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SURVEY OF THE VERTEBRATE FAUNA IN THE GRAMPIANS-EDENHOPE AREA OF SOUTHWESTERN VICTORIA

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Abstract

The Grampians-Edenhope Area of southwestern Victoria, Australia, contains four major land forms: woodland on sedimentary plains and sand dunes; heath, woodland and forest on sandstone ranges; woodland on plains and low hills of gravel and metamorphic rock; and woodland and forest on basaltic plains. On the plains much of the land has been cleared for crops and pasture but the remnants of native vegetation support valuable wildlife communities and are especially important for nomadic birds. The Grampians ranges were least affected by settlement and are the most important areas for wildlife in western Victoria. More than 50 plant communities and aquatic habitats are described and are used to discuss the distribution of 233 bird species, 54 mammal species, 40 reptile species, 14 amphibian species and 26 fish species. Most of these species are discussed individually: the birds in terms of abundance, distribution, habitat preference, breeding, feeding and conservation aspects; and the mammals and reptiles in terms of abundance, distribution, habitat preference, breeding and morphology.

Introduction

The Fisheries and Wildlife Division, Victoria, conducted wildlife surveys in the Grampians-Edenhope Area of southwestern Victoria (Fig. 1) between August 1974 and April 1975. Data collected during these surveys formed the basis of the fauna chapter in the Land Conservation Council's (LCC) report on their Southwest 2 Study Area (in prep.). Because the report by the LCC simply documents the existing fauna and is necessarily general, we publish this paper to provide a permanent record of: (1) our assessments of areas important for fauna conservation; (2) data collected during the surveys on animal habitats and on individual vertebrate species; and (3) detailed faunal information generously contributed by naturalists residing in the survey area (see Acknowledgements).

The following two sections of this paper describe the survey area, methods used and results obtained during the survey. Our assessments of areas important for fauna conservation (by region) appear in the main text and are followed by appendices which contain the detailed information on flora and fauna.

Survey Area

Landform. The surveys were conducted over an area of approximately 16,000 km² (Fig. 1), of which about 20 per cent is still in public ownership. The survey area has been divided into four main regions based on Sibley's (1967) geomorphological descriptions: (1) the Edenhope Region where plains of fluviatile and estuarine sediments are covered in many places by aeolian dunes and sheets of siliceous sands; (2) the Grampians Region (including the Black Range and Dundas Range) which consists of sandstone ranges uplifted into a cuesta formation and rising to 800 m; (3) the Ararat Region consisting mainly of undulating plains and low hills of slates and sandstones; and (4) the Hamilton Region where the plains and stony rises at Mt. Eccles and Mt. Napier have been formed by basalt lavas.

Climate. The climate of the Grampians-Edenhope Region is characterized by warm temperatures, winter rains, summer droughts and prevailing northwesterly summer winds (Walter 1971).

The average annual rainfall over the plains (i.e. Edenhope, Ararat and Hamilton Regions)

Figure 1—Place names and major blocks of Crown Land in the Grampians-Edenhope Area. The survey area is divided into four regions: 1 = Edenhope Region; 2 = Grampians Region; 3 = Ararat Region; and 4 = Hamilton Region.

ranges between 450 and 700 mm, whereas that at Halls Gap in the mountains of the Grampians Region is more than 900 mm. The wettest months (June, July and August) have a monthly average rainfall of 50-80 mm on the plains and more than 100 mm in the mountains. In summer monthly averages are 20-30 mm on the plains and 35 mm in the mountains. Large, irregular fluctuations in annual rainfall occurred between 1940 and 1965 (Gibbs and Maher 1967). During this period droughts occurred over much of the survey area in 10 of the 25 years, with one drought lasting for three years (1943-1945). At the other extreme, wet years occurred during 8 of the 25 years. The winter during which our fauna surveys were conducted (1974) was relatively wet.

Temperatures in towns on the plains average 25-30°C (maxima) to 11-13°C (minima) during January and 11-13°C (maxima) to 3-5°C (minima) during July. The mountainous area of the Grampians Region has lower average temperatures than those of the plains.

Methods and Results

Wildlife Habitats. The survey of the terrestrial wildlife habitats in the Grampians-Edenhope Area consisted of one or more visits to 180 different sites to gather information on physical habitat, structure of the vegetation, relative numbers of each tree species, cover abundance and growth-form of most shrub species, and listing of common herbaceous plants. Data collected at each site are presented as an annotated list (Appendix 1) and a table showing structure (Appendix 2) of 50 plant communities. A classification of terrestrial habitats (Table 1) was based on plant formations defined by Specht *et al.* (1974), and a simplified distribution of the major plant formations in the survey area is shown in Fig. 2. Nomenclature of plant species follows that of Willis (1962, 1972) and Appendix 3 lists scientific and common names of most plants collected during the survey and now held by the Fisheries and Wildlife Division, Victoria. Twenty-two species of *Eucalyptus* occur in large numbers in the survey area, and are the main plant species used in defining the plant communities in Table 1 and Appendix 1. Relationships between each pair of *Eucalyptus* species (whether in association or not in association but in contact or not in contact) and also the relationship of each species or association to each of the major regions of the survey area are shown in Appendix 4.

The survey of the aquatic habitats was more opportunistic than that of the terrestrial habitats and was mainly concerned with recording the flow, seasonality, depth and occurrence of wetland types in each survey region (Table 2) at the same time as surveying the vertebrate animals (usually birds) utilizing them. The land in the Grampians-Edenhope Area has been described by Blackburn and Gibbons (1956), Gibbons and Downes (1964) and Sibley (1967), in terms of land systems and land units. Salinities of some of the lakes in the survey area are given in Williams (1967) and in Chessman and Williams (1974). By combining these data and our survey data a simplified wetlands distribution map has been drawn up for the survey area (Fig. 3).

The following brief discussion of wildlife habitats in the Grampians-Edenhope Area is mainly based on the detailed survey information presented in the various figures, tables and appendices referred to above.

The most prevalent plant formations in the Edenhope Region are shrublands and woodlands. The shrublands are dominated by Brown Stringybark, heaths, (e.g. *Leptospermum*, *Banksia*) and sedges. These shrublands occur on the sandsheets and many hectares remain on Crown Land. Woodlands of Yellow Gum and River Red Gum once occurred continuously across the plains, and surrounded the patches of shrubland. Today most of these woodlands have been cleared for pasture and only scattered trees remain. Intrusions of mallee, typical of northwestern Victoria, occur near Mt. Arapiles and east of Noradjuha but are small in area and do not constitute a major habitat in the Edenhope Region. Wetlands occur throughout the plains in the Edenhope Region except in those areas covered by sandsheets. These wetlands range from temporarily inundated, shallow depressions, such as occur on the gilgaied soils north of Apsley, though country containing shallow swamps with sedge, reed

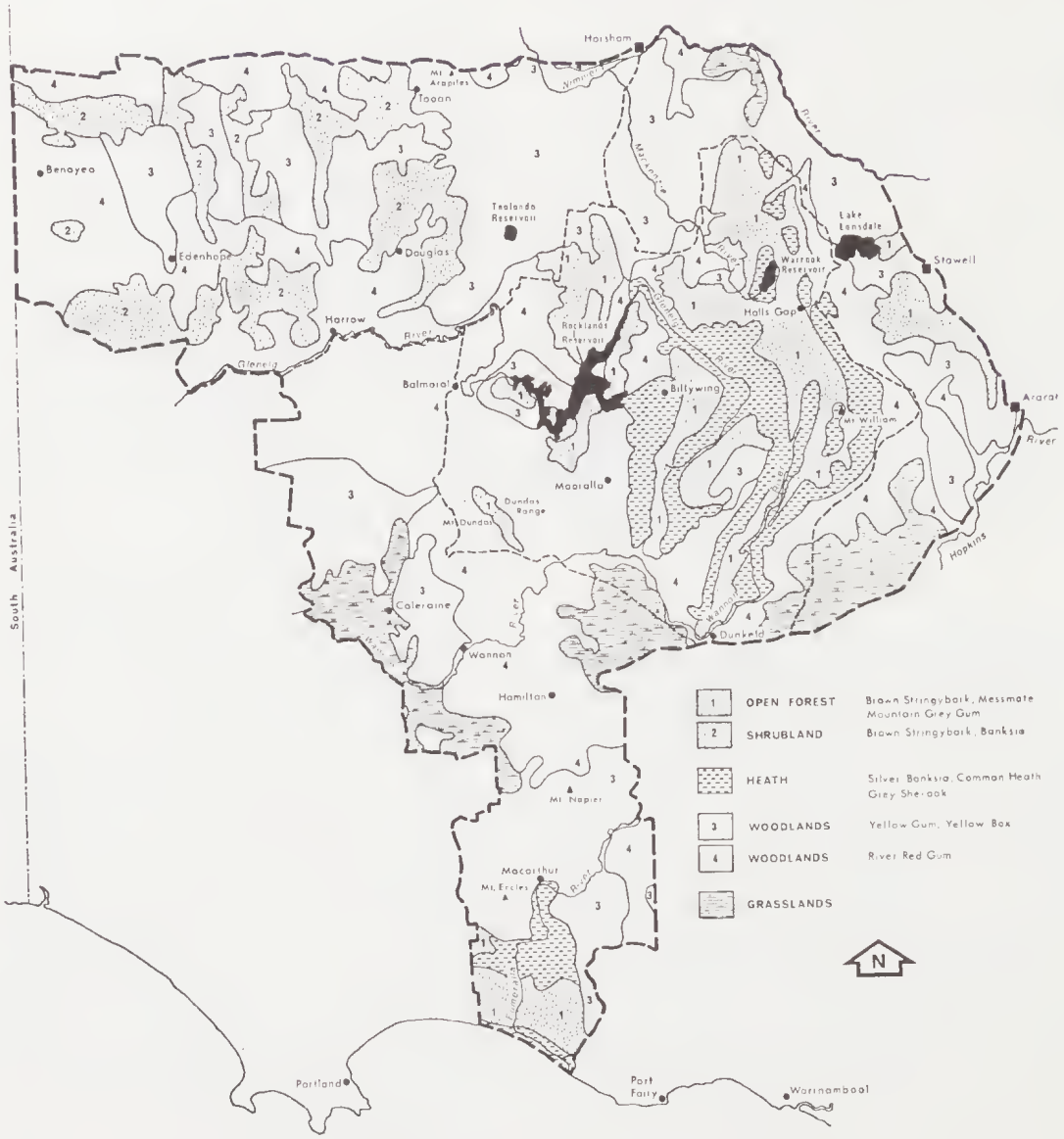

Figure 2—Major vegetation formations in the Grampians-Edenhope Area.

TABLE 1

Vegetation formations in the Grampians-Edenhope Area

Formation/ Structurally dominant species	*Community numbers in Appendix 1*			
	Edenhope	*Grampians*	*Ararat*	*Hamilton*
Tall open forest				
Messmate		7, 11		
Mountain Grey Gum		11, 12		
Open forest				
Messmate		5, 8, 10		28
Mountain Grey Gum		8, 9, 10		
Brown Stringybark		6, 8, 9, 10, 13		
Manna Gum		23		22
Swamp Gum		30, 31		30, 31
Candlebark		39		
Red Stringybark			40	
Low open forest				
Messmate		14		
Brown Stringybark		15, 16		
Long-leaf Box		15, 21	21	
Woodland				
River Red Gum	33, 34, 36, 37	33, 34, 36, 37	37	37
Yellow Box	42	42	41	
Yellow Gum	42, 43, 44, 45	42, 43		
Grey Box	46			
Black Box	47			
Manna Gum	25	24	24	
Slender Cypress Pine	49			
Shrubland				
Brown Stringybark	17, 18, 19, 20			
Mallee eucalypts	48			
Salt Paper-bark	50			
Heath				
White Sallee		1		
Grampians Gum		2, 3, 4		
Scent-bark		26		
Shining Peppermint		29		
Scented Paper-bark		32		
Cross-leaf Honey-myrtle		35		
Common Heath		27		
Grassland				
Native Grasses				37, 38
Pastures, Crops	Present	Present	Present	Present

TABLE 2

Occurrence of wetlands in the Grampians-Edenhope Area

Flow/Salinity	*Seasonality/Depth*	*Edenhope*	*Grampians*	*Ararat*	*Hamilton*
Standing Fresh Water	Temporarily Inundated Depressions	X		X	
	Seasonal Swamps	X	X	X	X
	Permanent Swamps and Shallow (<2 m) Lakes	X	X	X	
	Permanent Deep (>2 m) Lakes	X	X	X	
Flowing Fresh Water	Temporarily Inundated River Plains		X	X	
	Permanent Slow-Flowing Rivers	X	X	X	X
	Permanent Fast-Flowing Streams		X		
Standing Saline Water	Temporarily Inundated Depressions	X			X
	Seasonal Swamps and Saltpans				X
	Permanent Deep (>2 m) Lakes	X			X

X = Present in substantial numbers or area or both.

and River Red Gum margins, into country containing deep lakes, mostly of a lunette formation. A chain of large saline lakes extends north from White Lake past Mt. Arapiles. Fig. 4 shows the important wetlands in the Edenhope Region and Table 3 lists some of the more notable wildlife inhabitants and uses dependent on the wildlife resources.

The major plant formations in the Grampians Region are open forest, low open forest, heath and woodland. The open forests occur primarily on the ranges and surrounding slopes and are dominated by trees of Brown Stringybark, Messmate and Mountain Grey Gum. Beneath the trees in these forests heaths may cover large areas. Other shrubs in the open forests include small communities of mesomorphic shrubs along watercourses which are often fringed by dry sclerophyll shrubs. The most common herbs throughout the open forests are mid-height sedges which form a sparse to mid-dense layer. Tall dense sedges and fern layers occur only along wet gullies. Heath communities are found on shallow infertile soils in both sub-alpine situations and valleys. In the valleys, heaths merge into Scentbark forests on dry margins and into Swamp Gum forests on wet margins. Woodland communities composed of Yellow Gum, Yellow Box, and River Red Gum are extensive in the Black Range and intrude along valleys into the Grampian Ranges. Another common formation in the Black Range is low open forest dominated by Brown Stringybark, Messmate, Long-leaf Box and a tall, mid-dense growth of heaths (e.g. Oyster Bay Pine, Dwarf Sheoak and Silver Banksia). The major wetlands of the Grampians Region are permanent fast-flowing streams and canals and four deep freshwater reservoirs (viz. Rocklands, Wartook, Moora Moora and Bellfield). Seasonally flooded deposition plains occur along the Glenelg River and Tea-tree, Dwyer, Fyans and Mt. William Creeks, the banks of which are usu-

TABLE 3

Important uses or inhabitants of some wetlands in the Edenhope Region (see Fig. 4).

Wetland	*Use or inhabitant*
Boikerbert Swamp	Hunting
Booroopki Swamp	Potential Murray Cod holding site
Boundary Swamp	Hunting
Bringalbert (Lake)	Limited hunting; Redfin fishing
Carchap (Lake)	Waterfowl sanctuary
Carpolac (Lake)	Redfin fishing
Centre Lake	Wading birds
Charlegrark (Lake)	Murray Cod hatchery
Clarke (Lake)	Hunting
Clear Lake	Limited hunting; Redfin and Yabbie fishing
Collins Lake	Redfin fishing
Connagorach Swamp	Limited hunting; Yabbie fishing
Darragan Swamp	Limited hunting
Dollanoke (Lake)	Hunting; Redfin fishing; few Brolgas
Donald Swamp	Limited hunting
Dumbopperty Swamp	Limited hunting; Redfin fishing
Gymbowen Lake	Yabbie fishing
Jaka Lake	Important for waterfowl; limited hunting
Jarracteer (Lake)	Hunting; Redfin fishing; few Brolgas
Kanagulk (Lake)	Important for waterfowl; hunting
Karnak (Lake)	Hunting; Yabbie fishing
Koynock (Lake)	Hunting; Yabbie fishing
Kingcourt Swamp	Limited hunting
Leak Swamp	Redfin fishing
Miga Lake	Limited hunting; Redfin fishing
Mill Swamp	Yabbie fishing
Mockinya Swamp	Limited hunting
Mullancoree (Lake)	Hunting; Redfin fishing; few Brolgas
Murranbool Swamp	Yabbie fishing
North Lake	Wading birds
No-where-else Swamp	Potential Murray Cod holding site
Ratzcastle (Lake)	Redfin fishing
St. Marys Lake	Limited hunting; Redfin fishing
Toolondo Reservoir	Redfin and trout fishing
Wallace (Lake)	Important for waterfowl; Redfin and trout fishing
White Lake	Wading birds

ally covered by dense communities of tea-tree and River Red Gum.

The Ararat Region contains two floristic intrusions which do not occur elsewhere in the survey area. One intrusion consists of species belonging to the Long-leaf Box and Red Stringybark open forests occurring mainly near Ararat; the other, which occurs near Horsham, is woodland of Grey Box from the Northern Plains. The Ararat Region contains relatively few wetlands, although there are a few impoundments (e.g. Lakes Fyans, Lonsdale, Taylor and Pine) and slow-flowing rivers. A few Black Box and lignum swamps and gilgaied depressions occur east of Horsham but most are now under cultivation.

The Hamilton Region contains mainly agricultural land and remnants of the original vegetation of the volcanic plains. Our survey in this region was concentrated on the Stones State Faunal Reserve near Mt. Eccles. The reserve is covered by Manna Gum open forest and is atypical in relation to the rest of the volcanic plains which were once covered by River Red Gum grassy open woodlands and grasslands. This region contains a few large saline lakes (e.g. Lake Condah) which are now mostly drained and some areas of slightly saline depressions occurring on the basalt plains.

Birds. Terrestrial field work consisted primarily of surveying birds in as many of the 180 vegetation survey sites (Appendix 1) as possible. Some surveys were not standardized because the time, duration and effort of observations varied between different sites and between visits to the same sites. However, during all surveys we recorded actual or relative numbers of all avian species present and their utilization of particular structures within the habitat. Other surveys consisted of recording birds along lines (transects) 0·5 km long established in a number of vegetation survey

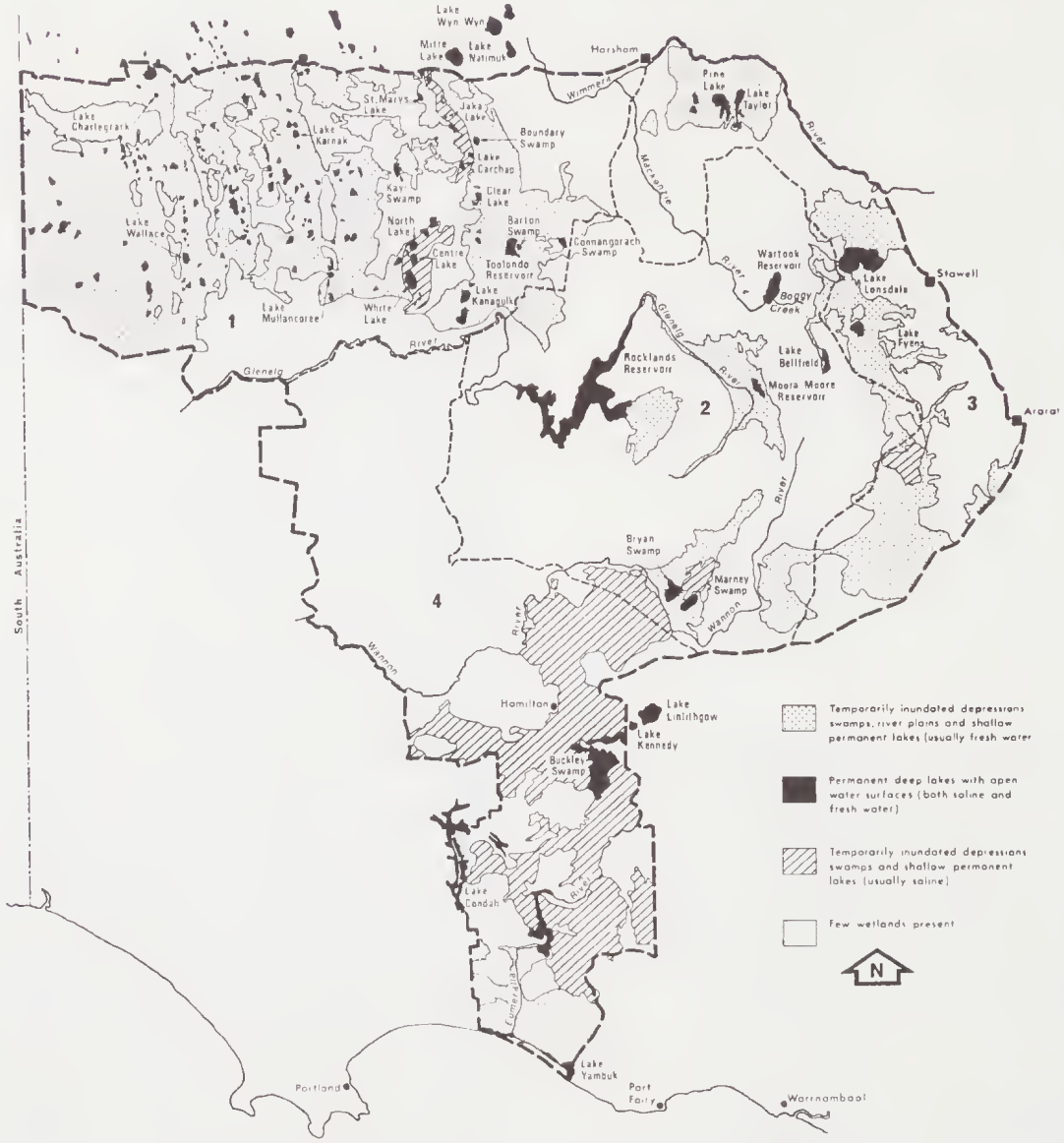

Figure 3—Distribution of wetlands in the Grampians-Edenhope Area.

Figure 4—Major lakes, swamps and reservoirs in the Edenhope Region.

sites. Birds were recorded along most of these transects during spring, summer and autumn. Spotlighting from vehicles (usually in conjunction with the mammal survey) was used for surveying nocturnal species such as owls and frogmouths. The wetland birds were recorded whenever they were encountered during field activities. However, in the Edenhope, Grampians and Ararat Regions we conducted periodic censuses (spring and autumn, occasionally also summer) of waterbirds on selected swamps, lakes and rivers. Another large portion of our information came from the literature and previous work done by staff of the Fisheries and Wildlife Division, Victoria, and other interested individuals (see Acknowledgements). Records held by the National Museum of Victoria, and by the Royal Australasian Ornithological Union were also important sources of information.

From the above sources we have documented the occurrence of 233 avian species in the Grampians-Edenhope Area. This number excludes seabirds that occur along the southern boundary of the survey area. One hundred and twelve species of birds occur in the forest, woodland, shrubland and heath formations (Table 4); 52 avian species are inhabitants of the semi-cleared pasture, grassland and suburban areas (Table 5); and 69 species occur in aquatic habitats (Table 6). Detailed information, including distribution, abundance, habitat preference, feeding and breeding, for each species appears in an annotated list (Appendix 5). Nomenclature follows Condon (1975) for the non-passerines and Schodde (1975) for the passerines.

Mammals. The published information available on the mammal fauna of the Grampians-Edenhope Area is meagre and consists mainly of old imprecise popular accounts and a more recent general discussion by Wakefield (1974). Some specific and up-to-date information has been derived from specimens in the collections of both the National Museum of Victoria, and the Fisheries and Wildlife Division, Victoria, and field data have recently been available from two mammal survey groups operating in the State. However, most of the information presented here is derived from the field work (about 140 man-days) of two members of the survey team. Mammal trapping was conducted in 31 of the 180 vegetation survey sites (Appendix 1), usually when the vegetation was being analysed. One hundred wire mesh cage traps (360 x 200 x 165 mm), baited with a

mixture of peanut butter, honey and rolled oats, were set at each locality for two nights and the intervening day. Traps were checked on the first morning and captured animals were either retained or marked and released. All traps were reset and checked again on the second morning, after which they were removed

TABLE 4

Checklist of avian species occurring in forest, woodland, shrubland and heath areas in the Grampians-Edenhope Area. See Appendix 5 for scientific names

Brown Goshawk
Collared Sparrowhawk
Painted Button-quail
Bush Stone-curlew
Japanese Snipe
Peaceful Dove
Diamond Dove
Common Bronzewing
Brush Bronzewing
Red-tailed Black Cockatoo
Yellow-tailed Black Cockatoo
Gang-gang Cockatoo
Rainbow Lorikeet
Musk Lorikeet
Purple-crowned Lorikeet
Little Lorikeet
Cockatiel
Budgerigah
Swift Parrot
Crimson Rosella
Blue-winged Parrot
Elegant Parrot
Pallid Cuckoo
Fan-tailed Cuckoo
Black-eared Cuckoo
Rufous-tailed Bronze-cuckoo
Shining Bronze-cuckoo
Powerful Owl
Spotted Owl
Barking Owl
Masked Owl
Tawny Frogmouth
Owlet-nightjar
Willie Wagtail
Spotted Quail-thrush
Grey-crowned Babbler
White-browed Babbler
Rufous Songlark
Superb Blue Wren
Variegated Wren
Southern Emu-wren
White-browed Scrubwren
Chestnut-rumped Hylacola
Fieldwren
Speckled Warbler
Weebill
White-throated Warbler
Brown Thornbill
Chestnut-rumped Thornbill
Buff-rumped Thornbill
Yellow Thornbill
Striated Thornbill
Varied Sittella
White-throated Treecreeper
Brown Treecreeper
Red Wattlebird
Little Wattlebird
Spiny-cheeked Honeyeater
Regent Honeyeater
Blue-faced Honeyeater
Yellow-faced Honeyeater
Singing Honeyeater
White-eared Honeyeater
Yellow-tufted Honeyeater
Fuscous Honeyeater
White-plumed Honeyeater
Black-chinned Honeyeater
Spotted Nightjar
Sacred Kingfisher
Rainbow Bee-eater
White-bellied Cuckoo-shrike
White-winged Triller
Scaly Thrush
Southern Scrub-robin
Rose Robin
Pink Robin
Flame Robin
Scarlet Robin
Red-capped Robin
Hooded Robin
Eastern Yellow Robin
Crested Shrike-tit
Gilbert's Whistler
Golden Whistler
Rufous Whistler
Grey Shrike-thrush
Satin Flycatcher
Restless Flycatcher
Rufous Fantail
Grey Fantail
Brown-headed Honeyeater
White-naped Honeyeater
Painted Honeyeater
Crescent Honeyeater
New Holland Honeyeater
White-fronted Honeyeater
Tawny-crowned Honeyeater
Eastern Spinebill
Mistletoebird
Spotted Pardalote
Striated Pardalote
Silvereye
Red-browed Firetail
Diamond Firetail
Olive-backed Oriole
White-winged Chough
Masked Woodswallow
White-browed Woodswallow
Dusky Woodswallow
Grey Butcherbird
Pied Currawong
Grey Currawong

TABLE 5

Checklist of avian species occurring in grasslands, semi-cleared pastures and suburban areas in the Grampians-Edenhope Area. See Appendix 5 for scientific names

Emu
Black-shouldered Kite
Black Kite
Whistling Kite
Wedge-tailed Eagle
Little Eagle
Spotted Harrier
Swamp Harrier
Black Falcon
Peregrine Falcon
Little Falcon
Brown Falcon
Nankeen Kestrel
Stubble Quail
Brown Quail
Little Button-quail
Plains-wanderer
Domestic Pigeon*
Crested Pigeon
Fork-tailed Swift†
Kookaburra
Singing Bushlark*
Common Skylark*
Welcome Swallow
Tree Martin
Fairy Martin
Richard's Pipit
Black-faced Cuckoo-shrike
Common Blackbird*
Jacky Winter
Brown Songlark
Yellow-rumped Thornbill
Southern Whiteface
Noisy Miner
White-fronted Chat
European Goldfinch*
European Greenfinch*
House Sparrow*

Galah
Long-billed Corella
Sulphur-crested Cockatoo
Eastern Rosella
Red-rumped Parrot
Barn Owl
Spine-tailed Swift†
Eurasian Tree Sparrow*
Common Starling*
Australian Magpie Lark
Little Woodswallow
Australian Magpie
Australian Raven
Little Raven

* Introduced
† Aerial

TABLE 6

Checklist of avian species occurring in aquatic habitats in the Grampians-Edenhope Area. See Appendix 5 for scientific names

Great Crested Grebe
Hoary-headed Grebe*
Little Grebe*
Australian Pelican
Darter
Pied Cormorant
Little Pied Cormorant*
Black Cormorant
Little Black Cormorant
White-necked Heron*
White-faced Heron
Cattle Egret
Large Egret
Nankeen Night-heron
Brown Bittern
Glossy Ibis
White Ibis
Straw-necked Ibis
Royal Spoonbill
Yellow-billed Spoonbill
Plumed Tree-duck
Black Swan*
Freckled Duck
Cape Barren Goose
Mountain Duck*
Black Duck*
Grey Teal*
Chestnut Teal
Shoveller
Pink-eared Duck*
White-eyed Duck
Wood Duck*
Blue-billed Duck
Land Rail
Water Rail
Marsh Crake
Spotted Crake
Spotless Crake
Black-tailed Native-hen*
Dusky Moorhen*
Swamphen
Coot
Brolga
Painted Snipe
Pied Oystercatcher
Masked Plover*
Banded Plover
Red-kneed Dotterel
Hooded Dotterel
Double-banded Dotterel
Red-capped Dotterel*
Black-fronted Dotterel*
Pied Stilt
Banded Stilt
Red-necked Avocet
Greenshank
Sharp-tailed Sandpiper
Red-necked Stint
Curlew Sandpiper
Sanderling
Silver Gull
Whiskered Tern
Gull-billed Tern
Azure Kingfisher
Clamorous Reed-warbler
Little Grassbird
Musk Duck
White-breasted Sea-eagle
Golden-headed Cisticola

* Recorded breeding in the Edenhope Region during 1974.

from the site and set in another locality later in the day. In Appendix 6, reference is made to a trapping rate which is a measure of trapping susceptibility rather than abundance; nevertheless it gives some indication of relative numbers of small ground-dwelling mammals. The rate is simply the percentage of traps occupied by individuals of a particular species where the unit duration of a trapping period is one night. Spotlighting from vehicles at night allowed long distances to be covered and was particularly useful for recording large macropod species and many of the possums. Hand-held spotlights were used while walking through small areas of bush and allowed quiet observations to be made on the relatively small arboreal mammals which can be overlooked while spotlighting from vehicles. Daylight observations were restricted mainly to large species such as kangaroos and deer. Other information came from finding dead animals, skeletal remains, tracks and identifiable faecal deposits. Anecdotal and often valuable information was supplied by interested local naturalists and farmers.

During the survey we documented the occurrence of 54 mammal species in the Grampians-Edenhope Area (Table 7); about 20% were introduced species. It appears that the mammal fauna of the plains in western Victoria has been altered by some species of rodents, dasyurids, bandicoots and macropods disappearing either directly or indirectly as a result of European settlement (Wakefield 1974). Some species still extant in western Victoria are presently in danger of extinction; these will be considered in more detail later in the discussion. Detailed information on abundance, distribution, habitat preference, breeding and recent records for each mammal species in the survey area appears in an annotated list (Appendix 6). Scientific nomenclature for the native mammals follows Ride (1970) except for *Potorous apicalis* which is replaced here by *P. tridactylus* following Johnston (1973).

TABLE 7

Checklist of mammals in the Grampians-Edenhope Area. See Appendix 6 for scientific names

Echidna	Bush Rat
Platypus	Black Rat*
Tiger Cat	Swamp Rat
Tuan	Sewer Rat*
Yellow-footed Antechinus	Silky Desert Mouse
Brown Antechinus	Smokey Mouse
Swainson's Antechinus	Heath Rat
Mouse Dunnart	House Mouse*
Fat-tailed Dunnart	Eastern Water Rat
Short-nosed Bandicoot	Fox*
Gunn's Bandicoot	Cat (feral)*
Koala	Pig (feral)*
Brush-tailed Possum	Red Deer*
Ring-tailed Possum	Goat (feral)*
Sugar Glider	Sheep (feral)*
Squirrel Glider	Greater Long-eared Bat
Yellow-bellied Glider	Lesser Long-eared Bat
Feather-tailed Glider	Bent-winged Bat
Eastern Pigmy Possum	Gould's Wattled Bat
Western Pigmy Possum	Chocolate Bat
Potoroo	Little Bat
Eastern Grey Kangaroo	Tasmanian Pipistrelle
Western Grey Kangaroo	Large-footed Bat
Red-necked Wallaby	Little Broad-nosed Bat
Brush-tailed Rock Wallaby	White-striped Bat
Hare*	Little Flat Bat
Rabbit*	Yellow-bellied Bat

* Introduced

Reptiles and amphibians. Field work on these groups was usually confined to opportunistic collecting while we were surveying either birds or mammals. The annotated list of reptiles (Appendix 7) and the checklist (Table 8) are based primarily on specimens in the National Museum of Victoria. However, a few days during the survey period were devoted to searching for reptiles in suitable habitats and a representative collection of species was lodged with the National Museum of Victoria. Specimens were collected by searching in hollow logs, around rocky out-crops, under logs and in litter. The distributions of the 40 species of reptiles occurring in the survey area are consistent with the assessment by Rawlinson (1971) that the reptile fauna is composed of three groups which correspond to the three major zoogeographic zones (Eyrean, Warm Temperate Bassian and Cool Temperate Bassian) in the survey area. Nomenclature for the reptiles follows Cogger (1975) except for *Anotis maccoyi*, *Lampropholis delicata* and *L. guichenoti* which follow Greer (1974) and the addition of *Leiolopisma coventryi* following Rawlinson (1975).

The distributions in the survey area of the 14 species of amphibians known to occur there (Table 9) are based on recently published data (Brook 1975) and are shown in Appendix 8. Nomenclature for the amphibians follows Cogger (1975) except for the genus *Crinia* which is replaced here by *Ranidella* following Blake (1973).

Fishes. During the present survey our involvement with terrestrial vertebrates precluded the gathering of much information on fishes.

However, detailed studies and surveys are presently being conducted on selected lakes and streams in the Grampians-Edenhope Area by the Freshwater Fisheries Section of the Fisheries and Wildlife Division, Victoria, and their results will be presented elsewhere. A list of fishes occurring in the survey area appears in Table 10. The list does not include all estuarine and marine fishes which may occur along the southern boundary of the study area. Nomenclature follows Barnham (in prep.).

TABLE 8

Checklist of reptiles in the Grampians-Edenhope Area

Chelidae (Side-necked Tortoise)
- *Chelodina longicollis* (Long-necked Tortoise)

Agamidae (Dragon Lizards)
- *Amphibolurus barbatus* (Bearded Dragon)
- *Amphibolurus diemensis* (Mountain Dragon)
- *Amphibolurus muricatus* (Jacky Lizard)
- *Amphibolurus pictus* (Painted Dragon)

Gekkonidae (Geckos)
- *Diplodactylus tessellatus* (Tessellated Gecko)
- *Phyllodactylus marmoratus* (Marbled Gecko)

Pygopodidae (Snake-lizards)
- *Delma inornata*
- *Delma impar*

Scincidae (Skinks)
Anotis maccoyi
Cryptoblepharus boutonii
Ctenotus robustus
Egernia luctuosa (Mourning Skink)
Egernia saxatilis (Black Rock Skink)
Egernia whitii (White's Skink)
Hemiergis decresiensis
Hemiergis peronii
Lampropholis delicata
Lampropholis guichenoti
Leiolopisma entrecasteauxii
Leiolopisma trilineata
Leiolopisma coventryi (Coventry's Skink)
Lerista bougainvillii
Morethia adelaidensis
Morethia boulengeri
Morethia obscura (Ocellated Skink)
Sphenomorphus tympanum
Sphenomorphus sp.
Tiliqua nigrolutea (Blotched Blue-tongued Lizard)
Tiliqua scincoides (Eastern Blue-tongued Lizard)
Trachydosaurus rugosus (Shingle-back)

Varanidae (Monitor Lizards)
Varanus gouldii (Sand Monitor)
Varanus varius (Lace Monitor)

Elapidae (Elapid Snakes)
Austrelaps superba (Lowlands Copperhead)
Drysdalia coronoides (White-lipped Snake)
Notechis scutatus (Eastern Tiger Snake)
Pseudechis porphyriacus (Red-bellied Black Snake)
Pseudonaja textilis (Eastern Brown Snake)
Unechis flagellum (Little Whip Snake)

Typhlopidae (Blind Snakes)
Typhlina proxima

TABLE 9

Checklist of amphibians in the Grampians-Edenhope Area

Hylidae (Tree Frogs)
Litoria ewingii (Brown Tree Frog)
Litoria lesueurii (Lesueur's Frog)
Litoria raniformis

Leptodactylidae (Southern Frogs)
Geocrinia laevis
Geocrinia victoriana
Limnodynastes dumerilii (Eastern Banjo Frog)
Limnodynastes peronii (Brown-striped Frog)
Limnodynastes tasmaniensis (Spotted Grass Frog)
Neobatrachus centralis (Trilling Frog)
Neobatrachus pictus (Meeowing Frog)
Pseudophryne bibronii (Brown Toadlet)
Pseudophryne semimarmorata (Southern Toadlet)
Ranidella parinsignifera
Ranidella signifera (Common Eastern Froglet)

TABLE 10

Checklist (incomplete) of fishes in the Grampians-Edenhope Area

Mordaciidae
Geotria australis (Pouched Lamprey)

Retropinnidae
Retropinna semoni (Australian Smelt)

Anguillidae
Anguilla australis (Short-finned Eel)

Mugilidae
Aldrichetta forsteri (Yellow-eyed Mullet)

Eleotridae
Philypnodon grandiceps (Big-headed Gudgeon)
Hypseleotris compressus (Carp Gudgeon)
Hypseleotris klunzingeri (Western Carp Gudgeon)

Gadopsidae
Gadopsis marmoratus (Blackfish)

Plotosidae
Tandanus tandanus (Catfish)

Bovichthyidae
Pseudaphritis urvilli (Tupong)

Nannopercidae
Nannoperca australis (Pigmy Perch)

Plectroplitidae
Plectroplites ambiguus (Golden Perch)

Maccullochellidae
Maccullochella peeli (Murray Cod)

Macquariidae
Percalates colonorum (Estuary Perch)
Macquaria australasica (Macquarie Perch)

Sparidae
Acanthopagrus butcheri (Black Bream)

Galaxiidae
Galaxias maculatus (Common Galaxiid)
Galaxias olidus (Ornate Mountain Galaxiid)
Galaxiella pusillus (Dwarf Galaxiid)

Percidae
Perca fluviatilis (English Perch or Redfin)*

Poeciliidae
Gambusia affinis (Mosquito Fish)*

Salmonidae
Salmo gairdneri (Rainbow Trout)*
Salmo trutta (Brown Trout)*

Cyprinidae
Carassius auratus (Goldfish)*

Carassius carassius (Crucian Carp)*
Tinca tinca (Tench)*

* Introduced

Discussion

The first European to explore the Grampians-Edenhope Area was Major Thomas Mitchell, who climbed Mt. William in the Gramplans in July 1836 (Mitchell 1839). His party then traversed the northern portions of the Ararat and Edenhope Regions before striking southwest past White Lake to the Glenelg River and down the river to the ocean, which they reached on 20 August 1836. Later that year they passed through the Hamilton Region, climbing both Mt. Napier and Mt. Abrupt (Grampians Region) before striking northeast towards Sydney. Mitchell extolled the beauty and the richness of the soil of the plains country, and his descriptions of the physical surroundings suggest that much of the plains was covered by relatively open, grassy woodlands. Today most of the areas through which Mitchell travelled are crop or pasture lands with few of the woodland trees and native grasses remaining. The mountainous areas of the Grampians Region have been less affected by European settlement, and the species of birds inhabiting the Grampians Region in 1891 (Anon. 1892) were essentially the same as those recorded there during the present survey.

