locations in which incidental searches were conducted is presented in Table A2.2(i) and the species recorded during each search in Table A2.2(ii).

**Table A2.2 (i): Locations of incidental observations recorded during the field survey.**

| Location | Easting | Northing | Date    |
|----------|---------|----------|---------|
| 1        | 428843  | 5728216  | 8/8/00  |
| 2        | 436200  | 5736000  | 9/8/00  |
| 3        | 440500  | 5737500  | 9/8/00  |
| 4        | 443800  | 5734375  | 9/8/00  |
| 5        | 458862  | 5741808  | 11/8/00 |
| 6        | 464576  | 5738703  | 12/8/00 |
| 7        | 459031  | 5741500  | 12/8/00 |
| 8        | 458254  | 5742162  | 12/8/00 |
| 9        | 441332  | 5740670  | 12/8/00 |
| 10       | 470900  | 5743800  | 30/8/00 |

Table A2.2 (ii): Incidental observations of fauna species recorded during the field assessment.

| Common Name                  | Scientific name                  | Location |   |   |   |   |   |   |   |   |    |
|------------------------------|----------------------------------|----------|---|---|---|---|---|---|---|---|----|
|                              |                                  | 1        | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| <b>Mammals</b>               |                                  |          |   |   |   |   |   |   |   |   | -  |
| Unidentified Antechinus      | <i>Antechinus sp.</i>            |          |   |   |   |   |   |   |   |   |    |
| Mountain Brushtail Possum    | <i>Trichosurus caninus</i>       | -        | - | - | - | - | - | - | - | - | -  |
| Swamp Wallaby                | <i>Wallabia tricolor</i>         | S        | - | - | - | - | - | S | - | - | -  |
| Common Wombat                | <i>Vombatus ursinus</i>          | -        | - | - | - | - | - | S | - | - | -  |
| European Rabbit              | <i>Oryctolagus cuniculus</i>     | -        | - | - | - | - | - | S | - | - | -  |
| Red Fox                      | <i>Canis vulpes</i>              |          |   |   |   |   |   |   |   |   | -  |
| Dog (feral)                  | <i>Canis familiaris</i>          |          |   |   |   |   |   |   |   |   | -  |
| <b>Birds</b>                 |                                  |          |   |   |   |   |   |   |   |   | -  |
| Pacific Black Duck           | <i>Anas superciliosa</i>         | S        | - | - | - | - | - | - | - | - | -  |
| Wedge tail Eagle             | <i>Aquila audax</i>              | -        | - | - | - | - | S | - | - | - | -  |
| Southern Boobook             | <i>Ninox novaehollandiae</i>     | -        | - | - | - | S | - | - | - | - | -  |
| Tawny Frogmouth              | <i>Podargus strigoides</i>       | -        | - | - | - | - | - | - | - | - | S  |
| Yellow-tailed Black-cockatoo | <i>Calyptrorhynchus funereus</i> | -        | - | - | - | - | - | - | - | S | -  |
| Crimson Rosella              | <i>Platycercus elegans</i>       | -        | - | - | - | - | - | - | S | S | -  |
| Brush Bronzewing             | <i>Phaps elegans</i>             | -        | - | - | - | - | - | S | - | - | -  |
| Laughing Kookaburra          | <i>Dacelo novaeguinae</i>        | S        | - | - | - | - | - | - | - | - | -  |
| Superb Lyrebird              | <i>Menura novaehollandiae</i>    | -        | H | H | - | - | - | - | H | - | -  |
| Spotted Pardalote            | <i>Pardalotus punctatus</i>      | -        | - | - | - | - | - | - | H | - | -  |
| Superb Fairy Wren            | <i>Malurus cyaneus</i>           | S        | - | - | - | - | - | S | - | - | -  |
| White-browed Scrubwren       | <i>Sericornis frontalis</i>      | -        | - | - | - | - | - | - | S | - | -  |
| Eastern Whipbird             | <i>Psophodes olivecea</i>        | -        | - | - | - | - | - | - | S | H | -  |
| White-throated Treecreeper   | <i>Cormobates leucophaeus</i>    | -        | H | - | - | - | - | - | - | - | -  |
| Crescent Honeyeater          | <i>Phylidonyris pyrrhoptera</i>  | S        | - | - | - | - | - | - | - | - | -  |
| Grey Shrike Thrush           | <i>Colluricincla harmonica</i>   | S        | - | - | - | - | - | - | - | - | -  |
| Australian Magpie            | <i>Gymnorhina tibicen</i>        | S        | - | - | - | - | - | - | - | - | -  |
| Grey Currawong               | <i>Strepera versicolor</i>       | S        | - | - | S | - | - | - | - | - | -  |
| Australian Raven             | <i>Corvus coronoides</i>         |          | H | - | - | - | - | - | S | - | -  |
| Little Raven                 | <i>Corvus mellori</i>            | S        | - | - | - | - | - | - | - | - | -  |
| <b>Amphibians</b>            |                                  |          |   |   |   |   |   |   |   |   |    |
| Common Froglet               | <i>Crinia signifera</i>          | H        | - | H | - | - | - | - | - | - | -  |
| Southern Brown Tree frog     | <i>Litoria ewingi</i>            | H        | - | - | - | - | - | - | - | - | -  |

### Hair tubing

Mammals were surveyed using hair-tubes (small-medium sized, semi-conical plastic tubes, ca. 10 cm in diameter) baited with a mixture of flour and one or more of either tuna, salmon or sardines. They contain double-sided tape to collect hair-samples of foraging mammals. Lines of between four to eight hair-tubes were set out at various locations (Table A2.2 (iii)). One 'tube-night' is equivalent to one hair-tube set in place for one night. Species are identified from hair structure and morphology. In some cases, when only a few hairs or damaged hairs are collected, definite

identification to species level is not possible. Fauna species recorded during the present survey from hair-tubes are presented in table A2.2 (iv).

The choice of hair-tube size, bait and locations of sampling were directed towards the detection of Spot-tailed Quolls. Additional fauna species are likely to have been collected with smaller hair-tubes, different baits and survey locations.

**Table A2.2 (iii): Locations of hair tubes surveys and survey effort conducted at each location.**

| Location | Mapsheet    | Easting | Northing | Number of tubes | Start Date | Finish Date | Hairtube nights |
|----------|-------------|---------|----------|-----------------|------------|-------------|-----------------|
| 1        | Mt Fatigue  | 437500  | 5734000  | 8               | 10/8/00    | 28/8/00     | 144             |
| 2        | Mt Fatigue  | 440297  | 5734273  | 8               | 10/8/00    | 28/8/00     | 144             |
| 3        | Mt Fatigue  | 440632  | 5733964  | 4               | 10/8/00    | 28/8/00     | 72              |
| 4        | Binginwarri | 447450  | 5735239  | 8               | 10/8/00    | 29/8/00     | 152             |
| 5        | Binginwarri | 447604  | 5737693  | 8               | 11/8/00    | 29/8/00     | 144             |
| 6        | Yinnar Sth  | 445624  | 5738865  | 4               | 11/8/00    | 29/8/00     | 72              |
| 7        | Yinnar Sth  | 454046  | 5742969  | 4               | 11/8/00    | 30/8/00     | 76              |
| 8        | Carrajung   | 462166  | 5747759  | 8               | 11/8/00    | 30/8/00     | 152             |
| 9        | Carrajung   | 458254  | 5742162  | 4               | 12/8/00    | 29/8/00     | 68              |
| 10       | Yinnar Sth  | 441332  | 5740670  | 6               | 12/8/00    | 29/8/00     | 102             |
| 11       | Yinnar Sth  | 442164  | 5739634  | 4               | 12/8/00    | 29/8/00     | 68              |
| 12       | Yinnar Sth  | 442570  | 5738617  | 4               | 12/8/00    | 29/8/00     | 68              |
| 13       | Dollar      | 431488  | 5731419  | 4               | 12/8/00    | 28/8/00     | 64              |

**Table A2.2 (iv). Fauna species recorded from hair tubes and the number of haitubes in which they were recorded at each site.**

| Common Name      | Scientific Name         | Location |    |   |    |    |    |    |    |   |    |    |    |    |
|------------------|-------------------------|----------|----|---|----|----|----|----|----|---|----|----|----|----|
|                  |                         | 1        | 2  | 3 | 4  | 5  | 6  | 7  | 8  | 9 | 10 | 11 | 12 | 13 |
| <b>Mammals</b>   |                         |          |    |   |    |    |    |    |    |   |    |    |    |    |
| Wombat           | <i>Vombatus ursinus</i> | -        | -  | - | x1 | x1 | -  | -  | -  | - | -  | -  | -  | x1 |
| Brush-tail sp.   | <i>Trichosurus sp.</i>  | -        | x1 | - | -  | -  | -  | -  | -  | - | -  | -  | x3 | -  |
| Swamp Wallaby    | <i>Wallabia bicolor</i> | -        | -  | - | -  | -  | -  | -  | x1 | - | -  | -  | -  | -  |
| Bush Rat         | <i>Rattus fuscipes</i>  | -        | -  | - | -  | -  | -  | -  | -  | - | -  | -  | x1 | -  |
| Unidentified rat | <i>Rattus sp.</i>       | -        | -  | - | x1 | -  | -  | x1 | -  | - | -  | -  | -  | -  |
| Dog              | <i>Canis familiaris</i> | x1       | -  | - | -  | -  | x1 | x1 | -  | - | -  | x1 | -  | -  |
| Fox              | <i>Canis vulpes</i>     | -        | -  | - | -  | -  | -  | -  | -  | - | -  | -  | -  | -  |
| Cat/fox          | -                       | -        | -  | - | -  | -  | -  | -  | -  | - | x1 | -  | x1 | -  |

## Spotlighting

Spotlighting is conducted to detect nocturnal mammals, birds and frogs. This involves the use of 50 watt 12 volt spotlights. Trails and roads are traversed on foot and in a vehicle during the night, and trees are searched for arboreal mammals and owls.

Frogs can also be detected at night with the aid of spotlights. During spotlighting, species are also recorded incidentally by identification of calls (e.g. owls, arboreal mammals, frogs). Spotlight surveys were timed and survey effort is expressed in spotlight-hours.

As described within section 3.3.4 (Limitations), the weather conditions were mostly inappropriate for spotlighting. Even some of the spotlighting that did occur (Table A2.2 (v)), proceeded in sub-optimal conditions and were generally abandoned after shorter than normal durations. Results of spotlighting surveys are provided in Table A2.2 (vi).

**Table A2.2 (v): Locations and survey effort for spotlight surveys during the present field assessment.**

| Location | Easting | Northing | Mapsheet     | Date    | Spotlight Hours |
|----------|---------|----------|--------------|---------|-----------------|
| 1        | 438694  | 5735378  | Mt Fatigue?  | 9/8/00  | 0.55            |
| 2        | 431232  | 5730515  | Dollar       | 9/8/00  | 0.33            |
| 3        | 455680  | 5743700  | Yinnar South | 11/8/00 | 0.33            |
| 4        | 443400  | 5734350  | Mt Fatigue   | 28/8/00 | 0.25            |
| 5        | 447800  | 5737700  | Binginwarri  | 29/8/00 | 0.17            |
| 6        | 447000  | 5733710  | Binginwarri  | 29/8/00 | 0.25            |
| 7        | 468300  | 5745250  | Carrajung    | 30/8/00 | 0.33            |

**Table A2.2 (iv): Fauna species recorded during spotlight surveys.**

| Common Name                  | Scientific Name                 | Location* |        |   |        |   |        |   |
|------------------------------|---------------------------------|-----------|--------|---|--------|---|--------|---|
|                              |                                 | 1         | 2      | 3 | 4      | 5 | 6      | 7 |
| <b>Mammals</b>               |                                 |           |        |   |        |   |        |   |
| Mountain Brushtail Possum    | <i>Trichosurus caninus</i>      | S (x2)    | S (x1) | - | -      | - | -      | - |
| Common Ringtail possum       | <i>Pseudochierus peregrinus</i> | S (x1)    | -      | - | S (x1) | - | S (x1) | - |
| Unidentified arboreal mammal | -                               | -         | -      | - | S (x1) | - | -      | - |
| Swamp Wallaby                | <i>Wallabia bicolor</i>         | -         | -      | - | S (x1) | - | -      | - |
| Red Fox                      | <i>Canis vulpes</i>             | S (x1)    | -      | - | -      | - | -      | - |
| <b>Amphibians</b>            |                                 |           |        |   |        |   |        |   |
| Southern Brown Tree Frog     | <i>Litoria ewingi</i>           | -         | -      | H | -      | - | H      | - |
| Common Froglet               | <i>Crinia signifera</i>         | -         | -      | H | -      | - | -      | - |

Legend: S=seen, H=Heard, \* see Figure 4 for survey locations

### Scat and Owl Pellet Analysis

Carnivorous mammals and owls expel undigested remains of their prey. The faeces of carnivorous mammals contain undigested hair and bones of prey and occasionally their own grooming hairs. These residual hairs can be analysed under a microscope and identified. Hence the scats of carnivorous mammals can indicate both predator and prey species. Owls regurgitate pellets that contain undigested remains of their prey. Such pellets are usually associated with roosting sites.

Two predator scats were collected and analysed during the present assessment (Table A2.2 (vii)).

**Table A2.2 (vii): Location, identification and analysis results of predator scats collected during the present assessment.**

| <b>Easting</b> | <b>Northing</b> | <b>Mapsheet</b> | <b>Date</b> | <b>Predator scat</b> | <b>Prey within scat</b>                               |
|----------------|-----------------|-----------------|-------------|----------------------|---|
| 454046         | 5742969         | Yinnar Sth      | 30/8/00     | Fox                  | Unidentified Antechinus,<br>Mountain Brushtail Possum |
| 441332         | 5740670         | Yinnar Sth      | 28/8/00     | Cat/Fox              | Common Wombat   |

### Nocturnal call playback

Some species have large home ranges or are particularly secretive and, therefore, are more difficult to locate when spotlighting. The calls of these species are played through a loud-speaker to attract them to the survey site or prompt a response call, followed by listening and spotlighting in the immediate area. This technique relies on the fact that most species of animal are territorial and use calls as a method of defending their territory from individuals of their own species. Owls can be surveyed in this manner (Kavanagh and Peake 1993), as well as other nocturnal species, such as nightjars and Stone-curlews. This method also involves listening after the cessation of playback, followed by spotlighting of the area.

Nocturnal call playback was conducted at 11 locations (Table A2.2 (vii)). However, it should be noted that a number of these were conducted during sub-optimal weather conditions, with a subsequent decreased probability of fauna detection (HANZAB ref). Fauna species recorded during nocturnal call playback are presented in Table A2.2 (viii). Frog species incidentally heard calling have also been included.

**Table A2.2 (vii): Nocturnal call playback sites conducted during the present assessment.**

| <b>Location</b> | <b>Easting</b> | <b>Northing</b> | <b>Date</b> |
|-----------------|----------------|-----------------|-------------|
| 1               | 438694         | 5735378         | 9/8/00      |
| 2               | 431232         | 5730515         | 9/8/00      |
| 3               | 464021         | 5749870         | 11/8/00     |
| 4               | 463836         | 5746907         | 11/8/00     |
| 5               | 455680         | 5743700         | 11/8/00     |
| 6               | 458500         | 5742150         | 11/8/00     |
| 7               | 440297         | 5734273         | 28/8/00     |
| 8               | 443400         | 5734350         | 28/8/00     |
| 9               | 447800         | 5737700         | 29/8/00     |
| 10              | 447000         | 5733710         | 29/8/00     |
| 11              | 468300         | 5745250         | 30/8/00     |



Table A2.2 (viii): Fauna species recorded during nocturnal call playback.

| Common Name               | Scientific Name              | Location* |   |   |   |   |   |   |   |   |    |    |
|---------------------------|------------------------------|-----------|---|---|---|---|---|---|---|---|----|----|
|                           |                              | 1         | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| <b>Mammals</b>            |                              |           |   |   |   |   |   |   |   |   |    |    |
| Mountain Brushtail Possum | <i>Trichosurus caninus</i>   | -         | - | - | - | - | - | S | - | - | -  | -  |
| Sugar Glider              | <i>Petuarus australis</i>    | -         | - | - | H | - | - | - | H | - | -  | -  |
| <b>Birds</b>              |                              |           |   |   |   |   |   |   |   |   |    |    |
| Powerful Owl              | <i>Ninox strenua</i>         | -         | - | - | - | - | - | H | - | - | -  | S  |
| Southern Boobook          | <i>Ninox novaehollandiae</i> | -         | - | - | - | - | - | - | - | - | H  | -  |
| <b>Amphibians</b>         |                              |           |   |   |   |   |   |   |   |   |    |    |
| Victorian Smooth Froglet  | <i>Geocrinia victoriana</i>  | -         | - | - | - | - | - | - | H | - | -  | -  |
| Southern Brown Tree Frog  | <i>Litoria ewingi</i>        | -         | - | - | - | - | - | - | H | - | -  | -  |
| Common Froglet            | <i>Crinia signifera</i>      | -         | - | - | H | - | - | - | H | - | -  | -  |

Legend: S=seen, H=heard, \* see Figure 4 for playback locations

# APPENDIX 3

## A3.1 FLORA RESULTS FOR THE CURRENT SURVEY

The table below lists the plant species recorded in this study. It represents species recorded during the 12 – 16 August 2000 and 4 – 8 September 2000.

### Notes to table:

Significance/status of species is designated below:

|              |  |
|--------------|--|
| E            | endangered in Australia (Briggs and Leigh, 1996)         |
| e            | endangered in Victoria (NRE 2000a; FIS unpublished data) |
| V            | vulnerable in Australia (Briggs and Leigh, 1996)         |
| v            | vulnerable in Victoria (NRE 2000a; FIS unpublished data) |
| R            | rare in Australia (Briggs and Leigh, 1996)               |
| r            | rare in Victoria (NRE 2000a; FIS unpublished data)       |
| B            | considered regionally significant by Beauglehole (1984)  |
| <sup>1</sup> | recorded from the Gippsland Plain Bioregion              |
| <sup>2</sup> | recorded from the Strzelecki Ranges Bioregion            |

| Significance              | Scientific Name  | Common Name         |
|---------------------------|--|---------------------|
| <b>Indigenous Species</b> |  |                     |
|                           | <i>Acacia dealbata</i> <sup>2</sup>                              | Silver Wattle       |
| National                  | <b>Rr</b> <i>Acacia howittii</i> <sup>1 2</sup>                  | Sticky Wattle       |
|                           | <i>Acacia mearnsii</i> <sup>1</sup>                              | Black Wattle        |
|                           | <i>Acacia melanoxylon</i> <sup>1 2</sup>                         | Blackwood           |
|                           | <i>Acacia</i> spp. <sup>1 2</sup>                                | Wattle              |
|                           | <i>Acacia verniciflua</i> <sup>2</sup>                           | Varnish Wattle      |
|                           | <i>Acaena novae-zelandiae</i> <sup>2</sup>                       | Bidgee-widgee       |
| Regional <sup>1</sup>     | <i>Acianthus caudatus</i> <sup>1</sup>                           | Mayfly Orchid       |
| Regional <sup>1</sup>     | <i>Acianthus</i> spp. <sup>1</sup>                               | Mosquito Orchid     |
|                           | <i>Allocasuarina littoralis</i> <sup>1</sup>                     | Black She-oak       |
| Regional <sup>2</sup>     | <i>Arthropodium</i> spp.s.s. <sup>1 2</sup>                      | Vanilla Lily        |
|                           | <i>Asplenium bulbiferum</i> ssp. <i>gracillimum</i> <sup>2</sup> | Mother Spleenwort   |
| Regional <sup>1</sup>     | <i>Asplenium flabellifolium</i> <sup>1</sup>                     | Necklace Fern       |
| Regional <sup>2</sup>     | <i>Astroloma humifusum</i> <sup>1 2</sup>                        | Cranberry Heath     |
|                           | <i>Australina pusilla</i> ssp. <i>muelleri</i> <sup>2</sup>      | Shade Nettle        |
| Regional <sup>2</sup>     | <i>Austrodanthonia</i> spp. <sup>2</sup>                         | Wallaby Grass       |
| Regional <sup>2</sup>     | <i>Austrostipa</i> spp. <sup>2</sup>                             | Spear Grass         |
|                           | <i>Bedfordia arborescens</i> <sup>2</sup>                        | Blanket-leaf        |
|                           | <i>Billardiera scandens</i> <sup>2</sup>                         | Common Apple-berry  |
| Regional <sup>2</sup>     | <i>Blechnum chambersii</i> <sup>2</sup>                          | Lance Water-fern    |
| Regional <sup>2</sup>     | <i>Blechnum fluviatile</i> <sup>2</sup>                          | Ray Water-fern      |
| Regional <sup>2</sup>     | <i>Blechnum nudum</i> <sup>2</sup>                               | Fishbone Water-fern |
|                           | <i>Blechnum watsii</i> <sup>2</sup>                              | Hard Water-fern     |
|                           | <i>Bossiaea prostrata</i> <sup>1</sup>                           | Creeping Bossiaea   |
| Regional <sup>1</sup>     | <i>Brunonia australis</i> <sup>1</sup>                           | Blue Pincushion     |
| Regional <sup>2</sup>     | <i>Burchardia umbellata</i> <sup>2</sup>                         | Milkmaids           |
| Regional <sup>1</sup>     | <i>Caladenia</i> spp. <sup>1</sup>                               | Caladenia           |
| Regional <sup>2</sup>     | <i>Calochlaena dubia</i> <sup>2</sup>                            | Common Ground-fern  |

|                         |  |                        |
|-------------------------|--|------------------------|
|                         | <i>Carex appressa</i> <sup>2</sup>                           | Tall Sedge             |
| Regional <sup>2</sup>   | <i>Carex breviculmis</i> <sup>2</sup>                        | Common Grass-sedge     |
|                         | <i>Cassinia aculeata</i> <sup>2</sup>                        | Common Cassinia        |
| Regional <sup>2</sup> B | <i>Cassinia arcuata</i> <sup>2</sup>                         | Drooping Cassinia      |
| Regional <sup>1</sup>   | <i>Cassinia longifolia</i> <sup>1 2</sup>                    | Shiny Cassinia         |
| Regional <sup>2</sup>   | <i>Chiloglottis valida</i> <sup>2</sup>                      | Common Bird-orchid     |
|                         | <i>Clematis aristata</i> <sup>2</sup>                        | Mountain Clematis      |
|                         | <i>Comesperma volubile</i> <sup>1</sup>                      | Love Creeper           |
|                         | <i>Coprosma quadrifida</i> <sup>2</sup>                      | Prickly Currant-bush   |
| Regional <sup>2</sup>   | <i>Correa lawrenceana</i> <sup>2</sup>                       | Mountain Correa        |
| Regional <sup>2</sup>   | <i>Cotula australis</i> <sup>2</sup>                         | Common Cotula          |
|                         | <i>Cyathea australis</i> <sup>2</sup>                        | Rough Tree-fern        |
| Regional <sup>2</sup>   | <i>Cymbonotus preissianus</i> <sup>2</sup>                   | Austral Bear's-ears    |
| Regional <sup>2</sup>   | <i>Dianella tasmanica</i> <sup>2</sup>                       | Tasman Flax-lily       |
|                         | <i>Dicksonia antarctica</i> <sup>2</sup>                     | Soft Tree-fern         |
|                         | <i>Drosera peltata</i> <sup>1 2</sup>                        | Tall Sundew            |
|                         | <i>Epacris impressa</i> <sup>1</sup>                         | Common Heath           |
|                         | <i>Eucalyptus cypellocarpa</i> <sup>2</sup>                  | Mountain Grey Gum      |
|                         | <i>Eucalyptus globulus</i> <sup>2</sup>                      | Southern Blue Gum      |
| Regional <sup>1 2</sup> | <i>Eucalyptus muelleriana</i> <sup>1 2</sup>                 | Yellow Stringybark     |
|                         | <i>Eucalyptus nitens</i> <sup>2</sup>                        | Shining Gum            |
|                         | <i>Eucalyptus obliqua</i> <sup>1 2</sup>                     | Messmate Stringybark   |
|                         | <i>Eucalyptus radiata</i> ssp. <i>radiata</i> <sup>2</sup>   | Narrow-leaf Peppermint |
|                         | <i>Eucalyptus regnans</i> <sup>2</sup>                       | Mountain Ash           |
|                         | <i>Euchiton</i> spp. <sup>1 2</sup>                          | Cudweed                |
|                         | <i>Fieldia australis</i> <sup>2</sup>                        | Fieldia                |
|                         | <i>Gahnia radula</i> <sup>1</sup>                            | Thatch Saw-sedge       |
| Regional <sup>2</sup>   | <i>Galium</i> spp. <sup>2</sup>                              | Bedstraw               |
|                         | <i>Geranium potentilloides</i> <sup>2</sup>                  | Cinquefoil Cranesbill  |
|                         | <i>Geranium</i> spp. <sup>2</sup>                            | Crane's Bill           |
| Regional <sup>1</sup>   | <i>Glossodia major</i> <sup>1</sup>                          | Wax-lip Orchid         |
| Regional <sup>2</sup>   | <i>Glycine clandestina</i> <sup>1 2</sup>                    | Twining Glycine        |
| Regional <sup>2</sup>   | <i>Gonocarpus humilis</i> <sup>2</sup>                       | Shade Raspwort         |
|                         | <i>Gonocarpus tetragynus</i> <sup>2</sup>                    | Common Raspwort        |
|                         | <i>Goodenia ovata</i> <sup>2</sup>                           | Hop Goodenia           |
|                         | <i>Grammitis billardierei</i> <sup>2</sup>                   | Common Finger-fern     |
|                         | <i>Hedycarya angustifolia</i> <sup>2</sup>                   | Austral Mulberry       |
| Regional <sup>2</sup>   | <i>Helichrysum scorpioides</i> <sup>1 2</sup>                | Button Everlasting     |
| Regional <sup>1</sup>   | <i>Hibbertia aspera</i> ssp. <i>aspera</i> s.s. <sup>1</sup> | Rough Guinea-flower    |
|                         | <i>Histiopteris incisa</i> <sup>2</sup>                      | Bat's Wing Fern        |
|                         | <i>Hydrocotyle hirta</i> <sup>2</sup>                        | Hairy Pennywort        |
| Regional <sup>2</sup>   | <i>Hydrocotyle laxiflora</i> <sup>1 2</sup>                  | Stinking Pennywort     |
| Regional <sup>2</sup>   | <i>Hymenophyllum cupressiforme</i> <sup>2</sup>              | Common Filmy Fern      |
| Regional <sup>2</sup>   | <i>Hymenophyllum flabellatum</i> <sup>2</sup>                | Shiny Filmy Fern       |
|                         | <i>Hypericum gramineum</i> <sup>1 2</sup>                    | Small St John's Wort   |
| Regional <sup>1 2</sup> | <i>Isolepis inundata</i> <sup>1 2</sup>                      | Swamp Club-sedge       |
| Regional <sup>2</sup>   | <i>Isolepis</i> spp. <sup>2</sup>                            | Club Sedge             |
| Regional <sup>2</sup> B | <i>Juncus gregiflorus</i> <sup>2</sup>                       | Green Rush             |

|                         |  |                          |
|-------------------------|--|--------------------------|
| Regional <sup>2</sup>   | <i>Juncus</i> spp. <sup>2</sup>                                  | Rush                     |
| Regional <sup>1</sup>   | <i>Kennedia prostrata</i> <sup>1</sup>                           | Running Postman          |
| Regional <sup>2</sup>   | <i>Kunzea ericoides</i> <sup>1 2</sup>                           | Burgan                   |
| Regional <sup>2</sup>   | <i>Lagenifera gracilis</i> <sup>2</sup>                          | Slender Lagenifera       |
|                         | <i>Lagenifera stipitata</i> <sup>1 2</sup>                       | Common Lagenifera        |
| Regional <sup>2</sup>   | <i>Lastreopsis acuminata</i> <sup>2</sup>                        | Shiny Shield-fern        |
| Regional <sup>2</sup> B | <i>Leionema bilobum</i> <sup>2</sup>                             | Notched Leionema         |
|                         | <i>Lepidosperma elatius</i> <sup>2</sup>                         | Tall Sword-sedge         |
| Regional <sup>2</sup>   | <i>Lepidosperma laterale</i> <sup>1 2</sup>                      | Variable Sword-sedge     |
| Regional <sup>1</sup>   | <i>Leptorhynchos linearis</i> <sup>1</sup>                       | Shiny Buttons            |
|                         | <i>Leptospermum continentale</i> <sup>2</sup>                    | Prickly Tea-tree         |
|                         | <i>Lomandra filiformis</i> ssp. <i>coriacea</i> <sup>1</sup>     | Wattle Mat-rush          |
|                         | <i>Lomandra filiformis</i> ssp. <i>filiformis</i> <sup>1 2</sup> | Wattle Mat-rush          |
|                         | <i>Lomandra longifolia</i> <sup>1 2</sup>                        | Spiny-headed Mat-rush    |
| Regional <sup>2</sup>   | <i>Lomatia ilicifolia</i> <sup>2</sup>                           | Holly Lomatia            |
| Regional <sup>2</sup>   | <i>Luzula meridionalis</i> <sup>2</sup>                          | Common Woodrush          |
|                         | <i>Melaleuca ericifolia</i> <sup>1</sup>                         | Swamp Paperbark          |
|                         | <i>Microlaena stipoides</i> var. <i>stipoides</i> <sup>1 2</sup> | Weeping Grass            |
|                         | <i>Microsorium pustulatum</i> <sup>2</sup>                       | Kangaroo Fern            |
| Regional <sup>2</sup>   | <i>Microtis</i> spp. <sup>2</sup>                                | Onion Orchid             |
| Regional <sup>2</sup>   | <i>Nothofagus cunninghamii</i> <sup>2</sup>                      | Myrtle Beech             |
|                         | <i>Olearia argophylla</i> <sup>2</sup>                           | Musk Daisy-bush          |
|                         | <i>Olearia lirata</i> <sup>1 2</sup>                             | Snow Daisy-bush          |
|                         | <i>Olearia phlogopappa</i> <sup>2</sup>                          | Dusty Daisy-bush         |
|                         | <i>Opercularia varia</i> <sup>1</sup>                            | Variable Stinkweed       |
|                         | <i>Orchidaceae</i> spp. <sup>1</sup>                             | Orchid                   |
| Regional <sup>2</sup>   | <i>Oxalis exilis</i> <sup>1 2</sup>                              | Shady Wood-sorrel        |
|                         | <i>Ozothamnus ferrugineus</i> <sup>2</sup>                       | Tree Everlasting         |
|                         | <i>Pandorea pandorana</i> <sup>2</sup>                           | Wonga Vine               |
| Regional <sup>2</sup>   | <i>Parsonsia brownii</i> <sup>2</sup>                            | Twining Silkpod          |
| Regional <sup>2</sup>   | <i>Pimelea axiflora</i> <sup>2</sup>                             | Bootlace Bush            |
| Regional <sup>2</sup>   | <i>Pimelea humilis</i> <sup>1 2</sup>                            | Common Rice-flower       |
| Regional <sup>2</sup>   | <i>Pittosporum bicolor</i> <sup>2</sup>                          | Banyalla                 |
| Regional <sup>1</sup>   | <i>Plantago debilis</i> <sup>1 2</sup>                           | Shade Plantain           |
| Regional <sup>2</sup>   | <i>Poa labillardierei</i> <sup>2</sup>                           | Common Tussock-grass     |
|                         | <i>Poa sieberiana</i> var. <i>hirtella</i> <sup>1</sup>          | Grey Tussock-grass       |
| Regional <sup>2</sup>   | <i>Poa sieberiana</i> <sup>1 2</sup>                             | Grey Tussock-grass       |
| Regional <sup>2</sup>   | <i>Poa</i> spp. <sup>2</sup>                                     | Tussock Grass            |
| Regional <sup>1</sup>   | <i>Poa tenera</i> <sup>1 2</sup>                                 | Slender Tussock-grass    |
| Regional <sup>2</sup>   | <i>Polyscias sambucifolia</i> <sup>2</sup>                       | Elderberry Panax         |
|                         | <i>Polystichum proliferum</i> <sup>2</sup>                       | Mother Shield-fern       |
|                         | <i>Pomaderris aspera</i> <sup>2</sup>                            | Hazel Pomaderris         |
| Regional <sup>2</sup>   | <i>Poranthera microphylla</i> <sup>1 2</sup>                     | Small Poranthera         |
|                         | <i>Prostanthera lasianthos</i> <sup>2</sup>                      | Victorian Christmas-bush |
|                         | <i>Prostanthera melissifolia</i> <sup>2</sup>                    | Balm Mint-bush           |
| Regional <sup>2</sup>   | <i>Pseudognaphalium luteoalbum</i> <sup>2</sup>                  | Jersey cudweed           |
|                         | <i>Pteridium esculentum</i> <sup>1 2</sup>                       | Austral Bracken          |
| National                | <b>V</b> <i>Pterostylis chlorogramma</i> <sup>1</sup>            | Green-striped Greenhood  |

|                         |  |                    |
|-------------------------|--|--------------------|
|                         | <i>Pterostylis longifolia</i> s.l. <sup>1 2</sup>        | Tall Greenhood     |
| Regional <sup>1</sup>   | <i>Pterostylis nutans</i> <sup>1</sup>                   | Nodding Greenhood  |
| Regional <sup>2</sup>   | <i>Pterostylis pedunculata</i> <sup>2</sup>              | Maroonhood         |
| Regional <sup>2</sup>   | <i>Pterostylis</i> spp. <sup>2</sup>                     | Greenhood          |
| Regional <sup>1 2</sup> | <i>Ranunculus</i> spp. <sup>1 2</sup>                    | Buttercup          |
| Regional <sup>2</sup>   | <i>Rapanea howittiana</i> <sup>2</sup>                   | Muttonwood         |
| Regional <sup>2</sup>   | <i>Rubus parvifolius</i> <sup>2</sup>                    | Small-leaf Bramble |
|                         | <i>Sambucus gaudichaudiana</i> <sup>2</sup>              | White Elderberry   |
| Regional <sup>2</sup>   | <i>Senecio glomeratus</i> <sup>2</sup>                   | Annual Fireweed    |
| Regional <sup>2</sup>   | <i>Senecio hispidulus</i> <sup>2</sup>                   | Rough Fireweed     |
|                         | <i>Senecio linearifolius</i> <sup>2</sup>                | Fireweed Groundsel |
| Regional <sup>2</sup>   | <i>Senecio minimus</i> <sup>2</sup>                      | Shrubby Fireweed   |
|                         | <i>Senecio pinnatifolius</i> <sup>2</sup>                | Variable Groundsel |
|                         | <i>Senecio</i> spp. <sup>2</sup>                         | Groundsel          |
| Regional <sup>1 2</sup> | <i>Senecio tenuiflorus</i> <sup>1 2</sup>                | Slender Fireweed   |
| Regional <sup>1</sup>   | <i>Stackhousia monogyna</i> <sup>1</sup>                 | Creamy Stackhousia |
|                         | <i>Stellaria flaccida</i> <sup>2</sup>                   | Forest Starwort    |
| Regional <sup>2</sup>   | <i>Stellaria pungens</i> <sup>2</sup>                    | Prickly Starwort   |
| Regional <sup>2</sup>   | <i>Tasmannia lanceolata</i> <sup>2</sup>                 | Mountain Pepper    |
|                         | <i>Tetrarrhena juncea</i> <sup>1 2</sup>                 | Forest Wire-grass  |
| Regional <sup>1 2</sup> | <i>Thelymitra</i> spp. <sup>1 2</sup>                    | Sun Orchid         |
|                         | <i>Tricoryne elatior</i> <sup>1</sup>                    | Yellow Rush-lily   |
|                         | <i>Urtica incisa</i> <sup>2</sup>                        | Scrub Nettle       |
| Regional <sup>1</sup>   | <i>Veronica calycina</i> <sup>1 2</sup>                  | Hairy Speedwell    |
| Regional <sup>2</sup>   | <i>Veronica plebeia</i> <sup>2</sup>                     | Trailing Speedwell |
|                         | <i>Viola hederacea</i> s.s. <sup>1 2</sup>               | Ivy-leaf Violet    |
| Regional <sup>1 2</sup> | <i>Wahlenbergia</i> spp. <sup>1 2</sup>                  | Bluebell           |
|                         | <i>Xanthorrhoea minor</i> ssp. <i>lutea</i> <sup>1</sup> | Small Grass-tree   |
| Regional <sup>2</sup>   | <i>Zieria arborescens</i> <sup>2</sup>                   | Stinkwood          |

### Introduced Species

|  |   |                               |
|--|---|-------------------------------|
|  | <i>Acetosella vulgaris</i> <sup>2</sup>       | Sheep Sorrel                  |
|  | <i>Agrostis capillaris</i> <sup>2</sup>       | Brown-top Bent                |
|  | <i>Anagallis arvensis</i> <sup>2</sup>        | Pimpernel                     |
|  | <i>Anthoxanthum odoratum</i> <sup>2</sup>     | Sweet Vernal-grass            |
|  | <i>Arctotheca calendula</i> <sup>1 2</sup>    | Cape Weed                     |
|  | <i>Brassica</i> spp. <sup>2</sup>             | Turnip                        |
|  | <i>Cerastium glomeratum</i> s.l. <sup>2</sup> | Common Mouse-ear<br>Chickweed |
|  | <i>Cirsium vulgare</i> <sup>1 2</sup>         | Spear Thistle                 |
|  | <i>Conyza</i> spp. <sup>2</sup>               | Fleabane                      |
|  | <i>Cynodon dactylon</i> <sup>2</sup>          | Couch                         |
|  | <i>Dactylis glomerata</i> <sup>2</sup>        | Cocksfoot                     |
|  | <i>Galium aparine</i> <sup>2</sup>            | Cleavers                      |
|  | <i>Genista monspessulana</i> <sup>2</sup>     | Montpellier Broom             |
|  | <i>Holcus lanatus</i> <sup>1 2</sup>          | Yorkshire Fog                 |
|  | <i>Hypericum androsaemum</i> <sup>2</sup>     | Tutsan                        |
|  | <i>Hypochoeris radicata</i> <sup>1 2</sup>    | Cat's Ear                     |
|  | <i>Leucanthemum vulgare</i> <sup>1 2</sup>    | Ox-eye Daisy                  |

|  |   |                     |
|--|---|---------------------|
|  | <i>Lolium</i> spp. <sup>1</sup>                         | Rye-grass           |
|  | <i>Lotus corniculatus</i> <sup>1 2</sup>                | Bird's-foot Trefoil |
|  | <i>Oxalis</i> spp. <sup>1 2</sup>                       | Wood-sorrel         |
|  | <i>Pinus radiata</i> <sup>2</sup>                       | Radiata Pine        |
|  | <i>Pittosporum undulatum</i> <sup>2</sup>               | Sweet Pittosporum   |
|  | <i>Plantago lanceolata</i> <sup>1 2</sup>               | Ribwort             |
|  | <i>Poa annua</i> <sup>2</sup>                           | Annual Meadow-grass |
|  | <i>Polycarpon tetraphyllum</i> <sup>2</sup>             | Four-leaved Allseed |
|  | <i>Prunella vulgaris</i> <sup>2</sup>                   | Self-heal           |
|  | <i>Raphanus raphanistrum</i> <sup>2</sup>               | Wild Radish         |
|  | <i>Rubus fruticosus</i> spp. agg. <sup>2</sup>          | Blackberry          |
|  | <i>Senecio jacobaea</i> <sup>2</sup>                    | Ragwort             |
|  | <i>Solanum nigrum</i> s.l. <sup>2</sup>                 | Black Nightshade    |
|  | <i>Solanum</i> spp. <sup>2</sup>                        | Nightshade          |
|  | <i>Sonchus asper</i> s.l. <sup>2</sup>                  | Rough Sow-thistle   |
|  | <i>Sonchus oleraceus</i> <sup>2</sup>                   | Common Sow-thistle  |
|  | <i>Stellaria media</i> <sup>2</sup>                     | Chickweed           |
|  | <i>Taraxacum</i> Sect. <i>Ruderalia</i> <sup>2</sup>    | Garden Dandelion    |
|  | <i>Trifolium repens</i> var. <i>repens</i> <sup>2</sup> | White Clover        |
|  | <i>Ulex europaeus</i> <sup>2</sup>                      | Gorse               |
|  | <i>Vicia sativa</i> <sup>2</sup>                        | Common Vetch        |

**Table A3.1:** Plant species recorded during the survey.

## A3.2 FLORA RESULTS FROM THE FIS

The table below lists the plant species recorded from the FIS maintained by NRE, within the HVP estate.

