A BIOLOGICAL SURVEY OF THE SOUTHERN MOUNT LOFTY RANGES SOUTH AUSTRALIA

2000-2001

BIOLOGICAL SURVEY SOUTH AUSTRALIA

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Fire-blackened trees in Horsnell Gully Conservation Park following a fire in 1965.

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PREFACE

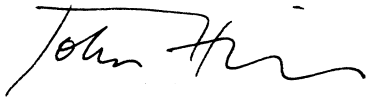
A Biological Survey of the Southern Mount Lofty Ranges, South Australia is a further product of the Biological Survey of South Australia.

The program of systematic biological surveys to cover the whole of South Australia arose out of a realisation that an effort was needed to increase our knowledge of the remaining vascular plants and vertebrate fauna of South Australia and to encourage its conservation.

Over the last 18 years, there has been a strong commitment to the Biological Survey by Government and an impressive dedication from hundreds of volunteer biologists.

By 2015, it is anticipated that the Biological Survey will achieve complete statewide coverage.

The Biological Survey of South Australia will be an achievement for which we can be very proud. We will have substantially improved our knowledge of the biodiversity of South Australia to enable biologists in the future to measure the direction of long-term ecological change. This will greatly enhance our ability to adequately manage nature conservation into the future.



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ABSTRACT

The Southern Mount Lofty Ranges (SMLR) Biological Survey study area boundary was defined as the Fleurieu and Mount Lofty Ranges IBRA (Interim Biogeographic Region of Australia) sub-regions. The survey area extends from the Barossa Valley in the north (Tanunda and Angaston) to the southern ocean in the south. The western boundary is formed by the steep western scarp of the Mount Lofty Ranges including Mount Lofty, the highest point (720m), which extends as an elevated plateau to the east, gradually falling towards the south- eastern boundary near Strathalbyn. The study region comprises 6 282 km^2, just 0.6% of the area of South Australia.

The primary aim of the SMLR Biological Survey was to determine the diversity and distribution of biological communities in the region. This was achieved by systematically surveying a range of survey quadrats that represented the biological variation over the study area.

Five surveys, conducted between 1977 and 2000 and comprising 1,177 vegetation quadrats in the survey region, contributed to the floristic analysis. Due to past vegetation clearance patterns, most of the survey quadrats were concentrated in the western two/thirds of the survey region. Survey quadrats were located on both crown and privately owned land. At least one survey quadrat was located in each of the *National Parks and Wildlife Act* reserves in the study region.

Three surveys, conducted between 1995 and 2000 and comprising 157 quadrats, contributed to the vertebrate analysis (these surveys also included vegetation quadrats). The major vertebrate survey fieldwork occurred in three separate periods, from autumn to early summer 2000. The vertebrate survey results were combined with previous records for the region to produce consolidated total species lists for each vertebrate category. Invertebrates were surveyed from 74 quadrats, using macro and micro pitfalls, and some hand collecting.

The total number of survey quadrat records contributed to the Biological Survey Database were: 40 091 vascular plants, 157 amphibians; 2 051 reptiles, 6 518 birds, 2 027 mammals and at least 2 100 invertebrates. These figures exclude opportune records.

Of the 40 091 survey records for plants, 35 920 (90%) were native. Between 992 and 1 227 taxa were recorded (incomplete identification of species prevents a more accurate determination), of which approximately 75% were native. The most commonly recorded plant species were *Xanthorrhoea semiplana* ssp. (Yacca), *Gonocarpus tetragynus* (Common Raspwort), *Lepidosperma semiteres* (Wire Rapier Bush), *Acacia pycnantha* (Golden Wattle), and *Platylobium obtusanglum* (Common Flat-pea). These species are typically "sclerophyllous", a feature that characterises the majority of remnant understorey in the region. The two most common eucalypts recorded were *Eucalyptus fasciculosa* (Pink Gum) and *E. obliqua* (Messmate Stringybark), both being recorded from just over 40% of quadrats. A distant third most common eucalypt was *E. cosmophylla* (Cup Gum) recorded from 22% of quadrats. These three eucalypts are all associated with less fertile soils.

Generally, highest native species diversity was associated with *E. fasciculosa* (Pink Gum), *E. obliqua* (Messmate Stringybark) and/or *E. goniocalyx* (Long-leaved Box) sclerophyll forest and woodlands, these communities averaging from 30 to 40 native species per quadrat. Low native species diversity was most commonly associated with *E. camaldulensis* (River Red Gum), *E. viminalis* ssp. (Manna Gum) and *E. leucoxylon* (SA Blue Gum) savannah woodlands. These communities also contained a very high proportion of weed components, averaging at least 12 weed species per quadrat. The savannah woodlands are generally located on more fertile soils with a grassy understorey, making them susceptible to direct clearance, grazing and weed invasion. Above-average numbers of weeds (namely, six to ten species per quadrat) occurred in drier woodland communities including *E. odorata* (Peppermint Box), *E. microcarpa* (Grey Box), *E. porosa* (Mallee Box) and *Allocasuarina verticillata* (Sheoak) communities.

Four weeds of National Significance were recorded from survey quadrats, namely Blackberry (128 records), Boneseed (97 records), Bridal Creeper (78 records) and Gorse (38 records). The most commonly recorded perennial weed was Rough Cat's-ear followed by African Daisy.

Of the confirmed 753 native taxa recorded from survey quadrats, 236 are rated at least Rare for the Southern Lofty herbarium region. Of these, 105 have a State rating and nine have a National rating. Five species were rated as Nationally Vulnerable: *Olearia pannosa* ssp. *pannosa*, *Glycine latrobeana*, *Prasophyllym pallidum*, *Correa calycina* and *Spyridium coactilifolium,* the latter being the most commonly recorded with 19 records. Of the 13 native taxa

endemic to the Southern Lofty herbarium region, six were recorded from survey quadrats. Of these, *Olearia grandiflora* and *Pultenaea involucrata* are locally common.

Two plant communities surveyed in the study region have been nominated as Nationally Threatened Ecological Communities. These are the swamps of the Fleurieu Peninsula and Peppermint Box (*Eucalyptus odorata*) grassy woodland. The swamps were specifically targeted by two of the surveys included in this Biological Survey report and hence have been comprehensively surveyed. The swamp communities also contain the highest numbers of conservation rated species. Peppermint Box woodlands are very rare in the region and this association was recorded at only one survey quadrat. State threatened plant communities recorded during the survey include *Eucalyptus goniocalyx* (Long-leaved Box) dominated Open Forest, *E. viminalis* ssp. (Manna Gum) Woodland, *E. microcarpa* (Grey Box) grassy Low Woodland, *E. ovata* (Swamp Gum) Low Open Forest and Low Woodland and *E. dalrympleana* ssp. *dalrympleana* (Candlebark) Open Forest.