Modification of wildlife habitats on the plains has undoubtedly benefited some animals, particularly domestic mammals (cattle, sheep, horses) some introduced bird species (starling, pigeon, sparrow, goldfinch) and some native bird species (quail, some cockatoos, pipit, magpie). However, the loss of such habitat is also detrimental to many species of native wildlife, and should most of the remaining native trees, shrubs and grasses be cleared, a large portion of the original complement of wildlife species would disappear.

Most standing surface water in the survey area is in the Edenhope Region, although a few large freshwater and saline lakes and impoundments occur in the other regions. The Grampians Region supports most of the fast-flowing streams in the survey area with a few slow-flowing rivers occurring in the other regions. Many of these bodies of water have been modified by draining, clearing of native vegetation from the catchments, stream or lake modifications, diversions, building of dams, irrigation and dumping of waste. However, many of the wetlands still support large assemblages of vertebrates but the continued modification of such waters will probably result in a decrease in the diversity of species inhabiting them.

Despite extensive habitat modification throughout the survey area the terrestrial and aquatic areas of Crown Land support valuable vertebrate communities. The wildlife values of the four survey regions (Fig. 1) of the Grampians-Edenhope Area are discussed below.

Wildlife values of the Edenhope Region. Remnants of the original vegetation indicate that most of the alienated land in the Edenhope Region (unshaded in Fig. 1) originally supported woodlands of River Red Gum, Yellow Gum, Yellow Box and, possibly, Grey Box. Because these woodlands occurred on the deeper more fertile soils, they were cleared for pasture and crops. Consequently, most of these woodlands have now gone, and only roadside remnants and a few plantations of small River Red Gums (along the margins of some blocks of Crown Land) remain of what was once the major terrestrial habitat in the region. It is impossible to determine the number of animal species which were common in these woodlands before European settlement, but there are indications that, at least, some mammal species have recently disappeared (Wakefield 1974). The results of our survey indicate that at present about 100 terrestrial vertebrate species occur in the woodland remnants of the Edenhope Region. These species include only those which are either common throughout the year or rely on the woodlands during some periods of the year (e.g. for feeding or nesting). Bird species make up about 60 per cent of the total number of common species in the woodlands, mammals about 25 per cent and reptiles and amphibians the remaining 15 per cent. Approximately 5 per cent are species alien to Australia which, in general, exert a disproportionate influence on the

vegetation and on the well-being of many of the native animal species. The populations of many of the native animals will decrease and some will disappear if the woodland remnants continue to be modified or destroyed. We suggest that at least 15 per cent of the total number of species are either already, or will soon be, experiencing difficulties in maintaining their population numbers in the Edenhope Region (see annotated lists for details). These include 13 species of birds (Bush Stone-curlew, Rainbow Lorikeet, Musk Lorikeet, Little Lorikeet, Purple-crowned Lorikeet, Swift Parrot, Long-billed Corella, Barking Owl, Grey-crowned Babbler, Blue-faced Honeyeater, Painted Honeyeater, Regent Honeyeater and Grey Butcherbird), one mammal species (Tuan) and one reptile species (Lace Monitor).

Most species whose populations may be in difficulties, as well as many of the other native woodland animals, fall into one or more of the following categories: (1) birds such as lorikeets and honeyeaters which move to the woodlands seasonally to feed on pollen, nectar and insects when the River Red Gums, Yellow Gums and Grey Box are flowering; (2) animals such as corella, cockatoos, owls, possums, tuans and Lace Monitor which require hollows in the trunks or limbs of large trees for breeding or sheltering; and (3) birds such as curlews and babblers which forage on the ground and appear to depend on woodland with relatively unchanged native undergrowth.

Maintenance of woodland habitats in the Edenhope Region will require the cooperation of government agencies and private land holders. As a first step, a detailed botanical study of the woodlands of the entire Grampians-Edenhope Area should be conducted to ascertain: (1) where the various woodland communities occurred originally; (2) the species composition in each community at present; and (3) the best means of ensuring that adequate mature trees and associated plants are present and that regeneration is occurring. Those woodland remnants still on Crown Lands (e.g. margins of the larger Crown Land blocks, roadside reserves, etc.) should be carefully managed to ensure that enough large trees remain to support populations of nectar-feeding animals, that enough over-mature trees remain to provide holes for nests and shelter and, if possible, that the understoreys of some woodlands be restored to their original composition. Ways of encouraging private landholders to plant appropriate woodland species when landscaping, creating shelter belts or even specifically planting areas for native wildlife should also be explored.

The vegetation on most of the large Crown Land blocks (shaded in Fig. 1) in the Edenhope Region is mainly Brown Stringybark shrubland. These shrublands were not alienated during early settlement because the soils were too poor to support crops or pasture. Consequently, these Crown Land blocks now support a relatively unmodified habitat, although grazing and fires have probably somewhat altered the ground-cover. The species composition of the vertebrate wildlife is different from that occurring in the adjacent pasture/woodland areas and consists of about 65 commonly occurring species (50 per cent birds, 30 per cent mammals and 20 per cent reptiles/amphibians). The relatively dense undergrowth on some of the blocks appears to be an important structural feature influencing the distribution of some of the wildlife species, particularly some thornbills, honeyeaters and the Western Pigmy Possum. The Red-tailed Black Cockatoo occurs in these blocks and we saw large numbers in the Jilpanger Block. The range of this cockatoo in Victoria has decreased since European settlement, and the large Crown Land blocks in the Edenhope Region appear to be one of the last strongholds of this species in the State. Also the Little Wattlebird sometimes occurs in large numbers in dense stands of banksias, which provide an important food source.

Occurring together within some of the Crown Land blocks in the Edenhope Region are typical inland (Eyrean) species of reptiles (Painted Dragon and Ocellated Skink) and temperate (Bassian) species of reptiles (Black Rock Skink). The shrublands are generally rich in reptiles which attain maximum diversity in blocks such as Mt. Arapiles where rocky outcrops adjoin woodland, shrubland and low open forest. The Silky Desert Mouse occurs

along the high sand ridges in areas which have not suffered heavy grazing or burning. Mouse Dunnarts are probably widespread in the shrublands but their numbers are difficult to assess because they are not usually captured in conventional traps. Other native mammals occurring in this habitat include the Echidna, Yellow-footed Antechinus, Western Grey Kangaroo and Red-necked Wallaby.

To ensure perpetuation of the assemblage of wildlife species now present in these shrublands in the Edenhope Region we suggest that as many as possible of the large Crown Land blocks be retained intact and in public ownership. A more detailed study of the fauna of these areas is required to ascertain the importance of each Crown Land block, particularly in relation to similar vegetation further south. Several of the blocks have fringes of woodland which, if at all possible, should be retained to provide wildlife habitat.

The intrusions of mallee vegetation into the Mt. Arapiles, Noradjuha and Wonwondah North areas are small but constitute some of the southern-most extensions of this habitat into western Victoria. Species of birds such as the Southern Scrub-robin, Variegated Wren, Gilbert's Whistler, White-fronted Honeyeater and Spiny-cheeked Honeyeater are at the southern limit of their range in western Victoria in these small intrusions of mallee. These wildlife species are more common further north but the Mt. Arapiles block, in particular, contains not only these animals, which have adapted to a mallee habitat, but also wildlife adapted to living in woodlands, low open forests, or on exposed rocky outcrops because of the diversity of habitats in this one block.

The pastures and croplands in the Edenhope Region support populations of most of the avian species listed in Table 5. The open terrain is suitable for hunting over by such predatory birds as eagles, kites, harriers and falcons. Some members of the parrot and cockatoo family (particularly Long-billed Corella, Galah and Sulphur-crested Cockatoo) forage in the pastures for roots and bulbs. Other wildlife species particularly well-adapted to survival in this open habitat include bird species (such as some quails and larks, Richard's Pipit, Yellow-rumped Thornbill, White-fronted Chat, Jacky Winter, House Sparrow, goldfinch, starling, magpie and raven), mammal species (such as Fat-tailed Dunnart, Rabbit, House Mouse, Fox and Cat) and reptile species (such as Eastern Blue-tongued Lizard, Shingle-back, and Eastern Brown Snake).

During periods of high rainfall many of the pastures are covered either entirely or partially by standing water. These temporary wetlands are favoured foraging areas for some of the large waders (e.g. Large Egret, White-necked and White-faced Herons), the small grebes and some of the ducks (e.g. Black Duck and Grey Teal). The Brolga is also a conspicuous species along the margins of the open pasture and aquatic areas in the Edenhope Region. This species still breeds in the region, but its long-term survival in the area is not certain. A detailed study of the habitat requirements of the Brolga in western Victoria would be a first step towards a management plan needed to ensure their survival.

The importance of the Edenhope Region in providing a large proportion of the aquatic habitat in western Victoria is apparent in Fig. 2. Although some avian species utilize impoundments and temporarily flooded agricultural land, their main habitats are the large areas of natural fresh and saline wetlands, most of which are unprotected and unmanaged in the Edenhope Region. Our survey only touched on some of these important wetlands and a more detailed study is required to determine priorities for conservation and management. Requirements for breeding, feeding and shelter of a particular avian species may be fulfilled only by a wide range of aquatic conditions. Therefore, a regional management plan must aim at preserving maximum diversity of wetland habitats.

Hundreds of saline and freshwater lakes, swamps and depressions which hold water temporarily occur throughout the western two-thirds of the Edenhope Region. The spring and early summer of 1974 were unusually wet, and standing water was widespread throughout the region. Waterbirds took advantage of these conditions and nests and broods of 15 different

species were documented in the region (Table 6). However, the area of nesting habitat has been considerably reduced by the clearing of land down to the margins of some lakes and by the draining of many of the swamps and seasonal depressions. Many of these lakes and swamps provide public duck hunting areas and a few of the more important ones are listed in Table 3 and shown in Fig. 4.

The permanent water bodies are probably important refuges for waterfowl during periods of low rainfall and after most temporary bodies of water have dried up, as occurred in 1972 (Mitchell 1973). During the non-breeding season the mud flats of some of these waters also provide foraging areas for six species of intercontinental migrants, of which two breed in the Arctic (Red-necked Stint and Curlew Sandpiper), three breed in Eurasia (Japanese Snipe, Greenshank and Sharp-tailed Sandpiper) and one breeds in New Zealand (Double-banded Dotterel). The narrow strip of land containing saline lakes and swamps, which extends from Mitre Lake on the northern boundary of the Edenhope Region through White Lake near the southern boundary (Fig. 2), may be important to such wader species as Pied and Banded Stilts and Red-necked Avocets. Very large flocks of these waders, as well as Black Swans and various species of ducks, have been reported from some of these lakes (particularly North, Centre and White Lakes near Douglas). We suggest that detailed and regular observations be made on the waders especially. The wide range of aquatic habitats is, in part, also responsible for the widespread occurrence in the Edenhope Region of at least five species of amphibians (and four other less widely distributed amphibians) as well as supporting other vertebrate species such as the Eastern Water Rat and the Long-necked Tortoise.

Some of the permanent lakes in the Edenhope Region (Table 3 and Fig. 4) support an important amateur freshwater fishery based mainly on Redfin (a few lakes also support trout populations). Amateur fishing for yabbies is popular, but at present they are not being commercially exploited in the region although the potential for such an industry exists. The Freshwater Fisheries Section of the Fisheries and Wildlife Division, Victoria, has recently established a Murray Cod hatchery on Lake Charlegrark. Two nearby bodies of permanent water, Booroopki Swamp and Nowhere-else Swamp (Morea Block), may be important for use as alternate Murray Cod holding sites as the project develops.

Wildlife values of the Grampians Region. The area of Crown Land remaining in this region exceeds 200,000 ha, most of it being continuous through the Grampians Ranges (e.g. Victoria, Serra and Mt. Difficult Ranges) and the Black Range (Fig. 1). The diverse habitats contained within this large Crown Land area support a correspondingly large and diverse assemblage of native vertebrate species. To maintain this diversity it is important that the continuous area of public land be managed as a single functional unit rather than arbitrarily dividing it into a series of small discrete units and managing each as an entity. Management of this Crown Land area as a single unit will enhance the chances of survival of those species of wildlife whose life cycles require the utilization of two or more distinct habitats as well as those species which attain their highest densities in ecotones.

The Crown Land west of the Victoria Range probably contains what is now the largest remaining area of woodland (River Red Gum, Yellow Gum and Yellow Box) in southwestern Victoria (Plate 19, Fig. 1). Although this plant formation was one of the major habitats in the survey area before European settlement, it has now nearly gone and the woodland area west of the Victoria Range covers only slightly more than 20,000 ha. These woodlands are the remains of a vast area of woodland which originally also covered most of the Edenhope Region to the west. Consequently, remarks made previously on the fauna of the woodlands in the Edenhope Region apply equally to the fauna of woodlands in the Grampians Region. However the woodlands in the Grampians region represent the most important area of this habitat remaining in southwestern Victoria and one major aim of their management should be to provide food, breeding sites and shelter for the large assemblage of vertebrate animals (some 100 species) which inhabit them. We

strongly suggest that an assessment of some of the structural features known to be important to vertebrate species (e.g. mature trees with large hollows, dense undergrowth, decaying logs) be made to ascertain how these woodlands can be managed to provide a more suitable environment (i.e. similar to pre-European woodlands) for many of the native species of wildlife.

Heath communities, widespread throughout the Crown Lands in the Grampians Region (Fig. 2), are inhabited by about 80 species of commonly occurring vertebrate animals (55 per cent birds, 30 per cent mammals and 15 per cent reptiles/amphibians). Lowland heaths, including the ecotone of heath under open forest, and sub-alpine heaths are the most extensive heath types occurring in the Grampians.

The lowland heaths (particularly those in the Victoria Valley) appear to be the northern extremity in Victoria of a predominantly coastal heath type which extends inland along the Glenelg River to the Grampians (Plate 19, Fig. 2). In these heaths such species as the Southern Emu Wren and the Heath Rat reach the northern limits of their distributions in Victoria. Similarly, the most northerly populations of the Short-nosed Bandicoot and the Potoroo in Victoria occur in heaths in the Grampians Region, but these heaths are usually under large trees and generally adjacent to thick gully vegetation. The importance to native mammals of this ecotonal zone in the Grampians has been discussed by Seebeck (1976). A single specimen of the Mourning Skink, a rare species whose centre of distribution appears to be coastal Victoria, has been collected from a heathy swamp in the Victoria Range. Large numbers of three species of honeyeaters (New Holland, Tawny-crowned and Eastern Spinebill) move into the lowland heaths in the spring to feed on the nectar from the flowers of the Common Heath. The fauna of the heath communities in the Victoria Valley is of special interest to biologists because of its similarities to the vertebrate fauna in the heaths occurring along the coast of Victoria. The perpetuation of these plant communities (and their associated fauna) in the Grampians should be a major aim in the management of this region. The management of these heaths may require periodic burning to maintain numbers and diversity of the vertebrate species inhabiting them (Cockburn 1975). However, this should be the subject of careful study and experimentation before wildlife management based mainly on controlled burning is introduced.

The number of the Victorian endemic Smokey Mouse recorded during our 1974-75 survey of the sub-alpine heaths in the Grampians Region exceeded the total number recorded in Victoria prior to that time and illustrates the likely importance of the Grampians area for this species' conservation. Most of the bird species which occur in the lowland heath and five species of reptiles also inhabit the sub-alpine heaths. The heaths are one of the nesting areas of the Flame Robin in western Victoria. Crescent Honeyeaters were common in the heaths near the summit of Major Mitchell Plateau in August 1974.

The open and low open forests, including the vegetation mapped as scrub by the Forests Commission of Victoria (undated), form the most extensive vegetation formation occurring in the Grampians Region (Fig. 1). At least 100 species of wildlife (55 per cent birds, 25 per cent mammals and 20 per cent reptiles/amphibians) commonly occur in these formations. Most of these species occur in other formations in the survey area, but the open forests are particularly important because of the relatively large area they cover. The chances of maintaining viable populations of many of the vertebrate species now occurring in southwestern Victoria will be enhanced if the areas of low open and open forest in the Grampians remain large. Uncommon species, such as Powerful and Barking Owls, have recently been recorded in the open forests of the Grampians. The forests also support the largest western Victorian populations of such species as Gang-gang Cockatoo and Koala and the low open forests contain large numbers of Scaly Thrushes and New Holland Honeyeaters.

At present this region is a popular recreation and tourist area which will probably become even more important in the future.

Recreation and tourism presently is compatible with flora and fauna conservation. However, as the number of people involved in such activities increases, conflicts between recreation and conservation will appear, particularly in local areas where concentrations of people occur because of easy access, scenic qualities, picnic facilities and presence of wildlife. We also suggest that the formulation of wildlife management policies for this Crown Land should take into account the importance of mature or overmature trees for those species requiring nest hollows and dens. Their precise requirements should be the subject of more detailed studies.

The Grampians Region contains the most extensive and scenic sandstone mountain ranges, including numerous cliffs and caves, in western Victoria. Thousands of tourists visit the Grampians each year partly because of the spectacular scenery and panoramic views provided by these mountain ranges. However, these ranges are also the habitat of the only known Brush-tailed Rock Wallaby colony remaining in western Victoria and they support a large breeding population of Peregrine Falcons. Both these species have been proposed for proclamation as Notable Species under the Wildlife Act 1976; the wallaby because of its serious decline in this State since 1900 and the falcon because of its decline in the northern hemisphere and fears that the local population may suffer a similar decline. Management authorities should avoid constructing roads, carparks, camp sites, picnic areas, nature walks etc. in areas which are important to these two species. Other species which occur in these rock communities include Nankeen Kestrel, Welcome Swallow, Eastern Pigmy Possum, some bats, Marbled Gecko and Black Rock Skink.

The few small scattered areas of tall open forest in the Grampians Region are important as the western limit of this habitat type in Victoria. The largest area of tall open forest in the Grampians Region occurs along Dairy Creek near Silverband Falls. Although we recorded only about 30 species of wildlife occurring in this habitat, it is important in supporting either migrants or relatively large populations of at least five of these species (Rufous Fantail, Satin Flycatcher, Crescent Honeyeater, Smokey Mouse and Coventry's Skink).

Two pine plantations (east of Wartook Reservoir and at Billywing) have been established in the Grampians Region by the Forests Commission of Victoria. Our survey did not include a census of vertebrate animals in these plantations, so we cannot compare their density or diversity with those of the adjacent native forests. However, a recent survey of birds in pine and native forests in New South Wales showed 'that the loss of diversity of species and actual numbers of individuals is very great when native forest is removed for pines' (Disney and Stokes 1976). We strongly recommend that careful consideration be given to the effects on native fauna before further expansion of existing pine plantations or establishing new plantations in the Grampians Region.

The main aquatic habitats in the Grampians Region are man-made reservoirs (e.g. Rocklands Reservoir, Moora Moora Reservoir, Wartook Reservoir, Lake Bellfield) and permanent fast-flowing streams and canals. There are also a few permanent swamps in the plains adjacent to the Grampians Ranges (e.g. Bryans, Marneys, Bradys) as well as some short portions of slow-flowing creeks and rivers (e.g. Green Creek and the upper reaches of the Wannon and Glenelg Rivers) (Plate 20, Fig. 3).

The reservoirs and slow-flowing rivers provide a large area of habitat for fishes. During our recent surveys seven Dwarf Galaxiids were found in Green Creek, a slow-flowing stream with a silt or mud bottom at an altitude of about 200 m. The only other records of this species from eastern Australia come from a few other areas in southwestern Victoria (Frankenberg 1969; Chessman and Williams 1974) and from restricted localities around Western Port. Therefore, Green Creek presents an excellent opportunity for preservation of a population of this little known species. Also another native species, the Pigmy Perch, is common in slow-flowing streams around the Grampians. Other fish species include Redfin, Brown and Rainbow Trout, Tench and Carp. The importance of these reservoirs and slow-flowing streams to the avifauna is not well known, but they prob-

ably provide refuge for many waterbirds during droughts. Aquatic mammals, such as the Platypus and Eastern Water Rat, and reptiles, such as the Long-necked Tortoise, also occur in some of these waters.

The permanent fast-flowing streams and canals in the Grampians Ranges support a fish fauna which is, as yet, relatively undisturbed. At present Blackfish and the Ornate Mountain Galaxiid inhabit some of these streams, but the effects of habitat alteration or competition with introduced species on populations of these two native species should be examined. Many species of mammals, birds, reptiles and amphibians depend on these permanent streams for water when other temporary sources have dried up. Therefore any water management plans for this part of Victoria should take into account the need to maintain adequate stream flows and standing water suitable for wildlife throughout the year.

Bryans Swamp, a shallow but relatively persistent body of water, is a State Faunal Reserve in the Grampians Region. It was surveyed on three occasions during 1974 and 1975, and 19 species of birds were recorded. Changes in the species composition of the avifauna appeared to be related to seasonal variations in water level. The avifauna on this swamp also appears to be highly variable between years, and as many as 500 White-necked Herons and 1000 White-faced Herons as well as Royal Spoonbills, Glossy Ibis, and Whiskered Terns have been reported (Mitchell 1973).

Wildlife values of the Ararat Region. Most of the land in this region has been cleared and is in private ownership. The few small remaining areas of Crown Land are either woodland (Plate 20, Fig. 4) or open forest. All these areas are valuable because, as Parsons *et al.* (1972) point out, 'very little is known of the ecology of the Grampians Plains and the destruction of the last remnants of native vegetation would make future study impossible'.

The Crown Land blocks around Lake Lonsdale (e.g. Illawarra, Mokepilly and Lonsdale Blocks in Fig. 1) are predominantly woodlands and are inhabited by a vertebrate fauna which once occurred throughout the plains surrounding the Grampians but which is now restricted to a few isolated Crown Land areas. These woodlands contain many of the 100 (approximately) vertebrate species that occur in similar woodland remnants in the Edenhope and Grampians Regions. Additionally, the Mokepilly Block contains a mixture of open forest and woodland vegetation and consequently has a more diverse fauna than either the woodland areas to the east or the open forest areas to the west. The woodlands of Yellow and Long-leaf Box and Red Stringybark in the Jallukar Block also contain some avian species (e.g. Speckled Warbler, Fuscous Honeyeater, Yellow-tufted Honeyeater, etc.) which attain their largest Victorian populations in the box-ironbark vegetation further east. However, their populations in the Jallukar Block are large relative to the other Crown Land blocks in the Grampians-Edenhope survey area.

The woodlands in the Ararat Region originally supported populations of the Squirrel Glider (Plate 21, Fig. 5), a species uncommon in Victoria. Two records exist for the Ararat Region: 5 km northwest of Stawell in 1970; and at Dadswell Bridge in 1968. This species may still be extant in the Ararat Region, but will require research to determine its status and to enable recommendations to be made on appropriate actions needed to maintain populations of this species in the survey area. The Lace Monitor has also been recorded from the woodlands of the Illawarra Block.

The open forest of Red Stringybark and Long-leaf Box which originally extended into the eastern portion of the survey area is now mainly confined to One Tree Block near Ararat. Most wildlife species which commonly occur in this block are found in the open forests on other blocks of Crown Land in the survey area. However, the floristics of this area differ from those of most other blocks in the survey area and a more detailed fauna survey might reveal subtle differences in species composition of the wildlife.

We endorse the recommendations implicit in the statement by Parsons *et al.* (1972) that 'it is necessary to reserve as many of the surviving remnants of the plains vegetation as possible, to ensure adequate preservation of the unique vegetation of the whole Grampians area'. We

point out that because the vegetation on these areas of Crown Land is different from that in the Grampians Ranges, the vertebrate fauna is also markedly different and further supports the suggestion that these woodland and open forest areas be preserved.

Pastures in the Ararat Region support most of the bird species listed in Table 5. Introduced vertebrate species such as House Sparrow, European Goldfinch, Common Starling, Domestic Pigeon, Rabbit, House Mouse, Fox and Cat, compete with or prey upon many of the native vertebrate species and are undoubtedly responsible for reductions of some populations. The impact that these introduced species have on native vertebrate populations is little known and a study on the interactions between some of these species is required.

In the Ararat Region, the lakes and reservoirs containing permanent or relatively persistent standing water include Alexandra Lake, Dock Lake, Lake Fyans, Green Lake, Lake Lonsdale, Norval Dam, Pine Lake and Taylor Lake. These waters support populations of Blackfish, Redfin, Carp, Tench, Brown and Rainbow Trout and, rarely, Murray Cod (Tunbridge and Rogan 1976). Golden Perch have recently been introduced into Green Lake (Barnham, Fisheries and Wildlife Division, pers. comm.). The few permanent streams (e.g. Fyans Creek, MacKenzie River and Mt William Creek) in this region support a similar fish fauna but probably have few Tench or Murray Cod.

The permanent waters of the reservoirs, streams and some swamps (e.g. Mt. William Swamp) probably provide refuge for many of the species of birds listed in Table 6. Some of the reservoirs still have many dead trees standing around their margins. These trees are important roosting and nesting structures for some parrots and cockatoos (e.g. Musk Lorikeet, Sulphur-crested Cockatoo, Long-billed Corella, Galah, Eastern Rosella, Red-rumped Parrot) and some birds of prey. However, once the trees decay and fall they will not be replaced. Platypus, Eastern Water Rat, Long-necked Tortoise and several species of amphibians are present in some of the permanent waters in the region.

Wildlife values of the Hamilton Region. Because most of this region is now in private ownership, the few remaining areas of Crown Land supporting native vegetation are very important. Before European settlement this region was covered by two main plant formations: woodlands of large trees with grassy undergrowth; and treeless grasslands of the volcanic plains (Fig. 2). The Stones and Mt. Napier Blocks (Fig. 1) were originally relatively small rocky areas of volcanic craters and associated lava flows which supported Manna Gum open forest; these areas were surrounded by deeper soils on which the woodlands grew. The woodlands were replaced by exotic grasses and other crops soon after settlement, and the land was alienated, leaving only the relatively infertile areas (Stones and Mt Napier) in public ownership. Today, although modified by fires and grazing, the vegetation on these two Crown Land areas is still composed of many of the original plant species.

The Stones Block includes both the Stones State Faunal Reserve (5241 ha) and Mt. Eccles National Park (395 ha). The wildlife reserve supports a large assemblage of bird species, most of which occur commonly in other open forest habitats. However, the mammalian fauna is distinctive and few areas, if any, support a ground fauna composed of the Tiger Cat, Brown Antechinus, Swainson's Antechinus, Eastern Grey Kangaroo, and Bush Rat, and an arboreal fauna which probably includes the Koala, Yellow-bellied Glider, Brush-tailed Possum, Sugar Glider and Feather-tailed Glider. The wildlife reserve also supports a large reptile population, and large numbers of Eastern Tiger Snakes have been reported by local residents. The Stones State Wildlife Reserve provides one of the best opportunities to protect and study species such as the Tiger Cat, the Yellow-bellied Glider, and the Eastern Tiger Snake within a small well-defined area of Victoria. Lake Surprise, in the adjacent national park, provides a permanent source of water for the vertebrate animals inhabiting the block, and the cliffs around the lake also provide habitat for some cliff-nesting birds. The Stones Block is important both for fauna conservation and for public recrea-

tion. However, the recreation consists primarily of sight-seeing and picnicking around Lake Surprise and it is doubtful whether the Manna Gum forests would support intensive recreational use without disturbance to some of the more important vertebrate populations. Around the Stones Block there are a few small isolated blocks of Crown Land which should be managed in conjunction with that block. The small blocks contain habitats (e.g. grasslands, marshes) which are not well represented in the present wildlife reserve/national park complex in the Hamilton Region. The vegetation in the Mt. Napier Block appears to have been modified to a greater extent than that in the Stones Block and may not support all the species known from the Stones.

The woodlands, grasslands and heaths which originally covered most of the Hamilton Region have been cleared mainly for pasture and crops. We are uncertain what the vertebrate species compositions of these areas were before settlement by Europeans, but a number of animal populations have probably declined as a result of habitat modification. A detailed historical study of the flora and fauna of this region would be useful in determining future land-use priorities in relation to wildlife populations. At least eight species of animals may be having difficulties in maintaining population numbers in the Hamilton Region; these include four avian species (Brolga, Plains-wanderer (Plate 21, Fig. 6), Long-billed Corella and Grey Butcherbird) and four mammal species (Gunn's Bandicoot, Tuan, Eastern Grey Kangaroo and Red-necked Wallaby). Habitat alteration (e.g. clearing of woodland trees or undergrowth, draining of swamps, grazing and other alterations to the grasslands, clearing of heathlands) is probably responsible for the declining populations of most of these species. Detailed biological and distributional studies, particularly on the Brolga, Plains-wanderer, Gunn's Bandicoot and Tuan, are required to effectively protect the remaining small populations of these species in western Victoria.

The grasslands along the Wannon River and northeast of Hamilton (Fig. 2) were the western limits of an extensive grassland which originally extended eastward almost to Melbourne. In Victoria these grasslands represent the plant formation most drastically reduced as a result of European settlement.

Conservation of the remnants of native woodlands which occur in roadside reserves, on margins of the few larger Crown Land blocks and on freehold land should be encouraged. These small areas should be carefully managed to ensure that enough large trees remain to support populations of nectar-feeding animals, to produce seeds for natural regeneration and to provide holes for nests and shelter.

The narrow strip of heath along the coast was not the subject of a detailed survey. However, the coastal heaths east of the survey area support species such as the Rufous Bristle Bird, Tawny-crowned Honeyeater, Beautiful Firetail, Swamp Antechinus and several species of skinks (Emison *et al.* 1975) and some of these species are probably present along the coastline of the Hamilton Region. We suggest that a specific effort be made to document the vertebrate fauna in this particular habitat.

Many swamps and depressions in the Hamilton Region have been drained. A few of the larger water bodies (e.g. Lake Condah, Buckley Swamp) may occasionally fill to nearly their original capacity, but usually they are either dry or a series of drains and channels. Brolgas and waterfowl still nest in the region, but their wetland habitat has been reduced to relatively small areas. Any Crown Lands with potential for supporting wetland habitat in the region should be retained and managed to perpetuate the presence of surface waters and associated vegetation.

The Eumeralla River flows through pasture land and has both a mud and a gravel bottom. Its upper reaches have been modified into a steep-sided, deep channel by river improvement works. It contains Brown Trout, eels, Tench, Crucian Carp, Tupong and Blackfish. The Shaw River carries a small population of Brown Trout. Lake Yambuk, which is formed by the joining of the Eumeralla and Shaw Rivers, is surrounded by sand dunes and has a sand and mud bottom. Species of fish commonly caught include bream, mullet, salmon and Estuary Perch. Brown Trout which enter

the lake from the Eumeralla and Shaw Rivers are sometimes taken (Tunbridge and Rogan 1976).

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Abbreviations used in the following appendices

AR	Ararat Region
d.b.h.	diameter at breast height
E	east or eastern
ER	Edenhope Region
FWD	Fisheries and Wildlife Division, Victoria
GR	Grampians Region
Herb	herb layer (Appendix 1)
HR	Hamilton Region
km	kilometre
m	metre
mm	millimetre
N	north or northern
NMV	National Museum of Victoria
p.c.	plant community
pers. comm.	personal communication
RAOU	Royal Australasian Ornithologists Union
S	south or southern
Shrub	shrub layer (Appendix 1)
Tree	tree layer (Appendix 1)
Unpub. MS	unpublished manuscript
W	west or western

Appendix 1

Annoted list of plant communities in the Grampians-Edenhope Area of southwestern Victoria. See Appendix 3 for scientific names

1. Heath (White Sallee on sub-alpine sites). Occurrence. Major Mitchell Plateau and Mt. William (rare), GR. Survey Sites. 12/8/74: S side of Major Mitchell Plateau at 1050 m. 20/3/75: SE side of Mt. William at 1120 m. Floristics. Tree: White Sallee. Shrub: Spike Wattle, Coast Banksia, Silver Banksia, Dwarf She-oak, Shiny Tea-tree and Prickly Tea-tree (also see McCann 1961). Herb: tussocks of sedge and grass (mat-rush, Tasman Flax-lily), several Compositae and other forbs. Moss mats are present.

2. Heath (Grampians Gum on moist sub-alpine sites). Occurrence. Mt. William, GR. Survey Sites. 5/11/74 and 22/3/75: summit of Mt. William at 1120 m. Floristics. Tree: Grampians Gum. Shrub: Spike Wattle, Silver Banksia, Coast Banksia, Dwarf She-oak, Prickly Tea-tree, Heath Tea-tree and Shiny Tea-tree. Herb: saw-sedges and many tussocks of short sedges. Moss is present.

3. Heath (Grampians Gum on dry sub-alpine sites). Occurrence. Serra Range, GR. Survey Sites. 21/3/75: W facing slope on Mirranatwa Gap at 460 m. 25/3/75: Serra Range E of Serra Park Homestead. Floristics. Tree: Grampians Gum. Shrub: Silver Banksia, Oyster Bay Pine, Dwarf She-oak, Prickly Tea-tree, Shiny Tea-tree, Common Correa, Common Heath, Pine Heath, Horny Cone-bush, Variable Prickly Grevillea, Flame Grevillea, flat-pea and Leafless Currant-bush. Herb: mainly sedges.

4. Heath. Occurrence. Victoria, Mt. Difficult and Mt. William Ranges, GR. Survey Sites. 12/8/74: W slope of Major Mitchell Plateau at 1080 m. 19/3/75: Mt. Difficult Range at 800 m. 20/3/75: Carters Track, Mt. Difficult Range at 620 m. 22/4/75: Mt. Thackeray and near Castle Rock, Victoria Range at 850 m. Floristics. Tree: Grampians Gum and Brown Stringybark. Shrub: Mountain Hickory Wattle, Spike Wattle, Silver Banksia, Coast Banksia, Veined Beard-heath, Prickly Tea-tree, Grampians Fringe-myrtle, Notched Phebalium, Cross-leaf Honey Myrtle, Wedge-leaf Hop-bush, Rough Coprosma and Hairy Correa. Herb: prostrate sedges, grass tussocks and some low ferns. Moss is present.

5. Open forest (Messmate and Brown Stringybark with a Mountain Hickory Wattle and Veined Beard-heath shrub layer). Occurrence. Uncommon and restricted to high altitudes in the ranges, GR. Survey Sites. 24/4/75: Victoria Range near Mt. Thackeray at 920 m. Floristics. Tree: Messmate and Brown Stringybark. Shrub: Mountain Hickory Wattle, Prickly Tea-tree, Orange Bell-climber, Common Heath, Pine Heath and Veined Beard-heath. Herb: tall tussocks of saw-sedge with a lower layer of grass tussocks, ferns and other forbs.

6. Open forest (Brown Stringybark, Shining Peppermint and heaths). Occurrence. High altitudes in Victoria, Mt. William and Mt. Difficult Ranges, GR. Survey Sites. 14/8/74: Mt. William Range above Stockyard Creek at 600-800 m. 7/9/74: near Wallaby Rocks, head of Sheet of Water Creek, Mt. Difficult Range at 600 m. 9/9/74: head of Hut Creek, Victoria Range at 600 m. Floristics. Tree: Brown Stringybark, Shining Peppermint and Messmate. Shrub: Myrtle Wattle, Mitchell's Wattle, Spike Wattle, Silver Banksia, Coast Banksia, Oyster Bay Pine, Prickly Tea-tree, Heath Tea-tree, Dwarf Hakea, Bushy Needlewood, Furze Hakea, Grampians Fringe-myrtle, Grampians Thryptomene, Common Heath and several other low heath species. Herb: sedge tussocks with an underlayer of moss.

7. Tall open forest (Messmate and Narrow-leaf Wattle). Occurrence. Uncommon and restricted to sheltered areas at high altitudes in the ranges, GR. Survey Sites. 9/9/74: near Hut Creek Junction, Victoria Range at 600 m. 19/3/75: Long Gully, Mt. Difficult Road at 600 m. Floristics. Tree: Messmate. Shrub: Blackwood, Narrow-leaf Wattle, Prickly Moses, Prickly Tea-tree, velvet-bush, Rough Coprosma and a few low heaths. Herb: tussock and prostrate sedges, Austral Bracken, grass and moss.

8. Open forest (Brown Stringybark and stunted Mountain Grey Gum). Occurrence. Sandstone outcrops at high altitudes on Mt. Difficult and Victoria Ranges, GR. Survey Sites. 5/9/74: near Goat Track, Victoria Range at 640 m. 7/9/74: Wallaby Rocks Track, Mt. Difficult Range. Floristics. Tree: Brown Stringybark and Mountain Grey Gum. Shrub: Myrtle Wattle, Spike Wattle, Silver Banksia, Oyster Bay Pine, Prickly Tea-tree, Heath Tea-tree, Grampians Fringe-myrtle, Notched Phebalium, Dwarf Hakea, Furze Hakea, Variable Prickly Grevillea, Pine Heath, Common Heath and several other low heaths. Herb: prostrate sedges, grass tussocks, Austral Bracken and lichens.