### Notes to table:

Significance/status of species is designated below:

|   |  |
|---|--|
| E | endangered in Australia (Briggs and Leigh, 1996)         |
| e | endangered in Victoria (NRE 2000a; FIS unpublished data) |
| V | vulnerable in Australia (Briggs and Leigh, 1996)         |
| v | vulnerable in Victoria (NRE 2000a; FIS unpublished data) |
| R | rare in Australia (Briggs and Leigh, 1996)               |
| r | rare in Victoria (NRE 2000a; FIS unpublished data)       |

| Significance              | Scientific Name                                      | Common Name                 |
|---------------------------|--|-----------------------------|
| <b>Indigenous Species</b> |  |                             |
| National                  | <b>Rr</b> <i>Eucalyptus kitsoniana</i>               | Bog Gum Fringed             |
| National                  | <b>Rr</b> <i>Acacia howittii</i>                     | Sticky Wattle               |
| National                  | <b>Rv</b> <i>Cyathea cunninghamii</i>                | Slender Tree-fern           |
| State                     | <b>r</b> <i>Corybas fimbriatus</i>                   | Helmet-orchid               |
| State                     | <b>r</b> <i>Prasophyllum patens</i>                  | Broad-lip Leek-orchid       |
| State                     | <b>r</b> <i>Sowerbaea juncea</i>                     | Rush Lily                   |
| State                     | <b>v</b> <i>Diuris punctata</i> var. <i>punctata</i> | Purple Diuris               |
|                           | <i>Acacia brownii</i>                                | Heath Wattle                |
|                           | <i>Acacia dealbata</i>                               | Silver Wattle               |
|                           | <i>Acacia genistifolia</i>                           | Spreading Wattle            |
|                           | <i>Acacia mearnsii</i>                               | Black Wattle                |
|                           | <i>Acacia melanoxylon</i>                            | Blackwood                   |
|                           | <i>Acacia mucronata</i> var. <i>longifolia</i>       | Narrow-leaf Wattle          |
|                           | <i>Acacia myrtifolia</i>                             | Myrtle Wattle               |
|                           | <i>Acacia obliquinervia</i>                          | Mountain Hickory Wattle     |
|                           | <i>Acacia stricta</i>                                | Hop Wattle                  |
|                           | <i>Acacia verniciflua</i>                            | Varnish Wattle              |
|                           | <i>Acacia verticillata</i>                           | Prickly Moses               |
|                           | <i>Acaena novae-zelandiae</i>                        | Bidgee-widgee               |
|                           | <i>Acaena ovina</i>                                  | Australian Sheep's Burr     |
|                           | <i>Acianthus exsertus</i> s.l.                       | Gnat Orchid                 |
|                           | <i>Acrotriche prostrata</i>                          | Trailing Ground-berry       |
|                           | <i>Acrotriche serrulata</i>                          | Honey-pots                  |
|                           | <i>Adiantum aethiopicum</i>                          | Common Maidenhair           |
|                           | <i>Agrostis avenacea</i>                             | Common Blown-grass          |
|                           | <i>Ajuga australis</i>                               | Austral Bugle               |
|                           | <i>Allantodia australis</i>                          | Austral Lady-fern           |
|                           | <i>Allocasuarina littoralis</i>                      | Black She-oak               |
|                           | <i>Allocasuarina paludosa</i>                        | Scrub She-oak               |
|                           | <i>Amperea xiphoclada</i> var. <i>xiphoclada</i>     | Broom Spurge                |
|                           | <i>Amphibromus archeri</i>                           | Pointed Swamp Wallaby-grass |
|                           | <i>Amyema pendula</i>                                | Drooping Mistletoe          |
|                           | <i>Aotus ericoides</i>                               | Common Aotus                |
|                           | <i>Asplenium bulbiferum</i> ssp. <i>gracillimum</i>  | Mother Spleenwort           |
|                           | <i>Asplenium flabellifolium</i>                      | Necklace Fern               |
|                           | <i>Asplenium flaccidum</i> ssp. <i>flaccidum</i>     | Weeping Spleenwort          |
|                           | <i>Astroloma humifusum</i>                           | Cranberry Heath             |

|  |  |                       |
|--|--|-----------------------|
|  | <i>Atherosperma moschatum</i>                        | Southern Sassafras    |
|  | <i>Australina pusilla</i>                            | Shade Nettle          |
|  | <i>Australina pusilla</i> ssp. <i>muelleri</i>       | Shade Nettle          |
|  | <i>Austrocynoglossum latifolium</i>                  | Forest Hound's-tongue |
|  | <i>Austrodanthonia penicillata</i>                   | Slender Wallaby-grass |
|  | <i>Austrodanthonia pilosa</i>                        | Velvet Wallaby-grass  |
|  | <i>Austrostipa rudis</i>                             | Veined Spear-grass    |
|  | <i>Austrostipa rudis</i> ssp. <i>rudis</i>           | Veined Spear-grass    |
|  | <i>Banksia marginata</i>                             | Silver Banksia        |
|  | <i>Banksia serrata</i>                               | Saw Banksia           |
|  | <i>Banksia spinulosa</i> var. <i>cunninghamii</i>    | Hairpin Banksia       |
|  | <i>Bauera rubioides</i>                              | Wiry Bauera           |
|  | <i>Baumea</i> spp.                                   | Twig Sedge            |
|  | <i>Bedfordia arborescens</i>                         | Blanket-leaf          |
|  | <i>Billardiera longiflora</i> var. <i>longiflora</i> | Purple Apple-berry    |
|  | <i>Billardiera scandens</i>                          | Common Apple-berry    |
|  | <i>Blechnum cartilagineum</i>                        | Gristle Fern          |
|  | <i>Blechnum chambersii</i>                           | Lance Water-fern      |
|  | <i>Blechnum fluviatile</i>                           | Ray Water-fern        |
|  | <i>Blechnum minus</i>                                | Soft Water-fern       |
|  | <i>Blechnum nudum</i>                                | Fishbone Water-fern   |
|  | <i>Blechnum patersonii</i> ssp. <i>patersonii</i>    | Strap Water-fern      |
|  | <i>Blechnum wattsii</i>                              | Hard Water-fern       |
|  | <i>Bossiaea cinerea</i>                              | Showy Bossiaea        |
|  | <i>Brachyscome aculeata</i>                          | Branching Daisy       |
|  | <i>Brachyscome angustifolia</i>                      | Grassland Daisy       |
|  | <i>Burchardia umbellata</i>                          | Milkmaids             |
|  | <i>Bursaria spinosa</i>                              | Sweet Bursaria        |
|  | <i>Calochlaena dubia</i>                             | Common Ground-fern    |
|  | <i>Cardamine gunnii</i> s.l.                         | Common Bitter-cress   |
|  | <i>Carex appressa</i>                                | Tall Sedge            |
|  | <i>Carex breviculmis</i>                             | Common Grass-sedge    |
|  | <i>Carex fascicularis</i>                            | Tassel Sedge          |
|  | <i>Cassinia aculeata</i>                             | Common Cassinia       |
|  | <i>Cassinia longifolia</i>                           | Shiny Cassinia        |
|  | <i>Cassinia trinerva</i>                             | Three-nerved Cassinia |
|  | <i>Cassytha glabella</i>                             | Slender Dodder-laurel |
|  | <i>Cassytha pubescens</i> s.s.                       | Downy Dodder-laurel   |
|  | <i>Centella cordifolia</i>                           | Centella              |
|  | <i>Centipeda minima</i>                              | Spreading Sneezeweed  |
|  | <i>Centrolepis strigosa</i> ssp. <i>strigosa</i>     | Hairy Centrolepis     |
|  | <i>Chiloglottis cornuta</i>                          | Green Bird-orchid     |
|  | <i>Chiloglottis gunnii</i> s.l.                      | Common Bird-orchid    |
|  | <i>Clematis aristata</i>                             | Mountain Clematis     |
|  | <i>Clematis glycinoides</i> var. <i>glycinoides</i>  | Forest Clematis       |
|  | <i>Comesperma volubile</i>                           | Love Creeper          |
|  | <i>Coprosma quadrifida</i>                           | Prickly Currant-bush  |
|  | <i>Correa lawrenceana</i>                            | Mountain Correa       |
|  | <i>Correa reflexa</i>                                | Common Correa         |
|  | <i>Corybas</i> spp.                                  | Helmet Orchid         |
|  | <i>Cotula australis</i>                              | Common Cotula         |
|  | <i>Cryptostylis leptochila</i>                       | Small Tongue-orchid   |
|  | <i>Cyathea australis</i>                             | Rough Tree-fern       |
|  | <i>Cyathea X marcescens</i>                          | Skirted Tree-fern     |
|  | <i>Daucus glochidiatus</i>                           | Austral Carrot        |
|  | <i>Daviesia latifolia</i>                            | Hop Bitter-pea        |
|  | <i>Daviesia ulicifolia</i>                           | Gorse Bitter-pea      |
|  | <i>Desmodium gunnii</i>                              | Southern Tick-trefoil |



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|  | <i>Deyeuxia quadriseta</i>                            | Reed Bent-grass         |
|  | <i>Deyeuxia rodwayi</i>                               | Tasman Bent-grass       |
|  | <i>Dianella caerulea</i> var. <i>caerulea</i>         | Paroo Lily              |
|  | <i>Dianella tasmanica</i>                             | Tasman Flax-lily        |
|  | <i>Dichelachne micrantha</i>                          | Short-hair Plume-grass  |
|  | <i>Dichelachne rara</i>                               | Common Plume-grass      |
|  | <i>Dichondra repens</i>                               | Kidney-weed             |
|  | <i>Dicksonia antarctica</i>                           | Soft Tree-fern          |
|  | <i>Dillwynia glaberrima</i>                           | Smooth Parrot-pea       |
|  | <i>Dillwynia sericea</i>                              | Showy Parrot-pea        |
|  | <i>Diplarrena moraea</i>                              | Butterfly Flag          |
|  | <i>Dipodium roseum</i> s.l.                           | Rosy Hyacinth-orchid    |
|  | <i>Drosera peltata</i> ssp. <i>auriculata</i>         | Tall Sundew             |
|  | <i>Drosera pygmaea</i>                                | Tiny Sundew             |
|  | <i>Echinopogon ovatus</i>                             | Common Hedgehog-grass   |
|  | <i>Elymus scaber</i>                                  | Common Wheat-grass      |
|  | <i>Epacris impressa</i>                               | Common Heath            |
|  | <i>Eragrostis brownii</i>                             | Common Love-grass       |
|  | <i>Eucalyptus bridgesiana</i> s.l.                    | But But                 |
|  | <i>Eucalyptus cephalocarpa</i> s.l.                   | Silver-leaf Stringybark |
|  | <i>Eucalyptus consideniana</i>                        | Yertchuk                |
|  | <i>Eucalyptus cytellocarpa</i>                        | Mountain Grey Gum       |
|  | <i>Eucalyptus globoidea</i>                           | White Stringybark       |
|  | <i>Eucalyptus globulus</i>                            | Southern Blue Gum       |
|  | <i>Eucalyptus globulus</i> ssp. <i>pseudoglobulus</i> | Gippsland Blue Gum      |
|  | <i>Eucalyptus muelleriana</i>                         | Yellow Stringybark      |
|  | <i>Eucalyptus obliqua</i>                             | Messmate Stringybark    |
|  | <i>Eucalyptus radiata</i> s.l.                        | Narrow-leaf Peppermint  |
|  | <i>Eucalyptus regnans</i>                             | Mountain Ash            |
|  | <i>Eucalyptus sieberi</i>                             | Silvertop Ash           |
|  | <i>Eucalyptus viminalis</i>                           | Manna Gum               |
|  | <i>Eucalyptus viminalis</i> ssp. <i>pryoriana</i>     | Coast Manna-gum         |
|  | <i>Eucalyptus willisii</i>                            | Shining Peppermint      |
|  | <i>Euchiton gymnocephalus</i> s.s.                    | Creeping Cudweed        |
|  | <i>Euchiton involucratus</i> s.l.                     | Star Cudweed            |
|  | <i>Euchiton involucratus</i> s.s.                     | Star Cudweed            |
|  | <i>Exocarpos cupressiformis</i>                       | Cherry Ballart          |
|  | <i>Fieldia australis</i>                              | Fieldia                 |
|  | <i>Gahnia radula</i>                                  | Thatch Saw-sedge        |
|  | <i>Gahnia sieberiana</i>                              | Red-fruit Saw-sedge     |
|  | <i>Galium australe</i>                                | Tangled Bedstraw        |
|  | <i>Galium gaudichaudii</i>                            | Rough Bedstraw          |
|  | <i>Galium propinquum</i>                              | Maori Bedstraw          |
|  | <i>Geranium potentilloides</i>                        | Cinquefoil Cranesbill   |
|  | <i>Geranium solanderi</i> s.l.                        | Austral Cranesbill      |
|  | <i>Gleichenia dicarpa</i>                             | Pouched Coral-fern      |
|  | <i>Gleichenia microphylla</i>                         | Scrambling Coral-fern   |
|  | <i>Gnaphalium</i> spp.                                | Cudweed                 |
|  | <i>Gonocarpus humilis</i>                             | Shade Raspwort          |
|  | <i>Gonocarpus micranthus</i> ssp. <i>micranthus</i>   | Creeping Raspwort       |
|  | <i>Gonocarpus tetragynus</i>                          | Common Raspwort         |
|  | <i>Gonocarpus teucroides</i> s.l.                     | Germander Raspwort      |
|  | <i>Goodenia elongata</i>                              | Lanky Goodenia          |
|  | <i>Goodenia humilis</i>                               | Swamp Goodenia          |
|  | <i>Goodenia lanata</i>                                | Trailing Goodenia       |
|  | <i>Goodenia ovata</i>                                 | Hop Goodenia            |
|  | <i>Grammitis billardierei</i>                         | Common Finger-fern      |
|  | <i>Gratiola peruviana</i>                             | Austral Brooklime       |

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|  | <i>Gynatrix pulchella s.l.</i>                      | Hemp Bush               |
|  | <i>Hakea</i> spp.                                   | Hakea                   |
|  | <i>Hardenbergia violacea</i>                        | Purple Coral-pea        |
|  | <i>Hedycarya angustifolia</i>                       | Austral Mulberry        |
|  | <i>Helichrysum leucopsidium</i>                     | Satin Everlasting       |
|  | <i>Helichrysum scorpioides</i>                      | Button Everlasting      |
|  | <i>Hibbertia acicularis</i>                         | Prickly Guinea-flower   |
|  | <i>Hibbertia aspera s.l.</i>                        | Rough Guinea-flower     |
|  | <i>Hibbertia empetrifolia s.l.</i>                  | Tangled Guinea-flower   |
|  | <i>Hibbertia procumbens</i>                         | Spreading Guinea-flower |
|  | <i>Hibbertia sericea s.l.</i>                       | Silky Guinea-flower     |
|  | <i>Histiopteris incisa</i>                          | Bat's Wing Fern         |
|  | <i>Hovea linearis</i>                               | Common Hovea            |
|  | <i>Hydrocotyle geraniifolia</i>                     | Forest Pennywort        |
|  | <i>Hydrocotyle hirta</i>                            | Hairy Pennywort         |
|  | <i>Hydrocotyle laxiflora</i>                        | Stinking Pennywort      |
|  | <i>Hymenophyllum australe</i>                       | Austral Filmy Fern      |
|  | <i>Hymenophyllum cupressiforme</i>                  | Common Filmy Fern       |
|  | <i>Hymenophyllum flabellatum</i>                    | Shiny Filmy Fern        |
|  | <i>Hymenophyllum rarum</i>                          | Narrow Filmy Fern       |
|  | <i>Hypericum gramineum</i>                          | Small St John's Wort    |
|  | <i>Hypericum japonicum</i>                          | Matted St John's Wort   |
|  | <i>Hypolepis rugosula</i>                           | Ruddy Ground-fern       |
|  | <i>Isolepis marginata</i>                           | Little Club-sedge       |
|  | <i>Juncus australis</i>                             | Austral Rush            |
|  | <i>Juncus pauciflorus</i>                           | Loose-flower Rush       |
|  | <i>Juncus planifolius</i>                           | Broad-leaf Rush         |
|  | <i>Juncus vaginatus</i>                             | Clustered Rush          |
|  | <i>Kennedia prostrata</i>                           | Running Postman         |
|  | <i>Kunzea ericoides</i>                             | Burgan                  |
|  | <i>Lagenifera gracilis</i>                          | Slender Lagenifera      |
|  | <i>Lagenifera stipitata</i>                         | Common Lagenifera       |
|  | <i>Lastreopsis acuminata</i>                        | Shiny Shield-fern       |
|  | <i>Leionema bilobum</i>                             | Notched Leionema        |
|  | <i>Lepidosperma elatius</i>                         | Tall Sword-sedge        |
|  | <i>Lepidosperma filiforme</i>                       | Common Rapier-sedge     |
|  | <i>Lepidosperma laterale</i>                        | Variable Sword-sedge    |
|  | <i>Lepidosperma longitudinale</i>                   | Pithy Sword-sedge       |
|  | <i>Leptinella reptans s.l.</i>                      | Creeping Cotula         |
|  | <i>Leptospermum continentale</i>                    | Prickly Tea-tree        |
|  | <i>Leptospermum myrsinoides</i>                     | Heath Tea-tree          |
|  | <i>Leptostigma reptans</i>                          | Dwarf Nertera           |
|  | <i>Leucopogon virgatus</i>                          | Common Beard-heath      |
|  | <i>Libertia pulchella</i>                           | Pretty Grass-flag       |
|  | <i>Lindsaea linearis</i>                            | Screw Fern              |
|  | <i>Lobelia alata</i>                                | Angled Lobelia          |
|  | <i>Lomandra filiformis</i>                          | Wattle Mat-rush         |
|  | <i>Lomandra longifolia</i>                          | Spiny-headed Mat-rush   |
|  | <i>Lomandra longifolia</i> ssp. <i>exilis</i>       | Cluster-headed Mat-rush |
|  | <i>Lomatia fraseri</i>                              | Tree Lomatia            |
|  | <i>Lomatia ilicifolia</i>                           | Holly Lomatia           |
|  | <i>Luzula campestris</i> spp. <i>agg.</i>           | Field Woodrush          |
|  | <i>Luzula meridionalis</i> var. <i>meridionalis</i> | Common Woodrush         |
|  | <i>Lycopodium deuterodensum</i>                     | Bushy Clubmoss          |
|  | <i>Lythrum hyssopifolia</i>                         | Small Loosestrife       |
|  | <i>Melaleuca squarrosa</i>                          | Scented Paperbark       |
|  | <i>Microlaena stipoides</i> var. <i>stipoides</i>   | Weeping Grass           |
|  | <i>Microsorium pustulatum</i>                       | Kangaroo Fern           |

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|  | <i>Monotoca elliptica s.l.</i>                       | Tree Broom-heath         |
|  | <i>Monotoca scoparia</i>                             | Prickly Broom-heath      |
|  | <i>Muellerina eucalyptoides</i>                      | Creeping Mistletoe       |
|  | <i>Myosotis australis</i>                            | Austral Forget-me-not    |
|  | <i>Notelaea ligustrina</i>                           | Privet Mock-olive        |
|  | <i>Nothofagus cunninghamii</i>                       | Myrtle Beech             |
|  | <i>Olearia argophylla</i>                            | Musk Daisy-bush          |
|  | <i>Olearia lirata</i>                                | Snow Daisy-bush          |
|  | <i>Olearia phlogopappa</i>                           | Dusty Daisy-bush         |
|  | <i>Opercularia varia</i>                             | Variable Stinkweed       |
|  | <i>Oxalis corniculata s.l.</i>                       | Yellow Wood-sorrel       |
|  | <i>Ozothamnus ferrugineus</i>                        | Tree Everlasting         |
|  | <i>Pandorea pandorana</i>                            | Wonga Vine               |
|  | <i>Parsonsia brownii</i>                             | Twining Silkpod          |
|  | <i>Persicaria decipiens</i>                          | Slender Knotweed         |
|  | <i>Pimelea axiflora</i>                              | Bootlace Bush            |
|  | <i>Pimelea humilis</i>                               | Common Rice-flower       |
|  | <i>Pimelea ligustrina</i>                            | Tall Rice-flower         |
|  | <i>Pimelea linifolia</i>                             | Slender Rice-flower      |
|  | <i>Pittosporum bicolor</i>                           | Banyalla                 |
|  | <i>Plantago debilis</i>                              | Shade Plantain           |
|  | <i>Platylobium formosum</i>                          | Handsome Flat-pea        |
|  | <i>Platylobium obtusangulum</i>                      | Common Flat-pea          |
|  | <i>Platysace heterophylla</i>                        | Slender Platysace        |
|  | <i>Poa ensiformis</i>                                | Sword Tussock-grass      |
|  | <i>Poa labillardierei</i>                            | Common Tussock-grass     |
|  | <i>Poa labillardierei</i> var. <i>labillardierei</i> | Common Tussock-grass     |
|  | <i>Poa sieberiana</i>                                | Grey Tussock-grass       |
|  | <i>Poa tenera</i>                                    | Slender Tussock-grass    |
|  | <i>Polyphlebium venosum</i>                          | Veined Bristle-fern      |
|  | <i>Polyscias sambucifolia</i>                        | Elderberry Panax         |
|  | <i>Polyscias sambucifolia</i> ssp. <i>B</i>          | Mountain Panax           |
|  | <i>Polystichum proliferum</i>                        | Mother Shield-fern       |
|  | <i>Pomaderris aspera</i>                             | Hazel Pomaderris         |
|  | <i>Poranthera microphylla</i>                        | Small Poranthera         |
|  | <i>Prostanthera lasianthos</i>                       | Victorian Christmas-bush |
|  | <i>Pseudognaphalium luteoalbum</i>                   | Jersey cudweed           |
|  | <i>Pteridium esculentum</i>                          | Austral Bracken          |
|  | <i>Pteris tremula</i>                                | Tender Brake             |
|  | <i>Pterostylis alpina s.l.</i>                       | Alpine Greenhood         |
|  | <i>Pterostylis longifolia s.l.</i>                   | Tall Greenhood           |
|  | <i>Pterostylis pedunculata</i>                       | Maroonhood               |
|  | <i>Pultenaea daphnoides</i>                          | Large-leaf Bush-pea      |
|  | <i>Pultenaea gunnii</i>                              | Golden Bush-pea          |
|  | <i>Pultenaea juniperina s.l.</i>                     | Prickly Bush-pea         |
|  | <i>Pultenaea muelleri</i>                            | Mueller's Bush-pea       |
|  | <i>Pultenaea scabra</i>                              | Rough Bush-pea           |
|  | <i>Ranunculus plebeius s.l.</i>                      | Forest/Hairy Buttercup   |
|  | <i>Rapanea howittiana</i>                            | Muttonwood               |
|  | <i>Rhytidosporum procumbens</i>                      | White Marianth           |
|  | <i>Ricinocarpos pinifolius</i>                       | Wedding Bush             |
|  | <i>Rubus parvifolius</i>                             | Small-leaf Bramble       |
|  | <i>Rumohra adiantiformis</i>                         | Leathery Shield-fern     |
|  | <i>Sambucus gaudichaudiana</i>                       | White Elderberry         |
|  | <i>Scaevola ramosissima</i>                          | Hairy Fan-flower         |
|  | <i>Schoenus apogon</i>                               | Common Bog-sedge         |
|  | <i>Schoenus maschalinus</i>                          | Leafy Bog-sedge          |
|  | <i>Senecio glomeratus</i>                            | Annual Fireweed          |

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|  | <i>Senecio hispidulus</i>                     | Rough Fireweed       |
|  | <i>Senecio linearifolius</i>                  | Fireweed Groundsel   |
|  | <i>Senecio minimus</i>                        | Shrubby Fireweed     |
|  | <i>Senecio pinnatifolius</i>                  | Variable Groundsel   |
|  | <i>Senecio quadridentatus</i>                 | Cotton Fireweed      |
|  | <i>Senecio tenuiflorus</i>                    | Slender Fireweed     |
|  | <i>Sigesbeckia orientalis</i>                 | Indian Weed          |
|  | <i>Solanum aviculare</i>                      | Kangaroo Apple       |
|  | <i>Solanum laciniatum</i>                     | Large Kangaroo Apple |
|  | <i>Stackhousia monogyna</i>                   | Creamy Stackhousia   |
|  | <i>Stellaria flaccida</i>                     | Forest Starwort      |
|  | <i>Stellaria pungens</i>                      | Prickly Starwort     |
|  | <i>Sticherus tener s.l.</i>                   | Silky Fan-fern       |
|  | <i>Tasmannia lanceolata</i>                   | Mountain Pepper      |
|  | <i>Tasmannia xerophila</i>                    | Alpine Pepper        |
|  | <i>Tetrarrhena juncea</i>                     | Forest Wire-grass    |
|  | <i>Tetradlea ciliata</i>                      | Pink-bells           |
|  | <i>Thelymitra media s.l.</i>                  | Tall Sun-orchid      |
|  | <i>Themeda triandra</i>                       | Kangaroo Grass       |
|  | <i>Tmesipteris obliqua</i>                    | Long Fork-fern       |
|  | <i>Todea barbara</i>                          | Austral King-fern    |
|  | <i>Tricoryne elatior</i>                      | Yellow Rush-lily     |
|  | <i>Triglochin procerum s.s.</i>               | Common Water-ribbons |
|  | <i>Urtica incisa</i>                          | Scrub Nettle         |
|  | <i>Veronica calycina</i>                      | Hairy Speedwell      |
|  | <i>Veronica plebeia</i>                       | Trailing Speedwell   |
|  | <i>Viola betonicifolia ssp. betonicifolia</i> | Showy Violet         |
|  | <i>Viola hederacea s.l.</i>                   | Ivy-leaf Violet      |
|  | <i>Viola hederacea s.s.</i>                   | Ivy-leaf Violet      |
|  | <i>Viola sieberiana s.l.</i>                  | Tiny Violet          |
|  | <i>Wahlenbergia communis s.l.</i>             | Tufted Bluebell      |
|  | <i>Wahlenbergia gracilentata s.l.</i>         | Annual Bluebell      |
|  | <i>Wahlenbergia gracilis s.l.</i>             | Sprawling Bluebell   |
|  | <i>Wahlenbergia stricta s.l.</i>              | Tall Bluebell        |
|  | <i>Xanthorrhoea minor ssp. lutea</i>          | Small Grass-tree     |
|  | <i>Xanthosia dissecta</i>                     | Cut-leaf Xanthosia   |
|  | <i>Xanthosia tridentata</i>                   | Hill Xanthosia       |
|  | <i>Zieria arborescens</i>                     | Stinkwood            |

### Introduced Species

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|--|--|----------------------------|
|  | <i>Acetosella vulgaris</i>             | Sheep Sorrel               |
|  | <i>Anagallis arvensis</i>              | Pimpernel                  |
|  | <i>Anthoxanthum odoratum</i>           | Sweet Vernal-grass         |
|  | <i>Bellis perennis</i>                 | English Daisy              |
|  | <i>Bromus catharticus</i>              | Prairie Grass              |
|  | <i>Centaureum erythraea</i>            | Common Centaury            |
|  | <i>Centaureum tenuiflorum</i>          | Branched Centaury          |
|  | <i>Cerastium fontanum ssp. vulgare</i> | Common Mouse-ear Chickweed |
|  | <i>Cerastium glomeratum s.l.</i>       | Common Mouse-ear Chickweed |
|  | <i>Cirsium vulgare</i>                 | Spear Thistle              |
|  | <i>Conyza bonariensis</i>              | Flaxleaf Fleabane          |
|  | <i>Cordyline australis</i>             | New Zealand Cabbage-tree   |
|  | <i>Cynosurus echinatus</i>             | Rough Dog's-tail           |
|  | <i>Dactylis glomerata</i>              | Cocksfoot                  |
|  | <i>Digitaria sanguinalis</i>           | Summer Grass               |
|  | <i>Echium plantagineum</i>             | Paterson's Curse           |
|  | <i>Ehrharta longiflora</i>             | Annual Veldt Grass         |
|  | <i>Galium aparine</i>                  | Cleavers                   |

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|  | <i>Gamochaeta purpurea</i> spp. agg.    | Cudweed                   |
|  | <i>Holcus lanatus</i>                   | Yorkshire Fog             |
|  | <i>Hyacinthoides hispanica</i>          | Spanish Bluebell          |
|  | <i>Hypericum androsaemum</i>            | Tutsan                    |
|  | <i>Hypochoeris radicata</i>             | Cat's Ear                 |
|  | <i>Leontodon taraxacoides</i>           | Hairy Hawkbit             |
|  | <i>Lotus suaveolens</i>                 | Hairy Bird's-foot Trefoil |
|  | <i>Mimulus moschatus</i>                | Musk Monkey-flower        |
|  | <i>Oxalis pes-caprae</i>                | Soursob                   |
|  | <i>Parentucellia viscosa</i>            | Sticky Bartsia            |
|  | <i>Pinus radiata</i>                    | Radiata Pine              |
|  | <i>Pittosporum undulatum</i>            | Sweet Pittosporum         |
|  | <i>Plantago coronopus</i>               | Buck's-horn Plantain      |
|  | <i>Plantago lanceolata</i>              | Ribwort                   |
|  | <i>Poa pratensis</i>                    | Kentucky Blue-grass       |
|  | <i>Prunella laciniata</i>               | Cut-leaf Self-heal        |
|  | <i>Prunella vulgaris</i>                | Self-heal                 |
|  | <i>Prunus cerasifera</i>                | Cherry Plum               |
|  | <i>Prunus laurocerasus</i>              | Cherry Laurel             |
|  | <i>Ranunculus repens</i>                | Creeping Buttercup        |
|  | <i>Rubus discolor</i>                   | Blackberry                |
|  | <i>Rubus fruticosus</i> spp. agg.       | Blackberry                |
|  | <i>Rubus laciniatus</i>                 | Cut-leaf Bramble          |
|  | <i>Rubus polyanthemus</i>               | Blackberry                |
|  | <i>Rubus vestitus</i>                   | Blackberry                |
|  | <i>Senecio jacobaea</i>                 | Ragwort                   |
|  | <i>Solanum nigrum</i> s.l.              | Black Nightshade          |
|  | <i>Sonchus asper</i> s.l.               | Rough Sow-thistle         |
|  | <i>Sonchus oleraceus</i>                | Common Sow-thistle        |
|  | <i>Stellaria media</i>                  | Chickweed                 |
|  | <i>Taraxacum</i> Sect. <i>Ruderalia</i> | Garden Dandelion          |
|  | <i>Trifolium dubium</i>                 | Suckling Clover           |
|  | <i>Ulex europaeus</i>                   | Gorse                     |
|  | <i>Zantedeschia aethiopica</i>          | White Arum Lily           |

### A3.3 SIGNIFICANT FLORA WITHIN 5KM OF THE HVP ESTATE

The table below lists the plant species recorded from the FIS maintained by NRE, within a five kilometre radius of the HVP estate.