PATN exploratory data analysis program was used to classify the 585 plant species records from quadrats into 41 groups based on the similarity of their floristic composition. These 41 groups formed 10 main alliances based on similar overstorey species. The vegetation of the South Mount Lofty Ranges, of which the Biological Survey study region forms part, was mapped in 2000. One hundred and fifty two vegetation groups were described for the mapping region, using a combination of survey site data, interpretation of aerial photography, ground-truthing and literature survey. The 152 groups have been summarised into 51 groups for the purpose of the map display according to common dominant overstorey species.

Of the 31 species of native mammals known to reside in the Southern Mount Lofty Ranges (SMLR) at the commencement of European settlement in 1836, only 22 can now be confirmed as currently resident within the region These consist of one monetreme (the Echidna), nine marsupial, three rodent and nine bat taxa. The status of the Platypus (*Ornithorhynchus anatinus*) is uncertain with only a few unverified records in the last 10 years. Of the eight extinct species, seven are marsupials and one is eutherian (placental). The Koala (*Phascolarctos cinereus*) has been introduced to the region and become naturalised. During the survey, a total of 2 027 mammal records of 18 species were made (excluding bats and domestic stock) over 157 survey quadrats.

Eight of the nine resident native bat species, nine of the 14[1] non-bat native resident mammals, and the introduced Koala were recorded at survey quadrats. The eight resident bat species recorded were: Gould's Wattled Bat, Chocolate Wattled Bat, Lesser Long-eared Bat, Large Forest Bat, Southern Forest Bat, Little Forest Bat, Southern Freetail Bat and White-striped Freetail Bat. The other native mammals recorded were: the Bush Rat, Western Grey Kangaroo, Common Ringtail Possum, Yellow-footed Antechinus, Short-beaked Echidna, Swamp Rat, Common Brushtail Possum, Southern Brown Bandicoot, and Western Pygmy Possum. One other, the Euro (*Macropus robustus*) was recorded opportunistically on several occasions during the survey. Of the three mammal species not recorded, the Common Dunnart (*Sminthopsis murina*) and Fat-tailed Dunnart (*Sminthopsis crassicaudata*) are both known to be only peripheral to the region, where no surveying was carried out. The Water Rat (*Hydromys chrysogaster*) relies upon well-vegetated permanent watercourses, a habitat type that is rare in the region and was not surveyed during the survey.

Eight of the nine species of introduced mammals with established feral populations in the region were recorded both at survey quadrats and opportunistically (House Mouse, Fox, Black Rat, Rabbit, Brown Hare, Fallow Deer, Feral Goat and Cat). The remaining species, the Brown Rat (*Rattus norvegicus*) was recorded opportunistically only once during the survey, largely due to its preference for an urban environment on the Adelaide Plains, resulting in a restricted peripheral distribution within the ranges.

The most frequently recorded species was the Bush Rat accounting for about 30% of all mammal records at survey quadrats. The Short-beaked Echidna and Western Grey Kangaroo, however, were recorded at most survey quadrats. The House Mouse was recorded at 70 survey quadrats.

Three of the current resident mammal species have a threatened status at National or State level,the Southern Brown Bandicoot – Nationally Endangered and State Vulnerable, the Platypus (current existence in SMLR is unconfirmed) – State Endangered and the Koala (introduced to the SMLR) – State Rare

Two hundred and ninety three bird species have been recorded for the study region, including 36 oceanic species and 11 introduced species. This represents 63% of the total bird species recorded within South Australia. One hundred and thirty nine species are considered resident.

One hundred and fifty seven bird species were recorded during the Biological Survey. From the 157 survey quadrats alone, a total of 6518 records of 127 bird species from 49 families and sub-families were recorded. Opportunistic

[1] This figure of 14 current native mammals includes the Platypus whose status is uncertain.

records totalled 1164 records of 136 species representing 53 families or sub-families. These included 30 species not recorded at survey quadrats. The majority of these additional species were water birds, rarely seen at survey quadrats.

Four sub-species are endemic to the SMLR: the Mount Lofty Ranges Southern Emu-wren (*Stipiturus malachurus intermedius*), Spotted Quail-thrush (*Cinclosoma punctatum anachoreta),* White-throated Treecreeper (*Cormobates leucophaeus grisescens*) and Chestnut-rumped Heathwren (*Calamanthus pyrrhopygius parkeri*). However, the SMLR is an "island" of woodland and forest, and is the western extreme of the range of many south-eastern Bassian species, some of which exist as isolated populations in the study region.

Fifty of the bird species recorded for the SMLR have legislated conservation ratings. Twenty of these species were recorded during the survey. In addition, the Mt Lofty Ranges Task Force has identified 37 species in the Mt Lofty Ranges which do not have a legislated conservation rating but which are known to be declining and considered at risk. These include the Brown Treecreeper (recorded at two survey quadrats), the Diamond Firetail and Crested Shrike-tit (recorded from one survey quadrat each), and the Jacky Winter and Restless Flycatcher, which were not recorded at all during the survey.

Forty-two native and two introduced reptile species are currently accepted as being resident in the study region. Of these, 37 native reptiles and both the introduced species were recorded during the survey. Twenty-seven species were recorded at quadrats with the remainder recorded opportunistically. Reptiles were recorded at 150 of the 157 survey quadrats.

Four small skink species were the most frequently and commonly recorded species, comprising 78% of all records. These were the Garden Skink (*Lampropholis guichenoti*), the Three-toed Earless Skink (*Hemiergis decresiensis*), Bougainville's Skink (*Lerista bougainvillii*) and the Eastern Three-lined Skink (*Bassiana duperreyi*). Four reptile species were each recorded at only one quadrat: the Pygmy Copperhead (*Austrelaps labialis*), the Eastern Stone Gecko (*Diplodactylus vittatus*), the Eastern Water Skink (*Eulamprus quoyii*) and the Little Whip Snake (*Suta flagellum*).

Six species recorded from the region have conservation ratings under State or Federal legislation. The highest rated species, the Flinders Worm Lizard, is Nationally Vulnerable and endemic to South Australia; however, it was not recorded during the survey. Cunningham's Skink and the Carpet Python are both considered Vulnerable for South Australia, and both were recorded opportunistically during the survey. The three species rated Rare for South Australia (Olive Snake-lizard, Heath Goanna and Yellow-bellied Water Skink) were also recorded during the survey. South Australian endemic species recorded during the survey were Pygmy Copperhead, Adelaide Snake Lizard and Southern Rock Dtella. Although the Pygmy Copperhead does not have a conservation rating, its distribution is restricted and it is infrequently encountered. The Black Tiger Snake, another South Australian endemic was not recorded, and is rare in the SMLR.

Two species not previously included in the herpetofauna of the SMLR were recorded opportunistically during the survey: the Delicate Skink (*Lampropholis delicata*) and Murray (or Macquarie) River Tortoise (*Emydura macquarii*). The Murray River Tortoise and another species (the Water Dragon) are assessed as being the result of pet escapes or releases, which have established wild populations within the region.

