

# Baseline Biodiversity Study for the Campaspe-Maribyrnong Headwaters Bio-link

A FLORA AND FAUNA SURVEY OF THE JIM JIM

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**Cover page:** Herb-rich Foothill Forest on the property of John and Lauraine Luckock. Photo by Matthew Vinicombe.

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## SUMMARY

Eleven conservation and ecology students from The Naturalist Society of La Trobe University assisted by others from the Newham and District Landcare group conducted a base-line study of the Jim Jim (Newham high ground) surveying for flora and fauna over a period of six days and five nights between the 10<sup>th</sup>- 15<sup>th</sup> of December in 2006.

As the total survey area spanned 200ha., six specific survey points were selected in an attempt to cover a reasonably broad range of habitat types and levels of anthropogenic disturbance. These were located on three properties belonging to private landholders. Information was also collected outside of these specific survey areas but still within the study area on an opportunistic basis.

Three broad Ecological Vegetation Classes were identified during the study. These are discussed further in Chapter 2. In total, 14 species of mammal (4 introduced), 58 birds (4 introduced), 11 reptiles and 4 frogs were recorded across the entire study area using the data collected as well as limited historical and anecdotal information. Numerous invertebrates and plants were also recorded with approximately 126 plant taxa and over 220 invertebrate samples noted and/or collected over the study period.

Significant findings included:

- One taxon of state and international significance, *Gallinago hardwickii* (Latham's Snipe), was detected during the survey with another two taxa of national and/or state significance thought to occur within the study area from recent anecdotal records. These were *Lathamus discolor* (Swift Parrot) and *Phascogale tapoatafa* (Brush-tailed Phascogale).
- A fourth taxon of conservation significance, *Glycine latrobeana* (Clover Glycine), was identified as possibly occurring within the study area with further survey efforts required to confirm its presence. This species is listed as vulnerable both nationally and within Victoria.

The latter three species are listed as threatened under the Flora and Fauna Guarantee Act 1988.

A number of threatening processes were also identified and recommendations made as to how best ameliorate these. These processes include grazing pressure by cattle on potentially sensitive areas, weed invasion, predation on native fauna by foxes and competition and degradation by rabbits. Specific recommendations relating to these and other potential threats to the conservation of biodiversity in the area are outlined in Chapter 5.

The data obtained suggests that the study area is of reasonable conservation significance and may represent populations of certain species that appear to be isolated in the landscape due to habitat fragmentation. The information collated during this study should prove useful in making comparisons with future data as revegetation efforts increase and corridors are created linking together larger areas of remnant habitat.

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## **CHAPTER 1. INTRODUCTION**

### **1.1 THE STUDY AREA**

The study was carried out on a 200 ha remnant (the Jim Jim) isolated by agricultural land on higher ground within the Macedon Ranges district. The area comprises privately owned land adjacent to the Hanging Rock Winery. Three properties were included in the scope of the study and selected according to the range of vegetation types represented on each, geographical features present and the willingness of land holders to participate. Site selection was also partly based on the ease by which pitfall trapping could be undertaken for surveying herpetofauna and small mammals. The three properties included in the survey were the Winery, Judy Hedstrom's property and John and Lauraine Luckock's property. In total, six specific study points were selected: one on the Luckock's property, two on Judy Hedstrom's land and two on the winery land. Ecological vegetation classes and habitat descriptions of individual study points are covered in Chapter 2.

The study area falls within the Central Victorian Uplands Bioregion in accordance with the EVC/Bioregion Benchmark for Vegetation Quality Assessment for Victoria (DSE 2004).

### **1.2 AIMS**

The primary objectives of the study were:

- to investigate and identify the diversity and abundance of various taxa including birds, reptiles, mammals, plants and invertebrates within the study area;
- make recommendations as to how best manage the area as a habitat corridor between Macedon Regional Park and the Cobaw Ranges; and
- collect data for comparison with future biodiversity studies subsequent to the establishment of the habitat corridor through the area.

This study was also aimed at educating and providing experience in ecological field techniques for the volunteers involved.

### **1.3 PROJECT BACKGROUND**

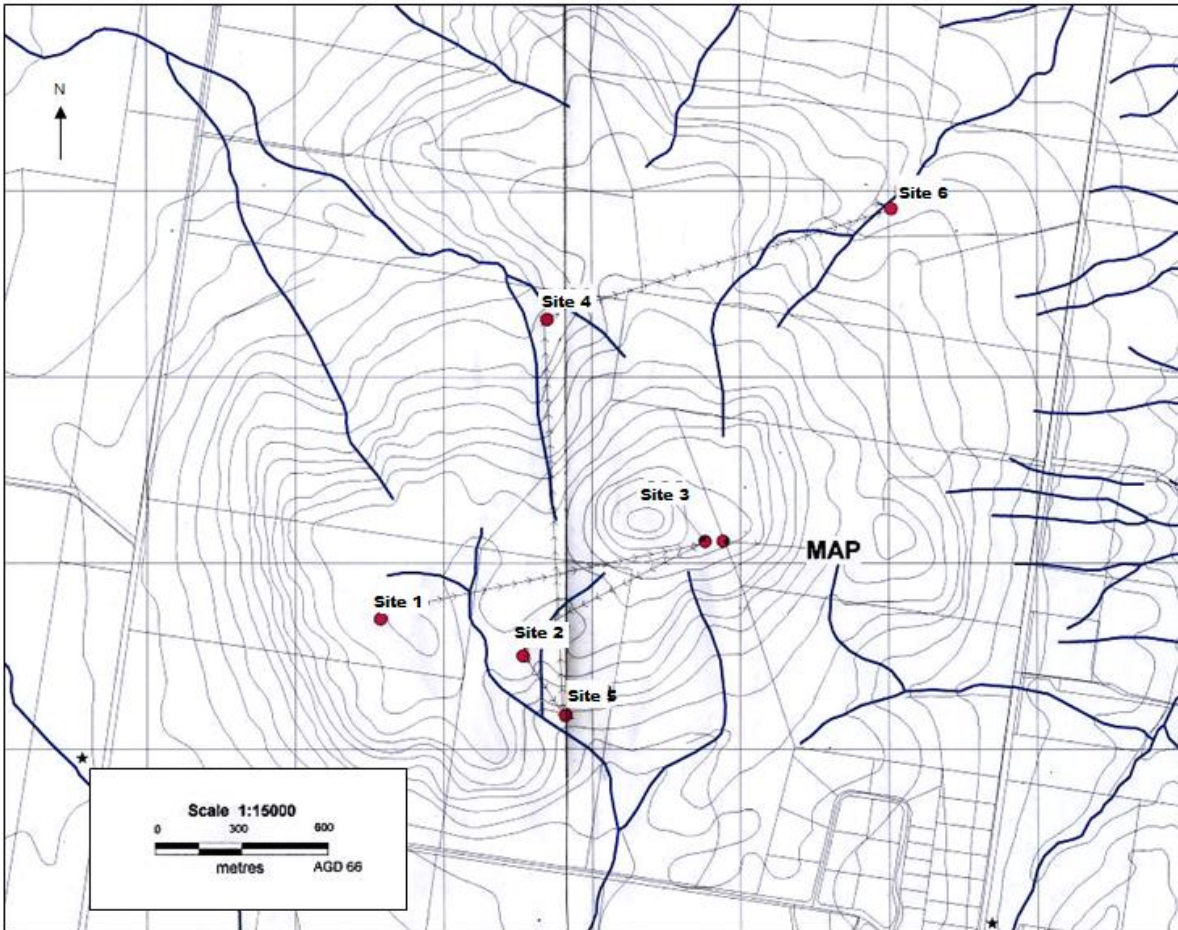
The Newham and District Landcare Group proposes to create a link of continuous vegetation joining the Macedon and Cobaw Ranges, reducing the effects of habitat fragmentation and isolation on populations of native plants and animals restricted to each region. In order to gain insight as to how best maintain and conserve biodiversity between them, it was thought necessary to conduct surveys of the area through which the habitat link is to be established.

A preliminary investigation was undertaken along Deep Creek at the commencement of the Maribyrnong catchment area by a group of conservation and ecology graduates from La Trobe University on four days during February and April 2005. The study focussed on obtaining inventories of key groups of flora and fauna within the survey area and making recommendations as to how best conserve it (Ingwersen 2005). The Deep Creek study recorded 32 bird species (4 introduced), 11 mammals (3 introduced), 3 reptiles, 5 amphibians, 29 terrestrial invertebrate taxa and 19 aquatic invertebrate taxa present within the study area. None of the taxa found at that time were listed as threatened at federal or state level although many species detected could be regarded as being of local or regional significance.

In early December 2006, The Naturalist Society of La Trobe University was commissioned by the Newham and District Landcare Group to survey the area on the Newham high ground. The week involved Elliot trapping for small mammals, pitfall trapping and active searching for terrestrial invertebrates, smaller reptiles, frogs and mammals, spotlighting, conducting bird surveys and plant identification within transects at six survey points within the study area. Invertebrate surveys were also undertaken at each site using nets to sweep vegetation and sample for aerial insects. The sites were chosen according to their vegetational composition, levels of anthropogenic disturbance and soil structure in such a way as to gain a broad understanding of the plants and animals present across the entire area. Data was recorded separately for each survey point.

## CHAPTER 2. SITE DESCRIPTIONS

Waypoints were taken at the beginning of the pitfall line for each study site using a Garmin Geographical Positioning System. Ecological Vegetation Classes were determined using a combination of map referencing and site visitation.



**Figure 1.** Localities of survey points within the study area.

There was some discrepancy between the EVC mapping data supplied by the Department of Sustainability and Environment for the study area and information obtained through observations of aerial maps and ground-truthing. These differences in the identification of EVCs are compared in Table 2. All available sources of information were taken into account when making final decisions as to the EVCs given to study sites.