#### Notes to table:

Significance/status of species is designated below:

|   |  |
|---|--|
| E | endangered in Australia (Briggs and Leigh, 1996)           |
| e | endangered in Victoria (NRE 2000a; FIS unpublished data)   |
| V | vulnerable in Australia (Briggs and Leigh, 1996)           |
| v | vulnerable in Victoria (NRE 2000a; FIS unpublished data)   |
| R | rare in Australia (Briggs and Leigh, 1996)                 |
| r | rare in Victoria (NRE 2000a; FIS unpublished data)         |
| K | poorly known in Australia (Briggs and Leigh, 1996)         |
| k | poorly known in Victoria (NRE 2000a; FIS unpublished data) |

| Significance              | Scientific Name  | Common Name               |
|---------------------------|--|---------------------------|
| <b>Indigenous Species</b> |  |                           |
| National                  | <b>Ee</b> <i>Prasophyllum frenchii</i>                   | Maroon Leek-orchid        |
| National                  | <b>Ee</b> <i>Rulingia prostrata</i>                      | Dwarf Kerrawang           |
| National                  | <b>K</b> <i>Genoplesium despectans</i>                   | Sharp Midge-orchid        |
| National                  | <b>Rk</b> <i>Eucalyptus yarraensis</i>                   | Yarra Gum                 |
| National                  | <b>Rr</b> <i>Eucalyptus kitsoniana</i>                   | Bog Gum                   |
| National                  | <b>Rr</b> <i>Acacia howittii</i>                         | Sticky Wattle             |
| National                  | <b>Rv</b> <i>Cyathea cunninghamii</i>                    | Slender Tree-fern         |
| National                  | <b>V</b> <i>Callitris oblonga</i>                        | Dwarf Cypress-pine        |
| National                  | <b>Vk</b> <i>Amphibromus fluitans</i>                    | River Swamp Wallaby-grass |
| National                  | <b>Vv</b> <i>Eucalyptus strzeleckii</i>                  | Strzelecki Gum            |
| State                     | <b>e</b> <i>Adiantum diaphanum</i>                       | Filmy Maidenhair          |
| State                     | <b>k</b> <i>Agrostis avenacea</i> var. <i>perennis</i>   | Wetland Blown-grass       |
| State                     | <b>k</b> <i>Austrodanthonia induta</i>                   | Shiny Wallaby-grass       |
| State                     | <b>k</b> <i>Caladenia alata</i>                          | Fairy Caladenia           |
| State                     | <b>k</b> <i>Desmodium varians</i>                        | Slender Tick-trefoil      |
| State                     | <b>k</b> <i>Entolasia stricta</i>                        | Upright Panic             |
| State                     | <b>k</b> <i>Lomandra glauca</i> s.s.                     | Blue Mat-rush             |
| State                     | <b>k</b> <i>Platylobium triangulare</i>                  | Ivy Flat-pea              |
| State                     | <b>r</b> <i>Caladenia aurantiaca</i>                     | Orange-tip Caladenia      |
| State                     | <b>r</b> <i>Corybas fimbriatus</i>                       | Fringed Helmet-orchid     |
| State                     | <b>r</b> <i>Cymbonotus lawsonianus</i>                   | Bear's-ears               |
| State                     | <b>r</b> <i>Grevillea chrysophaea</i>                    | Golden Grevillea          |
| State                     | <b>r</b> <i>Monotoca glauca</i>                          | Currant-wood              |
| State                     | <b>r</b> <i>Prasophyllum patens</i>                      | Broad-lip Leek-orchid     |
| State                     | <b>r</b> <i>Pterostylis fischii</i>                      | Fisch's Greenhood         |
| State                     | <b>r</b> <i>Pterostylis grandiflora</i>                  | Cobra Greenhood           |
| State                     | <b>r</b> <i>Sowerbaea juncea</i>                         | Rush Lily                 |
| State                     | <b>r</b> <i>Uncinia nemoralis</i>                        | River Hook-sedge          |
| State                     | <b>r</b> <i>Eucalyptus globulus</i> ssp. <i>globulus</i> | Southern Blue Gum         |

|       |   |                   |
|-------|---|-------------------|
| State | ▼ <i>Diuris punctata</i> var. <i>punctata</i>         | Purple Diuris     |
| State | ▼ <i>Grammitis magellanica</i> ssp. <i>nothofagei</i> | Beech Finger-fern |
| State | ▼ <i>Thelymitra circumsepta</i>                       | Naked Sun-orchid  |

# APPENDIX 4

## A4 FLORA QUADRAT RESULTS

The quadrats below were recorded during this current study. They represent species recorded during the 12 – 16 August 2000 and 4 – 8 September 2000.

### Notes to tables:

|   |               |
|---|---------------|
| + | cover < 1%    |
| 1 | cover 1–5%    |
| 2 | cover 5–25%   |
| 3 | cover 25–50%  |
| 4 | cover 50–75%  |
| 5 | cover 75–100% |

### F38195

Recs 12 Date : 12 Aug 2000 Location : 145°57'47" 38°17'36" Altitude : 430 Collector : AJH  
Vegetation : Pine

| Cover/<br>Abund.          | Species<br>Number | Scientific Name                                   | Common Name          |
|---------------------------|-------------------|---|----------------------|
| <b>Native Species</b>     |                   |   |                      |
| +                         | 0025              | <i>Acacia dealbata</i>                            | Silver Wattle        |
| +                         | 0788              | <i>Clematis aristata</i>                          | Mountain Clematis    |
| +                         | 0822              | <i>Coprosma quadrifida</i>                        | Prickly Currant-bush |
| +                         | 1722              | <i>Hydrocotyle hirta</i>                          | Hairy Pennywort      |
| +                         | 2179              | <i>Microlaena stipoides</i> var. <i>stipoides</i> | Weeping Grass        |
| +                         | 2645              | <i>Polystichum proliferum</i>                     | Mother Shield-fern   |
| +                         | 2777              | <i>Pteridium esculentum</i>                       | Austral Bracken      |
| +                         | 2999              | <i>Sambucus gaudichaudiana</i>                    | White Elderberry     |
| +                         | 3348              | <i>Tetrarrhena juncea</i>                         | Forest Wire-grass    |
| <b>Introduced Species</b> |                   |   |                      |
| +                         | 2539              | <i>Pinus radiata</i>                              | Radiata Pine         |
| +                         | 2952              | <i>Rubus fruticosus</i> spp. agg.                 | Blackberry           |
| +                         | 3471              | <i>Ulex europaeus</i>                             | Gorse                |



## F38196

Recs 30 Date : 12 Aug 2000 Location : 146°00'52" 38°17'54" Altitude : 300 Collector : AJH

| Cover/<br>Abund.          | Species<br>Number | Scientific Name                                   | Common Name           |
|---------------------------|-------------------|---|-----------------------|
| <b>Native Species</b>     |                   |   |                       |
| 1                         | 0025              | <i>Acacia dealbata</i>                            | Silver Wattle         |
| +                         | 0105              | <i>Acaena novae-zelandiae</i>                     | Bidgee-widgee         |
| +                         | 0403              | <i>Billardiera scandens</i>                       | Common Apple-berry    |
| +                         | 0887              | <i>Calochlaena dubia</i>                          | Common Ground-fern    |
| +                         | 0623              | <i>Carex appressa</i>                             | Tall Sedge            |
| +                         | 0668              | <i>Cassinia longifolia</i>                        | Shiny Cassinia        |
| 1                         | 0788              | <i>Clematis aristata</i>                          | Mountain Clematis     |
| 2                         | 0822              | <i>Coprosma quadrifida</i>                        | Prickly Currant-bush  |
| 2                         | 0895              | <i>Cyathea australis</i>                          | Rough Tree-fern       |
| 4                         | 1314              | <i>Eucalyptus regnans</i>                         | Mountain Ash          |
| +                         | 1431              | <i>Geranium potentilloides</i>                    | Cinquefoil Cranesbill |
| +                         | 1600              | <i>Hedycarya angustifolia</i>                     | Austral Mulberry      |
| +                         | 1691              | <i>Histiopteris incisa</i>                        | Bat's Wing Fern       |
| 1                         | 1722              | <i>Hydrocotyle hirta</i>                          | Hairy Pennywort       |
| 1                         | 2179              | <i>Microlaena stipoides</i> var. <i>stipoides</i> | Weeping Grass         |
| +                         | 2299              | <i>Olearia argophylla</i>                         | Musk Daisy-bush       |
| 2                         | 2312              | <i>Olearia lirata</i>                             | Snowy Daisy-bush      |
| +                         | 2381              | <i>Oxalis exilis</i>                              | Shady Wood-sorrel     |
| +                         | 2515              | <i>Pimelea axiflora</i>                           | Bootlace Bush         |
| 4                         | 2645              | <i>Polystichum proliferum</i>                     | Mother Shield-fern    |
| 1                         | 2777              | <i>Pteridium esculentum</i>                       | Austral Bracken       |
| +                         | 2999              | <i>Sambucus gaudichaudiana</i>                    | White Elderberry      |
| +                         | 3107              | <i>Senecio glomeratus</i>                         | Annual Fireweed       |
| +                         | 3250              | <i>Stellaria flaccida</i>                         | Forest Starwort       |
| +                         | 3348              | <i>Tetrarrhena juncea</i>                         | Forest Wire-grass     |
| +                         | 3512              | <i>Veronica plebeia</i>                           | Trailing Speedwell    |
| +                         | 5058              | <i>Viola hederacea</i> s.s.                       | Ivy-leaf Violet       |
| <b>Introduced Species</b> |                   |   |                       |
| +                         | 1748              | <i>Hypochoeris radicata</i>                       | Cat's Ear             |
| 2                         | 2539              | <i>Pinus radiata</i>                              | Radiata Pine          |
| 1                         | 2952              | <i>Rubus fruticosus</i> spp. agg.                 | Blackberry            |

## F38197

Recs 39 Date : 13 Aug 2000 Location : 146°11'45" 38°34'14" Altitude : 260 Collector : AJH

| Cover/<br>Abund.          | Species<br>Number | Scientific Name                                   | Common Name           |
|---------------------------|-------------------|---|-----------------------|
| <b>Native Species</b>     |                   |   |                       |
| +                         | 0057              | <i>Acacia melanoxylon</i>                         | Blackwood             |
| 1                         | 0105              | <i>Acaena novae-zelandiae</i>                     | Bidgee-widgee         |
| +                         | 0623              | <i>Carex appressa</i>                             | Tall Sedge            |
| +                         | 0668              | <i>Cassinia longifolia</i>                        | Shiny Cassinia        |
| +                         | 0788              | <i>Clematis aristata</i>                          | Mountain Clematis     |
| 1                         | 0822              | <i>Coprosma quadrifida</i>                        | Prickly Currant-bush  |
| 1                         | 0846              | <i>Cotula australis</i>                           | Common Cotula         |
| 4                         | 1314              | <i>Eucalyptus regnans</i>                         | Mountain Ash          |
| +                         | 8427              | <i>Euchiton</i> spp.                              | Cudweed               |
| 1                         | 8464              | <i>Galium</i> spp.                                | No Common Name        |
| 1                         | 1431              | <i>Geranium potentilloides</i>                    | Cinquefoil Cranesbill |
| 1                         | 1722              | <i>Hydrocotyle hirta</i>                          | Hairy Pennywort       |
| +                         | 1820              | <i>Juncus gregiflorus</i>                         | Green Rush            |
| +                         | 8601              | <i>Juncus</i> spp.                                | Rush                  |
| +                         | 1863              | <i>Lagenophora stipitata</i>                      | Common Bottle-daisy   |
| +                         | 1919              | <i>Lepidosperma elatius</i>                       | Tall Sword-sedge      |
| +                         | 3841              | <i>Luzula meridionalis</i>                        | Common Woodrush       |
| 1                         | 2179              | <i>Microlaena stipoides</i> var. <i>stipoides</i> | Weeping Grass         |
| 2                         | 2312              | <i>Olearia lirata</i>                             | Snowy Daisy-bush      |
| 1                         | 2381              | <i>Oxalis exilis</i>                              | Shady Wood-sorrel     |
| 1                         | 2555              | <i>Plantago debilis</i>                           | Shade Plantain        |
| 1                         | 2645              | <i>Polystichum proliferum</i>                     | Mother Shield-fern    |
| 2                         | 2777              | <i>Pteridium esculentum</i>                       | Austral Bracken       |
| 1                         | 2810              | <i>Pterostylis pedunculata</i>                    | Maroonhood            |
| +                         | 2999              | <i>Sambucus gaudichaudiana</i>                    | White Elderberry      |
| 1                         | 3115              | <i>Senecio linearifolius</i>                      | Fireweed Groundsel    |
| +                         | 3250              | <i>Stellaria flaccida</i>                         | Forest Starwort       |
| +                         | 3348              | <i>Tetrarrhena juncea</i>                         | Forest Wire-grass     |
| 1                         | 3512              | <i>Veronica plebeia</i>                           | Trailing Speedwell    |
| 1                         | 5058              | <i>Viola hederacea</i> s.s.                       | Ivy-leaf Violet       |
| <b>Introduced Species</b> |                   |   |                       |
| +                         | 0223              | <i>Anagallis arvensis</i>                         | Pimpernel             |
| +                         | 0782              | <i>Cirsium vulgare</i>                            | Spear Thistle         |
| +                         | 1692              | <i>Holcus lanatus</i>                             | Yorkshire Fog         |
| 4                         | 1739              | <i>Hypericum androsaemum</i>                      | Tutsan                |
| +                         | 1748              | <i>Hypochoeris radicata</i>                       | Cat's Ear             |
| +                         | 2543              | <i>Pittosporum undulatum</i>                      | Sweet Pittosporum     |
| +                         | 2580              | <i>Poa annua</i>                                  | Annual Meadow-grass   |
| +                         | 2757              | <i>Prunella vulgaris</i>                          | Self-heal             |
| +                         | 3183              | <i>Solanum nigrum</i> s.l.                        | Black Nightshade      |

**F38198**

Recs 19 Date : 13 Aug 2000 Location : 146°13'51" 38°33'39" Altitude : 280 Collector : AJH

| Cover/<br>Abund.      | Species<br>Number | Scientific Name                                   | Common Name           |
|-----------------------|-------------------|---|-----------------------|
| <b>Native Species</b> |                   |   |                       |
| +                     | 8003              | <i>Acacia</i> spp.                                | Wattle                |
| +                     | 0788              | <i>Clematis aristata</i>                          | Mountain Clematis     |
| +                     | 0846              | <i>Cotula australis</i>                           | Common Cotula         |
| +                     | 8464              | <i>Galium</i> spp.                                | No Common Name        |
| +                     | 1431              | <i>Geranium potentilloides</i>                    | Cinquefoil Cranesbill |
| +                     | 1722              | <i>Hydrocotyle hirta</i>                          | Hairy Pennywort       |
| +                     | 2051              | <i>Lomatia ilicifolia</i>                         | Holly Lomatia         |
| +                     | 2179              | <i>Microlaena stipoides</i> var. <i>stipoides</i> | Weeping Grass         |
| +                     | 2312              | <i>Olearia lirata</i>                             | Snowy Daisy-bush      |
| +                     | 2777              | <i>Pteridium esculentum</i>                       | Austral Bracken       |
| +                     | 3337              | <i>Tasmania lanceolata</i>                        | Mountain Pepper       |
| 1                     | 3348              | <i>Tetrarrhena juncea</i>                         | Forest Wire-grass     |
| +                     | 3503              | <i>Veronica calycina</i>                          | Hairy Speedwell       |
| +                     | 3512              | <i>Veronica plebeia</i>                           | Trailing Speedwell    |
| +                     | 5058              | <i>Viola hederacea</i> s.s.                       | Ivy-leaf Violet       |
| +                     | 3601              | <i>Zieria arborescens</i>                         | Stinkwood             |

**Introduced Species**

|   |      |                              |              |
|---|------|------------------------------|--------------|
| + | 1739 | <i>Hypericum androsaemum</i> | Tutsan       |
| + | 1748 | <i>Hypochoeris radicata</i>  | Cat's Ear    |
| 1 | 2539 | <i>Pinus radiata</i>         | Radiata Pine |

**F38199**

Recs 35 Date : 13 Aug 2000 Location : 146°14'26" 38°31'21" Altitude : 140 Collector : AJH

| Cover/<br>Abund.      | Species<br>Number | Scientific Name                                   | Common Name          |
|-----------------------|-------------------|---|----------------------|
| <b>Native Species</b> |                   |   |                      |
| +                     | 0025              | <i>Acacia dealbata</i>                            | Silver Wattle        |
| +                     | 0057              | <i>Acacia melanoxylon</i>                         | Blackwood            |
| 2                     | 0105              | <i>Acaena novae-zelandiae</i>                     | Bidgee-widgee        |
| 1                     | 0668              | <i>Cassinia longifolia</i>                        | Shiny Cassinia       |
| +                     | 0822              | <i>Coprosma quadrifida</i>                        | Prickly Currant-bush |
| 3                     | 1304              | <i>Eucalyptus obliqua</i>                         | Messmate Stringybark |
| 3                     | 1314              | <i>Eucalyptus regnans</i>                         | Mountain Ash         |
| +                     | 8464              | <i>Galium</i> spp.                                | No Common Name       |
| +                     | 8474              | <i>Geranium</i> spp.                              | Crane's Bill         |
| +                     | 1722              | <i>Hydrocotyle hirta</i>                          | Hairy Pennywort      |
| +                     | 8601              | <i>Juncus</i> spp.                                | Rush                 |
| 2                     | 1861              | <i>Lagenophora gracilis</i>                       | Slender Bottle-daisy |
| 1                     | 2179              | <i>Microlaena stipoides</i> var. <i>stipoides</i> | Weeping Grass        |
| +                     | 1616              | <i>Ozothamnus ferrugineus</i>                     | Tree Everlasting     |
| +                     | 2645              | <i>Polystichum proliferum</i>                     | Mother Shield-fern   |

|   |      |                              |                    |
|---|------|------------------------------|--------------------|
| + | 2650 | <i>Pomaderris aspera</i>     | Hazel Pomaderris   |
| + | 2777 | <i>Pteridium esculentum</i>  | Austral Bracken    |
| 2 | 8978 | <i>Ranunculus</i> spp.       | Buttercup          |
| + | 3107 | <i>Senecio glomeratus</i>    | Annual Fireweed    |
| 3 | 3115 | <i>Senecio linearifolius</i> | Fireweed Groundsel |

**Introduced Species**

|   |      |                                   |                     |
|---|------|-----------------------------------|---------------------|
| 1 | 0223 | <i>Anagallis arvensis</i>         | Pimpernel           |
| 1 | 0236 | <i>Anthoxanthum odoratum</i>      | Sweet Vernal-grass  |
| 1 | 0255 | <i>Arctotheca calendula</i>       | Cape Weed           |
| 2 | 8148 | <i>Brassica</i> spp.              | Turnip              |
| + | 0782 | <i>Cirsium vulgare</i>            | Spear Thistle       |
| 2 | 0948 | <i>Dactylis glomerata</i>         | Cocksfoot           |
| + | 1402 | <i>Galium aparine</i>             | Cleavers            |
| 1 | 1748 | <i>Hypochoeris radicata</i>       | Cat's Ear           |
| + | 0772 | <i>Leucanthemum vulgare</i>       | Ox-eye Daisy        |
| 1 | 2561 | <i>Plantago lanceolata</i>        | Ribwort             |
| 1 | 2580 | <i>Poa annua</i>                  | Annual Meadow-grass |
| 1 | 2757 | <i>Prunella vulgaris</i>          | Self-heal           |
| + | 2952 | <i>Rubus fruticosus</i> spp. agg. | Blackberry          |
| + | 3113 | <i>Senecio jacobaea</i>           | Ragwort             |
| + | 3518 | <i>Vicia sativa</i>               | Common Vetch        |

**F38200**

Recs 36 Date : 13 Aug 2000 Location : 146°17'06" 38°30'36" Altitude : 350 Collector : AJH

| Cover/<br>Abund. | Species<br>Number | Scientific Name | Common Name |
|------------------|-------------------|-----------------|-------------|
|------------------|-------------------|-----------------|-------------|

**Native Species**

|   |      |   |                          |
|---|------|---|--------------------------|
| + | 8003 | <i>Acacia</i> spp.                                  | Wattle                   |
| 2 | 0105 | <i>Acaena novae-zelandiae</i>                       | Bidgee-widgee            |
| + | 0287 | <i>Asplenium bulbiferum</i> ssp. <i>gracillimum</i> | Mother Spleenwort        |
| + | 0666 | <i>Cassinia aculeata</i>                            | Common Cassinia          |
| 1 | 0668 | <i>Cassinia longifolia</i>                          | Shiny Cassinia           |
| + | 0788 | <i>Clematis aristata</i>                            | Mountain Clematis        |
| + | 0822 | <i>Coprosma quadrifida</i>                          | Prickly Currant-bush     |
| + | 0846 | <i>Cotula australis</i>                             | Common Cotula            |
| 2 | 1302 | <i>Eucalyptus nitens</i>                            | Shining Gum              |
| 1 | 8474 | <i>Geranium</i> spp.                                | Crane's Bill             |
| 1 | 1722 | <i>Hydrocotyle hirta</i>                            | Hairy Pennywort          |
| + | 1820 | <i>Juncus gregiflorus</i>                           | Green Rush               |
| + | 1863 | <i>Lagenophora stipitata</i>                        | Common Bottle-daisy      |
| + | 3841 | <i>Luzula meridionalis</i>                          | Common Woodrush          |
| 1 | 2179 | <i>Microlaena stipoides</i> var. <i>stipoides</i>   | Weeping Grass            |
| 1 | 2312 | <i>Olearia lirata</i>                               | Snowy Daisy-bush         |
| 2 | 2381 | <i>Oxalis exilis</i>                                | Shady Wood-sorrel        |
| 4 | 1616 | <i>Ozothamnus ferrugineus</i>                       | Tree Everlasting         |
| + | 2643 | <i>Polyscias sambucifolia</i>                       | Elderberry Panax         |
| + | 2645 | <i>Polystichum proliferum</i>                       | Mother Shield-fern       |
| 2 | 2743 | <i>Prostanthera lasianthos</i>                      | Victorian Christmas-bush |
| 1 | 2777 | <i>Pteridium esculentum</i>                         | Austral Bracken          |
| 2 | 3114 | <i>Senecio pinnatifolius</i>                        | Variable Groundsel       |
| + | 3337 | <i>Tasmannia lanceolata</i>                         | Mountain Pepper          |

|   |      |                             |                   |
|---|------|-----------------------------|-------------------|
| 1 | 3348 | <i>Tetrarrhena juncea</i>   | Forest Wire-grass |
| 1 | 5058 | <i>Viola hederacea</i> s.s. | Ivy-leaf Violet   |

**Introduced Species**

|   |      |                                   |                     |
|---|------|-----------------------------------|---------------------|
| + | 2966 | <i>Acetosella vulgaris</i>        | Sheep Sorrel        |
| + | 0782 | <i>Cirsium vulgare</i>            | Spear Thistle       |
| + | 1422 | <i>Genista monspessulana</i>      | Montpellier Broom   |
| + | 1692 | <i>Holcus lanatus</i>             | Yorkshire Fog       |
| + | 1739 | <i>Hypericum androsaemum</i>      | Tutsan              |
| + | 1748 | <i>Hypochoeris radicata</i>       | Cat's Ear           |
| 1 | 2058 | <i>Lotus corniculatus</i>         | Bird's-foot Trefoil |
| + | 2561 | <i>Plantago lanceolata</i>        | Ribwort             |
| + | 2580 | <i>Poa annua</i>                  | Annual Meadow-grass |
| 2 | 2952 | <i>Rubus fruticosus</i> spp. agg. | Blackberry          |

**F38201**

Recs 41 Date : 14 Aug 2000 Location : 146°18'07" 38°34'40" Altitude : 450 Collector : AJH

| Cover/<br>Abund.          | Species<br>Number | Scientific Name                                   | Common Name           |
|---------------------------|-------------------|---|-----------------------|
| <b>Native Species</b>     |                   |   |                       |
| 2                         | 0105              | <i>Acaena novae-zelandiae</i>                     | Bidgee-widgee         |
| 1                         | 0627              | <i>Carex breviculmis</i>                          | Common Grass-sedge    |
| +                         | 0666              | <i>Cassinia aculeata</i>                          | Common Cassinia       |
| +                         | 0822              | <i>Coprosma quadrifida</i>                        | Prickly Currant-bush  |
| +                         | 0831              | <i>Correa lawrenceana</i>                         | Mountain Correa       |
| 1                         | 0846              | <i>Cotula australis</i>                           | Common Cotula         |
| +                         | 0895              | <i>Cyathea australis</i>                          | Rough Tree-fern       |
| 2                         | 1314              | <i>Eucalyptus regnans</i>                         | Mountain Ash          |
| 1                         | 1431              | <i>Geranium potentilloides</i>                    | Cinquefoil Cranesbill |
| +                         | 1600              | <i>Hedycarya angustifolia</i>                     | Austral Mulberry      |
| 1                         | 1722              | <i>Hydrocotyle hirta</i>                          | Hairy Pennywort       |
| +                         | 1856              | <i>Kunzea ericoides</i>                           | Burgan                |
| +                         | 1919              | <i>Lepidosperma elatius</i>                       | Tall Sword-sedge      |
| +                         | 1956              | <i>Leptospermum continentale</i>                  | Prickly Tea-tree      |
| +                         | 2051              | <i>Lomatia ilicifolia</i>                         | Holly Lomatia         |
| 2                         | 2179              | <i>Microlaena stipoides</i> var. <i>stipoides</i> | Weeping Grass         |
| +                         | 8739              | <i>Microtis</i> spp.                              | Onion Orchid          |
| 4                         | 2312              | <i>Olearia lirata</i>                             | Snowy Daisy-bush      |
| +                         | 2381              | <i>Oxalis exilis</i>                              | Shady Wood-sorrel     |
| 3                         | 1616              | <i>Ozothamnus ferrugineus</i>                     | Tree Everlasting      |
| 1                         | 8909              | <i>Poa</i> spp.                                   | Tussock Grass         |
| +                         | 2645              | <i>Polystichum proliferum</i>                     | Mother Shield-fern    |
| 2                         | 2777              | <i>Pteridium esculentum</i>                       | Austral Bracken       |
| 1                         | 8978              | <i>Ranunculus</i> spp.                            | Buttercup             |
| +                         | 3114              | <i>Senecio pinnatifolius</i>                      | Variable Groundsel    |
| +                         | 3337              | <i>Tasmannia lanceolata</i>                       | Mountain Pepper       |
| 1                         | 3348              | <i>Tetrarrhena juncea</i>                         | Forest Wire-grass     |
| 1                         | 5058              | <i>Viola hederacea</i> s.s.                       | Ivy-leaf Violet       |
| <b>Introduced Species</b> |                   |   |                       |
| +                         | 2966              | <i>Acetosella vulgaris</i>                        | Sheep Sorrel          |
| 1                         | 0153              | <i>Agrostis capillaris</i>                        | Brown-top Bent        |

|   |      |  |                     |
|---|------|--|---------------------|
| 3 | 0236 | <i>Anthoxanthum odoratum</i>               | Sweet Vernal-grass  |
| 1 | 8148 | <i>Brassica</i> spp.                       | Turnip              |
| 1 | 0948 | <i>Dactylis glomerata</i>                  | Cocksfoot           |
| 3 | 1692 | <i>Holcus lanatus</i>                      | Yorkshire Fog       |
| 2 | 1748 | <i>Hypochoeris radicata</i>                | Cat's Ear           |
| 1 | 2058 | <i>Lotus corniculatus</i>                  | Bird's-foot Trefoil |
| + | 2539 | <i>Pinus radiata</i>                       | Radiata Pine        |
| 1 | 2561 | <i>Plantago lanceolata</i>                 | Ribwort             |
| 2 | 2757 | <i>Prunella vulgaris</i>                   | Self-heal           |
| 2 | 2952 | <i>Rubus fruticosus</i> spp. agg.          | Blackberry          |
| 1 | 3435 | <i>Trifolium repens</i> var. <i>repens</i> | White Clover        |

**F38202**

Recs 30 Date : 14 Aug 2000 Location : 146°18'19" 38°33'59" Altitude : 530 Collector : AJH

| Cover/<br>Abund.          | Species<br>Number | Scientific Name                                      | Common Name           |
|---------------------------|-------------------|--|-----------------------|
| <b>Native Species</b>     |                   |  |                       |
| 3                         | 0057              | <i>Acacia melanoxylon</i>                            | Blackwood             |
| +                         | 0105              | <i>Acaena novae-zelandiae</i>                        | Bidgee-widgee         |
| +                         | 0887              | <i>Calochlaena dubia</i>                             | Common Ground-fern    |
| 1                         | 0623              | <i>Carex appressa</i>                                | Tall Sedge            |
| +                         | 0627              | <i>Carex breviculmis</i>                             | Common Grass-sedge    |
| 2                         | 0666              | <i>Cassinia aculeata</i>                             | Common Cassinia       |
| +                         | 0788              | <i>Clematis aristata</i>                             | Mountain Clematis     |
| 1                         | 0822              | <i>Coprosma quadrifida</i>                           | Prickly Currant-bush  |
| 1                         | 1039              | <i>Dicksonia antarctica</i>                          | Soft Tree-fern        |
| 2                         | 1314              | <i>Eucalyptus regnans</i>                            | Mountain Ash          |
| +                         | 1431              | <i>Geranium potentilloides</i>                       | Cinquefoil Cranesbill |
| +                         | 1507              | <i>Goodenia ovata</i>                                | Hop Goodenia          |
| 1                         | 1600              | <i>Hedycarya angustifolia</i>                        | Austral Mulberry      |
| +                         | 1691              | <i>Histiopteris incisa</i>                           | Bat's Wing Fern       |
| 1                         | 1722              | <i>Hydrocotyle hirta</i>                             | Hairy Pennywort       |
| +                         | 8601              | <i>Juncus</i> spp.                                   | Rush                  |
| 1                         | 2183              | <i>Microsorium pustulatum</i> ssp. <i>pustulatum</i> | Kangaroo Fern         |
| 3                         | 2299              | <i>Olearia argophylla</i>                            | Musk Daisy-bush       |
| 2                         | 2312              | <i>Olearia lirata</i>                                | Snowy Daisy-bush      |
| +                         | 2540              | <i>Pittosporum bicolor</i>                           | Banyalla              |
| 3                         | 2645              | <i>Polystichum proliferum</i>                        | Mother Shield-fern    |
| +                         | 2999              | <i>Sambucus gaudichaudiana</i>                       | White Elderberry      |
| +                         | 9058              | <i>Senecio</i> spp.                                  | Groundsel             |
| 1                         | 3250              | <i>Stellaria flaccida</i>                            | Forest Starwort       |
| 1                         | 3348              | <i>Tetrarrhena juncea</i>                            | Forest Wire-grass     |
| 1                         | 3476              | <i>Urtica incisa</i>                                 | Scrub Nettle          |
| 2                         | 3512              | <i>Veronica plebeia</i>                              | Trailing Speedwell    |
| 1                         | 5058              | <i>Viola hederacea</i> s.s.                          | Ivy-leaf Violet       |
| <b>Introduced Species</b> |                   |  |                       |
| +                         | 0782              | <i>Cirsium vulgare</i>                               | Spear Thistle         |
| +                         | 2952              | <i>Rubus fruticosus</i> spp. agg.                    | Blackberry            |

## F38203

Recs 23 Date : 14 Aug 2000 Location : 146°18'40" 38°33'46" Altitude : 470 Collector : AJH

| Cover/<br>Abund.          | Species<br>Number | Scientific Name                   | Common Name          |
|---------------------------|-------------------|-----------------------------------|----------------------|
| <b>Native Species</b>     |                   |                                   |                      |
| 1                         | 0057              | <i>Acacia melanoxylon</i>         | Blackwood            |
| +                         | 0408              | <i>Blechnum nudum</i>             | Fishbone Water-fern  |
| 1                         | 0413              | <i>Blechnum wattsii</i>           | Hard Water-fern      |
| +                         | 0788              | <i>Clematis aristata</i>          | Mountain Clematis    |
| +                         | 0822              | <i>Coprosma quadrifida</i>        | Prickly Currant-bush |
| 1                         | 0831              | <i>Correa lawrenceana</i>         | Mountain Correa      |
| 2                         | 0895              | <i>Cyathea australis</i>          | Rough Tree-fern      |
| 2                         | 1039              | <i>Dicksonia antarctica</i>       | Soft Tree-fern       |
| 4                         | 1314              | <i>Eucalyptus regnans</i>         | Mountain Ash         |
| +                         | 1366              | <i>Fieldia australis</i>          | Fieldia              |
| +                         | 1519              | <i>Grammitis billardierei</i>     | Common Finger-fern   |
| 1                         | 1600              | <i>Hedycarya angustifolia</i>     | Austral Mulberry     |
| +                         | 1876              | <i>Lastreopsis acuminata</i>      | Shiny Shield-fern    |
| +                         | 2481              | <i>Leionema bilobum</i>           | Notched Leionema     |
| +                         | 2299              | <i>Olearia argophylla</i>         | Musk Daisy-bush      |
| +                         | 2312              | <i>Olearia lirata</i>             | Snowy Daisy-bush     |
| 1                         | 2515              | <i>Pimelea axiflora</i>           | Bootlace Bush        |
| +                         | 2540              | <i>Pittosporum bicolor</i>        | Banyalla             |
| +                         | 2643              | <i>Polyscias sambucifolia</i>     | Elderberry Panax     |
| +                         | 2645              | <i>Polystichum proliferum</i>     | Mother Shield-fern   |
| +                         | 2744              | <i>Prostanthera melissifolia</i>  | Balm Mint-bush       |
| 1                         | 3348              | <i>Tetrarrhena juncea</i>         | Forest Wire-grass    |
| <b>Introduced Species</b> |                   |                                   |                      |
| +                         | 2952              | <i>Rubus fruticosus</i> spp. agg. | Blackberry           |

## F38205

Recs 24 Date : 14 Aug 2000 Location : 146°19'13" 38°30'30" Altitude : 400 Collector : AJH

| Cover/<br>Abund.      | Species<br>Number | Scientific Name                                     | Common Name          |
|-----------------------|-------------------|---|----------------------|
| <b>Native Species</b> |                   |   |                      |
| +                     | 0025              | <i>Acacia dealbata</i>                              | Silver Wattle        |
| 1                     | 0057              | <i>Acacia melanoxylon</i>                           | Blackwood            |
| +                     | 0287              | <i>Asplenium bulbiferum</i> ssp. <i>gracillimum</i> | Mother Spleenwort    |
| +                     | 0406              | <i>Blechnum fluviatile</i>                          | Ray Water-fern       |
| 1                     | 0408              | <i>Blechnum nudum</i>                               | Fishbone Water-fern  |
| 3                     | 0413              | <i>Blechnum wattsii</i>                             | Hard Water-fern      |
| +                     | 0887              | <i>Calochlaena dubia</i>                            | Common Ground-fern   |
| +                     | 0623              | <i>Carex appressa</i>                               | Tall Sedge           |
| +                     | 0627              | <i>Carex breviculmis</i>                            | Common Grass-sedge   |
| +                     | 0788              | <i>Clematis aristata</i>                            | Mountain Clematis    |
| 1                     | 0822              | <i>Coprosma quadrifida</i>                          | Prickly Currant-bush |

|   |      |  |                    |
|---|------|--|--------------------|
| 3 | 0895 | <i>Cyathea australis</i>                             | Rough Tree-fern    |
| + | 1039 | <i>Dicksonia antarctica</i>                          | Soft Tree-fern     |
| 3 | 1314 | <i>Eucalyptus regnans</i>                            | Mountain Ash       |
| + | 1366 | <i>Fieldia australis</i>                             | Fieldia            |
| + | 1600 | <i>Hedycarya angustifolia</i>                        | Austral Mulberry   |
| + | 1691 | <i>Histiopteris incisa</i>                           | Bat's Wing Fern    |
| + | 2183 | <i>Microsorium pustulatum</i> ssp. <i>pustulatum</i> | Kangaroo Fern      |
| 2 | 2312 | <i>Olearia lirata</i>                                | Snowy Daisy-bush   |
| 1 | 2645 | <i>Polystichum proliferum</i>                        | Mother Shield-fern |
| + | 2777 | <i>Pteridium esculentum</i>                          | Austral Bracken    |
| 2 | 3348 | <i>Tetrarrhena juncea</i>                            | Forest Wire-grass  |
| + | 3512 | <i>Veronica plebeia</i>                              | Trailing Speedwell |
| + | 5058 | <i>Viola hederacea</i> s.s.                          | Ivy-leaf Violet    |

**F38206**

Recs 29 Date : 14 Aug 2000 Location : 146°19'16" 38°29'24" Altitude : 210 Collector : AJH

| Cover/<br>Abund.          | Species<br>Number | Scientific Name                                     | Common Name           |
|---------------------------|-------------------|---|-----------------------|
| <b>Native Species</b>     |                   |   |                       |
| 1                         | 0025              | <i>Acacia dealbata</i>                              | Silver Wattle         |
| +                         | 0287              | <i>Asplenium bulbiferum</i> ssp. <i>gracillimum</i> | Mother Spleenwort     |
| 1                         | 0408              | <i>Blechnum nudum</i>                               | Fishbone Water-fern   |
| +                         | 0623              | <i>Carex appressa</i>                               | Tall Sedge            |
| +                         | 0627              | <i>Carex breviculmis</i>                            | Common Grass-sedge    |
| +                         | 0667              | <i>Cassinia arcuata</i>                             | Drooping Cassinia     |
| +                         | 0788              | <i>Clematis aristata</i>                            | Mountain Clematis     |
| +                         | 0846              | <i>Cotula australis</i>                             | Common Cotula         |
| +                         | 0895              | <i>Cyathea australis</i>                            | Rough Tree-fern       |
| +                         | 1314              | <i>Eucalyptus regnans</i>                           | Mountain Ash          |
| +                         | 8427              | <i>Euchiton</i> spp.                                | Cudweed               |
| +                         | 1431              | <i>Geranium potentilloides</i>                      | Cinquefoil Cranesbill |
| +                         | 1691              | <i>Histiopteris incisa</i>                          | Bat's Wing Fern       |
| 1                         | 1722              | <i>Hydrocotyle hirta</i>                            | Hairy Pennywort       |
| +                         | 1863              | <i>Lagenophora stipitata</i>                        | Common Bottle-daisy   |
| +                         | 2645              | <i>Polystichum proliferum</i>                       | Mother Shield-fern    |
| 3                         | 2777              | <i>Pteridium esculentum</i>                         | Austral Bracken       |
| 1                         | 3107              | <i>Senecio glomeratus</i>                           | Annual Fireweed       |
| 2                         | 3119              | <i>Senecio minimus</i>                              | Shrubby Fireweed      |
| +                         | 9072              | <i>Solanum</i> spp.                                 | Nightshade            |
| +                         | 3348              | <i>Tetrarrhena juncea</i>                           | Forest Wire-grass     |
| 1                         | 5058              | <i>Viola hederacea</i> s.s.                         | Ivy-leaf Violet       |
| <b>Introduced Species</b> |                   |   |                       |
| +                         | 0223              | <i>Anagallis arvensis</i>                           | Pimpernel             |
| +                         | 0782              | <i>Cirsium vulgare</i>                              | Spear Thistle         |
| +                         | 1748              | <i>Hypochoeris radicata</i>                         | Cat's Ear             |
| +                         | 2757              | <i>Prunella vulgaris</i>                            | Self-heal             |
| +                         | 2952              | <i>Rubus fruticosus</i> spp. agg.                   | Blackberry            |
| +                         | 3183              | <i>Solanum nigrum</i> s.l.                          | Black Nightshade      |
| +                         | 3435              | <i>Trifolium repens</i> var. <i>repens</i>          | White Clover          |