9. Open forest (Brown Stringybark and Mountain Grey Gum). Occurrence. High Altitudes in Victoria and Serra Ranges, GR. Survey Sites. 31/10/74: Sawmill Track, Victoria Range at 600 m. Floristics. Tree: Brown Stringybark and Mountain Grey Gum. Shrub: Blackwood, Prickly Moses, Hedge Wattle, spyridium, Hairy Correa, Orange Bell-climber, Golden-tip, Rough Coprosma, Rough Bush-pea, and Love Creeper. Herb: Forest Wire Grass, Austral Bracken and a few other ferns.

10. Open forest (Messmate, Brown Stringybark and Mountain Grey Gum). Occurrence. Uncommon in the ranges, usually on margins of tall open and open forests, GR. Survey Sites. 14/8/74: Stockyard Creek Track, Mt. William Range at 480 m. 9/9/74: head of Hut Creek, Victoria Range at 400 m. Floristics. Tree: Messmate, Brown Stringybark and Mountain Grey Gum. Shrub: Narrow-leaf Wattle, Prickly Moses, Hedge Wattle, Myrtle Wattle, Rough Wattle, Silver Banksia, Dwarf She-oak, Prickly Tea-tree, Yellow Hakea, Dwarf Hakea, Common Correa, Common Heath, Austral Grass-tree, spyridium, Hairy Correa, Rough Bush-pea, Rough Coprosma and Orange Bell-climber. Herb: tussocks of sedges, goodenia and lichens.

11. Tall open forest (Messmate and Mountain Grey Gum). Occurrence. Sheltered gullies in the ranges, GR. Survey Sites. 1/11/74: above Silverband Falls, Serra Range at 450 m. Floristics. Tree: Messmate and Mountain Grey Gum. Shrub: Blackwood, Narrow-leaf Wattle, Hazel Pomaderris, Hairy Correa, Prickly Currant-bush, Rough Coprosma and Victorian Christmas-bush. Herb: saw-sedge tussocks, Austral Bracken, grass, flax-lily, prostrate sedges, moss and several ground ferns.

12. Tall open forest (Mountain Grey Gum). Occurrence. Uncommon and restricted to gullies, GR. Survey Sites. 9/9/74: Happy Track, Victoria Range at 400 m. Floristics. Tree: Mountain Grey Gum. Shrub: Hazel Pomaderris, Blue Howittia, Hairy Correa, Cherry Ballart, spyridium and Rough Coprosma. Herb: saw-sedge tussocks, grass and flax-lily.

13. Open forest (Brown Stringybark). Occurrence. Uncommon and mainly restricted to sheltered scree deposits below Victoria Range, GR. Survey Sites. Happy Track, Victoria Range at 400 m Floristics. Tree: Brown Stringybark. Shrub: Myrtle Wattle, Common Correa, velvet-bush, Love Creeper, Rough Bush-pea and Slender Dodder-laurel. Herb: goodenia, flax-lily, tussocks of grass and saw-sedge.

14. Low open forest (Brown Stringybark and Messmate). Occurrence. Common and widespread in the ranges, GR. Survey Sites. 3/11/74: near Camp of Emus Foot, Victoria Range at 400 m. 29/10/74: Muirfoot Track, Black Range at 400 m. 19/3/75: 6 km N of Halls Gap on Mt. Zero Road at 400 m. 20/3/75: shores of Lake Wartook at 400 m. 10/9/74: junction of Wallaby Rocks and Roses Creek Roads at 440 m. Floristics. Tree: Brown Stringybark and Messmate. Shrub: Myrtle Wattle, Mitchell's Wattle, Spike Wattle, Sallow Wattle, Silver Banksia, Oyster Bay Pine, Dwarf She-oak, Winged Spyridium, Prickly Tea-tree, Woolly Tea-tree, Heath Tea-tree, Fringe-myrtle, three species of hakea, Common Heath, Variable Prickly Grevillea, bitter-pea and Cherry Ballart. Herb: sedge tussocks, Austral Bracken, prostrate sedges and flax-lily.

15. Low open forest (Brown Stringybark and Long-leaf Box). Occurrence. Common around low rock and scree slopes in the Grampians and Black Ranges, GR. Survey Sites. 6/9/74: N end of Black Range at 300 m. 11/9/74: below Asses Ears, Mt. Difficult Range at 380 m. Floristics. Tree: Brown Stringybark and Long-leaf Box. Shrub: Myrtle Wattle, Spreading Wattle, Varnish Wattle, Juniper Wattle, Silver Banksia, Oyster Bay Pine, Dwarf She-oak, Winged Spyridium, Heath Tea-tree, grevilleas, Common Correa, Common Heath, hakeas, Grampians Thryptomene, Cross-leaf Honey-myrtle and several bush-peas. Herb: sedge tussocks, mosses and lichens.

16. Low open forest (Brown Stringybark). Occurrence. Common on lower slopes of outwash sand in and around the mountains and ranges, GR and ER. Survey Sites. 10/9/74: Hines Track S of Mt. Difficult Range at 240 m. 2/11/74: below Asses Ears, Mt. Difficult Range at 300 m. 29/10/74: SW of Mt. Zero at 250 m. 19/3/75: Halls Gap on Mt. Zero Road below Mt. Difficult Range at 260 m. 24/3/75: Mt. Zero at 250 m. 26/3/75: below Red Rock, Victoria Range. 17/4/75: Mt. Arapiles at 250 m. Floristics. Tree: Brown Stringybark. Shrub: 30 species recorded in this association and listed in Appendix 3. Herb: prostrate sedges and annual grasses.

17. Shrubland (Brown Stringybark). Occurrence. Uncommon and restricted to ER where it occurs on the crests of a few high sand ridges. Sur-

vey Sites. 16/4/75 and 19/4/75: Jilpanger Block. Floristics. Tree: Brown Stringybark. Shrub: Desert Banksia, Mitchell's Wattle, Oyster Bay Pine, Dwarf She-oak, Heath Tea-tree, Daphne Heath, Spreading Brachyloma, Rosy Baeckea, Fringe-myrtle and Beaked Hakea. Herb: mainly prostrate sedges.

18. Shrubland (Brown Stringybark). Occurrence. Common on sand sheets, ER. Survey Sites. 6/10/74: Yallakar Block at 200 m. 6/12/74: Kadnook Block. 16/4/75 and 19/4/75: Jilpanger Block. Floristics. Tree: Brown Stringybark. Shrub: Desert Banksia, Oyster Bay Pine, Dwarf She-oak, Common Heath, bush-pea, Fringe-myrtle, Austral Grass-tree and Spike Wattle. Herb: mainly prostrate sedges.

19. Shrubland (Brown Stringybark). Occurrence. Common and restricted to sand sheets, ER. Survey Sites. 3/10/74, 4/10/74 and 5/10/74: Tooan Block at 160 m. 4/12/74: Tallageira Block at 160 m 5/12/74: Morea Block at 160 m 11/12/74: Yallakar Block at 200 m. 19/4/75: Jilpanger Block. Floristics. Tree: Brown Stringybark. Shrub: same as in 18 (above) plus Myrtle Wattle, Spike Wattle, Silver Banksia and Heath Tea-tree. Herb: prostrate sedges, flax-lily, Austral Bracken, clover and mosses.

20. Shrubland (Brown Stringybark). Occurrence. Common and widespread on sand sheets, ER. Survey Sites. 6/10/74: Yallakar Block at 200 m. 8/12/74: Jilpanger Block. Floristics. Tree: Brown Stringybark with Yellow Gum and Manna Gum on some margins. Shrub: Black Wattle, Prickly Tea-tree, Heath Tea-tree, Fringe-myrtle, Silver Banksia, Desert Banksia, beard-heath, bush-pea, Dwarf She-oak and Oyster Bay Pine. Herb: prostrate sedges, Austral Bracken and flax-lily.

21. Low open forest (Long-leaf Box). Occurrence. Uncommon, scattered and restricted to AR and E side of GR except for an isolated occurrence at Mt. Arapiles, ER. Survey Sites. 11/9/74: near Zumsteins below Mt. Difficult Range, GR, at 240 m. 17/4/75: near lookout on Mt. Arapiles, ER, at 300 m. 15/3/75: near Jallukar Block, AR, at 240 m. 15/3/75: One Tree Block, AR, at 400 m. 29/3/75: Black Range S of Stawell, AR, at 400 m. 20/3/75: Pohlners Track near Mt. Zero, GR. 21/4/75: Chinamans Track below Mt. Difficult Range, GR, at 300 m. Floristics. Tree: Long-leaf Box. Shrub: Black Wattle, Hedge Wattle, Wallowa Wattle, Varnish Wattle, Rough Wattle, Sallow Wattle, Juniper Wattle, Golden Wattle, Silver Banksia, Austral Grass-tree, Grampians Thryptomene, Beaked Hakea, Variable-Prickly Grevillea and Cherry Ballart. Herb: a mixture of sedges, forbs and grasses.

22. Open forest (Manna Gum). Occurrence. Restricted to stony rises in the Stones and Mt. Napier Blocks, HR. Survey Sites. 18/2/75: near the Natural Bridge, Stones Block at 240 m. 18/2/75: near Vaughan Buffer, Stones Block at 240 m. 22/2/75: Millard Track, Stones Block at 240 m. Floristics. Tree: Manna Gum. Shrub: Blackwood, Black Wattle, Cherry Ballart, Sweet Bursaria, Tree Lucerne and cassinia. Herb: Austral Bracken, grass tussocks, thistles, maiden-hair fern, clover and lichens.

23. Open forest (Manna Gum). Occurrence. Mainly on uncleared private lands near Halls Gap, GR. Survey Sites. 1/11/74: S of golf course, Halls Gap at 260 m. Floristics. Tree: Manna Gum. Shrub: Blackwood, Black Wattle and Prickly Tea-tree. Herb: Austral Bracken, grass tussocks, mosses and orchids.

24. Woodland (Manna Gum). Occurrence. Restricted to small areas in GR and AR. Survey Sites. 19/3/75: Black Range S of Stawell, AR, at 340 m. 21/4/75: Chinamans Track W of Mt. Difficult Range, GR. Floristics. Tree: Manna Gum (may be a hybrid with Scent-bark). Shrub: Black Wattle, Golden Wattle and Silver Banksia. Herb: a scattered cover of annual grasses.

25. Woodland (Manna Gum). Occurrence. Restricted to a narrow zone between Brown Stringybark and River Red Gum or Yellow Gum on sands, ER. Survey Sites. 2/10/74: W of Bartons Swamp, Toolondo Block at 160 m. 6/10/74: Haylocks Road, Yallakar Block at 180 m. 4/12/74: Tallageira Block at 180 m. 8/12/74: Apsley Common. 5/12/74: Dopewora Block. Floristics. Tree: Manna Gum (possibly a hybrid with Scent-bark). Shrub: Blackwood, Black Wattle, Silver Banksia, Prickly Tea-tree, Daphne Heath and Flame Heath. Herb: scattered annual grasses.

26. Heath (Scent-bark). Occurrence. Extensive on outwash sands in GR, particularly in Victoria Valley and Billywing area. Survey Sites. 19/3/75: Mt. Difficult Track at 500 m. 20/3/75: Coppermine Track near Mt. Zero at 300 m. 22/3/75: Halls Gap rubbish dump near Mokepilly, AR, at 200 m and Cassidy Gap, Serra Range at 300 m 10/9/74: Lodge and Siphon Roads junction, Vic-

toria Valley at 220 m. 2/9/74: Lodge Road, Victoria Valley. Floristics. Tree: Scent-bark (possibly a hybrid with Manna Gum). Shrub: Varnish Wattle, Myrtle Wattle, Wirilda, Hedge Wattle, Sallow Wattle, Rough Wattle, hakeas, Heath Tea-tree, Prickly Tea-tree, Silver Banksia, Flame Heath and Common Heath. Herb: scattered annual grasses and occasionally sedges.

27. Heath (Plate 19, Fig. 2). Occurrence. Common in Victoria Valley and Billywing area, GR. Survey Sites. 3/9/74: Siphon Road, Victoria Valley. 4/9/74: Billywing area. Floristics. Tree: none. Shrub: Silver Banksia, Desert Banksia, Dwarf She-oak, Common Heath, beard-heath, Flame Heath, guinea-flower, Furze Hakea, Common Correa and Broom Spurge. Herb: saw-sedge and rapier-sedge.

28. Open forest (Messmate). Occurrence. SW of Bessiebelle HR. Survey Sites. 20/2/75: SW of Bessiebelle at 100 m. Floristics. Tree: Messmate. Shrub: Blackwood, Black Wattle, Prickly Tea-tree and Sweet Bursaria. Herb: Austral Bracken and grass.

29. Heath (Shining Peppermint). Occurrence. Uncommon, mainly in valleys on SE side of GR. Survey Sites. 12/3/75: near head of Wannon River, GR, at 300-380 m. 22/3/75: rubbish dump E of Halls Gap, AR, at 200 m. Floristics. Tree: Shining Peppermint, Brown Stringybark, Messmate and Scent-bark. Shrub: Varnish Wattle, Silver Banksia, Oyster Bay Pine, Dwarf She-oak, Common Heath, Prickly Tea-tree, Heath Tea-tree, Variable-Prickly Grevillea and Common Correa. Herb: mainly sedges (see Parsons *et al.* 1972).

30. Open forest (Swamp Gum). Occurrence. Widely distributed along margins of gullies in the S portions of GR and HR. Survey Sites. 9/9/74: Hut Gully, Victoria Range, GR. 11/9/74: near Roses Gap below Mt. Difficult Range, GR. 1/11/74: Halls Gap, GR. 20/2/75: S of Bessiebelle, HR. Floristics. Tree: Swamp Gum; this is an ecotonal community which merges into nearly pure Swamp Gum on the wetter margins and into Manna Gum, Brown Stringybark, Scent-bark, Long-leaf Box, Yellow Box, Messmate, Mountain Grey Gum and Shining Peppermint on the drier margins. Shrub: similar to those listed for community 31 (below) with a few additional species from the drier adjacent communities. Herb: Austral Bracken, grass tussocks, mosses and orchids.

31. Open forest (Swamp Gum). Occurrence. Restricted to a few small wet gullies in GR and HR. Survey Sites. 20/2/75: SW of Bessiebelle, HR. 21/3/75: E side of Lake Wartook, GR. 21/3/75: near Cassidy Gap, Serra Range, GR. Floristics. Tree: Swamp Gum. Shrub: Blackwood, Black Wattle, Varnish Wattle, Wirilda, Prickly Moses, Silver Banksia, Dwarf She-oak, Flame Heath, Prickly Tea-tree, Woolly Tea-tree, Heath Tea-tree, Scented Paper-bark and bauera. Herb: Austral Bracken, saw-sedge, grass, moss, goodenia, lichens, prostrate sedges and rapier-sedge.

32. Heath (Scented Paper-bark). Occurrence. Uncommon and restricted to a few gullies in GR, becoming common SW of the Stones Block, HR. Survey Sites. 5/9/74: near Goat Track, Victoria Range, GR, and E side of Lake Wartook, Mt. Difficult Range, GR. Floristics. Tree: a few Scent-barks or Messmates may be present. Shrub: Scented Paper-bark, Swamp Honey-myrtle, Prickly Moses, Silver Banksia, Dwarf She-oak and Prickly Tea-tree. Herb: saw-sedge, prostrate sedges, mosses and lichens.

33. Woodland (River Red Gum) (Plate 19, Fig. 1). Occurrence. Widespread in ER, GR and AR. Survey Sites. 9/9/74: Moora Moora Reservoir, Victoria Valley, GR. 12/9/74: Lodge Road, Victoria Valley, GR. 1/11/74: Halls Gap rubbish dump. Floristics. Tree: River Red Gum. Shrub: Blackwood, Black Wattle, Prickly Moses, Hedge Wattle, Spike Wattle, Varnish Wattle, Golden Wattle, Prickly Tea-tree, Cross-leaf Honey-myrtle, Cherry Ballart and Silver Banksia. Herb: short sedges, broad-leaved forbs, mosses and grasses.

34. Woodland (River Red Gum and myrtles). Occurrence. Mainly on swamp margins (usually freehold) in ER. Survey Sites. 3/10/74: Kallungar Block, ER. 24/3/75: Sheet of Water Creek, Victoria Valley, GR. Floristics. Tree: River Red Gum. Shrub: Prickly Tea-tree, Cross-leaf Honey-myrtle and Scarlet Bottlebrush. Herb: tall sedges, rushes, water milfoil and spike-rush.

35. Heath (Cross-leaf Honey-myrtle). Occurrence. Areas of winter inundation, GR. Survey Sites. Sheet of Water Creek, Victoria Valley, GR. Floristics. Tree: a few River Red Gum. Shrub: Silver Banksia, Prickly Tea-tree, Manuka, Cross-leaf Honey-myrtle, Dwarf Hakea and Yellow Hakea. Herb: grasses, mosses and moisture tolerant forbs.

36. Woodland (River Red Gum with open grass areas underneath) (Plate 20, Fig. 4). Occurrence. Originally covered large areas on the

plains in ER and GR; now mainly cleared. Survey Sites. 2/9/74: near Halls Gap, GR. 8/9/74: near Glenisla Crossing, Victoria Valley, GR. 4/12/74: swamp margin N of Apsley, ER. Floristics. Tree: River Red Gum. Herb: mainly grasses, lilies and other forbs.

37. Woodland and pasture (River Red Gum and annual grasses). Occurrence. River Red Gum woodlands were once widespread and common, now mainly cleared to pastures with scattered trees; common throughout the plains of ER, GR and AR. Survey Sites. 4/9/74: Glenisla-Billywing area, GR, and Mokepilly, AR. 6/12/74: Thompson Creek at Benayeo N of Apsley, ER. 5/12/74: Dopewora Block, ER. Floristics. Tree: River Red Gum. Shrub: a few Bull-oaks. Herb: mainly annual grasses except on gilgaied soils where lilies and sedges predominate.

38. Grassland with River Red Gum fringing the rivers. Occurrence. Natural grassland was not originally extensive in the survey area, occurring only in HR and AR. Grasslands have increased since European settlement. Survey Sites. 19/2/75: along Wannon River and in Wannon Valley near Coleraine, HR. Floristics. Tree: River Red Gum along the rivers. Herb: mainly annual grasses; along rivers Cane Grass and tall forbs are present.

39. Open forest (Candlebark). Occurrence. Rare, seen only in GR. Survey Sites. W of Lake Bellfield at 300 m. Floristics. Tree: Candlebark. Shrub: similar to the list for community 41 (below).

40. Open forest (Red Stringybark). Occurrence. Uncommon in E portion of AR. Survey Sites. 15/3/75: One Tree Hill Block at 420 m. Floristics. Tree: Red Stringybark. Shrub: similar to the list for community 41 (below). Herb: tussocks of grass.

41. Woodland (Yellow Box). Occurrence. Uncommon and restricted to GR and AR. Survey Sites. 9/3/75: SW of Stawell, AR, at 400 m. 21/4/75: Chinamans Track, GR, at 320 m. 15/3/75: Jallukar Block, AR, at 240 m and W of Ararat, AR, at 400 m. Floristics. Tree: Yellow Box, Long-leaf Box and Red Stringybark. Shrub: Blackwood, Black Wattle, Narrow-leaf Wattle, Prickly Moses, Hedge Wattle, Sallow Wattle, Lightwood, Silver Banksia, Oyster Bay Pine, Drooping She-oak, Common Heath, Flame Heath, Cranberry Heath, Prickly Tea-tree and Grampians Thryptomene. Herb: grasses, forbs and mosses.

42. Woodland (Yellow Gum and Yellow Box). Occurrence. Widespread in ER, GR and AR where it fringes Crown Land; much has been cleared. Survey Sites. 6/9/74: 10 km E of Halls Gap in a Crown Land road reserve, AR, at 200 m; H.G.H. Corner, Black Range, GR, at 240 m; and Roses Gap, GR. 11/9/74: Mt. Victory and Asses Ears Roads junction, GR, at 240 m. 3/10/73: Toolondo Block, ER, at 200 m. 1/12/74: Mokepilly Block, AR. 15/3/75: Jallukar Block, AR. Floristics. Tree: Yellow Gum and Yellow Box. Shrub: wattles and a few heath-like species. Herb: short sedges or annual grasses, depending on soil moisture.

43. Woodland (Yellow Gum and wattles). Occurrence. Outwash sands at Mt. Arapiles, ER, probably also present in GR. Survey Sites. 16/4/75: NW side of Mt. Arapiles, ER, at 240 m. Floristics. Tree: Yellow Gum and Yellow Box. Shrub: Golden Wattle, Juniper Wattle, Gold-dust Wattle, Wallowa, Pine Heath, Cranberry Heath, guinea-flower and Heath-myrtle. Herb: annual grasses, short sedges and other forbs.

44. Woodland (Yellow Gum and heaths). Occurrence. Widespread in ER, occurring in small stands on winter-wet clay pans in and around sand sheets. Survey Sites. 5/12/74: Morea Block at 160 m. 7/12/74: Tallageira Block. 22/3/75: Yallakar Block. Floristics. Tree: Yellow Gum and Brown Stringybark. Shrub: Silver Banksia, Flame Heath, Cranberry Heath, guinea-flower, Prickly Tea-tree, Broom Baeckea, Fringe-myrtle, Mallee Honey-myrtle, Violet Honey-myrtle, Moonah, Scarlet Bottlebrush, Desert Hakea, Muntries, Yellow Rice-flower, Cherry Ballart and several species of wattles. Herb: not assessed.

45. Woodland (Yellow Gum and Bull-oak). Occurrence. Uncommon in ER and AR, mainly cleared and now only occurring as remnants on freehold land. Survey Sites. 7/12/74: Thompson Creek along Benayeo Road, ER. 22/3/75: near Mokepilly, AR. Floristics. Tree: Yellow Gum. Shrub: Bull-oak. Herb: annual grasses and a few sedges.

46. Woodland (Grey Box). Occurrence. Originally widespread in the plains of ER and AR, now mainly cleared; a few small stands still fringe some Crown Lands. Survey Sites. 30/10/74: roadside near Lah-arum, AR. 7/12/74: Thompson

Creek at Benayeo N of Apsley, ER. 17/4/75: golf course at Mt. Arapiles, ER. 18/4/75: 2 km S of Horsham, ER. 15/4/75: near Wimmera River E of Horsham, AR. Floristics. Tree: Grey Box, Black Box and Bull-oak. Shrub: Bull-oak and a few species of wattles. Herb: see Connor (1966) for a list of both shrub and herb species.

47. Woodland (Black Box and Bull-oak). Occurrence. Uncommon and restricted to flood plains of the Wimmera River, ER and AR. Survey Sites. 8/8/74: NW of Mt. Arapiles, ER. 15/4/75: Wimmera River E of Horsham, AR. Floristics. Tree: Black Box and Bull-oak. Shrub: Bull-oak. Herb: see Connor (1966) for list.

48. Shrubland (mallee eucalypts). Occurrence. A few small areas of mallee occur between Horsham and the Tooan Block, ER. They are outliers of mallee from the Little Desert and it is suggested that 2 or 3 tongues of mallee once extended S across what is now farmland along ironstone ridges into the Natimuk area (Middleton pers. comm.). Survey Sites. 1/10/74: Tooan Block. 6/10/74: SW of Horsham and E of Noradjuha. 16/4/75: NW slopes of Mt. Arapiles. 17/4/75: flora reserve E of Noradjuha. Floristics. Tree: Kamarooka Mallee, Dumosa Mallee, Yellow Mallee and Peppermint Box. Shrub: Golden Wattle, Gold-dust Wattle, Spiny Wattle, Juniper Wattle, Grey Mulga, Oyster Bay Pine, Flame Heath, Cranberry Heath, hakeas, guinea-flower, Rosy Baeckea, Muntries, Fringe-myrtle, Leafless Bitter-pea, Thorny Bitter-pea, correa, Sweet Bursaria, Cross-leaf Honey-myrtle, Violet Honey-myrtle and Broom Honey-myrtle. Herb: annual grasses, mosses and a few sedges.

49. Woodland (Slender Cypress Pine). Occurrence. Mainly restricted to old lunettes in ER. Survey Sites. 5/10/74: S edge of Crown Land in Kallungar Block. 18/4/75: 4 km S of Horsham. Floristics. Tree: Slender Cypress Pine. Shrub: Flame Heath and Daphne Heath. Herb: annual grasses.

50. Shrubland (Salt Paper-bark). Occurrence. Restricted to the shores of a chain of saline lakes occurring along the E boundaries of the Tooan, Jilpanger and Toolondo Blocks, ER. Survey Sites. 7/10/74: lakeside N of Douglas in Jilpanger Block. Floristics. Tree: Salt Paper-bark. Herb: mainly sedges.

Appendix 2.—Structure of plant communities in the Grampians-Edenhope Area

(a) Shrubland and heath formations

Plant community numbers (see Appendix 1)	1	2	3	4	17	18	19	20	26	27	29	32	35	48	50
Tall shrubs (m)	1·5	—	2	4–10	6–8	4–9	6–8	8–12	6–12	—	3–11	—	—	4–12	8–10
—bole (m)	—	—	—	3	—	1	2	4	4	—	—	—	—	2	0·5
—d.b.h. (m)	0·04	—	—	0·1	0·1	0·1	0·3	0·3	0·9	—	—	—	—	0·1	0·3
—(%)	15	—	35	30	8	15	15	20	25	—	20	—	—	10–40	20
Mid-height shrubs (m)	1	1	1·5	3	1	2	3	1	4	1	4	3	3	4	—
—(%)	30	50	28	30	10	30	30	20	15	55	30	45	60	30	—
Low shrubs (m)	0·3	0·2	—	0·5	0·5	0·4	0·3	0·5	1	0·4	0·4	—	—	0·5	—
—(%)	50	70	—	25	25	40	35	35	8	45	30	—	—	8	—
Herbs (m)	0·4	0·2	—	0·2	0·1	0·1	0·3	0·2	0·3	0·3	0·2	0·2	—	0·2	1
—(%)	50	70	—	25	20	10	36	50	30	20	60	70	—	50	50
Bryophytes (%)	20	20	—	—	—	—	15	80	25	—	—	10	—	80	60
Logs*	—	—	—	—	1	6	16	10	16	—	—	—	—	—	—
Litter depth (mm)	—	2	—	—	4	5	4	5	2	—	—	—	—	—	—
—(%)	—	60	—	—	15	15	15	15	4	—	—	—	—	—	—
Bare ground (%)	20	20	—	—	—	30	15	8	10	5	—	—	—	—	—

(%) = per cent cover
* = number of fallen logs within a 15 x 200 m area

(b) Tall open, open and low open forest formations

Plant Community numbers (see Appendix 1)	5	6	7	8	9	10	11	12	13	14	15	16	21	22	23	28	30	31	39	40
Tree height (m)	25–30	8–24	26–33	10–24	30	25–30	15	26–33	26–33	8–26	6–12	5–10	6–16	14–26	18	18–25	8–25	24	25	15
—bole (m)	20	9	20	5	20	13	7	18	20	16	5	0·4	—	15	15	8	12	—	—	—
—d.b.h. (m)	1·5	0·8	0·4	0·7	1	1·5	1	1	1	1·2	0·7	0·2	—	0·5	0·5	0·8	1	—	—	—
—hollows†	—	5	—	—	—	20	60	—	—	10	8	10	—	6	5	16	10	—	—	—
—(%)	45	35	50	50	35	50	35	55	55	25	30	25	25	25	30	40	30	35	35	25
Tall shrubs (m)	3	2	4	4	6	3	4	3	—	3	4	5	2	4	5	6	5	3	7	—
—(%)	15	35	20	20	2	45	50	60	—	25	40	10	15	10	5	20	5	35	25	—
Low shrubs (m)	1	1	1	—	1·5	1	1	—	1	1	1	1	0·4	0·4	1·5	—	2	0·5	—	1
—(%)	20	45	40	—	40	25	35	—	60	25	35	15	25	60	10	—	40	100	—	15
Herbs (m)	0·8	0·3	—	—	—	—	0·3	0·4	0·4	0·3	0·2	0·2	0·2	0·4	0·4	0·5	0·5	1	0·1	0·2
—(%)	70	30	—	—	—	—	5	70	70	60	15	25	90	70	70	80	60	95	45	100
Bryophytes (%)	—	—	70	—	40	50	95	—	—	25	—	30	—	10	10	—	—	30	—	—

Logs*	—	5	—	16	16	5	20	16	16	5	16	8	—	12	12	12	8	—	—	—
Litter depth (mm)	—	4	—	4	5	1	2	2	1	1	4	5	—	5	5	5	8	5	—	—
—(%)	—	25	—	30	80	40	70	40	40	40	28	15	—	15	15	20	30	30	—	—
Bare ground (%)	—	—	—	—	—	—	5	—	—	—	—	30	—	15	15	—	—	—	—	—

(%) = per cent cover
* = number of fallen logs within a 15 x 200 m area
† = per cent of trees containing hollows

(c) Woodland formation

Plant community numbers (see Appendix 1)	24	25	33	34	36	37	41	42	43	44	45	46	47	49
Tree height (m)	14	7–18	14–24	12–15	12–26	10–20	10–15	10–14	10–14	10–16	14–19	12–16	11–13	8–12
—bole (m)	—	5	12	—	6	—	—	8	6	—	—	2	—	0·1
—d.b.h. (m)	—	0·5	1·5	—	1·5	1	—	7	0·3	—	—	0·3	—	0·3
—hollows†	—	7	6	—	4	6	—	25	—	—	—	—	—	—
—(%)	20	30	28	15	20	25	18	22	15	25	25	30	9	45
Tall shrubs (m)	4	4	5	2	—	7	4	3	1	2	7	3	10	—
—(%)	6	15	10	70	—	10	—	10	12	50	10	5	30	—
Low shrubs (m)	—	1	1	—	—	—	1	—	0·3	0·2	—	—	—	0·5
—(%)	—	30	8	—	—	—	—	—	10	25	—	—	—	15
Herbs (m)	0·4	0·4	0·2	—	0·3	0·1	0·2	0·2	0·2	—	—	0·3	0·1	—
—(%)	40	40	12	—	50	20	70	65	90	—	—	80	75	—
Bryophytes (%)	—	40	85	—	95	20	—	90	—	—	15	10	—	5
Logs*	—	15	8	—	5	9	—	4	2	—	—	4	—	—
Litter depth (mm)	—	—	5	—	—	—	—	1	—	—	—	—	—	—
—(%)	—	4	25	—	30	—	—	10	—	—	—	15	—	—
Bare ground (%)	—	15	—	—	—	—	—	6	—	—	—	—	—	—

(%) = per cent cover
* = number of fallen logs within a 15 x 200 m area
† = per cent of trees containing hollows

Appendix 3.—Plant species list

Common name	Scientific name	Plant community numbers (see Appendix 1)
Annual Veldt Grass	*Ehrharta longiflora*	
Austral Bracken	*Pteridium esculentum*	
Austral Grass-tree	*Xanthorrhoea australis*	4, 6, 7, 10, 14–19, 21, 26
Australian Clematis	*Clematis aristata*	1, 9, 11, 13
Australian Dusty Miller	*Spyridium parvifolium*	
Australian Indigo	*Indigofera australis*	
Beaked Hakea	*Hakea rostrata*	14–18, 21
Bitter-pea	*Daviesia mimosoides*	
Black-anther Flax-lily	*Dianella revoluta*	
Black Box	*Eucalyptus largiflorens*	47
Black Rapier-sedge	*Lepidosperma carphoides*	
Black Wattle	*Acacia mearnsii*	14, 16, 20–26, 28, 30, 31, 33, 39–41
Blackwood	*Acacia melanoxylon*	7, 9, 11, 22, 23, 25, 28, 30, 33, 39–41
Blue Boronia	*Boronia caerulescens*	
Blue Howittia	*Howittia trilocularis*	12
Blue Stars	*Chamaescilla corymbosa*	
Blue Tinsel-lily	*Calectasia cyanea*	
Bonesced	*Chrysanthemoides monilifera*	
Broom Baeckea	*Baeckea behrii*	21, 44, 48
Broom Honey-myrtle	*Melaleuca uncinata*	48
Broom Spurge	*Amperea xiphoclada*	1, 21, 27, 29
Brown Stringybark	*Encalyptus baxteri*	4–5, 7–10, 13–20
Bull-oak	*Casuarina luehmannii*	16, 37, 38, 42, 45, 46
Bundled Guinea-flower	*Hibbertia fasciculata*	14–16, 18–20, 25, 26, 27, 29, 33, 43
Bush Heath	*Brachyloma ericoides*	15, 18
Bushy Needlewood	*Hakea sericea*	
Bush-pea	*Pultenaea benthamii*	3, 11
Bush-pea	*Pultenaea costata*	5
Bush-pea	*Pultenaea d'altonii*	3
Bush-pea	*Pultenaea hibbertioides*	17, 18, 26
Bush-pea	*Pultenaea humilis*	16
Bush-pea	*Pultenaea laxiflora*	16, 43
Bush-pea	*Pultenaea prolifera*	16, 27
Bush-pea	*Pultenaea prostrata*	
Button-grass	*Gymnoschoenus sphaerocephalus*	
Candlebark	*Eucalyptus rubida*	39
Cassinia	*Cassinia* sp.	4
Cherry Ballart	*Exocarpos cupressiformis*	12, 14, 16, 21, 22, 26, 33, 44
Chocolate Lily	*Dichopogon strictus*	
Cleland's Beard-heath	*Leucopogon clelandii*	
Clustered Everlasting	*Helichrysum semipapposum*	
Coarse Dodder-laurel	*Cassytha melantha*	
Coarse Twine-rush	*Leptocarpus brownii*	
Coast Banksia	*Banksia integrifolia*	1, 2, 6
Coast Saw-sedge	*Gahnia trifida*	
Coast Swainson-pea	*Swainsona lessertiifolia*	
Common Beard-heath	*Leucopogon virgatus*	15–20, 25, 27, 29
Common Billy-buttons	*Craspedia glauca*	
Common Correa	*Correa reflexa*	1–3, 6–8, 10, 13–16, 18, 19, 20, 26, 27, 29

Common name	Scientific name	Plant community numbers (see Appendix 1)
Common Heath	*Epacris impressa*	1–3, 5, 6, 8, 10, 13–16, 18–20, 26, 27, 29, 39–41
Common Hovea	*Hovea heterophylla*	8, 11, 12, 14–16, 27
Common Rapier-sedge	*Lepidosperma filiforme*	
Cootamundra Wattle	*Acacia baileyana*	20
Cranberry Heath	*Astroloma humifusum*	16, 20–21, 25, 26, 33, 39–41, 43, 44, 48
Cross-leaf Honey-myrtle	*Melaleuca decussata*	4, 15, 33–35, 48
Dagger Hakea	*Hakea teretifolia*	
Daisy-bush	*Olearia erubescens*	
Daphne Heath	*Brachyloma daphnoides*	14, 16–21, 26
Desert Banksia	*Banksia ornata*	16–20, 27
Downy Dodder-laurel	*Cassytha pubescens*	
Desert Hakea	*Hakea muellerana*	44
Drooping She-oak	*Casuarina stricta*	21, 39–41
Dumosa Mallee	*Eucalyptus dumosa*	48
Dwarf Geebung	*Persoonia chamaepeuce*	
Dwarf Hakea	*Hakea rugosa*	3, 6, 8, 10, 15, 20, 35, 42
Dwarf She-oak	*Casuarina pusilla*	1–3, 10, 14–20, 26–27, 29, 31, 32
Early Black Wattle	*Acacia decurrens*	
Erect Guinea-flower	*Hibbertia stricta*	
Eutaxia	*Eutaxia microphylla*	44
Fairy Wax-flower	*Eriostemon verrucosus*	
Flame Grevillea	*Grevillea dimorpha*	3
Flame Heath	*Astroloma conostephioides*	6, 14–21, 25–27, 31, 39–41, 43, 44, 48
Flat Cord-rush	*Restio complanatus*	
Forest Wire Grass	*Tetrarrhena juncea*	9
Fringed Everlasting	*Helichrysum baxteri*	
Fringe-myrtle	*Calytrix tetragona*	4, 14, 16–21, 44, 48
Furze Hakea	*Hakea ulicina*	6, 8, 14, 18, 20, 27
Gold-dust Wattle	*Acacia acinacea*	42, 43, 46, 48
Golden Heath	*Styphelia adscendens*	6, 8, 17, 18, 25, 26, 27, 31
Golden Pennants	*Loudonia behrii*	
Golden Spray	*Viminaria juncea*	
Golden-tip	*Goodia lotifolia*	
Golden Wattle	*Acacia pycnantha*	16, 21, 33, 39–41, 44, 48
Gorse Bitter-pea	*Daviesia ulicifolia*	13, 14, 16, 17, 20
Grampians Fringe-myrtle	*Calytrix sullivanii*	1, 4, 6
Grampians Grevillea	*Grevillea confertifolia*	
Grampians Guinea-flower	*Hibbertia humifusa*	
Grampians Gum	*Eucalyptus alpina*	2–4
Grampians Parrot-pea	*Dillwynia oreodoxa*	
Grampians Thryptomene	*Thryptomene calycina*	6, 15, 16, 21, 26, 39–41
Grey Box	*Eucalyptus microcarpa*	46
Grey Everlasting	*Helichrysum obcordatum*	
Grey Mulga	*Acacia brachybotrya*	44, 48
Guinea-flower	*Hibbertia cistiflora*	17
Guinea-flower	*Hibbertia obtusifolia*	48
Guinea-flower	*Hibbertia procumbens*	
Guinea-flower	*Hibbertia virgata*	16, 18–20, 25–27, 44
Hairy Boronia	*Boronia pilosa*	
Hairy Correa	*Correa aemula*	4, 9–12, 14
Hairy Geebung	*Persoonia rigida*	14, 15, 17–20