**Table 1.** Ecological Vegetation Classes (EVCs) identified and waypoints for each survey site.

Site	EVC	Easting	Northing
1 (Winery land)	Plains Grassy Woodland	5728726	3014980
2 (Winery land)	Scoria Cone Woodland	5776661	3024771
3 (Hedstrom's land)	Plains Grassy Woodland	5838056	2994258
4 (Hedstrom's land)	Scoria Cone Woodland	5784936	2934321
5 (Winery land)	Herb-rich Foothill Forest	5791053	3040878
6 (Luckock's land)	Herb-rich Foothill Forest	5901041	2904790

**Table 2.** Comparisons of names given to different EVCs identified within the study area.

Site	Chosen EVC name for the current study	DSE EVC Map data provided through mapping service: bnr_external_v1	Initial on-site assessments of vegetation types
1	Plains Grassy Woodland	Scoria Cone Woodland	
2	Scoria Cone Woodland	Herb-rich Foothill Forest	Plains Grassy Woodland
3	Plains Grassy Woodland		Plains Grassy Woodland
4	Scoria Cone Woodland	Scoria Cone Woodland	
5	Herb-rich Foothill Forest	Herb-rich Foothill Forest	Herb-rich Foothill Forest
6	Herb-rich Foothill Forest	Scoria Cone Woodland	Herb-rich Foothill Forest

Floristic descriptions for each of the six sites and the EVCs identified at each are as follows:

**Site 1. Ridgeline above the Winery land – EVC: Plains Grassy Woodland**

The site is on a south-east facing slope and consists of former grazing land, the understorey being dominated by *Pteridium esculentum* (Bracken) and *Poa labillardieri* (Common Tussock Grass) with a relatively open overstorey dominated primarily by *Eucalyptus viminalis* (Manna Gum). Other typical components of the floristic community included *Acacia dealbata* (Silver Wattle), *Acacia melanoxylon* (Blackwood), *Austrodanthonia eriantha* (Hill Wallaby-grass), *Hydrocotyle laxiflora* (Stinking Pennywort) and *Senecio hispidulus* var. *hispidulus* (Rough Fireweed). Common exotic species included *Hypochoeris radicata* (Cat's Ear) and *Anthoxanthum odoratum* (Sweet Vernal-grass), the total weed cover averaging less than 5%. The site has a substantial amount of cover by ground litter and woody debris providing ideal microhabitats for small mammals such as *Antechinus agilis* (Agile Antechinus), 2 being recorded there during the study. Herpetofauna was relatively abundant at this site (particularly frogs) with *Lampropholis guichenoti* (Garden Skink), *Limnodynastes dumerilii dumerilii* (Eastern Banjo Frog) and *Litoria verreauxii verreauxii* (Whistling Tree Frog) commonly recorded.

**Site 2. Ridgeline above the Winery land – EVC: Scoria Cone Woodland**

Located on the northern edge of a broad valley, this site is dominated by *Eucalyptus viminalis* (Manna Gum) with an understorey dominated by *Poa labillardieri* (Common Tussock Grass) interspersed with scattered herbs including *Stellaria pungens* (Prickly Starwort), *Acaena novae-zelandiae* (Bidgee Widgee), *Lagenophora huegii* (Coarse

Bottle-daisy), *Geranium retrorsum* (Grassland Crane's Bill), *Dichondra repens* (Kidney Weed) and *Sececio hispidulus* var. *hispidulus* (Rough Fireweed). *Acacia mearnsii* (Black Wattle) was present in the taller shrub layer. Canopy cover was estimated at 30%. The weed component included *Hypochoeris radicata* (Cat's Ear), *Marrubium vulgare* (Horehound), *Holcus lanatus* (Yorkshire Fog) and *Galium aparine* (Cleavers), contributing to less than 10% of the overall cover for the site. As for Site 1, this site had a fairly substantial ground layer of litter and woody debris. Vertebrates recorded at this site during the survey included *Limnodynastes dumerilii dumerilii* (Eastern Banjo Frog), *Tiliqua nigrolutea* (Blotched Blue-tongued Lizard), *Phascolarctos cinereus* (Koala) and *Wallabia biocolor* (Swamp Wallaby).

### **Site 3: Judy Hedstrom's land – EVC: Plains Grassy Woodland**

The part of the property surveyed at this location was on a gentle south-west facing slope with a herb layer dominated by *Pteridium esculentum* (Bracken) and *Poa labillardieri* (Common Tussock Grass). Few emergent shrubs or trees were present with a total canopy cover approximating 10% provided by *Acacia melanoxylon* (Blackwood) and *Eucalyptus pauciflora* (Snowgum). Inter-tussock spaces are primarily occupied by smaller herbs and graminoids including *Acaena novae-zelandiae* (Bidgee Widgee), *Geranium ciliatum* (Crane's Bill), *Rumex brownii* (Slender Dock), *Poa sieberiana* var. *sieberiana* (Wiry Tussock-grass), *Austrodanthonia geniculata* (Knead Wallaby-grass), *Hydrocotyle laxiflora* (Stinking Pennywort) and *Elymus scabrus* (Common Wheat-grass). Weeds species identified include *Acetosella vulgaris* (Sheep Sorrel), *Anthoxanthum odoratum* (Sweet Vernal-grass) and *Plantago lanceolata* (Ribwort). This site is currently subject to periodic grazing and although there is a substantial cover by ground litter in some areas, woody debris are extremely sparse. A small basalt outcrop adjoins this site and was found to provide shelter for a number of small vertebrates including *Egernia saxtilis intermedia* (Black Rock Skink), *Lerista bougainvillii* (Bougainville's Skink) and *Parasuta flagellum* (Little Whip Snake).

### **Site 4: Judy Hedstrom's land – EVC: Scoria Cone Woodland**

This site is on a slight north-west facing slope which is subject to periodic grazing by cattle. The dominant tree species was identified as *Eucalyptus viminalis* (Manna Gum) with a grassy herb layer heavily dominated by *Poa labillardieri* (Common Tussock Grass) merging into stands of *Pteridium esculentum* (Bracken). *Acacia dealbata* (Silver Wattle) and *Acacia melanoxylon* (Blackwood) are present as taller shrubs. Smaller herbs identified as sparsely occupying inter-tussock spaces included *Rumex brownii* (Slender Dock), *Hydrocotyle laxiflora* (Stinking Pennywort), *Austrodanthonia geniculata* (Knead Wallaby-grass) and *Poa sieberiana* var. *sieberiana* (Wiry Tussock-grass). This area had a substantial weed component typically consisting of *Acetosella vulgaris* (Sheep Sorrel), *Anthoxanthum odoratum* (Sweet Vernal-grass), *Hypochoeris radicata* (Cat's Ear), *Bromus catharticus* (Prairie Grass), *Briza minor* (Lesser Quaking-grass), *Lagurus ovatus* (Hare's-tail Grass) and *Psoralea pinnata* (Blue Psoralea). It should be noted that adjoining this site is a deeply eroded gully supporting the only naturally occurring population of *Dicksonia antarctica* (Smooth Tree Fern) within the study area. This site is also adjacent to a large Wedge-tailed Eagle nest.

**Site 5: Winery land adjacent to bed and breakfast – EVC: Herb-rich Foothill Forest**

The Messmate (*Eucalyptus obliqua*) dominated gully adjacent to the Winery bed and breakfast is a sheltered area supporting a number of larger canopy trees and smaller saplings in the understorey. This area contained the greatest proportion of woody ground debris. The ground layer is dominated by smaller herbs and grasses including *Whalenbergia stricta* (Tall Bluebell), *Microlaena stipoides* (Weeping Grass), *Dichondra repens* (Kidney Weed), *Acaena novae-zelandiae* (Bidgee Widgee), *Glycine microphylla* (Small-leaf Glycine), *Clematis aristata* (Mountain Clematis), *Asperula scoparia* (Prickly Woodruff), *Euchiton involucratus* (Star Cudweed) and *Geranium retrorsum* (Grassland Crane's Bill). Weeds identified as being characteristic of the site included *Anthoxanthum odoratum* (Sweet Vernal-grass), *Hypochoeris radicata* (Cat's Ear), *Bromus catharticus* (Prairie Grass), *Bromus hordeaceus* (Soft Brome) and *Holcus lanatus* (Yorkshire Fog). Vertebrates of note include *Vombatus ursinus* (Common Wombat), *Trachyglossus aculeatus* (Short-beaked Echidna), *Antechinus agilis* (Agile Antechinus), *Litoria ewingi* (Southern-brown Tree Frog) and *Eulamprus tympanum tympanum* (Southern Water Skink).

**Site 6: John and Lauraine Luckcock's land (gully) EVC: Herb-rich Foothill Forest**

A relatively open gully dominated by *Eucalyptus obliqua* (Messmate) with a *Poa labillardieri* (Common Tussock Grass) dominated understorey. Taller shrubs typical of this site are *Acacia dealbata* (Silver Wattle) and *Acacia melanoxylon* (Blackwood) with medium to smaller shrubs also present including *Acrotriche prostrata* (Trailing Ground-berry) and *Indigofera australis* (Austral Indigo). Smaller herbs recorded included *Glycine clandestina* (Twining Glycine), *Geranium retrorsum* (Grassland Crane's Bill), *Euchiton involucratus* (Star Cudweed), *Austrodanthonia setacea* (Bristly Wallaby-grass), *Stellaria pungens* (Prickly Starwort), *Poa tenera* (Slender Tussock-grass) and *Elymus scabrus* (Common Wheat-grass). Typical weeds were *Anthoxanthum odoratum* (Sweet Vernal-grass), *Hypochoeris radicata* (Cat's Ear), *Bromus catharticus* (Prairie Grass), *Holcus lanatus* (Yorkshire Fog), *Trifolium subterraneum* (Subterranean Clover), *Aster subulatus* (Aster Weed) and *Phalaris aquatica* (Toowoomba Canary-grass). It should be noted that recent anecdotal reports have been made in relation to the vulnerable *Phascogale tapoatafa* (Brush-tailed Phascogale) occurring on the opposite side of the gully to this site (Luckcock pers. comm.).