F38207

Recs 47 Date : 15 Aug 2000 Location : 146°25'33" 38°28'33" Altitude : 450 Collector : AJH

| Cover/<br>Abund.          | Species<br>Number | Scientific Name                    | Common Name              |
|---------------------------|-------------------|------------------------------------|--------------------------|
| <b>Native Species</b>     |                   |                                    |                          |
| +                         | 0025              | <i>Acacia dealbata</i>             | Silver Wattle            |
| +                         | 0099              | <i>Acacia verniciflua</i>          | Varnish Wattle           |
| +                         | 0105              | <i>Acaena novae-zelandiae</i>      | Bidgee-widgee            |
| +                         | 0403              | <i>Billardiera scandens</i>        | Common Apple-berry       |
| +                         | 0887              | <i>Calochlaena dubia</i>           | Common Ground-fern       |
| 1                         | 0623              | <i>Carex appressa</i>              | Tall Sedge               |
| 1                         | 0667              | <i>Cassinia arcuata</i>            | Drooping Cassinia        |
| 2                         | 0668              | <i>Cassinia longifolia</i>         | Shiny Cassinia           |
| +                         | 0788              | <i>Clematis aristata</i>           | Mountain Clematis        |
| +                         | 0846              | <i>Cotula australis</i>            | Common Cotula            |
| +                         | 0907              | <i>Cynodon dactylon</i>            | Couch                    |
| +                         | 1030              | <i>Dianella tasmanica</i>          | Tasman Flax-lily         |
| 3                         | 1302              | <i>Eucalyptus nitens</i>           | Shining Gum              |
| +                         | 8427              | <i>Euchiton</i> spp.               | Cudweed                  |
| +                         | 8464              | <i>Galium</i> spp.                 | No Common Name           |
| 1                         | 1431              | <i>Geranium potentilloides</i>     | Cinquefoil Cranesbill    |
| 1                         | 1484              | <i>Gonocarpus humilis</i>          | Shade Raspwort           |
| 2                         | 1507              | <i>Goodenia ovata</i>              | Hop Goodenia             |
| +                         | 1691              | <i>Histiopteris incisa</i>         | Bat's Wing Fern          |
| 1                         | 1722              | <i>Hydrocotyle hirta</i>           | Hairy Pennywort          |
| +                         | 1741              | <i>Hypericum gramineum</i>         | Small St John's Wort     |
| +                         | 8581              | <i>Isolepis</i> spp.               | Club Sedge               |
| +                         | 8601              | <i>Juncus</i> spp.                 | Rush                     |
| +                         | 1863              | <i>Lagenophora stipitata</i>       | Common Bottle-daisy      |
| +                         | 3841              | <i>Luzula meridionalis</i>         | Common Woodrush          |
| 1                         | 2312              | <i>Olearia lirata</i>              | Snowy Daisy-bush         |
| +                         | 2319              | <i>Olearia phlogopappa</i>         | Dusty Daisy-bush         |
| 1                         | 1616              | <i>Ozothamnus ferrugineus</i>      | Tree Everlasting         |
| 1                         | 2743              | <i>Prostanthera lasianthos</i>     | Victorian Christmas-bush |
| +                         | 2744              | <i>Prostanthera melissifolia</i>   | Balm Mint-bush           |
| +                         | 2762              | <i>Pseudognaphalium luteoalbum</i> | Jersey Cudweed           |
| +                         | 2777              | <i>Pteridium esculentum</i>        | Austral Bracken          |
| 1                         | 3107              | <i>Senecio glomeratus</i>          | Annual Fireweed          |
| 3                         | 3119              | <i>Senecio minimus</i>             | Shrubby Fireweed         |
| 1                         | 3348              | <i>Tetrarrhena juncea</i>          | Forest Wire-grass        |
| 1                         | 5058              | <i>Viola hederacea</i> s.s.        | Ivy-leaf Violet          |
| <b>Introduced Species</b> |                   |                                    |                          |
| 1                         | 0153              | <i>Agrostis capillaris</i>         | Brown-top Bent           |
| 1                         | 0236              | <i>Anthoxanthum odoratum</i>       | Sweet Vernal-grass       |
| +                         | 0782              | <i>Cirsium vulgare</i>             | Spear Thistle            |
| +                         | 8253              | <i>Conyza</i> spp.                 | Fleabane                 |
| 1                         | 1692              | <i>Holcus lanatus</i>              | Yorkshire Fog            |
| 1                         | 1748              | <i>Hypochoeris radicata</i>        | Cat's Ear                |
| +                         | 9287              | <i>Oxalis</i> spp. (naturalised)   | Wood-sorrel              |
| +                         | 2561              | <i>Plantago lanceolata</i>         | Ribwort                  |
| +                         | 2757              | <i>Prunella vulgaris</i>           | Self-heal                |

|   |      |                                   |                   |
|---|------|-----------------------------------|-------------------|
| 1 | 2952 | <i>Rubus fruticosus</i> spp. agg. | Blackberry        |
| + | 3203 | <i>Sonchus asper</i> s.l.         | Rough Sow-thistle |

**F38208**

Recs 28 Date : 15 Aug 2000 Location : 146°25'39" 38°28'34" Altitude : 450 Collector : AJH

| Cover/<br>Abund. | Species<br>Number | Scientific Name | Common Name |
|------------------|-------------------|-----------------|-------------|
|------------------|-------------------|-----------------|-------------|

**Native Species**

|   |      |   |                       |
|---|------|---|-----------------------|
| 3 | 0025 | <i>Acacia dealbata</i>                            | Silver Wattle         |
| 1 | 0105 | <i>Acaena novae-zelandiae</i>                     | Bidgee-widgee         |
| + | 0403 | <i>Billardiera scandens</i>                       | Common Apple-berry    |
| 2 | 0667 | <i>Cassinia arcuata</i>                           | Drooping Cassinia     |
| 2 | 0668 | <i>Cassinia longifolia</i>                        | Shiny Cassinia        |
| + | 0846 | <i>Cotula australis</i>                           | Common Cotula         |
| + | 8427 | <i>Euchiton</i> spp.                              | Cudweed               |
| + | 8464 | <i>Galium</i> spp.                                | No Common Name        |
| + | 1431 | <i>Geranium potentilloides</i>                    | Cinquefoil Cranesbill |
| 1 | 1722 | <i>Hydrocotyle hirta</i>                          | Hairy Pennywort       |
| + | 1863 | <i>Lagenophora stipitata</i>                      | Common Bottle-daisy   |
| 1 | 2179 | <i>Microlaena stipoides</i> var. <i>stipoides</i> | Weeping Grass         |
| 2 | 2312 | <i>Olearia lirata</i>                             | Snowy Daisy-bush      |
| + | 2381 | <i>Oxalis exilis</i>                              | Shady Wood-sorrel     |
| 2 | 1616 | <i>Ozothamnus ferrugineus</i>                     | Tree Everlasting      |
| + | 2645 | <i>Polystichum proliferum</i>                     | Mother Shield-fern    |
| 2 | 2744 | <i>Prostanthera melissifolia</i>                  | Balm Mint-bush        |
| + | 2777 | <i>Pteridium esculentum</i>                       | Austral Bracken       |
| 3 | 3119 | <i>Senecio minimus</i>                            | Shrubby Fireweed      |
| 2 | 3348 | <i>Tetrarrhena juncea</i>                         | Forest Wire-grass     |
| + | 3476 | <i>Urtica incisa</i>                              | Scrub Nettle          |
| 1 | 5058 | <i>Viola hederacea</i> s.s.                       | Ivy-leaf Violet       |

**Introduced Species**

|   |      |                                   |                     |
|---|------|-----------------------------------|---------------------|
| + | 0782 | <i>Cirsium vulgare</i>            | Spear Thistle       |
| 5 | 1282 | <i>Eucalyptus globulus</i>        | Southern Blue-gum   |
| + | 1692 | <i>Holcus lanatus</i>             | Yorkshire Fog       |
| 1 | 2580 | <i>Poa annua</i>                  | Annual Meadow-grass |
| + | 2757 | <i>Prunella vulgaris</i>          | Self-heal           |
| + | 2952 | <i>Rubus fruticosus</i> spp. agg. | Blackberry          |

**F38209**

Recs 28 Date : 15 Aug 2000 Location : 146°27'16" 38°28'14" Altitude : 510 Collector : AJH

| Cover/<br>Abund. | Species<br>Number | Scientific Name | Common Name |
|------------------|-------------------|-----------------|-------------|
|------------------|-------------------|-----------------|-------------|

**Native Species**

|   |      |   |                   |
|---|------|---|-------------------|
| 2 | 0025 | <i>Acacia dealbata</i>                              | Silver Wattle     |
| 1 | 0057 | <i>Acacia melanoxylon</i>                           | Blackwood         |
| 1 | 0105 | <i>Acaena novae-zelandiae</i>                       | Bidgee-widgee     |
| + | 0287 | <i>Asplenium bulbiferum</i> ssp. <i>gracillimum</i> | Mother Spleenwort |

|   |      |   |                       |
|---|------|---|-----------------------|
| + | 0413 | <i>Blechnum watsii</i>                            | Hard Water-fern       |
| + | 0623 | <i>Carex appressa</i>                             | Tall Sedge            |
| + | 0666 | <i>Cassinia aculeata</i>                          | Common Cassinia       |
| 1 | 0788 | <i>Clematis aristata</i>                          | Mountain Clematis     |
| 2 | 0822 | <i>Coprosma quadrifida</i>                        | Prickly Currant-bush  |
| + | 0846 | <i>Cotula australis</i>                           | Common Cotula         |
| 2 | 0895 | <i>Cyathea australis</i>                          | Rough Tree-fern       |
| 4 | 1314 | <i>Eucalyptus regnans</i>                         | Mountain Ash          |
| + | 1431 | <i>Geranium potentilloides</i>                    | Cinquefoil Cranesbill |
| 1 | 1722 | <i>Hydrocotyle hirta</i>                          | Hairy Pennywort       |
| 1 | 2179 | <i>Microlaena stipoides</i> var. <i>stipoides</i> | Weeping Grass         |
| 3 | 2312 | <i>Olearia lirata</i>                             | Snowy Daisy-bush      |
| + | 2515 | <i>Pimelea axiflora</i>                           | Bootlace Bush         |
| 1 | 2645 | <i>Polystichum proliferum</i>                     | Mother Shield-fern    |
| + | 2777 | <i>Pteridium esculentum</i>                       | Austral Bracken       |
| + | 8978 | <i>Ranunculus</i> spp.                            | Buttercup             |
| 3 | 3114 | <i>Senecio pinnatifolius</i>                      | Variable Groundsel    |
| + | 3250 | <i>Stellaria flaccida</i>                         | Forest Starwort       |
| 2 | 3348 | <i>Tetrarrhena juncea</i>                         | Forest Wire-grass     |
| + | 3512 | <i>Veronica plebeia</i>                           | Trailing Speedwell    |

**Introduced Species**

|   |      |                                   |                     |
|---|------|-----------------------------------|---------------------|
| + | 2058 | <i>Lotus corniculatus</i>         | Bird's-foot Trefoil |
| 1 | 2580 | <i>Poa annua</i>                  | Annual Meadow-grass |
| + | 2757 | <i>Prunella vulgaris</i>          | Self-heal           |
| 2 | 2952 | <i>Rubus fruticosus</i> spp. agg. | Blackberry          |

**F38210**

Recs 19 Date : 15 Aug 2000 Location : 146°23'26" 38°32'31" Altitude : 390 Collector : AJH

| Cover/<br>Abund. | Species<br>Number | Scientific Name | Common Name |
|------------------|-------------------|-----------------|-------------|
|------------------|-------------------|-----------------|-------------|

**Native Species**

|   |      |   |                      |
|---|------|---|----------------------|
| 3 | 0057 | <i>Acacia melanoxylon</i>                           | Blackwood            |
| + | 0287 | <i>Asplenium bulbiferum</i> ssp. <i>gracillimum</i> | Mother Spleenwort    |
| + | 0337 | <i>Australina pusilla</i> ssp. <i>muelleri</i>      | Shade Nettle         |
| + | 0406 | <i>Blechnum fluviatile</i>                          | Ray Water-fern       |
| 1 | 0413 | <i>Blechnum watsii</i>                              | Hard Water-fern      |
| 1 | 0788 | <i>Clematis aristata</i>                            | Mountain Clematis    |
| 1 | 0822 | <i>Coprosma quadrifida</i>                          | Prickly Currant-bush |
| + | 0831 | <i>Correa lawrenceana</i>                           | Mountain Correa      |
| 4 | 0895 | <i>Cyathea australis</i>                            | Rough Tree-fern      |
| 1 | 1039 | <i>Dicksonia antarctica</i>                         | Soft Tree-fern       |
| 3 | 1304 | <i>Eucalyptus obliqua</i>                           | Messmate Stringybark |
| 1 | 1600 | <i>Hedycarya angustifolia</i>                       | Austral Mulberry     |
| 3 | 2283 | <i>Nothofagus cunninghamii</i>                      | Myrtle Beech         |
| + | 2540 | <i>Pittosporum bicolor</i>                          | Banyalla             |
| + | 2643 | <i>Polyscias sambucifolia</i>                       | Elderberry Panax     |
| 1 | 2645 | <i>Polystichum proliferum</i>                       | Mother Shield-fern   |
| 1 | 3337 | <i>Tasmannia lanceolata</i>                         | Mountain Pepper      |
| 1 | 3348 | <i>Tetrarrhena juncea</i>                           | Forest Wire-grass    |
| + | 5058 | <i>Viola hederacea</i> s.s.                         | Ivy-leaf Violet      |

## F38211

Recs 32 Date : 04 Sep 2000 Location : 146°37'18" 38°21'36" Altitude : 440 Collector : AJH

| Cover/<br>Abund.          | Species<br>Number | Scientific Name                                   | Common Name           |
|---------------------------|-------------------|---|-----------------------|
| <b>Native Species</b>     |                   |   |                       |
| 3                         | 0099              | <i>Acacia verniciflua</i>                         | Varnish Wattle        |
| 1                         | 0105              | <i>Acaena novae-zelandiae</i>                     | Bidgee-widgee         |
| 1                         | 9099              | <i>Austrostipa</i> spp.                           | Spear Grass           |
| +                         | 0403              | <i>Billardiera scandens</i>                       | Common Apple-berry    |
| +                         | 0666              | <i>Cassinia aculeata</i>                          | Common Cassinia       |
| 2                         | 0788              | <i>Clematis aristata</i>                          | Mountain Clematis     |
| 3                         | 0822              | <i>Coprosma quadrifida</i>                        | Prickly Currant-bush  |
| +                         | 1267              | <i>Eucalyptus cypellocarpa</i>                    | Mountain Grey-gum     |
| 1                         | 1304              | <i>Eucalyptus obliqua</i>                         | Messmate Stringybark  |
| +                         | 8464              | <i>Galium</i> spp.                                | No Common Name        |
| 1                         | 1431              | <i>Geranium potentilloides</i>                    | Cinquefoil Cranesbill |
| +                         | 1484              | <i>Gonocarpus humilis</i>                         | Shade Raspwort        |
| 1                         | 1507              | <i>Goodenia ovata</i>                             | Hop Goodenia          |
| 1                         | 1722              | <i>Hydrocotyle hirta</i>                          | Hairy Pennywort       |
| 1                         | 1856              | <i>Kunzea ericoides</i>                           | Burgan                |
| 3                         | 1861              | <i>Lagenophora gracilis</i>                       | Slender Bottle-daisy  |
| +                         | 3841              | <i>Luzula meridionalis</i>                        | Common Woodrush       |
| 2                         | 2179              | <i>Microlaena stipoides</i> var. <i>stipoides</i> | Weeping Grass         |
| 2                         | 2312              | <i>Olearia lirata</i>                             | Snowy Daisy-bush      |
| +                         | 2381              | <i>Oxalis exilis</i>                              | Shady Wood-sorrel     |
| 2                         | 1616              | <i>Ozothamnus ferrugineus</i>                     | Tree Everlasting      |
| +                         | 2399              | <i>Pandorea pandorana</i>                         | Wonga Vine            |
| 1                         | 2555              | <i>Plantago debilis</i>                           | Shade Plantain        |
| 3                         | 2610              | <i>Poa tenera</i>                                 | Slender Tussock-grass |
| +                         | 2650              | <i>Pomaderris aspera</i>                          | Hazel Pomaderris      |
| 2                         | 2777              | <i>Pteridium esculentum</i>                       | Austral Bracken       |
| +                         | 2999              | <i>Sambucus gaudichaudiana</i>                    | White Elderberry      |
| +                         | 3255              | <i>Stellaria pungens</i>                          | Prickly Starwort      |
| 1                         | 3503              | <i>Veronica calycina</i>                          | Hairy Speedwell       |
| 1                         | 5058              | <i>Viola hederacea</i> s.s.                       | Ivy-leaf Violet       |
| <b>Introduced Species</b> |                   |   |                       |
| 4                         | 1282              | <i>Eucalyptus globulus</i>                        | Southern Blue-gum     |
| +                         | 1748              | <i>Hypochoeris radicata</i>                       | Cat's Ear             |

## F38212

Recs 47 Date : 04 Sep 2000 Location : 146°40'59" 38°21'15" Altitude : 380 Collector : AJH

| Cover/<br>Abund.      | Species<br>Number | Scientific Name           | Common Name    |
|-----------------------|-------------------|---------------------------|----------------|
| <b>Native Species</b> |                   |                           |                |
| +                     | 0025              | <i>Acacia dealbata</i>    | Silver Wattle  |
| 1                     | 0057              | <i>Acacia melanoxylon</i> | Blackwood      |
| 1                     | 0099              | <i>Acacia verniciflua</i> | Varnish Wattle |

|   |      |   |                        |
|---|------|---|------------------------|
| 1 | 0105 | <i>Acaena novae-zelandiae</i>                     | Bidgee-widgee          |
| + | 9099 | <i>Austrostipa</i> spp.                           | Spear Grass            |
| + | 0627 | <i>Carex breviculmis</i>                          | Common Grass-sedge     |
| + | 0666 | <i>Cassinia aculeata</i>                          | Common Cassinia        |
| 1 | 0788 | <i>Clematis aristata</i>                          | Mountain Clematis      |
| 2 | 0822 | <i>Coprosma quadrifida</i>                        | Prickly Currant-bush   |
| 1 | 1030 | <i>Dianella tasmanica</i>                         | Tasman Flax-lily       |
| 3 | 1304 | <i>Eucalyptus obliqua</i>                         | Messmate Stringybark   |
| 2 | 3828 | <i>Eucalyptus radiata</i> ssp. <i>radiata</i>     | Narrow-leaf Peppermint |
| + | 8427 | <i>Euchiton</i> spp.                              | Cudweed                |
| + | 8464 | <i>Galium</i> spp.                                | No Common Name         |
| 1 | 1431 | <i>Geranium potentilloides</i>                    | Cinquefoil Cranesbill  |
| 1 | 1484 | <i>Gonocarpus humilis</i>                         | Shade Raspwort         |
| 1 | 1507 | <i>Goodenia ovata</i>                             | Hop Goodenia           |
| 1 | 1722 | <i>Hydrocotyle hirta</i>                          | Hairy Pennywort        |
| + | 1856 | <i>Kunzea ericoides</i>                           | Burgan                 |
| 1 | 1861 | <i>Lagenophora gracilis</i>                       | Slender Bottle-daisy   |
| 1 | 1919 | <i>Lepidosperma elatius</i>                       | Tall Sword-sedge       |
| 2 | 2046 | <i>Lomandra longifolia</i>                        | Spiny-headed Mat-rush  |
| + | 3841 | <i>Luzula meridionalis</i>                        | Common Woodrush        |
| 2 | 2179 | <i>Microlaena stipoides</i> var. <i>stipoides</i> | Weeping Grass          |
| + | 2312 | <i>Olearia lirata</i>                             | Snowy Daisy-bush       |
| + | 2381 | <i>Oxalis exilis</i>                              | Shady Wood-sorrel      |
| 1 | 2399 | <i>Pandorea pandorana</i>                         | Wonga Vine             |
| 1 | 2555 | <i>Plantago debilis</i>                           | Shade Plantain         |
| + | 2600 | <i>Poa labillardierei</i>                         | Common Tussock-grass   |
| 3 | 2610 | <i>Poa tenera</i>                                 | Slender Tussock-grass  |
| + | 2645 | <i>Polystichum proliferum</i>                     | Mother Shield-fern     |
| 2 | 2777 | <i>Pteridium esculentum</i>                       | Austral Bracken        |
| + | 2810 | <i>Pterostylis pedunculata</i>                    | Maroonhood             |
| + | 3111 | <i>Senecio hispidulus</i>                         | Rough Fireweed         |
| 1 | 3114 | <i>Senecio pinnatifolius</i>                      | Variable Groundsel     |
| + | 3129 | <i>Senecio tenuiflorus</i>                        | Slender Fireweed       |
| + | 3255 | <i>Stellaria pungens</i>                          | Prickly Starwort       |
| + | 9134 | <i>Thelymitra</i> spp.                            | Sun Orchid             |
| 1 | 3503 | <i>Veronica calycina</i>                          | Hairy Speedwell        |
| 1 | 5058 | <i>Viola hederacea</i> s.s.                       | Ivy-leaf Violet        |
| + | 9236 | <i>Wahlenbergia</i> spp.                          | No Common Name         |

**Introduced Species**

|   |      |                                       |                   |
|---|------|---------------------------------------|-------------------|
| + | 0223 | <i>Anagallis arvensis</i>             | Pimpernel         |
| 2 | 1282 | <i>Eucalyptus globulus</i>            | Southern Blue-gum |
| + | 1748 | <i>Hypochoeris radicata</i>           | Cat's Ear         |
| + | 2917 | <i>Raphanus raphanistrum</i>          | Wild Radish       |
| + | 2952 | <i>Rubus fruticosus</i> spp. agg.     | Blackberry        |
| + | 3336 | <i>Taraxacum officinale</i> spp. agg. | Garden Dandelion  |

**F38213**

Recs 27 Date : 05 Sep 2000 Location : 146°57'33" 38°22'02" Altitude : 70 Collector : AJH

| Cover/<br>Abund.          | Species<br>Number | Scientific Name                                   | Common Name           |
|---------------------------|-------------------|---|-----------------------|
| <b>Native Species</b>     |                   |   |                       |
| +                         | 8003              | <i>Acacia</i> spp.                                | Wattle                |
| 1                         | 8079              | <i>Arthropodium</i> spp. (s.s.)                   | Vanilla Lily          |
| +                         | 9099              | <i>Austrostipa</i> spp.                           | Spear Grass           |
| 1                         | 3689              | <i>Drosera peltata</i>                            | Pale Sundew           |
| +                         | 8427              | <i>Euchiton</i> spp.                              | Cudweed               |
| 3                         | 1394              | <i>Gahnia radula</i>                              | Thatch Saw-sedge      |
| 1                         | 1723              | <i>Hydrocotyle laxiflora</i>                      | Stinking Pennywort    |
| +                         | 1741              | <i>Hypericum gramineum</i>                        | Small St John's Wort  |
| 1                         | 1779              | <i>Isolepis inundata</i>                          | Swamp Club-sedge      |
| 2                         | 1856              | <i>Kunzea ericoides</i>                           | Burgan                |
| 1                         | 1863              | <i>Lagenophora stipitata</i>                      | Common Bottle-daisy   |
| +                         | 4709              | <i>Lomandra filiformis</i> ssp. <i>coriacea</i>   | Wattle Mat-rush       |
| +                         | 2046              | <i>Lomandra longifolia</i>                        | Spiny-headed Mat-rush |
| 2                         | 2179              | <i>Microlaena stipoides</i> var. <i>stipoides</i> | Weeping Grass         |
| 1                         | 2381              | <i>Oxalis exilis</i>                              | Shady Wood-sorrel     |
| 1                         | 2683              | <i>Poranthera microphylla</i>                     | Small Poranthera      |
| +                         | 3129              | <i>Senecio tenuiflorus</i>                        | Slender Fireweed      |
| +                         | 3503              | <i>Veronica calycina</i>                          | Hairy Speedwell       |
| 1                         | 5058              | <i>Viola hederacea</i> s.s.                       | Ivy-leaf Violet       |
| <b>Introduced Species</b> |                   |   |                       |
| +                         | 0255              | <i>Arctotheca calendula</i>                       | Cape Weed             |
| +                         | 0782              | <i>Cirsium vulgare</i>                            | Spear Thistle         |
| 1                         | 1692              | <i>Holcus lanatus</i>                             | Yorkshire Fog         |
| +                         | 1748              | <i>Hypochoeris radicata</i>                       | Cat's Ear             |
| +                         | 8683              | <i>Lolium</i> spp.                                | No Common Name        |
| +                         | 2058              | <i>Lotus corniculatus</i>                         | Bird's-foot Trefoil   |
| +                         | 9287              | <i>Oxalis</i> spp. (naturalised)                  | Wood-sorrel           |
| +                         | 2561              | <i>Plantago lanceolata</i>                        | Ribwort               |

**F38214**

Recs 44 Date : 05 Sep 2000 Location : 146°56'55" 38°21'58" Altitude : 90 Collector : AJH

| Cover/<br>Abund.      | Species<br>Number | Scientific Name                 | Common Name       |
|-----------------------|-------------------|---------------------------------|-------------------|
| <b>Native Species</b> |                   |                                 |                   |
| +                     | 0056              | <i>Acacia mearnsii</i>          | Black Wattle      |
| 1                     | 0110              | <i>Acianthus caudatus</i>       | Mayfly Orchid     |
| +                     | 0677              | <i>Allocasuarina littoralis</i> | Black Sheoak      |
| +                     | 8079              | <i>Arthropodium</i> spp. (s.s.) | Vanilla Lily      |
| +                     | 0304              | <i>Astroloma humifusum</i>      | Cranberry Heath   |
| +                     | 8361              | <i>Austrodanthonia</i> spp.     | Wallaby Grass     |
| 1                     | 0440              | <i>Bossiaea prostrata</i>       | Creeping Bossiaea |

|   |             |   |                                |
|---|-------------|---|--------------------------------|
| 1 | 8171        | <i>Caladenia</i> spp.                             | Caladenia                      |
| + | 0801        | <i>Comesperma volubile</i>                        | Love Creeper                   |
| 1 | 3689        | <i>Drosera peltata</i>                            | Pale Sundew                    |
| 3 | 1300        | <i>Eucalyptus muelleriana</i>                     | Yellow Stringybark             |
| 2 | 1304        | <i>Eucalyptus obliqua</i>                         | Messmate Stringybark           |
| + | 8427        | <i>Euchiton</i> spp.                              | Cudweed                        |
| 2 | 1394        | <i>Gahnia radula</i>                              | Thatch Saw-sedge               |
| 1 | 1445        | <i>Glossodia major</i>                            | Wax-lip Orchid                 |
| 1 | 1723        | <i>Hydrocotyle laxiflora</i>                      | Stinking Pennywort             |
| + | 1741        | <i>Hypericum gramineum</i>                        | Small St John's Wort           |
| 3 | 1856        | <i>Kunzea ericoides</i>                           | Burgan                         |
| 1 | 1863        | <i>Lagenophora stipitata</i>                      | Common Bottle-daisy            |
| + | 1923        | <i>Lepidosperma laterale</i>                      | Variable Sword-sedge           |
| 1 | 1943        | <i>Leptorhynchus nitidulus</i>                    | Shiny Buttons                  |
| 2 | 4709        | <i>Lomandra filiformis</i> ssp. <i>coriacea</i>   | Wattle Mat-rush                |
| 2 | 4710        | <i>Lomandra filiformis</i> ssp. <i>filiformis</i> | Wattle Mat-rush                |
| 2 | 2046        | <i>Lomandra longifolia</i>                        | Spiny-headed Mat-rush          |
| 1 | 2147        | <i>Melaleuca ericifolia</i>                       | Swamp Paperbark                |
| 1 | 2179        | <i>Microlaena stipoides</i> var. <i>stipoides</i> | Weeping Grass                  |
| + | 2344        | <i>Opercularia varia</i>                          | Variable Stinkweed             |
| + | 7305        | <i>Orchidaceae</i> spp.                           | No Common Name                 |
| + | 2381        | <i>Oxalis exilis</i>                              | Shady Wood-sorrel              |
| 1 | 2523        | <i>Pimelea humilis</i>                            | Common Rice-flower             |
| 1 | 4834        | <i>Poa sieberiana</i> var. <i>hirtella</i>        | Grey Tussock-grass             |
| + | 2683        | <i>Poranthera microphylla</i>                     | Small Poranthera               |
| + | 2777        | <i>Pteridium esculentum</i>                       | Austral Bracken                |
| + | <b>4728</b> | <b><i>VvPterostylis chlorogramma</i></b>          | <b>Green-striped Greenhood</b> |
| 1 | 2802        | <i>Pterostylis longifolia</i> s.l.                | Tall Greenhood                 |
| 1 | 2806        | <i>Pterostylis nutans</i>                         | Nodding Greenhood              |
| + | 8978        | <i>Ranunculus</i> spp.                            | Buttercup                      |
| 1 | 3348        | <i>Tetrarrhena juncea</i>                         | Forest Wire-grass              |
| + | 9134        | <i>Thelymitra</i> spp.                            | Sun Orchid                     |
| 1 | 3421        | <i>Tricoryne elatior</i>                          | Yellow Rush-lily               |
| + | 5058        | <i>Viola hederacea</i> s.s.                       | Ivy-leaf Violet                |
| + | 9236        | <i>Wahlenbergia</i> spp.                          | No Common Name                 |
| 1 | 3588        | <i>Xanthorrhoea minor</i> ssp. <i>lutea</i>       | Small Grass-tree               |

**Introduced Species**

|   |      |                             |           |
|---|------|-----------------------------|-----------|
| + | 1748 | <i>Hypochoeris radicata</i> | Cat's Ear |
|---|------|-----------------------------|-----------|

**F38215**

Recs 42 Date : 05 Sep 2000 Location : 146°45'00" 38°28'05" Altitude : 110 Collector : AJH

| Cover/<br>Abund. | Species<br>Number | Scientific Name | Common Name |
|------------------|-------------------|-----------------|-------------|
|------------------|-------------------|-----------------|-------------|

**Native Species**

|   |             |                                 |                      |
|---|-------------|---------------------------------|----------------------|
| + | <b>0044</b> | <b><i>RrAcacia howittii</i></b> | <b>Sticky Wattle</b> |
| + | 0057        | <i>Acacia melanoxylon</i>       | Blackwood            |
| 1 | 8007        | <i>Acianthus</i> spp.           | Mosquito Orchid      |
| + | 0288        | <i>Asplenium flabellifolium</i> | Necklace Fern        |
| 1 | 0304        | <i>Astroloma humifusum</i>      | Cranberry Heath      |
| + | 0440        | <i>Bossiaea prostrata</i>       | Creeping Bossiaea    |
| + | 0508        | <i>Brunonia australis</i>       | Blue Pincushion      |

|   |      |   |                       |
|---|------|---|-----------------------|
| 1 | 0668 | <i>Cassinia longifolia</i>                        | Shiny Cassinia        |
| + | 0801 | <i>Comesperma volubile</i>                        | Love Creeper          |
| 1 | 3689 | <i>Drosera peltata</i>                            | Pale Sundew           |
| 1 | 1165 | <i>Epacris impressa</i>                           | Common Heath          |
| 3 | 1300 | <i>Eucalyptus muelleriana</i>                     | Yellow Stringybark    |
| 1 | 1304 | <i>Eucalyptus obliqua</i>                         | Messmate Stringybark  |
| 1 | 1394 | <i>Gahnia radula</i>                              | Thatch Saw-sedge      |
| + | 1445 | <i>Glossodia major</i>                            | Wax-lip Orchid        |
| 1 | 1455 | <i>Glycine clandestina</i>                        | Twining Glycine       |
| 1 | 1626 | <i>Helichrysum scorpioides</i>                    | Button Everlasting    |
| 2 | 5436 | <i>Hibbertia aspera</i> ssp. <i>aspera</i> s.s.   | Rough Guinea-flower   |
| 1 | 1723 | <i>Hydrocotyle laxiflora</i>                      | Stinking Pennywort    |
| + | 1741 | <i>Hypericum gramineum</i>                        | Small St John's Wort  |
| + | 1847 | <i>Kennedia prostrata</i>                         | Running Postman       |
| 1 | 1863 | <i>Lagenophora stipitata</i>                      | Common Bottle-daisy   |
| 1 | 4709 | <i>Lomandra filiformis</i> ssp. <i>coriacea</i>   | Wattle Mat-rush       |
| 3 | 4710 | <i>Lomandra filiformis</i> ssp. <i>filiformis</i> | Wattle Mat-rush       |
| 1 | 2046 | <i>Lomandra longifolia</i>                        | Spiny-headed Mat-rush |
| 1 | 2179 | <i>Microlaena stipoides</i> var. <i>stipoides</i> | Weeping Grass         |
| + | 2312 | <i>Olearia lirata</i>                             | Snowy Daisy-bush      |
| + | 2344 | <i>Opercularia varia</i>                          | Variable Stinkweed    |
| + | 2381 | <i>Oxalis exilis</i>                              | Shady Wood-sorrel     |
| 1 | 2523 | <i>Pimelea humilis</i>                            | Common Rice-flower    |
| + | 2555 | <i>Plantago debilis</i>                           | Shade Plantain        |
| + | 2608 | <i>Poa sieberiana</i>                             | Grey Tussock-grass    |
| 1 | 2610 | <i>Poa tenera</i>                                 | Slender Tussock-grass |
| + | 2683 | <i>Poranthera microphylla</i>                     | Small Poranthera      |
| 1 | 2777 | <i>Pteridium esculentum</i>                       | Austral Bracken       |
| + | 3244 | <i>Stackhousia monogyna</i>                       | Creamy Stackhousia    |
| + | 9134 | <i>Thelymitra</i> spp.                            | Sun Orchid            |
| + | 3503 | <i>Veronica calycina</i>                          | Hairy Speedwell       |
| 1 | 5058 | <i>Viola hederacea</i> s.s.                       | Ivy-leaf Violet       |
| + | 9236 | <i>Wahlenbergia</i> spp.                          | No Common Name        |

**Introduced Species**

|   |      |                             |              |
|---|------|-----------------------------|--------------|
| + | 1748 | <i>Hypochoeris radicata</i> | Cat's Ear    |
| + | 0772 | <i>Leucanthemum vulgare</i> | Ox-eye Daisy |

**F38216**

Recs 33 Date : 06 Sep 2000 Location : 146°31'07" 38°28'02" Altitude : 500 Collector : AJH

| Cover/<br>Abund. | Species<br>Number | Scientific Name | Common Name |
|------------------|-------------------|-----------------|-------------|
|------------------|-------------------|-----------------|-------------|