Common name	Scientific name	Plant community numbers (see Appendix 1)
Hairy Mint-bush	*Prostanthera hirtula*	
Harc's-tail	*Lagurus ovatus*	
Harlequin-flowcr	*Sparaxis grandiflora*	
Hazel Pomaderris	*Pomaderris aspera*	11, 12
Heath-myrtle	*Micromyrtus ciliata*	16, 26, 43, 48
Heath Spyridium	*Spyridium eriocephalum*	11
Heath Tea-tree	*Leptospermum myrsinoides*	1, 2, 6, 14–20, 26, 29, 31, 32
Hedge Wattle	*Acacia armata*	9, 10, 21, 26, 33, 39–41, 44
Holly Grevillea	*Grevillea ilicifolia*	
Hooked Needlewood	*Hakea vittata*	
Hop Bitter-pea	*Daviesia latifolia*	
Hop Wattle	*Acacia stricta*	
Horny Cone-bush	*Isopogon ceratophyllus*	3, 6, 8, 10, 14–20, 26, 27, 29, 31
Ivy Flat-pea	*Platylobium triangulare*	3
Juniper Wattle	*Acacia ulicifolia*	15, 16, 21, 43, 48
Kamarooka Mallee	*Eucalyptus froggattii*	48
Lance Beard-heath	*Leucopogon lanceolatus*	
Large-leaf Ray-flower	*Anthocercis frondosa*	
Lavender Grevillea	*Grevillea lavandulacea*	15
Leafless Bitter-pea	*Daviesia brevifolia*	8, 14–18, 26, 48
Leafless Currant-bush	*Leptomeria aphylla*	3, 8, 14, 15, 17, 18
Lightwood	*Acacia implexa*	
Long-leaf Box	*Eucalyptus goniocalyx*	15, 21
Love Creeper	*Comesperma volubile*	8, 10, 13, 16
Mallee Honey-myrtle	*Melaleuca neglecta*	
Manna Gum	*Eucalyptus viminalis*	22–26
Manuka	*Leptospermum scoparium*	35
Matted Bush-pea	*Pultenaea pedunculata*	15, 16
Messmate Stringybark	*Eucalyptus obliqua*	5, 7, 10, 11, 14, 28
Mistletoes	*Amyema* sp.	
Mitchell's Wattle	*Acacia mitchellii*	6, 14, 17, 18
Moonah	*Melaleuca lanceolata*	4, 44
Mountain Correa	*Correa lawrenciana*	
Mountain Grevillea	*Grevillea alpina*	
Mountain Grey Gum	*Eucalyptus cypellocarpa*	8–12
Mountain Hickory Wattle	*Acacia obliquinervia*	4, 5
Mountain Pepper	*Drimys lanceolata*	5, 6, 8, 10, 13–16, 18–20
Mountain Tea-tree	*Leptospermum grandifolium*	
Mt. Byron Bush-pea	*Pultenaea patellifolia*	15, 16
Muntries	*Kunzea pomifera*	48
Myrtle Wattle	*Acacia myrtifolia*	6, 8, 10, 13–16, 19, 28
Narrow-leaf Bitter-pea	*Daviesia virgata*	15, 20
Narrow-leaf Trymalium	*Trymalium d'altonii*	
Narrow-leaf Wattle	*Acacia mucronata*	7, 10, 11, 39–41
Notched Phebalium	*Phebalium bilobum*	1, 4, 5
Onion-grass	*Romulca rosea*	
Orange Bell-climber	*Marianthus bignoniaceus*	5, 9, 10
Oyster Bay Pine	*Callitris rhomboidea*	2, 4, 6, 8, 14–20, 29, 39–41, 48
Pale-fruit Ballart	*Exocarpos strictus*	44
Pale Turpentine Bush	*Beyeria leschenaultii*	16, 21
Pale Rush	*Juncus pallidus*	
Peach Heath	*Lissanthe strigosa*	

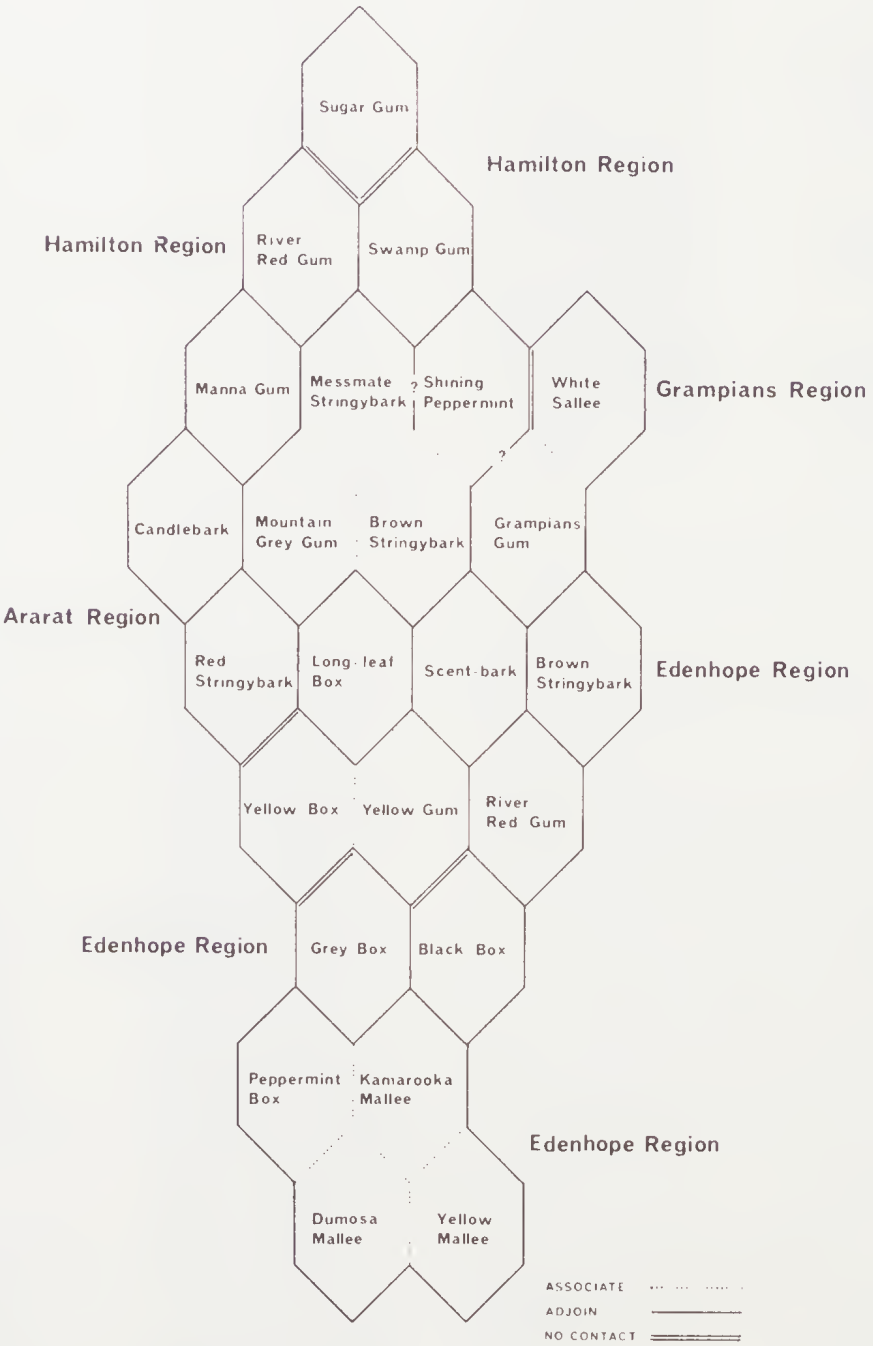
Common name	Scientific name	Plant community numbers (see Appendix 1)
Peppermint Box	*Eucalyptus odorata*	48
Pine Heath	*Astroloma pinifolium*	1, 4, 5, 7, 8, 15, 16, 19, 21, 26
Pink Beard-heath	*Leucopogon ericoides*	10, 16
Pink-bells	*Tetratheca ciliata*	5, 8, 10, 13–15, 18–20, 26
Pink Swamp-heath	*Sprengelia incarnata*	1
Ploughshare Wattle	*Acacia gunnii*	
Prickly Bush-pea	*Pultenaea juniperina*	
Prickly Cryptandra	*Cryptandra tomentosa*	27
Prickly Currant-bush	*Coprosma quadrifida*	11
Prickly Geebung	*Persoonia juniperina*	8
Prickly Moses	*Acacia verticillata*	7, 9, 10, 14, 26, 28, 29, 31, 32, 33, 39–41
Prickly Starwort	*Stellaria pungens*	
Prickly Tea-tree	*Leptospermum juniperinum*	1–8, 10, 14, 16, 20, 23, 25–26, 28–35, 44
Purple Coral-pea	*Hardenbergia violacea*	
Purple Eyebright	*Euphrasia collina*	
Red-fruit Saw-sedge	*Gahnia sieberiana*	
Red Parrot-pea	*Dillwynia hispida*	
Red Stringybark	*Eucalyptus macrorhyncha*	40
River Bottlebrush	*Callistemon paludosus*	
River Red Gum	*Eucalyptus camaldulensis*	33–38
River Tea-tree	*Leptospermum obovatum*	30
Rock Correa	*Correa glabra*	1, 2
Rosemary Grevillea	*Grevillea rosmarinifolia*	
Rosy Baeckea	*Baeckea ramosissima*	17, 18, 48
Rough Bush-pea	*Pultenaea scabra*	8, 9, 10, 13, 14
Rough Coprosma	*Coprosma hirtella*	4, 7, 9–12
Rough Mint-bush	*Prostanthera denticulata*	
Rough Star-hair	*Astrotricha asperifolia*	
Rough Wattle	*Acacia aspera*	10, 21, 26
Round-leaf Mint-bush	*Prostanthera rotundifolia*	
Round Templetonia	*Templetonia egena*	27, 32
Ruddy Beard-heath	*Leucopogon rufus*	1, 6, 17, 20
Rust Bush-pea	*Pultenaea hispidula*	
Rusty-pods	*Hovea longifolia*	
Sallow Wattle	*Acacia longifolia*	14, 16, 21, 24, 26, 49–52
Salt Paper-bark	*Melaleuca halmaturorum*	50
Saw-sedge	*Gahnia* sp.	
Scarlet Bottlebrush	*Callistemon macropunctatus*	34, 44
Scarlet Coral-pea	*Kennedia prostrata*	15, 16, 18-20
Scent-bark	*Eucalyptus aromaphloia*	24-26, 29
Scented Paper-bark	*Melaleuca squarrosa*	31, 32
Scrambling Lily	*Geitonoplesium cymosum*	
Scrubby Velvet-bush	*Lasiopetalum dasyphyllum*	6, 7
Shrub Violet	*Hybanthus floribundus*	
Shining Peppermint	*Eucalyptus nitida*	3, 6, 14, 29
Shiny Tea-tree	*Leptospermum nitidum*	1–4
Short Purple-flag	*Patersonia fragilis*	
Showy Bauera	*Bauera sessiliflora*	11, 31
Showy Parrot-pea	*Dillwynia sericea*	14
Silky Guinea-flower	*Hibbertia sericea*	15–21, 25, 48

Common name	Scientific name	Plant community numbers (see Appendix 1)
Silver Banksia	*Banksia marginata*	1, 4, 6, 8, 10, 14–16, 18–21, 24–27, 29–33, 35, 39–41, 44
Silver Daisy	*Celmisia asteliifolia*	1
Silver Wattle	*Acacia dealbata*	
Slender Bog-rush	*Schoenus tenuissimus*	
Slender Cypress Pine	*Callitris preissii*	49
Slender Dodder-laurel	*Cassytha glabella*	4, 6, 13–20, 26
Slender Honey-myrtle	*Melaleuca gibbosa*	
Slender Hop-bush	*Dodonaea angustissima*	21
Slender Mint-bush	*Prostanthera saxicola*	
Slender Rice-flower	*Pimelea linifolia*	
Slender Saw-sedge	*Gahnia microstachya*	
Slender Smoke-bush	*Conospermum patens*	14, 16–19, 26
Slender Twine-rush	*Leptocarpus tenax*	
Slender Velvet-bush	*Lasiopetalum baueri*	6, 10, 13, 44, 48
Small-flower Grevillea	*Grevillea parviflora*	
Small-fruit Hakea	*Hakea microcarpa*	
Small Grass-tree	*Xanthorrhoea minor*	20, 25
Small-leaved Clematis	*Clematis microphylla*	16, 19, 22
Smooth Tea-tree	*Leptospermum glabrescens*	
Snow Myrtle	*Calytrix alpestris*	
Spike Wattle	*Acacia oxycedrus*	1, 2, 4, 6, 8, 13, 14, 19, 26, 31
Spiny Mint-bush	*Prostanthera spinosa*	
Spiny Wattle	*Acacia spinescens*	14, 48
Spreading Brachyloma	*Brachyloma depressum*	14–21, 33
Spreading Wattle	*Acacia diffusa*	15
Sugar Gum	*Eucalyptus cladocalyx*	37
Swamp Club-moss	*Selageinella uliginosa*	
Swamp Gum	*Eucalyptus ovata*	30, 31
Swamp Honey-myrtle	*Melaleuca squamea*	44
Sweet Apple-berry	*Billardierai cymosa*	
Sweet Bursaria	*Bursaria spinosa*	11, 14, 15, 22, 28, 48
Sweet Quandong	*Santalum acuminatum*	
Tall Rice-flower	*Pimelea ligustrina*	
Tall Sword-sedge	*Lepidosperma elatius*	
Tasman Flax-lily	*Dianella tasmanica*	
Tassel Cord-rush	*Restio tetraphyllus*	
Tassel Rope-bush	*Hypolaena fastigiata*	
Thatch Saw-sedge	*Gahnia radula*	
Thorny Bitter-pea	*Daviesia pectinata*	48
Thyme Beard-heath	*Leucopogon thymifolius*	2, 7, 9, 14, 16
Trailing Ground-berry	*Acrotiche prostrata*	
Tree Everlasting	*Helichrysum dendroideum*	
Tree Lucerne	*Chamaecytisus proliferus*	22, 25
Variable Daisy	*Brachycome ciliaris*	
Variable Prickly Grevillea	*Grevillea aquifolium*	1–3, 6, 8, 14–16, 21, 26, 29
Variable Sword-sedge	*Lepidosperma laterale*	
Varnish Wattle	*Acacia verniciflua*	15, 16, 21, 26, 33
Veined Beard-heath	*Leucopogon neurophyllus*	1, 2, 45
Victorian Christmas-bush	*Prostanthera lasianthos*	11, 31
Victorian Flat-pea	*Platylobium alternifolium*	
Victorian Smoke-bush	*Conospermum mitchellii*	1, 2, 8, 16, 27, 29

Common name	Scientific name	Plant community numbers (see Appendix 1)
Violet Honey-myrtle	*Melaleuca wilsonii*	44, 48
Violet Kunzea	*Kunzea parvifolia*	44
Wallowa	*Acacia calamifolia*	16, 21, 30, 43, 44
Wedge-leaf Hop-bush	*Dodonaea cuneata*	4, 16
Western Golden-tip	*Goodia medicaginea*	
White Sallee	*Eucalyptus pauciflora*	1, 2
Winged Spyridium	*Spyridium vexilliferum*	14, 15
Wirilda	*Acacia retinodes*	14, 16, 26, 31, 33
Wiry Bauera	*Bauera rubioides*	1, 6, 30
Wombat Berry	*Eustrephus latifolius*	
Woolly-style Heath	*Epacris lanuginosa*	
Woolly Tea-tree	*Leptospermum lanigerum*	14, 31, 33, 39–41
Yellow Box	*Eucalyptus melliodora*	41, 42
Yellow Gum	*Eucalyptus leucoxylon*	42–45
Yellow Hakea	*Hakea nodosa*	10, 35
Yellow Mallee	*Eucalyptus incrassata*	48
Yellow Rice-flower	*Pimelea flava*	44
Zieria	*Zieria*	

Appendix 4.

Relationships between the species of *Eucalyptus* occurring in the Grampians- Edenhope Area



Appendix 5.
Annotated list of birds from the Grampians-Edenhope Area of southwestern Victoria

DROMAIIDAE (EMU)

Dromaius novaehollandiae. Emu.

Abundance and distribution. Common and restricted in ER, GR and AR; not seen in HR. Flocks containing 50 birds were seen occasionally; However, most sightings were of family groups. Habitat. Mainly pasture lands bordering woodland and open forest, particularly in GR. Occasional flocks were also in some Crown Land areas covered by woodland, shrubland, open forest and heath. It appears that the mosaic pattern of woodland or open forest surrounded by pasture land which occurs in the N portion of the survey area is conducive to the continued success of this species in the area. Breeding. Between October and December 1974 the total number of young counted in six family groups ranged from 3 to 8 and averaged 4·5 young. On 28 July 1957 a nest with eight eggs was found near Mt. Zero, GR, in an area of Brown Stringybark with heath undergrowth (Binns 1957).

PODICIPEDIDAE (GREBES)

Podiceps cristatus. Great Crested Grebe.

Abundance and distribution. Rare. Recorded in ER near the Mt. Arapiles Block, on Jaka Lake and on Lake Wallace; in GR near Dunkeld; and in AR at Lake Fyans. Habitat. Permanent freshwater lakes and reservoirs with areas of open deep water. Breeding. Eggs were found at Lake Wallacc, ER, in late December 1972 (Mitchell 1973; McCulloch 1973).

Podiceps poliocephalus. Hoary-headed Grebe.

Abundance and distribution. Uncommon and widespread; usually alone or in small flocks. Habitat. Temporary and permanent freshwater lakes, swamps and flooded pastures; open water areas are favoured. Breeding. A nest containing eggs was in a flooded pasture in ER near the Mt. Arapiles Block in October 1974.

Tachybaptus novaehollandiae. Little Grebe.

Abundance and distribution. Common and widespread in ER and AR; uncommon in GR and HR. Habitat. Temporary and permanent freshwater swamps and lakes. Breeding. A floating nest containing seven eggs was found (3 October 1974) on a pond 7 x 15 m and located betwecn Kallungar and Tooan Blocks in ER. Sedges and River Red Gums were on its margin, but the surrounding area was mainly pasturc.

PELECANIDAE (PELICANS)

Pelecanus conspicillatus. Australian Pelican.

Abundancc and distribution. Uncommon. Rccorded in ER at Toolondo Reservoir; in GR at Rocklands Reservoir, Marncy Swamp and Moora Moora Rescrvoir; and in AR at Lake Lonsdalc. Habitat. Large bodies of decp standing fresh watcr.

ANHINGIDAE (DARTERS)

Anhinga melanogaster. Darter.

Abundance and distribution. Rare. Recorded in GR on Rocklands Reservoir and at Cherrypool. Habitat. Large freshwater lakes and reservoirs. Breeding. A single nest on a horizontal tree branch was found near Rocklands Reservoir in December 1974 (Morris pers. comm.).

PHALACROCORACTIDAE (CORMORANTS)

Phalacrocorax varius. Pied Cormorant.

Abundance and distribution. Rare. Recorded in AR at Lake Lonsdale. Habitat. Large permanent freshwater lakes. Brceding. One pair was nesting at Lake Lonsdale in December 1964 (Wheelcr 1965).

Phalacrocorax melanoleucos. Little Pied Cormorant.

Abundance and distribution. Common and widespread. Habitat. It was present on largc permanent bodies of standing fresh water (e.g. Toolondo and Rocklands Reservoirs, and Lakcs Fyans, Lonsdale and Charlegrark), and farm dams in all regions, on temporary freshwater swamps, on flooded pastures and woodlands particularly in ER, on streams and rivers (c.g. Boggy Creek in GR and the Glenelg Rivcr) and on estuaries (Lake Yambuk at the mouth of the Eumeralla River). Brceding. On 7 December 1974 a nesting colony consisting of at least eight nests was located in the middle of a flooded woodland on the E margin of thc Tallageira Block, ER. The nests were on the branches of River Red Gums and contained well-developed young. Thirty pairs nested in AR on Lake Lonsdale between Dccember 1964 and February 1965 (Wheeler 1965).

Phalacrocorax carbo. Black Cormorant.

Abundance and distribution. Uncommon. Re-

corded in GR at Bryan Swamp, Rocklands Reservoir and near Balmoral; in AR at Lake Lonsdale and near Mokepilly; and in HR at Cavendish. Habitat. Large deep bodies of permanent fresh water; occasionally rivers, temporary swamps and other shallow bodies of water. Breeding. Twenty pairs nested in AR at Lake Lonsdale between December 1964 and February 1965 (Wheeler 1965).

Phalacrocorax sulcirostris. Little Black Cormorant.

Abundance and distribution. Uncommon. Recorded in ER at Lake Connangorach, over flooded woodland near Apsley and at Lake Wallace; in GR at Rocklands Reservoir and near Balmoral; and in AR at Lake Lonsdale. Habitat. Permanent bodies of flowing and standing fresh water. Breeding. Sixty pairs nested in AR at Lake Lonsdale between December 1964 and February 1965 (Wheeler 1965).

ARDEIDAE (HERONS AND BITTERNS)

Ardea pacifica. White-necked Heron.

Abundance and distribution. Uncommon and widespread with local concentrations, particularly in ER and GR. Habitat. Pastures (either flooded or with new plant growth) or shallow margins of swamps and lakes. Breeding. Several nests were in River Red Gums around Barton Swamp, ER, in October 1974. Two nests, each containing at least two well-developed young, were in the Tallageira Block, ER, on 7 December 1974. Both were in the lower branches of River Red Gums standing in the middle of flooded woodlands.

Ardea novaehollandiae. White-faced Heron.

Abundance and distribution. Common and widespread. Habitat. Margins of temporary and permanent freshwater swamps and lakes; pastures (both flooded and those with new plant growth) are favoured foraging areas. Breeding. Nesting recorded in GR (McGarvie pers. comm.).

Ardeola ibis. Cattle Egret.

Abundance and distribution. Rare; recently established in Australia and recorded in GR near Dunkeld in 1962 (Austin 1962a). Recorded in HR near Nareen in 1972 and 1973 (Austin pers. comm.). Habitat. Swamp margins and pastures.

Egretta alba. Large Egret.

Abundance and distribution. Uncommon and widespread with local concentrations during FWD survey in ER at Lake Charlegrark and S of Mt. Arapiles Block; and in GR at Bryan Swamp and in the Wannon River floodplain at SE end of Serra Range. Habitat. Shallow margins of freshwater lakes and swamps and pastures (either flooded or with new plant growth).

Nycticorax caledonicus. Nankeen Night-heron.

Abundance and distribution. Uncommon; recorded in ER at Lake Charlegrark and St. Marys Lake; in GR at Bryan Swamp, Cherrypool and near Balmoral; and in HR near Cavendish. Habitat. Usually in trees on margins of freshwater streams, lakes and swamps.

Botaurus poiciloptilus. Brown Bittern.

Abundance and distribution. Rare; not seen during FWD survey. Recorded N of Mt. Dundas Block in GR in 1956-57 (McGarvie pers. comm.); and in HR at Mt. Eccles in September 1951 (Learmonth 1951). Habitat. Confined to thick reed-beds in swamps, lakes and streams (Wheeler 1967a).

PLATALEIDAE (IBISES AND SPOONBILLS)

Plegadis falcinellus. Glossy Ibis.

Abundance and distribution. Rare; not seen during FWD survey. Recorded in late December 1972, at Lake Natimuk (just N of the ER boundary) and in GR at Bryan Swamp and near Balmoral. Habitat. Margins of rivers and swamps. Breeding. No nesting recorded in the survey area. However, it breeds at Naracoorte, South Australia (Condon 1969), which is about 20 km W of the western boundary of ER. Movements. Condon (1969) indicates that its occurrence depends on rainfall. It is interesting to note that 1972 (when flocks were in the survey area) was an unusually dry year (McCulloch 1973).

Threskiornis molucca. White Ibis.

Abundance and distribution. Uncommon and widespread. Habitat. Margins of freshwater swamps, lakes and rivers (e.g. Bryan Swamp in GR, Lake Lonsdale in AR, the Wannon River in GR, etc.). It forages in pastures. Breeding. Nesting occurred in GR at Bryan Swamp in 1960 and along the Wannon River near Bryan Swamp in 1968; and in HR at Buckley Swamp in 1968 (Cowling unpub. MS). Conservation aspects. The conservation of this species should be encouraged because it feeds upon invertebrate pest species in agricultural areas.

Threskiornis spinicollis. Straw-necked Ibis.

Abundance and distribution. Common and widespread. Flocks in excess of 100 birds were noted in ER between the Konnepra and Jilpanger Blocks and SW of the Toolondo Block; and in AR near Mt. Dryden. Habitat. Margins of freshwater swamps, lakes, rivers and farm ponds. It commonly forages in pastures. Breeding. Nesting occurred in GR on Bryan Swamp in 1960 and along the Wannon River near Bryan Swamp in 1968 (Cowling, unpub. MS). A rookery is also reported in GR on Shannon Swamp near Glenisla (Middleton pers. comm.). Conservation aspects. As for White Ibis (above).

Platalea regia. Royal Spoonbill.

Abundance and distribution. Rare. Recorded in ER near Edenhope; in GR at Bryan Swamp and near Balmoral; and in AR at Lake Lonsdale. Habitat. Margins of swamps, rivers and lakes.

Platalea flavipes. Yellow-billed Spoonbill.

Abundance and distribution. Common and widespread. Habitat. Shallows of freshwater lakes, rivers, swamps and flooded pastures. Breeding. Young were present in GR during late December 1972 (McCulloch 1973). Between 10 and 20 nests were in ER at Boikerbert Swamp (Apsley) in 1972 (Thomas pers. comm.).

ANATIDAE (GEESE, SWANS, DUCKS)

Dendrocygna eytoni. Plumed Tree-duck.

Abundance and distribution. Rare; not observed in FWD survey. Since 1970 we have reports of it in ER at Clear Lake (Middleton pers. comm.) and on Lake Natimuk along the N boundary of the survey area (McQueen pers. comm.). Habitat. Freshwater lakes and swamps. Breeding. Local residents of ER state that it occasionally breeds in the region. However, we were unable to confirm this.

Cygnus atratus. Black Swan.

Abundance and distribution. Common and widespread. Habitat. A wide range of aquatic habitats including saline lakes (e.g. White Lake, ER), freshwater lakes (e.g. Lake Lonsdale, AR), estuaries (e.g. Lake Nambuk, HR), flooded mountain streams in GR, large swamps with dense emergent vegetation (e.g. NW margin of Morea Block in ER) and flooded pastures and woodlands throughout the survey area. Breeding. Adults with broods were first recorded on 13 August and some cygnets were still considerably smaller than the adults in December. Between 13 August and 4 October the young counted in 20 broods averaged 4·9 cygnets per brood (range, 2-8). During late December of the relatively dry year of 1972 young swans were dying of starvation on some of the lakes which were drying up (Mitchell 1973).

Stictonetta naevosa. Freckled Duck.

Abundance and distribution. Rare; not seen in FWD survey. A flock of about 30 was recorded in March-April of 1953 near the E boundary of HR (Shanks 1953). There are few other published records of this species in the vicinity of the survey area. Habitat. The flock was on a small saline lake of about 16 ha.

Cereopsis novaehollandiae. Cape Barren Goose.

Abundance and distribution. Rare; not seen in FWD survey. General sightings have been recorded from ER and AR subsequent to 1970 (Middleton and Thomas pers. comm.). Specific sightings were recorded (Morris pers. comm.) from Lake Kennedy (E boundary of HR) on 11 February 1967 (a flock of 14) and on 3 August 1967 (a flock of 3). A single bird was seen in HR at Nareen in 1970 (Austin pers. comm.) and another was at Branxholme (near W boundary of HR) in July 1975 (Middleton pers. comm.). Habitat. During February of 1967 Morris (pers. comm.) provided the following comments on Lake Kennedy: open water which is surrounded by pasture; the geese can be seen regularly in the NE corner feeding in the vegetation growing over salty ground; the lake will probably dry up later in the year.

Tadorna tadornoides. Mountain Duck.

Abundance and distribution. Common in ER, AR and HR and uncommon in GR; widespread throughout. Large mobile flocks are formed after fledging of young. Habitat. Both open water and margins of fresh to saline lakes and swamps. Pastures with new plant growth or those which are flooded are extensively utilized. Breeding. Broods were seen September through November. Of 18 broods counted in ER, the average number of young in each was 8·9.

Anas superciliosa. Black Duck.

Abundance and distribution. Common and widespread. Habitat. Bodies of standing and flowing fresh water, particularly temporary sedge swamps and flooded or unflooded pastures with new plant growth. Breeding. A nest with 8 eggs was found

on 6 September 1974 in AR. It was on the ground in dense Kangaroo Grass (25 cm tall) in a roadside reserve of Yellow Gum woodland. Adults with ducklings were also noted in ER in early October 1951 (Storr *et al.* 1952).

Anas gibberifrons. Grey Teal.

Abundance and distribution. The most common duck in the survey area and widespread throughout. Groups in excess of 500 birds have been recently recorded in ER near Douglas and on Lake Carchap; and in GR on Rocklands Reservoir. Habitat. Bodies of water ranging from flooded woodlands through seasonal swamps to large lakes and reservoirs. Also flowing waters but usually the slower moving, vegetated portions of streams or rivers were occupied. Breeding. Many broods were seen in ER between early October and early December. Of 11 broods counted, the average number of young in each was 7·2 (range, 6-8).

Anas castanea. Chestnut Teal.

Abundance and distribution. Rare; seen singly or in pairs in ER during FWD survey. Local concentrations are occasionally reported, e.g. Karnak Swamp during early 1974 (Thomas pers. comm.). Habitat. Usually on large bodies of standing water.

Anas rhynchotis. Shoveller.

Abundance and distribution. Uncommon and widespread with local concentrations (e.g. near Goroke, ER, early in 1974) (Thomas pers. comm.). Recorded in ER on Connangorach Swamp, near Goroke, S of Barton Swamp, near the Tooan Block and on Lake Mullancoree; in GR near Balmoral; in AR along the Western Highway (N of Mt. Zero); and on Lake Linlithgow (near E boundary of HR). Habitat. Usually on temporary swamps and flooded pastures in spring and congregating on permanent lakes and swamps in autumn. Breeding. A brood of 14 young was seen in AR on 1 October.

Malacorhynchus membranaceus. Pink-eared Duck.

Abundance and distribution. Uncommon in ER with local concentrations, such as occurred on Karnak Swamp early in 1974 (Thomas pers. comm.). Mitchell (1973) also recorded 50 on Lake Mullancoree during late December 1972. Populations in Victoria fluctuate and largest numbers occur apparently after wet years in inland Australia (Wright pers. comm.). This appeared to be the case in 1965 when large flocks were reported on Lake Linlithgow (near E boundary of HR) during late February-early March (Morris pers. comm.) and in ER on Lake Carchap in late May (Thomas pers. comm.). Habitat. Large bodies of standing water. Breeding. A pair of adults with 2 young were seen on a temporary swamp along the Wimmera Highway W of the Kallungur Block, ER, on 4 October 1974.

Aythya australis. White-eyed Duck.

Abundance and distribution. Uncommon in ER with local concentrations near Goroke and Edenhope in 1974 and near Douglas early in 1975 (Thomas pers. comm.). More than 500 were on Lake Mullancoree in December 1972 (Mitchell 1973). Habitat. Temporary and permanent swamps and lakes.

Chenonetta jubata. Wood Duck.

Abundance and distribution. Common and widespread. Pairs and small flocks, usually of less than 10 birds, were present August through December. After December flocks of more than 100 birds were on bodies of water such as Clear Lake and Toolondo Reservoir in ER; Bryan Swamp and Rocklands Reservoir in GR; Lake Lonsdale, Pine Lake and Lake Taylor in AR; and the Wannon River in HR. Habitat. Flooded pastures and woodlands, seasonal swamps and on farm ponds as well as foraging in unflooded pastures. Large bodies of flowing and standing freshwater were occupied subsequent to nesting. Breeding. Four broods, averaging 7·5 young in each, were seen in ER and AR between October and early December.

Oxyura australis. Blue-billed Duck.

Abundance and distribution. Uncommon in ER; not observed elsewhere. Recorded on Jaka Lake and Lake Wallace. Habitat. Both lakes have large areas of open deep water.

Biziura lobata. Musk Duck.

Abundance and distribution. Uncommon and widespread with local concentrations noted in ER on St. Marys Lake, White Lake and Lake Charlegrark; and in GR on Bryan Swamp and Moora Moora Reservoir. Habitat. Large, deep bodies of standing fresh water; occasionally on rivers and seasonal sedge swamps.

ACCIPITRIDAE (KITES, HAWKS, EAGLES)

Elanus notatus. Black-shouldered Kite.

Abundance and distribution. Uncommon and widespread over the plains of the survey area. In

1952, population numbers were larger than normal in the Coleraine area, HR, and Austin (1953a) indicated that a wide range of habitat was being utilized. Breeding. Nests in trees in pastures of HR (Austin pers. comm.).

Milvus migrans. Black Kite.

Abundance and distribution. Rare; not seen in FWD survey. In 1952 a spectacular increase in numbers occurred in Victoria (Wheeler 1967a). Single birds began arriving in HR around Hamilton-Coleraine in February 1952 and by June had joined into flocks of up to 30 birds (Austin 1953a). Two such flocks occurred between Hamilton and Coleraine where they occupied territory and food with Whistling Kites. Austin (1953a) speculated that an outbreak of myxomatosis, and the consequent large numbers of rabbits killed on the roads, may have been responsible for the increased population of this species. Habitat. Open forest and plains country particularly near habitation (Wheeler 1967a). Feeding. The birds in HR during 1952 were feeding mainly on rabbits killed on roads (Austin 1953a).

Haliastur sphenurus. Whistling Kite.

Abundance and distribution. Common and widespread; usually as solitary or paired birds soaring overhead. Habitat. Semi-cleared pastures. Feeding. Rabbits are reportedly taken in, or near, the survey area (Hill 1907; Austin 1953a). Breeding. A common nesting bird in the survey area; some breeding details are given by Hill (1907a) for the Ararat District (near AR), by D'Ombrain (1905a) for the Casterton District (near the W boundary of HR), and by McCulloch (1973) for GR.

Accipiter fasciatus. Brown Goshawk.

Abundance and distribution. Common in GR, uncommon elsewhere; widespread throughout. Habitat. Open forests; occasionally woodlands, shrublands and roadside trees in pastures. Feeding. Usually this goshawk catches and kills its own food, which consists mainly of vertebrates. However, during an outbreak of myxomatosis in 1952, the goshawk was seen feeding on rabbit carcasses in HR near Coleraine (Austin 1953a). Breeding. Adults with young out of the nest were in GR near Balmoral during late December 1972 (McCulloch 1973).

Accipiter cirrhocephalus. Collared Sparrowhawk.

Abundance and distribution. Rare; recorded in GR along the Glenelg River at Balmoral and S of Rocklands Reservoir. Habitat. The bird near Rocklands Reservoir was in a Yellow Gum/Yellow Box woodland. Feeding. The individual in the woodland unsuccessfully chased a New Holland Honeyeater through the tree canopies.

Haliaeetus leucogaster. White-breasted Sea-eagle.

Abundance and distribution. Rare; not seen in FWD survey. Recorded in ER at Lake Wallace; in GR at Rocklands and Moora Moora Reservoirs; and in AR at Lakes Lonsdale and Fyans. Habitat. Large freshwater lakes.

Aquila audax. Wedge-tailed Eagle.

Abundance and distribution. Common and widespread. The literature indicates that the population of this species in SW Victoria has remained relatively constant during the past 80 years. However, precise information is lacking; this is unfortunate because it would be relatively simple to locate all the nests of this species within a defined area and then to follow the breeding population fluctuations over a long period of time. Habitat. It soars over all habitats, but most commonly over pastures, woodlands and open rock formations. Feeding. Reported feeding on dead rabbits on roads in GR (Mitchell 1973). Breeding. About the turn of this century 10 or 12 pairs were nesting in the Ararat District (just E of AR) (Hill 1907a). Hill indicated that they sometimes nested on dead trees in open, level country, but more often in growing timber on hillsides.

Hieraaetus morphnoides. Little Eagle.

Abundance and distribution. Uncommon and widespread; most sightings during FWD survey were in ER. Habitat. Our sightings were of birds over pastures. However, Austin (1953a) saw five over timbered country. Breeding. Young were in nests in GR near Balmoral in late December 1972 (McCulloch 1973).

Circus assimilis. Spotted Harrier.

Abundance and distribution. Rare and widespread; not seen in FWD survey. Habitat. Grasslands and croplands (Wheeler 1967a).

Circus aeruginosus. Swamp Harrier.

Abundance and distribution. Uncommon and widespread. Habitat. Swamps, lake and river margins, pastures, heathy areas and croplands. Breeding. D'Ombrain (1905a) noted that this species often nested in the middle of a crop in the Casterton District (W boundary of HR), and that

breeding commenced in September. Clutches generally contained three and occasionally five eggs.

FALCONIDAE (FALCONS)

Falco subniger. Black Falcon.

Abundance and distribution. Rare; not seen in FWD survey but population increases occasionally occur. Between April 1951 and June 1952, at least 30 sightings of this species were made by Austin (1953a) in SW Victoria. He usually saw it singly, but on one occasion he did record a pair. Occasionally seen in GR near S end of Victoria Range in 1952-53 (McGarvie pers. comm.). Habitat. Austin (1953a) noted that all birds were in areas with little or no timber, and the only trees used as perches were isolated and dead. The observations by McGarvie were also in cleared areas. Feeding. An Australian Magpie Lark and a Common Skylark were taken (Austin 1953a). He also describes this falcon as hunting above and behind a Swamp Harrier as it flew over long grass.

Falco peregrinus. Peregrine Falcon.