### CHAPTER 3. GENERAL METHODS

The initial eleven investigators and volunteers from La Trobe University were divided into two roughly even groups, one focussing on the zoological report and the other focussing on the botanical report. Each group was lead by a principal investigator and also supported by a number of local volunteers from the Newham and District Landcare group. Both groups shared responsibilities for the inspection of pitfall lines at 6:00am. and again at 7:00pm. each day. Elliot traps used for small mammal capture were also inspected at 6:00am by all field participants.

Spotlighting was undertaken on two evenings for nocturnal birds and mammals, one night in Messmate (*Eucalyptus obliqua*) dominated Herb Rich Foothill-forest at Site 5 and the second night along Jim and Boundary Roads (south and west boundaries of the study area). A single spotlight attached to an external motorbike battery was used on each occasion.

Pitfall traps were used as a method for surveying invertebrates, herpetofauna (frogs and reptiles) and small ground mammals. Each pitfall line consisted of a 30cm. high x 50m. long flyscreen drift fence positioned along the ground over 10 x 20L. plastic pails (buckets) spaced at 4m. intervals. The buckets were buried with their rims set flush to the ground and the bottom of the fence was buried about an inch into the ground to prevent the passage of animals underneath it.

The purpose of the drift fence is to act as a guide so that smaller terrestrial animals are “fed” into the buckets when they encounter it. It is held erect with the use of 5mm. gauge galvanised fencing pegs that can be wound to ensure tension is maintained along its entire length. Fencing pegs were also placed at both sides of each bucket and at both ends of the pitfall line as shown in the diagram bellow.



**Figure 2.** Diagram showing the structure of a constructed pitfall line (aerial view) including positions of buckets, pegs and flywire.

One end of each pitfall line was “tagged and flagged” with flagging tape and permit number attached to a star picket driven into the ground with a mallet. The exact location of each line was taken using a GPS and the coordinates noted down.

Each bucket had 5 small holes drilled into its base to allow for drainage in case of a rain event whilst ensuring small animals such as juvenile skinks could not escape through the penetrations. In order to provide trapped animals with protection from predators and

large fluctuations in temperature, a length of 40mm.-60mm. PVC piping was placed at the base of each bucket.

Once vertebrates were retrieved from pitfall lines and Elliot traps, they were either released on site or held temporarily for identification purposes before being returned to the place of capture.



**Figure 3.** Two Agile Antechinus (*Antechinus agilis*) caught in Elliot traps at Site 1. Photo by Ainslee Hill.

## CHAPTER 4. FLORA AND FAUNA SURVEYS

### 4.1 VEGETATION SURVEYS

#### 4.1.1 Methods

Quadrat surveys were carried out at each of the six survey sites as well as within other Ecological Vegetation Classes (EVCs) across the study area so as to provide floristic descriptions of the vegetation types and plant communities present as well as formulate a general plant list for the entire area. This process of dividing up the study site into smaller representative units for sampling purposes is known as stratification. Additional sites for botanical surveys were selected using a combination of local knowledge of the area's geology, ground-truthing and interpreting aerial photographs. Within each selected unit, a transect 30m. long and wide was marked out using a measuring tape and field assistants identified plants within the 900m<sup>2</sup> area including trees, shrubs, herbs and grasses. Percentage cover of weed species, rocks, woody debris, leaf litter, mosses and lichens was estimated for each as well as the percentage canopy cover for the dominant tree species.

The bulk of plants were identified in the field while herbarium specimens were taken from unknown taxa for identification at a later date using the Flora of Melbourne (Australian Plants Society Maroondah 2001).

#### 4.1.2 Results

The following EVCs were identified as occurring across the study area:

##### **Plains Grassy Woodland**

**Description:** Eucalypt dominated woodland, typically *Eucalyptus viminalis* (Manna Gum), with a grassy-herb layer dominated by *Pteridium esculentum* (Bracken), *Poa labillardieri* (Common Tussock Grass) or *Themeda triandra* (Kangaroo Grass). Typical open canopy cover averaging 15%. Inter-tussock spaces are mainly occupied by smaller herbs, small shrubs and graminoids including *Pimelea humilis* (Common Rice-flower), *Astroloma humifusum* (Cranberry Heath), *Hydrocotyle laxiflora* (Stinking Pennywort), *Geranium* spp. (Crane's Bill), *Lomandra filiformis* (Wattle Mat-rush), *Schoenus apogon* (Common Bog-sedge), *Austrostipa mollis* (Soft Spear-grass), *Austrodanthonia* spp. (Wallaby Grass) and *Elymus scabrus* (Common Wheat-grass). Taller shrub layer of *Acacia melanoxylon* (Blackwood) and/or *Acacia dealbata* (Silver Wattle) was typical of sites surveyed. Common weed species identified within this EVC were *Hypochoeris radicata* (Cat's Ear), *Romulea rosea* (Onion Grass) and *Anthoxanthum odoratum* (Sweet Vernal-grass).

Of interest at Site 3. was canopy co-dominance of *Eucalyptus pauciflora* (Snowgum) and *Acacia melanoxylon* (Blackwood). *Eucalyptus obliqua* (Messmate) and *E. viminalis* (Manna Gum) were also present. A substantial litter layer was characteristic of this EVC ranging from 40%-80% coverage between sites although substantial amounts woody

ground debris were lacking (<10%). Weed coverage ranged from <5% - 25%, bryophytes/lichens averaged 10% coverage and rock cover ranged from 5%-10%.

**Table 3.** Plants indentified as occurring within Plains Grassy Woodland. \* indicates naturalised exotic species.

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<b>TREES</b>	
<i>Eucalyptus obliqua</i>	Messmate
<i>Eucalyptus pauciflora</i>	Snow Gum
<i>Eucalyptus viminalis</i> spp. <i>viminalis</i>	Manna Gum
<i>Eucalyptus dives</i>	Broad-leaved Peppermint
<i>Eucalyptus obliqua</i>	Messmate Stringybark
<b>SMALL TREES/TALLER SHRUBS</b>	
<i>Acacia dealbata</i>	Silver Wattle
<i>Acacia mearnsii</i>	Black Wattle
<i>Acacia melanoxylon</i>	Blackwood
<b>SMALL SHRUBS</b>	
<i>Pimelea humilis</i>	Common Rice-flower
<i>Astroloma humifusum</i>	Cranberry Heath
<b>MEDIUM SHRUBS</b>	
<i>Calytrix tetragona</i>	Fringe Myrtle
<b>HERBS</b>	
<i>Senecio hispidulus</i> var. <i>hispidulus</i>	Rough Fireweed
<i>Pteridium esculentum</i>	Austral Bracken
* <i>Psoralea pinnata</i>	Blue Psoralea
<i>Geranium ciliatum</i>	Crane's Bill
<i>Kennedia prostrata</i>	Running Postman
* <i>Hypochoeris radicata</i>	Cat's Ear
<i>Rumex brownii</i>	Slender Dock
<i>Leptorhynchus squamatus</i>	Scaly Buttons
<i>Oxalis perennans</i>	Grassland Wood-sorrel
<i>Acaena novae-zelandiae</i>	Bidgee Widgee
* <i>Plantago lanceolata</i>	Ribwort
* <i>Acetosella vulgaris</i>	Sheep Sorrel
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort
<i>Gonocarpus tetragynus</i>	Common Raspwort
<i>Drosera peltata</i> s.l.	Tall Sundew
<b>MONOCOTS</b>	
* <i>Aira</i> sp.	Hair-grass
* <i>Anthoxanthum odoratum</i>	Sweet Vernal-grass
<i>Arthropodium strictum</i>	Chocolate Lily
<i>Austrodanthonia eriantha</i>	Hill Wallaby-grass
<i>Austrodanthonia geniculata</i>	Kneed Wallaby-grass
<i>Austrodanthonia racemosa</i>	Clustered Wallaby-grass

<i>Austrostipa mollis</i>	Soft Spear-grass
<i>Bulbine bulbosa</i>	Bulbine lily
<i>Lomandra filiformis</i> s.l.	Wattle Mat-rush
<i>Poa labillardieri</i>	Large Tussock-grass
<i>Poa</i> sp.	Tussock Grass
<i>Poa sieberiana</i> var. <i>sieberiana</i>	Wiry Tussock-grass
<i>Schoenus apogon</i>	Common Bog-sedge
<i>Themeda triandra</i>	Kangaroo Grass
<i>Tricoryne elatior</i>	Yellow Rush-lily
<i>Elymus scabrus</i>	Common Wheat-grass
* <i>Bromus</i> sp.	Brome
* <i>Lagurus ovatus</i>	Hare's-tail Grass
* <i>Romulea rosea</i>	Onion Grass

### **Scoria Cone Woodland**

**Description:** Eucalypt dominated woodland, typically *Eucalyptus viminalis* (Manna Gum), over a grassy-bracken dominated understorey interspersed with smaller herbs. Occurs on slopes of freely-draining scoria cones and basalt soils that are often skeletal in structure. Common components of the grassy-herb layer include *Rumex brownii* (Slender Dock), *Acaena novae-zelandiae* (Bidgee Widgee), *Acaena echinata* (Sheep's Burr), *Dichondra repens* (Kidney Weed) and *Senecio hispidulus* var. *hispidulus* (Rough Fireweed). *Acacia melanoxylon* (Blackwood) is typically present as a taller shrub or small tree. Typical weeds include *Hypochoeris radicata* (Cat's Ear), *Briza minor* (Lesser Quaking-grass) and *Romulea rosea* (Onion Grass). This EVC had a substantial weed component ranging from 10%-20% cover. Coverage by bryophytes/lichens was <10%, as was litter coverage. Surface rocks were sparse or absent (although relatively abundant below the surface) and woody debris covered 11%-12% of the ground layer. Canopy cover averaged 25%.