**Native Species**

|   |      |   |                      |
|---|------|---|----------------------|
| 1 | 0025 | <i>Acacia dealbata</i>                              | Silver Wattle        |
| + | 0287 | <i>Asplenium bulbiferum</i> ssp. <i>gracillimum</i> | Mother Spleenwort    |
| + | 0382 | <i>Bedfordia arborescens</i>                        | Blanket-leaf         |
| + | 0406 | <i>Blechnum fluviatile</i>                          | Ray Water-fern       |
| + | 0408 | <i>Blechnum nudum</i>                               | Fishbone Water-fern  |
| + | 0666 | <i>Cassinia aculeata</i>                            | Common Cassinia      |
| 1 | 0788 | <i>Clematis aristata</i>                            | Mountain Clematis    |
| 2 | 0822 | <i>Coprosma quadrifida</i>                          | Prickly Currant-bush |
| 2 | 0831 | <i>Correa lawrenceana</i>                           | Mountain Correa      |



|   |      |  |                          |
|---|------|--|--------------------------|
| 1 | 0895 | <i>Cyathea australis</i>                             | Rough Tree-fern          |
| + | 1039 | <i>Dicksonia antarctica</i>                          | Soft Tree-fern           |
| 3 | 1314 | <i>Eucalyptus regnans</i>                            | Mountain Ash             |
| + | 1366 | <i>Fieldia australis</i>                             | Fieldia                  |
| + | 1431 | <i>Geranium potentilloides</i>                       | Cinquefoil Cranesbill    |
| + | 1507 | <i>Goodenia ovata</i>                                | Hop Goodenia             |
| 1 | 1600 | <i>Hedycarya angustifolia</i>                        | Austral Mulberry         |
| 1 | 1722 | <i>Hydrocotyle hirta</i>                             | Hairy Pennywort          |
| + | 2183 | <i>Microsorium pustulatum</i> ssp. <i>pustulatum</i> | Kangaroo Fern            |
| 4 | 2299 | <i>Olearia argophylla</i>                            | Musk Daisy-bush          |
| 2 | 2312 | <i>Olearia lirata</i>                                | Snowy Daisy-bush         |
| + | 2399 | <i>Pandorea pandorana</i>                            | Wonga Vine               |
| 1 | 2540 | <i>Pittosporum bicolor</i>                           | Banyalla                 |
| 1 | 2645 | <i>Polystichum proliferum</i>                        | Mother Shield-fern       |
| 3 | 2650 | <i>Pomaderris aspera</i>                             | Hazel Pomaderris         |
| 1 | 2743 | <i>Prostanthera lasianthos</i>                       | Victorian Christmas-bush |
| + | 2777 | <i>Pteridium esculentum</i>                          | Austral Bracken          |
| + | 8946 | <i>Pterostylis</i> spp.                              | Greenhood                |
| + | 2999 | <i>Sambucus gaudichaudiana</i>                       | White Elderberry         |
| + | 3129 | <i>Senecio tenuiflorus</i>                           | Slender Fireweed         |
| + | 3337 | <i>Tasmania lanceolata</i>                           | Mountain Pepper          |
| + | 3348 | <i>Tetrarrhena juncea</i>                            | Forest Wire-grass        |
| + | 3512 | <i>Veronica plebeia</i>                              | Trailing Speedwell       |
| 1 | 5058 | <i>Viola hederacea</i> s.s.                          | Ivy-leaf Violet          |

**F38217**

Recs 17 Date : 06 Sep 2000 Location : 146°31'19" 38°28'06" Altitude : 500 Collector : AJH

| Cover/<br>Abund.          | Species<br>Number | Scientific Name                   | Common Name              |
|---------------------------|-------------------|-----------------------------------|--------------------------|
| <b>Native Species</b>     |                   |                                   |                          |
| 3                         | 0025              | <i>Acacia dealbata</i>            | Silver Wattle            |
| +                         | 0057              | <i>Acacia melanoxylon</i>         | Blackwood                |
| 1                         | 0408              | <i>Blechnum nudum</i>             | Fishbone Water-fern      |
| 2                         | 0413              | <i>Blechnum wattsii</i>           | Hard Water-fern          |
| +                         | 0666              | <i>Cassinia aculeata</i>          | Common Cassinia          |
| +                         | 0788              | <i>Clematis aristata</i>          | Mountain Clematis        |
| 1                         | 0822              | <i>Coprosma quadrifida</i>        | Prickly Currant-bush     |
| 3                         | 0831              | <i>Correa lawrenceana</i>         | Mountain Correa          |
| 2                         | 0895              | <i>Cyathea australis</i>          | Rough Tree-fern          |
| 4                         | 1314              | <i>Eucalyptus regnans</i>         | Mountain Ash             |
| +                         | 2299              | <i>Olearia argophylla</i>         | Musk Daisy-bush          |
| 3                         | 2312              | <i>Olearia lirata</i>             | Snowy Daisy-bush         |
| 3                         | 2645              | <i>Polystichum proliferum</i>     | Mother Shield-fern       |
| 3                         | 2650              | <i>Pomaderris aspera</i>          | Hazel Pomaderris         |
| 1                         | 2743              | <i>Prostanthera lasianthos</i>    | Victorian Christmas-bush |
| 1                         | 3348              | <i>Tetrarrhena juncea</i>         | Forest Wire-grass        |
| <b>Introduced Species</b> |                   |                                   |                          |
| +                         | 2952              | <i>Rubus fruticosus</i> spp. agg. | Blackberry               |

**F38218**

Recs 32 Date : 06 Sep 2000 Location : 146°40'58" 38°24'29" Altitude : 470 Collector : AJH

| Cover/<br>Abund.          | Species<br>Number | Scientific Name                                   | Common Name           |
|---------------------------|-------------------|---|-----------------------|
| <b>Native Species</b>     |                   |   |                       |
| 3                         | 0099              | <i>Acacia verniciflua</i>                         | Varnish Wattle        |
| +                         | 0403              | <i>Billardiera scandens</i>                       | Common Apple-berry    |
| +                         | 0627              | <i>Carex breviculmis</i>                          | Common Grass-sedge    |
| 1                         | 0788              | <i>Clematis aristata</i>                          | Mountain Clematis     |
| 2                         | 0822              | <i>Coprosma quadrifida</i>                        | Prickly Currant-bush  |
| 3                         | 1267              | <i>Eucalyptus cypellocarpa</i>                    | Mountain Grey-gum     |
| 3                         | 1300              | <i>Eucalyptus muelleriana</i>                     | Yellow Stringybark    |
| +                         | 8464              | <i>Galium</i> spp.                                | No Common Name        |
| +                         | 1431              | <i>Geranium potentilloides</i>                    | Cinquefoil Cranesbill |
| +                         | 1484              | <i>Gonocarpus humilis</i>                         | Shade Raspwort        |
| 2                         | 1507              | <i>Goodenia ovata</i>                             | Hop Goodenia          |
| 1                         | 1723              | <i>Hydrocotyle laxiflora</i>                      | Stinking Pennywort    |
| +                         | 8601              | <i>Juncus</i> spp.                                | Rush                  |
| 1                         | 1863              | <i>Lagenophora stipitata</i>                      | Common Bottle-daisy   |
| +                         | 3841              | <i>Luzula meridionalis</i>                        | Common Woodrush       |
| 1                         | 2179              | <i>Microlaena stipoides</i> var. <i>stipoides</i> | Weeping Grass         |
| 3                         | 2312              | <i>Olearia lirata</i>                             | Snowy Daisy-bush      |
| +                         | 2399              | <i>Pandorea pandorana</i>                         | Wonga Vine            |
| +                         | 2608              | <i>Poa sieberiana</i>                             | Grey Tussock-grass    |
| 2                         | 2610              | <i>Poa tenera</i>                                 | Slender Tussock-grass |
| +                         | 2650              | <i>Pomaderris aspera</i>                          | Hazel Pomaderris      |
| 1                         | 2777              | <i>Pteridium esculentum</i>                       | Austral Bracken       |
| +                         | 8946              | <i>Pterostylis</i> spp.                           | Greenhood             |
| +                         | 3114              | <i>Senecio pinnatifolius</i>                      | Variable Groundsel    |
| 1                         | 3129              | <i>Senecio tenuiflorus</i>                        | Slender Fireweed      |
| +                         | 3255              | <i>Stellaria pungens</i>                          | Prickly Starwort      |
| 1                         | 3348              | <i>Tetrarrhena juncea</i>                         | Forest Wire-grass     |
| 1                         | 3503              | <i>Veronica calycina</i>                          | Hairy Speedwell       |
| 1                         | 5058              | <i>Viola hederacea</i> s.s.                       | Ivy-leaf Violet       |
| +                         | 9236              | <i>Wahlenbergia</i> spp.                          | No Common Name        |
| <b>Introduced Species</b> |                   |   |                       |
| +                         | 0236              | <i>Anthoxanthum odoratum</i>                      | Sweet Vernal-grass    |
| +                         | 1748              | <i>Hypochoeris radicata</i>                       | Cat's Ear             |

**F38219**

Recs 39 Date : 06 Sep 2000 Location : 146°39'47" 38°27'12" Altitude : 300 Collector : AJH

| Cover/<br>Abund.      | Species<br>Number | Scientific Name                 | Common Name   |
|-----------------------|-------------------|---------------------------------|---------------|
| <b>Native Species</b> |                   |                                 |               |
| 4                     | 0044              | <i>RrAcacia howittii</i>        | Sticky Wattle |
| 1                     | 8079              | <i>Arthropodium</i> spp. (s.s.) | Vanilla Lily  |

|   |      |   |                       |
|---|------|---|-----------------------|
| 1 | 0512 | <i>Burchardia umbellata</i>                       | Milkmaids             |
| + | 0666 | <i>Cassinia aculeata</i>                          | Common Cassinia       |
| + | 0668 | <i>Cassinia longifolia</i>                        | Shiny Cassinia        |
| 1 | 4888 | <i>Chiloglottis valida</i>                        | Common Bird-orchid    |
| 1 | 0788 | <i>Clematis aristata</i>                          | Mountain Clematis     |
| + | 0822 | <i>Coprosma quadrifida</i>                        | Prickly Currant-bush  |
| + | 0903 | <i>Cymbonotus preissianus</i>                     | Austral Bear's-ears   |
| 1 | 3689 | <i>Drosera peltata</i>                            | Pale Sundew           |
| 1 | 1267 | <i>Eucalyptus cypellocarpa</i>                    | Mountain Grey-gum     |
| 4 | 1300 | <i>Eucalyptus muelleriana</i>                     | Yellow Stringybark    |
| 1 | 1304 | <i>Eucalyptus obliqua</i>                         | Messmate Stringybark  |
| + | 8427 | <i>Euchiton</i> spp.                              | Cudweed               |
| 1 | 8464 | <i>Galium</i> spp.                                | Bedstraw              |
| + | 1431 | <i>Geranium potentilloides</i>                    | Cinquefoil Cranesbill |
| + | 1489 | <i>Gonocarpus tetragynus</i>                      | Common Raspwort       |
| 1 | 1507 | <i>Goodenia ovata</i>                             | Hop Goodenia          |
| 1 | 1626 | <i>Helichrysum scorpioides</i>                    | Button Everlasting    |
| 1 | 1723 | <i>Hydrocotyle laxiflora</i>                      | Stinking Pennywort    |
| + | 1741 | <i>Hypericum gramineum</i>                        | Small St John's Wort  |
| 1 | 1863 | <i>Lagenophora stipitata</i>                      | Common Bottle-daisy   |
| 1 | 4710 | <i>Lomandra filiformis</i> ssp. <i>filiformis</i> | Wattle Mat-rush       |
| + | 3841 | <i>Luzula meridionalis</i>                        | Common Woodrush       |
| 1 | 2179 | <i>Microlaena stipoides</i> var. <i>stipoides</i> | Weeping Grass         |
| + | 2381 | <i>Oxalis exilis</i>                              | Shady Wood-sorrel     |
| 1 | 2523 | <i>Pimelea humilis</i>                            | Common Rice-flower    |
| 1 | 2555 | <i>Plantago debilis</i>                           | Shade Plantain        |
| 1 | 2610 | <i>Poa tenera</i>                                 | Slender Tussock-grass |
| + | 2683 | <i>Poranthera microphylla</i>                     | Small Poranthera      |
| + | 2802 | <i>Pterostylis longifolia</i> s.l.                | Tall Greenhood        |
| + | 8946 | <i>Pterostylis</i> spp.                           | Greenhood             |
| + | 3129 | <i>Senecio tenuiflorus</i>                        | Slender Fireweed      |
| + | 9134 | <i>Thelymitra</i> spp.                            | Sun Orchid            |
| 1 | 3512 | <i>Veronica plebeia</i>                           | Trailing Speedwell    |
| 1 | 5058 | <i>Viola hederacea</i> s.s.                       | Ivy-leaf Violet       |
| 1 | 9236 | <i>Wahlenbergia</i> spp.                          | No Common Name        |

**Introduced Species**

|   |      |                             |                    |
|---|------|-----------------------------|--------------------|
| + | 1748 | <i>Hypochoeris radicata</i> | Cat's Ear          |
| + | 3204 | <i>Sonchus oleraceus</i>    | Common Sow-thistle |

**F38220**

Recs 27 Date : 07 Sep 2000 Location : 146°22'35" 38°31'30" Altitude : 400 Collector : AJH

| Cover/<br>Abund. | Species<br>Number | Scientific Name | Common Name |
|------------------|-------------------|-----------------|-------------|
|------------------|-------------------|-----------------|-------------|

**Native Species**

|   |      |   |                      |
|---|------|---|----------------------|
| 3 | 0025 | <i>Acacia dealbata</i>                              | Silver Wattle        |
| 1 | 0287 | <i>Asplenium bulbiferum</i> ssp. <i>gracillimum</i> | Mother Spleenwort    |
| 1 | 0405 | <i>Blechnum chambersii</i>                          | Lance Water-fern     |
| + | 0408 | <i>Blechnum nudum</i>                               | Fishbone Water-fern  |
| 3 | 0413 | <i>Blechnum watsii</i>                              | Hard Water-fern      |
| + | 0788 | <i>Clematis aristata</i>                            | Mountain Clematis    |
| + | 0822 | <i>Coprosma quadrifida</i>                          | Prickly Currant-bush |

|   |      |  |                    |
|---|------|--|--------------------|
| 2 | 0895 | <i>Cyathea australis</i>                             | Rough Tree-fern    |
| 4 | 1039 | <i>Dicksonia antarctica</i>                          | Soft Tree-fern     |
| 3 | 1314 | <i>Eucalyptus regnans</i>                            | Mountain Ash       |
| 1 | 1507 | <i>Goodenia ovata</i>                                | Hop Goodenia       |
| + | 1519 | <i>Grammitis billardierei</i>                        | Common Finger-fern |
| 1 | 1600 | <i>Hedycarya angustifolia</i>                        | Austral Mulberry   |
| + | 1691 | <i>Histiopteris incisa</i>                           | Bat's Wing Fern    |
| 1 | 1722 | <i>Hydrocotyle hirta</i>                             | Hairy Pennywort    |
| + | 1734 | <i>Hymenophyllum cupressiforme</i>                   | Common Filmy Fern  |
| + | 1735 | <i>Hymenophyllum flabellatum</i>                     | Shiny Filmy Fern   |
| + | 1779 | <i>Isolepis inundata</i>                             | Swamp Club-sedge   |
| 1 | 2183 | <i>Microsorium pustulatum</i> ssp. <i>pustulatum</i> | Kangaroo Fern      |
| + | 2283 | <i>Nothofagus cunninghamii</i>                       | Myrtle Beech       |
| + | 2312 | <i>Olearia lirata</i>                                | Snowy Daisy-bush   |
| + | 2540 | <i>Pittosporum bicolor</i>                           | Banyalla           |
| + | 2645 | <i>Polystichum proliferum</i>                        | Mother Shield-fern |
| + | 3337 | <i>Tasmania lanceolata</i>                           | Mountain Pepper    |
| + | 3348 | <i>Tetrarrhena juncea</i>                            | Forest Wire-grass  |
| 1 | 3512 | <i>Veronica plebeia</i>                              | Trailing Speedwell |
| 1 | 5058 | <i>Viola hederacea</i> s.s.                          | Ivy-leaf Violet    |

**F38221**

Recs 19 Date : 07 Sep 2000 Location : 146°22'34" 38°29'50" Altitude : 380 Collector : AJH

| Cover/<br>Abund.          | Species<br>Number | Scientific Name                                      | Common Name          |
|---------------------------|-------------------|--|----------------------|
| <b>Native Species</b>     |                   |  |                      |
| 3                         | 0025              | <i>Acacia dealbata</i>                               | Silver Wattle        |
| 2                         | 0057              | <i>Acacia melanoxylon</i>                            | Blackwood            |
| +                         | 0105              | <i>Acaena novae-zelandiae</i>                        | Bidgee-widgee        |
| +                         | 0666              | <i>Cassinia aculeata</i>                             | Common Cassinia      |
| 1                         | 0788              | <i>Clematis aristata</i>                             | Mountain Clematis    |
| 2                         | 0822              | <i>Coprosma quadrifida</i>                           | Prickly Currant-bush |
| 2                         | 0831              | <i>Correa lawrenceana</i>                            | Mountain Correa      |
| 2                         | 0895              | <i>Cyathea australis</i>                             | Rough Tree-fern      |
| 4                         | 1314              | <i>Eucalyptus regnans</i>                            | Mountain Ash         |
| +                         | 1722              | <i>Hydrocotyle hirta</i>                             | Hairy Pennywort      |
| +                         | 2183              | <i>Microsorium pustulatum</i> ssp. <i>pustulatum</i> | Kangaroo Fern        |
| 4                         | 2312              | <i>Olearia lirata</i>                                | Snowy Daisy-bush     |
| 1                         | 2643              | <i>Polyscias sambucifolia</i>                        | Elderberry Panax     |
| 3                         | 2645              | <i>Polystichum proliferum</i>                        | Mother Shield-fern   |
| 1                         | 2777              | <i>Pteridium esculentum</i>                          | Austral Bracken      |
| 1                         | 3337              | <i>Tasmania lanceolata</i>                           | Mountain Pepper      |
| 1                         | 3348              | <i>Tetrarrhena juncea</i>                            | Forest Wire-grass    |
| +                         | 5058              | <i>Viola hederacea</i> s.s.                          | Ivy-leaf Violet      |
| <b>Introduced Species</b> |                   |  |                      |
| +                         | 2952              | <i>Rubus fruticosus</i> spp. agg.                    | Blackberry           |

F38222

Recs 43 Date : 07 Sep 2000 Location : 146°34'48" 38°30'26" Altitude : 120 Collector : AJH

| Cover/<br>Abund.          | Species<br>Number | Scientific Name                                   | Common Name                |
|---------------------------|-------------------|---|----------------------------|
| <b>Native Species</b>     |                   |   |                            |
| +                         | 0044              | <i>RrAcacia howittii</i>                          | Sticky Wattle              |
| 3                         | 9099              | <i>Austrostipa</i> spp.                           | Spear Grass                |
| 1                         | 0627              | <i>Carex breviculmis</i>                          | Common Grass-sedge         |
| +                         | 0666              | <i>Cassinia aculeata</i>                          | Common Cassinia            |
| 1                         | 0788              | <i>Clematis aristata</i>                          | Mountain Clematis          |
| 2                         | 1267              | <i>Eucalyptus cypellocarpa</i>                    | Mountain Grey-gum          |
| 4                         | 1300              | <i>Eucalyptus muelleriana</i>                     | Yellow Stringybark         |
| 1                         | 1304              | <i>Eucalyptus obliqua</i>                         | Messmate Stringybark       |
| +                         | 8427              | <i>Euchiton</i> spp.                              | Cudweed                    |
| 1                         | 8464              | <i>Galium</i> spp.                                | Bedstraw                   |
| 1                         | 1431              | <i>Geranium potentilloides</i>                    | Cinquefoil Cranesbill      |
| 1                         | 1455              | <i>Glycine clandestina</i>                        | Twining Glycine            |
| +                         | 1489              | <i>Gonocarpus tetragynus</i>                      | Common Raspwort            |
| 1                         | 1723              | <i>Hydrocotyle laxiflora</i>                      | Stinking Pennywort         |
| +                         | 1741              | <i>Hypericum gramineum</i>                        | Small St John's Wort       |
| +                         | 1923              | <i>Lepidosperma laterale</i>                      | Variable Sword-sedge       |
| +                         | 3841              | <i>Luzula meridionalis</i>                        | Common Woodrush            |
| 2                         | 2179              | <i>Microlaena stipoides</i> var. <i>stipoides</i> | Weeping Grass              |
| +                         | 2312              | <i>Olearia lirata</i>                             | Snowy Daisy-bush           |
| 1                         | 2381              | <i>Oxalis exilis</i>                              | Shady Wood-sorrel          |
| 1                         | 2555              | <i>Plantago debilis</i>                           | Shade Plantain             |
| 1                         | 2600              | <i>Poa labillardierei</i>                         | Common Tussock-grass       |
| 2                         | 2610              | <i>Poa tenera</i>                                 | Slender Tussock-grass      |
| 1                         | 2683              | <i>Poranthera microphylla</i>                     | Small Poranthera           |
| +                         | 2777              | <i>Pteridium esculentum</i>                       | Austral Bracken            |
| +                         | 2956              | <i>Rubus parvifolius</i>                          | Small-leaf Bramble         |
| +                         | 3107              | <i>Senecio glomeratus</i>                         | Annual Fireweed            |
| 1                         | 3129              | <i>Senecio tenuiflorus</i>                        | Slender Fireweed           |
| +                         | 3476              | <i>Urtica incisa</i>                              | Scrub Nettle               |
| 1                         | 3503              | <i>Veronica calycina</i>                          | Hairy Speedwell            |
| 1                         | 5058              | <i>Viola hederacea</i> s.s.                       | Ivy-leaf Violet            |
| 1                         | 9236              | <i>Wahlenbergia</i> spp.                          | No Common Name             |
| <b>Introduced Species</b> |                   |   |                            |
| +                         | 0223              | <i>Anagallis arvensis</i>                         | Pimpernel                  |
| 1                         | 0236              | <i>Anthoxanthum odoratum</i>                      | Sweet Vernal-grass         |
| 1                         | 0719              | <i>Cerastium glomeratum</i> s.l.                  | Common Mouse-ear Chickweed |
| +                         | 0782              | <i>Cirsium vulgare</i>                            | Spear Thistle              |
| +                         | 0948              | <i>Dactylis glomerata</i>                         | Cocksfoot                  |
| +                         | 0255              | <i>Arctotheca calendula</i>                       | Cape Weed                  |
| +                         | 1748              | <i>Hypochoeris radicata</i>                       | Cat's Ear                  |
| +                         | 2622              | <i>Polycarpon tetraphyllum</i>                    | Four-leaved Allseed        |
| +                         | 2917              | <i>Raphanus raphanistrum</i>                      | Wild Radish                |
| +                         | 3204              | <i>Sonchus oleraceus</i>                          | Common Sow-thistle         |
| +                         | 3251              | <i>Stellaria media</i>                            | Chickweed                  |

## F38223

Recs 27 Date : 08 Sep 2000 Location : 146°14'21" 38°34'46" Altitude : 280 Collector : AJH

| Cover/<br>Abund.          | Species<br>Number | Scientific Name                                      | Common Name          |
|---------------------------|-------------------|--|----------------------|
| <b>Native Species</b>     |                   |  |                      |
| +                         | 0025              | <i>Acacia dealbata</i>                               | Silver Wattle        |
| 3                         | 0057              | <i>Acacia melanoxylon</i>                            | Blackwood            |
| +                         | 0666              | <i>Cassinia aculeata</i>                             | Common Cassinia      |
| 1                         | 0788              | <i>Clematis aristata</i>                             | Mountain Clematis    |
| 2                         | 0822              | <i>Coprosma quadrifida</i>                           | Prickly Currant-bush |
| +                         | 0831              | <i>Correa lawrenceana</i>                            | Mountain Correa      |
| 3                         | 0895              | <i>Cyathea australis</i>                             | Rough Tree-fern      |
| 2                         | 1304              | <i>Eucalyptus obliqua</i>                            | Messmate Stringybark |
| 2                         | 1314              | <i>Eucalyptus regnans</i>                            | Mountain Ash         |
| 1                         | 1366              | <i>Fieldia australis</i>                             | Fieldia              |
| +                         | 1519              | <i>Grammitis billardierei</i>                        | Common Finger-fern   |
| 2                         | 1600              | <i>Hedycarya angustifolia</i>                        | Austral Mulberry     |
| +                         | 1722              | <i>Hydrocotyle hirta</i>                             | Hairy Pennywort      |
| +                         | 2481              | <i>Leionema bilobum</i>                              | Notched Leionema     |
| 1                         | 2183              | <i>Microsorium pustulatum</i> ssp. <i>pustulatum</i> | Kangaroo Fern        |
| 1                         | 2312              | <i>Olearia lirata</i>                                | Snowy Daisy-bush     |
| 2                         | 2645              | <i>Polystichum proliferum</i>                        | Mother Shield-fern   |
| 2                         | 2650              | <i>Pomaderris aspera</i>                             | Hazel Pomaderris     |
| +                         | 2777              | <i>Pteridium esculentum</i>                          | Austral Bracken      |
| +                         | 2999              | <i>Sambucus gaudichaudiana</i>                       | White Elderberry     |
| +                         | 3114              | <i>Senecio pinnatifolius</i>                         | Variable Groundsel   |
| +                         | 3337              | <i>Tasmannia lanceolata</i>                          | Mountain Pepper      |
| 1                         | 3348              | <i>Tetrarrhena juncea</i>                            | Forest Wire-grass    |
| +                         | 3476              | <i>Urtica incisa</i>                                 | Scrub Nettle         |
| 1                         | 3503              | <i>Veronica calycina</i>                             | Hairy Speedwell      |
| 1                         | 5058              | <i>Viola hederacea</i> s.s.                          | Ivy-leaf Violet      |
| <b>Introduced Species</b> |                   |  |                      |
| +                         | 2543              | <i>Pittosporum undulatum</i>                         | Sweet Pittosporum    |

## F38224

Recs 30 Date : 08 Sep 2000 Location : 146°15'07" 38°34'03" Altitude : 400 Collector : AJH

| Cover/<br>Abund.      | Species<br>Number | Scientific Name                                     | Common Name          |
|-----------------------|-------------------|---|----------------------|
| <b>Native Species</b> |                   |   |                      |
| +                     | 0025              | <i>Acacia dealbata</i>                              | Silver Wattle        |
| +                     | 0057              | <i>Acacia melanoxylon</i>                           | Blackwood            |
| 1                     | 0287              | <i>Asplenium bulbiferum</i> ssp. <i>gracillimum</i> | Mother Spleenwort    |
| 3                     | 0413              | <i>Blechnum wattsii</i>                             | Hard Water-fern      |
| +                     | 0666              | <i>Cassinia aculeata</i>                            | Common Cassinia      |
| 1                     | 0788              | <i>Clematis aristata</i>                            | Mountain Clematis    |
| 1                     | 0822              | <i>Coprosma quadrifida</i>                          | Prickly Currant-bush |
| 3                     | 0895              | <i>Cyathea australis</i>                            | Rough Tree-fern      |

|   |      |  |                      |
|---|------|--|----------------------|
| 4 | 1039 | <i>Dicksonia antarctica</i>                          | Soft Tree-fern       |
| 1 | 1304 | <i>Eucalyptus obliqua</i>                            | Messmate Stringybark |
| 3 | 1314 | <i>Eucalyptus regnans</i>                            | Mountain Ash         |
| 1 | 1366 | <i>Fieldia australis</i>                             | Fieldia              |
| 2 | 1600 | <i>Hedycarya angustifolia</i>                        | Austral Mulberry     |
| + | 1691 | <i>Histiopteris incisa</i>                           | Bat's Wing Fern      |
| + | 1722 | <i>Hydrocotyle hirta</i>                             | Hairy Pennywort      |
| + | 1734 | <i>Hymenophyllum cupressiforme</i>                   | Common Filmy Fern    |
| 1 | 2183 | <i>Microsorium pustulatum</i> ssp. <i>pustulatum</i> | Kangaroo Fern        |
| 2 | 2299 | <i>Olearia argophylla</i>                            | Musk Daisy-bush      |
| 1 | 2312 | <i>Olearia lirata</i>                                | Snowy Daisy-bush     |
| + | 2399 | <i>Pandorea pandorana</i>                            | Wonga Vine           |
| + | 2426 | <i>Parsonsia brownii</i>                             | Twining Silkpod      |
| + | 2540 | <i>Pittosporum bicolor</i>                           | Banyalla             |
| 2 | 2645 | <i>Polystichum proliferum</i>                        | Mother Shield-fern   |
| 2 | 2650 | <i>Pomaderris aspera</i>                             | Hazel Pomaderris     |
| + | 2777 | <i>Pteridium esculentum</i>                          | Austral Bracken      |
| + | 2916 | <i>Rapanea howittiana</i>                            | Muttonwood           |
| + | 2999 | <i>Sambucus gaudichaudiana</i>                       | White Elderberry     |
| + | 3337 | <i>Tasmannia lanceolata</i>                          | Mountain Pepper      |
| 1 | 3348 | <i>Tetrarrhena juncea</i>                            | Forest Wire-grass    |
| + | 3512 | <i>Veronica plebeia</i>                              | Trailing Speedwell   |

**F38225**

Recs 15 Date : 14 Aug 2000 Location : 146°19'13" 38°32'13" Altitude : 460 Collector : AJH

| Cover/<br>Abund. | Species<br>Number | Scientific Name | Common Name |
|------------------|-------------------|-----------------|-------------|
|------------------|-------------------|-----------------|-------------|

**Native Species**

|   |      |                               |                      |
|---|------|-------------------------------|----------------------|
| 1 | 0057 | <i>Acacia melanoxylon</i>     | Blackwood            |
| 2 | 0413 | <i>Blechnum wattsii</i>       | Hard Water-fern      |
| + | 0788 | <i>Clematis aristata</i>      | Mountain Clematis    |
| + | 0822 | <i>Coprosma quadrifida</i>    | Prickly Currant-bush |
| 3 | 0831 | <i>Correa lawrenceana</i>     | Mountain Correa      |
| 4 | 0895 | <i>Cyathea australis</i>      | Rough Tree-fern      |
| + | 1039 | <i>Dicksonia antarctica</i>   | Soft Tree-fern       |
| 4 | 1314 | <i>Eucalyptus regnans</i>     | Mountain Ash         |
| + | 1366 | <i>Fieldia australis</i>      | Fieldia              |
| + | 1600 | <i>Hedycarya angustifolia</i> | Austral Mulberry     |
| + | 2299 | <i>Olearia argophylla</i>     | Musk Daisy-bush      |
| + | 2312 | <i>Olearia lirata</i>         | Snowy Daisy-bush     |
| + | 2515 | <i>Pimelea axiflora</i>       | Bootlace Bush        |
| + | 2645 | <i>Polystichum proliferum</i> | Mother Shield-fern   |
| 3 | 3348 | <i>Tetrarrhena juncea</i>     | Forest Wire-grass    |

# APPENDIX 5

## A5.1 EVC DESCRIPTIONS FOR THE STUDY AREA

Descriptions of Ecological Vegetation Classes occurring in the Strzelecki Ranges study area from VicRFASC (1999).

### EVC 16 Lowland Forest

Lowland Forest is a very widespread and floristically diverse dry forest vegetation type that is found across the lowland plains from East Gippsland to the western edge of the study area. It typically develops on Tertiary and Quaternary deposits of clay, sand and gravel of moderate fertility. The understorey varies from shrubby to heathy to sedgy and may even be grassy as fertility increases and the group merges into Gippsland Plains Grassy Woodland. With decreasing fertility the group merges into Heathy Woodland through to Sand Heathland.

It occurs mostly in the low rainfall areas but is also found in areas of intermediate rainfall where it occupies the dry aspects and dry crests where incident radiation is greatest. In these areas Damp Forest develops immediately downslope where sufficient topographic protection is available.

The core type is associated with clay soils but an outlier of sandy surface deposits also occurs.

To aid identification of this group a range of vegetation types need to be described, ranging from where the group floristically approaches Damp Forest (at the wettest end of the group) and Herb-rich Foothill Forest through to the driest forms. A number of other types also need to be described through a drainage gradient ranging from sites with impeded drainage (on the margins of Wetland, Sedge Wetland, Swamp Scrub and Clay Heathland) through to well-drained sites associated with a well-drained, sandy soil form which has affinities with Heathy Woodland.

There are five floristic communities of Lowland Forest: *Strzeleckis* Lowland Forest, *Wilson's Promontory* Lowland Forest, *Depauperate* Lowland Forest, *Gippsland Plains* Lowland Forest and *Latrobe Valley* Lowland Forest.

Floristic Community:

16-03 *Strzeleckis* Lowland Forest

This floristic community occurs on the Tertiary deposits in the Mirboo North area of the Strzeleckis.

Average annual rainfall is in the vicinity of 1000mm and elevation is 200-250m above sea level.

*Strzeleckis* Lowland Forest is commonly dominated by Messmate *Eucalyptus obliqua* and Mountain Grey Gum *E. cypellocarpa*, but a range of other eucalypts may dominate or be present. This includes Yellow Stringybark *E. muelleriana*, Silver-top *E. sieberi*, Narrow-leaf Peppermint *E. radiata*, Yertchuck *E. considiniana* and Swamp Gum *E. ovata* in poorer drained areas.

The understorey is typically dry in character and includes a range of shrubby wattle species such as Varnish Wattle *Acacia verniciflua*, Prickly Moses *A. verticillata*, Hop



Wattle *A. stricta* and Narrow-leaf Wattle *A. mucronata*. Other shrubs often present are Hop Goodenia *Goodenia ovata*, Snow Daisy Bush *Olearia lirata*, *Cassinia* sp., Bracken *Pteridium esculentum*, and the prickly-leaved shrubs such as Prickly Tea-tree *Leptospermum continentale*, Prickly Bush Pea *Pultenaea juniperina* and Common Heath *Epacris impressa*. Wire-grass *Tetrarrhena juncea* and tussocks of Tussock-grass *Poa* sp. are also present. Thatch Saw-sedge *Gahnia radula*, is also found and is sometimes locally dominant. Common groundcover species include Ivy-leaf violet *Viola hederacea*, Common Lagenifera *Lagenifera stipitata*, and Small St John's Wort *Hypericum gramineum*.

Two species with a high fidelity but low overall frequency to the group are Hairpin Banksia *Banksia spinulosa* var. *cunninghamii* and Bushy Hakea *Hakea decurrens* (sensu Willis 1972).

### **EVC 17 Riparian Scrub**

Riparian Scrub typically occupies the poor drainage areas along creeks, small rivers and flats on shallow to deep acidic, peaty or sandy soils. It is widespread at Wilsons Promontory and in the lower rainfall areas of Gippsland such as Holey Plains State Park, Mullungdung and Won Wron State Forests. It is floristically close to Wet Heathland which tends to be lower in stature (less than 2m in height) and more diverse in composition. Average annual rainfall is in the vicinity of 600-900 mm and elevation ranges from sea level to 80m.

The scrub is dominated by Scented Paperbark *Melaleuca squarrosa* but Swamp Paperbark *Melaleuca ericifolia*, Prickly Moses *Acacia verticillata* and Woolly Tea-tree *Leptospermum lanigerum* are also locally dominant with thickets of Tall Sword-sedge *Gahnia clarkei*, Red-fruit Sword-sedge *G. sieberiana*, and Scrambling Coral-fern *Gleichenia microphylla*. Emergent trees of Swamp Gum *Eucalyptus ovata* may also be present.

Riparian Scrub often occurs on the margins of wetlands and Wet Heathland and therefore often includes a suite of wetland herb species such as Running Marsh-flower *Villarsia reniformis*, the sedges, Pithy Sword-sedge *Lepidosperma longitudinale* and Square Twig-sedge *Baumea tetragona*, and the Tassel Cord-rush *Restio tetraphyllus*. Patches of *Sphagnum* moss are also often found.

### **EVC 23 Herb-rich Foothill Forest**

Herb-rich Foothill Forest is not as common to the south as it is to the north of the Great Dividing Range. South of the Great Dividing Range it occurs on the inland margins of stream valleys closer to the Great Dividing Range and in rainshadow valleys of the Wonnangatta, Dargo and the upper reaches of the Tambo Rivers. Within the study area, climatically it occurs in continental locations in rainshadows of the mountain ranges running coastward, where water is taken out of the atmosphere, leaving the valleys drier, in effect, therefore, growing in similar climatic conditions to this EVC north of the Great Dividing Range where rainfall is low over summer.

Moderate to high soil fertility is reflected by the characteristically high diversity and cover of graminoid and herbaceous species in the ground layer of all floristic communities of this EVC. A small tree layer is nearly always present over a few scattered shrubs which form an open understorey.

There are five floristic communities of Herb-rich Foothill Forest: *Silurian Limestone* Herb-rich Foothill Forest, *Splitlers Range* Herb-rich Foothill Forest, *Northern Fall*

Herb-rich Foothill Forest, *Strzeleckis* Herb-rich Foothill Forest and *Tussocky* Herb-rich Foothill Forest.

*Strzeleckis* Herb-rich Foothill Forest is typically dominated by Messmate *Eucalyptus obliqua*, Mountain Grey Gum *E. cypellocarpa* and Narrow-leaf Peppermint *E. radiata* but may also include Yellow Stringybark *E. muelleriana*, Gippsland Blue Gum *E. globulus* ssp. *pseudoglobulus*, and even Silver-top *E. sieberi* in extreme cases.

The understorey includes the shrubs Varnish Wattle *Acacia verniciflua*, Hop Goodenia *Goodenia ovata*, Prickly Currant-bush *Coprosma quadrifida*, Common Cassinia *Cassinia aculeata*, Snow Daisy-bush *Olearia lirata*, Tree Everlasting *Ozothamnus ferrugineus* and Common Raspwort *Gonocarpus tetragynus*. The climbers Mountain Clematis *Clematis aristata* and Wonga Vine *Pandorea pandorana* are often present whilst the ubiquitous Austral Bracken *Pteridium esculentum* is also frequent.