Abundance and distribution. Common in GR and uncommon but with local concentrations elsewhere; widespread throughout. Habitat. Cliff faces which provide protection for nest sites and perching areas. Most cliffs overlooked pastures although a few overlooked open forests and woodlands. Feeding. Skeletal material found in eyries indicates that the introduced Domestic Pigeon is a major food source, but a wide range of other avian species are also taken (e.g. Gang-gang and Sulphur-crested Cockatoos, Crimson Rosellas, Common Starlings, White-faced Herons, cormorants, magpies and Masked Plovers). The location of eyries may influence the types of prey taken. For example, eyries above bodies of water contained remains of more aquatic species than did the eyries overlooking either pastures or open forests. Breeding. Nesting was documented in ER and GR. Copulation was recorded between 3 September and 4 October 1974. We followed the progress of two active eyries through the 1974 nesting season: one eyrie, located in a small recess close to the top of a cliff face, was found on 3 October; it contained three eggs which were being incubated. The nesting platform was level, dirt-covered and about 0·7 x 0·7 m in size. The cliff was near a major road in an area subjected to fairly intensive recreational use; the eyrie was easily accessible by a short climb up the back of the cliff. On 5 October three eggs and an adult were still present, but by 9 October only two eggs were in the eyrie and on 20 October the nest was empty. The second eyrie, located under an overhanging ledge at the base of a sheer cliff, was found on 12 September; it contained two eggs and one adult was present. To reach the eyrie a large, steep, rounded rock had to be climbed; the top of this rock was relatively level and extended to the base of the cliff where the eyrie was situated. The location of the eyrie was near a minor road in an area which, potentially, could be important for recreation. Fortunately, it has only light usage at the present time. On 30 September both eggs were present and two adults were flying over the eyrie. On 10 October both eggs were fractured and the young birds inside were vocalising; two adults were flying overhead. On 29 October, 2 November and 7 November two downy young and one adult were present; both chicks were banded on the last-mentioned visit. Our final inspection of the eyrie was made on 11 December when we observed one adult and two juveniles flying overhead. Conservation aspects. The abundance of this species in the survey area is of particular importance in view of the nearly world-wide population decline of this species (Hickey 1968). Studies initiated now, while this species is still in substantial numbers in Victoria, could assist in preventing similar, local population declines. Obviously, the data presented on the breeding of this species in the survey area suggest that accessible eyries are vulnerable to human interference. Because of the tendency of this falcon to have traditional nesting sites (White 1968) it is essential that management authorities in areas which are, or will be, predominantly recreation-oriented be informed as to eyrie locations. Such information (which should not be made public) would not only allow a discreet surveillance of these sites (to discourage human interference) but, more importantly, would prevent the management authority from constructing roads, car parks, camp sites, picnic areas, nature walks, etc., near documented eyrie sites.

Falco longipennis. Little Falcon.

Abundance and distribution. Rare and widespread. Recorded in ER near North Lake; in GR near Balmoral; and in HR near Coleraine and near Wannon. Habitat. The bird near North Lake was over a pasture adjacent to a large block of Brown Stringybark shrubland. Feeding. We observed it pursuing starlings.

Falco berigora. Brown Falcon.

Abundance and distribution. One of the most abundant raptors throughout the survey area. Usually seen singly or in pairs and only occasionally in threes or fours (family groups?). Habitat. Semi-cleared pasture and crop lands and occasionally woodlands, heathy areas, over swamps and on margins of open forests. Breeding. D'Ombrain (1905a) gave the following information on nests in the Casterton District (W boundary of HR): five nests were found during September 1903, all in River Red Gums. The clutch size was three in every case.

Falco cenchroides. Nankeen Kestrel.

Abundance and distribution. Uncommon and widespread. Usually seen singly, as pairs or, rarely, in groups of up to six birds. Habitat. Semi-cleared pasture and crop lands, woodlands, open forests, heathy areas, rock cliffs and rocky offshore pinnacles. Breeding. D'Ombrain (1905a) noted that this species nested in the Casterton District (W boundary of HR) between October and November. He stated that the clutch is generally four, but frequently five, and gave specific information on a nest found in a hole in a River Red Gum on 28 October 1903.

PHASIANIDAE (QUAILS)

Coturnix pectoralis. Stubble Quail.

Abundance and distribution. Common and widespread except in timbered and mountainous areas. During the past 15 years large numbers have sometimes been recorded near Lake Linlithgow (E boundary of HR), in the S portion of AR and in the Natimuk area of ER by Morris and Thomas (pers. comm.). Habitat. Pastures and crop lands, particularly those containing wheat, linseed, hog weed or new growths of grass. Breeding. Reported from various places in the survey area (Morris, Thomas, Austin and McGarvie pers. comm.).

Coturnix australis. Brown Quail.

Abundance and distribution. Not seen during FWD survey. Recorded in GR at Marney and Bryan Swamps and at Rocklands Reservoir during late December 1972 (Mitchell 1973). Habitat. Margins of freshwater swamps and reservoirs. Breeding. McCulloch (1973) noted young in GR during late December 1972.

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TURNICIDAE (BUTTON-QUAILS)

Turnix varia. Painted Button-quail.

Abundance and distribution. Uncommon and widespread. Habitat. Open forests, woodlands and shrublands, particularly where there is little ground cover.

Turnix velox. Little Button-quail.

Abundance and distribution. Not seen during FWD survey. Hill (1907b) recorded it during some summers before 1907 E of Ararat (near E boundary of AR) and Austin (1951) recorded it in 1949-50 near Casterton (just W of HR) and near Edenhope, ER. Habitat. Austin (1951) saw this quail in light bracken in open country. Breeding. The birds near Casterton were reported nesting in 1949-50.

PEDIONOMIDAE (PLAINS-WANDERER)

Pedionomus torquatus. Plains-wanderer

(Plate 21, Fig. 6).

Abundance and distribution. Rare; not seen in FWD survey. A dead bird was found N of Horsham (N boundary of survey area) in May 1973, and was sent to NMV where it is lodged as a specimen (W 9092). D'Ombrain (1926) noted it in HR near Hamilton in 1922. Habitat. Flat, open, grass-covered plains (Frith 1969). Conservation aspects. Early during European settlement it was common on the plains in Victoria (D'Ombrain 1926), but a dramatic population decline has occurred throughout its range and today it is seldom seen. Studies to determine its present Victorian status are required.

RALLIDAE (RAILS, CRAKES, SWAMPHENS)

Rallus philippensis. Land Rail.

Abundance and distribution. Not seen in FWD survey; recorded recently in AR at Stawell (McCann pers. comm.) and in HR at Nareen (Austin pers. comm.) but there are few other recent literature records for the survey area. Some old, general records of it occurring in or near the survey area include: Anon. (1892); Hill (1907b); and Sullivan (1929a). Habitat. Swampy conditions, crops and cultivation, and, at times, forested areas (Wheeler 1967a). Breeding. Five eggs were found in a nest at Warrnambool (just E of HR) during late October 1928 (Sullivan 1929a).

Rallus pectoralis. Water Rail.

Abundance and distribution. One bird was captured alive in a mammal trap in GR on the E side of Lake Wartook in FWD survey; it was later released in the same area. Also recently reported in GR at Wannon Bridge (McCann pers. comm.) and in ER at Horsham (Thomas pers. comm.). Habitat. The bird trapped near Lake Wartook was in dense wet sedges under a shrub layer of Scented Paperbarks.

Porzana pusilla. Marsh Crake.

Abundance and distribution. Not seen in FWD survey and there are few literature references from the survey area. However, because of the dense nature of its habitat, it may be more abundant than is suggested by the few recorded sightings. Recorded in GR near Balmoral (Mitchell 1973); and in AR· at Lake Fyans (McCann pers. comm.). Habitat. Dense vegetation in swamps.

Porzana fluminea. Spotted Crake.

Abundance and distribution. Not seen in FWD survey. The general remarks made for the Marsh Crake also apply here. Mitchell (1973) reported it as common in GR near Balmoral in December 1972; and McCann (pers. comm.) has recently observed it in AR at Lake Lonsdale and near Stawell. The NMV has specimens from Edenhope and Stawell. Habitat. Dense vegetation bordering swamps and rivers.

Porzana tabuensis. Spotless Crake.

Abundance and distribution. Not seen in FWD survey. Recorded in ER along the Glenelg River near Harrow (Austin pers. comm.); in GR near Balmoral (Mitchell 1973); and in AR at Lake Lonsdale (McCann pers. comm.). Habitat. Dense vegetation in swampy areas.

Gallinula ventralis. Black-tailed Native-hen.

Abundance and distribution. A few solitary and paired birds were in ER (usually along the N boundary) during FWD survey. The numbers of this species had been high for two or three years before our survey (Middleton pers. comm.). Such population fluctuations are normal and Wheeler (1967a) remarks that it appears in great numbers during, and immediately after, flood periods. Habitat. Temporary or permanent freshwater swamps, lakes and flooded pastures. Breeding. A pair with a brood of chicks was in ER near the Mt. Arapiles Block in early October 1974.

Gallinula tenebrosa. Dusky Moorhen.

Abundance and distribution. Uncommon and widespread. Habitat. Large permanent bodies of fresh water; also flooded woodlands and other temporary bodies of water during spring. Breeding. Adults with chicks were seen in a flooded River Red Gum woodland in ER near the Tallageira Block on 7 December 1974. Young moorhens were seen also in GR near Balmoral during late December 1972 (McCulloch 1973).

Porphyrio porphyrio. Swamphen.

Abundance and distribution. Common and widespread. Habitat. Margins of seasonal swamps and flooded pastures or woodlands; shorelines of large permanent bodies of water are important during late summer and early autumn. Breeding. Young were on swamps in GR near Balmoral in late December 1972 (McCulloch 1973). A regular breeder in AR at Lake Fyans (McCann pers. comm.).

Fulica atra. Coot.

Abundance and distribution. Common and widespread. Habitat. Freshwater and saline lakes, swamps and flooded pastures; occasionally on slow-flowing rivers and streams. Seen both on open water and on vegetated margins. Breeding. McCulloch (1973) noted adults with young in GR in late December 1972.

GRUIDAE (CRANES)

Grus rubicunda. Brolga.

Abundance and distribution. Uncommon and widespread. Habitat. Pastures or swamps on the plains, particularly semi-cleared pastures with some low-lying, poorly drained areas. Occasionally in stubble fields, but usually near swamps. Breeding. Nesting is reported in all regions of the survey area. Conservation aspects. We suggest that a field study to determine the status of this species in Victoria be conducted. The results of this study might suggest areas which, if set aside as reserves, could lead to a permanent nucleus of successful breeding birds being established in the State.

BURHINIDAE (STONE-CURLEWS)

Burhinus magnirostris. Bush Stone-curlew.

Abundance and distribution. Rare; not seen in FWD survey. Hill (1907b) presented the following information on the status of this species in the Ararat District, shortly after the turn of the

century: 'fairly numerous on the timbered rises, but, according to old residents, they are less numerous than formerly, which may be accounted for by the increase in the number of foxes'. Other factors possibly also responsible for their decline include predation by feral Cats, clearing of the woodlands and agricultural activities. Between 1919 and present other sightings or calls have been reported in ER near Lake Wallace (Wheeler 1964); in GR (Audas 1920) and N of Mt. Dundas Block (McGarvie pers. comm.); in AR at Illawarra Block (Middleton pers. comm.) and along the Wimmera River near Horsham (Thomas pers. comm.); and in HR near Cavendish and Wannon (Wheeler 1967b; Mitchell 1973). Habitat. Noted in Yellow Gum woodland in the Illawarra Block (Middleton pers. comm.) and in River Red Gum areas N of Mt. Dundas Block (McGarvie pers. comm.). Conservation aspects. Studies are required to determine the reasons for the population declines of this species. In particular, the effects of the loss and alteration of its woodland habitat should be examined.

ROSTRATULIDAE (PAINTED SNIPE)

Rostratula benghalensis. Painted Snipe.

Abundance and distribution. Rare. Four in GR at McGlashan's Swamp (near Balmoral) in late December 1972 (Mitchell 1973) and two N of Mt. Dundas Block in October and November 1957 (McGarvie pers. comm.). Habitat. Swamps.

HAEMATOPODIDAE (OYSTERCATCHERS)

Haematopus ostralegus. Pied Oystercatcher.

Abundance and distribution. Common along the S boundary of HR (Isles pers. comm.). Habitat. Sandy ocean beaches and tidal flats.

CHARADRIIDAE (LAPWINGS, PLOVERS AND DOTTERELS)

Vanellus miles. Masked Plover.

Abundance and distribution. Common and widespread. Pairs or small flocks were present during spring and early summer; in mid-December a few larger flocks were evident and by March-April flocks containing 20 to 50 birds were common. Habitat. Margins of permanent and temporary lakes, swamps, reservoirs, etc., particularly where receding water has left exposed flats. Also areas of flooded vegetation, pastures with new growth and crops such as lucerne. Breeding. Adults with young were seen during September and October 1974. A nest of four eggs was found in the Victoria Valley, GR, on 5 September 1974. It was in a depression on a slight rise and was lined with grasses. Another nest with four eggs was on a mud bank near Hamilton, HR, on 27 August 1971 (RAOU nest card).

Vanellus tricolor. Banded Plover.

Abundance and distribution. Not seen in FWD survey. Flocks of up to 75 birds were in GR near S end of Victoria Range in May 1954 (McGarvie pers. comm.). Two were in GR along Victoria Range Road in December 1972 (Mitchell 1973). Reported regularly at Concongella (just E of AR) near Stawell (McCann pers. comm.). Habitat. Swamps, lagoons, and a strong preference for grassy plains often far from water (Condon and McGill 1974). The birds seen by McGarvie were in open country. Breeding. Nests regularly at Concongella (McCann pers. comm.). Nesting recorded in HR near Coleraine (RAOU nest cards). A regular nesting bird in GR near S end of Victoria Range (McGarvie pers. comm.).

Erythrogonys cinctus. Red-kneed Dotterel.

Abundance and distribution. Rare; only recorded during FWD survey along the N boundary of ER at Mitre Lake (a flock of 4 in October 1974). McCann (pers. comm.) has seen it in AR at Lake Lonsdale and it has been reported elsewhere in the survey area by Sullivan (1929a), Wheeler (1964) and Mitchell (1973). Habitat. Margins of standing bodies of water.

Charadrius rubricollis. Hooded Dotterel.

Abundance and distribution. Common along the S boundary of HR (Isles pers. comm.). Habitat. Ocean beaches.

Charadrius bicinctus. Double-banded Dotterel.

Abundance and distribution. Common during winter months along S boundary of HR (Isles pers. comm.). Rare inland; recorded in ER at Lake Wallace (Wheeler 1964). Habitat. Ocean beaches and, occasionally, inland swamps and lake margins. Movements. A winter migrant to Victoria, arriving as early as February and leaving in August (Wheeler 1967a). Breeds in New Zealand (Frith 1969).

Charadrius ruficapillus. Red-capped Dotterel.

Abundance and distribution. Uncommon in ER. Most sightings were of small flocks, each with less than 10 birds, in October 1974, but a flock of about 80 birds was near Douglas on 15 April

1975. Habitat. Dry margins or beds of freshwater and, in particular, salt lakes. Breeding. Young were seen in ER at White Lake on 5 October 1957 (Bald 1957a). Also recorded nesting in GR (McGarvie pers. comm.).

Charadrius melanops. Black-fronted Dotterel.

Abundance and distribution. Uncommon and widespread. Habitat. Margins, particularly of sand or mud, of permanent and temporary bodies of water. Sometimes it nests far from water. Breeding. A nest in a depression in the ground and lined with bark contained two eggs on 3 October 1974. It was in a Yellow Box/Yellow Gum woodland about 100 m from a large temporary lake in the Toolondo Block, ER. The undergrowth was sparse and appeared heavily grazed. Also recorded nesting in GR (McGarvie pers. comm.); in AR near Stawell (McCann pers. comm.); and in HR near Coleraine (RAOU nest card).

RECURVIROSTRIDAE (STILTS, AVOCETS)

Himantopus himantopus. Pied Stilt.

Abundance and distribution. Uncommon and widespread; most sightings are from ER. Recorded in ER at Lake Wallace, lakes near Douglas, Lake Natimuk (N boundary of ER) and 2 km SW of Mt. Arapiles Block; in AR at Lake Lonsdale; and in HR near Macarthur. Habitat. Margins of lakes and swamps. Movements. Relatively large numbers are seen during dry years such as 1972 (Mitchell 1973) and few are seen during wet years such as 1974 (FWD survey). Possibly they move out of the arid interior to the few permanent lakes and swamps remaining on the periphery of their range during dry periods.

Cladorhynchus leucocephalus. Banded Stilt.

Abundance and distribution. Uncommon, only seen in ER. Recorded at Centre Lake (9 birds in October 1974) and White Lake (40 birds in April 1975). A flock of 800 was on White Lake and another flock of approximately the same size was on Centre Lake on 5 October (Bald 1957a). Austin (1962b) recorded 10,000 birds on the lakes at Douglas and implied that such numbers might be smaller than usual. Habitat. Shallow open margins or sandbars of salt lakes. Occasionally associated with Pied Stilts, Red-necked Avocets and Black Swans. Breeding. Of 9 birds at Centre Lake, two had full chest bands and the rest were without or had indistinct bands. About one-third of the 40 on White Lake had full chest bands. Most of the 800 birds on White Lake in 1957 had full chest bands (Bald 1957a). Conservation aspects. The salt lakes in ER near Douglas appear to be one of the main inland areas for this species in Victoria.

Recurvirostra novaehollandiae. Red-necked Avocet.

Abundance and distribution. Uncommon, only seen in ER. Reported on Centre Lake (70 birds) in October 1974 and on Mitre Lake and a lake N of Lake Natimuk (N boundary of ER). Austin (1962b) reported 10,000 on the lakes near Douglas in 1962. They were with about 100 Pied Stilts and 10,000 Banded Stilts. Habitat. Shallow open margins of salt lakes.

SCOLOPACIDAE (SANDPIPERS, SNIPE)

Tringa nebularia. Greenshank.

Abundance and distribution. Rare; not seen in FWD survey. Mitchell (1973) recorded the following for late December 1972: 'Two L. Natimuk; three McGlashan's Swamp; two L. Mulla'. All three localities are either in or near ER. Habitat. Inland swamps and shallow lakes. Movements. Breeds in N Europe and N Asia and migrates in winter through E Asia to Australia (Frith 1969).

Gallinago hardwickii. Japanese Snipe.

Abundance and distribution. Uncommon and widespread. Habitat. Dense vegetation in marshes, swamps and wet heaths. Movements. Breeds in Japan and migrates S in winter through New Guinea to Australia (Frith 1969).

Calidris acuminata. Sharp-tailed Sandpiper.

Abundance and distribution. Uncommon; not seen in FWD survey. Flocks of up to 500 birds have been reported in or near ER at White and Centre Lakes, Lake Natimuk and Lake Mullaneoree; and in GR on Bryan and Marney Swamps. Habitat. Margins of saline and freshwater lakes and swamps. Movements. Breeds in NE Siberia and migrates through E Asia to Australia (Frith 1969).

Calidris ruficollis. Red-necked Stint.

Abundance and distribution. Common during summer months along S boundary of HR (Isles pers. comm.). Uncommon inland; a flock of about 70 was in ER on the margin of a lake near the Mt. Arapiles Block in October 1974. Also recorded on White and Centre Lakes in October 1957 (Bald 1957a). Habitat. Ocean and estuary

beaches, tidal flats, margins of saline and freshwater lakes and swamps. Movements. Breeds in NE Siberia and W Alaska and migrates through Asia to Australia (Frith 1969).

Calidris ferruginea. Curlew Sandpiper.

Abundance and distribution. Rare; not seen in FWD survey. Recorded at Lake Natimuk (N boundary of ER) in December 1972 (Mitchell 1973). Habitat. Margins of lakes and swamps. Movements. Breeds in E Arctic Asia and migrates in winter through E Asia to Australia (Frith 1969).

Calidris alba. Sanderling.

Abundance and distribution. Rare; a flock of 80 was in HR near Lake Yambuk on 23 July 1976 (Isles pers. comm.). Habitat. Ocean beaches. Movements. Breeds N of the Arctic Circle, some migrate to Australia where they are widespread from November to May. Many birds overwinter in Australia (Condon 1969).

LARIDAE (GULLS, TERNS)

Larus novaehollandiae. Silver Gull.

Abundance and distribution. Uncommon and widespread. Usually in flocks of 10-100 individuals. Habitat. Saline and freshwater lakes and swamps; flocks often occur around food sources far from water.

Chlidonias hybrida. Whiskered Tern.

Abundance and distribution. Uncommon and widespread. Occasionally in flocks of up to 300 birds (Sullivan 1929b). Habitat. Saline and freshwater lakes and swamps, flooded pastures and freshly ploughed croplands (where they feed on invertebrates). Breeding. Three nests were found in GR near Dunkeld on 22 December 1968 (RAOU nest cards).

Gelochelidon nilotica. Gull-billed Tern.

Abundance and distribution. Rare; in 38 years Austin (pers. comm.) recorded three small flocks flying over Nareen in HR.

COLUMBIDAE (PIGEONS AND DOVES)

Colomba livia. Domestic Pigeon.

Abundance and distribution. Uncommon and widespread. Usually in small flocks, seldom of more than 20 birds. Analyses of wing bones found in Peregrine Falcon eyries in the survey area indicate that some nesting pairs rely on the pigeons as a food source when feeding young. Habitat. Areas extensively modified by human occupation (e.g. towns, farm buildings, cleared pastures, bridges, etc.).

Geopelia striata. Peaceful Dove.

Abundance and distribution. Uncommon in ER, GR and AR; not seen in HR. Habitat. In ER at the Mt. Arapiles Block we observed this species in Grey Box and Yellow Gum woodlands. Breeding. Commonly breeds in AR near Stawell; it has colonised this area within the past 25 years (McCann pers. comm.).

Geopelia cuneata. Diamond Dove.

Abundance and distribution. Rare; possibly only an accidental visitor to the survey area. Seen in ER near Lake Wallace in March 1964 (Wheeler 1964). Habitat. No data available for survey area.

Phaps chalcoptera. Common Bronzewing.

Abundance and distribution. Common and widespread in ER, GR and AR; not seen in HR. Habitat. Dense shrub layers. Dominant tree species are probably less important than the density of the shrub layers. Recorded in such diverse tree associations as Yellow Gum/Yellow Box, Brown Stringybark/Small Grass Tree, Messmate, and Brown Stringybark/Manna Gum. Breeding. Nests in AR near Stawell (McCann pers. comm.).

Phaps elegans. Brush Bronzewing.

Abundance and distribution. Rare; recorded in GR at Balmoral, Victoria Valley and along Grampians Road near Mt. William turn-off; and in HR near Hamilton. Habitat. In Victoria Valley the birds were in heaths under Scent-barks (p.c.-26).

Ocyphaps lophotes. Crested Pigeon.

Abundance and distribution. Uncommon and restricted mainly to N portions of ER and AR. Also recorded in ER S of Toolondo Block (Mitchell 1973) and near Stawell along Concongella Creek (just E of AR) (McCann pers. comm.). Habitat. Sightings along the N boundary of the survey area were usually in pasture lands. Breeding. Nests along Concongella Creek, an area it has colonised within the past 25 years (McCann pers. comm.).

CACATUIDAE (COCKATOOS)

Calyptorhynchus magnificus. Red-tailed Black Cockatoo.

Abundance and distribution. Rare and restricted to ER. Recorded in the Kadnook, Tallegeira and Jilpanger Blocks during FWD survey. Previously

reported in the Edenhope and Harrow districts (Austin 1951), the Edenhope region (Attiwill 1960), in the Toolondo Block (Middleton pers. comm.), on the Moree Bridge Road (Wheeler 1964) and along the Edenhope Road (Mitchell 1973). The NMV has three specimens from ER. Habitat. Brown Stringybark shrubland. Feeding. Our observations of this species feeding on unripened Brown Stringybark seeds confirm similar observations made by Austin (1951) and Attiwill (1960). The latter author also states 'The birds also feed on the seeds of banksias, hakeas, small casuarinas and other native shrubs, particularly after a bushfire has passed over a patch of this type of country. Very rarely, they have been observed on the ground feeding on prickly burrs, and they also bite into dead timber in search of the larva of wood-boring beetles'. Breeding. Attiwill (1960) gives six recent nesting records for ER: three during October/November and three during February/March. The nests were in large hollows in eucalypts. Conservation aspects. The Victorian range of this species has apparently decreased since the early days of settlement (Wheeler 1967a) and it is now restricted to the SW part of the State with ER being one of its last strongholds. Conservation of some of the larger areas of Brown Stringybark in this region is essential to the local survival of this species.

Calyptorhynchus funereus. Yellow-tailed Black Cockatoo.

Abundance and distribution. Uncommon and widespread. Habitat. Usually seen in flight over a wide range of habitats. The few sightings of birds not in flight were made in woodlands (Yellow Gum/River Red Gum, Yellow Gum/banksia and River Red Gum/Silver Banksia), Brown Stringybark shrubland and a pine plantation. Feeding. Five were feeding on seeds from Desert Banksia cones in the Tallageira Block (ER) and three were carrying pine cones when they flew from a roadside stand of introduced pines W of the Jilpanger Block (ER). Breeding. An adult was on a nest 5 m up in a burnt Messmate on 22 November 1969 (Mt. William, GR) (RAOU nest card).

Callocephalon fimbriatum. Gang-gang Cockatoo.

Abundance and distribution. Uncommon and widespread in GR; rare in ER. Seldom seen further W than the Victoria-South Australia border (Condon 1969); Middleton (pers. comm.) suggests that the N boundary of ER is the N limit of its range in W Victoria. Habitat. Mainly open forests, particularly of Brown Stringybark. Rare in woodlands (Yellow Gum/Yellow Box). Feeding. Observed feeding on Messmate and Scrub Cypress Pine seeds during FWD survey. Breeding. McCulloch (1973) recorded young out of the nest in GR during December 1972.

Cacatua roseicapilla. Galah.

Abundance and distribution. Uncommon and widespread with local concentrations in ER near the Mt. Arapiles Block. Flocks usually contained less than 10 birds and occasionally Galahs were with flocks of either Sulphur-crested Cockatoos, Long-billed Corellas or Red-rumped Parrots. Comments on the southward range expansion of this species in the W portion of the survey area are made by Austin (1951). Habitat. Mainly pastures; rarely woodland remnants (Grey Box and Yellow Gum/Grey Box) on pasture land margins.

Cacatua tenuirostris. Long-billed Corella.

Abundance and distribution. Common and widespread; usually in flocks, occasionally of up to several hundred birds, with Sulphur-crested Cockatoos. On 3 October 1974, we counted a total of 182 Long-billed Corellas along a N-S drive of 31 km between the Mt. Arapiles Block and the E side of the Toolondo Block (ER). These birds were in nine separate flocks which ranged in size from 1 to 60 individuals. Habitat. Pastures. Large woodland trees such as River Red Gum and Yellow Gum are selected for roosting and nesting. These trees are either isolated in pastures or are parts of extensive woodlands, particularly near areas of open water. Feeding. Oats, wheat and Onion-grass bulbs are taken (Sullivan 1929c; Smith 1962). Breeding. Adults with fledged young were in ER near Noradjuha in November 1961, and they were also nesting in trees in a swamp about 32 km SE of Noradjuha (Smith 1962). Nesting also occurs in AR in dead trees in Lake Fyans (Smart pers. comm.). Conservation aspects. The survey area is one of the last strongholds of this species in southern Australia and a concerted effort to ensure its continued survival in SW Victoria is required. Immediate studies should be conducted to elucidate its life history as well as its impact on cereal crops grown in the area. It is important that methods designed to alleviate its impact on cereal crops are critically reviewed before implementation to ensure that no adverse long-term effects on the population will occur.

Cacatua galerita. Sulphur-crested Cockatoo.

Abundance and distribution. Common and widespread; usually in flocks of up to several hundred birds with Long-billed Corellas. Habitat. Pastures. Large woodland trees such as River Red Gums and Yellow Gums are used for nesting and roosting. Feeding. Seen feeding in GR on Onion-grass bulbs and on oats. Breeding. Nesting recorded in GR (McGarvie pers. comm.).

LORIIDAE (LORIKEETS)

Trichoglossus haematodus. Rainbow Lorikeet.

Abundance and distribution. Rare and widespread. Recorded in ER between Benayeo and the Tallagcira Block, near Edenhope, S of the Tooan Block, W of the Toolondo Block, and Horsham; in GR at S end of Victoria Range, Victoria Valley, Balmoral and N of Rocklands Reservoir; and in AR at Dadswell Bridge and Stawell. Habitat. Woodlands, particularly those containing Yellow Gum, Yellow Box or River Red Gum. Conservation aspects. As for Musk Lorikeet (below).

Glossopsitta concinna. Musk Lorikeet.

Abundance and distribution. Common and widespread. Habitat. Yellow Gum woodlands, sometimes in association with Yellow Box, River Red Gum or both. Feeding. Nectar/pollen from Yellow Gum blossoms is commonly taken; also seen feeding on unopened flowers of River Red Gums. Breeding. Recorded nesting in GR at Cherrypool in 1954 (McGarvie pers. comm.). Conservation aspects. The extensive loss of woodlands in the survey area may ultimately result in population declines of this species. The few segments of woodland remaining in the survey area should be carefully managed to provide a continual nectar source for nomadic birds such as the lorikeets.

Glossopsitta porphyrocephala. Purple-crowned Lorikeet.

Abundance and distribution. Uncommon and widespread; locally common in ER at Mt. Arapiles Block in April 1975. Habitat. Woodlands; our records include River Red Gum and Grey Box woodlands. Feeding. At Mt. Arapiles Grey Box blossoms were being selected. The appearance of lorikeets in these trees coincided with the appearance of the blossoms. Conservation aspects. As for Musk Lorikeet (above).

Glossopsitta pusilla. Little Lorikeet.

Abundance and distribution. Uncommon and widespread; not seen in FWD survey. Recorded in ER near Edenhope (Wheeler 1964); in GR near Balmoral and Rocklands Reservoir (Mitchell 1973); and in AR near Stawell (McCann pers. comm.). Habitat. Woodlands. Conservation aspects. As for Musk Lorikeet (above).

POLYTELITIDAE (LONG-TAILED PARROTS)

Nymphicus hollandicus. Cockatiel.

Abundance and distribution. Not seen in FWD survey. Reported in most suitable areas in GR around Balmoral and the Black Range in December 1972 (Mitchell 1973). Wheeler (1967a) describes this species as one whose numbers vary considerably from year to year.

PLATYCERCIDAE (BROAD-TAILED PARROTS)

Melopsittacus undulatus. Budgerygah.

Abundance and distribution. Rare; not seen in FWD survey. Recorded in GR near Balmoral in December 1972 (Mitchell 1973). Habitat. Mainly open forests in the northern districts (Wheeler 1967a). Movements. Predominantly an inland species which experiences occasional northern movements (Wheeler 1967a; Condon 1969).

Lathamus discolor. Swift Parrot.

Abundance and distribution. Rare and widespread; not seen in FWD survey. Recorded in ER near Edenhope in March (Wheeler 1964) and near Lar-arum in May (Middleton pers. comm.); in GR N of the Mt. Dundas Block in September 1956 (McGarvie pers. comm.); in AR near Stawell in October (McCann pers. comm.); and in HR at Coleraine in March (Austin 1953b). Habitat. Woodlands. Feeding. A flock of 12 was feeding on blossoms of a Red-flowering Gum (*Eucalyptus ficifolia*) at Coleraine (Austin 1953b). Movements. Breeds in Tasmania (Frith 1969; Slater 1970) and generally is only present in SE Australia between March and September. Conservation aspects. As for Musk Lorikeet (above).

Platycercus elegans. Crimson Rosella.

Abundance and distribution. Common and widespread; particularly abundant in GR. Habitat. Open forests, woodlands, shrublands; occasional in heaths and in trees remaining in pastures. Brown Stringybark associations were particularly well populated, but also seen in plant associations composed of one or more of the following trees: River Red Gum, Scent-bark, Manna Gum,

Yellow Gum, Yellow Box, Mountain Grey Gum, Messmate, Grey Box, Shining Peppermint and Swamp Gum. Breeding. Nesting recorded in GR (McGarvie pers. comm.).

Platycercus elegans. Crimson Rosella.

Abundance and distribution. Common and widespread, although few birds occur in the mountain ranges of GR. Habitat. Woodlands and semi-cleared pastures. Most common in River Red Gum associations, but also in plant associations of Yellow Gum, Yellow Box, Grey Box or Manna Gum. Breeding. Nesting recorded in GR (McGarvie pers. comm.).

Psephotus haematonotus. Red-rumped Parrot.

Abundance and distribution. Common and widespread, although few birds occur in the mountain ranges of GR. Particularly abundant along N and W boundaries of ER. Habitat. Semi-cleared pastures where the few remaining trees are either River Red Gum, Yellow Gum or Grey Box. Unlike the Eastern Rosella, this parrot seldom occurs in woodlands but uses woodland margins that open onto pasture. Breeding. Adults were feeding fledged young in ER between Apsley and the Tallageira Block on 7 December 1974. Adults also noted as feeding young out of the nest in GR in late December 1972 (McCulloch 1973).

Neophema chrysostoma. Blue-winged Parrot.

Abundance and distribution. Uncommon. One was in ER in the Kadnook Block in December 1974 (FWD survey) and Wheeler (1964) saw one near Wrattonbully, South Australia (about 10 km SW of Lankoop in ER) in March 1964. Storr *et al.* (1952) recorded it in HR near Haywood (about 15 km S of the Stones Block) in October 1951 and we saw a flock of about 20 immature *Neophema* parrots, which could have been either Blue-winged or Elegant Parrots, in the Stones Block in February 1975. Five were near Lake Yambuk (HR) on 27 July 1975 (Isles pers. comm.). Habitat. The bird in the Kadnook Block was in Brown Stringybark shrubland, the immature parrots were in Manna Gum open forest and the birds near Lake Yambuk were on a primary dune. Feeding. The individual in the Kadnook Block was feeding on *Leucopogon* sp. fruits and the five near Lake Yambuk were eating seeds of *Cakile* sp.

Neophema elegans. Elegant Parrot.

Abundance and distribution. Rare. Sullivan (1929a) recorded two flocks near Lake Condah (HR) in July 1928 and we saw a flock of immature *Neophema* parrots, which could have either been Elegant or Blue-winged Parrots, in the Stones Block in February 1975. Habitat. The birds near Lake Condah were feeding among heaps of scattered straw and the flock of immatures was in a Manna Gum open forest.

CUCULIDAE (CUCKOOS)

Cuculus pallidus. Pallid Cuckoo.

Abundance and distribution. Uncommon and widespread. This migratory species has been recorded in the survey area as early in the spring as 9 August (Sullivan 1929a). Interestingly, it was present in substantial numbers in GR on 18-19 October 1972 (Wheeler and Pescott 1973), but only two juveniles were recorded there during late December of the same year (Mitchell 1973). Thus, it may follow a similar pattern to that in the Canberra area where, after breeding, the adults move away in the early weeks of the New Year but juveniles remain until the end of April (Frith 1969). Habitat. Brown Stringybark shrublands, heaths, open forests and trees in pastures. Breeding. Juveniles have been seen being fed by White-naped, New Holland and Fuscous Honeyeaters. Movements. Not well known and apparently complex, but it is absent from SE Australia during winter.

Cuculus pyrrhophanus. Fan-tailed Cuckoo.

Abundance and distribution. Uncommon and widespread; usually seen from September to March (inclusive), but one was in HR near Lake Yambuk on 27 July 1976 (Isles pers. comm.). Habitat. Brown Stringybark and Manna Gum open forests, Yellow Gum/Yellow Box woodland and River Red Gum in pastures. Breeding. Nesting recorded in GR (McGarvie pers. comm.). Movements. Not well known, apparently there is some migration away from SE Australia during winter, but it may not involve the entire population (Slater 1970). Wheeler (1967a) indicates that many winter in Victoria.

Chrysococcyx osculans. Black-eared Cuckoo.

Abundance and distribution. Rare; not seen in FWD survey. Recorded in GR near Balmoral in December 1972 (Mitchell 1973). Also recorded as rare in the Ararat District (E of AR) by Hill (1907b). Habitat. Open forests and plains (Wheeler 1967a). Breeding. Hill (1907b) recorded eggs in nests of Speckled Warblers and Superb Blue Wrens. Movements. Not well under-

stood, but most S populations move N during winter (Macdonald 1973).

Chrysococcyx basalis. Rufous-tailed Bronze-cuckoo.

Abundance and distribution. Uncommon and widespread. More plentiful than the Shining Bronze-cuckoo in the survey area (Middleton pers. comm.). Habitat. Open forests (particularly of Manna Gum) and woodlands. Breeding. Foster parents in the Ararat District (E of AR) include Scarlet Robins, Buff-rumped Thornbills and Superb Blue Wrens (Hill 1907b). Movements. Largely migratory, especially S breeding populations, most of which leave for the North in March and return S in September (Macdonald 1973). Many winter in Victoria (Wheeler 1967a).

Chrysococcyx lucidus. Shining Bronze-cuckoo.

Abundance and distribution. Uncommon and widespread; less plentiful than the Rufous-tailed Bronze-cuckoo in the survey area (Middleton pers. comm.). Habitat. Open forests and woodlands. Breeding. Fledglings have been seen in ER in the Mt. Arapiles Block (Middleton pers. comm.). Movements. A summer migrant to Victoria and it winters within the State only on rare occasions (Wheeler 1967a).

STRIGIDAE (OWLS)

Ninox strenua. Powerful Owl.

Abundance and distribution. Uncommon and restricted to GR; seldom recorded far from the mountain ranges in the survey area. Recorded from Victoria Valley (FWD survey), Pomonal and Roses Gap (McCann pers. comm.), N of Yarram Park (Grey pers. comm.) and Billywing (Austin 1962c; Hall and McKean 1962). Habitat. Open forest. The bird in Victoria Valley was in an area of Swamp Gum with dense sedge undergrowth.

Ninox novaeseelandiae. Spotted Owl.

Abundance and distribution. Common and widespread. Habitat. Most areas which support tree growth. Breeding. D'Ombrain (1905a) mentions five nests, two of which had clutches of three, in the Casterton District (near the W boundary of HR) during October and November. Three young birds out of the nest were in GR near Balmoral in late December 1972 (Mitchell 1973; McCulloch 1973).

Ninox connivens. Barking Owl.

Abundance and distribution. Uncommon; not seen in FWD survey. Recorded in GR at Victoria Valley (Braithwaite pers. comm.); in AR near Stawell (McCann pers. comm.); and in or near HR by D'Ombrain (1905a), Wheeler (1967b) and Middleton (pers. comm.). Habitat. Woodlands and open forests. Breeding. A pair has nested for a number of years in the NW portion of HR (Austin pers. comm.).