All six of the resident native frog species known to occur in the SMLR were recorded during the survey: the Painted Frog, Marbled Frog, Brown Froglet, Bull Frog, Brown Toadlet and Brown Tree Frog. One hundred and fifty seven frog records were obtained from the survey quadrats, with records being obtained from 66 of the 157 survey quadrats. The Brown Froglet was the most commonly recorded species, followed by the Bull Frog.

Excluding ants, more than 197 species of invertebrates from 86 families were recorded from 74 survey quadrats. The most commonly recorded Orders were Collembola and Coleoptera (Beetles). Thirty-one ant genera were recorded from 95 survey quadrats. Only the *Camponotus* genus was identified to species level, and 13 species were recorded.

The Monitoring River Health Initiative (MRHI), which is a coordinated national river bio-assessment and prediction scheme included 51 sites from the Mount Lofty Ranges. Further work from 1997-1999 involved sampling another 450 test sites as part of the AUSRIVAS (AUStralian RIVer Assessment System) program. This included a further 211 sites from waterways in the Mt Lofty Ranges study area from the Gawler Creek catchment in the north to the Finniss River in the south. An overview of the aquatic macroinvertebrates found at these sites is presented which identifies biodiversity 'hotspots', describes the rare species and gives a summary of the bio-assessment ratings for each site. Some comments are also included about the threats and opportunities to address river health issues in the study area.

Finally a series of conservation management recommendations are provided covering: recommendations for further research/survey work and a brief discussion of the biodiversity conservation challenges ahead for the SMLR.

A mass flowering of Myrtle Wattle in Cleland Conservation Park two years after a fire. (Photo: A. Robinson).

A male Tawny Dragon showing his breeding colours. (Photo: P. Canty).

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In total 52 people took part in the fieldwork component of the survey, with varying commitments of time from one week in most cases, to the maximum possible of six weeks for the survey coordinator. As well as the involvement of many volunteers, the participation in the Biological Survey by a number of NP&WS district staff and staff from the Environmental Analysis and Research (EAR) Section of the Department for Transport, Urban Planning and the Arts (DTUPA) is gratefully acknowledged.

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3. Specimen Identification, Verification and Technical Expertise
Plants: Rosemary Taplin
Mammals: Cath Kemper
Reptiles and Amphibians: Mark Hutchinson and Maya Penck
Birds: Graham Carpenter and Phillipa Horton
Ants: Archie McArthur
Arachnids: David Hirst

4. Data Entry
David Armstrong and David Thompson

5. Editing the report
Comments on drafts and proof reading of various chapters of the report were provided by Graham Armstrong, Graham Carpenter, Jeff Foulkes, Mark Hutchinson, Cath Kemper, Terry Reardon and Tony Robinson.

6. Cover design and figure drafting
Chris Willis

7. Land Access
Forestry SA: Brian Gepp, Ian Tanner at Williamstown, Trevor Ferguson at Kuitpo.
SAWater: Arthur Bailey at Mount Bold Reservoir, Ross Sullivan at Barossa/South Para Reservoirs and Brian Murray at Kangaroo Creek/ Millbrook Reservoirs.

NPWSA: many staff contributed information on park access and biodiversity values to the survey. Particular thanks to Richard DeGroot and Ron Sarrs at Blackhill, Eric Dahl and Steve Taylor at Para Wirra, Bob Gooch at Cleland, Terry Gregory, Richard Coombes, Tim Fuhlbohm and Neville Houlihan at Belair, Chris Halstead and John Bracken at Victor Harbour.

Approximately 80 private and Heritage Agreement land owners also granted permission for the survey to access their land, particularly during the preliminary vegetation survey in late 1999 and early 2000.

8. Hair-tube Analysis
Nerissa Haby

9. Freshwater Macro-invertebrates
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INTRODUCTION

D. Armstrong[1] and S. Croft[1]

BACKGROUND AND AIMS

In South Australia a program of systematic fauna and flora surveys across the state has been developed and implemented since 1971. This program known as the Biological Survey of South Australia, was established under the auspices of the Biological Survey Coordinating Committee (Foulkes and Gillen 2000). This interdepartmental committee comprises representatives from the South Australian Museum, Planning SA, Environment and Heritage, Plant Biodiversity Centre, SA Research and Development Institute, and Primary Industries and Resources SA. The aim of these surveys is to document the range of biological variation across the state to improve long-term natural resource management.

To date, vegetation only surveys in the Agricultural Zone, have been completed for: the Mt Lofty Ranges (1985), the Mid North (1992), Burra Hills (1994), Yorke Peninsula (1994), Southern Eyre Peninsula (1995), Upper Midnorth (1996), Northern Adelaide Plains (1996), North Eastern Eyre Peninsula (1998) and North Western Eyre Peninsula (1999). Vegetation and vertebrate surveys in the Agricultural Zone have been completed for the South East, Murray Mallee (1990), Western Murray Flats (1992), Kangaroo Island (1989 – 1990), Offshore Islands (1971-1982) and South East Coast (1982-1983). In addition, the same survey methodology has been used for specific surveys concentrating on specialists habitats such as grassy ecosystems and numerous smaller-scale surveys of parks and reserves conducted by various government and non-government organisations.

In the Pastoral Zone, Biological Surveys have been carried out in twelve major regions: Cooper Creek (1983, 1991), Nullarbor (1984), Gawler Ranges (1985), Yellabinna (1987), Stony Deserts (1994-1996), Strzelecki Dunefields (1988 – 1992), Diamantina River area (1994), South Olary Plains (1996), Anangu-Pitjantjatjara Lands of north-western S.A. (1992 – 1996), North Olary Plains (1995), Flinders Ranges (1998- 1999) and Sandy Deserts (1997 – present). Generally the boundaries of these surveys have been based on the environmental regions of South Australia as delineated by Laut *et al*. (1977) and more recently by bioregions (Thackway and Cresswell 1995).

BIOLOGICAL SURVEY OF SA OBJECTIVES

The principal aim of the Biological Survey of South Australia is to systematically sample a variety of sites chosen to represent the range of biological variation over each study area and across the state in order to enhance integrated land management and conservation. A secondary aim is to support, with scientific data, Government strategies for biodiversity conservation and ecologically sustainable development. The specific objectives of the Southern Mount Lofty Biological Survey were:

1. To observe, collect and identify species of plants and vertebrate fauna present in the area by sampling an array of fixed quadrats representing the geographical and biological diversity of the region. In particular the Survey conducted during 2000 was the first systematic survey of vertebrates over the entire study region. The floristic component of this survey supplemented several previous flora surveys within the region.
2. To establish a comprehensive data base of the flora and associated vertebrate communities of the SMLR that is amenable to ecological analyses.
3. To document and classify the patterns of species and communities across the region and their relationship with physical parameters.
4. To evaluate the conservation status of species and communities within the SMLR, as a basis for conservation strategies.
5. To provide the South Australian Plant Biodiversity Centre and South Australian Museum with collections representative of the diversity of plants and vertebrates in the region.
6. To establish a long-term monitoring system and associated database to enable subsequent measurement of environmental change.