**Table 4.** Plants identified as occurring within Scoria Cone Woodland. \* indicates naturalised exotic species.

<b>TREES</b>	
<i>Eucalyptus obliqua</i>	Messmate
<i>Eucalyptus dives</i>	Broad-leaved Peppermint
<i>Eucalyptus viminalis</i> spp. <i>viminalis</i>	Manna Gum
<i>Eucalyptus obliqua</i>	Messmate Stringybark
<b>SMALL TREES/TALLER SHRUBS</b>	
<i>Acacia dealbata</i>	Silver Wattle
<i>Acacia mearnsii</i>	Black Wattle
<i>Acacia melanoxylon</i>	Blackwood
<b>HERBS</b>	
<i>Senecio hispidulus</i> var. <i>hispidulus</i>	Rough Fireweed
<i>Pteridium esculentum</i>	Austral Bracken
* <i>Psoralea pinnata</i>	Blue Psoralea
<i>Geranium retrorsum</i>	Grassland Crane's Bill



* <i>Hypochoeris radicata</i>	Cat's Ear
<i>Rumex brownii</i>	Slender Dock
<i>Oxalis perennans</i>	Grassland Wood-sorrel
<i>Acaena novae-zelandiae</i>	Bidgee Widgee
<i>Acaena echinata</i>	Sheep's Burr
* <i>Marrubium vulgare</i>	Horehound
* <i>Galium aparine</i>	Cleavers
<i>Lagenophora huegii</i>	Coarse Bottle-daisy
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort
<i>Dichondra repens</i>	Kidney Weed
<i>Wahlenbergia stricta</i>	Tall Bluebell
<i>Stellaria pungens</i>	Prickly Starwort

#### MONOCOTS

* <i>Anthoxanthum odoratum</i>	Sweet Vernal-grass
* <i>Holcus lanatus</i>	Yorkshire Fog
<i>Austrodanthonia geniculata</i>	Kneed Wallaby-grass
<i>Juncus amabilis</i>	Rush
<i>Juncus flavidus</i>	Yellow Rush
<i>Juncus</i> sp.	Rush
<i>Poa labillardieri</i>	Large Tussock-grass
<i>Poa sieberiana</i> var. <i>sieberiana</i>	Wiry Tussock-grass
* <i>Briza minor</i>	Lesser Quaking-grass
* <i>Bromus catharticus</i>	Prairie Grass
* <i>Lagurus ovatus</i>	Hare's-tail Grass
* <i>Romulea rosea</i>	Onion Grass

#### CLIMBERS

<i>Clematis aristata</i>	Mountain Clematis
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### **Herb-rich Foothill Forest**

**Description:** Highly distinctive EVC dominated by *Eucalyptus obliqua* (Messmate) with a high diversity of herbs and grasses occupying the ground layer. Typical smaller shrubs, herbs and grasses identified include *Geranium retrorsum* (Grassland Crane's Bill), *Acrotriche prostrata* (Trailing Ground-berry), *Pteridium esculentum* (Bracken), *Dichondra repens* (Kidney Weed), *Stellaria pungens* (Prickly Starwort), *Clematis aristata* (Mountain Clematis), *Glycine clandestina* (Twining Glycine), *Microlaena stipoides* (Weeping Grass), *Acaena novae-zelandiae* (Bidgee Widgee), *Poa tenera* (Slender Tussock-grass) and *Euchiton involucratus* (Star Cudweed). Other medium to taller shrubs recorded include *Acacia dealbata* (Silver Wattle), *Acacia melanoxylon* (Blackwood) and *Indigofera australis* (Austral Indigo). Common weed species recorded were *Anthoxanthum odoratum* (Sweet Vernal-grass), *Hypochoeris radicata* (Cat's Ear), *Bromus catharticus* (Prairie Grass) and *Holcus lanatus* (Yorkshire Fog). This EVC had the greatest coverage by woody ground debris and highest proportion of bryophytes. Weeds covered <10% of the total ground area and surface rocks were extremely sparse or absent.

**Table 5.** Plants indentified as occurring within Herb-rich Foothill Forest. \* indicates naturalised exotic species.

---

<b>TREES</b>	
<i>Eucalyptus obliqua</i>	Messmate
<b>SMALL TREES/TALLER SHRUBS</b>	
<i>Acacia dealbata</i>	Silver Wattle
<i>Acacia melanoxylon</i>	Blackwood
<b>MEDIUM SHRUBS</b>	
<i>Indigofera australis</i>	Austral Indigo
<b>SMALL SHRUBS</b>	
<i>Acrotriche prostrata</i>	Trailing Ground-berry
<b>HERBS</b>	
<i>Glycine clandestina</i>	Twining Glycine
<i>Glycine microphylla</i>	Small-leaf Glycine
<i>Pteridium esculentum</i>	Austral Bracken
<i>Mentha</i> sp.	Mint
<i>Geranium retrorsum</i>	Grassland Crane's Bill
* <i>Hypochoeris radicata</i>	Cat's Ear
<i>Rumex</i> sp.	Dock
<i>Oxalis perennans</i>	Grassland Wood-sorrel
<i>Acaena novae-zelandiae</i>	Bidgee Widgee
* <i>Trifolium subterraneum</i>	Subterranean Clover
* <i>Marrubium vulgare</i>	Horehound
* <i>Aster subulatus</i>	Aster-weed
<i>Asperula scoparia</i>	Prickly Woodruff
<i>Epilobium hirtigerum</i>	Narrow-leaf Willow-herb
<i>Dichondra repens</i>	Kidney Weed
<i>Wahlenbergia stricta</i>	Tall Bluebell
<i>Stellaria pungens</i>	Prickly Starwort
<i>Senecio minimus</i>	Shrubby Fireweed
<i>Euchiton involucratus</i>	Star Cudweed
<b>MONOCOTS</b>	
* <i>Anthoxanthum odoratum</i>	Sweet Vernal-grass
* <i>Holcus lanatus</i>	Yorkshire Fog
<i>Austrodanthonia setacea</i>	Bristly Wallaby-grass
<i>Microlaena stipoides</i>	Weeping Grass
* <i>Phalaris aquatica</i>	Toowoomba Canary-grass
<i>Poa tenera</i>	Slender Tussock-grass
<i>Poa labillardieri</i>	Large Tussock-grass
<i>Juncus</i> sp.	Rush
* <i>Bromus hordeaceus</i>	Soft Brome
* <i>Bromus catharticus</i>	Prairie Grass
<i>Echinopogon ovatus</i>	Common Hedgehog-grass
<i>Elymus scabrus</i>	Common Wheat-grass

\* *Dactylis glomerata* Cocksfoot

**CLIMBERS**

*Clematis aristata* Mountain Clematis

**Granitic Hills Woodland**

**Description:** Rocky slope sparsely dominated by *Eucalyptus dives* (10% canopy coverage). Less diverse when compared to other EVCs in the area and tree growth is relatively stunted. Typical understorey components include *Pimelea humilis* (Common Rice-flower), *Dichondra repens* (Kidney Weed), *Microlaena stipoides* (Weeping Grass), *Senecio hispidulus* (Rough Fireweed) and *Hypericum gramineum* (Small St. John's Wort). Characteristic weed species include *Aira* spp. (Hair-grass), *Hypochoeris radicata* (Cat's Ear) and *Centaurium erythraea* (Common Centaury). Litter coverage averages 10% as does weed coverage, and coverage by cryptogams. There are few woody debris in this EVC but rock coverage is substantial.

**Table 6.** Plants identified as occurring within Granitic Hills Woodland. \* indicates naturalised exotic species.

**TREES**

*Eucalyptus dives* Broad-leaved Peppermint  
*Eucalyptus viminalis* spp. *viminalis* Manna Gum

**SMALL TREES/TALLER SHRUBS**

*Acacia mearnsii* Black Wattle

**SMALL SHRUBS**

*Pimelea humilis* Common Rice-flower

**HERBS**

*Oxalis perennans* Grassland Wood-sorrel  
 \**Centaurium erythraea* Common Centaury  
*Hypericum gramineum* Small St. John's Wort  
 \**Hypochoeris radicata* Cat's Ear  
*Dichondra repens* Kidney Weed  
*Senecio hispidulus* var. *hispidulus* Rough Fireweed  
*Senecio tenuifolius* Slender Fireweed

**MONOCOTS**

\**Anthoxanthum odoratum* Sweet Vernal-grass  
 \**Holcus lanatus* Yorkshire Fog  
*Austrodanthonia geniculata* Knead Wallaby-grass  
*Microlaena stipoides* Weeping Grass  
 \**Aira* sp. Hair-grass  
*Poa labillardieri* Large Tussock-grass

**CLIMBERS**

*Amyema pendulum* Drooping Mistletoe

## **Grassy Dry Forest**

**Description:** Sparsely occupied by an unidentified *Eucalyptus* sp., the shrub layer of this EVC is dominated by *Calytrix tetragona* (Fringe Myrtle). Tree canopy coverage is estimated at 10%. The shrub layer within this EVC is better developed than that of others, typically comprising *Cassinia longifolia* (Drooping Cassinia), *Hovea linearis* (Common Hovea), *Pimelea linifolia* (Slender Rice-flower) and *Astroloma humifusum* (Cranberry Heath). *Joycea pallida* (Silvertop Wallaby-grass), *Poa sieberiana* var. *sieberiana* (Wiry Tussock-grass), *Lomandra filiformis* ssp. *coriacea* (Wattle Mat-rush), *Gonocarpus tetragynus* (Common Raspwort), *Austrostipa mollis* (Soft Spear-grass) and *Austrodanthonia geniculata* (Knead Wallaby-grass) form common components of the ground layer. Only one weed species, *Centaureum erythraea* (Common Centaury), was recorded with an estimated coverage of <5%. There is substantial litter and rock layer each comprising about 60% ground coverage, woody debris constituting about 10% coverage. Bryophytes and lichens occupy approximately 10% of the substrate surface.