TYTONIDAE (BARN OWLS)

Tyto alba. Barn Owl.

Abundance and distribution. Common and widespread except in the mountain ranges of GR. Habitat. Woodlands, semi-cleared pastures and settled areas and it roosts in tree hollows, old buildings, caves, thick foliage or down wells (Frith 1969). Breeding. D'Ombrain (1905b) gives details on nesting of this species in the Casterton District (near W boundary of HR) around the turn of this century.

Tyto novaehollandiae. Masked Owl.

Abundance and distribution. Rare; not seen in FWD survey. Recorded in the Casterton District (near W boundary of HR) during the early part of this century (D'Ombrain 1903; 1905a). Wakefield (1963) suggests that an accumulation of bones found in a sandstone recess in GR was from the disgorged pellets of this species. It may be significant that the composition of the mammal remains indicated that this recess had not been used for many years. Habitat. Forested areas (Wheeler 1967a). Breeding. Details of a nest and its contents (one fledgling and a partly intact egg shell) found in the Casterton District in December 1902 are described by D'Ombrain (1903).

PODARGIDAE (FROGMOUTHS)

Podargus strigoides. Tawny Frogmouth.

Abundance and distribution. Common and widespread. Habitat. Most areas where large trees are present. Breeding. A common breeder in the Casterton District (near W boundary of HR) where D'Ombrain (1905b) found eight nests between August and November 1903. Sullivan (1929d) found three nests in the Western District in 1928. It breeds regularly in AR near Stawell (McCann pers. comm.).

AEGOTHELIDAE (OWLET-NIGHTJARS)

Aegotheles cristatus. Owlet-nightjar.

Abundance and distribution. Uncommon and widespread. Recorded in ER at Mt. Arapiles Block (observed on three occasions since 1967); in GR near Rocklands Reservoir; and in AR near Stawell. Habitat. Open forests and settled areas (Wheeler 1967a). At Mt. Arapiles sightings have been made in Brown Stringybark shrubland and in Long-leaf Box low open forest (p.c.-21). Breeding. Recorded nesting near Stawell (McCann pers. comm.).

CAPRIMULGIDAE (NIGHTJARS)

Caprimulgus guttatus. Spotted Nightjar.

Abundance and distribution. Rare; a nightjar was seen in GR near Moora Moora Reservoir on 31 October 1974. Our identification was only positive to genus, but previously published material on the distribution of nightjars suggests that it was a Spotted Nightjar. Also recorded in GR near Billywing (Hall and McKean 1962) and Middleton (pers. comm.) reported a road-killed specimen near Wail (N of ER). Habitat. The bird near Moora Moora Reservoir was in an open forest with a dense understorey.

APODIDAE (SWIFTS)

Hirundapus caudacutus. Spine-tailed Swift.

Abundance and distribution. Uncommon and widespread. Most sightings of this migratory species in the survey area have been made between December and March although Frith (1969) states that it occurs in Australia between early October and mid-August. Habitat. Most of its time in Australia is spent in the air and it occurs over all types of habitats. Movements. It migrates to Japan and Siberia where it breeds between May and August (Frith 1969).

Apus pacificus. Fork-tailed Swift.

Abundance and distribution. There are few records from the survey area. Middleton (pers. comm.) records it as occasional, but not as regular as the Spine-tailed Swift. Habitat. As for Spine-tailed Swift (above). Movements. It migrates to E Asia where it breeds between May and August.

ALCEDINIDAE (KINGFISHERS)

Ceyx azureus. Azure Kingfisher.

Abundance and distribution. Rare. One recorded in GR at Cherrypool in March 1954 (McGarvie pers. comm.). A specimen was taken in either GR or AR in November-December 1891 (Anon. 1892). Hill (1907b) recorded this species along the Wimmera River (E of AR) and Sullivan (1929d) remarked that he had seen only one in the Western District of Victoria. Habitat. Along rivers, streams and lake margins (Wheeler 1967a). Breeding. Hill (1907b) reported it nesting along the Wimmera River in December.

Dacelo novaeguineae. Kookaburra.

Abundance and distribution. Common and widespread. Habitat. Most areas containing trees. Breeding. Adults were feeding young out of the nest in GR in late December 1972 (McCulloch 1973).

Halcyon sancta. Sacred Kingfisher.

Abundance and distribution. Uncommon with local concentrations; widespread. Recorded in ER near Apsley and along the Edenhope to Harrow road; in GR near Balmoral and Rocklands Reservoir; in AR in the Illawarra Block; and in HR near Wannon. Habitat. Woodlands, particularly those with River Red Gums, sometimes near bodies of fresh water. Rarely in open forest. Breeding. Nests with eggs and young, and adults feeding young out of nests were in GR in late December 1972 (McCulloch 1973). Movements. A migrant to S Australia and is absent in winter (Frith 1969).

MEROPIDAE (BEE-EATERS)

Merops ornatus. Rainbow Bee-eater.

Abundance and distribution. Uncommon and widespread. A summer migrant first seen in the survey area on 2 October 1974 and last seen on 19 March 1975. Habitat. Open forests and woodlands; also seen in an olive plantation. Breeding. It nests in ER near Harrow and Edenhope (Austin 1951) and at Mt. Arapiles Block (Middleton pers. comm.); in GR near Balmoral (McCulloch 1973); and in AR near Stawell, Lake Fyans and Lake Lonsdale (McCann pers. comm.).

ALAUDIDAE (LARKS)

Mirafra javanica. Singing Bushlark.

Abundance and distribution. Not seen in FWD survey. Recorded in GR just S of the Victoria Range (McGarvie pers. comm.); and near HR in the Portland District (Learmonth 1966) and at Warrnambool (Sullivan 1928). Habitat. Grasslands, crops and marshy areas (Wheeler 1967a).

Alauda arvensis. Common Skylark.

Abundance and distribution. We did not obtain an estimate of the abundance of this introduced species in relation to that of Richard's Pipit in the survey area. Recently recorded in or near HR by Austin (1953a) and Wheeler (1967b) and in GR by Mitchell (1973). Habitat. Grasslands, crops and cultivated areas (Wheeler 1967a).

HIRUNDINIDAE (SWALLOWS AND MARTINS)

Hirundo neoxena. Welcome Swallow.

Abundance and distribution. Common and widespread. Habitat. Abundant where open flying space is available (e.g. pastures, woodlands and clearings in open forests). However, nearly all plant formations, as well as some cliff faces, various other rock formations and margins of aquatic areas are utilized. Breeding. A common breeding species in the survey area. Eggs have been found from August through November and young from September through December (FWD survey; RAOU nest cards; McCulloch 1973). Nesting sites include buildings, bridges, porches, hollow trunks of River Red Gums, along cliffs and under rock overhangs.

Cecropis nigricans. Tree Martin.

Abundance and distribution. Common and widespread; usually in large flocks. Habitat. Pastures with large roadside trees or pastures adjoining open forests or woodlands. Also River Red Gum woodlands, particularly those on margins of freshwater lakes. Breeding. Nesting recorded in GR (McGarvie pers. comm.).

Cecropis ariel. Fairy Martin.

Abundance and distribution. Uncommon and widespread. Recorded in ER near Lake Charlegrark; in GR at Rocklands Reservoir and near Balmoral; and in AR near Stawell. Habitat. Open areas, many times near freshwater lakes or rivers. Breeding. Nests were on the main wall of Rocklands Reservoir (GR) in mid-October 1972 (Wheeler and Pescott 1973). Adults were feeding young in nests near Balmoral (GR) in late December 1972 (McCulloch 1973). It commonly nests near Stawell (AR) where it uses road culverts for supporting nests (McCann pers. comm.).

MOTACILLIDAE (PIPITS AND WAGTAILS)

Anthus novaeseelandiae. Richard's Pipit.

Abundance and distribution. Common in HR and uncommon elsewhere. Habitat. Open pasture and crop lands, rarely on roadsides in heaths of the Victoria Valley (GR). Breeding. Adults were feeding young near Balmoral (GR) in late December 1972 (McCulloch 1973).

CAMPEPHAGIDAE (CUCKOO-SHRIKES)

Coracina novaehollandiae. Black-faced Cuckoo-shrike.

Abundance and distribution. Uncommon and widespread. Habitat. Woodlands and semi-cleared pastures. Occasionally open forests. Breeding. Adults were feeding young in GR near Balmoral in late December 1972 (McCulloch 1973).

Coracina papuensis. White-bellied Cuckoo-shrike.

Abundance and distribution. Rare; not seen in FWD survey. A number of observers have seen birds in ER, GR and AR (McCann pers. comm.; Middleton pers. comm.; Austin 1951; Wheeler 1964; Wheeler and Pescott 1973; and Mitchell 1973). Habitat. Woodlands, semi-cleared pastures and open forests. Breeding. A nest was '40 feet up' in a eucalypt near Naracoorte, South Australia (20 km W of ER) between 6 and 12 October 1951 (Storr *et al.* 1952). Two pairs were nesting in AR near Stawell in November 1975 (McCann pers. comm.). Movements. It may move in and out of the survey area in relation to climatic conditions (Austin 1951).

Lalage sueurii. White-winged Triller.

Abundance and distribution. Rare and widespread. Recorded in ER in Kadnook and Connewirrecoo Blocks and at the Horsham Golf Course; in GR near Balmoral and Rocklands Reservoir; and in AR near Stawell. Habitat. Woodlands, shrublands and semi-cleared pastures. Movements. Migratory, arriving in southern Australia in mid-October and leaving in February (Frith 1969).

MUSCICAPIDAE (FLYCATCHERS, THRUSHES AND WHISTLERS)

Zoothera dauma. Scaly Thrush.

Abundance and distribution. Uncommon in GR, AR and HR; not seen in ER. Habitat. Plant associations with dense shrub layers. Breeding. Campbell (1906) noted a young bird with weak flight when he disturbed it in GR near Dunkeld.

Drymodes brunneopygia. Southern Scrub-robin.

Abundance and distribution. Rare and restricted to ER. Recorded near Mt. Arapiles Block (Chisholm 1955) and at Wonwondah North (14·5 km

SW of Horsham and 25·8 km ESE of Mt. Arapiles) (Bald 1957b). Habitat. Shrubland (mallee) p.c.-48. Breeding. Nesting occurs at Mt. Arapiles (Chisholm 1955). Five nests were found at Wonwondah North in 1955 and all contained a single egg; where mallee trees were growing the nests were in debris in the central clump of trees, but in other areas the nests were in slight hollows in the ground and lined with grass (Bald 1957b).

Turdus merula. Common Blackbird.

Abundance and distribution. Uncommon and widespread; an introduced species. Habitat. Suburban areas, pasture lands, blackberry thickets along watercourses, etc.

Petroica rosea. Rose Robin.

Abundance and distribution. Rare. A male was banded in HR at Coleraine on 27 September 1962 (Austin 1963a). A male was seen at Wail (N of ER) on 25 April 1964 (Middleton pers. comm.). Habitat. The bird at Coleraine was in a suburban garden.

Petroica rodinogaster. Pink Robin.

Abundance and distribution. Rare. A single male was in GR near the top of Mt. Abrupt near Dunkeld in late March 1967 (Wheeler 1967b). Habitat. It was in a fern gully.

Petroica phoenicea. Flame Robin.

Abundance and distribution. A migratory species which is apparently absent from most of the survey area during summer (November through February). A few birds were seen during August and early September 1974 and the first sighting in 1975 was of five pairs foraging in an open grassy area along the margin of Wartook Reservoir (GR) on 20 March (FWD survey). Data collected by McCann (pers. comm.) in AR near Stawell indicate that small numbers are present throughout winter (May through September). Sullivan (1929a) gives dates of first arrivals in HR near Hamilton as 19 April in 1928 and 14 April in 1929. Habitat. Woodlands, open forests, pastures and other open grassy areas. Four birds were in White Sallee heath on top of Major Mitchell Plateau (GR) in August 1974; this is habitat similar to that in which it nests in the E part of the State. Breeding. Nesting in GR in October 1909 is described by Campbell (1910b). McCann (pers. comm.) indicates that it regularly nests in GR on Mt. William, Victoria Range and Mt. Difficult Range. Movements. There is movement out of most of the survey area probably sometime in September and they do not reappear until late March. Apparently most move either to high altitudes (over 1200 m) in the Australian Alps or to Tasmania to breed.

Petroica multicolor. Scarlet Robin.

Abundance and distribution. Uncommon and widespread. Usually in pairs or small family groups. Habitat. Generally in areas of substantial tree and/or shrub growth. Recorded most often in Brown Stringybark shrubland in ER, but also occurring in woodlands and open forests of Scentbark, Long-leaf Box, Red Stringybark and Yellow Box. Seldom in pastures or other extensive open areas. Breeding. A nest about 3 m up a small Messmate was recorded in GR in September 1927 (Cohn 1927). Adults feeding young were in GR in late December 1972 (McCulloch 1973).

Petroica goodenovii. Red-capped Robin.

Abundance and distribution. Rare in ER, AR and HR; not seen in GR. Recorded in ER at Mt. Arapiles and W of Lake Wallace; in HR near Narcen; and in AR near Ararat and near Stawell. Habitat. Woodlands, open forests and shrublands.

Melanodryas cucullata. Hooded Robin.

Abundance and distribution. Uncommon and widespread. Recorded in ER in the Dopewora, Connewirrecoo, Jilpanger and Mt. Arapiles Blocks, near Edenhope and near Kanagulk; in GR near Balmoral, Rocklands Reservoir, and Victoria Range; and in AR. Habitat. Our sightings in ER were in Brown Stringybark shrublands, River Red Gum woodland with scattered wattle undergrowth and Yellow Gum woodland with an open understorey. Breeding. McCulloch (1973) recorded adults feeding young in GR in late December 1972. McGarvie (pers. comm.) recorded nesting on the W slopes of the Victoria Range in 1954.

Eopsaltria australis. Eastern Yellow Robin.

Abundance and distribution. Common and widespread. Habitat. Most plant formations contain populations of this species and its presence or absence in any particular area depends on the density of the shrub layer rather than on that of the tree layer. It is common in dense shrubs, such as occur along watercourses and in lightly grazed stands of timber. Breeding. This is a common nesting bird in the survey area and details are given for GR by Cohn (1927), Wheeler and

Pescott (1973) and McCulloch (1973); and for HR by RAOU (nest card).

Microeca leucophaea. Jacky Winter.

Abundance and distribution. Uncommon and widespread. Usually as individuals or small family groups, seldom in flocks. Habitat. Open grassy areas in woodlands composed of large River Red Gums, Yellow Gums, Yellow Boxes and Long-leaf Boxes. Occasionally under trees remaining in semi-cleared pastures and in open areas in Brown Stringybark and Manna Gum open forests. Breeding. Nest building, eggs and young in and out of nests were in GR near Balmoral (McCulloch 1973). D'Ombrain (1905b) noted two eggs in a nest on 27 September 1903 in the Casterton District (near W boundary of HR).

Falcunculus frontatus. Crested Shrike-tit.

Abundance and distribution. Uncommon and widespread. Habitat. Most areas which support tree growth. Breeding. Adults were feeding young out of the nest in GR near Balmoral in late December 1972 (McCulloch 1973).

Pachycephala inornata. Gilbert's Whistler.

Abundance and distribution. Rare and restricted; not seen in FWD survey. Middleton (pers. comm.) reports that it regularly occurs along the N boundary of ER in the Mt. Arapiles and Tooan Blocks. Habitat. Shrublands (mallee) which extend into these two blocks from the north.

Pachycephala pectoralis. Golden Whistler.

Abundance and distribution. Uncommon and widespread. During spring and early summer (1974) most sightings were of pairs or individuals (males in full plumage) in GR. In late summer and early autumn sightings were mainly of plain-coloured birds in ER, AR and HR. Habitat. The spring and early summer sightings in GR were usually in low open forests (particularly in the Black Range), in mature open forests or along the few moist streamsides which support tall open forests. During late summer and early autumn there appears to be a dispersal of birds to the woodlands, shrublands and pastures of the low areas surrounding the mountains of GR. Movements. An altitudinal migration within the survey area (the ranges in summer and the low surrounding areas in winter) is suggested by our data as well as unpublished data collected near Stawell (McCann pers. comm.). Similar migrations occur in other mainland populations of this whistler (Frith 1969).

Pachycephala rufiventris. Rufous Whistler.

Abundance and distribution. Locally common in GR from October through March. We did not record this species away from the ranges and adjacent Crown Lands, but other workers report that it occurs throughout most of the survey area. Habitat. Brown Stringybark open forests and, occasionally, Manna Gum, Swamp Gum, Yellow Box, Yellow Gum and Scrub Cypress Pine open forests and woodlands. Breeding. Wheeler (1967b) noted a pair feeding flying young in GR in late March 1967. Adults feeding young out of the nest were also seen during late December 1972 (McCulloch 1973). Movements. There are little published data on the winter distribution of this species in the survey area. However, unpublished data from the Stawell area (McCann pers. comm.) suggest that it is absent, possibly migrating north during winter.

Colluricincla harmonica. Grey Shrike-thrush.

Abundance and distribution. Common and widespread. Habitat. Most areas which support some tree or shrub growth. We recorded it from the moist tall open forests growing along a few of the streams in GR to pasture lands in areas away from the ranges. Breeding. Two nests were found during FWD survey: on 3 October 1974 a nest containing two eggs was in a Desert Banksia in Brown Stringybark shrubland in the Tooan Block (ER); and on 29 October 1974 another nest with two eggs was located between the bark and trunk of a Yellow Box in a Yellow Gum/Yellow Box woodland NW of Rocklands Reservoir (GR). Adults were feeding young out of the nest in GR in late December 1972 (McCulloch 1973). Nesting was also recorded in HR near Colcraine between 12 September and 15 October (RAOU nest card).

Myiagra cyanoleuca. Satin Flycatcher.

Abundance and distribution. Rare. One female *Myiagra* sp. was in GR near Silverband Falls in October 1974 (FWD survey). Middleton (pers. comm.) reports recent sightings of Satin Flycatchers in GR in the S end of Victoria Range, near Golton Gorge and in the S end of Serra Range. It was a regular visitor to the Victoria Range (GR) between 1951 and 1957 (McGarvic pers. comm.). One was collected in GR either in November or December 1891 (Anon. 1892) and one was seen between Cavendish (HR) and Balmoral (GR) in late December 1972 (Mitchell 1973). Habitat. Tall open and open forests. Breed-

ing. Austin (1963b) states that it nests regularly in GR but gives no details. Movements. A regular migrant to southern Australia, arriving in September and leaving in March or April (Slater 1974).

Myiagra inquieta. Restless Flycatcher.

Abundance and distribution. Uncommon and widespread. Habitat. Woodlands and rarely open forests. Breeding. Nesting recorded in GR and HR (Austin pers. comm.; RAOU nest cards) and in AR (McCann pers. comm.). Our limited data indicate that nesting activities occur at least between early September and early January.

Rhipidura rufifrons. Rufous Fantail.

Abundance and distribution. Rare in GR and HR; not seen in ER and AR. Recorded in GR at Silverband Falls on 1 November 1974 (FWD survey) and on the slope of Mt. William on 1 December 1959 (Austin 1963b); and in HR at the Stones State Faunal Reserve in late February 1975 (FWD survey), at Hamilton on 23 March 1963 (McCann 1963), near edge of Mt. Eccles crater on 12 January 1965 (Learmonth 1965) and Austin (1963b) states that it frequently appears in the Casterton District in November and March. Habitat. Tall open forests and open forests with dense undergrowth. Breeding. The Rufous Fantail seen by Learmonth (1965) on 12 January at Mt. Eccles crater flew to a nest 9 m up in an open eucalypt in a Manna Gum open forest with little undergrowth. Movements. Austin (1963b) reports that it remains for short periods and suggests that it may be passing on migration during November and March.

Rhipidura fuliginosa. Grey Fantail.

Abundance and distribution. Common, particularly in GR, and widespread. Habitat. Open forests, particularly those with dense undergrowth. Occasionally on open forest/woodland margins. Breeding. Adults were feeding young in GR near Balmoral in late December 1972 (McCulloch 1973). Sullivan (1928), in commenting on the Western District of Victoria in general, indicated that young were present as early as the first of June.

Rhipidura leucophrys. Willie Wagtail.

Abundance and distribution. Common and widespread. Habitat. Woodlands, occasionally open forests and pastures where they adjoin woodlands. Breeding. Eggs and young in and out of nests were in GR near Balmoral in late December 1972 (McCulloch 1973). D'Ombrain (1905b) noted nest building on 9 September 1903 in the Casterton District (near W boundary of HR). Other nest activities are documented (between mid-September and late December) in GR near Rocklands Reservoir and Balmoral; in AR near Lake Fyans; and in HR 19·3 km NNW of Coleraine (RAOU nest cards).

ORTHONYCHIDAE (LOG-RUNNERS, QUAIL-THRUSHES AND WHIPBIRDS)

Cinclosoma punctatum. Spotted Quail-thrush.

Abundance and distribution. Rare and restricted to GR; not seen in FWD survey. Recorded near Wartook Reservoir and Victoria Range (McGarvie and Middleton pers. comm.). Habitat. Confined mainly to ridges and dry gullies in light and rain forest areas (Wheeler 1967a).

TIMALIIDAE (BABBLERS AND ALLIES)

Pomatostomus temporalis. Grey-crowned Babbler.

Abundance and distribution. Rare. Recently recorded in ER near Edenhope (one bird) (Storr *et al.* 1952); in GR in N portion of Victoria Valley (FWD survey); and in AR at Lake Fyans (McCann pers. comm.). Apparently it was considerably more plentiful in the survey area soon after the turn of this century (Hill 1907a; Chisholm 1964), and as late as 1927 they were often seen in GR (Cohn 1927). Habitat. Dense shrub layers in woodlands, particularly River Red Gums. Conservation aspects. The decline of this species in the survey area appears associated with the removal of its primary habitat (i.e. most of the original woodlands have been cleared for pasture and crop lands). The undergrowth of the few remaining stands of woodlands have been cleared either to facilitate the removal of timber or by extensive grazing of domestic stock.

Pomatostomus superciliosus. White-browed Babbler.

Abundance and distribution. Uncommon and widespread in ER, GR and AR; rare in HR where we can find one reference to it occurring near Coleraine (Sullivan 1928). Habitat. Dense shrub layers in open forests, woodlands and shrublands. In heavily grazed areas they are usually in Prickly Tea-trees or Hedge Wattles which appear to be relatively unpalatable to domestic livestock. Other workers have also indicated that wattles are important to this species (Hill 1907a; Lang 1932). Breeding. Nesting in or near the area has been reported by Campbell (1906) and Lang (1932) in

AR; by Hill (1907a) in the Ararat District (E of AR); and by Wheeler and Pescott (1973) in GR. Hill (1907a) indicates that nesting commences in July, and Lang (1932) found nests containing eggs or young from August to December.

SYLVIIDAE (OLD WORLD WARBLERS)

Acrocephalus stentoreus. Clamorous Reed-warbler.

Abundance and distribution. Not seen in FWD survey, probably because of insufficient time spent searching the habitat where it would be expected to occur. It is recorded regularly in the survey area and was recorded as early as 1891 either in GR or AR (Anon. 1892). Habitat. Dense reed beds along the margins of freshwater lakes, swamps and rivers. Breeding. Hill (1907a) recorded nesting in reeds along the Wimmera River E of Ararat (slightly out of the survey area). At present it is a common nesting species in AR at Lake Fyans, Lake Lonsdale and near Stawell (McCann pers. comm.). Movements. Summer migrant, but some winter in Victoria (Wheeler 1967a).

Megalurus gramineus. Little Grassbird.

Abundance and distribution. Not seen in FWD survey but it has been recorded regularly throughout the survey area since 1891 (Anon. 1892; Sullivan 1929d; Wheeler 1967b; Wheeler and Pescott 1973; and Mitchell 1973). Habitat. Thick vegetation growing on the margins of permanent lakes, swamps and rivers.

Cisticola exilis. Golden-headed Cisticola.

Abundance and distribution. As with the previous two species we spent little time in the habitat of this species. However, it has been recorded in either GR or AR as early as 1891 (Anon. 1892) and noted as present in the Western District of Victoria by Sullivan (1929d). More recently recorded in GR near Balmoral and Marney Swamp (Mitchell 1973) and in HR near Wannon and Coleraine (Wheeler 1967b). Habitat. Wet dense grasslands bordering freshwater swamps, lakes and streams. Breeding. Between 2 and 20 January 1966 a nest in a marsh near Dunmore (HR) pro- (Hamilton, HR) as early as 8 October (Sullivan duced four young (RAOU nest card).

Cinclorhamphus mathewsi. Rufous Songlark.

Abundance and distribution. Uncommon with local concentrations in ER and AR (FWD survey); widespread throughout. It is a summer migrant which has been recorded in the survey area 1929a). Habitat. Woodlands, particularly those with open grassy areas. Breeding. Eggs were taken in early November of both 1898 and 1899 E of Ararat, which is slightly out of the survey area. Movements. Summer migrant in fluctuating numbers (Wheeler 1967a).

Cinclorhamphus cruralis. Brown Songlark.

Abundance and distribution. Rare and widespread. Recorded in ER near Mt. Arapiles Block in October 1974 (FWD survey); in GR in late December 1972 (Mitchell 1973); and in AR near Willaura on 6 September 1928 (Sullivan 1929a) and E of Ararat (slightly out of the survey area) (Hill 1907a). Habitat. Pasture and crop lands. Movements. Summer migrant, but some winter in Victoria (Wheeler 1967a).

MALURIDAE (AUSTRALO-PAPUAN WRENS)

Malurus cyaneus. Superb Blue Wren.

Abundance and distribution. Common and widespread. Habitat. Dense shrub layers, particularly riparian areas and areas where there is little grazing (e.g. the Stones State Faunal Reserve, HR). Austral Bracken, Hedge Wattle and Woolly Tea-tree are commonly inhabited. Breeding. A nest with young in the Morea Block (ER) was about 1·2 m up in a Hedge Wattle on 5 December 1974 (FWD survey). Noted as nesting in October 1972 in GR (Wheeler and Pescott 1973) and eggs and young were present in late December 1972 in GR near Balmoral (McCulloch 1973; RAOU nest card). It is also the foster parent of the Black-eared Cuckoo and the Rufous-tailed Bronze-cuckoo in the Ararat District (Hill 1907b).

Malurus lamberti. Variegated Wren.

Abundance and distribution. Rare and restricted in ER to Mt. Arapiles Block (FWD survey) and Wonwondah North (Bald 1957b). Habitat. In Victoria mainly shrubland (mallee) in the N of the survey area. Mt. Arapiles Block and Wonwondah North contain scattered clumps of mallee which represent about the S limit of this vegetation in Victoria (and the S limit of this wren).

Stipiturus malachurus. Southern Emu-wren.

Abundance and distribution. Uncommon and restricted to GR and HR. Recorded in GR in the Victoria Valley, Halls Gap, creek in Mt. William Range, upper Wannon River and Victoria Range; and in HR along the Glenelg River and near

Bessiebell. Habitat. Heaths and tussock grass areas in swamp basins.

ACANTHIZIDAE (SCRUBWRENS, THORNBILLS, AUSTRALIAN WARBLERS AND ALLIES)

Sericornis frontalis. White-browed Scrubwren.

Abundance and distribution. Common in the mountain ranges of GR and in the Stones State Faunal Reserve and near Bessiebell in HR; uncommon in ER and AR. The N boundary of ER appears to be the N extent of the range of this wren in Western Victoria (Middleton pers. comm.). Habitat. Dense undergrowth, particularly along watercourses and in lightly grazed areas. Dense shrub layers and heaths in GR and thick Austral Bracken in the Stones State Faunal Reserve and near Bessiebell are particularly well populated. Rarely in Brown Stringybark shrublands in ER or in open areas such as those in pastures or some woodlands. Breeding. On 6 September 1959 Cooper (1960) found a nest with two eggs in a gully in GR. A nest with four eggs was in trousers hanging in a shed near Macarthur (HR) in early October 1964 (RAOU nest card).

Sericornis pyrrhopygius. Chestnut-rumped Hylacola.

Abundance and distribution. Rare and widespread. Recorded in ER along the Edenhope to Harrow Road (Wheeler 1964) and in the Mt. Arapiles Block (FWD survey); and in GR on or near the Victoria Range (Wheeler 1967b; McGarvie pers. comm.; Middleton pers. comm.). Regularly sighted in Red Ironbark open forests near Stawell just E of AR (McCann pers. comm.). The populations in the Mt. Arapiles Block and on the N end of Victoria Range should be examined carefully because it is possible that they are *S. cauta* rather than *S. pyrrhopygius*. Habitat. Heaths and dense shrub layers in open forests. Breeding. Nesting in ironbarks just E of Stawell (AR) in August 1975 (McCann pers. comm.). Nesting near S tip of Victoria Range in 1953 (McGarvie pers. comm.).

Sericornis fuliginosus. Fieldwren.

Abundance and distribution. Rare. Recorded in GR in the Victoria Valley (FWD survey); and in HR in the Stones Block (Learmonth 1951) and near Wannon (Wheeler 1967b). Sullivan (1928) states that it was seen occasionally in the Western District of Victoria. Habitat. Heaths and swamps.

Sericornis sagittatus. Speckled Warbler.

Abundance and distribution. Rare in GR and AR; not seen in ER and HR. Possibly the W boundary of GR is the W limit of the range of this species in Victoria. Recorded in GR near Rocklands Reservoir, in Mt. Dundas and Mooralla Blocks and near Balmoral; and in AR in the Jallukar Block. Habitat. Woodlands (particularly Yellow Gum/Yellow Box) and open forests.

Smicrornis brevirostris. Weebill.

Abundance and distribution. Uncommon and widespread in ER, GR and AR; not seen in HR. Habitat. Woodlands (particularly Yellow Gum), shrublands (mallee) and open forests.

Gerygone olivacea. White-throated Warbler.

Abundance and distribution. Rare, not seen during FWD survey. Recorded in GR in November 1909 (Campbell 1910a) and near Rocklands Reservoir in December 1972 (Mitchell 1973) and in HR near Coleraine in January 1954 (Austin 1954). Habitat. Open forests, mainly E of the survey area (Wheeler 1967a). Breeding. It was nesting (three eggs) in a box-tree about 3·2 km from the foot of the Grampians on 27 November 1909 (Campbell 1910a). Movements. A summer migrant to Victoria.

Acanthiza pusilla. Brown Thornbill.

Abundance and distribution. Common and widespread. Particularly abundant in GR near Silverband Falls and in HR at the Stones State Faunal Reserve. Habitat. Tall open forests, open forests, woodlands, shrublands and heaths. Its distribution in the survey area appears linked to the presence of thick undergrowth rather than to the distribution of dominant tree species. Breeding. An adult was feeding a fledged young in GR near Silverband Falls on 1 November 1975 (FWD survey). Four nests recorded in HR near Dunmore (RAOU nest cards).

Acanthiza uropygialis. Chestnut-rumped Thornbill.

Abundance and distribution. Rare. The NMV holds a specimen collected in the Grampians in 1961. Habitat. Usually shrublands (mallee).

Acanthiza reguloides. Buff-rumped Thornbill.

Abundance and distribution. Common, particularly in AR, and widespread. Usually in small flocks of 5-10 birds, rarely of more than 20. Habitat. Open forests, particularly those with Long-leaf Box, Red Stringybark and Brown

Stringybark; woodlands and shrublands. Breeding. Nesting recorded in GR (McGarvie pers. comm.).

Acanthiza chrysorrhoa. Yellow-rumped Thornbill.

Abundance and distribution. Common and widespread, except in the mountain ranges of GR. Usually in flocks of 10-20 birds. Habitat. Usually foraging on the ground in pastures or under scattered trees along roadsides. Rarely in open forests and woodlands. Breeding. A common nesting species in and near the survey area (Campbell 1906; McGarvie pers. comm.; Hill 1907a; McCann pers. comm.; FWD survey; RAOU nest cards). Nesting commences in July and continues at least into December; clutches are usually of 3 or 4 eggs. Nesting sites include paperbarks (*Melaleuca halmatarorum*), citrus trees, pine trees, cypress trees and lower portions of occupied Wedge-tailed Eagle nests.

Acanthiza nana. Yellow Thornbill.

Abundance and distribution. Uncommon (with local concentrations in GR) and widespread. Habitat. Mainly open forests; occasionally woodlands, tall open forests and shrublands. Shows preference for wattles (Wheeler 1967a; Frith 1969).

Acanthiza lineata. Striated Thornbill.

Abundance and distribution. Uncommon and widespread. Habitat. Tree canopies in tall open forests, open forests, occasionally woodlands and shrublands. Usually in mobile flocks of up to 10 birds in each. Breeding. Regular nesting species in AR near Stawell (McCann pers. comm.). Nesting recorded in GR (McGarvie pers. comm.).

Aphelocephala leucopsis. Southern Whiteface.

Abundance and distribution. Uncommon and widespread. Recorded in ER at Mt. Arapiles Block, along the Edenhope to Harrow Road and near Lake Kanagulk; in GR near Rocklands Reservoir, near S end of Victoria Range and in the Wannon River floodplain on SE side of Serra Range; in AR near Stawell; and in HR along the Wannon River and N of Coleraine. Habitat. Pasture lands and margins of woodlands. Breeding. Nesting recorded in GR (McGarvie pers. comm.).

NEOSITTIDAE (SITTELLAS)

Neositta chrysoptera. Varied Sittella.

Abundance and distribution. Uncommon and widespread; usually in small flocks of less than 10 birds. Habitat. Seen in Long-leaf Box low open forest and Brown Stringybark open forest during FWD survey. Breeding. Nesting recorded in Victoria Range (GR) in 1954 (McGarvie pers. comm.). Adults were feeding young in GR near Balmoral in late December 1972 (McCulloch 1973; RAOU nest card).

CLIMACTERIDAE (AUSTRALIAN TREE-CREEPERS)

Climacteris leucophaea. White-throated Treecreeper.

Abundance and distribution. Common, particularly in GR, and widespread. Habitat. Tall open forest, open forest, low open forest, shrubland and rarely, woodland.

Climacteris picumnus. Brown Treecreeper.

Abundance and distribution. Common and widespread except in the mountains of GR where it is rare. Habitat. Woodlands variously composed of Yellow Gum, Yellow Box, River Red Gum, Grey Box, Long-leaf Box and Buloke, occasionally in Brown Stringybark shrubland. Breeding. Adults were feeding young in GR near Balmoral in late December 1972 (McCulloch 1973).

MELIPHAGIDAE (HONEYEATERS)

Anthochaera carunculata. Red Wattlebird.

Abundance and distribution. Common and widespread. Habitat. Most areas with large trees. Feeding. Recorded taking nectar from blossoms of Yellow Gums, Manna Gums and Red-flowering Yellow Gums (cultivated). Breeding. A common breeding species with young in nest recorded as early as 5 August (RAOU nest card) and with fledged young still being fed by adults in late December (McCulloch 1973).

Anthochaera chrysoptera. Little Wattlebird.

Abundance and distribution. Uncommon with local concentrations in ER and GR. Habitat. Plant associations in which members of the genus *Banksia* are common. Feeding. Recorded taking nectar from flowers of Desert and Silver Banksias. Also seen feeding around the tips of new growth of Silver Banksias.

Anthochaera rufogularis. Spiny-cheeked Honeyeater.

Abundance and distribution. Rare in ER, GR and AR; not recorded in HR. Most sightings are from the Mt. Arapiles Block in ER. Habitat. Usually

shrublands (mallee and occasionally Brown Stringybark), rarely woodlands.

Xanthomyza phrygia. Regent Honeyeater.

Abundance and distribution. Rare, not seen in FWD survey. Recorded in ER along the Glenelg River at Harrow (Wheeler 1964) and at Apsley (Austin 1951); in GR in the Black Range (Wheeler and Pescott 1973), at Halls Gap (Glover 1954) and at Golton Gorge (Middleton pers. comm.); and in AR near Stawell (McCann 1957). Habitat. The common eucalypts around Stawell are Red Ironbark, Long-leaf Box and Yellow Gum (McCann 1957). Breeding. Recorded nesting in a Long-leaf Box near Stawell in 1975 (McCann pers. comm.).

Entomyzon cyanotis. Blue-faced Honeyeater.

Abundance and distribution. Rare. Recorded in ER near Edenhope (Austin 1951) and at Harrow (Wheeler 1964); in GR near Rocklands Reservoir (FWD survey); and in AR near Dadswell Bridge (Middleton pers. comm.) and near Stawell (McCann pers. comm.). Habitat. Woodlands, particularly River Red Gum, Yellow Gum and Yellow Box. Feeding. Recorded taking nectar from Yellow Gum blossoms. Breeding. Nesting is recorded in ER near Edenhope (Austin 1951) and in AR near Stawell (McCann pers. comm.). Conservation aspects. The continued removal of large woodland trees such as River Red Gums, Yellow Gums and Yellow Boxes from the survey area may result in the local disappearance of this species. It is currently present in very low numbers.

Manorina melanocephala. Noisy Miner.

Abundance and distribution. Uncommon and widespread. Habitat. Woodlands or roadside trees in semi-cleared pastures. Occasionally on pasture/shrubland margins. Feeding. Recorded taking nectar from blossoms of a Red-flowering Yellow Gum (cultivated). Breeding. Nesting recorded in GR (McGarvie pers. comm.).

Lichenostomus chrysops. Yellow-faced Honeyeater.

Abundance and distribution. Common in HR in the Stones State Faunal Reserve; uncommon and widespread elsewhere. Habitat. Dense shrub layers in most plant formations, but particularly in Manna Gum open forest. Feeding. Recorded taking nectar from Manna Gum and Yellow Gum blossoms. Breeding. Nesting recorded in GR (McGarvie pers. comm.).

Lichenostomus virescens. Singing Honeyeater.

Abundance and distribution. Common in parts of the narrow coastal strip between Port Fairy and Lake Yambuk (just E of HR) in February 1975 (FWD survey). Habitat. In the survey area it is usually found only in coastal heaths.

Lichenostomus leucotis. White-eared Honeyeater.

Abundance and distribution. Common in HR in the Stones State Faunal Reserve; uncommon and widespread elsewhere. Habitat. Open forests (particularly Manna Gum), shrublands (both mallee and Brown Stringybark), woodlands and heaths. Feeding. Recorded taking nectar from Yellow Gum blossoms. Breeding. A recently constructed nest (no eggs) was found in GR in a shrub near Mt. Zero on 4 August 1957 (Binns 1957). Recorded nesting in GR (McGarvie pers. comm.).