BIOLOGICAL SURVEYS INCLUDED IN THIS REPORT

Data from five Biological Surveys has been combined for analysis in this report. Field data for all surveys has been extracted from the Department for Environment and Heritage's Survey database. Full details of these surveys appear in the Methods chapter but in brief the surveys are:

- Mt Lofty Ranges survey, 1985, focussing on high rainfall forests and woodlands (vegetation only)
- Mt Lofty – Private, 1987 - focussing on swamps and other remnants of the southern Fleurieu, and

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also Long-leaved Box communities in the northern Adelaide Hills (vegetation only)

- Mt Lofty – Emu Wren, 1993 -1996 – surveyed only swamps of the Fleurieu Peninsula (vegetation and vertebrates)
- Southern Fleurieu (Scientific Expedition Group), 1997 - 1999 – southern Fleurieu remnants (vegetation and vertebrates), and
- Southern Mt Lofty, 2000 – a range of communities, particularly concentrating on "gaps" in prior surveys (vegetation and vertebrates).

Notable exceptions to surveys not included in the analysis are grassy ecosystems and coastal vegetation (both are the subject of separate reports: namely Robertson 1998 and Oppermann 1999).

BIODIVERSITY PLANS AND INTERIM NATURAL RESOURCE MANAGEMENT PLANS

Concurrently with this Biological Survey report the above documents are being independently prepared. These documents aim to summarise all natural resource information and values with the aim of providing biodiversity management strategies. Species and also regions of high conservation value are highlighted. Consequently this report and the above reports are complementary and do not duplicate material to any degree.

THE PHYSICAL ENVIRONMENT

STUDY AREA BOUNDARY AND DESCRIPTION

IBRA Sub-regions

The area described as the Southern Mount Lofty Ranges (SMLR) for the purpose of this survey may generally be described as all the hills and ranges of the Mount Lofty Ranges south of the Gawler River. The precise boundary is delineated by two IBRA[1] sub-regions as follows:

- All of the Fleurieu IBRA sub-region of the Kanmantoo Bioregion and
- All of the Mount Lofty Ranges IBRA sub-region of the Flinders Lofty Block **less** the area which includes urban land on the Adelaide plain.

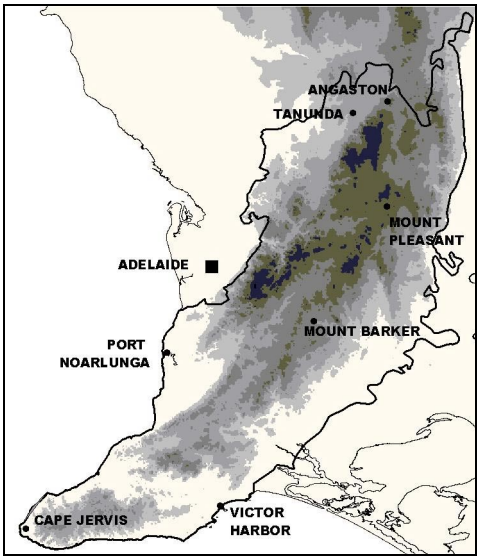

Figure 1.
SMLR study area boundary.

Fleurieu IBRA sub-region

"This sub-region is predominantly an undulating to low hilly upland with steeper marginal ranges and hills. A laterized surface occurs on the Fleurieu Peninsula and becomes increasingly dissected northward to where only a few remnants survive as rounded crests and summits with mottled yellow duplex soils. The lowest lying areas are within the Inman Valley where soft glacial and fluvio-glacial deposits have been lowered more quickly than the surrounding sedimentary rocks." (Blason and Carruthers in prep.)

The southern Fleurieu Peninsula area is a plateau with an average altitude of 350m above sea level, dissected by steeply descending creeks with an average rainfall of 850mm per annum.

Very little native vegetation remains in the northern half of this sub-region.

Mount Lofty Ranges IBRA sub-region

The Barossa Valley is the lowest area in this sub-region and represents a structural basin. The rest of the sub-region consists of hilly uplands on sandstone and shale with northerly trending strike ridges and dissected lateritic tableland remnants (Blason and Carruthers in prep.)

The vegetation of the Mt Lofty Ranges IBRA sub-region is summarised in Blason and Carruthers (in prep.) as follows. Woodlands and forests, "commonly dominated by *Eucalyptus obliqua* (Messmate Stringybark) and *E. baxteri* (Brown Stringybark) are found in higher rainfall areas on deep, lateritic soils. Shallower or sandy soils support *E. fasciculosa* (Pink Gum), *E. cosmophylla* (Cup Gum) and in the northern part of the region *E. goniocalyx* (Long-leaved Box). *Eucalyptus leucoxylon* (SA Blue Gum) dominates the woodlands on podzolised soils in the lower rainfall areas, *E. viminalis* ssp. *cygnetensis* (Rough-barked Manna Gum) dominates the wetter and cooler woodlands and *E. odorata* (Peppermint Box) characterises drier sites. Eucalypts give way to *Allocasuarina verticillata* (Drooping Sheoak) in the most arid woodlands and in coastal situations on shallow rocky soils."

Environmental Associations

The above IBRA sub-regions have been delineated from Laut *et al*. (1977) who mapped South Australia in terms of Environmental Associations. These are smaller mapped land units than IBRA sub-regions, and represent a particular combination of landforms.

The SMLR survey area consists of all 20 Environmental Associations within the Peninsula Uplands Environmental Region (one of three regions that constitute the Mount Lofty Block Province). In addition, Rosedale, the most southerly of the Environmental Associations of the Mid-north Wheatlands Environmental Region is also included within the SMLR survey area, as it is south of the Gawler River and contains significant areas of remnant native vegetation, including Sandy Creek Conservation Park. Appendix I contains descriptions of the environmental associations occurring in the Fleurieu

[1] Interim Biogeographic Regions of Australia (IBRA) sub-regions are distinctive landscapes with characteristic patterns of landforms, soils and vegetation (Thackway and Cresswell 1995). Australia has been divided into 354 IBRA sub-regions.

and Mt Lofty Ranges sub-regions. Their locations are shown in Figure 2.

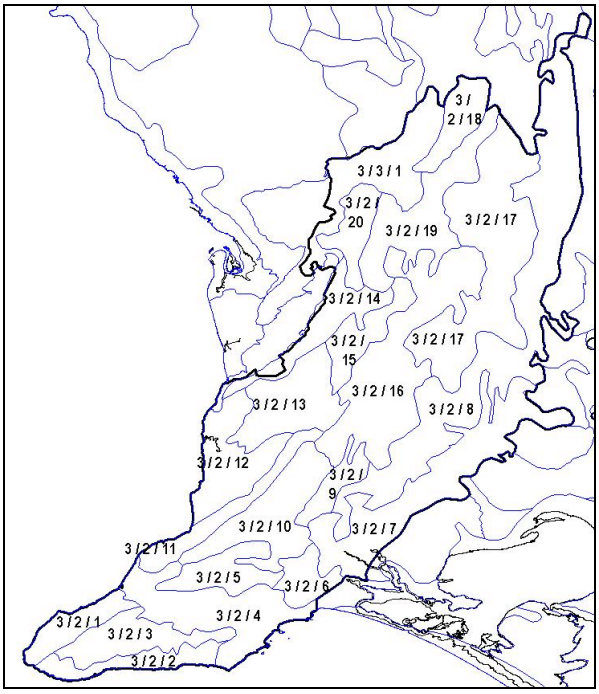

Figure 2.
Location of Environmental Associations occurring within SMLR study area boundary (refer Appendix I for description of codes).