**Table 7.** Plants indentified as occurring within Grassy Dry Forest. \* indicates naturalised exotic species.

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### **TREES**

*Eucalyptus* sp. Eucalyptus

### **SMALL TREES/TALLER SHRUBS**

*Acacia mearnsii* Black Wattle  
*Exocarpos cupressiformis* Cherry Ballart

### **MEDIUM SHRUBS**

*Calytrix tetragona* Fringe Myrtle  
*Cassinia longifolia* Shiny Cassinia

### **SMALL SHRUBS**

*Astroloma humifusum* Cranberry Heath  
*Pimelea linifolia* Slender Rice-flower  
*Hovea linearis* Common Hovea

### **HERBS**

*Gonocarpus tetragynus* Common Raspwort  
 \**Centaureum erythraea* Common Centaury  
*Stackhousia monogyna* Creamy Candles  
 \**Hypochoeris radicata* Cat's Ear  
*Stellaria pungens* Prickly Starwort

### **MONOCOTS**

*Poa sieberiana* var. *sieberiana* Wiry Tussock-grass  
*Lomandra filiformis* ssp. *coriacea* Wattle Mat-rush  
*Austrodanthonia eriantha* Hill Wallaby-grass  
*Austrodanthonia geniculata* Knead Wallaby-grass  
*Joycea pallida* Silvertop Wallaby-grass

*Austrostipa mollis*  
*Thelymitra* sp.

Soft Spear-grass  
 Sun-orchid

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Other significant botanical findings included:

- The nationally vulnerable *Glycine latrobeana* (Clover Glycine) was identified as possibly occurring within the study area along the Winery ridgeline on the way to Site 1. A single plant was located but identification could not be confirmed as it was not in flower. Further survey efforts will be required when the plant is in flower to confirm its presence. This species is also listed as threatened under the Flora and Fauna Guarantee Act 1988 and vulnerable on the Advisory List of Rare of Threatened Plants in Victoria (DSE 2005).
- Adjacent to site 4 on Judy Hedstrom's property, a deeply eroded gully was found containing the only specimens of *Dicksonia antarctica* (Soft Tree Fern) known to occur within the study area.

## 4.2 MAMMALS

### 4.2.1 Methods

Smaller terrestrial mammals were surveyed for with the use of pitfall traps (as discussed in Chapter 3) as well as Elliot brand aluminium box traps (330<sub>mm</sub>. x 80<sub>mm</sub>. x 100<sub>mm</sub>.). Arboreal mammals were surveyed for by spotlighting along Jim Road and Boundary Road as well as at Site 5 at night whilst larger terrestrial mammals were opportunistically encountered throughout the week. Fox scats were opportunistically collected for examination for traces of native mammals as well as other indirect evidence such as scats and fur. Tracks were noted and identified in the field using Triggs (2004).

Elliot folding traps (box traps) provided an effective method for the live capture of small terrestrial mammals such as *Antechinus*. For the purpose of ease and uniformity, traps were placed at intervals within a rough grid pattern but strategically placed at points in the grid where trapping success was likely to be higher (for example, beside a fallen log or under a grass tussock). To increase the likelihood of capture, some traps were also placed along possible runs and near hollow stags. Baits consisted of a mixture of rolled oats combined with roughly one part peanut butter and one part honey. Bacon pieces were also added in an attempt to attract carnivorous marsupials such as *Dunnarts*. Each bait ball measuring approximately 3cm. in diameter was wrapped in a single layer of non-scented toilet paper and placed toward the back of a trap. Marking the locality of each trap using flagging tape assisted in re-locating them the following morning.

80 Elliot traps were placed at various points within each of the six study sites and each site was surveyed separately on a different night (5 nights in total) with the exception of the Luckock's property (Site 6). Trapping effort with all 80 traps operational across the

study area for the week amounted to a total of 4400 hours (880 hrs. at each site). However, trapping effort was reduced to 858 hrs. for Sites 1 and 2 due to the premature closure of two traps at each, resulting in a revised total of 4356 trapping hrs. across the entire study area for the week.

Nomenclature follows Menkhorst and Knight (2004).

#### 4.2.2 Results and discussion

Only one species of small mammal, *Antechinus agilis* (Agile Antechinus) was caught with the aid of Elliott traps and no small mammals were caught in pitfall buckets. *Antechinus agilis* is a relatively small dasyurid marsupial native to south-eastern Australia and although many populations closer to Melbourne appear to have been decimated by cats and foxes, the species still seems to be common in areas of suitable habitat. Planting of exotic pines, timber harvesting operations and control-burning are other factors implicated in reducing numbers (Strahan ed. 1995). Although there appeared to be suitable habitat available for other small terrestrial mammals including *Sminthopsis crassicaudata* (Fat-tailed Dunnart) and *Rattus fuscipes* (Bush Rat), none were recorded during the current survey. The above mentioned species have all been recorded during past surveys of the nearby Macedon Forest Park (Town and Country Planning Board 1975) and both *Antechinus agilis* and *A. Swainsonii* (Dusky Antechinus) have been recorded at Camel's Hump on Mt. Macedon (Macedon Ranges Conservation Society 2003).

Two feral species, *Oryctolagus cuniculus* (European Rabbit) and *Vulpes vulpes* (Red Fox), were commonly sighted throughout the study area in relatively high densities at all sites. Apart from direct observation of animals, warrens and scats from both species were frequently encountered. *Bos taurus* (Domestic Cattle) were observed at all sites apart from the Luckcock's property (Site 6) and the Winery ridgeline (Sites 1 and 2). A *Capra hircus* (Goat) skull was also found on the Winery land.

Recent reports of *Phascogale tapoatafa* (Brush-tailed Phascogale) occurring within the study area (Luckcock pers. comm.) are highly significant as the species is listed as threatened under the Flora and Fauna Guarantee Act 1988 and vulnerable on the Advisory list of Threatened Vertebrate Fauna in Victoria (DSE 2003). Reduction in the species's range has been largely attributed to clearing of habitat for agriculture. Low population densities and the tendency for all males to die annually after breeding make this species particularly vulnerable to extinction in areas of fragmented habitat (Strahan ed. 1995). Phascogales also face competition from feral honeybees for suitable nest hollows and may fall prey to cats and foxes.

*Phascolarctos cinereus* (Koala), *Pseudocheirus peregrinus* (Common Ringtail Possum), *Trichosurus vulpecula* (Common Brushtail Possum) were all sighted whilst spotlighting for nocturnal animals along Boundary and Jim Roads. White-striped Freetail Bats, *Tadarida australis*, were also heard echolocating overhead. No mammals were encountered whilst spotlighting in *Eucalyptus obliqua* Herb-rich Foothill Forest at Site 5.

The apparent greater abundance of hollow-dependent mammals closer to the roadside may be due to the presence of older trees with greater hollow-bearing potential at these sites although further survey efforts and comparisons of tree age and hollow availability would be required to confirm this.

Swamp Wallabies were seen at most sites that had a reasonable overstorey of *Eucalyptus* spp. Notes were made of wombat burrows and tracks in gullies at Sites 4 and 5 with one individual seen entering a burrow at the later site. Mobs of Eastern Grey Kangaroos were frequently seen moving about in more open areas whilst driving from site to site. Two Short-beaked Echidnas, *Tachyglossus aculeatus*, were seen during the week – one at Site 6 and the other on Boundary Rd. and a koala skull was found at Site 2. Whilst inspecting pitfall traps.

**Table 8.** Native and introduced mammals recorded within the study area.

NATIVE MAMMALS	INTRODUCED MAMMALS
<p><i>Antechinus agilis</i> (Agile Antechinus)  <i>Macropus giganteus</i> (Eastern Grey Kangaroo)  <i>Phascogale tapoatafa</i> (Brush-tailed Phascogale)  <i>Phascolarctos cinereus</i> (Koala)  <i>Pseudocheirus peregrinus</i> (Common Ringtail Possum)  <i>Tachyglossus aculeatus</i> (Short-beaked Echidna)  <i>Tadarida australis</i> (White-striped Freetail Bat)  <i>Trichosurus vulpecula</i> (Common Brushtail Possum)  <i>Vombatus ursinus</i> (Common Wombat)  <i>Wallabia bicolor</i> (Swamp Wallaby)</p>	<p><i>Bos taurus</i> (Domestic Cattle)  <i>Capra hircus</i> (Goat)  <i>Oryctolagus cuniculus</i> (European Rabbit)  <i>Vulpes vulpes</i> (Red Fox)</p>



**Figure 4.** Short-beaked Echidna (*Tachyglossus sculeatus*) found at Site 5. Photo by Matthew Vinicombe.

## 4.3 HERPETOFAUNA

### 4.3.1 Methods

Reptiles and amphibians were surveyed for at each survey site during the study through active searching, pitfall trapping (as outlined in Chapter 3) and chance encounters whilst out in the field. Methods used during active searches included rock rolling, searching under woody debris, lifting loose bark and inspecting under discarded corrugated iron sheets left at Site 4. Some reptiles were also encountered whilst driving from one site to another or performing other field work. Frogs were caught in pitfall traps and also detected whilst out spotlighting.

Scientific nomenclature for reptiles and amphibians recorded during the study follows the names in Wilson and Swan (2003).

### 4.3.2 Results and discussion

In total, nine species of reptile and four frogs were recorded during the study with a further two reptiles regarded as being likely to occur within the study area from anecdotal evidence. The majority of reptiles and frogs recorded were found in pitfall traps, those encountered only through other means were *Egernia saxtilis intermedia* (Black Rock Skink), *Lerista bougainvillii* (Bougainville's Skink) and *Tiliqua scincoides* (Eastern Blue-tongued Lizard). *Egernia saxtilis intermedia* is regarded as being largely saxicolous



in habit (Tzaros 2005) and a single specimen was detected sheltering in a crevice on a small basalt boulder outcrop at Site 3 (Plains Grassy Woodland). It is likely to occur more extensively through rockier habitats surrounding the study area. A single *Lerista bougainvillii* was detected whilst searching under basalt rocks in the vicinity of Site 4 and two Eastern Blue-tongued Lizards, *Tiliqua scincoides*, were found crossing roads on different days. No reptiles were found under the sheets of corrugated iron.