Lichenostomus melanops. Yellow-tufted Honeyeater.

Abundance and distribution. Uncommon and restricted to a few localities in GR and AR. Locally common near Stawell (McCann pers. comm.). Habitat. Woodlands, open forests and low open forests. McEvey (1958) indicates that the preferred habitat is Red Ironbark/Red Stringybark open forest, which becomes extensive just E of AR. Feeding. Recorded taking nectar from Yellow Gum blossoms. Breeding. It nests frequently in grass tussocks and in shrubs less than 0·5 m tall between August and January in AR near Stawell (McCann pers. comm.). A nest with both eggs and young was in GR near Rocklands Reservoir during late October 1965 (RAOU nest card).

Lichenostomus fusca. Fuscous Honeyeater.

Abundance and distribution. Common in AR, reported as the commonest honeyeater at Stawell (Ashby 1927) and near Ararat (Lang 1929); uncommon in GR; rare in ER and not seen in HR. Habitat. Woodlands and low open forests, particularly those containing Grey Box, Long-leaf Box or Yellow Box. Feeding. Nectar was being taken from Manna Gum blossoms in AR near Stawell during March 1975. Breeding. An adult was on a nest in the outer canopy leaves of a 9 m tall Long-leaf Box in the Jallukar Block (AR) on 18 March 1975 (FWD survey). McCann (pers. comm.) reports that it nests regularly in AR near Stawell and has seen feathered young in a nest during November; flying young

have been seen in the same area in January (Glover 1954). Two young were in GR near Balmoral in late December 1972 (RAOU nest card).

Lichenostomus penicillatus. White-plumed Honeyeater.

Abundance and distribution. Common and widespread in ER, GR and AR; uncommon in HR. Habitat. Woodlands (particularly of large River Red Gums) or where large woodland trees remain in semi-cleared pastures. Breeding. Breeding activities have been recorded between early September and late December, with adults feeding fledged young as late as mid-March (FWD survey; RAOU nest cards).

Melithreptus gularis. Black-chinned Honeyeater.

Abundance and distribution. Uncommon and widespread. Habitat. Woodlands (particularly River Red Gum), open forests (particularly Swamp Gum), shrublands (Brown Stringybark) and heaths (Scent-bark). Breeding. Adults were feeding fledged young in GR near Balmoral in late December 1972 (McCulloch 1973).

Melithreptus brevirostris. Brown-headed Honeyeater.

Abundance and distribution. Uncommon and widespread. Habitat. Open forests, shrublands (both mallee and Brown Stringybark), woodlands and heaths (Scent-bark). Feeding. Seen taking nectar from Yellow Gum blossoms. Breeding. Adults were feeding flying young in GR in late March 1967 (Wheeler 1967b).

Melithreptus lunatus. White-naped Honeyeater.

Abundance and distribution. Common (particularly in GR near Halls Gap and in HR in the Stones State Faunal Reserve) and widespread. Habitat. Most areas with large trees, but particularly abundant in Manna Gum open forest. Feeding. Recorded taking nectar from Yellow Gum blossoms. Breeding. Two nests, each containing three young, were in trees in the Balmoral State Forest (GR) between 25 and 30 December 1972 (RAOU nest cards).

Grantiella picta. Painted Honeyeater.

Abundance and distribution. This rare and interesting species appeared in ER near Edenhope every year between 1916 and 1927 (Hindwood 1935). During these years it arrived either in September or October and left during February and March; it did not appear after 1927. More recently McCann (pers. comm.) has recorded it along the E boundary of AR. Habitat. All the sightings by Hindwood (1935) were in one patch of shrubland which contained mainly stringybarks infested with mistletoe. Feeding. Mistletoe berries appeared to be the favoured food of this species near Edenhope. Tree branches near nests were covered with mistletoe seeds and the ground below was littered with them. Breeding. Nests were located near Edenhope in stringybarks and, on one occasion, in a clump of mistletoe during the month of October. The nests were at heights varying from 3 to 15 m above the ground and were woven amongst flower buds in the outer tree branches. The number of eggs in a clutch varied from one to three with the usual number being two (Hindwood 1935). McCann (pers. comm.) reports recent nesting near Deep Lead (along E boundary of AR). Movements. A summer visitor to Victoria (Wheeler 1967a).

Phylidonyris pyrrhoptera. Crescent Honeyeater.

Abundance and distribution. Recorded in the survey area only in GR. In August 1974 it was common on Major Mitchell Plateau and in March 1975 it was on the summit of Mt. William. In spring of 1974 it was also common upstream from Silverband Falls but was absent from this locality in autumn of 1975. Apparently the population in GR has fluctuated during the past 70 years and some of the previous information is summarized by Cooper (1960). During September 1959 Cooper considered it common in GR and states that 'there appears to be a small movement from the Grampians into the surrounding countryside at certain times of the year, but the birds do not wander far'. A few individuals were also recorded in GR along the Glenelg River below Rocklands Reservoir on 18-19 October 1972 (Wheeler and Pescott 1973). Habitat. Apparently attracted to the heaths on Major Mitchell Plateau and to banksias associated with stunted Brown Stringybarks on Mt. William. The vegetation along the creek above Silverband Falls is a Messmate/Brown Stringybark association which has an understorey structurally similar to some wet sclerophyll areas in the Otway Range and parts of eastern Victoria. The habitat of this honeyeater in GR as described by Cooper (1960) is dense gullies and thick tea-tree scrub growing on the slopes and tops of the ranges. Feeding. Recorded taking nectar from heath (*Epacris* sp.) flowers. Breeding. Cooper (1960) presents the following information: 'On September 6, 1959 in a gully in the Grampian Range, I found a nest that was being

built in the top of a clump of dead ferns that had fallen from an overhanging rockface. The nest was built into a small depression in the top of the ferns and its edges were unattached'. Five days later the nest contained eggs.

Phylidonyris novaehollandiae. New Holland Honeyeater.

Abundance and distribution. Common in ER, GR, AR and uncommon in HR; widespread throughout. Habitat. Plant associations with dense shrub layers. Feeding. Recorded taking nectar from the flowers of Yellow Gums, Crimson Bottlebrushes, *Cestrum parqui* (cultivated), Silver Banksias and Desert Banksias. Breeding. A common nesting species in GR (FWD survey; Wheeler and Pescott 1973; McCulloch 1973; RAOU nest card) and in AR (McCann pers. comm.).

Phylidonyris albifrons. White-fronted Honeyeater.

Abundance and distribution. Rare; not seen in FWD survey. Recorded in GR at Balmoral during late December 1972 (Mitchell 1973) and in AR at Stawell and Dadswell Bridge in 1972 (McCann pers. comm.). Habitat. Mainly confined to mallee vegetation which occurs N of the survey area.

Cliciphila melanops. Tawny-crowned Honeyeater.

Abundance and distribution. Uncommon and restricted to GR. Recorded along the upper Wannon River (McCann pers. comm.), in the Victoria Valley (FWD survey), at the SW end of Victoria Range (Middleton pers. comm.) and in the Black Range (Wheeler and Pescott 1973). Habitat. Heaths, usually in the lowlands. Breeding. Nests regularly along the upper Wannon River (McCann pers. comm.).

Acanthorhynchus tenuirostris. Eastern Spinebill.

Abundance and distribution. Uncommon and widespread; locally common during September in GR in Victoria Valley. Habitat. Tall open forests, open forests, low open forests, shrublands (Brown Stringybark) and heaths (particularly during spring). Rarely woodlands and suburban gardens. Feeding. Recorded taking nectar from flowers of Manna Gums, banksias and mistletoe. Breeding. Adults were feeding fledged young in GR near Balmoral in late December 1972 (McCulloch 1973).

EPHTHIANURIDAE (AUSTRALIAN CHATS)

Ephthianura albifrons. White-fronted Chat.

Abundance and distribution. Uncommon, with local concentrations, and widespread. Occasionally in flocks of up to 30 birds in each. Habitat. Open grassy pastures; occasionally margins of lakes and swamps. Breeding. A common nesting bird throughout SW Victoria with specific information being presented by McCulloch (1973) for GR; by Hill (1907a) and Cohn (1927) for AR; and by Sullivan (1928) and RAOU (nest card) for HR.

DICAEIDAE (FLOWERPECKERS AND ALLIES)

Dicaeum hirundinaceum. Mistletoebird.

Abundance and distribution. Uncommon and widespread. Habitat. Most tree-covered areas (particularly woodlands); it inhabits mistletoe which is parasitic on most eucalypt tree species in the survey area. Breeding. It nests in AR near Stawell (McCann pers. comm.).

PARDALOTIDAE (PARDALOTES)

Pardalotus punctatus. Spotted Pardalote.

Abundance and distribution. Common, particularly in GR, and widespread. Habitat. Open forests, particularly of Brown Stringybark; occasionally tall open forests, low open forests and shrublands. Breeding. In early December 1891, a nest with two young was in a burrow in the ground in GR (Anon. 1892). Wheeler and Pescott (1973) reported breeding in GR in October 1972.

Pardalotus striatus. Striated Pardalote.

Abundance and distribution. Common and widespread. Habitat. Woodlands (particularly of River Red Gum), open forests and shrublands. Characteristically an inhabitant of tree canopies. Breeding. Nesting recorded in GR (McGarvie pers. comm.).

ZOSTEROPIDAE (WHITE-EYES)

Zosterops lateralis. Silvereye.

Abundance and distribution. Uncommon and widespread; usually in small flocks of up to 15 birds. Habitat. Most plant associations containing well-developed tree or shrub layers. Breeding. Young Silvereyes have been seen in the Western District of Victoria as early as the week ended 2 June (Sullivan 1928). Wheeler and Pescott (1973) reported breeding in GR on 18-19 October 1972.

FRINGILLIDAE (FINCHES, BUNTINGS AND ALLIES)

Carduelis carduelis. European Goldfinch.

Abundance and distribution. Common in HR, uncommon in ER, GR and AR; widespread throughout. Introduced. Habitat. Pasture and grasslands. Breeding. Forty-six nests were examined in HR near Dunmore between 1964 and 1966 (RAOU nest cards). Eggs and young were present between September and February (inclusive). The clutch size was usually five eggs or, occasionally, four. Nesting recorded in GR (McGarvie pers. comm.).

Carduelis chloris. European Greenfinch.

Abundance and distribution. Uncommon; an introduced species recorded in small numbers in HR at Hamilton and Coleraine (Austin pers. comm.). Habitat. Suburban gardens.

PASSERIDAE (OLD WORLD SPARROWS)

Passer domesticus. House Sparrow.

Abundance and distribution. Common, particularly in HR, and widespread; introduced. Habitat. Pastures, suburban gardens and towns. Breeding. Adults were feeding young in GR near Balmoral in late December 1972 (McCulloch 1973).

Passer montanus. Eurasian Tree Sparrow.

Abundance and distribution. Rare in western Victoria; one recorded in HR near Wannon in late March 1967 (Wheeler 1967b). Introduced.

PLOCEIDAE (WEAVERS, WAXBILLS AND ALLIES)

Emblema temporalis. Red-browed Firetail.

Abundance and distribution. Uncommon and widespread. Habitat. Grassy areas, particularly those near dense shrub growth such as along watercourses or areas which are not heavily grazed. Feeding. Recorded taking grass seeds. Breeding. Adults were feeding fledged young in GR near Balmoral in late December 1972 (McCulloch 1973). A nest was in a wattle on SW end of Victoria Range in November 1955 (Middleton pers. comm.).

Emblema guttata. Diamond Firetail.

Abundance and distribution. Uncommon and widespread. Habitat. Open grassy areas in woodlands, pastures, open forests and suburban gardens. Breeding. Regularly nests in AR near Stawell (McCann pers. comm.). Adults were feeding young in GR near Balmoral in late December 1972 (McCulloch 1973).

STURNIDAE (STARLINGS, MYNAS AND ALLIES)

Sturnus vulgaris. Common Starling.

Abundance and distribution. Common and widespread with particularly large numbers in HR. As early as 1928 this introduced species was 'very common' in the Western District of Victoria (Sullivan 1928). Habitat. Pastures and near human habitation. Breeding. Nesting recorded in GR (McGarvie pers. comm.).

ORIOLIDAE (ORIOLES AND FIGBIRDS)

Oriolus sagittatus. Olive-backed Oriole.

Abundance and distribution. Rare; two seen in HR near Wannon in late March 1967 (Wheeler 1967b). One recorded in GR on W side of Victoria Range in November 1967 (McGarvie pers. comm.). Habitat. Generally confined to forested areas (Wheeler 1967a). Movements. A summer migrant to Victoria, although some winter here (Wheeler 1967a).

CORCORACIDAE (AUSTRALIAN MUD-NESTERS)

Corcorax melanorhamphos. White-winged Chough.

Abundance and distribution. Uncommon and widespread; in small flocks of up to 30 birds. Habitat. Woodlands (River Red Gum, Yellow Gum and Yellow Box) and open forests (Brown Stringybark, Swamp Gum and Red Stringybark). Breeding. Recorded nesting in GR in the Black Range in October 1972 (Wheeler and Pescott 1973).

GRALLINIDAE (MAGPIE LARKS)

Grallina cyanoleuca. Australian Magpie Lark.

Abundance and distribution. Common and widespread. Habitat. Pastures, crop lands, woodlands, suburban gardens and margins of standing water. Breeding. Adults were feeding young in a nest in GR near Balmoral in late December 1972 (McCulloch 1973).

ARTAMIDAE (WOODSWALLOWS)

Artamus personatus. Masked Woodswallow.

Abundance and distribution. Uncommon, not seen in FWD survey. Recorded in GR along the E boundary (McCann pers. comm.) and near Rock-

lands Reservoir (Wheeler and Pescott 1973). Mixed flocks of masked and white-brows are regularly sighted in HR over Coleraine on their N migration and Austin (1972) gives details of such sightings for 3 November 1971. The White-browed Woodswallow predominates in the survey area. Habitat. A highly mobile species which may be seen in or over most habitats with woodlands being preferred in the survey area. Breeding. Both the Masked and White-browed Woodswallow nested near Portland in December of 1950 and 1952 and near Casterton in December 1962 (both areas are just W of HR). There were hundreds of nesting birds in approximately the ratio of ten white-browed to one masked. On these occasions they used only a small area of bushland, and several nests were in one tree (Austin 1972). Movements. The northward migration over Coleraine usually occurs during October and November (Austin 1972). Both the Masked and the White-browed Woodswallow mingle in mixed-species flocks and wander extensively over the continent, wintering mainly in the tropics (Frith 1969).

Artamus superciliosus. White-browed Woodswallow.

Abundance and distribution. Numbers fluctuate, occasionally common. Recorded in ER in the Tooan Block (FWD survey); in GR along the E boundary and near Rocklands Reservoir; and in HR over Coleraine (also see comments for Masked Woodswallow above). Habitat. As for Masked Woodswallow. Feeding. McCann (1964) gives a detailed description of this species feeding on Sugar Ants (*Camponotus* sp.) in GR. Wheeler and Pescott (1973) describe a large flock flopping in amongst Yellow Gum blossoms and feeding on insects and possibly nectar in GR near Rocklands Reservoir. Breeding. Nests with eggs or young were present in GR through the summer of 1963, until the middle of January 1964 (McCann 1964). Nests with eggs and young were in GR near Balmoral in late December 1972 (McCulloch 1973). Also see breeding information for Masked Woodswallow (above). Movements. As for Masked Woodswallow (above).

Artamus cyanopterus. Dusky Woodswallow.

Abundance and distribution. Common and widespread. Habitat. Woodlands and semi-cleared pastures, particularly those which provide perching sites as well as adequate open space for soaring and insect catching on the wing. Occasional in most other habitats where trees are present. Breeding. Adults were feeding young in GR near Balmoral in late December 1972 (McCulloch 1973).

Artamus minor. Little Woodswallow.

Abundance and distribution. Rare. A single bird with a flock of Tree Martins was in ER near Edenhope in early September 1941 (Collins 1942), and a flock of 15 was in GR near Dunkeld on 8 March 1969 (Austin 1969; 1972).

CRACTICIDAE (BUTCHERBIRDS AND CURRAWONGS)

Cracticus torquatus. Grey Butcherbird.

Abundance and distribution. Rare. Single birds have recently been recorded in ER in the Kallungur and Dopewora Blocks (FWD survey) and along the road between Edenhope and Harrow (Wheeler 1964). In GR one was recorded in Victoria Valley (McGarvie pers. comm.) and two were seen near Rocklands Reservoir (Mitchell 1973). Habitat. Woodlands, shrublands and roadside trees in pastures. Conservation aspects. Austin (1951) comments that this species was once common throughout the whole of the SW district in Victoria, but it is now seldom seen. We suggest that more detailed studies on this bird over all of its range in Victoria might be required to ascertain its present status in relation to previous numbers and distribution.

Gymnorhina tibicen. Australian Magpie.

Abundance and distribution. Common and widespread. Habitat. All habitat types, but particularly pasture and crop lands. In ER on 3 October 1974 we counted 138 magpies along a secondary road between the Mt. Arapiles Block and Clear Lake (a distance of 24·5 km) or an average of about 5·6 magpies per km of road. Breeding. Many recently fledged young were present in ER during early October 1974. A high mortality of these young birds occurred along main roads where many were struck by vehicles. On 3 October 1974, we travelled 30 km on main roads around Horsham and counted 26 recently killed young (nearly one per km). Sullivan (1928), in commenting on the Western District of Victoria in general, indicated that young of the species were present as early as the 1st June.

Strepera graculina and *S. versicolor*. Pied and Grey Currawongs.

Abundance and distribution. Uncommon, with occasional local concentrations, and widespread. The forms of this genus are quite confusing in this part of the State and may require detailed

study to clarify the situation. Habitat. Light to moderately dense stands of timber. Breeding. Adult Pied Currawongs were feeding fledged young in GR near Balmoral in late December 1972 (McCulloch 1973).

CORVIDAE (CROWS)

Corvus coronoides and *C. mellori*. Australian and Little Ravens.

Abundance and distribution. During this survey, ravens were identified only to genus, but recent work by Rowley (1970) indicates that both Australian and Little Ravens are present. Ravens were common and widespread with a flock containing more than 1000 individuals near the coast between Lake Yambuk and Port Fairy on 21 February 1975. Habitat. Pasture and crop lands, but occasionally in all types of terrestrial habitats. Breeding. On 5 December 1974 we found a nest with two well-grown young in ER in the Morea Block. It was about 4 m from the top of a Yellow Gum (15 m tall) standing in the middle of a flooded depression in a woodland.

Appendix 6

Annotated list of mammals from the Grampians-Edenhope Area of southwestern Victoria

TACHYGLOSSIDAE (ECHIDNA)

Tachyglossus aculeatus. Echidna.

Abundance and distribution. Uncommon and widespread. Habitat. Most terrestrial habitats, ranging from wet cool areas in the Victoria and Mt. William Ranges, GR, to dry sandy environments with sparse vegetation in ER. Occasionally in pasture land, but usually near native vegetation. Most recent record. 1973 (FWD 9257). Observed in 1974-75 FWD survey.

ORNITHORHYNCHIDAE (PLATYPUS)

Ornithorhynchus anatinus. Platypus.

Abundance and distribution. Uncommon and restricted to major waterways (e.g. Wimmera, Wannon and Glenelg River systems). Habitat. The Platypus is an aquatic species which emerges from water only to enter burrows in stream banks. The burrows are excavated in friable silts along the streams and are vulnerable to stream bank alterations (e.g. stream 'improvements') or grazing of heavy domestic animals. Conservation aspects. There are few areas set aside for the conservation of this species in Victoria; GR offers an opportunity to protect a large area of its habitat. The Wimmera River (once joined to the Murray River) has a population of Platypus which, in its present isolated state, may be of zoogeographic interest. Most recent record. 1970 (FWD 5269).

DASYURIDAE (MARSUPIAL CARNIVORES)

Dasyurus maculatus. Tiger Cat.

Abundance and distribution. Uncommon and apparently now restricted to the Stones Block, HR. Two individuals were trapped at one trapping site during the survey. Habitat. Manna Gum open forest with a ground layer of grass, Austral Bracken and many volcanic boulders (p.c.-22). The accumulation of rocks provides many small recesses and caves for den sites. During the breeding season males sometimes occur in adjacent pastures but these cleared areas do not support a permanent population. Breeding. Two individuals trapped in late February were juvenile males, approximately one-half to two-thirds grown. Adult and sexually active males have been recorded during the months of June, July and August. Conservation aspects. The Stones Block provides the best opportunity to protect and study the Tiger Cat in Victoria. Other areas where this species occurs, such as the Otway Range and East Gippsland, are so large and the observations are so scattered that no specific area within these can be defined with the certainty that a viable Tiger Cat population is included. Most recent record. 1975 (FWD 10020). Observed in 1974-75 FWD survey.

Phascogale tapoatafa. Tuan.

Abundance and distribution. Rare and widespread. Recorded in ER at Apsley and Telangatuk East; and in HR at Brit Brit, Cavendish, Bulart and Coleraine. Habitat. Woodlands (e.g. River Red Gum) and open forests (e.g. box) with grassy or sparse shrub undergrowth. These were formerly widely distributed on the plains of the survey area but are now restricted to river reserves and road margins. The extensive series of swamps and lakes in ER may provide enough woodland for small populations of Tuans to survive. Conservation aspects. Little is known about the biology of this species, which makes it difficult to suggest ways to improve its chances of survival. If the *status quo* of pasture to woodland ratio is maintained in the western plains the species may be adequately catered for. Woodlands, particularly roadside reserves, must be left untouched. Most recent record. One road-killed

specimen (NMV C13164) found during 1974-75 FWD survey.

Antechinus flavipes. Yellow-footed Antechinus.

Abundance and distribution. Uncommon and widespread. Recorded from all regions of the survey area but absent S of Hamilton, HR. A total of 35 individuals was trapped at 15 trapping sites and the maximum trapping rate was 4 per cent. Habitat. Woodland, open forest, low open forest and shrubland. In particular, Brown Stringybark low open forest and shrubland with tall dense heath underlayers which occur from the outwash sands of GR through to high sand dunes in ER. It occasionally occurs in wetter vegetation such as Messmate and Brown Stringybark open forest and is also recorded in swampy areas with Scent-bark and River Red Gum. Shrubs appear to be most important and where they are tall and dense, Yellow-footed Antechinus is recorded. The highest altitude at which it was recorded was 680 m. Trapped in p.c. (plant communities in Appendix 1)—6, 8, 14, 16, 18, 19, 20, 26, 31 and 33. Breeding. Trapping results indicate that male die-off was complete by mid-August. Females with pouch young were first recorded in early September; each female examined had 10 young. Lactating females without pouch young but each with 10 functioning teats were recorded in early October. The first of the year's offspring were trapped in early December and by March they had almost attained adult dimensions. Morphology. Individuals examined were of the typical *Antechinus flavipes flavipes* form as described by Wakefield and Warneke (1967). Mean dimensions for five adult female specimens are:

Weight (g)	Total Length (mm)	Tail Length (mm)	Pes (mm)	Ear (mm)
32	196	86	19	18

Most recent record. Collected in 1974-75 FWD survey (NMV C14052).

Antechinus stuartii. Brown Antechinus.

Abundance and distribution. Common and restricted; occurring throughout the ranges in GR and in the Stones Block, HR. A total of 89 individuals was recorded at 13 trapping sites with a maximum trapping rate of 29 per cent on Major Mitchell Plateau, GR. Habitat. Open forest, tall open forest and sub-alpine heath. In GR it was usually recorded in the ranges and foothills where the dominant trees were tall and of typical forest form with a well-developed undergrowth of shrubs and dense herbs. However, much of the Grampians vegetation is stunted, particularly at high altitudes where adverse climatic conditions and rocky substrate have prevented significant growth. Broken rocky substrate and dense heaths on Major Mitchell Plateau supported a dense population of the Brown Antechinus. The habitat of the Stones Block was marginal and only one individual was recorded. Trapped in p.c.—1, 2, 6, 8, 9, 10, 12, 14, 22, 26, 28, 29, 30, 31 and 32. Breeding. Trapping results suggest that male die-off was complete by mid to late August. Most females captured in early September had pouch young; of 22 individuals examined, 20 had eight young, 1 had seven young and 1 had six young. All females examined had eight teats. Young examined on 8 September 1974 had crown-rump lengths of approximately 10 mm. In late October all animals trapped were adult lactating females without pouch young; juveniles were first recorded in early December. Young of the 1974 season reached adult dimensions in March 1975. Morphology. The animals recorded in the Grampians were similar to those described by Wakefield and Warneke (1967). Considerable variability was noted and weights varied in adults from 25 g for a female to a maximum 43 g for a male. Means of plastic characters measured on animals trapped between March and September are given below. The number of animals involved in each mean is given in brackets.

	Weight (g)	Total Length (mm)	Tail (mm)	Pes (mm)	Ear (mm)
Female	26·4(8)	190(20)	88(20)	18·1(19)	17·4(20)
Male	35·2(5)	211(5)	94·8(5)	17·6(5)	16·6(5)

The disparity between the number of animals in the weight sample and those used for linear measurements exists because wet specimens were measured but not weighed. Most pelage characteristics were similar to those in other Victorian populations. However, in some specimens from the survey area the orbital crescent, which is usually unnoticeable, was as prominent as that in *Antechinus flavipes* and there was a distinct (also similar to *A. flavipes*) antero-posterior differentiation in colour of the dorsal pelage, with the head and neck region being a steel, almost blue-grey hue changing abruptly to the 'normal' grizzled grey of the back. These animals were also larger than average and were sympatric with

A. flavipes. Most recent record. Collected in 1974-75 FWD survey (NMV C13961).

Antechinus swainsonii. Swainson's Antechinus.

Abundance and distribution. Common and restricted to GR and HR. Widespread in the Grampians ranges and occurs throughout the Stones and Mt. Napier Blocks, HR. Ninety-five animals were trapped at 14 trapping localities with a maximum trapping rate of 20 per cent. Habitat. Wet, dense shrub and herb layers which usually occur in areas with relatively high rainfall such as the major Grampians ranges and in dry areas along streams and around foothills of the major ranges where run-off results in luxuriant sedge and fern growth. In the Stones Block, HR, Austral Bracken rather than shrubs dominates the undergrowth and the aggregations of volcanic boulders provide numerous small caves and other recesses suitable for nesting. This is similar to the Lake Corangamite 'Stony Rises' which also support large *Antechinus swainsonii* populations (Emison *et al.* 1975). Trapped in p.c.—1, 2, 6, 7, 8, 9, 10, 12, 14, 22, 26, 28, 29, 31 and 32. Breeding. Male die-off had been completed before the start of the trapping programme on 13 August 1974. Females both with unused pouches and pouch young were recorded in mid-August. The one pouch litter examined possessed eight young on the eight available teats. At the beginning of September all animals trapped were lactating females without pouch young. The next trapping period was in late October when, of 25 individuals recorded, 22 were juveniles and there was a marked difference in juvenile size, suggesting either differing birth dates or growth rates. No second year females were recorded later than December. Morphology. Pelage characteristics and size were uniform throughout the survey area. Superficially, at least, the population in the survey area resembles the lowland populations from elsewhere in the State and contrasts markedly with the large dark animals of the moist highlands. Adult males were not trapped during the survey but means of the plastic characters for seven adult females are:

Total Length (mm)	Tail (mm)	Pes (mm)	Ear (mm)
224	99·0	20·6	17·4

Most recent record. Collected in 1974-75 FWD survey (NMV C13960).

Sminthopsis murina. Mouse Dunnart.

Abundance and distribution. Uncommon. There are two records for the survey area: a specimen collected 23 km NNW of Coleraine, HR, in 1962; and a trapping record in 1976 for the northern Victoria Valley, GR (Cockburn pers. comm.). It may be widespread in HR and ER. Habitat. Shrubland. In other parts of Victoria the Mouse Dunnart is associated with dry sandy environments such as mallee and Brown Stringybark shrubland. Large Crown Land blocks in ER (e.g. Jilpanger Block) have an environment similar to other parts of its range. Most recent record. 1962 (NMV C4510).

Sminthopsis crassicaudata. Fat-tailed Dunnart.

Abundance and distribution. Uncommon and widespread. Recorded in ER at Goroke and Telangatuk East; in AR at Stawell and Ararat; and in HR at Coleraine and Hamilton. The small number of records (14) is probably not a true indication of abundance because they are often confused with the House Mouse and both species are called 'field mice' in many country areas. Habitat. Grassy plains. The Fat-tailed Dunnart was undoubtedly a resident of the formerly widespread woodlands and grassy plains which once covered the Basalt Plains and Northern Plains of Victoria. These habitats have now been cleared to pasture land but Fat-tailed Dunnarts are still widespread and appear to survive well in some farm areas. Nest sites are usually located beneath logs, rocks or discarded farm implements. Most recent record. 1970 (NMV C9545).

PERAMELIDAE (BANDICOOTS)

Isoodon obesulus. Short-nosed Bandicoot.

Abundance and distribution. Common and restricted to GR and possibly AR. Recorded at Billywing, Halls Gap, Pomonal, northern Victoria Valley, Mt. Rosea and Teddy Bear Gap. Four animals were trapped at one locality with a maximum trapping rate of 3 per cent. Habitat. Dense herb layers in several different plant communities (e.g. moist swampy areas of heath usually in or near stands of trees, and wet stream side or swamp vegetation of sedges and Austral Bracken). Roadside reserves of sedges and grasses may support populations on the plains in AR. Short-nosed Bandicoots forage on lawns in Halls Gap and seek refuge in thick ground vegetation of Austral Bracken and sedges. Breeding. Three females examined on 10 September 1974 exhibited a wide range of breeding conditions. One was a

sub-adult although nearly full-grown, the second had three small unfurred pouch young and the third had four large furred pouch young which were close to leaving the pouch. Most recent record. Collected in 1974-75 FWD survey (NMV C14058).

Perameles gunnii. Gunn's Bandicoot.

Abundance and distribution. Uncommon and restricted. The last known population in Victoria occurs mainly in the city of Hamilton, HR, although recent specimen records indicate that the present range extends NW as far as Coleraine and S to Port Fairy. Recollections of landholders indicate that even within the last 50 years the species has been far more widespread and occurred throughout the plains and into the southern Victoria Valley of GR. They attribute the decline of the species to the upsurge of the Fox population. Habitat. Grassland and woodland. It formerly inhabited the grasslands on the volcanic plains but now occurs mainly in suburban gardens in Hamilton and some lightly farmed areas such as creekside and road reserves. Conservation aspects. The survival of this species in Victoria may be dependent upon adequate areas of suburban gardens remaining in Hamilton. In the long-term, it may be important to examine the predator-prey relationship between the Fox and this bandicoot before its reintroduction into areas where it previously occurred. Most recent record. 1971 (NMV C10997).

PHASCOLARCTIDAE (KOALA)

Phascolarctos cinereus. Koala.

Abundance and distribution. Common and restricted. The distribution of Koalas in the survey area is related to the liberation of animals in selected areas by FWD. As far as is known, no natural populations remained in the survey area after the decimation of Koalas in the late 1800s and early 1900s. Liberations began in 1947 and 1948 when groups of 12 and 16 animals respectively were released at Wartook Reservoir, GR. In 1957, 611 animals were released in the Halls Gap, GR, and Ararat, AR, areas. Several animals have recently been released in the Stones Block, HR. These releases have been successful and viable populations occur at each of these localities. Habitat. Open forest and woodland where suitable food trees are present. They occur in Manna Gum forests around Halls Gap, in the Stones Block and at Lake Wartook. Most recent record. 1971 (FWD 5444). Observed in 1974-75 FWD survey.

PHALANGERIDAE (LARGE POSSUMS)

Trichosurus vulpecula. Brush-tailed Possum.

Abundance and distribution. Common and widespread. Habitat. Most tree-covered areas; in some localities they may take shelter in sheds and the roofs of houses. Brown Stringybark shrubland which is extensive in ER and some parts of GR is unsuitable, possibly because there are few nest sites. Treeless pastures are not occupied but woodland roadside reserves are densely populated. With these few exceptions, all woodland and open forest is occupied and in GR droppings and tracks of this possum also occur throughout extensive rocky areas and broken cliffs. Most recent record. 1972 (FWD 8125). Observed in 1974-75 FWD survey.

PETAURIDAE (GLIDERS AND ALLIES)

Pseudocheirus peregrinus. Ring-tailed Possum.

Abundance and distribution. Uncommon and widespread. Recorded in ER at Mt. Arapiles and Nurrabiel; in GR at Victoria Valley, Mt. Frederick, Pomonal and Rocklands Reservoir; and in AR at Ararat. Habitat. River Red Gum, Yellow Box, Yellow Gum, Scent-bark, Brown Stringybark, Swamp Gum, Manna Gum and Messmate woodlands and open forests with dense shrub layers of banksias, tea-trees and wattles over 3 m tall. In GR such vegetation occurs along creeks and in some swamps, but not on dry slopes or in heath. This possum has also been reported among rock screes and on cliffs, although this was not observed during FWD survey. On the plains, cultivation has destroyed most of the original vegetation and the remnant Ring-tailed Possum populations are restricted to some roadside reserves and other reserves such as Mt. Arapiles. Most recent record. 1975 (FWD 10113). Observed in 1974-75 FWD survey.

Petaurus breviceps. Sugar Glider.

Abundance and distribution. Uncommon and widespread. Recorded in ER at Horsham; in GR at Rocklands Reservoir, Victoria Valley, Halls Gap, Pomonal and Mirranatwa Gap; in AR at Stawell; and in HR at Coleraine, Hamilton, Mt. Eccles and Tarrayoukyan. Habitat. River Red Gum, Yellow Gum and Yellow Box woodland and Scent-bark, Manna Gum and Swamp Gum open forest. In ER the glider is restricted

to swampy areas of River Red Gum and Yellow Gum woodland. The structure of the dominant tree species is important in determining Sugar Glider distribution and the presence of tall shrubs (e.g. Silver Wattle) may also be important. Most recent record. 1973 (FWD 9112). Observed in 1974-75 FWD survey.

Petaurus norfolcensis. Squirrel Glider (Plate 21, Fig. 5).

Abundance and distribution. Rare and restricted in the survey area. There are only two records in the survey area (both from AR): 5 km NW of Stawell in 1970; and Dadswell Bridge in 1968. The species is rare to uncommon throughout all of its Victorian range. Habitat. River Red Gum, Yellow Gum and Yellow Box woodlands on the plains. Most of these woodlands have been cleared for agriculture or devastated during the gold mining era. The small remaining areas are restricted to swamps and along roadsides and rivers. Squirrel Gliders have not been recorded in any of the major blocks of Crown Land. Most recent record. 1970 (NMV C9543).

Petaurus australis. Yellow-bellied Glider.

Abundance and distribution. Uncommon and restricted. Recorded in the Stones State Faunal Reserve, the Stones Block, HR. This population is isolated from those at Cape Otway and in the Portland district. Habitat. Manna Gum open forest. Characteristic 'V' gougings occur on many trees indicating that this glider occurs throughout the wildlife reserve. Conservation aspects. The established wildlife reserve provides an excellent opportunity to protect the species within a defined area. Most recent record. Observed in 1974-75 FWD survey.

BURRAMYIDAE (PIGMY POSSUMS)

Acrobates pygmaeus. Feather-tailed Glider.

Abundance and distribution. Uncommon but probably widespread in GR, AR and HR. Recorded in GR at Victoria Valley and in AR at Willaura. Habitat. River Red Gum, Yellow Gum and Yellow Box woodland and Manna Gum, Scent-bark and Swamp Gum open forest are probably suitable. A well-developed shrub layer of wattles is probably beneficial. The large areas of Brown Stringybark shrubland in ER and some areas of GR may be unsuitable. Most recent record. 1971 (NMV C10740). Observed in 1974-75 FWD survey.

Cercartetus nanus. Eastern Pigmy Possum.

Abundance and distribution. Uncommon and restricted. There is only one specimen from the survey area (Stawell in AR) but observations have been made at McKenzie Creek (Wakefield 1963b), The Pinnacle and Mirranatwa Gap, all localities in GR. Habitat. Open forest, heath and woodland. The observations at Mirranatwa Gap and The Pinnacle were in heathy areas with extensive broken rock and cliffs. Most recent record. 1965 (FWD P496).

Cercartetus concinnus. Western Pigmy Possum.

Abundance and distribution. Rare and probably restricted to ER. One specimen from Edenhope and an observation at Murrabiel constitute the only records from the survey area. The centre of the Victorian distribution of this species is in the mallee and banksia shrublands of the Little Desert, Big Desert and Sunset Country. Habitat. Mallee and Brown Stringybark shrublands, Yellow Gum and Black Box woodlands which have mid-dense shrub layers of proteaceous shrubs (e.g. banksias, hakeas, etc.) and some myrtaceous shrubs such as melaleucas. The species may also occasionally occur on farmland, usually in farm machinery (Wakefield 1963b). Most recent record. 1952 (NMV C2471). Observed in 1957 (Wakefield 1963b).

MACROPODIDAE (KANGAROOS AND WALLABIES)

Potorous tridactylus. Potoroo.

Abundance and distribution. Uncommon and restricted. Recorded from one locality near Pomonal, GR (Seebeck 1976). This population is isolated from others near Portland in the SW and Warrnambool in the SE. Habitat. Tall dense heath on wet sites. The optimum habitat is in the moist gullies under Swamp Gum open forest with dense layers of myrtles and tall sedges. It is less abundant on the adjacent drier slopes where Shining Peppermint is common and the shrub and herb layers are mid-dense. Most recent record. 1972 (FWD 8380).

Genus *Macropus*: Identification.