Geology, Geomorphology and Soils
Comprehensive accounts of the region's geology, geomorphology and soils are in the *Natural History of the Adelaide Region* (Twidale *et al*. 1976) and will not be repeated in detail in this report. However, the general topography of the ranges is concisely summarised by the following brief extract from Adamson and Osborn (1924):

"Inland to the east of the city, the Mount Lofty Range rises with rather steep slopes to a general height of about 1,500 feet (460m), Mount Lofty, 2334 feet (720m) being the highest point. While it is possible to speak of a western face to the Mount Lofty Range near Adelaide, on the eastern side the summit generally extends as an elevated plateau which has a gradual fall towards the Murray River." "The crest of the main Mount Lofty Range lies near to the western face. It consists of a complex of ridges separated by valleys, some of which have steep and rocky sides. These valleys form an intersecting series and run in varied directions. The ridges between may be broad and flat-topped or rather narrow, but for the most part the general outlines are smooth and somewhat rounded, not rugged."

Corbett and Whitelock (1977), Long (1999) and Blason and Carruthers (in prep.) also have summaries of the region's geology and topography. Long's (1999) report includes a map showing catchment boundaries. The geology of the Fleurieu Peninsula region, in particular, is described in the Draft Management Plan for the Parks of the Fleurieu Peninsula Region (National Parks and Wildlife Service 1985).

BIOGEOGRAPHIC VALUES
Even prior to European settlement the SMLR was a virtual island of woodland and forest, isolated by the waters of the Southern Ocean and Backstairs Passage to the south and Gulf St Vincent to the west, and the drier more open woodland and mallee habitats on the plains to the north and east. It is in effect an outlier of the Bassian biogeographic region that encompasses the sclerophyll woodland and forest areas with an average annual rainfall in excess of 500mm, of the south-east and south-west of the Australian continent. Within the SMLR, many plant and vertebrate species exist as populations isolated from the greater areas of their natural distribution in the southeast of the continent. Several species of plants are endemic to the region. The extensive clearing of forest and woodland in the SMLR, for pastoral and agricultural purposes, since European settlement has increased this isolation. It has also fragmented what was once one "island" into many smaller islands.

The SMLR survey region covers an area of 6,282 square kilometres. This represents 0.6% of the total area of South Australia and a mere 0.08% of Australia. The small size of the region is of particular significance in relation to the relatively large number of species of both fauna and flora recorded within it, many of which exist as isolated populations.

Human Population
Using figures from the Australian Bureau of Statistics (ABS) 1996 population census, there are an estimated 340,000 inhabitants in the study area. Many are concentrated in the Southern Vales and southern suburbs of Adelaide, in the low rolling hills to the west of the Willunga scarp and south of Marino/Hallet Cove to Sellicks Beach, where 177,000 (52%) of the region's population lives. The high population densities coincide with very little remnant vegetation.

Local Government Areas and Soil Board Districts within the Southern Mt Lofty Ranges are described in Long (1999) and Blason and Carruthers (in prep.).

Natural Resource Values
The SMLR is the "back yard" to metropolitan Adelaide, which has a population of 1,046,000 (1996 Census, ABS). As such, it acts as the main natural water supply catchment for the city, contains some of the most intensive agricultural and horticultural resources found within the State and is the primary source of land-based outdoor recreational opportunities for the residents of Adelaide. The Integrated Natural Resource Management Plan for the Mount Lofty Ranges and Greater Adelaide Region (MLRIINRMG, in prep.) elaborates upon these values.

Land Clearance and Current Perceptions of the SMLR

Probably due to the study region's proximity to the city, the fauna, flora and unique biodiversity values of the region are generally taken for granted by residents of both the city and ranges. Much of what was believed to be common knowledge of many of the vertebrate wildlife species of the region prior to this survey was not substantiated when data from the Department for Environment and Heritage (DEH) and South Australian Museum (SAM) data bases were examined.

The view of the relatively well vegetated hills face from the Adelaide Plains which is observed as the backdrop to the city itself, gives the false impression that the biodiversity values of the SMLR are far more intact than is actually the case. The hills face zone comprises a number of almost contiguous parks including: Ansteys Hill Recreation Park, Black Hill, Morialta, Horsnell Gully and Cleland Conservation Parks, and Belair National Park (Figure 3). The steepness of the hills face zone rendered it unsuitable for cropping and in most cases even for grazing. Whilst having been extensively quarried, the steep escarpment has been relatively undisturbed when compared to the remainder of the SMLR.

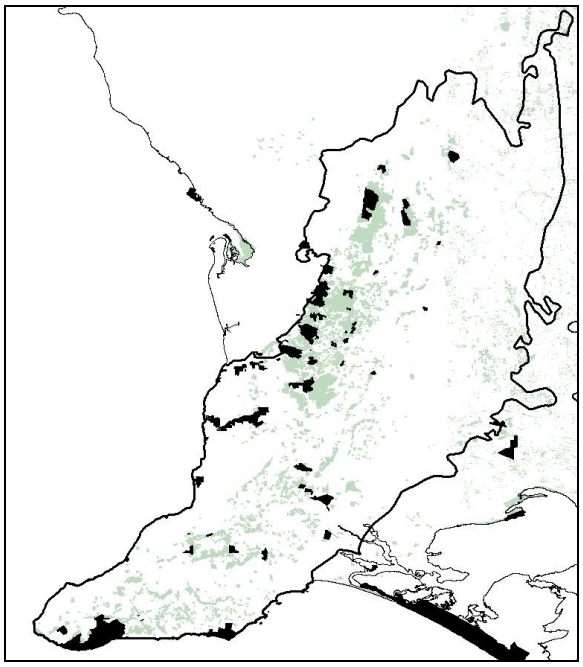

Figure 3.
Location of National Parks and Wildlife Act Reserves (black shading) and remnant vegetation (grey shading) within study area - showing concentration of reserves along western scarp.

This forested backdrop to the city, however, is relatively narrow. Beginning at the eastern edge of the suburbs at the base of the hills, it varies in width from about 5km to nearly 10km in the area immediately south of the Torrens Gorge. To the north and south of this screen are lower rolling hills that were cleared for agriculture many years ago and in some cases more recently for housing.