The herb-rich ground cover includes the grasses Common Tussock-grass *Poa labillardieri*, Short-hair Plume-grass *Dichelachne micrantha*, Weeping Grass *Microlaena stipoides*, Forest Wire-grass *Tetrarrhena juncea*, Common Hedgehog-grass *Echinopogon ovatus*, Stiped Wallaby-grass *Austrodanthonia racemosa* var. *racemosa* and Reed Bent-grass *Deyeuxia quadriseta*. Common herbs are Ivy-leaf Violet *Viola hederacea*, Common Lagenifera *Lagenifera stipitata*, Hairy Speedwell *Veronica calycina*, Bidgee-widgee *Acaena novae-zelandiae*, Twining Glycine *Glycine clandestina*, Small St John's Wort *Hypericum gramineum*, Small Poranthera *Poranthera microphylla*, and Yellow Wood-sorrel *Oxalis corniculata* spp. agg.

*Strzeleckis* Herb-rich Foothill Forest is on the drier side of Damp Forest and *Tussocky* Herb-rich Foothill Forest and eventually merges into Lowland Forest as soil fertility decreases. A number of drier species found in this community which are not found in the damper, adjacent EVCs include Thatch Saw-sedge *Gahnia radula*, Common Heath *Epacris impressa*, Wattle Mat-rush *Lomandra filiformis*, Spiny-headed Mat-rush *Lomandra longifolia* and Hyacinth Orchid *Dipodium punctatum*.

The relatively dry nature of this EVC is reflected in the absence of 'wet' ground-ferns such as Common Ground-fern *Calochloena dubia* and Mother Shield-fern *Polystichum proliferum*. The group is also closely related, at the drier end, to the dry forest EVCs of *South Gippsland* Plains Grassy Forest and Lowland Forest.

## **EVC 29     Damp Forest**

Damp Forest is widespread in Gippsland in moderately fertile areas between Wet Forest, the drier end of Shrubby Foothill Forest and the driest forest types such as Lowland Forest, Herb-rich Foothill Forest, and Heathy Woodland. It develops on the drier sites in Wet Forest or on the margins of Warm Temperate Rainforest. It also occurs on protected slopes associated with *Tussocky* Herb-rich Foothill Forest, Lowland Forest or even Heathy Woodland, provided topographic protection is sufficient.

In the lowlands and dissected country below 700m Damp Forest favours gullies or eastern and southern slopes. Above this elevation and in higher rainfall zones the effect of cloud cover at ground level and the subsequent fog drip permits this class to expand out of the gullies onto broad ridges and northern and western aspects. It occurs on a wide range of geologies and soils are usually colluvial, deep and well-structured with moderate to high levels of humus in the upper soil horizons (Woodgate et al. 1994). Rainfall is approximately 800-1600 mm per annum and elevation ranges from sea level in South Gippsland to up to 1000m in the montane areas where it merges into Montane Damp Forest.

The dominant eucalypts are commonly Messmate *Eucalyptus obliqua* and Mountain Grey Gum *E. cypellocarpa*. A range of other species may be present as well such as Yellow Stringybark *E.muelleriana* (in South Gippsland with Sticky Wattle *Acacia howittii* present in the understorey), Silvertop *E.sieberi*, Gippsland Blue Gum *E.globulus* ssp. *pseudoglobulus*, Narrow-leaf Peppermint *E.radiata*, Gippsland Peppermint *E.croajingolensis*, Brown Stringybark *E.baxteri* and Swamp Gum *E.ovata* in the vicinity of poorer drainage. Trees of Blackwood *Acacia melanoxylon* and Silver Wattle *Acacia dealbata* are often present.

The understorey typically includes moisture-dependent fern species such as Common Ground-fern *Calochlaena dubia*, Gristle Fern *Blechnum cartilagineum*, Mother Shield-fern *Polystichum proliferum* and Rough Tree-fern *Cyathea australis*, and the presence of broad-leaved species typical of wet forest mixed with elements from dry forest types such as Lowland Forest.

Broad-leaved species include Hazel Pomaderris *Pomaderris aspera*, Victorian Christmas-bush *Prostanthera lasianthos*, Snow Daisy-bush *Olearia lirata*, *Cassinia* spp, Hop Goodenia *Goodenia ovata*, Elderberry *Panax Polyscias sambucifolia* and White Elderberry *Sambucus gaudichaudiana*. Sweet Pittosporum *Pittosporum undulatum* is often present in South Gippsland. The wet forest shrub, Prickly Currant-bush *Coprosma quadrifida*, and Fireweed Groundsel *Senecio linearifolius* are also common. Drier shrubby elements include Prickly Moses *Acacia verticillata*, Prickly Bush Pea *Pultenaea juniperina*, Narrow-leaf Wattle *Acacia mucronata* and Varnish Wattle *Acacia verniciflua*. Other species commonly present are Austral Bracken *Pteridium esculentum* and Forest Wire-grass *Tetrarrhena juncea*, Broad-leaf Stinkweed *Opercularia ovata*, Tall Sword-sedge *Lepidosperma elatius*, Wonga Vine *Pandorea pandorana* and Mountain Clematis *Clematis aristata*.

At the drier end of Damp Forest a number of species start to appear such as Narrow-leaf Peppermint *Eucalyptus radiata*, Narrow-leaf Wattle *Acacia mucronata*, Cherry Ballart *Exocarpos cupressiformis*, Grey Tussock-grass *Poa sieberiana*, Prickly Tea-tree *Leptospermum continentale* and Thatch Saw-sedge *Gahnia radula*. At Wilsons Promontory, the shrub Blue Olive-berry *Elaeocarpus reticulatus* is a common species which indicates its close affinities with *Wilsons Promontory Overlap* Warm Temperate Rainforest.

Riparian habitats in Damp Forest contain indicator species of Riparian Forest such as Soft Water-fern *Blechnum minus*, Fishbone Water-fern *Blechnum nudum*, Austral King-fern *Todea barbara*, Scrambling Coral-fern *Gleichenia microphylla*, Tall Saw-sedge *Gahnia clarkei* and Tall Sedge *Carex appressa*.

Floristic Community:

29-01 Vine-rich Damp Forest

*Vine-rich* Damp Forest is scattered throughout the study area in areas with high effective rainfall. Although usually associated with lower slopes and gullies ranging between 400-600m in altitude, in protected environments (such as south-facing slopes) it may ascend to elevations in excess of 700m above sea level. The average annual rainfall of 750 mm per annum is relatively low, however the protected nature of the environment and the fertile soils help retain moisture and hence support a suite of ferns and broad leaf shrubs.

*Vine-rich* Damp Forest forms a moderate to tall open forest. The overstorey trees most commonly include Messmate *Eucalyptus obliqua* and Mountain Grey Gum *E. cypellocarpa*, but Gippsland Peppermint *E. croajingolensis* may co-dominate,

especially in valley floors. White Stringybark *E. globoidea* is also a common co-dominant on middle to upper slopes and in more exposed situations. Silver Wattle *Acacia dealbata* is a common understorey tree, occurring as a moderately tall, slender tree or large shrub.

Large mesic shrubs are common but smaller-leaved shrubs, tolerant of lower humidity are most prominent. Prickly Currant-bush *Coprosma quadrifida*, Shiny Cassinia *Cassinia longifolia* and Bootlace Bush *Pimelea axiflora* occur most frequently. Broad leaf shrubs are structurally less important and include Blanket-leaf *Bedfordia arborescens*, Snowy Daisy-bush *Olearia lirata* and Hazel Pomaderris *Pomaderris aspera* with the occasional Musk Daisy-bush *Olearia argophylla*.

Rough Tree-fern *Cyathea australis*, the only tree fern recorded in this EVC, is often scattered amongst the shrub layer. Beneath this, ground ferns are prominent in cover and include the strongly rhizomatous Austral Bracken *Pteridium esculentum* and Common Ground-fern *Calocholeana dubia*. Mother Shield-fern *Polystichum proliferum* may dominate some sites.

A diverse array of forbs and graminoids are present but this stratum is not structurally dominant. Tasman Flax-lily *Dianella tasmanica*, Spiny-headed Mat-rush *Lomandra longifolia*, Weeping Grass *Microlaena stipoides*, Sword Tussock-grass *Poa ensiformis* and Ivy-leaf Violet *Viola hederacea* are the most common.

Vines are particularly rich in this community of Damp Forest. Mountain Clematis *Clematis aristata* is most common with Common Apple-berry *Billardiera scandens*, Love Creeper *Comesperma volubile*, Austral Sarsaparilla *Smilax australis*, Wombat Berry *Eustrephus latifolius* and Wonga Vine *Pandorea pandorana* often present. Climbers and scramblers are very prominent and the presence of Wombat Berry *Eustrephus latifolia* and Austral Sarsaparilla *Smilax australis* emphasises floristic links for Warm Temperate Rainforest.

### **EVC 30 Wet Forest**

Wet Forest is predominantly a tall forest characterised by a layer of broad-leaf shrubs over a dense cover of tree-ferns and ground ferns. It occurs on relatively fertile soils such as deep organic loams and clay loams in the topographically protected high rainfall areas and headwaters of south flowing streams on the south side of the Great Dividing Range in the Avon Wilderness, around Mt Baldhead, Mt Elizabeth and on the southern fall of the Nuniong Plateau. It is also widespread in South and West Gippsland, particularly in the Strzelecki Ranges and at Wilsons Promontory.

This EVC includes a very wide range of structural variation ranging from tall old-growth forest up to 60m in height through to regrowth forest and scrub which has the potential to support tall forest. It also includes treeless areas dominated by wet scrub and even "oldfields" which were once cleared but are now dominated by native vegetation. These areas are typically dominated by broad-leaved shrubs such as Snow Daisy-bush *Olearia lirata*, Hazel Pomaderris *Pomaderris aspera*, and Three-nerved Cassinia *Cassinia trinerva*. The native fireweed, Fireweed Groundsel *Senecio linearifolius* is often present

Wet Forest is dominated by Mountain Ash *Eucalyptus regnans* but may be dominated locally by Blackwood *Acacia melanoxylon* or Silver Wattle *A. dealbata*. A range of other eucalypt species can be present but these tend to be on the periphery of extensive areas dominated by Mountain Ash *E. regnans*. These include Manna Gum *E. viminalis* (often occurring along major river flats and on associated slopes), Strzelecki Gum *Eucalyptus strzeleckii*, Gippsland Blue Gum *E. globulus* ssp. *pseudoglobulus*,

Messmate *E. obliqua*, and Mountain Grey Gum *E. cypelloarpa* which occurs on the edges of Wet Forest stronghold areas immediately before Damp Forest becomes more developed. Tree-ferns are sometimes present, particularly Rough Tree-fern *Cyathea australis* on the slopes and Soft Tree-fern *Dicksonia antarctica* along the creek lines as well as some of the “wet-ferns” such as Mother Shield-fern *Polystichum proliferum* and Hard Water-fern *Blechnum watsii*.

Common understorey species are the broad-leaved shrubs such as Snow Daisy-bush *Olearia lirata*, Musk Daisy-bush *O. argophylla*, Blanket Leaf *Bedfordia arborescens*, Hazel Pomaderris *Pomaderris aspera*, *Cassinia* spp., Tree Lomatia *Lomatia fraseri* and Austral Mulberry *Hedycarya angustifolia*. The prickly shrub, Prickly Currant-bush *Coprosma quadrifida*, and the vines Mountain Clematis *Clematis aristata* and Wonga Vine *Pandorea pandorana* are also often present. Other shrubs sometimes include Sweet Pittosporum *Pittosporum undulatum*, Tree Lomatia *Lomatia fraseri* and Victorian Christmas-bush *Prostanthera lasianthos*. At the drier end of this group the understorey becomes very low in stature (less than 2m) and broad-leaved species other than Snow Daisy-bush *Olearia lirata* are notably absent. This variant tends to occur on the most exposed, drier northerly aspects.

Wet Forest develops extensively around the localised areas of Cool Temperate Rainforest in the study area. At the dry end of its range it changes to Damp Forest and Shrubby Foothill Forest, which tends to first appear on the drier, steeper aspects associated with Wet Forest in the more protected sites.

Areas of old-growth Wet Forest are very localised in the study area. Large patches were observed immediately west of Traralgon Creek Road in the most topographically protected sites.

There are two floristic communities of Wet Forest: *Gippsland 1* Wet Forest and *Gippsland 2* Wet Forest.

Floristic Community:

30-01 *Gippsland 1* Wet Forest

*Gippsland 1* Wet Forest occurs across the study area along creeks and on south-facing slopes and gullies. It grows on a variety of geologies, which combine with high rainfall and moist loamy organic soils to provide a fertile environment for tall trees, broad-leaf shrubs and ferns. Average rainfall is high ranging from 700–1200mm, with high effective rainfall on protected southerly slopes. It grows at a range of altitudes from 500-1100m above sea level.

The overstorey may carry a range of eucalypts including Messmate Stringybark *Eucalyptus obliqua*, Gippsland Peppermint *Eucalyptus croajingolensis*, Narrow-leaf Peppermint *E. radiata* in the west of the study area and *E. croajingolensis* to the east of the study area. Manna Gum *Eucalyptus viminalis* and *E. obliqua* may co-dominant in some areas, such as the Nunniong Plateau and the Mount Baldhead areas.

Silver Wattle *Acacia dealbata* is the ubiquitous understorey tree in this EVC. A diversity of tall broad-leaved shrubs are prominent and often form a complete cover, although this may be broken by an equally dense layer of tree ferns. The most common tall shrubs include Hazel Pomaderris *Pomaderris aspera*, Blanket Leaf *Bedfordia arborescens*, Musk Daisy-bush *Olearia argophylla*, and Rough Coprosma *Coprosma hirtella*. Common Cassinia *Cassinia aculeata*, Prickly Currant-bush *Coprosma quadrifida*, Elderberry *Panax Polyscias sambucifolia*, Snow Daisy-bush *Olearia lirata*

and Dusty Daisy-bush *O. phlogopappa* form a shorter layer beneath the taller shrub layer.

Tree ferns are often present with Soft Tree-fern *Dicksonia antarctica* at the wettest sites and Rough Tree-fern *Cyathea australis* at lower elevations and on slightly drier sites. Ground ferns include Austral Bracken *Pteridium esculentum*, Mother Shield-fern *Polystichum proliferum* and Fishbone Water-fern *Blechnum nudum*.

The ground layer is equally rich in species, dominated by large moisture-loving herbs, and graminoids such as the large tussocks of Tasman Flax-lily *Dianella tasmanica*, Tussock-grasses *Poa* spp. and Tall-headed Mat-rush *Lomandra longifolia*. The diverse array of smaller forbs include Ivy-leaf Violet *Viola hederacea*, Soft Cranesbill *Geranium potentilloides*, Bidgee Widgee *Acaena novae-zelandiae*, Hairy Pennywort *Hydrocotyle hirta* and Common Lagenifera *Lagenifera stipitata*. Forbs indicative of Wet Forest include Mountain Cotula *Leptinella filicula*, Scrub Nettle *Urtica incisa* and Forest Starwort *Stellaria flaccida*.

The only climber common in this floristic community is Mountain Clematis *Clematis aristata*.

Floristic Community:

30-06 Gippsland 2 Wet Forest

*Gippsland 2* Wet Forest grows in similar environments to *Gippsland 1* Wet Forest. Rainfall is very high, ranging from 950–1350mm per annum and effective rainfall extremely high. It ranges in elevation from 700 to 1160m above sea level, thus reaching montane environments.

*Gippsland 2* Wet Forest is the wettest of the eucalypt-dominated vegetation types. At higher elevations Alpine Ash *Eucalyptus delegatensis* dominates the overstorey whilst at lower elevations Mountain Ash *E. regnans* dominates wetter sites and Manna Gum *Eucalyptus viminalis* and species of the narrow-leaved peppermint group are prominent (for example, Narrow-leaved Peppermint *Eucalyptus radiata* s.s., Monaro Peppermint *Eucalyptus radiata* ssp. *robertsonii* and Gippsland Peppermint *Eucalyptus croajingolensis*). The understorey tree layer is well developed with Silver Wattle *Acacia dealbata* and Blackwood *A. melanoxylon* dominating.

The shrub layer is usually very dense and may form an almost impenetrable thicket, especially after disturbance. It is most often dominated by Soft Tree-fern *Dicksonia antarctica* and a mixture of large mesic shrubs including Banyalla *Pittosporum bicolor*, Mountain Tea-tree *Leptospermum grandifolium*, Blanket-leaf *Bedfordia arborescens*, Victorian Christmas Bush *Prostanthera lasianthos*, Mountain Pepper *Tasmannia lanceolata*, Hazel Pomaderris *Pomaderris aspera* and Musk Daisy-bush *Olearia argophylla*. Several smaller shrubs are also common including Common Cassinia *Cassinia aculeata*, Elderberry *Panax Polyscias sambucifolia*, White Elderberry *Sambucus gaudichaudiana* and Dusty Daisy-bush *Olearia phlogopappa*.

The ground layer is also very dense and is dominated by ferns. Mother Shield-fern *Polystichum proliferum*, Fishbone Water-fern *Blechnum nudum*, Hard Water-fern *B. watsii*, Ray Water-fern *B. fluviatile* and Austral Bracken *Pteridium esculentum* commonly form a complete cover.

Common herbs and graminoids including Tussock-grasses *Poa* spp, Scrub Nettle *Urtica incisa*, Shade Nettle *Australina pusilla* and Bidgee Widgee *Acaena novae-zelandiae* may reach high densities in open patches, often created by local disturbance, or

where the substrate is rocky. Other herbs and graminoids include Tall Sedge *Carex appressa*, Tasman Flax-lily *Dianella tasmanica*, Small-leaf Bramble *Rubus parvifolius*, Hairy Pennywort *Hydrocotyle hirta*, Ivy-leaf Violet *Viola hederacea*, Mountain Cotula *Leptinella filicula*, Forest Mint *Mentha laxiflora* and Forest Starwort *Stellaria flaccida*. Forest Wire-grass *Tetrarrhena juncea* is also common.

Mountain Clematis *Clematis aristata* is the only commonly occurring climber.

### **EVC 31 Cool Temperate Rainforest**

Floristic Community:

#### 31-01 Central Highlands Cool Temperate Rainforest

*Central Highlands Cool Temperate Rainforest* is only found in the highest rainfall areas of Wet Forest associated with the most topographically protected sites in the Strzeleckis and Wilsons Promontory. There are also isolated occurrences in the foothills of the Great Dividing Range including the headwaters of Freestone Creek and Mount Useful Creek. It typically occupies protected south and south-easterly aspects and gullies of these sheltered streams. On some southern slopes that remain long-unburnt, the community can extend upslope beyond its usual gully refuge, even to minor saddles.

The climate is cool temperate with snowfalls a common event over most winters in the higher altitudes. Elevation varies from 500-1200m above sea level and average annual rainfall is 1000-1200 mm. Parent geologies range from granites, granodiorites and acid volcanics to marine sediments. The soils are formed through colluvial or alluvial processes and may be quite stony and are often red-brown, deep, well-structured krasnozems with an A horizon that is rich in humus (Peel 1999).

*Central Highlands Cool Temperate Rainforest* is characterised by a low diversity of trees, grasses, sedges, herbs and climbers and a high diversity of shrubs and ferns. The canopy is typically dominated by moss-covered Myrtle Beech *Nothofagus cunninghamii* and Southern Sassafras *Atherosperma moschatum* but localised adjoining areas can also be dominated by Blackwood *Acacia melanoxylon*. Scattered emergent Mountain Ash *Eucalyptus regnans* which is widespread in the surrounding Wet Forest may also be present.

The fern-dominated understorey is typically open in structure and may include stands of old-growth Soft Tree-fern *Dicksonia antarctica* with trunks covered with a characteristically high cover and diversity of delicate epiphytic filmy-ferns. These plants are only one cell thick and are extremely sensitive to drought stress. Species such as Austral Filmy Fern *Hymenophyllum australe*, Narrow Filmy Fern *H. rarum* and Shiny Filmy Fern *H. flabellatum* are good indicator species for the group whilst Common Filmy fern *H. cupressiforme* is also frequently present but less faithful to the group. Rough Tree-fern *Cyathea australis* often occurs upslope from watercourses, whilst the rare Slender Tree-fern *Cyathea cunninghamii* and Skirted Tree-fern *Cyathea x marcescens* are good indicator species for this group occurring closer to the gully floor and being more reliant on moisture.

A number of other epiphytic ferns are present on tree trunks such as Kangaroo Fern *Microsorium pustulatum*, Weeping Spleenwort *Asplenium flaccidum*, and Common Finger-fern *Grammitis billardieri* whilst the climber, Fieldia *Fieldia australis*, is also frequently present. Rare epiphytic primitive fern allies are sometimes present such as Long Fork-fern, *Tmesipteris obliqua*. The groundlayer includes a number of "wet fern" species such as Mother Shield-fern *Polystichum proliferum* as well as Leathery Shield-fern *Rumohra adiantiformis* and a diversity of *Blechnum* species including Hard

Water-fern *B. watsii*, Lance water-fern *B. chambersii*, Strap Water-fern *B. pattersonii* and Ray Water-fern *B. fluviatile*.

### **EVC 32 Warm Temperate Rainforest**

Warm Temperate Rainforest occurs in the foothills to 700m above sea level, with moderate to high rainfall ranging from 800-1200mm. It occurs on stream flats, drainage lines and gullies. Parent geologies are predominantly marine sandstones or alluviums, with occasional granites and limestones (Peel 1999). Eucalypts do not form a dominant overstorey, with only the occasional emergents present. Rather, other species of tall trees form the canopy, with a ground layer dominated by ferns.

There are five floristic communities of Warm Temperate Rainforest in the study area: *Alluvial Terraces* Warm Temperate Rainforest, *East Gippsland Coastal* Warm Temperate Rainforest, *East Gippsland Foothills* Warm Temperate Rainforest, *Strzeleckis* Warm Temperate Rainforest and *Wilson's Promontory Overlap* Warm Temperate Rainforest.

Floristic Community:

32-07 *Strzeleckis* Warm Temperate Rainforest

*Strzeleckis* Warm Temperate Rainforest is entirely restricted to the lowland valleys of the Strzelecki Ranges in South Gippsland. It is found at elevations between 80 and 240m above sea level where it grows on the slopes adjacent to streams and along minor gullies in the vicinity of Damp Forest and Wet Forest. Soils are deep grey to dark greyish-brown friable clay loams derived from Cretaceous feldspathic mudstones and arkose sandstones (Peel 1999).

Structurally, these rainforest stands are low in stature and simple in floristic composition. The overstorey is dominated by Mountain Grey Gum *Eucalyptus cypellocarpa*, Gippsland Blue Gum *E. globulus* ssp. *pseudoglobulus*, Messmate *E. obliqua* and Yellow Stringybark *E. muelleriana*. Blackwood *Acacia melanoxylon* is a common emergent as many sites have been cleared and/or logged in the past. Other more common secondary species include Austral Mulberry *Hedycarya angustifolia* and Hazel Pomaderris *Pomaderris aspera* which often act as canopy trees. In less disturbed sites, Sweet Pittosporum *Pittosporum undulatum* and Muttonwood *Rapanea howittiana* are well represented as the primary canopy species (Peel 1999).

The canopy is covered with lianes including Forest Clematis *Clematis glycinoides*, Wonga Vine *Pandorea pandorana*, and to a lesser extent Twining Silkpod *Parsonsia brownii*. The understorey is characteristically open with only one shrub species, Prickly Currant-bush *Coprosma quadrifida* ever dominant. Other species recorded from gaps in the community include Musk Daisy-bush *Olearia argophylla*, Snowy Daisy Bush *O. lirata*, Elderberry *Panax polycias sambucifolia*, Victorian Christmas Bush *Prostanthera lasiantha*, Forest Nightshade *Solanum prinophyllum*, Kangaroo Apple *S. aviculare* and Scrub Nettle *Urtica incisa*.

The ground cover is dominated by herbs where more light penetrates through the canopy, or it is sparse and litter-dominated in the shadier areas. Common herbs include Shade Plantain *Plantago debilis*, Weeping Grass *Microlaena stipoides*, Forest Starwort *Stellaria flaccida*, Forest Hound's-tongue *Austrocynoglossum latifolium* and Yellow Wood-sorrel *Oxalis corniculata* spp. agg. Other species present are the ferns Necklace Fern *Asplenium flabellifolium* (indicative of the drier understorey conditions), Sickie Fern *Pellaea falcata*, Tender Brake *Pteris tremula*, Mother Shield-fern *Polystichum*



*proliferum*, Tall Sword-sedge *Lepidosperma elatius* and Tussock-grass *Poa* spp.

#### **EVC 48    Heathy Woodland**

Heathy Woodland is mainly confined to the Gippsland plains, South Gippsland and the northern part of Wilsons Promontory. Geology consists of Tertiary and Quaternary sands. This EVC develops on the most infertile deep uniform sands with the topsoil being a light grey, loose sand, grading into a bleached greyish-white to yellow-brown sand (sometimes gravelly) subsoil. Sometimes a gravelly sand surface over a cemented yellow-brown gravelly hardpan is present. Elevation is from near sea level to 350m at Toms Cap and rainfall varies from 1000 mm at Wilsons Promontory to less than 500 mm per annum in the Sale area.

Heathy Woodland merges into Sand Heathland where sites become extremely well-drained, infertile and drought-stressed. As conditions become more poorly drained, the group merges into Sand Heathland/Wet Heathland Mosaic through to Wet Heathland and Riparian Scrub. Floristically, the EVC is closely related to Damp Sands Herb-rich Woodland which occurs on more fertile sands and is characterised by a more diverse herbaceous ground cover of forbs and grasses as well as a complement of heathy shrubs indicative of arenaceous soils.

The canopy consists of low scattered trees of Messmate *Eucalyptus obliqua*, Narrow-leaf Peppermint *E. radiata* and Shining Peppermint *E. willisii* as well as Yertchuk *E. considianiana*. Messmate *E. obliqua* is only ever found in this EVC in exposed near coastal situations in a stunted form. The shrub-dominated heathy understorey lacks grasses and herbs and is characterised by prickly-leaved shrubs of the Myrtaceae, Epacridaceae, Dilleniaceae, Fabaceae and Mimosaceae families. Banksias (Proteaceae family) are also common with Saw Banksia *Banksia serrata* often being a conspicuous species. The most frequent shrubs found in the understorey include Heath Tea-tree *Leptospermum myrsinoides*, Prickly Tea-tree *L. continentale*, Common Heath *Epacris impressa*, Showy Bossiaea *Bossiaea cinerea* and Prickly Broom-heath *Monotoca scoparia*.

Other shrubs present are Sweet Wattle *Acacia suaveolens*, Broom Spurge *Amperea xiphoclada*, Smooth Parrot-pea *Dillwynia glaberrima*, Silver Banksia *Banksia marginata*, Saw Banksia *B. serrata*, Common Beard-heath *Leucopogon virgatus*, Common Correa *Correa reflexa*, Common Wedge-pea *Gompholobium huegelii*, Common Aotus *Aotus ericoides*, Prickly Broom-heath *Monotoca scoparia*, Hairy Pink-bells *Tetralochea pilosa*, Horny Cone-bush *Isopogon ceratophyllus*, Common Flat-pea *Platylobium obtusangulum*, Honey-pots *Acrotriche serrulata* Wedding Bush *Ricinocarpos pinifolius* and Spike Wattle *Acacia oxycedrus*. The Guinea-flowers *Hibbertia* spp. are notably diverse in this group.

Other common species present are Austral Bracken *Pteridium esculentum*, Thatch Saw-sedge *Gahnia radula*, Spiny-headed Mat-rush *Lomandra longifolia*, and Small Grass-tree *Xanthorrhoea minor* ssp. *lutea*, Austral Grass-tree *Xanthorrhoea australis*, Blue Dampiera *Dampiera stricta*, Tassel Rope-rush *Hypolaena fastigiata*, Sand-hill Sword-sedge *Lepidosperma concavum*, and Slender Dodder-laurel *Cassytha glabella*.

Bracken dominated understoreys can develop in this group probably as a result of a high fire frequency or unsuitable burning regime, leading to the elimination of heathy shrubs and *Banksia serrata* from the understorey.

## A5.2 EVC AREAS WITHIN THE STUDY AREA

These figures are the combination of areas mapped as resources and native vegetation

| Riparian Scrub Complex | Lowland Forest | Heathy Woodland | Damp Forest | Weedy Lowland Forest | Weedy Damp Forest | Wet Forest | Weedy Wet Forest | Strzeleckis Warm Temperate Rainforest | Central Highlands Cool Temperate Rainforest | Herb-Rich Foothill Forest | Plantation (Softwood and Weedy Hardwood) | Water Body | Cleared/ Severely disturbed | Unknown/ Unclassified |
|------------------------|----------------|-----------------|-------------|----------------------|-------------------|------------|------------------|---------------------------------------|---|---------------------------|--|------------|-----------------------------|-----------------------|
| 0.00                   | 0.94           | 0.00            | 189.99      | 1.00                 | 124.71            | 3285.99    | 322.38           | 0.00                                  | 12.17                                       | 0.00                      | 2556.93                                  | 0.00       | 400.70                      | 0.00 Albert           |
| 0.00                   | 38.78          | 0.00            | 660.94      | 1.54                 | 24.54             | 985.53     | 143.25           | 0.09                                  | 0.00  | 73.34                     | 1436.88                                  | 0.00       | 220.24                      | 0.00 Bodman           |
| 0.00                   | 0.00           | 0.00            | 0.00        | 0.00                 | 0.00              | 264.12     | 0.00             | 0.00                                  | 0.00  | 0.00                      | 0.51                                     | 0.00       | 224.05                      | 0.00 Boolarra         |
| 0.00                   | 0.00           | 0.00            | 478.27      | 0.00                 | 60.37             | 2066.02    | 150.97           | 0.00                                  | 2.71  | 0.00                      | 1190.39                                  | 0.00       | 464.30                      | 0.80 Callignee        |
| 0.00                   | 54.85          | 0.00            | 133.30      | 24.04                | 18.70             | 2264.80    | 296.15           | 0.00                                  | 72.67                                       | 0.00                      | 2709.12                                  | 0.00       | 870.61                      | 1.17 Jack             |
| 0.00                   | 0.00           | 0.00            | 0.00        | 0.00                 | 0.00              | 3718.45    | 10.22            | 0.00                                  | 57.86                                       | 0.00                      | 788.08                                   | 0.94       | 248.70                      | 0.00 Livingstone      |
| 0.03                   | 116.44         | 74.46           | 380.42      | 0.00                 | 7.53              | 206.21     | 8.06             | 1.62                                  | 0.00  | 75.23                     | 1457.84                                  | 0.00       | 112.52                      | 0.00 Macks            |
| 0.00                   | 0.00           | 0.00            | 0.00        | 0.00                 | 0.00              | 1051.20    | 15.42            | 0.00                                  | 0.00  | 0.00                      | 523.34                                   | 0.00       | 230.06                      | 0.00 Turtons          |
| 0.00                   | 0.00           | 0.00            | 47.07       | 0.00                 | 0.29              | 4404.72    | 58.41            | 0.00                                  | 104.90                                      | 0.00                      | 557.54                                   | 0.33       | 354.56                      | 0.00 Woorarra         |
| 0.00                   | 0.00           | 0.00            | 0.00        | 0.00                 | 0.00              | 186.14     | 2.82             | 0.00                                  | 0.00  | 0.00                      | 465.60                                   | 0.00       | 11.43                       | 0.00 Allambee         |
| 0.00                   | 0.00           | 0.00            | 0.00        | 0.00                 | 0.00              | 278.79     | 51.07            | 0.00                                  | 0.00  | 0.00                      | 439.41                                   | 0.22       | 26.93                       | 0.00 Childers         |

# APPENDIX 6

## A6.1. FAUNA SPECIES

The table below (Table A6) records fauna species recently recorded (post 1970) from the vicinity of HVP land within the core area of the Strzelecki Ranges ('Strz'), as well as scattered HVP land to the east and west of Strzelecki Ranges ('East' and 'West' respectively). This data has been obtained from the Atlas of Victorian Wildlife database, maintained by the Department of Natural Resources and Environment. The status of each species within the area they have been recorded is also noted.