Three species of *Macropus* occur in the survey area. The Red-necked Wallaby, smaller than the two kangaroos, is distinctly marked and is not difficult to recognise. However, considerable difficulty was encountered in positively identifying animals of the Western and Eastern Grey

Kangaroo species. In the absence of blood protein analyses (Kirsch and Poole 1972), *ad hoc* identification criteria were devised by discussion with persons familiar with both species (e.g. J. K. Dempster) and by morphological and behavioural observations and resultant feedback in the field. Poole (1973) discusses species determination by using coat colour alone and found the grey or brown colouration of the forehead the only consistent distinguishing feature. Clearly, without shooting animals, the identification of forehead colouration would be difficult during the day and impossible at night. In order to obtain at least some meaningful observations we utilized the general colour difference between the two species. Eastern Grey Kangaroos in E Victoria are light grey and Western Grey Kangaroos in far NW Victoria are a distinct brown. By recording the occurrence of these extremes and disregarding the questionable intermediate forms (of which there were many), it was possible to determine some differentiation in habitat utilization and therefore distribution in the survey area. Previous confusion in the taxonomy of the grey kangaroo species precludes the use of specimen data.

Macropus giganteus. Eastern Grey Kangaroo.

Abundance and distribution. Common and widespread. Recorded in GR at Pomonal, Victoria Valley, Lake Wartook, Halls Gap, Billywing, Zumsteins, Mirranatwa and as far west as Rocklands Reservoir; and in HR in the Stones Block. Habitat. Open forests and woodlands with ground covers of grass and few shrubs. They are common in River Red Gum woodlands in the Victoria Valley and in open forest margins around Halls Gap where farmland and lawns provide ideal grazing conditions. The Stones Block contains Manna Gum open forest with a grass and Austral Bracken herb layer which adjoins cleared areas of old farmland. Short grasses and herbs for grazing, rather than shrubs for browsing, are prevalent in most Eastern Grey Kangaroo habitat. Breeding. Young at foot and in the pouch were present throughout the survey period. Most recent record. Observed in 1974-75 FWD survey.

Macropus fuliginosus. Western Grey Kangaroo.

Abundance and distribution. Recorded throughout major Crown Land blocks in ER and in GR as far east as the Serra Range. Western Grey Kangaroos are sympatric with Eastern Grey Kangaroos from Rocklands Reservoir through the Victoria Valley to the Serra Range. Habitat. Low sandy sites covered by Brown Stringybark shrubland with a dry heath layer. Generally not recorded high in the ranges but occasionally on the foothills. This kangaroo often congregates (in some localities with Eastern Grey Kangaroos) around clearings or farmlands and emerges from cover at dusk to feed. Breeding. Young at foot and in the pouch were observed throughout the survey period. Most recent record. Observed in 1974-75 FWD survey.

Macropus rufogriseus. Red-necked Wallaby.

Abundance and distribution. Common and widespread. Recorded in ER in the Jilpanger, Tooan and Mt. Arapiles Blocks; in GR at Victoria Valley, Billywing, Mirranatwa, Black Range, Zumsteins and Halls Gap; and in HR at 5 km W of Bessiebelle. It was particularly common in Victoria Valley and at some of the other localities in GR, but less so in the smaller Crown Land blocks where local farmers suggest that '1080' poisoning has reduced populations. Habitat. Heath, shrubland, open forest and low open forest. Particularly common in Brown Stringybark low open forest with a heathy shrub layer and interspersed by clearings. This wallaby inhabits most mountainous areas and other moist shrub vegetation as well as most habitats occupied by the Western Grey Kangaroo. It emerges from cover at dusk to feed on grasses and regenerating shrubs in farmland and grassy woodland. Breeding. Young at foot and in pouch were observed throughout the survey period. Most recent record. Collected in 1974-75 FWD survey (NMV C13926).

Petrogale penicillata. Brush-tailed Rock Wallaby.

Abundance and distribution. Rare and restricted. Once common and widespread throughout rocky mountainous areas of Victoria but populations declined early this century. It is now restricted to two areas in the State, one in the Snowy River region of eastern Victoria and the other in a small area in the Victoria Range, GR. Since attention was drawn to the present population in GR (Wakefield 1971) extensive searches of nearby ranges have failed to uncover any other existing populations although old faecal material and caves which may have been used by rock wallabies were found at Mt. Stapylton and in the Hut Creek Gorge. Habitat. Rugged rocky areas. In the Victoria Range sandstone cliffs and stacks of broken rock have formed caves and shelter. The vegetation is sparse Brown Stringybark trees and a scattered growth of shrubs such as hakeas

and casuarinas. Conservation aspects. The size of the population in GR is unknown and it is difficult to know the wisest course to pursue for their conservation. One possibility is to ensure that they remain undisturbed although a study of them might lead to an understanding of the reason for their decline. Such knowledge and an active propagation programme might allow reinstatement not only throughout GR but at Mt. Arapiles and the eastern highlands as well. Most recent record. 1971 (Wakefield 1971).

LEPORIDAE (HARES AND RABBITS)

Lepus europaeus. Hare.

Abundance and distribution. Probably uncommon and widespread in AR and HR. Introduced into Australia last century, the species has spread widely through farming areas and some alpine areas of eastern Australia. Habitat. Grassy plains. It is probably now restricted to farmland on plains. Most recent record. None.

Oryctolagus cuniculus. Rabbit.

Abundance and distribution. Common and widespread. Introduced into Australia last century and now present throughout the survey area. Habitat. Most terrestrial environments except extensive rocky areas, dense wet forest and well-managed farmland. It inhabits virtually all types of vegetation. Most recent record. Observed in 1974-75 FWD survey.

MURIDAE (RATS AND MICE)

Rattus fuscipes. Bush Rat.

Abundance and distribution. Common and restricted. Recorded in HR at the Stones and Mt. Napier Blocks; 106 animals were trapped at two trap sites with a maximum trapping rate of 30 per cent. Apparently absent from suitable habitat in GR although remains are present in subfossil deposits (Wakefield 1963a). Animals in HR appear to represent the eastern limit of distribution of the subspecies *R. f. greyi*. Habitat. The vegetation in the Stones Block is mainly Manna Gum open forest with a herb layer of Austral Bracken and grasses over a stony substrate which contains a labyrinth of small holes and tunnels. Most recent record. Collected in 1974-75 FWD survey (NMV C13560).

Rattus rattus. Black Rat.

Abundance and distribution. Common and widespread; 34 individuals were trapped at 13 trap sites in GR and ER (Mt. Arapiles Block) with a maximum trapping rate of 4 per cent. An exotic species which is now established in urban, rural and some natural surroundings. Habitat. In GR and at Mt. Arapiles (ER) the Black Rat occurs in rocky areas or near creeks, these being amongst the few areas in which it is not closely associated with man. In other parts of its Victorian range this rat inhabits rural areas in and around farm buildings and thrives in some urban environments, particularly rubbish dumps. Trapped in p.c.—6, 7, 8, 9, 10, 14, 15, 16, 21, 26, 29, 30, 31 and 43. Most recent record. Collected in 1974-75 FWD survey (NMV C13958).

Rattus lutreolus. Swamp Rat.

Abundance and distribution. Common and widespread. Recorded in GR at Halls Gap, Victoria Valley, Mt. William, Lake Wartook, Black Range, Mirranatwa Gap, Pomonal and Dunkeld; and in HR at Byaduk and Mt. Napier; 210 animals were trapped at 14 trap sites with a maximum trapping rate of 26 per cent. Habitat. A wide range of environments are occupied, from warm lowlands at Byaduk (HR) to cold sub-alpine conditions on 1160 m Mt. William (GR). Mid-dense to dense herb cover of approximately 0·3 m high is essential. Such vegetation most commonly occurs in tall dense heaths and sedge swamps such as those in Victoria Valley and in sub-alpine heaths in GR. In drier areas its distribution is restricted to dense vegetation along creeks. It has been reported from farmland margins E and SE of Dunkeld (Munro pers. comm.). It is not known how widely it is distributed in the open plains. Trapped in p.c.—1, 2, 6, 7, 8, 9, 10, 12, 14, 15, 16, 26, 28, 29, 30, 31, 32 and 33. Breeding. Males with prominent scrota but undescended testes were recorded during September; one scrotal male was recorded in March. Juveniles were first recorded in early December and were still present during March. Most recent record. Collected in 1974-75 FWD survey (NMV C13957).

Rattus norvegicus. Sewer Rat.

Abundance and distribution. Uncommon and restricted. The only record for the survey area is a specimen from Hamilton, HR. This species has spread in association with towns since its introduction from Europe. Habitat. Urban environments. The specimen was collected in tall grass beside a creek in Hamilton. Most recent record. Collected in 1974-75 FWD survey (FWD 9804).

Pseudomys albocinereus. Silky Desert Mouse.

Abundance and distribution. Uncommon and restricted. Recorded in ER in Jilpanger, Kallungar and Yallakar Blocks; 24 animals were trapped at four trap sites with a maximum trapping rate of 13 per cent. Habitat. High sand dunes covered by Brown Stringybark shrubland with a sparse to mid-dense layer of shrubs such as Silky Teatree and Desert Banksia (p.c.—17 and 18). Elaborate burrows are dug into the sides of the sandhills. Breeding. A female trapped on 8 October 1974 had three large (20 mm) embryos. A female caught on 10 December 1974 was pregnant and gave birth to three young in captivity on 13 December. An adult scrotal male was trapped on 13 December. All animals trapped in mid-April were sub-adult males and females. Most recent record. Collected in 1974-75 FWD survey (NMV C14054).

Pseudomys fumeus. Smokey Mouse.

Abundance and distribution. Uncommon and restricted. Recorded in GR at Mirranatwa Gap, Major Mitchell Plateau, Mt. William, Silverband Falls and both the northern and southern portions of Victoria Range; 33 individuals were recorded from four trap sites with a maximum trapping rate of 14 per cent. This is an endemic Victorian species although it may eventually be recorded in some sub-alpine regions of New South Wales. Habitat. In GR it is restricted to dense wet undergrowth in tall open forests and sub-alpine heaths of the high ranges. Elsewhere in Victoria it has been recorded in moist undergrowth of some open forest, fern gullies in tall vegetation both on broken rocky mountain tops and on hillsides. Breeding. Scrotal males were trapped in October and November of 1974. A pregnant female trapped in early November gave birth to three young in captivity in early December. Other females trapped in early November were not pregnant. Most recent record. Collected in 1974-75 FWD survey (FWD 9942).

Pseudomys shortridgei. Heath Rat.

Abundance and distribution. Common and widespread throughout GR; 83 animals were trapped at 10 trapping sites with a maximum trapping rate of 11 per cent. It occurs only in the SW corner of Victoria. Habitat. Heath and open forest with heath undergrowth. The distributions of this species and of the Smokey Mouse are almost mutually exclusive. Trapped in p.c.—6, 8, 14, 15, 16, 26, 29, 30 and 31. Breeding. A pregnant female was trapped in early December 1974. During the survey no single period of the year had an influx of juveniles, although sub-adults and juveniles were always present. Most recent record. Collected in 1974-75 FWD survey (NMV C13175).

Mus musculus. House Mouse.

Abundance and distribution. Common and widespread. An exotic species recorded throughout ER, GR and HR. It probably occurs in AR; 153 individuals were trapped at 16 trap sites with a maximum trapping rate of 18 per cent. Habitat. Most plant formations, particularly where herb cover is sparse and tall shrub layer (e.g. 2 m) is well developed; exceptions are sub-alpine heath and tall open forest. Most recent record. Collected in 1974-75 FWD survey (NMV C13953).

Hydromys chrysogaster. Eastern Water Rat.

Abundance and distribution. Uncommon and restricted. Recorded in ER at Horsham and Toolondo Reservoir; in GR at Fyans Creek, Silverband Falls, Pomonal, Stony Creek, Halls Gap and Mirranatwa Gap; and in AR at Lake Lonsdale. Habitat. Usually in or near freshwater lakes and swamps on the plains; occasionally in both upper fast-flowing and lower tepid stream sections. Most recent record. 1974 (FWD 9541). Observed in 1974-75 FWD survey.

CANIDAE (DOGS AND FOXES)

Vulpes vulpes. Fox.

Abundance and distribution. Common and widespread. An exotic species recorded in ER at Jilpanger Block; in GR at Pomonal, Black Range, Lake Wartook and Victoria Valley; and in HR at the Stones Block. Habitat. Common in pasture lands and present throughout most areas of native vegetation. Most recent record. 1971 (FWD 5664). Observed in 1974-75 FWD survey.

FELIDAE (CATS)

Felis catus. Cat.

Abundance and distribution. Uncommon and widespread throughout the survey area. Habitat. Most terrestrial environments with the possible exception of wet and cold areas such as sub-alpine heath on Mt. William. Conservation aspects. Feral populations of this species should be studied to determine the impact of its predation on native vertebrate populations. Control of some feral populations of this species in Victoria is neces-

sary. Most recent record. Observed in 1974-75 FWD survey.

SUIDAE (PIGS)

Sus scrofa. Pig.

Abundance and distribution. Rare and restricted (if extant). Audas (1925) recorded an earlier undated occurrence in both the Victoria and Wartook Valleys, GR. They are now absent from these areas. There are some recent unconfirmed reports of wild pigs in the Wannon River area NE of Dunkeld, GR. Habitat. Areas surrounding swamps and marshes.

CERVIDAE (DEER)

Cervus elaphus. Red Deer.

Abundance and distribution. Uncommon and restricted. Recorded in GR at Victoria and Wartook Valleys, Billywing, Zumsteins and Lake Bellfield. Habitat. Open forests and woodlands with grass layers and tall sparse shrub undergrowth; some swamps and reservoir margins provide emergent vegetation which is grazed. Shrublands and heaths are seldom occupied. Most recent record. Observed in 1974-75 FWD survey.

BOVIDAE (CATTLE, SHEEP AND GOATS)

Capra hircus. Goat.

Abundance and distribution. Uncommon and restricted. Recorded throughout GR and in HR (reported by local land holders) in the Stones Block. Habitat. In GR tracks, droppings and camp sites were found in rocky localities on all of the major ranges; signs were most common in steep rugged areas. Typical situations included overhangs and caverns for camp sites and vegetation between rocks and on lower slopes for grazing. Some semi-tame animals were seen near Halls Gap but the large herds occurred in the Victoria Range. The Stones Block in HR has a rocky substrate with a grass and Austral Bracken layer beneath a Manna Gum open forest. Most recent record. Observed in 1974-75 FWD survey.

Ovis aries. Sheep.

Abundance and distribution. Uncommon and restricted. A feral population occurs in HR in the Stones Block. Habitat. Manna Gum open forest with grass and Austral Bracken beneath. Most recent record. Observed in 1974-75 FWD survey.

CHIROPTERA (THE BATS)

The species list of bats occurring in the survey area is incomplete and little is known of the habits of the species recorded. Only small insect-eating bats (microchiropterans) are resident in the area. The following annotated list includes species likely to occur in the survey area as well as those known to be present. Their likely abundance and distribution are listed.

VESPERTILIONIDAE (ORDINARY SMALL BATS)

Nyctophilus timoriensis. Greater Long-eared Bat.

Abundance and distribution. Uncommon and widespread. Habitat. Woodland and open forest. Most recent record. Recorded by Wakefield (1963a) in subfossil deposits. Most recent record. 1977 (Parnaby pers. comm.).

Nyctophilus geoffroyi. Lesser Long-eared Bat.

Abundance and distribution. Common and widespread. Recorded in GR at Woohlpooer, in AR at Bellellen and in HR at Hamilton. Habitat. Woodland and open forest. Most recent record. 1971 (FWD 6832). Individuals captured in 1977 (Parnaby pers. comm.).

Miniopteris schreibersii. Bent-winged Bat.

Abundance and distribution. Probably common and widespread. Habitat. Woodland and open forest wherever suitable caves are present.

Chalinolobus gouldii. Gould's Wattled Bat.

Abundance and distribution. Common and widespread. Habitat. Woodland and open forest. Most recent record. Observed in 1974-75 FWD survey. Individuals captured in 1977 (Parnaby pers. comm.).

Chalinolobus morio. Chocolate Bat.

Abundance and distribution. Common and widespread. Habitat. Woodland and open forest. Most recent record. Individuals captured in 1977 (Parnaby pers. comm.).

Eptesicus pumilus. Little Bat.

Abundance and distribution. Common and widespread. Habitat. Woodland and open forest. Most recent record. 1971 (FWD 6807). Individuals captured in 1977 (Parnaby pers. comm.).

Pipistrellus tasmaniensis. Tasmanian Pipistrelle.

Abundance and distribution. Only recently recorded in Victoria but found to be widespread

(Parnaby pers. comm.); recorded in GR. Habitat. Woodland and open forest. Most recent record. Individuals captured in 1977 (Parnaby pers. comm.).

Myotis adversus. Large-footed Bat.

Abundance and distribution. Rare and widespread. Habitat. Caves in woodland and open forest.

Nycticeius greyi. Little Broad-nosed Bat.

Abundance and distribution. Uncommon but possibly widespread in northern and western portions of the survey area. Habitat. Hot dry areas. Most recent record. Individuals captured in 1977 (Parnaby pers. comm.).

MOLOSSIDAE (MASTIFF BATS)

Tadarida australis. White-striped Bat.

Abundance and distribution. Probably common and widespread over most habitats in the survey area. Most recent record. 1964 at Dadswell Bridge, AR (McCann pers. comm.).

Tadarida planiceps. Little Flat Bat.

Abundance and distribution. Possibly common in the warm northern and western portions of the survey area. Most recent record. See Wakefield (1974).

EMBALLONURIDAE (SHEATH-TAILED BATS)

Taphozous flaviventris. Yellow-bellied Bat.

Abundance and distribution. Not recorded from survey area but possibly rare and widespread.

Appendix 7.—Annotated list of reptiles from the Grampians-Edenhope Area of southwestern Victoria

CHELIDAE (SIDE-NECKED TORTOISES)

Chelodina longicollis. Long-necked Tortoise.

Abundance and distribution. Common in the Glenelg and Wimmera River systems and in lakes in ER, GR and HR. Recorded in ER at Lake Charlegrark, 10 km SSE of Gymbowen, Edenhope, 14 km SE of Edenhope, and 5 km E of Clear Lake; and in GR at Moora Moora Reservoir. Habitat. Tepid freshwater streams and lakes in the plains are most suitable; cold fast-flowing mountain streams are unsuitable. Most recent record. 1964 (NMV D10898). Observed in 1974-75 FWD survey.

AGMIDAE (DRAGON LIZARDS)

Amphibolurus barbatus. Bearded Dragon.

Abundance and distribution. Common throughout survey area except, apparently, S of Hamilton, HR. Recorded in ER at Toolondo Reservoir, Mt. Arapiles, 10 km N of Apsley, North Lake, and Clear Lake Road 5 km NE of Douglas; in GR at Muline Creek and Rocklands Reservoir; and in AR at Horsham, Stawell, Pomonal and 11 km NW of Dadswell Bridge. Habitat. Woodlands, particularly of Yellow Gum and River Red Gum; also pastures if trees (e.g. roadside reserves) or fences are present. Most recent record. 1969 (NMV D14085). Observed in 1974-75 FWD survey.

Amphibolurus diemensis. Mountain Dragon.

Abundance and distribution. Rare; restricted to the ranges of GR. This is the western extremity of a patchy distribution which includes the eastern highlands and Tasmania. Habitat. Tall open forests, wetter forms of open forests and subalpine heaths. Most recent record. About 1970 (specimen in the South Australian Museum).

Amphibolurus muricatus. Jacky Lizard.

Abundance and distribution. Common throughout survey area except, apparently, S of Hamilton, HR. Recently recorded in ER at Jilpanger Block; in GR at Mt. Cassel; and in AR at Pomonal. Habitat. Open forest, shrubland and woodland, particularly areas of Brown Stringybark with heath undergrowth. Most recent record. 1969 (NMV D17574). Observed in 1974-75 FWD survey.

Amphibolurus pictus. Painted Dragon.

Abundance and distribution. Only found in the Jilpanger Block ER, but its distribution probably includes other Crown Land blocks in ER. Habitat. Shrublands of Brown Stringybark and Desert Banksia; mainly on sands or, occasionally, on dry claypans. Most recent record. Collected in 1974-75 FWD survey (NMV D33445).

GEKKONIDAE (GECKOS)

Diplodactylus tessellatus. Tessellated Gecko.

Abundance and distribution. Two specimens, dated 1905, exist from Clear Lake, ER. It is an inland species which may still occur in the survey area. Habitat. Unknown. Most recent record. 1905 (NMV D226).

Phyllodactylus marmoratus. Marbled Gecko.

Abundance and distribution. Common and widespread throughout ER, GR and AR but apparently absent from HR. Recorded in ER at 17 km SW of Edenhope and Mt. Arapiles; in GR at 16 km W of Halls Gap, 1 km N of Halls Gap, Asses Ears and Black Range; and in AR at Ararat, Stawell, and Black Range S of Stawell. Habitat. Usually rocky outcrops such as occur in the Grampians or at Mt. Arapiles; occasionally in woodland beneath shedding bark and in or under logs. Most recent record. Collected in 1974-75 FWD survey (NMV D33436).

PYGOPODIDAE (SNAKE-LIZARDS)

Delma inornata.

Abundance and distribution. Uncommon; four specimens from Stawell, AR. It probably occurs in other dry warm areas of AR and possibly in dry peripheral areas of GR. Habitat. Usually dense ground cover of shrubs in dry vegetation. Most recent record. 1956 (NMV D15463).

Delma impar.

Abundance and distribution. Originally widespread, but no specimens from the survey area since 1904. Recorded in ER at Horsham; and in HR at Hamilton and Byaduk. Habitat. Grasslands such as occurred on the basalt plains. Most recent record. 1904 (NMV R10883).

SCINCIDAE (SKINKS)

Anotis maccoyi.

Abundance and distribution. Recorded in GR at White Bull Swamp and Major Mitchell Plateau; and in HR at Coleraine. Habitat. Sub-alpine heath, wetter forms of open forest and woodland. Most recent record. Collected in 1974-75 FWD survey (NMV D33432).

Cryptoblepharus boutonii.

Abundance and distribution. Common at Mt. Arapiles and probably widespread throughout the rest of ER. There is also a doubtful 1887 record from GR. Habitat. Woodland. It is primarily arboreal and is most common in Yellow Gum woodland where shedding bark and splitting logs and trunks provide ideal refuge sites. Most recent record. Collected in 1974-75 FWD survey (FWD 9956).

Ctenotus robustus.

Abundance and distribution. Uncommon and widespread in survey area. Recorded in ER at Lake Charlegrark, Mt. Arapiles and Meereek Block; in GR at Victoria Gap and Victoria Valley; and in AR at Black Range S of Stawell. Habitat. Open warm environments, usually on sandy soils and adjacent to rocky outcrops and boulders where they seek shelter. Open forest, woodland and shrubland are all utilized. Most recent record. Collected in 1974-75 FWD survey (NMV D33439).

Egernia luctuosa. Mourning Skink.

Abundance and distribution. Rare; probably restricted to GR. One specimen collected near the junction of Goat Track and Victoria Range Road in the Victoria Range. Habitat. The specimen was collected in a heathy swamp at a high altitude. It occurs in swamps elsewhere in Victoria. Most recent record. 1971 (NMV D17299).

Egernia saxatilis. Black Rock Skink.

Abundance and distribution. Common on most rocky ranges in the survey area. Recorded in ER at Mt. Arapiles; in GR at Hut Creek Gorge, Victoria Range and Mt. Rosca Track; and in AR at Stawell. Habitat. Rocky areas. It basks on rock surfaces, forages in adjacent vegetation and shelters beneath exfoliating rocks. Most recent record. Collected in 1974-75 FWD survey (NMV D33441).

Egernia whitii. White's Skink.

Abundance and distribution. Common and widespread throughout the survey area although its distribution is patchy. Recorded in GR at Mt. William and Black Range; in AR at Stawell and Ararat; and in HR at Byaduk, Lake Condah near Heywood, 10 km N of Narrawong, and the Stones State Faunal Reserve. Habitat. Usually rocky substrates. However, unlike *E. saxatilis*, it is not confined to open rocky expanses, but basks on isolated rocks, forages widely through usually sparse low vegetation, and seeks refuge by digging sometimes elaborate burrows in soil beneath rocks. Most recent record. Collected in 1974-75 FWD survey (NMV D33426).

Hemiergis decresiensis.

Abundance and distribution. Common; restricted to the N portion of the survey area. Recorded from ER at Mt. Arapiles and 8 km SW of Natimuk. Habitat. Warm environments, usually associated with rocky substrates. Most recent record. Collected in 1974-75 FWD survey (NMV D33434).

Hemiergis peronii.

Abundance and distribution. Not recorded in 1974-75 FWD survey but recent NMV specimens are listed for Stawell, AR. Habitat. The NMV specimens were from an old building site in farmland. Most recent record. 1976 (NMV D48291).

Lampropholis delicata.

Abundance and distribution. Uncommon; probably widespread in ER and it may occur in GR and AR. Recorded in ER at Jilpanger Block and 10 km SSE of Miga Lake. Habitat. Woodlands with much bark and leaf litter; often occurring beneath logs, particularly in Yellow Gum woodland. Most recent record. Collected in 1974-75 FWD survey (NMV D33446).

Lampropholis guichenoti.

Abundance and distribution. Common and widespread. Recorded in ER at Mt. Arapiles; in GR at Victoria Valley, Woohlpooer, Mt. Zero, and 13 km S of Halls Gap; in AR at 13 km S of Stawell; and in HR at Coleraine and the Stones State Faunal Reserve. Habitat. Most forest and woodland formations; particularly common in open areas with exposed rocky surfaces such as in GR. Most recent record. Collected in 1974-75 FWD survey (NMV D33428).

Leiolopisma entrecasteauxii.

Abundance and distribution. Uncommon in GR and HR. Recorded in GR at Mt. Rosea, Mt. William, and Victoria Valley; and in HR at Byaduk and 15 km W of Yambuk. Habitat. Usually grassy areas in open forest, woodland or pasture land. At high altitudes (e.g. Mt. William) it often basks and seeks shelter among rock screes. Most recent record. Collected in 1974-75 FWD survey (FWD 9933).

Leiolopisma trilineata.

Abundance and distribution. Common in GR and HR. Recorded in GR at Lake Wartook, Mt. Rosea, and 6 km W of Dunkeld; and in HR at Byaduk. Habitat. Most forest and woodland formations; usually in clearings often associated with low shrubs or grassland. Most recent record. Collected in 1974-75 FWD survey (FWD 9932).

Leiolopisma coventryi. Coventry's skink.

Abundance and distribution. Uncommon; restricted to GR. Recorded at Strahans Camp (Victoria Valley) and 3 km SE of Mt. Victory. Habitat. Tall open forest and wetter forms of open forest including sub-alpine heath. Most recent record. 1970 (NMV D38185).

Lerista bougainvillii.

Abundance and distribution. Uncommon and widespread. Recorded in ER at Mt. Arapiles and 17 km SW of Edenhope; in GR at 1·5 km N of Halls Gap, Lake Wartook, Victoria Valley, Chimney Pots, and 3 km ESE of Mt. Victory; and in AR at Stawell, Black Range S of Stawell, and 13 km S of Stawell. Habitat. Open forest, woodland and a small area of mallee at Mt. Arapiles. Friable sandy soils, large accumulations of litter and a warm climate are other factors important in influencing the distribution of this species. Most recent record. Collected in 1974-75 FWD survey (FWD 9955).

Morethia adelaidensis.

Abundance and distribution. Rare; distribution is unknown. Recorded in ER near Lake Charlegrark; in GR (a general record from 1892); and in HR at 13 km S of Stawell. Habitat. Possibly woodland. Most recent record. 1963 (NMV D15064).

Morethia boulengeri.

Abundance and distribution. Common in ER and GR. Recorded in ER at Mt. Arapiles and 8 km SW of Natimuk; and in GR at Tower Hill. Habitat. Woodland and pasture land if objects suitable to shelter under are present. Most recent record. Collected in 1974-75 FWD survey (NMV D33438).

Morethia obscura. Ocellated Skink.

Abundance and distribution. Common; restricted to major Crown Land blocks in ER. Recorded in the Jilpanger Block at several localities and in the Meereek Block. Habitat. Brown Stringybark shrubland with heath underneath on dry sandy soils. Most recent record. Collected in 1974-75 FWD survey (FWD 9953).

Sphenomorphus tympanum. Cool Temperate Form.

Abundance and distribution. Common and widespread in ER, GR and HR. Specimens come from throughout the Grampians Ranges and the Stones State Faunal Reserve. Habitat. Moist sites, usually near streams. In GR records are usually associated with streams and tall open forest whereas in the Stones State Faunal Reserve in HR records are

from rocky areas. Most recent record. Collected in 1974-75 FWD survey (NMV D33424).

Sphenomorphus sp. Warm Temperate Form.

Abundance and distribution. One specimen is from Great Western on E edge of AR; the species may occur elsewhere on the plains of AR. Habitat. Streams or other moist environments usually in otherwise dry and warm areas. Most recent record. The Australian Museum in Sydney holds the above-mentioned specimen (Rawlinson pers. comm.).

Tiliqua nigrolutea. Blotched Blue-tongued Lizard.

Abundance and distribution. Uncommon and widespread in AR and HR. Habitat. Tall open forest, sub-alpine heath and coastal heath. Most recent record. About 1970 (Rawlinson pers. comm.).

Tiliqua scincoides. Eastern Blue-tongued Lizard.

Abundance and distribution. Uncommon and widespread in ER, GR and HR. Habitat. Woodland and grassland. Most recent record. About 1970 (Rawlinson pers. comm.).

Trachydosaurus rugosus. Shingle-back.

Abundance and distribution. Common and widespread in ER, GR and HR. Recorded in ER at Horsham, Mt. Arapiles, and Jilpanger Block; in GR at 3 km W of Halls Gap, and Red Rock; and in HR at Hamilton and Cavendish. Habitat. Virtually all environments except high cool ranges of GR. Open forest, shrubland, woodland, pasture land and heath are all inhabited. Most recent record. 1964 (NMV D40046). Observed in 1974-75 FWD survey.

VARANIDAE (MONITOR LIZARDS)

Varanus gouldii. Sand Monitor.

Abundance and distribution. No specimen records exist, but local farmers describe two species of goanna in the area and some burrows observed in the Jilpanger Block, ER, suggest that the Sand Monitor is present. If the species does occur in the survey area it probably is restricted to ER. Habitat. Shrubland on sandy soil. Most recent record. None.

Varanus varius. Lace Monitor.

Abundance and distribution. Uncommon and restricted to ER and AR. Recorded in ER at Mt. Arapiles and in AR at Illawarra. Habitat. Woodland with a grassy or sparse shrub underlayer. Most recent record. Collected in 1974-75 FWD survey (NMV D33442).

ELAPIDAE (ELAPID SNAKES)

Austrelaps superba. Lowlands Copperhead.

Abundance and distribution. Uncommon and restricted to GR and HR. Recorded in GR at 5 km N of Dunkeld and at Mt. William; and in HR at Macarthur, Hamilton, 3 km NE of Hamilton, Coleraine and 10 km W of Macarthur. Habitat. Lowland swamps, sub-alpine heath and possibly tall open forest. Most recent record. 1964 (NMV D40068). Observed in 1974-75.

Drysdalia coronoides. White-lipped Snake.

Abundance and distribution. Uncommon and restricted to GR and possibly HR. Two specimens exist, both from GR. Habitat. Grasslands on the plains and along the coast; clearings in tall open forest and sub-alpine heath. Most recent record. 1970 (NMV D33169).

Notechis scutatus. Eastern Tiger Snake.

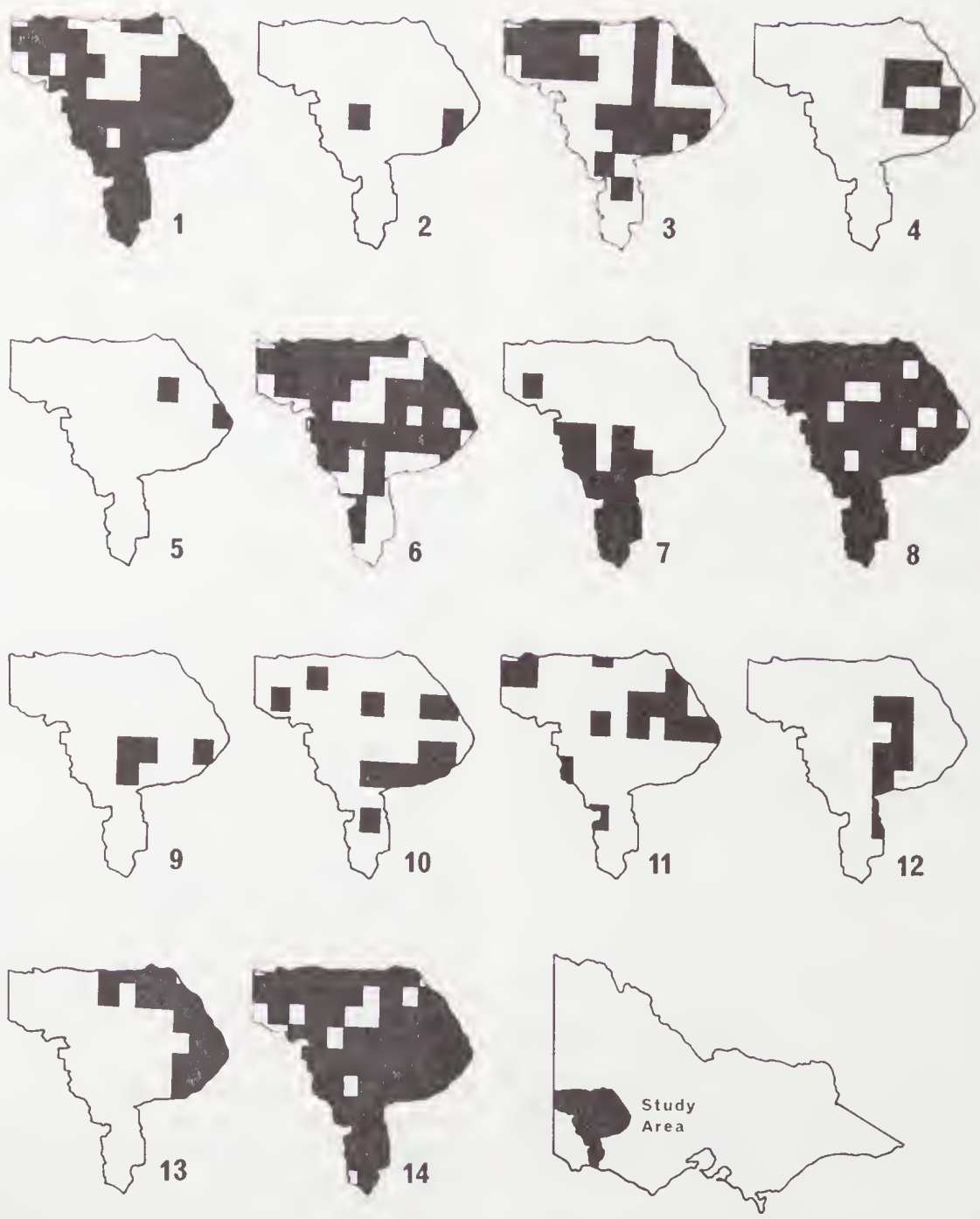
Abundance and distribution. Common and widespread. Recorded in ER at Douglas; in GR at 16 km NE of Dunkeld, 10 km E of Halls Gap, and 8 km NW of Moora Moora Reservoir; and in HR at Cavendish and the Stones State Faunal Reserve. Habitat. Usually low-lying swamps and possibly some wet sites in open forest of GR. Most recent record. Collected in 1974-75 FWD survey (NMV D42234).

Pseudechis porphyriacus. Red-bellied Black Snake.

Abundance and distribution. Uncommon and apparently restricted to GR and the Wimmera River System, ER. Recorded in GR at 8 km NW of Moora Moora Reservoir and 10 km N of Halls Gap. Habitat. Usually along streams or swamps; rarely among rocks and cliffs on hillsides. Most recent record. Collected in 1974-75 FWD survey (NMV D33449).

Pseudonaja textilis. Eastern Brown Snake.

Abundance and distribution. Common and widespread throughout all except HR. Recorded in ER at Edenhope, St. Marys Lake, Tooan Block, Mt. Arapiles Block, Natimuk, and 5 km N of Douglas; in GR at Flat Rock Crossing, Mt. William Road, Victoria Valley, and Glenisla Crossing; and in AR at Stawell. Habitat. All plant formations at low altitudes (i.e. pasture, wood-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land, heath, open forest and shrubland). Most recent record. Collected in 1974-75 FWD survey (NMV D33422).

Unechis flagellum. Little Whip Snake.

Abundance and distribution. Uncommon. Recorded in GR on Cassidy's Gap road and in AR at Stawell, Ararat, 13 km S of Stawell and 6 km S of Dadswell Bridge. Habitat. Grassland and woodland in dry warm areas. Most recent record. 1976 (NMV D48447).

TYPHLOPIDAE (BLIND SNAKES)

Typhlina proxima.

Abundance and distribution. Uncommon and widespread in GR and AR. Recorded in GR at Asses Ears and 13 km S of Halls Gap; and in AR at Lake Lonsdale and Stawell. Habitat. Rocky areas such as the Grampians and in pastures where logs and stumps are present. Usually found in loose soils under rocks and logs. Most recent record. 1972 (NMV D17505).

Appendix 8

Distribution maps of the amphibians occurring in the Grampians-Edenhope Area (after Brook 1975)

1 = *Litoria ewingii*
2 = *Litoria lesueurii*
3 = *Litoria raniformis*
4 = *Geocrinia laevis*
5 = *Geocrinia victoriana*
6 = *Limnodynastes dumerilii*
7 = *Limnodynastes peronii*
8 = *Limnodynastes tasmaniensis*
9 = *Neobatrachus centralis*
10 = *Neobatrachus pictus*
11 = *Pseudophryne bibronii*
12 = *Pseudophryne semimarmorata*
13 = *Ranidella parinsignifera*
14 = *Ranidella signifera*

Explanation of Plates

PLATE 19

Figure 1—Woodlands of River Red Gum in Victoria Valley, Grampians Region.

Figure 2—Heath in Victoria Valley, Grampians Region.

PLATE 20

Figure 3—Upper reaches of a slow-flowing stream in the Grampians Region.

Figure 4—Roadside reserve of River Red Gum in the Ararat Region.

PLATE 21

Figure 5—Squirrel Glider, an uncommon mammal in Victoria. Two records exist from the Ararat Region in the survey area.

Figure 6—Plains-wanderer, formerly in large numbers in western Victoria, but it is now very rare. It may still be present in low numbers in the Ararat and Hamilton Regions.

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