Much of the remainder of the hills, which are not under native vegetation, are also low rolling hills and wide valleys, which have mostly been used for grazing. Although grazing has not generally necessitated broadacre clearance of woodland and forest, it has reduced the majority of understorey plants and a portion of the overstorey trees. Roadside trees and scattered remnant mature trees in paddocks help to give a parkland impression, generally aesthetically pleasing, but provide little suitable habitat for native wildlife. Travelling through these areas by road may create the impression that large areas are better vegetated than they actually are. Examination of aerial photographs quickly exposes this two-dimensional view as false.

Remnant Vegetation

Vegetation clearance and forest utilisation began with the first European settlers (Williams 1974). The once large areas of grasslands and grassy woodlands covering the foothills and the eastern hills were generally cleared first. Most of the remaining less favourable sites were cleared after World War II.

Of the approximately 13% of the study region which remains uncleared, the majority is on nutritionally poor upland soils, sand or in areas of steep terrain, all of which were unsuitable for agriculture. The dominant eucalypt woodland or forest type reflects this clearly. Most of the remnant vegetation is dominated by Stringybarks (*Eucalyptus obliqua* and *E. baxteri*), Pink Gum (*E. fasciculosa*) and Long-leaved Box (*E. goniocalyx*), which are usually found on the poorer quality soils.

The smooth-barked "gums", River Red Gum (*E. camaldulensis*), SA Blue Gum (*E. leucoxylon*), Manna Gum (*E. viminalis* ssp. *viminalis*) and Candlebark Gum (*E. dalrympleana*) occur on more fertile loamy soils, and are generally confined to scattered trees and isolated small remnants. The understorey has often been removed by grazing and converted to grassland dominated by introduced species.

This has also been the fate of the majority of what is regarded as the intact native areas of "gum". These, usually SA Blue Gum dominated areas, have generally had the larger specimens logged out, have had the understorey grazed at some time and are mostly on steep slopes (e.g. Morialta, Blackhill and Montacute Conservation Parks). The smooth-barked eucalypt remnants tend to be highly weed infested (e.g. South Para Reservoir) or have major recreational pressures and facilities (e.g. Belair National Park and Mark Oliphant Conservation Park).

In general throughout the study region, the remnant areas contain relatively small trees, below 10 –15m

tall. Areas where Stringybarks, Pink Gums and Long-leaved Box exceed this height do exist, but at that height they are usually on better than average soils for the species

The pattern of valley clearance leaving only ridge top remnants is clearly evident when viewing aerial photography or remnant vegetation mapping for the region (Fig. 4). Extensive logging, firewood cutting and increased frequency of large-scale fires have further compromised the ecological value of these remnants. These activities have effectively removed much of the dead fallen and standing timber, or forest "furniture", which is an important habitat component for many vertebrate species.

Figure 4.
Much of the remnant vegetation of the SMLR has been cleared or partially cleared, leaving a matrix of remnant vegetation, horticulture and residential buildings. The steeper slopes and ridge tops generally retain natural vegetation. (Photo: J. Turpin)

Today, there is virtually no vegetation in the SMLR which not been altered since European settlement (authors' personal observations). Much of the remaining woodland and forest is regrowth. In 1831, on making the first European ascent of Mount Lofty, Captain Collett Barker commented on the size of the trees on the summit, including one with a girth of approximately five metres (Robinson 1978). When crossing the SMLR in 1837, Robert Cock described two Stringybark trees near the summit of Mount Lofty with a circumference of 36 and 40 and a half feet (Hyde 1999). That trees approaching the size of these exist anywhere within the SMLR today is doubtful. Their absence is indicative of the changes within the region since European occupation.

Much of the eastern side of the region which was originally SA Blue Gum (*E. leucoxylon*) and River Red Gum (*E. camaldulensis*) Open Woodlands with grassy understoreys, or Grassland and Irongrass (*Lomandra* spp.) communities. This area, however, has been so heavily modified by agriculture and grazing that very few areas of intact habitat exist that are sufficiently large to survey using the Biological Survey of SA methods. Early Europeans travelling through on journeys of exploration commented upon the suitability of this area for pasture (Hyde 1999). Figure 5 illustrates the concentration of survey sites in the western half of the study region. In the eastern areas of the region, therefore, SA Museum records were relied upon as the principal source of vertebrate information.

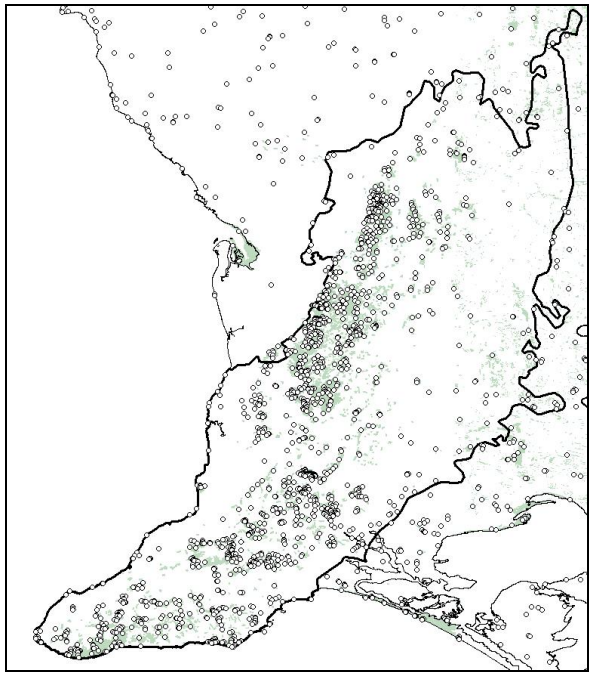

Figure 5.
Location of vegetation survey sites within study area, showing concentration of sites in western half of SMLR.

Fragmentation of Vegetation
As discussed above, the remaining vegetation is highly fragmented. The following information is extracted from Blason and Carruthers (in prep.). Of the remaining vegetation in the Mount Lofty Ranges Region (as defined in Blason and Carruthers in prep.):

- 10% occurs in 2281 blocks between 1 to 10 ha
- 25% occurs in 905 blocks between 10 to 100 ha
- 20% occurs in 93 blocks between 100 to 500 ha
- 8% occurs in 11 blocks between 500 to 1000 ha
- 37% occurs in 12 blocks greater than 1000 ha

These statistics are elaborated upon in Table 1.

Table 1.
Size distribution of native vegetation blocks in Mt Lofty Ranges INRM (source: Carruthers and Blason in prep.).

Block size range (ha)	Number of Blocks	Blocks as % of Total Numbers	Estimated Area (ha)	Area as % of Total Vegetation
1 – 10	2,281	69	9,360	10
10 – 100	905	27	22,780	25
100 – 500	93	3	18,660	20
500 – 1000	11	<1	7,340	8
>1000	12	<1	33,220	37
TOTAL	3,264	100	91,360	100

Figure 6.
Most remnant vegetation patches in the SMLR study region are less than 10 ha, and often with a degraded understorey. Photo shows remnant vegetation patches near Victor Harbor, a highly cleared district. (Photo: A. Robinson)

SURVEY LOGISTICAL DIFFICULTIES
Although relatively small in area and close to facilities, logistically the SMLR is a difficult region in South Australia to undertake a Biological Survey. In addition to the fragmented nature of the remnant vegetation areas, there is an intricate road network, multiple landowners, both private and Government, a massive amount of fences and locked gates, and complex topography forming a variety of natural access barriers.