**Table A6: Status of fauna species known to occur within the Strzelecki Ranges (Strz) and from scattered HVP leasehold to the east (East) and west (West) of the Strzelecki Ranges**

### Notes to table:

Significance/status of species is designated by:

|    |                          |
|----|--------------------------|
| N  | National                 |
| St | State                    |
| R  | Regional                 |
| L  | Local                    |
| -  | not known from this area |
| *  | introduced species       |

| Common Name               | Scientific Name                 | Strz | East | West |
|---------------------------|---------------------------------|------|------|------|
| <b>MAMMALS</b>            |                                 |      |      |      |
| Platypus                  | <i>Ornithorhynchus anatinus</i> | R    | -    | -    |
| Short-beaked Echidna      | <i>Tachyglossus aculeatus</i>   | L    | L    | L    |
| Spot-tailed Quoll         | <i>Dasyurus maculatus</i>       | N    | N    | -    |
| Agile Antechinus          | <i>Antechinus agilis</i>        | L    | L    | L    |
| Dusky Antechinus          | <i>Antechinus swainsonii</i>    | L    | -    | R    |
| Southern Brown Bandicoot  | <i>Isodon obesulus</i>          | -    | -    | N    |
| Long-nosed Bandicoot      | <i>Perameles nasuta</i>         | R    | -    | R    |
| Common Brushtail Possum   | <i>Trichosurus vulpecula</i>    | L    | L    | L    |
| Mountain Brushtail Possum | <i>Trichosurus caninus</i>      | L    | -    | L    |
| Common Ringtail Possum    | <i>Pseudocheirus peregrinus</i> | L    | L    | L    |
| Greater Glider            | <i>Petauroides volans</i>       | R    | L    | L    |
| Sugar Glider              | <i>Petaurus breviceps</i>       | L    | L    | L    |
| Feathertail Glider        | <i>Acrobates pygmaeus</i>       | R    | R    | -    |
| Eastern Pygmy-possum      | <i>Cercartetus nanus</i>        | R    | L    | -    |
| Koala                     | <i>Phascolarctos cinereus</i>   | N    | N    | N    |
| Common Wombat             | <i>Vombatus ursinus</i>         | L    | L    | L    |
| Black Wallaby             | <i>Wallabia bicolor</i>         | L    | L    | L    |

| Common Name                | Scientific Name                     | Strz | East | West |
|----------------------------|-------------------------------------|------|------|------|
| Red-necked Wallaby         | <i>Macropus rufogriseus</i>         | -    | R    | -    |
| Eastern Grey Kangaroo      | <i>Macropus giganteus</i>           | L    | L    | L    |
| White-striped Freetail Bat | <i>Tadarida australis</i>           | N    | N    | -    |
| Gould's Long-eared Bat     | <i>Nyctophilus gouldi</i>           | L    | -    | -    |
| Lesser Long-eared Bat      | <i>Nyctophilus geoffroyi</i>        | L    | L    | -    |
| Common Bent-wing Bat       | <i>Miniopterus schreibersii</i>     | N    | -    | -    |
| Gould's Wattled Bat        | <i>Chalinolobus gouldii</i>         | R    | L    | -    |
| Chocolate Wattled Bat      | <i>Chalinolobus morio</i>           | L    | L    | -    |
| Eastern False Pipistrelle  | <i>Falsistrellus tasmaniensis</i>   | L    | R    | -    |
| Southern Forest Bat        | <i>Vespadelus regulus</i>           | L    | -    | -    |
| Little Forest Bat          | <i>Vespadelus vulturnus</i>         | L    | L    | -    |
| Large Forest Bat           | <i>Vespadelus darlingtoni</i>       | L    | -    | -    |
| Eastern Broad-nosed Bat    | <i>Scotorepens orion</i>            | R    | -    | -    |
| Broad-toothed Rat          | <i>Mastocomys fuscus</i>            | S    | -    | -    |
| Bush Rat                   | <i>Rattus fuscipes</i>              | L    | L    | L    |
| Swamp Rat                  | <i>Rattus lutreolus</i>             | R    | L    | L    |
| Water Rat                  | <i>Hydromys chrysogaster</i>        | -    | -    | L    |
| Black Rat                  | <i>Rattus rattus</i>                | *    | *    | -    |
| House Mouse                | <i>Mus musculus</i>                 | *    | *    | -    |
| European Rabbit            | <i>Oryctolagus cuniculus</i>        | *    | -    | *    |
| Brown Hare                 | <i>Lepus capensis</i>               | *    | -    | -    |
| Cattle (feral)             | <i>Bos taurus</i>                   | *    | -    | -    |
| Dingo/Dog (feral)          | <i>Canis familiaris</i>             | *    | -    | -    |
| Red Fox                    | <i>Canis vulpes</i>                 | *    | *    | *    |
| Cat (feral)                | <i>Felis catus</i>                  | *    | *    | *    |
| Dog                        | <i>Canis familiaris familiaris</i>  | *    | *    | -    |
| <b>BIRDS</b>               |                                     |      |      | -    |
| Emu                        | <i>Dromaius novaehollandiae</i>     | R    | R    | -    |
| Common Bronzewing          | <i>Phaps chalcoptera</i>            | L    | L    | L    |
| Brush Bronzewing           | <i>Phaps elegans</i>                | L    | L    | -    |
| Wonga Pigeon               | <i>Leucosarcia melanoleuca</i>      | R    | -    | -    |
| Lewin's Rail               | <i>Rallus pectoralis</i>            | -    | -    | S    |
| Dusky Moorhen              | <i>Gallinula tenebrosa</i>          | L    | -    | -    |
| Purple Swamphen            | <i>Porphyrio porphyrio</i>          | L    |      | L    |
| Eurasian Coot              | <i>Fulica atra</i>                  | -    | -    | L    |
| Australasian Grebe         | <i>Tachybaptus novaehollandiae</i>  | L    | L    | L    |
| Hoary-headed Grebe         | <i>Poliiocephalus poliocephalus</i> | L    | -    | -    |
| Great Cormorant            | <i>Phalacrocorax carbo</i>          | L    | -    | L    |
| Little Black Cormorant     | <i>Phalacrocorax sulcirostris</i>   | -    | -    | L    |

| Common Name                  | Scientific Name                   | Strz | East | West |
|------------------------------|-----------------------------------|------|------|------|
| Little Pied Cormorant        | <i>Phalacrocorax melanoleucos</i> | L    | -    | L    |
| Gull-billed Tern             | <i>Sterna nilotica</i>            | S    | -    | -    |
| Silver Gull                  | <i>Larus novaehollandiae</i>      | L    | -    | -    |
| Masked Lapwing               | <i>Vanellus miles</i>             | L    | L    | L    |
| Australian White Ibis        | <i>Threskiornis molucca</i>       | L    | -    | -    |
| Straw-necked Ibis            | <i>Threskiornis spinicollis</i>   | L    | -    | L    |
| Yellow-billed Spoonbill      | <i>Platalea flavipes</i>          | L    | -    | -    |
| Great Egret                  | <i>Ardea alba</i>                 | -    | -    | S    |
| White-faced Heron            | <i>Egretta novaehollandiae</i>    | L    | -    | L    |
| White-necked Heron           | <i>Ardea pacifica</i>             | -    | -    | L    |
| Magpie Goose                 | <i>Anseranas semipalmata</i>      | -    | S    | -    |
| Australian Wood Duck         | <i>Chenonetta jubata</i>          | L    | L    | -    |
| Black Swan                   | <i>Cygnus atratus</i>             | L    | L    | L    |
| Australian Shelduck          | <i>Tadorna tadornoides</i>        | L    | -    | L    |
| Pacific Black Duck           | <i>Anas superciliosa</i>          | L    | L    | L    |
| Chestnut Teal                | <i>Anas castanea</i>              | L    | L    | L    |
| Grey Teal                    | <i>Anas gracilis</i>              | L    | L    | L    |
| Australasian Shoveler        | <i>Anas rhynchotis</i>            | -    | -    | S    |
| Freckled Duck                | <i>Stictonetta naevosa</i>        | N    | -    | -    |
| Hardhead                     | <i>Aythya australis</i>           | -    | -    | S    |
| Swamp Harrier                | <i>Circus approximans</i>         | L    | -    | -    |
| Grey Goshawk                 | <i>Accipiter novaehollandiae</i>  | S    | -    | -    |
| Brown Goshawk                | <i>Accipiter fasciatus</i>        | L    | L    | L    |
| Collared Sparrowhawk         | <i>Accipiter cirrhocephalus</i>   | R    | -    | R    |
| Wedge-tailed Eagle           | <i>Aquila audax</i>               | R    | R    | R    |
| Black-shouldered Kite        | <i>Elanus axillaris</i>           | L    | -    | -    |
| Peregrine Falcon             | <i>Falco peregrinus</i>           | L    | -    | -    |
| Brown Falcon                 | <i>Falco berigora</i>             | L    | -    | -    |
| Nankeen Kestrel              | <i>Falco cenchroides</i>          | L    | -    | -    |
| Southern Boobook             | <i>Ninox novaeseelandiae</i>      | L    | L    | L    |
| Barking Owl                  | <i>Ninox connivens</i>            | -    | -    | S    |
| Powerful Owl                 | <i>Ninox strenua</i>              | N    | N    | N    |
| Masked Owl                   | <i>Tyto novaehollandiae</i>       | S    | -    | -    |
| Sooty Owl                    | <i>Tyto tenebricosa</i>           | S    | -    | -    |
| Barn Owl                     | <i>Tyto alba</i>                  | -    | -    | R    |
| Rainbow Lorikeet             | <i>Trichoglossus haematodus</i>   | R    | -    | -    |
| Glossy Black-Cockatoo        | <i>Calyptorhynchus lathami</i>    | N    | N    | -    |
| Yellow-tailed Black-Cockatoo | <i>Calyptorhynchus funereus</i>   | L    | -    | L    |
| Gang-gang Cockatoo           | <i>Callocephalon fimbriatum</i>   | L    | L    | L    |

| Common Name               | Scientific Name                  | Strz | East | West |
|---------------------------|----------------------------------|------|------|------|
| Sulphur-crested Cockatoo  | <i>Cacatua galerita</i>          | L    | L    | L    |
| Long-billed Corella       | <i>Cacatua tenuirostris</i>      | -    | -    | L    |
| Galah                     | <i>Cacatua roseicapilla</i>      | L    | -    | L    |
| Australian King-Parrot    | <i>Alisterus scapularis</i>      | -    | -    | L    |
| Crimson Rosella           | <i>Platycercus elegans</i>       | L    | L    | L    |
| Eastern Rosella           | <i>Platycercus eximius</i>       | L    | L    | L    |
| Blue-winged Parrot        | <i>Neophema chrysostoma</i>      | R    | R    | R    |
| Tawny Frogmouth           | <i>Podargus strigoides</i>       | R    | R    | R    |
| Australian Owlet-nightjar | <i>Aegotheles cristatus</i>      | R    | R    | -    |
| Laughing Kookaburra       | <i>Dacelo novaeguineae</i>       | L    | L    | L    |
| Sacred Kingfisher         | <i>Todiramphus sanctus</i>       | L    | L    | -    |
| White-throated Nightjar   | <i>Eurostopodus mystacalis</i>   | L    | L    | L    |
| White-throated Needletail | <i>Hirundapus caudacutus</i>     | L    | L    | -    |
| Fork-tailed Swift         | <i>Apus pacificus</i>            | L    | L    | -    |
| Pallid Cuckoo             | <i>Cuculus pallidus</i>          | R    | R    | R    |
| Fan-tailed Cuckoo         | <i>Cacomantis flabelliformis</i> | L    | L    | -    |
| Brush Cuckoo              | <i>Cacomantis variolosus</i>     | -    | -    | R    |
| Horsfield's Bronze-Cuckoo | <i>Chrysococcyx basalis</i>      | L    | -    | -    |
| Shining Bronze-Cuckoo     | <i>Chrysococcyx lucidus</i>      | L    | L    | -    |
| Superb Lyrebird           | <i>Menura novaehollandiae</i>    | L    | -    | L    |
| Welcome Swallow           | <i>Hirundo neoxena</i>           | L    | L    | L    |
| Tree Martin               | <i>Hirundo nigricans</i>         | R    | -    | -    |
| Grey Fantail              | <i>Rhipidura fuliginosa</i>      | L    | L    | L    |
| Rufous Fantail            | <i>Rhipidura rufifrons</i>       | L    | -    | L    |
| Willie Wagtail            | <i>Rhipidura leucophrys</i>      | L    | L    | L    |
| Leaden Flycatcher         | <i>Myiagra rubecula</i>          | L    | -    | -    |
| Satin Flycatcher          | <i>Myiagra cyanoleuca</i>        | L    | L    | L    |
| Jacky Winter              | <i>Microeca fascinans</i>        | L    | L    | -    |
| Scarlet Robin             | <i>Petroica multicolor</i>       | L    | L    | L    |
| Flame Robin               | <i>Petroica phoenicea</i>        | L    | -    | -    |
| Pink Robin                | <i>Petroica rodinogaster</i>     | R    | -    | -    |
| Rose Robin                | <i>Petroica rosea</i>            | L    | -    | L    |
| Eastern Yellow Robin      | <i>Eopsaltria australis</i>      | L    | L    | L    |
| Golden Whistler           | <i>Pachycephala pectoralis</i>   | L    | L    | L    |
| Rufous Whistler           | <i>Pachycephala rufiventris</i>  | L    | L    | L    |
| Olive Whistler            | <i>Pachycephala olivacea</i>     | L    | -    | L    |
| Grey Shrike-thrush        | <i>Colluricincla harmonica</i>   | L    | L    | L    |
| Magpie-lark               | <i>Grallina cyanoleuca</i>       | L    | -    | L    |
| Crested Shrike-tit        | <i>Falcunculus frontatus</i>     | L    | -    | L    |

| Common Name                | Scientific Name                     | Strz | East | West |
|----------------------------|-------------------------------------|------|------|------|
| Eastern Whipbird           | <i>Psophodes olivaceus</i>          | L    | -    | L    |
| Black-faced Cuckoo-shrike  | <i>Coracina novaehollandiae</i>     | L    | L    | L    |
| Spotted Quail-thrush       | <i>Cinlosoma punctatum</i>          | R    | L    | -    |
| Brown Gerygone             | <i>Gerygone mouki</i>               | R    | -    | -    |
| White-fronted Chat         | <i>Epthianura albifrons</i>         | -    | L    | -    |
| Striated Thornbill         | <i>Acanthiza lineata</i>            | L    | L    | L    |
| Brown Thornbill            | <i>Acanthiza pusilla</i>            | L    | L    | L    |
| Yellow Thornbill           | <i>Acanthiza nana</i>               | -    | -    | L    |
| Buff-rumped Thornbill      | <i>Acanthiza reguloides</i>         | L    | L    | L    |
| Yellow-rumped Thornbill    | <i>Acanthiza chrysorrhoa</i>        | L    | -    | L    |
| White-browed Scrubwren     | <i>Sericornis frontalis</i>         | L    | L    | L    |
| Large-billed Scrubwren     | <i>Sericornis magnirostris</i>      | R    | -    | -    |
| Chestnut-rumped Heathwren  | <i>Hylacola pyrrhopygia</i>         | R    |      | -    |
| Pilotbird                  | <i>Pycnoptilus floccosus</i>        | L    | -    | -    |
| Superb Fairy-wren          | <i>Malurus cyaneus</i>              | L    | L    | L    |
| White-browed Woodswallow   | <i>Artamus superciliosus</i>        | R    | -    | -    |
| Dusky Woodswallow          | <i>Artamus cyanopterus</i>          | L    | L    | L    |
| Varied Sittella            | <i>Daphoenositta chrysoptera</i>    | L    | L    | L    |
| White-throated Treecreeper | <i>Cormobates leucophaeus</i>       | L    | L    | L    |
| Red-browed Treecreeper     | <i>Climacteris erythroptis</i>      | L    | -    | -    |
| Mistletoebird              | <i>Dicaeum hirundinaceum</i>        | L    | L    | L    |
| Spotted Pardalote          | <i>Pardalotus punctatus</i>         | L    | L    | L    |
| Silvereye                  | <i>Zosterops lateralis</i>          | L    | L    | L    |
| White-naped Honeyeater     | <i>Melithreptus lunatus</i>         | L    | L    | L    |
| Brown-headed Honeyeater    | <i>Melithreptus brevirostris</i>    | L    | L    | -    |
| Eastern Spinebill          | <i>Acanthorhynchus tenuirostris</i> | L    | L    | L    |
| Lewin's Honeyeater         | <i>Meliphaga lewinii</i>            | L    | -    | -    |
| Yellow-faced Honeyeater    | <i>Lichenostomus chrysops</i>       | L    | L    | L    |
| White-eared Honeyeater     | <i>Lichenostomus leucotis</i>       | L    | L    | L    |
| Yellow-tufted Honeyeater   | <i>Lichenostomus melanops</i>       | R    | L    | -    |
| White-plumed Honeyeater    | <i>Lichenostomus penicillatus</i>   | L    | L    | -    |
| Crescent Honeyeater        | <i>Phylidonyris pyrrhoptera</i>     | L    | L    | L    |
| New Holland Honeyeater     | <i>Phylidonyris novaehollandiae</i> | L    | L    | L    |
| Noisy Miner                | <i>Manorina melanocephala</i>       | L    | -    | -    |
| Little Wattlebird          | <i>Anthochaera chrysoptera</i>      | L    | L    | -    |
| Red Wattlebird             | <i>Anthochaera carunculata</i>      | L    | L    | L    |
| Noisy Friarbird            | <i>Philemon corniculatus</i>        | R    | -    | -    |
| Singing Bushlark           | <i>Mirafrja javanica</i>            | R    | -    | -    |
| Beautiful Firetail         | <i>Stagonopleura bella</i>          | R    | -    | -    |

| Common Name                  | Scientific Name                    | Strz | East | West |
|------------------------------|------------------------------------|------|------|------|
| Red-browed Finch             | <i>Neochmia temporalis</i>         | L    | -    | L    |
| Olive-backed Oriole          | <i>Oriolus sagittatus</i>          | L    | L    | -    |
| White-winged Chough          | <i>Corcorax melanorhamphos</i>     | R    | L    | -    |
| Pied Currawong               | <i>Strepera graculina</i>          | L    | L    | L    |
| Grey Currawong               | <i>Strepera versicolor</i>         | L    | L    | L    |
| Grey Butcherbird             | <i>Cracticus torquatus</i>         | L    | L    | L    |
| Australian Magpie            | <i>Gymnorhina tibicen</i>          | L    | L    | L    |
| Bassian Thrush               | <i>Zoothera lunulata</i>           | L    | L    | L    |
| Forest Raven                 | <i>Corvus tasmanicus</i>           | R    | L    | -    |
| Australian Raven             | <i>Corvus coronoides</i>           | L    | L    | L    |
| Mallard                      | <i>Anas platyrhynchos</i>          | *    | -    | -    |
| Little Raven                 | <i>Corvus mellori</i>              | L    | L    | L    |
| Striated Pardalote           | <i>Pardalotus striatus</i>         | L    | -    | L    |
| Spotted Turtle-Dove          | <i>Streptopelia chinensis</i>      | *    | -    | *    |
| Common Blackbird             | <i>Turdus merula</i>               | *    | *    | *    |
| Skylark                      | <i>Alauda arvensis</i>             | *    | -    | -    |
| House Sparrow                | <i>Passer domesticus</i>           | *    | -    | *    |
| European Goldfinch           | <i>Carduelis carduelis</i>         | *    | -    | *    |
| Common Myna                  | <i>Acridotheres tristis</i>        | *    | -    | -    |
| Common Starling              | <i>Sturnus vulgaris</i>            | *    | -    | *    |
| <b>REPTILES</b>              |                                    |      |      |      |
| Common Long-necked Tortoise  | <i>Chelodina longicollis</i>       | R    | L    | -    |
| Tree Goanna                  | <i>Varanus varius</i>              | R    | R    | R    |
| White's Skink                | <i>Egernia whitii</i>              | L    | L    | L    |
| McCoy's Skink                | <i>Nannoscincus maccoyi</i>        | L    | L    | L    |
| Delicate Skink               | <i>Lampropholis delicata</i>       | L    | L    | L    |
| Garden Skink                 | <i>Lampropholis guichenoti</i>     | L    | L    | L    |
| Weasel Skink                 | <i>Saproscincus mustelinus</i>     | R    | L    | L    |
| Bougainville's Skink         | <i>Lerista bougainvillii</i>       | -    | L    | -    |
| Coventry's Skink             | <i>Niveoscincus coventryi</i>      | L    | -    | -    |
| Metallic Skink               | <i>Niveoscincus metallicus</i>     | L    | -    | -    |
| Spencer's Skink              | <i>Pseudemoia spenceri</i>         | R    | -    | -    |
| Blotched Blue-tongued Lizard | <i>Tiliqua nigrolutea</i>          | L    | L    | L    |
| Common Blue-tongued Lizard   | <i>Tiliqua scincoides</i>          | L    | L    | L    |
| Eastern Small-eyed Snake     | <i>Rhinoplocephalus nigrescens</i> | R    | L    | -    |
| White-lipped Snake           | <i>Drysdalia coronoides</i>        | L    | -    | L    |
| Tiger Snake                  | <i>Notechis scutatus</i>           | L    | L    | L    |
| Eastern Three-lined Skink    | <i>Bassiana duperreyi</i>          | R    | -    | -    |
| Red-bellied Black Snake      | <i>Pseudechis porphyriacus</i>     | L    | L    | L    |



| Common Name                    | Scientific Name                      | Strz | East | West |
|--------------------------------|--------------------------------------|------|------|------|
| Eastern Brown Snake            | <i>Pseudonaja textilis</i>           | -    | L    | -    |
| Black Rock Skink               | <i>Egernia saxatilis intermedia</i>  | R    | -    | -    |
| Southern Water Skink (CTF)     | <i>Eulamprus tympanum (CTF)</i>      | L    | -    | L    |
| Yellow-bellied Water Skink     | <i>Eulamprus heatwolei (WTF)</i>     | R    | -    | -    |
| Lowland Copperhead             | <i>Austrelaps superbus</i>           | L    | L    | L    |
| unidentified scincid           | <i>Scincidae sp.</i>                 | L?   | L?   |      |
| unidentified agamid            | <i>Agamidae sp.</i>                  | L?   |      |      |
| <b>FROGS</b>                   |                                      |      |      |      |
| Victorian Smooth Froglet       | <i>Geocrinia victoriana</i>          | L    | L    | L    |
| Southern Bullfrog              | <i>Limnodynastes dumerilii</i>       | L    | L    | L    |
| Striped Marsh Frog             | <i>Limnodynastes peronii</i>         | L    | L    | L    |
| Spotted Marsh Frog             | <i>Limnodynastes tasmaniensis</i>    | L    | L    | L    |
| Haswell's Froglet              | <i>Paracrinia haswelli</i>           | L    | L    | -    |
| Southern Toadlet               | <i>Pseudophryne semimarmorata</i>    | L    | L    | -    |
| Common Froglet                 | <i>Crinia signifera</i>              | L    | L    | L    |
| Southern Brown Tree Frog       | <i>Litoria ewingii</i>               | L    | L    | L    |
| Lesueur's Frog                 | <i>Litoria lesueuri</i>              | R    | -    | -    |
| Peron's Tree Frog              | <i>Litoria peronii</i>               | R    | L    | -    |
| Warty Bell Frog                | <i>Litoria raniformis</i>            | -    | N    | N    |
| Whistling Tree Frog            | <i>Litoria verreauxii verreauxii</i> | L    | L    | -    |
| Martin's Toadlet               | <i>Uperoleia martini</i>             | -    | R    | -    |
| <b>FISH</b>                    |                                      |      |      |      |
| Short-headed Lamprey           | <i>Mordacia mordax</i>               | L    | L    | L    |
| Pouched Lamprey                | <i>Geotria australis</i>             | R    | R    | R    |
| Australian Grayling            | <i>Prototroctes maraena</i>          | N    | N    | N    |
| Broadfin Galaxias              | <i>Galaxias brevipinnis</i>          | R    | -    | R    |
| Mountain Galaxias              | <i>Galaxias olidus</i>               | R    | R    | R    |
| Spotted Galaxias               | <i>Galaxias truttaceus</i>           | R    | -    | R    |
| Southern Pigmy Perch           | <i>Nannoperca australis</i>          | L    | L    | L    |
| River Blackfish                | <i>Gadopsis marmoratus</i>           | R    | R    | R    |
| Striped Gudgeon                | <i>Gobiomorphus australis</i>        | S    | -    | -    |
| Cox's Gudgeon                  | <i>Gobiomorphus coxii</i>            | S    | -    | -    |
| <b>CRUSTACEANS</b>             |                                      |      |      |      |
| Strzelecki Burrowing Crayfish  | <i>Engaeus rostrigaleatus</i>        | N    | -    | -    |
| South Gippsland Spiny Crayfish | <i>Euastacus neodiversus</i>         | S    | -    | -    |

## A 6.2. NATIONAL SIGNIFICANCE

### Spot-tailed Quoll *Dasyurus maculatus*

*Distribution:* Recent records of the Spot-tailed Quoll in Victoria are concentrated in the Snowy River valley, Otway Range, Mount Eccles National Park, Rodger River and Gippsland Lakes. There are fewer than 35 records of the Spot-tailed Quoll in the Gippsland RFA region mainly concentrated around the Gippsland Lakes area. About half of the records from this region are pre-1970, with the two of the most recent records from State forest north of Bairnsdale in 1991 and Won Wron State Forest in 1985 (Atlas of Victorian Wildlife *unpub. data*; VicRFASC 1999). Until recently, there were no substantiated records of the Spot-tailed Quoll from the Strzelecki Ranges (Menkhorst 1995, VicRFASC 1999), although for many years there had been speculation that it may occur within the Strzelecki Ranges (Mansergh 1984). In late 1999, an officer from the Yarram NRE office collected Spot-tailed Quoll hair near Dingo Creek in the south of the Strzelecki Ranges (B. Atkins, *pers. comm.*).

*Habitat:* The Spot-tailed Quoll is an agile climber and occupies many forested habitats. Although it is most abundant in wetter forests, it has also been regularly recorded in the drier habitat types. Within the Gippsland area, it has been recorded from a broad range of vegetated habitats including rainforest, wet sclerophyll forest, dry sclerophyll forest and woodland, although its specific habitat requirements are not known (Mansergh and Belcher 1992, VicRFASC 1999). Den sites include tree hollows, logs, wind-rows, burrows, rock crevices, caves and boulder tumbles with many different sites being used within a home range (Menkhorst 1995, Belcher 1997).

*Territoriality:* Females are thought to have a home range of between 614-1067 hectares, while males may have a home range of up to 4500 hectares (VicRFASC 1999). Spot-tailed Quolls, although seemingly solitary creatures, use common defecation sites: termed 'latrines', which appear to have an important social function such as communication of female reproductive condition (Belcher 1994).

Considered to be sedentary, not migratory or nomadic (VicRFASC 1999). Their ability to disperse is unknown, but is often presumed to be high (VicRFASC 1999). Females maintain exclusive female territories (but tolerate juvenile females) Male territories overlap with other male and female territories at least during the breeding season (Belcher 1995, VicRFASC 1999).

*Threats and management:* Clearing of native vegetation and timber harvesting are two of the biggest threats to this species in Victoria and the Gippsland area

(Mansergh and Belcher 1992, VicRFASC 1999). An Action Plan has been prepared for this species under the Flora and Fauna Guarantee Act.

*Occurrence within study area:* The search for Spot-tailed Quolls in the Strzelecki Ranges were initiated after an observation of a quoll near Dingo Creek by a local resident approximately 10-15 years earlier (B. Atkins pers comm.). Given that the maximum lifespan of a Spot-tailed Quoll is considered to be about five years, it is reasonable to assume that they are breeding in the area and are maintaining an on-going population. More detailed surveys are likely to proceed for the Spot-tailed Quoll in the area over the next couple of years, which may reveal the extent of their use of the Strzelecki Ranges. (B. Atkins *pers comm*). At present, all that can be concluded is that the known local Spot-tailed Quoll population uses parts of the Agnes River sub-catchment.

### **Eastern Bent-wing Bat *Miniopterus schreibersii oceanensis***

*Distribution:* The Common Bent-wing Bat is distributed across southern and eastern Victoria (Menkhorst 1995). Distribution of records within the Gippsland region widely scattered including from Walhalla, Moe, Strzelecki Ranges, Glenmaggie, Rotamah Island (Gippsland Lakes), and near Mt Wills (VicRFASC 1999). It was recorded from near HVP land to the east of Mirboo East in the early 1990s. Few bat surveys have been conducted within the Strzelecki Ranges.

*Habitat:* This insectivorous bat generally roosts in caves, but will also roost in man-made structures such as road culverts, old mines, stormwater channels and occasionally buildings. Roost sites are usually near well timbered areas where bats forage for aerial insects, primarily moths, both above and below the canopy (Menkhorst and Lumsden 1995). They will use a broad variety of habitats, from open woodlands and open grasslands. However, typically this bat is found in well timbered valleys where it feeds above the tree canopy (Strahan 1995). Most available information is related to roosting; very little is known about other habitat requirements and ecology (VicRFASC 1999).

*Territoriality:* Discrete local populations of Eastern Bent-wing Bats centre on a breeding cave for births and development of young, but disperse to other caves at other times of the year, up to a distance of 300 kilometres (Churchill 1998). Female Eastern Bent-wing Bats congregate in large breeding colonies to give birth; only two sites are known for Victoria, one near Nowa Nowa, and the other near Warrnambool (Dwyer and Hamilton-Smith 1965). Their home range is unknown, however lactating females are known to travel from Nargun Cave (East Gippsland) to Rotamah Island 34 kilometres away for nightly foraging trips (VicRFASC 1999).

*Threats and Management:* The effects of forestry practices such as timber harvesting and fuel reduction burning on this species and its prey, are unknown

(Law 1996), but are probably low in comparison to other impacts such as human disturbance of mineshaft roosting sites, collapse of mineshaft and introduced pest species (VicRFASC 1999). An action plan for this species has not yet been prepared under the Flora and Fauna Guarantee Act 1988.

*Occurrence in the study area:* There are no known roosting sites for the Eastern Bent-wing Bat within the Strzelecki Ranges or near scattered HVP leasehold properties to the east or west of the Strzelecki Ranges. The frequency of use of the Strzelecki Ranges by the Eastern Bent-wing Bat and its importance for foraging activities are unknown.

### **Powerful Owl *Ninox strenua***

*Distribution:* Within Victoria, mostly occurs to the south of the 36°30' line of latitude. The size of the Victorian population is largely unknown but probably less than 500 pairs, possibly less than 100 pairs in the Gippsland RFA region (VicRFASC 1999). There have been greater than 10 records of the Powerful Owl from near or within the core area of HVP leasehold properties in the Strzelecki Ranges (AVW *unpub. data*), and the Powerful Owl was recorded twice during the present assessment. It has also been recorded from the vicinity of scattered HVP land to the east and west of the Strzelecki Ranges (3 and 4 records, respectively).

*Habitat:* This is the largest owl species in Australia. It prefers tall open sclerophyll forest and woodlands, requiring large, hollow-bearing eucalypts for breeding. The Powerful Owl prefers areas with dense scrub nearby but has been recorded in a variety of wooded habitats. It prefers large tracts of continuous forest, but will sometimes occur in more fragmented landscapes or near permanent streams dominated by Mountain Grey Gum *Eucalyptus cypellocarpa* and other eucalypts. The Powerful Owl roosts in the tree canopy and utilises large tree hollows for nesting. A dense shrub layer provides essential shelter for pre-fledged owlets, which, after falling to the ground, avoid predators by climbing shrubs (McNabb 1996, Hollands 1991)

*Territoriality:* Powerful Owls are a sedentary species and breeding pairs occupy large permanent territories (300-1000 ha) that contain a number of roost sites and nest trees (McNabb 1996). The size of their home range is dependent upon the suitability of the habitat and the availability of prey species (VicRFASC 1999).

*Threats and Management:* Significant threats to the Powerful Owl include disturbances that reduce the availability of nest sites (i.e. suitable large hollow-bearing trees), roosting habitat and/or prey availability. Given that the majority of records of the Powerful Owl from the Gippsland area are from State Forest (VicRFASC 1999), a reduction in the availability of nest sites, roost sites and prey through forest management activities (especially harvesting, but also road

construction) has the potential to create significant impacts on local populations (Debus and Chafer 1994).

*Occurrence in the study area:* There are at least two Powerful Owls within the vicinity of HVP land in the Strzelecki Ranges (this study). There are also likely to be additional pairs of birds within the Strzelecki Ranges. Potentially, Powerful Owls could use scattered HVP leasehold properties to the east and west of the Strzelecki Ranges as part of their home ranges.

#### **Warty Bell Frog *Litoria raniformis***

*Distribution:* Historically, the Warty Bell Frog has been recorded from most regions of Victoria, with the exception of Mallee and Alpine areas. However, the known range of this large frog species has contracted dramatically over the past two decades. Their decline is likely to be a combination of disease, habitat loss/modification and predation by mosquito fish. In the 1970s, there were a small number of records of the Warty Bell Frog from the vicinity of scattered HVP leasehold properties to the east and west of the Strzelecki Ranges (AVW unpub. data). There have been very few records of the Warty Bell Frog from anywhere within Gippsland since the early 1980s.

*Habitat:* The Warty Bell Frog is largely associated with permanent water bodies - streams, lagoons, farm dams and old quarry sites. The species is largely aquatic, found among vegetation within or at the edges around water.

*Territoriality and Movements:*

*Threats and Management:* At present, there is insufficient information available to clearly define objectives for a recovery plan for the Warty Bell Frog (Frog Act pL). The frog Action Plan indicates that the most important objective in the short term should be to learn more about the reasons for the decline of the Warty Bell Frog.

*Occurrence in the study area:*

#### **Koala *Phascolarctos cinereus***

*Distribution;* In the early 1900s, populations of koalas in Victoria had been decimated, largely as a result of the fur trade. From the 1920s onwards, a large scale koala translocation programme was undertaken, involving the movement of more than 10000 animals to over 70 sites in Victoria and South Australia (Houlden et al. 1996). Most current koala populations in Victoria and South Australia are descended from source sites at Phillip Island and French Island stock. These koalas are relatively genetically homogenous (Houlden et al. 1999). South Gippsland and the Strzelecki Ranges have not been directly involved in the translocation programme. Koala populations in these areas have additional

unique genetic diversity compared to the rest of Victoria (Houlden et al. 1999) and are subsequently of a higher conservation importance.

*Habitat:* They occur primarily in eucalypt dominated forests, and feed on eucalypt leaves. Although captive and free-ranging koalas have been known to feed from many hundreds of eucalypt species, plus a number of non-eucalypt species (Blanchard 1994), they typically feed from only a dozen or so eucalypt species, such as *Eucalyptus globulus*, *E. ovata*, *E. viminalis* and *E. obliqua* (Lee & Martin 1988). It has been suggested that Mountain Ash *E. regnans*, typically not a prime food source for koalas, may be an important koala food tree in the Strzelecki Ranges (S. Zent pers comm), however, further investigations are required.

*Territoriality and Movements:* Home range of koalas vary according to availability of food trees. Koalas are likely to have relatively large home ranges within the Strzelecki Ranges due to the low density of suitable food trees.

*Threats:* Within the Strzelecki Ranges, koalas are likely to be most threatened by disease (ie. Chlamydia) and habitat modification and loss of food trees through forestry activities.

*Occurrence in the study area:* There are relatively few records of the koalas within the study area, mostly from around Jack River-College Creek area and to the east of Tarra-Bulga National Park, although there is anecdotal evidence they were more abundant in the past (S. Zent pers. comm.). The paucity of koala records from much of the remainder of the Strzelecki Ranges study area may reflect sampling biases or may reflect their absence from these areas. Much of the study area is dominated by Mountain Ash *E. regnans* or acacia species, as such, there are relatively few food trees for the koala. Although koala is known to feed from Mountain Ash trees (S. Zent pers. comm.), they are not a preferred food source. The occurrence of the koalas in Mountain Ash dominated areas of the Strzelecki Ranges is probably related to the presence of more-suitable food trees scattered throughout these areas. It is likely that koalas occur through much of the Strzelecki Ranges study area, although in low densities.

### **Australian Grayling *Prototroctes maraena***

*Distribution:* On mainland Australia it has been recorded from coastal drainages from Hopkins River in Western Victoria, to the Grose River, near Sydney (Cadwallader and Backhouse 1983). Can occur a long distance inland.

*Habitat:* The Australian Grayling occurs in rivers and streams, preferring cool, clear waters with a gravel substrate and alternating pools and riffles (Cadwallader and Backhouse 1983)

*Territoriality:* Spawning is thought to occur in freshwater river and streams, the larvae then being swept downstream to the estuary and juvenile fish migrating upstream four to six months later (Faragher and Harris 1994).

*Threats:* Various theories exist as to the causes for its decline, including habitat degradation, barriers to movement, disease and competition from alien species (Koehn and Morrison 1990, Faragher and Harris 1994), though the importance of each of these is poorly understood.

*Occurrence in the study area:* Australian Grayling has been recorded in many of the waterways draining from the Strzelecki Ranges, in waterways close to the study area. This includes the Franklin, Agnes and Morwell Rivers.

### **Strzelecki Burrowing Crayfish *Engaeus strzelecki***

*Distribution:* The Strzelecki Burrowing Crayfish only occurs along a 30 kilometre section of the high altitude region of the eastern Strzelecki Ranges in South Gippsland (Horwitz 1990).

*Habitat:* Within its known range it is thought to be common in flood-beds and banks of streams, particularly smaller stream tributaries (van Praagh and Hinkley 1999). Burrows of this species occur in soils of a heavy clay component where they occur in a wet or seepage area. The root mattings of tree ferns are important habitat features (Horwitz 1990).

*Territoriality:* Territoriality is unknown. Home range unknown but probably small. Movements/dispersal unknown.

*Threats and Management:* Any activity leading to an alteration in the nature of the streamside watertable or drainage patterns could affect the species survival (van Praagh and Hinkley 1999). This could include activities associated with timber harvesting. Horwitz (1990) recommends (a) more study of life history of the species, (b) discouragement of any activity which may lead to an alteration in the nature of the streamside watertable, and (c) buffer strips around gullies and their banks in areas of forestry. These buffer strips around the riparian areas need to be maintained. Tarra-Bulga National Park is the only permanently reserved habitat for this species.

*Occurrence in the study area:* Records of this species throughout Strzelecki Ranges section of the study area.

## A6.3 STATE SIGNIFICANT SPECIES

### **Broad-toothed Rat** *Mastacomys fuscus*

*Distribution:* The Broad-toothed Rat is widespread but patchily distributed. It is known from the Snowfields, Highlands, Otway Ranges and Wilsons Promontory (Menkhorst 1995). Remains have also been found in predator scats from the Otway Plain and near Cann River (Menkhorst 1995) and from English Corner in the Strzelecki Ranges.

*Habitat:* Inhabits high rainfall areas from subalpine heath and sedgeland down to coastal grasslands and heath. In lower altitude areas (300 to 1000 metres) they inhabit areas with a dense wet understorey within wet forest communities.

*Territoriality and Movements:* Most evidence is from alpine environments, where females have small overlapping home ranges and males large non-overlapping home ranges during summer breeding period (Menkhorst 1995). Juveniles have good dispersal abilities, many may move long distances in search of suitable habitat (Menkhorst 1995).

*Threats and Management:* They are difficult species to study as they are rarely caught in Elliot traps. However, their relatively regular occurrence in predator scats suggest they may be more abundant than trapping indicates (unless predators are selectively preying on Broad-toothed Rats over other rats) (Menkhorst 1995). There is clear evidence of predation by foxes. Their range has also been reduced through agriculture and housing (Menkhorst 1995). Protection of riparian areas during forestry operations is important management for this species survival in harvesting areas (Menkhorst 1995).

*Occurrence in the study area:* Remains found within predator scat in the vicinity of English Corner (S. Zent pers. comm.). Older records (pre 1977) are known from English Corner and Olsens Bridge (Norris et al. 1979, Mansergh and Norris 1982a). Status over Strzelecki Ranges is unknown, but there is at least likely to be a small population in the vicinity of English Corner.

### **Barking Owl** *Ninox connivens*

*Distribution:* Has been recorded through much of Victoria, though rarely in Mallee areas or along the coast in the western half of the state. It is unknown how many occur within Victoria, but it has been estimated at possibly less than 50 breeding pairs (VicRFASC 1999). There are a small number of scattered Barking Owl records from the Gippsland region. The majority of records are close to forest/farmland ecotones, but it is likely that a proportion of these records are mis-identifications (VicRFASC 1999). It has been recorded near HVP land to the west of the Strzelecki Ranges.

*Habitat:* The Barking Owl prefers dry sclerophyll forests and woodlands across Australia. It is usually recorded in dense riparian galleries with large, hollow-



bearing eucalypts suitable for breeding and roosting, but is occasionally recorded in clumps of trees in partly cleared land (Higgins 1999). The Barking Owl will sometimes use trees in country towns, but is rarely recorded in urban areas (Higgins 1999). The majority of the Gippsland records are from farm/forest ecotones (VicRFASC 1999). It nests in hollows in large old trees. The extensive loss of its woodland habitat has been mainly due to clearance for agriculture. It is not recorded in regenerating areas of forest less than 60 years old. Rarely recorded from wet forest and then usually only near clearings (VicRFASC 1999). The species appears to have a preference for hunting in open habitat (Robinson 1994) but roosts among dense vegetation. The Barking Owl exhibits a wide dietary flexibility, medium-sized mammals and birds including rabbits, gliders, kookaburras, magpies and parrots are commonly taken. Small mammals such as bats, and lizards, frogs and insects are also eaten (Schodde and Mason 1980, Conole 1985). Birds primarily nest in large, hollow-bearing trees (Schodde and Mason 1980).