Two lizard species belonging to the family Scincidae were recorded by Ingwersen and others during surveys carried out along Newham Deep Creek in February 2005. These were *Lampropholis guichenoti* (Graden Skink) and *Tiliqua nigrolutea* (Blotched Blue-tongued Lizard), the later misidentified as *T. scincoides* (Eastern Blue-tongued Lizard). Both species of *Tiliqua* were detected during the current study, the two differentiated by differences in dorsal banding pattern, absence of the dark area behind the eye of *T. nigrolutea* and larger temporal scales on the head of *T. scincoides*. These characters are described further in Cogger (2000).

Two larger elapid snakes not recorded during the current study but said to have been sighted recently within the study area by local landholders are *Pseudechis porphyriacus* (Red-bellied Black Snake) and *Pseudonaja textilis* (Eastern Brown Snake) (Roberts pers. comm.). If verified, the presence of *P. porphyriacus* would likely be of regional significance as although once widespread closer to Melbourne, the species range is thought to have retracted to areas of the Lerderderg Gorge and beyond (Museum Victoria 2005). Although considered dangerous, the venom of this species is not regarded as being as potent as that of many similar-sized elapids. *Pseudonaja textilis* is a large, highly venomous snake that has adapted well to human disturbance and although not found during surveys, is probably common throughout the study area. A third snake, *Parasuta flagellum* (Little Whip Snake), was detected during pit trap inspections at Site 3. Although mildly venomous, this small snake is regarded as being relatively harmless to humans, thought to feed primarily on smaller skinks and sheltering under rocks and other ground debris (Museum Victoria 2005).

The frogs *Crinia parinsignifera* (Plains Froglet) and *Litoria verreauxii* (Whistling Tree Frog) were encountered and heard calling whilst spotlighting at night beside the Winery dam.

**Table 9.** Reptiles and amphibians recorded within the study area. \* Indicates anecdotal record.

REPTILES	AMPHIBIANS
<p><i>Amphibolurus muricatus</i> (Jacky Dragon)</p> <p><i>Egernia saxtilis intermedia</i> (Black Rock Skink)</p> <p><i>Eulamprus tympanum tympanum</i> (Southern Water Skink)</p> <p><i>Lampropholis guichenoti</i> (Garden Skink)</p> <p><i>Lerista bougainvillii</i> (Bougainville's Skink)</p> <p><i>Parasuta flagellum</i> (Little Whip Snake)</p> <p>*<i>Pseudechis porphyriacus</i> (Red-bellied Black Snake)</p> <p><i>Pseudemoia entrecasteauxii</i> (Southern Grass Skink)</p> <p>*<i>Pseudonaja textilis</i> (Eastern Brown Snake)</p> <p><i>Tiliqua nigrolutea</i> (Blotched Blue-tongued Lizard)</p> <p><i>Tiliqua scincoides scincoides</i> (Eastern Blue-tongued Lizard)</p>	<p><i>Crinia parinsignifera</i> (Plains Froglet)</p> <p><i>Limnodynastes dumerilii dumerilii</i> (Eastern Banjo Frog)</p> <p><i>Litoria ewingi</i> (Southern Brown Tree Frog)</p> <p><i>Litoria verreauxii verreauxii</i> (Whistling Tree Frog)</p>

The bulk of the reptiles and frogs recorded in the study area are regarded and being relatively common and widespread throughout the state, although some may be of regional significance. None are currently considered threatened nationally or within Victoria.



**Figure 5.** Southern Water Skink (*Eulamprus tympanum tympanum*) seen at Site 5. Photo by Matthew Vinicombe.



**Figure 6.** Southern Brown Tree Frog (*Litoria ewingi*) at Site 5. Photo by Ainslee Hill.

## 4.4 BIRDS

### 4.4.1 Methods

Bird walks along informal transects were undertaken at each study site as well as in a range of other vegetation types present on the Jim for a total survey effort of four days. Birds were also opportunistically recorded when encountered whilst out in the field. Birds seen flying over were regarded as being present on the site and species seen within 100m. of the study area but not witnessed using or flying over the study area were noted separately. Evidence of breeding for some taxa was also noted in Appendix 2. Each survey was lead by John Shaw from the Woodend Bird Observers Group accompanied by three to six other field assistants at any one time.

Call playback for various owls and nightjars was used while out spotlighting along Boundary and Jim Roads at night.

Bird names and identification followed Simpson and Day (2004).

### 4.4.2 Results

A total of 58 bird species were recorded as occurring within the study area during the current survey and based on the personal accounts of locals with a single other species recorded nearby.

Of these, *Gallinago hardwickii* (Latham's Snipe) is listed as near threatened under the Advisory list of Threatened Vertebrate Fauna in Victoria (DSE 2003). This species is also of international importance having been listed as a migratory bird under the Japan-Australia Agreement for the Protection of Migratory Birds (JAMBA) and China-Australia Agreement for the Protection of Migratory Birds (CAMBA). Two Latham's Snipes were seen in long grass by the Winery dam and could be regularly flushed from hiding. These were recorded on consecutive days in the same location.

Although not recorded during the current study, *Lathamus discolor* (Swift Parrot) may be present within the study area with a pair thought to be this species sighted feeding in flowering *Eucalyptus leucoxylon* (Yellow Gum) along a driveway (Roberts pers. comm.). This species is listed as endangered under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 as well as threatened under the Victorian Flora and Fauna Guarantee Act 1988. It is also considered endangered in Victoria under the Advisory list of Threatened Vertebrate Fauna in Victoria (DSE 2003).

Other notable sightings during the week included *Aquila audax* (Wedge-tailed Eagles) flying overhead with an unoccupied nest located in the fork of a Eucalypt tree at Site 4 indicating that a pair has bred within the study area before. A pair of Wedge-tailed Eagles may use the same nest site in consecutive years or on rotation (Simpson and Day 1999) and it can be assumed that the nest come across during this survey will be used again by the birds in future. Although blamed and persecuted for livestock losses in the

past, such allegations are largely unfounded and the species is now fully protected by law.

Call playback yielded little results with a single distant response from a Boobook Owl (*Ninox boobook*) across a paddock opposite the Jim Jim from Boundary Road. A Boobook Owl was also recoded within the study area roosting in a Eucalypt tree.

Introduced birds recorded include *Acridotheres tristis* (Common Myna), *Carduelis carduelis* (European Goldfinch), *Passer domesticus* (House Sparrow) and *Sturnus vulgaris* (Common Starling). The Common Starling and Common Myna are both known to use hollows for nesting in and may outcompete native birds for suitable breeding sites (Simpson and Day 1999). A single Emu sighted during the week within the study area is thought to be a captive escapee (Roberts pers. comm.).

Although not recorded within the study area, *Acanthorhynchus tenuirostris* (Eastern Spinebill) was sighted within 100m. and is likely to be present there.

A list of all species recorded with accompanying conservation status and ecological data is provided in Appendix 2.



**Figure 7.** Long-billed Corella (*Cacatua tenuirostris*).  
Photo by Russel Alkins.

## **4.5 INVERTEBRATES**

### **4.5.1 Methods**

Terrestrial invertebrates were sampled for at all sites from pitfall buckets and sweep nets were used to target flying and arboreal insects. Invertebrates from pitfall buckets were placed in vials for transportation using tweezers.

Sweep netting involved groups of six people standing approximately 10m. apart at each site and walking along a 50m. transect, sweeping grass and other vegetation for invertebrates along the way. Obvious flying insects such as Lepidopterans were also chased after. Sweeping for invertebrates was done for about half an hour at each site, the total sampling effort for the week using this technique amounting to approximately 18 hours.

Most invertebrates collected from each study site were preserved in vials of 70% ethanol and labelled with the date and collection locality. Others were euthanised in ethyl acetate and stored in semi-transparent paper envelopes. Invertebrates were then sorted into their various orders.

### **4.5.2 Results**

Approximately 225 specimen samples were collected in total representing over 170 taxa.

Due to the need for further taxonomic analysis of samples, only initial results showing the numbers of recognisable taxonomic units (RTUs) collected belonging to different orders have been included. The invertebrates will be identified further for reporting at a later date. Parataxonomy refers to the practice of identifying and sorting specimens (based on morphological or other characters) into RTUs without necessarily assigning them a name. That is, those specimens that appear similar are grouped together and assumed to belong to the same taxon. This minimises the need for formal taxonomic input during the early stages of biological assessment.

**Table 10.** Representation of major invertebrate orders from study sites using recognisable taxonomic units.

Key to invertebrate orders: CO=Coleoptera (Beetles), LE=Lepidoptera (Butterflies and moths), OR=Orthoptera (Grasshoppers and crickets), BL=Blattodea (Cockroaches), DI=Diptera (True flies), DE=Dermaptera (Earwigs), HE=Hemiptera (True bugs), EP=Ephemeroptera (Mayflies), PH=Phasmatodea (Stick insects), ME=Mecoptera (Scorpion flies), OD=Odonata (Dragonflies and damselflies), IS=Isoptera (Termites), HY=Hymenoptera (Ants and wasps), AR=Arachnida (Spiders), CE=Centipedia (Centipedes), AM=Amphipoda (Amphipods).

Site	Invertebrate order													TOTAL			
	CO	LE	OR	BL	DI	DE	HE	EP	PH	ME	OD	IS	HY		AR	CE	AM
1	4	1	1	2	5	1	1	0	0	0	0	0	1	8	1	0	25
2	5	4	3	4	1	0	0	0	0	0	1	0	1	11	1	0	31
3	5	2	1	0	0	0	2	0	1	0	1	0	2	0	1	0	15
4	3	3	6	2	1	0	1	0	0	0	0	0	0	5	0	0	31
5	6	3	1	2	1	0	2	1	1	1	6	0	5	6	2	1	38
6	6	0	3	3	0	0	2	0	0	0	0	1	4	6	2	0	27

## CHAPTER 5. RECOMMENDATIONS

The presence of at least one taxon of state significance and the likely occurrence of at least two others warrants future planning and specific actions to monitor and conserve populations. In order to effectively manage those species' habitats, broader conservation actions are also required to be enacted that focus on preserving whole communities within the study area. Based on the results obtained in this study, various research and management recommendations have been made to provide guidance in facilitating this process.