Further division of the SMLR into three sub-regions
The study area was divided into three sub-regions based on broad variations in climate and habitat. This was to improve logistical management but also to facilitate data interpretation. The sub-regions are:
Southern Barossa/South Para: Gawler River, south to the Torrens River.
Adelaide Hills: Torrens River south to latitude 35^0 $11^{'}$ (this equates to the southern-most limit of the Onkaparinga River).
Fleurieu Peninsula: Latitude 35^0 $11^{'}$ (ie southerly point of Onkaparinga River) to the south coast of the Fleurieu Peninsula.

These subdivisions are shown in Figure 7 and the dominant structural formations within these areas are shown in Table 2.

Table 2.
Dominant structural formations within the three sub-regions within the SMLR study area.

Structural Formation	Sub-region		
	Southern Barossa	Adelaide Hills	Fleurieu
Stringybark Forest/Woodland		✔	✔
Stringybark and Pink Gum Low Woodland – on poor soils, usually ridges or hill tops		✔	✔
Long-leaved Box, Stringybark species and Pink Gum Low Woodland – on poor soils on ridge and hill tops, north of Torrens Gorge	✔	✔	
SA Blue Gum Woodland, occasionally with some River Red Gums	✔	✔	✔
Larger water courses with narrow corridors of Manna Gum		✔	✔
Swamps (mainly in Fleurieu district) including Swamp Gum		✔	✔
Grey Box – hills face slopes with open grassland		✔	
Pink Gum/Native Pine woodlands on laterite or sand	✔		
Coastal mallee (Newland Head)			✔

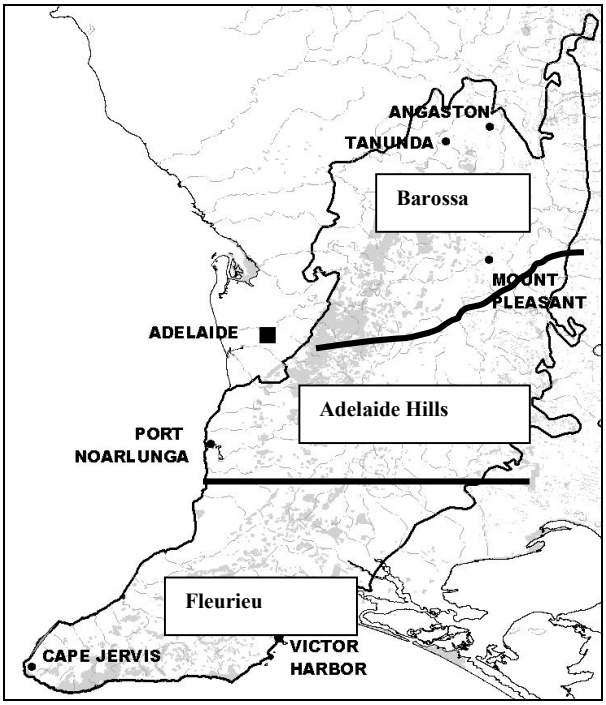

Figure 7.
The three sub-divisions within SMLR study region.

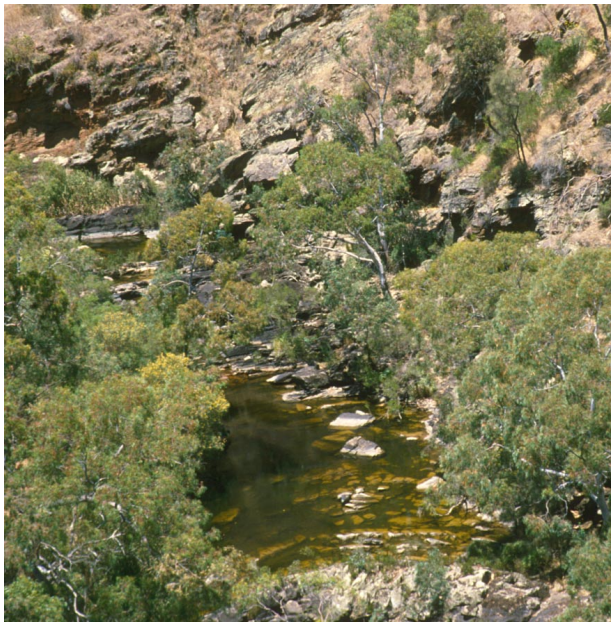

Figure 8.
The Onkaparinga River forms the southerly boundary between the Adelaide Hills and Fleurieu sub-regions. The photo shows River Red Gum lining the banks. (Photo: A. Robinson).

CLIMATE

The major climate throughout the Mount Lofty Ranges consists of a temperate pattern with a hot, dry summer and moderately wet winter on the slopes of Mt Lofty and associated ranges (Schwerdtfeger 1976).

Mount Lofty (720m) and associated ranges create significant orographic rain for about 8 months of the year, resulting in some of the highest winter rainfall averages in the State. Substantial cloud cover, enhanced by orographic uplift, may extend non-continuously well into spring over the ranges. This causes overall solar radiation totals to be much less than areas on the Adelaide Plains. The drop in temperature with altitude, supplemented by the extended cloud cover lowers average temperatures by up to several degrees Celsius less than temperatures on the plain.

There is a considerable variation in rainfall, and to a lesser extent temperatures within the SMLR study area, mainly due to topography and altitude. The mean height of the main ridges of the Mt Lofty Ranges is approximately half that of the main peak (Schwerdtfeger 1976). In the Adelaide Hills sub-region (Fig. 7), annual precipitation rises steadily from 600mm to over 1000mm along ridges which run approximately east to west (Specht 1972). Records from 1972 – 74 indicated the mean annual rainfall in the vicinity of Mt Lofty Summit approached 1,600 mm, approximately four times the rate that falls on the Adelaide Plains near the coast at Port Adelaide (Schwerdtfeger 1976). Some parts of the ranges average 600 mm/month during winter, with occasional thunderstorms in summer adding sudden downpours of up to 100 mm/day.

Similarly, there are great variations in rainfall in the Fleurieu Peninsula sub-region. The rainfall, in general, increases with altitude ranging from about 400mm in the east near the mouth of the River Murray up to nearly 1000 mm on the south-western plateau.

Within the Barossa sub-region, there are similar variations in rainfall, with some of the driest northern areas experiencing 300mm annual rainfall and the wetter areas averaging about 900mm annual rainfall.

In contrast to the cool, wet winters within the SMLR region, summer is characterised by long periods of dry conditions, during which time the evaporation rate may approximate 200 mm/month (Schwerdtfeger 1976). Most summer rain is in the form of thunderstorms. During the drier spring and summer months tall trees on the highest ridges may frequently capture cloud droplets even when it is not actually raining.