*Territoriality and Movements:* The Barking Owl defends a small territory (30-200 ha) in which they nest and roost within a much larger home range (foraging range), which may be greater than 1000 ha (VicRFASC 1999). Individuals have been observed hunting up to five kilometres from their roosts. (Silveira 1997a). Territorial, non-colonial breeding pairs (Schodde and Mason 1980). Juveniles have been known to disperse long distances (VicRFASC 1999). The Barking Owl is a sedentary species and pairs occupy large home ranges.

*Threats and Management:* Due to the various uncertainties and the lack of information on habitat use within the Gippsland region, the significance of disturbances on the population within the region are largely unknown (VicRFASC 1999). In other regions loss and fragmentation of habitat through clearing was identified as a potentially significant threat as was a reduced availability large hollow-bearing trees, used by the species for nesting, as a result of timber harvesting and firewood collection (VicRFASC 1999).

Occurrence in study area:

### **Sooty Owl *Tyto tenebricosa***

*Distribution:* There are two main populations within Victoria, one within the Mountain Ash forests to the east of Melbourne and other in east Gippsland. Within the Gippsland area, Sooty Owls are widespread in the forested central and northern areas; with a few scattered records in the southern part of the region. There is an isolated record of the Sooty Owl from near HVP leasehold property in the Strzelecki Ranges, near Gunyah. This may have been a misidentification.

*Habitat:* Prefer tall old-growth montane forests, but sometimes recorded in riparian habitat. They inhabit mainly wet Mountain Grey Gum gullies, rainforests

and Mountain Ash forests in large areas of continuous forest (Emison et al. 1987). Sometimes occurs in younger forest if there is old-growth forest nearby or a high density of stags (Higgins 1999). The Sooty Owl is a specialist inhabitant of nutrient rich, wet forests (Lumsden et al. 1991, Milledge et al. 1991).

*Territoriality and Movements:* In general, their home range is probably between 200-800+ hectares, although estimates have varied from 200 ha to 3000 ha (VicRFASC 1999). The size of the home range is likely to be related to the suitability of the habitat and the availability of prey species. Sooty Owls are sedentary, non-colonial and territorial (VicRFASC 1999). Pairs apparently mate for the life of a partner, are sedentary and occupy large home ranges (VicRFASC 1999).

Large trees with hollows are required for roosting and breeding; caves may also be used if available. Sooty Owls feed on both arboreal and terrestrial mammals although in some areas terrestrial and scansorial mammals make up the bulk of the prey (Schodde and Mason 1980, E. McNabb pers. comm.).

*Threats and Management:* Major threatening processes are those which result in a reduction in the availability of tree hollows, which are used for both nesting activities and as sites of shelter and reproduction for their prey species (Garnett 1992a). Thus, threats include forest management activities that result in loss of habitat or hollow-bearing trees, particularly timber harvesting, but also road construction and maintenance.

### **Grey Goshawk *Accipiter novaehollandiae***

*Distribution:* Within the Gippsland region, most records of the Grey Goshawk are scattered to the south of the Princes Highway in the south-east of the region in the Strzelecki Ranges and the Gippsland Plains (Emison et al. 1987). The species has been recorded from State forest and from private land, often close to State forest (Atlas of Victorian Wildlife). It has been estimated that there are fewer than 200 breeding pairs in Victoria (VicRFASC 1999).

*Habitat:* Within the Gippsland area, Grey Goshawks are known to inhabit wet forests and gullies (including those containing Mountain Grey Gum *E. cypellocarpa*), riparian forest, occasionally woodlands, dry forest, suburban parks and wooded farmlands (Emison et al. 1987, VicRFASC 1999). The Grey Goshawk is adapted for life in closed forest where it hunts within or just above the canopy by making short flights from perches; it may also hunt in nearby open country (Olsen and Olsen 1985, Mooney and Holdsworth 1988, Olsen et al. 1990). In Tasmania, adult Grey Goshawks are known to primarily use old-growth wet forests for hunting and nesting. Some individuals may also nest in mixed-age or young regrowth forest if old-growth trees are present. Nest sites

are often near water (Mooney and Holdsworth 1988, Brereton and Mooney 1994).

*Territoriality and movements:* Their home range is unknown, but possibly contains core areas of about 1000 ha (Mooney and Holdsworth 1988). Grey Goshawks establish non-colonial; monogamous pairs. Established pairs sedentary; other individuals disperse widely. They are territorial when breeding.

*Threats and management:* The Grey Goshawk predominantly utilises older age-classes of forest for nesting and foraging. Timber harvesting can convert older age-classes of forest to young regrowth stands causing the loss of both nesting and foraging habitat (Mooney 1987, Mooney 1988, Mooney and Holdsworth 1988). While the Grey Goshawk may tolerate some level of disturbance near nest sites (e.g. selective logging, limited road building), nests are deserted following intense/direct disturbance (Mooney and Holdsworth 1988).

Occurrence in study area:

#### **Masked Owl *Tyto novaehollandiae***

*Distribution:* Within the Gippsland area, records are predominantly in the centre of the region (around Kalimna, Bairnsdale, Bruthen, Colquhoun State Forest). It is rare in the gippsland area (VicRFASC 1999). It has been recorded from the southern section of the Strzelecki Ranges. There is an estimated 300-400 breeding pairs in Victoria, with an estimated 60 breeding pairs in Gippsland and East Gippsland plains (VicRFASC 1999).

*Habitat:* Generally found in lowland forests. It has been recorded from Valley-floor Forest in the Strzelecki Ranges (VicRFASC 1999). Records of the Masked Owl are often from the ecotone between two vegetation types (VicRFASC 1999). The Masked Owl is a rarely recorded species that requires trees with large hollows for daytime roosting and nesting. Dense foliage may be used for roosting. Breeding pairs occupy large permanent territories (>1000 ha) (Kavanagh and Murray 1996). Important habitat components include eucalypt forest for roosting and nesting, and forest edge and open woodland for hunting; the species is most often recorded near the boundary between two vegetation types (Peake et al. 1993, Debus and Rose 1994).

*Territoriality and Movements:* The Masked Owl has a home range of 1017 to 1178 hectares, based on the results collected from one radiotracked female (VicRFASC 1999). It has powers of dispersal, in non-colonial, territorial and sedentary (VicRFASC 1999).

*Threats and management:* Management models for the Masked Owl in the Gippsland area have been unable to be developed due to the paucity of data for this species (VicRFASC 1999). Masked Owl faces many forest activity

threats. Loss of standing trees with hollows for nest and roost sites is a threat in forests managed for timber production. Masked Owls require open forest for foraging, and dense logging regeneration may not be suitable foraging habitat (Peake et al. 1993).

**South Gippsland Spiny Crayfish *Eustacus neodiversis***

*Distribution:* Wilsons Promotory and the Strzelecki Ranges at elevations of 50 to 600 metres above sea-level

*Habitat:* In the Strzelecki ranges, they occur in streamside vegetation dominated by Mountain Ash and tree-ferns (NRE 1998).

*Territoriality:* Territoriality is unknown. Home range unknown but probably small. Movements/dispersal unknown.

*Threats and management:* Threats are likely to involve loss of habitat and habitat modification through timber harvesting. No management plans are available, but they are probably similar to Strzelecki Burrowing Crayfish (i.e. discouragement of any activity which may lead to an alteration in the nature of the streamside watertable, and buffer strips around gullies and their banks in areas of forestry).

*Occurrence in the study area:* Has been recorded alongside the Tarra River within the Tarra-Bulga National Park. Possible recent record near the headwaters of Agnes River (S. Zent, pers. comm.). Likely to have a wider distribution within the Strzelecki Ranges study area.

# APPENDIX 7

## A7. SIGNIFICANCE ASSESSMENT

### A7.1 Introduction

The assessment of biological values enables recommendations for the best protection and management of significant species and habitats, and to protect and maintain biodiversity.

### A7.2 Defining Significant Species and Communities

#### Flora

The significance of remnant native vegetation and populations of any plant species is evaluated on a geographical scale with four levels: **National**, **State**, **Regional** and **Local**. These levels are:

**National** significance of vascular plant species is assessed using comparison to lists of significant plants in Briggs & Leigh (1996).

**State** significance of vascular plant species is assessed using comparison to lists of significant plants in NRE (2000) and Flora Information System unpublished data.

**Regional** significance for flora is assessed using various options. These include a list provided by Beaglehole (1984) for the Gippsland South area as defined by the Land Conservation Council (1973). More recently, bioregions have been more rigorously defined for Victoria (NRE 1997c), and the extensive quadrat/defined area plant list database of the Department of Natural Resources and Environment has been used to determine the frequency of records for vascular plants in each of these regions.

The regions for this study are defined as the Gippsland Plain and Strzelecki Ranges Bioregions (NRE 1997c).

A species is defined as having Regional significance if it occurs in one per cent or less of the known quadrat/list records for any particular bioregion. If that region has been substantially cleared or disturbed, a five per cent threshold is applied. The use of bioregions is considered the most ecologically-sound method to evaluate regional significance; however, species considered significant by other authors are also noted.

As both Bioregion are considered to be substantially cleared, a 5% threshold for regional significance is used in this case.

**Local** significance is applied to a vascular plant species that is endangered, vulnerable or rare within a defined local area.

#### Vegetation Communities

A vegetation community (or Ecological Vegetation Class) is considered significant if it is rare or threatened within a particular geographic context. As for species, a hierarchy of **National**, **State**, **Regional** and **Local** levels of significance is used in assessing vegetation community significance.

**Local** significance is applied to an area that makes a substantial contribution to biodiversity conservation in the local area. Due to the depletion of native vegetation across Victoria, all native vegetation is considered to have at least Local significance.

Community nomenclature follows the Typology for Vegetation in Victoria (NRE in prep.).

## Fauna

The significance of fauna species is considered at four potential levels: **National, State, Regional** and **Local**. These levels are:

**National** significance is assessed using recognised listings: IUCN (1996) and species listed under Schedule 1 of the (Commonwealth) *Endangered Species Protection Act 1992* (ESP).

**State** significance is assessed using recognised listings: NRE (2000b), and species listed as threatened under Schedule 2 of the (Victorian) *Flora and Fauna Guarantee Act 1988* (FFG).

Fauna species that are threatened in Australia or Victoria can also be placed into one of three threat categories: **critically endangered, endangered** or **vulnerable**. Depending on a number of variables, fauna species listed as **lower risk – near threatened** may be either as a higher or lower conservation status. For example, a species listed as ‘lower risk – near threatened’ on a national list may be considered of either national or state significance, whereas a species listed as ‘lower risk – near threatened’ on a state list may be considered of either state or regional significance. Species listed as **data deficient** on a national list are considered state significant, while species considered data deficient on a state list are considered regionally significant.

The categories are based on those developed by the International Union for the Conservation of Nature (IUCN). The following descriptions have been taken from *Threatened Fauna in Victoria – 2000* (NRE 2000).

**Critically Endangered:** A taxon is **Critically Endangered** when it is facing an extremely high risk of extinction in the wild in Victoria in the immediate future.

**Endangered:** A taxon is **Endangered** when it is not Critically Endangered but is facing a very high risk of extinction in the wild in Victoria in the near future.

**Vulnerable:** A taxon is **Vulnerable** when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in Victoria in the near future.

**Lower Risk – Near Threatened:** A taxon is **Lower Risk Near Threatened** when it has been evaluated, and does not satisfy the criteria for Critically Endangered, Endangered or Vulnerable, but is close to qualifying for Vulnerable. In practise, these species are most likely to move into threatened categories should current declines continue or catastrophes befall the species.

**Data Deficient:** A taxon is **Data Deficient** when there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future investigation will show that threatened classification is appropriate.

**Regional** significance for fauna is assessed by referring to relevant government reports, consulting experts familiar with the area, referring to literature, and drawing on the consultant's field experience. This may include species listed as Data Deficient on State lists.

All indigenous fauna is considered to be of at least **local** conservation significance.

## Habitat assessment

According to standard practice, habitat assessment was undertaken for terrestrial vertebrate fauna recorded during this study. The status of a species' habitat – the environment in which it lives – is a major factor in its continued survival.

Floristic and structural features of the vegetation form a habitat type, which provides a set of resources to support a community of fauna species. Habitat types correspond broadly to vegetation communities. Lines drawn around these habitats do not represent rigid boundaries, as many species move between habitats or utilise more than one habitat according to changing conditions or seasons.

The value of a habitat will assist in the final determination of significance. This is determined by a number of features, including:

- Habitat status
- Size/connectivity
- Condition
- Significant species
- Other features

Three categories are used to evaluate habitat value: **high**, **moderate** or **low**.

**High:** ground flora containing a high number of indigenous species; vegetation community structure, ground, log and litter layer intact and undisturbed; a high level of breeding, nesting, feeding and roosting resources available; a high richness and diversity of native fauna species.

**Moderate:** ground flora containing a moderate number of indigenous species; vegetation community structure, ground log and litter layer moderately intact and undisturbed; a moderate level of breeding, nesting, feeding and roosting resources available; a moderate richness and diversity of native fauna species.

**Low:** ground flora containing a low number of indigenous species, vegetation community structure, ground log and litter layer disturbed and modified; a low level of breeding, nesting, feeding and roosting resources available; a low richness and diversity of native fauna species.

Other habitat features, such as its value as a habitat corridor, or the presence of remnant communities, or unusual ecology or community structure, may also be used to assess habitat quality.

## A7.3 Site Conservation Significance

The assessment of site conservation significance is based on several criteria:

**Size:** the overall size of the habitat

- small – < or equal to 10 hectares (low value)

- small to medium – 10 to 50 hectares (medium value)
- medium – 50 to 200 hectares (medium value)
- large – > 200 hectares (high value)

If a community/habitat has a restricted distribution and occurs in the small or medium size categories above, a high value is allocated.

**Connectivity:** linkages of the habitat to adjacent areas of native vegetation and fauna habitat.

- good linking corridor > 500 metres wide to large natural area (as defined above) (high value)
- moderate linking corridor > 100 metres wide to natural area (medium value)
- poor linking corridor < 100 metres wide to small fragmented habitats (low value).

Where an area is connected by a riparian corridor, the connectivity value is also considered high, regardless of the width of the corridor.

#### **Significant Flora and Fauna Species:**

Values for these criteria are based on the number of significant species potentially on that site. They are divided into the following classes:

- one or more significant species (State or National) recorded in study site (**high value**)
- five or more species of state significance, or one or more species of National significance with potential to utilise habitats within study site (**high value**)
- one to four species of State significance with potential to utilise habitats within study site (**medium value**)
- no significant species with potential to utilise habitats within study site (**low value**).

**Distribution:** the degree to which the habitat is distributed in the region and whether the habitat is a Local, Regional or State example. The values are classed as:

- State, Regional or Local example with limited distribution in the region (**high value**)
- State or Regional example with extensive distribution or a local example with moderate distribution (**medium value**)
- Local example with extensive or wide distribution in the region (**low value**).

**Conservation Status:** conservation status is considered at a State and/or Regional level using the following categories:

- habitat poorly conserved in national parks in the region or conservation status unknown (**high value**)
- small to medium size areas of the habitat (as defined previously) conserved in national parks in the region (**medium value**)
- large areas of the habitat conserved in national parks in the region (**low value**).

If the conservation status of a vegetation community/habitat is unknown a conservative approach is taken, with a high value being allocated. This approach should be implemented until more information is available, and a



more informed decision can be made.

**Ecological Integrity:** the degree of intactness of vegetation within the habitat, using indicators such as the abundance of weeds, condition of the understorey and habitat structure. Ecological integrity classes are:

- intact, low proportion of weed species, understorey and canopy in good condition, good habitat structure (**high value**)
- low proportion of weed species, understorey in moderate condition, canopy in moderate condition, moderate habitat structure (**medium value**)
- medium to high proportion of weed species, highly disturbed understorey and canopy, highly disturbed habitat structure (**low value**).

**Viability:** assessed using the area of habitat, edge/area ratio of the habitat, presence of disturbed low quality vegetation, presence of threats/disturbances in the habitat. Viability classes are:

- low edge to area ratio, consistent low levels of disturbance, low level of threats (**high value**)
- moderate edge to area ratio, small disturbed areas, moderate level of threats and disturbance (**medium value**)
- low edge to area ratio, disturbed areas common, moderate level of threats and disturbance (**medium value**)
- high edge to area ratio, disturbed areas common, high level of threats and disturbance (**low value**).

**Richness and Diversity:** the number of species, communities and habitats, classified as:

- highly rich and diverse – high number of species, communities and habitats (**high value**)
- rich and diverse – moderate number of species, communities and habitats (**medium value**)
- depauperate – low numbers of species, communities and habitats (**low value**).

# APPENDIX 8

## A8. STATUTORY REGULATIONS

### A8.1 Victorian legislation

#### *Flora and Fauna Guarantee Act 1988*

The *Flora and Fauna Guarantee Act 1988* (FFG) is Victoria's main instrument for protecting biodiversity. If species, ecological communities and threatening processes meet certain criteria they can be listed under the Act. Once listed, NRE prepares Action Statements specifying how the species, community or threatening process should be managed. Action Statements are not legally binding documents but are a statement of NRE policy. Critical Habitat can be declared under the Act for either a species or an ecological community. In areas of Critical Habitat, the Minister of Natural Resources and Environment can impose an Interim Conservation Order (ICO). An ICO is a powerful instrument that can immediately control or prohibit any activities that might be harmful to listed species or communities. ICOs are generally an instrument of last resort, and a negotiated approach leading to a management plan or a Public Authority Management Agreement is likely to be the first option in areas of Critical Habitat, rather than using legislative powers.

The Act also provides protection for a large number of *protected flora* (which includes all plant species occurring within listed communities). A permit under the Act is required to take (kill, injure, disturb or collect) protected flora or listed fish species. Protected flora species are likely to be found in most areas of native vegetation in Victoria. Therefore, permits are likely to be required in many situations where native vegetation is being removed.

Mechanisms exist under the Act to exempt public authorities from the permit requirements where an authority has instituted appropriate systems as approved by NRE.

#### *Wildlife Act 1975*

A permit under the Wildlife Act is required to take, destroy or capture protected wildlife (all native vertebrate species unless declared as noxious, all invertebrate species listed under the FFG Act, and some introduced game species). 'Take', in this Act, has been interpreted to mean intentionally capture or kill, and not in the broader sense of the FFG Act that applies to flora and fish. Permits under the Wildlife Act therefore appear not to be required for indirect 'taking', such as habitat removal, but are required for anyone trapping or handling protected fauna, including activity while undertaking biological surveys or where species are to be collected as part of impact minimisation.

#### *Catchment and Land Protection Act 1994*

This Act contains provisions relating to catchment planning, land management, noxious weeds and pest animals that may have indirect relevance to native flora and fauna issues. Although the Act is relevant in the context of the impacts of development and maintenance works on soil erosion, water quality and catchment condition, it does not address biodiversity matters directly.

#### *Planning and Environment Act 1987*

The Planning Scheme for Victoria has recently been amended to form the Victorian Planning Provisions. The State policy on Native Vegetation Retention has been directly transferred to the State Planning Policy and Framework and the provisions transferred to the Particular Provisions. A planning permit is required to remove, destroy or lop certain native vegetation under these provisions.

A planning permit is required to remove native vegetation on any land in a holding of 0.4 hectares or greater in size. Local municipalities are the Responsible Authority and NRE is a Statutory Referral Authority. A number of exemptions to this permit requirement apply and these are listed in the Provisions.

The Victoria Planning Provisions and the NRE Guidelines on Native Vegetation Retention (DCNR [now NRE] 1996) guide the assessment of applications to clear land. The criteria include: the role of native vegetation in conserving flora and fauna; protecting water quality and preventing land degradation; if land contains a rare community, or supports rare species, or forms a wildlife corridor.

### ***Environment Effects Act 1978 and Amendment Act 1994***

The Victorian Environment Effects Act allows the Minister for Planning to determine that certain development proposals require assessment of their potential impact on the environment. Such an assessment may be a full Environmental Effects Statement (EES) or at a lower level of detail, as determined by the Minister.

## **A8.2 Federal Legislation**

### ***Environment Protection (Impact of Proposals) Act 1975***

The Commonwealth Environment Protection (Impact of Proposals) Act is relevant where federal funding is involved or where National Estate or world heritage sites are involved (there are currently no world heritage sites in Victoria). The Act allows the Minister for Environment to determine that certain development proposals require assessment of their potential impact on the environment. Such an assessment may be a full Environmental Impact Statement (EIS) or may be at a lower level of detail, such as a Preliminary Environmental Report, as determined by the Minister. Under the Intergovernmental Agreement on the Environment (IGAE), the Commonwealth and the State aim to minimise duplication, and usually there is agreement to only undertake one environmental assessment process (usually the State process) or to undertake a joint process.

### ***Environment Protection and Biodiversity Conservation Act 1999***

The EPBC Act is the Commonwealth's principal instrument for protecting biodiversity. It has similarities with the Victorian FFG Act but is stronger since any

development affecting a listed endangered species or community or an 'important population' of a vulnerable species automatically triggers an assessment and approval process. Species, ecological communities and threatening processes can be listed under the Act if they meet certain criteria. The Commonwealth can delegate responsibility for assessment and approvals to the States, and this is currently being negotiated with Victoria. The Act carries a range of penalties for infringements.

### ***Australian Heritage Commission Act 1975***

The Australian Heritage Commission was established in 1975 under the Australian Heritage Commission Act. The Act provides for the protection of natural and cultural 'places', listed on the Register of the National Estate, of significance to Australians. The Act is only binding on areas controlled by the Commonwealth, although places can be located on any land tenure. The commission will normally make submissions on proposals that may impact on listed National Estate places, whether or not on Commonwealth land. The existence of a National Estate listing generally creates a degree of public interest and concern about any proposal for development at that place.

When federal funding is involved, the Commonwealth may place conditions on a project relating to National Estate places or it may withhold funding.

## **A8.3 Other Relevant Policies and Regulations**

### **Victoria's Biodiversity Strategy**

Victoria's Biodiversity Strategy is outlined in three separate documents. *Victoria's biodiversity – Sustaining Our Living Wealth* (NRE 1997a) sets out the framework. The second document, *Victoria's Biodiversity – Our Living Wealth* (NRE 1997b) describes our natural heritage. *Victoria's Biodiversity – Directions in Management* (NRE 1997c) details the actions to take to ensure biodiversity is managed in a manner both ecologically sound and sustainable.

### **Australian Natural Heritage Charter**

The Australian Natural Heritage Charter (Australian Heritage Commission 1996) sets

standards and principles for conserving and managing places with natural heritage significance. The charter is similar to the Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (usually known as the Burra Charter). The charter does not have legislative backing, but is accepted both within government and among professionals as setting the appropriate ground rules for conservation management.

### **International Treaties**

There is a range of international treaties and agreements relating to flora, fauna and biodiversity that Australia has entered into. In particular, there are ten sites in Victoria (comprising over 60 individual wetlands) listed under the Ramsar Agreement on the Conservation of Wetlands of International Significance.

# GLOSSARY & REFERENCES

# GLOSSARY

## Scientific Terminology

Rules for the scientific classification and naming of species have been developed over a long period and are now accepted world-wide. Once a species has been described and named in accordance with these rules, that name is accepted and used universally. The common name may vary according to place and time, and the one common name might be shared by several different species. The scientific name, however, will remain unique and – with few exceptions – unchanged. Existing species have been sub-divided or split, resulting in an increasing number of sub-species.

A scientific name is latinised and is made up of a number of parts, which, when written in full will include family, genus and species. Scientific names used in this report appear as two parts and are italicised. For example, River Red Gum is referred to as *Eucalyptus camaldulensis*, which is made up by:

- the **genus** or generic name (*Eucalyptus*)
- the **species** or specific name (*camaldulensis*).

## List of definitions

**Alluvial:** pertaining to deposits of earth, sand etc. that have been left by water flowing over land that is not permanently submerged.

**Alluvial terrace:** a platform created from deposits of alluvial material along river banks.

**Anabranh:** a branch of the river that leaves the main stream and either enters it again, dries up, or sinks into the ground.

**Annual:** a plant that completes its life cycle within one year.

**Biodiversity:** the variety of all life-forms – the different plants, animals and micro-organisms, the genes they contains and the **ecosystems** they form.

**Biological health:** the suitability of the environment for the growth of plants, animals and microorganisms.

**Bioregion:** as defined by the Department of Natural Resources and Environment (NRE 1997c) *Victoria's Biodiversity: Directions in Management*. Or from subsequent advice from NRE" as the map in the published document has been changed after input from others.

**Community:** the recognisable association of species that regularly occur together in similar environments.

**Condition:** the degree to which a natural community or habitat retains its integrity and naturalness.

**Connectivity:** the degree to which areas of habitat are joined by remnant vegetation.

**Cover:** the proportion of shadow a plant species would cast if the sun were directly overhead.

**Dicotyledon:** a flowering plant with two seed leaves.

**Diurnal:** active by day.

**Diversity:** the variety of living things.

**Dominant species:** one or more plant species that provide the majority of cover in the uppermost layer of vegetation.

**Ecological Vegetation Class (EVC):** the highest level in the hierarchy of vegetation typology developed by NRE. An EVC consists of one or more floristic vegetation communities under a common regime of ecological processes within a particular environment at a regional, state or continental scale (Woodgate et al. 1994).

**Ecologist:** a person trained in ecology (botany, zoology, ecological science, freshwater ecology) and experienced in the survey and assessment of natural ecological systems.

**Ecosystem:** a dynamic complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit.

**Endangered (in Victoria):** rare and at risk of disappearing from the wild.

**Environmental weeds:** plants that aggressively invade natural vegetation and displace native flora and fauna. They may be exotic, alien or ecologically 'out-of-balance' indigenous species and adversely affect survival or regeneration of indigenous species.

**Exotic species:** a non-indigenous species.

**Flora:** pertaining to plants.

**Fauna:** pertaining to animals.

**Gilgai soils:** soils with an undulating surface, presenting as a pattern of mounds and depressions. A possible cause is the alternation of swelling and cracking of clay during periods of wet and dry conditions.

**Grassland herb:** a plant species characteristic of grassland environments that is soft with little or no woody stem tissue.

**Grassy Wetland:** a treeless vegetation community in poorly drained areas and dominated by plant species tolerant of wet soil conditions, especially grasses.

**Habitat connection:** a dispersal route for large or mobile fauna species to move between larger areas of habitat. These are often linear in shape, such as remnant vegetation along roadside reserves or railway lines, or may consist of a mosaic of inter-connected blocks of remnant vegetation.

**Habitat type:** formed by plant composition and structural features of the vegetation that provide a set of resources to support a community of fauna species. Habitat types correspond broadly to the vegetation communities.

**Introduced Species:** not indigenous to the area.

**Local (conservation) significance:** of significance within a local area e.g. a

species that is endangered, vulnerable or rare within a defined local area; (of a site) an area that makes a substantial contribution to biodiversity conservation in the local area. All areas of native vegetation are considered to be of at least local significance due to the depletion of native vegetation through Victoria.

**Local geomorphological significance:** a site typically displaying clear examples of very common landforms (as defined by Rosengren 1986).

**Monocotyledon:** a flowering plant with one seed leaf.

**National (conservation) significance:** of significance at the national level, e.g. a species considered to be **endangered**, **vulnerable** or **rare** within Australia. A site of **national significance** is an area that makes a substantial contribution to **biodiversity** conservation in Australia.

**Non-vascular plant:** plants without a vascular (vein) system (fungi, mosses, algae, etc.).

**Noxious weeds:** plants proclaimed under the *Victorian Catchment and Land Protection Act 1994*. They include four types: State prohibited, Regionally prohibited, Regionally controlled and Restricted. Noxious weeds are species that seriously threaten or potentially threaten agricultural production.

**Quadrat:** a sample of vegetation, of defined area and shape, commonly between 100 and 1000 sq. metres. Within the quadrat, each species is listed and allocated a defined cover/abundance value. A range of other environmental attributes are also described.

**Plains Grassland:** a treeless vegetation community of the Western Victorian Basalt Plains, usually dominated by Kangaroo Grass *Themeda triandra*, with a range of other characteristic native species, such as native tussock-grasses *Poa* spp. Spear grasses *Stipa* spp., and Wallaby grasses *Danthonia* species. The community is listed as threatened under the *Victorian Flora and Fauna Guarantee Act 1988*.

**Rabbit calicivirus:** a disease organism, recently released in Australia as a biological control agent for wild rabbits.

**Rare (in Victoria):** plants that are rare in Victoria but not otherwise threatened, i.e. there are relatively few known populations (Gullan et al. 1990).

**Regionally controlled weed:** legally defined by the Victorian Catchment and Land Protection Act, and determined by each Victorian Regional Catchment authority in conjunction with NRE for each particular Region. Listed species are those which are widespread, but are still considered important for control. Landholders must take all reasonable steps to control and prevent these weeds spreading on their property and adjacent roadsides.

**Regionally prohibited weed:** legally defined by the Victorian Catchment and Land Protection Act, and listed by NRE for each Victorian Catchment and Land Protection Authority/Board Region. Listed species are generally not widely distributed within a particular region, and can be feasibly eradicated from the region. Landholders are responsible for control of these species on their own land.

**Regional (conservation) significance:** of significance within a defined region. For a species or community – considered to be endangered, vulnerable or rare within a defined region. For a site – considered to make a substantial contribution to biodiversity conservation in the defined region.

**Restricted weed:** legally defined by the Victorian Catchment and Land Protection Act, as those species that pose a serious threat to primary production, crown land, the environment or community health in other states or territories, and have the potential to spread into and within Victoria.

To date no plants in Victoria have been declared Restricted weeds.

**Riparian:** river related.

**Scat:** droppings.

**Significance:** the importance of sites, communities, habitats or species for conservation, scientific or existence values.

**State (conservation) significance:** (of a species or community) considered to be **endangered, vulnerable** or **rare** within Victoria; (of a site) considered to make a substantial contribution to **biodiversity** conservation in Victoria.

**State prohibited weed:** legally defined by the Victorian Catchment and Land Protection Act, are those that do not occur in Victoria but pose a significant threat if they invade, or are present here, pose a serious threat and can reasonably be expected to be eradicated.

**Storey:** midstorey, overstorey, understorey

**Taxon:** (pl. **taxa**) a group or category in a system of classification, e.g. species.

**Taxonomy:** method of classification.

**Terrestrial:** land-dwelling.

**Threatened community:** a plant community that is rare, endangered or significantly depleted. Under the Victorian Flora and Fauna Guarantee Act, a threatened community is eligible for listing and hence legislative protection if it is 'in a demonstrable state of decline that is likely to result in extinction' or is 'significantly prone to future threats that are likely to result in extinction'.

**Threatening processes:** a process, for instance weed invasion or pest animals, which, as defined under the Flora and Fauna Guarantee Act, threatens the survival or evolutionary development of a range of species or a community.

**Vascular plant:** plants with a vascular (vein) system (ferns, conifers, flowering plants etc.).

**Vegetation condition:** the level of intactness of indigenous vegetation or degree to which it is degraded from its original condition, which is assessed according to factors including weed levels, number of native species (compared with the expected diversity of



the particular community), and alteration in structure.

**Vertebrate:** having a backbone.

**Vulnerable (in Victoria):** rare, not presently endangered but likely to become so in the longer term due to continued depletion, or on sites where land use changes are likely to affect the survival of the plant in the wild (Gullan et al. 1990).

**Wildlife corridor:** a band or a series of patches of habitat that allow wildlife (plants and animals) to move through them. Wildlife corridors are usually defined in areas where much of the native vegetation has been cleared, but can also occur within broad area of native vegetation, e.g. along streams.

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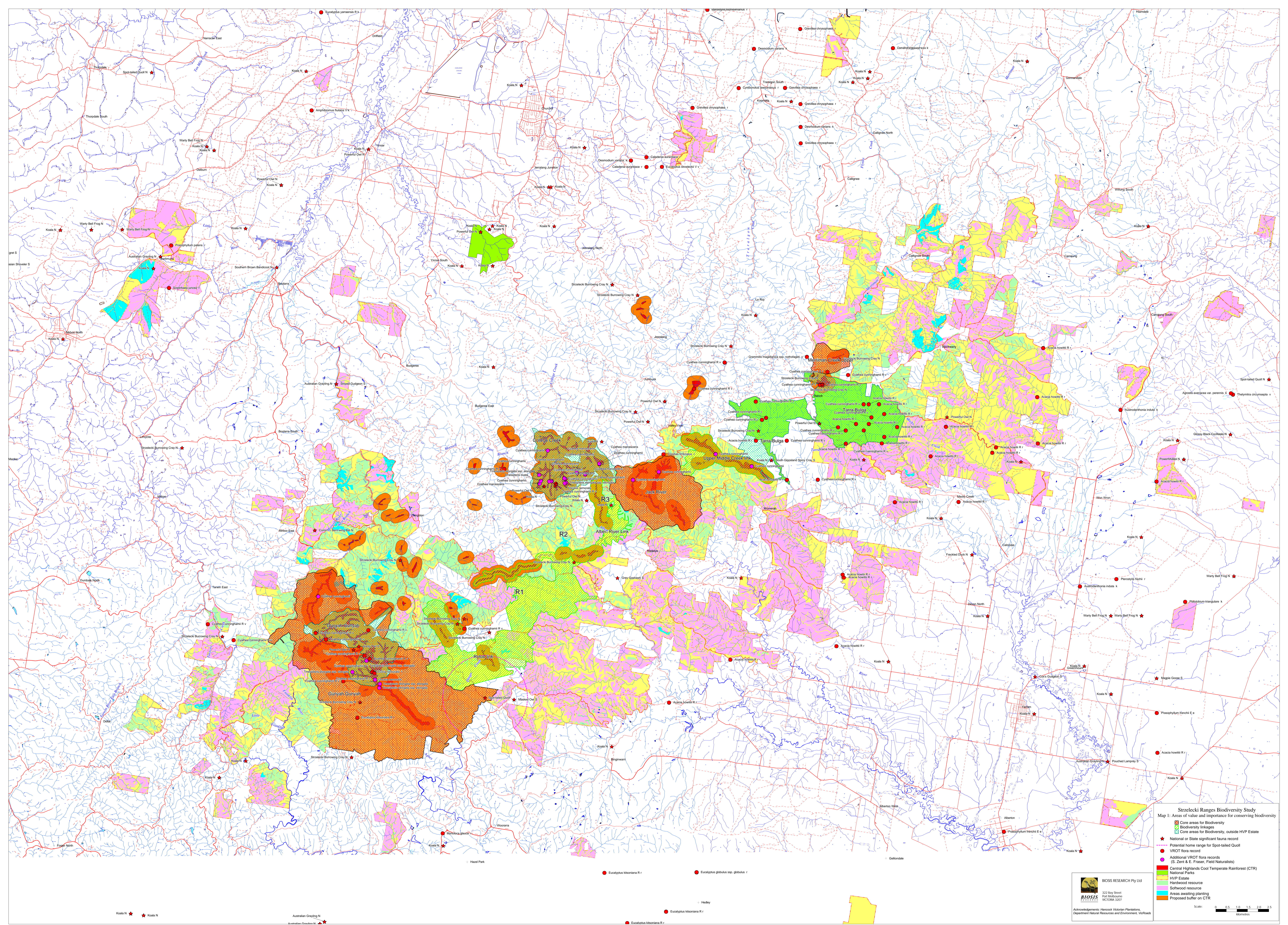
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**Map 1:** Valuable areas of biodiversity and associated habitat links in and around HVP's South Gippsland Estate.



**Strzelecki Ranges Biodiversity Study**  
 Map 1: Areas of value and importance for conserving biodiversity

- Core areas for Biodiversity
- Biodiversity linkages
- Core areas for Biodiversity, outside HVP Estate
- National or State significant fauna record
- Potential home range for Spot-tailed Quail
- VROTF fauna records
- Additional VROTF fauna records (S. Zent & E. Fraser, Field Naturalists)
- Central Highlands Cool Temperate Rainforest (CTR)
- National Parks
- HVP Estate
- Hardwood resource
- Softwood resource
- Areas awaiting planting
- Proposed buffer on CTR

Scale: 0 0.5 1.0 1.5 2.0 2.5 Kilometres

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Koala N ★ Koala N

Australian Grayling N ★ Australian Grayling N

Eucalyptus kisoiana R r Eucalyptus globulus ssp. globulus r

Eucalyptus kisoiana R r Eucalyptus kisoiana R r

Hedley