### **Research Recommendations:**

As a matter of high importance, further field investigations are required to confirm the presence of the following threatened taxa within the study area: *Lathamus discolor* (Swift Parrot), *Phascogale tapoatafa* (Brush-tailed Phascogale) and *Glycine latrobeana* (Clover Glycine).

It is advised that surveys for *Lathamus discolor* be carried out during winter months when birds have made their annual migration to the mainland from Tasmania. Spotlighting within suitable habitat and further trapping efforts involving the use of tree traps and hair tubes may be necessary to determine the persistence of *Phascogale tapoatafa* within the study area. If surveys for both species yield results, it is recommended that these are followed up by monitoring to assess population densities and viability.

If practical for the relevant landholders, in order to assess landscape recovery after the removal of grazing pressure, it may be desirable to create cattle exclusion plots within each of the EVCs identified during the study. These could be then be monitored over time and compared with grazed plots to determine the ability of indigenous vegetation to re-colonise areas after the removal of cattle. Of particular interest would be the germination response by middle-storey shrubs which seem to be absent from much of the study area but are likely to have been present in higher densities in the past.

The data collected during the current study will be available for future comparison with data obtained through further studies after the establishment of the Campaspe-Maribyrnong Headwaters Bio-link. Comparisons between studies will enable an assessment to be made of the effectiveness of establishing a habitat corridor through the area with the aim of increasing species richness, abundance and gene flow between isolated remnants. For future fauna surveys, it may also be beneficial to attempt trapping in the other EVCs identified during the current study. Trapping in these areas was not attempted on this occasion due to time constraints and difficulties in installing pitfall lines on rockier soils. At such sites, the use of wire funnel or cage traps placed on the ground along drift fences instead of digging in buckets may be more a practical option.



**Management Recommendations:**

In order to ensure the integrity of restored floristic communities is maintained, it is essential that the correct indigenous species be selected for planting in particular areas based on the knowledge or educated assumption that they would have existed there previously. It is also desirable for selected plants to be grown from locally collected seed and cutting material so as to maintain the genetic diversity already present within local populations. However, it is also best to maximise the number of plants from which propagation material is collected to ensure the genetic contribution to planting stock is not biased toward a small number of individuals.

Of particular focus to mid-term revegetation efforts should be the recovery of the shrubby understorey that would have been present within many of the EVCs identified but now seems to be restricted to isolated remnants where grazing has not had a significant impact (particularly on rockier sites). The areas that naturally have a substantial grassy understorey but a greatly reduced shrub layer such as the more open Plains Grassy Woodland EVC (particularly those areas dominated by *Themeda triandra*) may benefit from periodic mosaic burning every few years to reduce the amount of ground litter and open up spaces between tussocks for colonisation by smaller herbs, orchids and graminoids. Before attempting to undertake any ecological burns, sites would need to be assessed carefully to determine a suitable time-frame for and extent of burning depending on the species present and to what extent similar habitats are represented in the remainder of the study area.

Ideally, weed eradication programs for obvious noxious species including *Echium plantagineum* (Paterson's Curse) should be enacted before plants set seed. Hand-weeding may be required in more sensitive areas where a higher proportion of indigenous species are present whilst the appropriate herbicide should be applied to eliminate plants in more open areas such as pasture. Due to their high invasive impact, the following noxious and environmental weeds should be targeted for control as a priority: *Echium plantagineum* (Paterson's Curse), *Holcus lanatus* (Yorkshire Fog), *Anthoxanthum odoratum* (Sweet Vernal-grass), *Phalaris aquatica* (Toowoomba Canary-grass), *Dactylis glomerata* (Cocksfoot), *Ulex europaeus* (Gorse), *Acetosella vulgaris* (Sheep Sorrel), *Galium aparine* (Cleavers), *Plantago lanceolata* (Ribwort), *Trifolium repens* var. *repens* (White Clover).

Should further survey efforts confirm the existence of *Glycine latrobeana* (Clover Glycine) within the study area, it is advisable that where possible, exclusion plots of a reasonable size be created around plants to protect them from grazing by cattle and kangaroos. In order for the plots to be effective, reasonable buffers of remnant vegetation around plants should also be maintained to minimise edge effects such as weed invasion. Some areas identified as being of higher biodiversity value and those that contain other significant or isolated remnants would also benefit from being protected from stock grazing.

Although the Swift Parrot's breeding habitat is in Tasmania, they migrate to south-eastern mainland during the cooler months of the year to feed primarily on winter-flowering Eucalypts. Many of these trees are characteristic of box-ironbark vegetation

not present within the study area but potential feeding habitat should be retained wherever identified.

Hollow-bearing trees should also be retained and protected as a high priority as many species identified during the study depend on hollows and dead stags for nesting and roosting in. Of particular importance is the retention of older trees within Herb-rich Foothill Forest where Brush-tailed Phascogales have been sighted by landholders in the past. Where hollows are limited, specially designed nest boxes could be erected. Although nest boxes are effective to a degree, these are never an ideal substitute for natural tree hollows. Predation by cats and foxes has also been identified as a key threat to this species (Humphries and Seebeck 1997).

Both foxes and rabbits are known to compete with native animals for habitat and food resources and foxes are noted as having played a significant role in reducing numbers of many smaller ground mammals through predation. As rabbits are potential prey for foxes, populations may increase in number when fox control measures are employed. Conversely, if rabbit numbers are reduced without a reduction in fox numbers, foxes may adversely affect populations of native mammals through increased predation. For these reasons it is recommended that future fox and rabbit control programs run concurrently wherever possible.

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## APPENDIX 1. List of plant species occurring within the study area

LEGEND	
*	Exotic weed species
s.l.	Latin for the “in the broad sense” ( <i>sensu lato</i> )
spp.	A number of possible species
sp.	One possible species
ssp.	Subspecies
var.	Variety

### PTERIDIOPHYTA

#### Adiantaceae

*Adiantum aethiopicum* Common Maidenhair Fern

#### Aspleniaceae

*Asplenium flabellifolium* Necklace Fern

#### Dennstaedtiaceae

*Pteridium esculentum* Austral Bracken

#### Dicksoniaceae

*Dicksonia antarctica* Soft Tree Fern

### ANGIOSPERMAE - MONOCOTYLEDONS

#### Anthericaceae

*Arthropodium milleflorum* Pale Vanilla Lily

*Arthropodium strictum* Chocolate Lily

#### Asphodelaceae

*Bulbine bulbosa* Bulbine Lily

#### Colchicaceae

*Burchardia umbellata* Milkmaids

*Wurmbea dioica* Early Nancy

#### Cyperaceae

*Carex appressa* Tall Sedge

*Schoenus apogon* Common Bog-sedge

#### Iridaceae

\* *Romulea rosea* Onion Grass

#### Juncaceae

*Juncus amabilis* Rush

*Juncus flavidus* Yellow Rush

<i>Juncus</i> spp.	Rush
<b>Orchidaceae</b>	
<i>Caladenia carnea</i>	Pink Fingers
<i>Chiloglottis</i> sp.	Bird-orchid
<i>Microtis</i> sp.	Onion-orchid
<i>Thelymitra</i> sp.	Sun-orchid
<b>Phormiaceae</b>	
<i>Tricoryne elatior</i>	Yellow Rush-lily
<b>Poaceae</b>	
* <i>Aira</i> sp.	Hair-grass
* <i>Anthoxanthum odoratum</i>	Sweet Vernal-grass
<i>Austrodanthonia eriantha</i>	Hill Wallaby-grass
<i>Austrodanthonia geniculata</i>	Kneed Wallaby-grass
<i>Austrodanthonia racemosa</i>	Clustered Wallaby-grass
<i>Austrodanthonia setacea</i>	Bristly Wallaby-grass
<i>Austrostipa mollis</i>	Soft Spear-grass
<i>Austrostipa</i> sp.	Spear-grass
* <i>Briza minor</i>	Lesser Quaking-grass
* <i>Bromus catharticus</i>	Prairie Grass
* <i>Bromus hordeaceus</i>	Soft Brome
* <i>Bromus</i> sp.	Brome
* <i>Dactylis glomerata</i>	Cocksfoot
<i>Echinopogon ovatus</i>	Common Hedgehog-grass
<i>Elymus scabrus</i>	Common Wheat-grass
* <i>Holcus lanatus</i>	Yorkshire Fog
<i>Joycea pallida</i>	Silvertop Wallaby-grass
* <i>Lagurus ovatus</i>	Hare's-tail Grass
<i>Microlaena stipoides</i>	Weeping Grass
* <i>Phalaris aquatica</i>	Toowoomba Canary-grass
<i>Poa labillardieri</i>	Large Tussock-grass
<i>Poa sieberiana</i> var. <i>sieberiana</i>	Wiry Tussock-grass
<i>Poa</i> sp.	Tussock-grass
<i>Poa tenera</i>	Slender Tussock-grass
<i>Themeda triandra</i>	Kangaroo Grass
<b>Xanthorrhoeaceae</b>	
<i>Lomandra filliformis</i> s.l.	Wattle Mat-rush
<i>Lomandra filiformis</i> ssp. <i>coriacea</i>	Wattle Mat-rush
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
<b>ANGIOSPERMAE - DICOTYLEDONS</b>	
<b>Apiaceae</b>	
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort

**Asteraceae**

* <i>Aster subulatus</i>	Aster-weed
<i>Cassinia aculeata</i>	Common Cassinia
<i>Cassinia longifolia</i>	Shiny Cassinia
<i>Cymbonotus preissianus</i>	Austral Bear's Ear
<i>Euchiton involucratus</i>	Star Cudweed
* <i>Hypochoeris radicata</i>	Cat's Ear
<i>Lagenophora huegii</i>	Coarse Bottle-daisy
<i>Leptorhynchus squamatus</i>	Scaly Buttons
<i>Ozothamnus ferrugineus</i>	Tree Everlasting
<i>Senecio hispidulus</i> var. <i>hispidulus</i>	Rough Fireweed
<i>Senecio minimus</i>	Shrubby Fireweed
<i>Senecio tenuifolius</i>	Slender Fireweed

**Boraginaceae**

* <i>Echium plantagineum</i>	Paterson's Curse
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**Campanulaceae**

<i>Lobelia pedunculata</i>	Matted Pratia
<i>Lobelia pratioides</i>	Poison Lobelia
<i>Wahlenbergia luteola</i>	Yellow-wash Bluebell
<i>Wahlenbergia stricta</i>	Tall Bluebell

**Caryophyllaceae**

<i>Stellaria pungens</i>	Prickly Starwort
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**Convolvulaceae**

<i>Convolvulus erubescens</i>	Australian Bindweed
<i>Dichondra repens</i>	Kidney Weed

**Crassulaceae**

<i>Crassula helmsii</i>	Swamp Stonecrop
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**Droseraceae**

<i>Drosera peltata</i> s.l	Tall Sundew
<i>Drosera peltata</i> ssp. <i>auriculata</i>	Tall Sundew
<i>Drosera peltata</i> ssp. <i>peltata</i>	Pale Sundew

**Epacridaceae**

<i>Acrotriche prostrata</i>	Trailing Ground-berry
<i>Astroloma humifusum</i>	Cranberry Heath

**Fabaceae**

<i>Bossiaea prostrata</i>	Creeping Bossiaea
* <i>Chamaecytisus palmensis</i>	Tree Lucerne
<i>Glycine clandestina</i>	Twining Glycine
<i>Glycine microphylla</i>	Small-leaf Glycine

<i>Glycine</i> sp.	Glycine
<i>Hovea linearis</i>	Common Hovea
<i>Indigofera australis</i>	Austral Indigo
<i>Kennedia prostrata</i>	Running Postman
* <i>Psoralea pinnata</i>	Blue Psoralea
* <i>Trifolium repens</i> var. <i>repens</i>	White Clover
* <i>Trifolium subterraneum</i>	Subterranean Clover
* <i>Ulex europaeus</i>	Gorse
<b>Gentianaceae</b>	
* <i>Centaurium erythraea</i>	Common Centaury
<b>Geraniaceae</b>	
<i>Geranium ciliatum</i>	Crane's Bill
<i>Geranium retrorsum</i>	Grassland Crane's Bill
<i>Pelargonium rodneyanum</i>	Magenta Stork's Bill
<b>Haloragaceae</b>	
<i>Gonocarpus tetragynus</i>	Common Raspwort
<b>Hypericaceae</b>	
<i>Hypericum gramineum</i>	Small St. John's Wort
<b>Lamiaceae</b>	
* <i>Marrubium vulgare</i>	Horehound
<i>Mentha</i> sp.	Mint
<b>Loranthaceae</b>	
<i>Amyema pendulum</i>	Drooping Mistletoe
<b>Mimosaceae</b>	
<i>Acacia dealbata</i>	Silver Wattle
<i>Acacia mearnsii</i>	Black Wattle
<i>Acacia melanoxylon</i>	Blackwood
<b>Myrtaceae</b>	
<i>Calytrix tetragona</i>	Fringe Myrtle
<i>Eucalyptus dives</i>	Broad-leaved Peppermint
<i>Eucalyptus obliqua</i>	Messmate Stringybark
<i>Eucalyptus ovata</i>	Swamp Gum
<i>Eucalyptus pauciflora</i>	Snow Gum
<i>Eucalyptus radiata</i>	Narrow-leaved Peppermint
<i>Eucalyptus</i> sp.	Eucalyptus
<i>Eucalyptus viminalis</i> spp. <i>viminalis</i>	Manna Gum
<b>Onagraceae</b>	
<i>Epilobium hirtigerum</i>	Narrow-leaf Willow-herb

**Oxalidaceae**

*Oxalis perennans* Grassland Wood-sorrel

**Plantaginaceae**

\* *Plantago lanceolata* Ribwort

**Polygonaceae**

\* *Acetosella vulgaris* Sheep Sorrel  
*Rumex brownii* Slender Dock  
*Rumex* spp. Dock

**Ranunculaceae**

*Clematis aristata* Mountain Clematis

**Rosaceae**

*Acaena echinata* Sheep's Burr  
*Acaena novae-zelandiae* Bidgee Widgee

**Rubiaceae**

*Asperula conferta* Common Woodruff  
*Asperula scoparia* Prickly Woodruff  
\* *Galium aparine* Cleavers

**Santalaceae**

*Exocarpos cupressiformis* Cherry Ballart

**Scrophulariaceae**

*Veronica gracilis* Slender Speedwell

**Stackhousiaceae**

*Stackhousia monogyna* Creamy Candles

**Stylidiaceae**

*Stylidium graminifolium* Grass Trigger-plant

**Thymelaeaceae**

*Pimelea humilis* Common Rice-flower  
*Pimelea linifolia* Slender Rice-flower

**Violaceae**

*Viola betonicifolia* Showy Violet  
*Viola hederacea* Native Violet



## APPENDIX 2. Bird list including conservation status and ecological data

LEGEND	
<b>S = Status of record</b>	<b>FFG = Flora and Fauna Guarantee Act 1988</b>
O = recorded out of but within 100m. of study area	L = listed under the Act
I = introduced	
B = breeding	<b>EPBC = Environment Protection and Biodiversity Conservation Act 1999</b>
U = unconfirmed sighting	EN = endangered
E = captive escapee	
<b>JAMBA = Japan-Australia Agreement for the Protection of Migratory Birds</b>	<b>VROT = Advisory list of Threatened Vertebrate Fauna in Victoria – 2003</b>
• = listed	E = endangered
	NT = near threatened
<b>CAMBA = China-Australia Agreement for the Protection of Migratory Birds</b>	
• = listed	

Scientific name	Common name	S	JAMBA	CAMBA	EPBC	FFG	VROT
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill						
<i>Acanthiza pusilla</i>	Brown Thornbill						
<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill	O					
<i>Acridotheres tristis</i>	Common Myna	I					
<i>Anas gracilis</i>	Grey Teal						
<i>Anas superciliosa</i>	Pacific Black Duck						
<i>Anthochaera carunculata</i>	Red Wattlebird						
<i>Anthus australis</i>	Australian Pipit						
<i>Aquila audax</i>	Wedge-tailed Eagle						
<i>Artamus cyanopterus</i>	Dusky Woodswallow	B					
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo						
<i>Cacatua tenuirostris</i>	Long-billed Corella						
<i>Carduelis carduelis</i>	European Goldfinch	I					
<i>Chenonetta jubata</i>	Australian Wood Duck						
<i>Cocorax melanorhamphos</i>	White-winged Chough						
<i>Colluricincla harmonica</i>	Grey Shrike-thrush						
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike						
	White-throated						
<i>Cormobates leucophaeus</i>	Treecreeper						
<i>Corvus mellori</i>	Little Raven						
<i>Dacelo novaeguineae</i>	Laughing Kookaburra						
<i>Daphoenositta chrysoptera</i>	Varied Sittella						
<i>Dromaius novaehollandiae</i>	Emu	E					
<i>Egretta novaehollandiae</i>	White-faced Heron						
<i>Eolophus roseicapillus</i>	Galah						
<i>Falco berigora</i>	Brown Falcon						
<i>Falco cenchroides</i>	Nankeen Kestrel						
<i>Fulica atra</i>	Eurasian Coot	B					
<i>Gallinago hardwickii</i>	Latham's Snipe		•	•			NT
<i>Grallina cyanoleuca</i>	Magpie-lark						
<i>Gymnorhina tibicen</i>	Australian Magpie						

<i>Hirundo neoxena</i>	Welcome Swallow				
<i>Lathamus discolor</i>	Swift Parrot	U	EN	L	E
<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater				
<i>Lichenostomus leucotis</i>	White-eared Honeyeater				
	White-plumed				
<i>Lichenostomus penicillatus</i>	Honeyeater				
<i>Malurus cyaneus</i>	Supurb Fairy-wren				
<i>Manorina melanocephala</i>	Noisy Miner				
<i>Melithreptus lunatus</i>	White-naped Honeyeater				
<i>Neochmia temporalis</i>	Red-browed Finch	B			
<i>Ninox boobook</i>	Southern Boobook Owl				
<i>Nymphicus hollandicus</i>	Cockatiel	E			
<i>Ocyphaps lophotes</i>	Crested Pigeon				
<i>Oriolus sagittatus</i>	Olive-backed Oriole				
<i>Pachycephala rufiventris</i>	Rufous Whistler	B			
<i>Pardalotus punctatus</i>	Spotted Pardalote				
<i>Pardalotus striatus</i>	Striated Pardalote				
<i>Passer domesticus</i>	House Sparrow	I			
<i>Phalacrocorax melanoleucos</i>	Little Pied Cormorant				
<i>Petrochelidon nigricans</i>	Tree Martin				
<i>Platycercus elegans</i>	Crimson Rosella				
<i>Platycercus eximius</i>	Eastern Rosella				
<i>Rhipidura fuliginosa</i>	Grey Fantail				
<i>Rhipidura leucophrys</i>	Willie Wagtail				
<i>Sericornis frontalis</i>	White-browed Scrubwren				
<i>Strepera versicolor</i>	Grey Currawong				
<i>Sturnus vulgaris</i>	Common Starling	I			
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe	B			
<i>Threskiornis molucca</i>	Australian White Ibis				
<i>Vanellus miles</i>	Masked Lapwing				