Local topographic variations also cause variations in weather eg deep gullies and valleys experience greater shading and cooler temperatures. Aspect strongly influences evaporation (and hence soil moisture). The following quote from Specht (1972) illustrates the influence of aspect and rainfall within the ranges:

> "Three species of *Eucalyptus* are common on soils developed from phyllite ridges. Where annual precipitation is 60 – 70 cm, *E. odorata* (Peppermint Box) occupies the north-facing slopes while *E. leucoxylon* (Blue Gum) occurs with *E. odorata* on the south-facing slopes. Between 70 and 80 cm annual precipitation, *E. leucoxylon* is common on both sides of the ridges, but is found only on north-facing slopes when the annual rainfall lies between 80 and 100 cm; *E. viminalis* (Manna Gum) then occupies the south-facing slopes."

Table 3 illustrates the range in average annual rainfalls received within the study area:

Table 3.
Annual temperature and rainfall averages for selected locations within study region.

Location	Avg. Rain-fall (mm)
Mount Kitchener, Hundred Moorooroo, east of Tanunda, Angaston	600[1]
Altona, Hundred Barossa, near Lyndoch and Tanunda	600[1]
Pimpala Road, Hundred Barossa, Between Sandy Ck, Lyndoch and Williamstown	600[1]
Pewsey Vale and Wirra Wirra Peaks, Hundred Barossa	900[1]
Watts Gully Road, adjoining Warren CP	700[1]
Barossa, South Para and Warren Reservoirs	700[1]
Humbug Scrub, Hundred Para Wirra	700[1]
Mount Gawler	750[1]
Cromer, Hundred Para Wirra	350[1]
Deep Creek, Hundred Onkaparinga	950[1]
Basket Range, Hundred Onkaparinga	900[1]
Langhorne Creek, south-eastern Fleurieu Peninsula	390[2]
Mt Jagged, south-west Fleurieu Peninsula	963[2]
Stirling West	1165[3]
Morphett Vale	575[3]
Mount Pleasant	670[3]

[1] = Wells (1976)
[2]= National Parks and Wildlife Service
[3] = Adamson and Osborn (1924)

PREVIOUS BIOLOGICAL RESEARCH

VEGETATION
There have been numerous vegetation studies and surveys of the SMLR – most specialising in particular habitats or locations.

Lange (1976) provided a resume of major vegetation studies of the SMLR "from earliest investigations and conditions to the present day". Lange noted that the accumulated knowledge describing and classifying the region's vegetation was marked by a varied approach and lack of continuity. Major accounts of vegetation of the region are:

Adamson and Osborn's (1924) *The Ecology of the Eucalyptus forest of the Mount Lofty Ranges* (*Adelaide District*), *South Australia*. Lange (1976) noted that "After half a century their pioneering paper still is used as a main source of information about Adelaide Hills vegetation…". Adamson and Osborn (1924) divided the vegetation into three formations:

1. Stringybark (sclerophyll) Formation, including *Eucalyptus obliqua* forests. These forests occurred at rainfalls greater than 750mm, mostly on ridges and hills and on shallow soils, formed from quartz.
2. Savannah Woodland Formation, including *Eucalyptus leucoxylon* and *Eucalyptus odorata*. Savannah woodland formation occurred at rainfalls of 400-900mm, mostly on soils derived from non-silicious rocks.
3. Red Gum Formation, including *Eucalyptus camaldulensis* and *Eucalyptus viminalis* ssp. *viminalis* in the valleys and lower slopes.

Swamps were recognised but not described by Adamson and Osborn (1924).

Wood's (1937) *The Vegetation of South Australia,* was the first attempt to describe the vegetation of all of South Australia and this account "greatly augmented" the paper of Adamson and Osborn (Lange 1976).

Crocker and Wood (1947) outlined historical influences in accounting for the occurrence, composition and characteristics of plant communities now present in South Australia.

Papers by Jessup (1946), Specht and Perry (1948) and Specht *et al*. (1961) included an emphasis on the relationships between soil and vegetation.

Specht's (1972) *Vegetation of South Australia* provided one of the most comprehensive accounts of Adelaide regional vegetation *(*Lange 1976).

Other specialised studies since 1976
Wells (1976) described and assessed 20 vegetation remnants of the north-central Mount Lofty Ranges, along with conservation recommendations.

Lamprey and Mitchell (1979) provided a detailed account of the vegetation of the Fleurieu Peninsula.

Mitchell *et al.* (1981) surveyed remnant vegetation and wetlands in the central and north-eastern Mt Lofty Ranges.

Green (1994) investigated the ecology of the central Mt Lofty Ranges.

Hyde (1999) described and mapped pre-European vegetation and described remnant vegetation of the Bremer Barker Catchment. Hyde, in turn outlines previous botanical studies for this Bremer Barker Catchment (in the south east of the SMLR), including: Boomsma (1948), Hyde 1993, 1995, 1996), Crawford (1997) and the Bremer Barker Catchment Group (1996).

Biological Surveys listed in the Department for Environment and Heritage's Survey Database
Included in this Biological Survey vegetation analysis for the SMLR are five separate surveys, of which the most extensive was conducted in 1985 and comprised over 600 quadrats. Details of all five surveys, which comprise this analysis, are outlined in the Methods chapter.

In addition to the above five surveys included in this report, a number of other surveys conducted within the SMLR region are listed in the Department for Environment and Heritage's Survey database (Table 4). These include surveys conducted on behalf of the former councils of Happy Valley, Stirling and Noarlunga. A series of surveys were conducted in Adelaide Hills parks in the late 1970's: Kyeema CP, Belair NP, Para Wirra CP, Morialta CP, Cleland CP and Horsnell Gully CP. These surveys sampled vegetation and vertebrate fauna over a range of plant communities. Only the flora data has been entered into the Survey database. Some of these survey sites have now been incorporated in Survey 117, "Southern Mt Lofty".

FAUNA
Prior to the Southern Mt Lofty Biological Survey, conducted in 2000, there had been no systematic survey of fauna for the SMLR. However, research on particular mammal species in the Mt Lofty Ranges has been quite extensive. Long (1999) provided the following list of researchers: Paull (1995), Alexander *et*

al. (1978a,b,c), Aslin *et al.* (1981) Carne *et al.* (1997), Marshall *et al.* (1995), Regel (1995), Sanderson and Kirkley (1998) and Scott (n.d.). Long (1999) also notes that Field Naturalists Journals are another source for mammal notes with most of the SA Mammal Club field trips documented. Further details of historical and current fauna research are provided in the Results chapter.

Table 4.
Summary of flora and fauna surveys conducted in the SMLR study area, where data resides in Department for Environment and Heritage databases.

Survey Name (and number) appearing in survey database	Date	Type of Survey	Conducting organisation/individual
Mt Lofty (5)	1985	Vegetation	D Goodwins, DTUPA
Mt Lofty Ranges (32)	1981	Vegetation	S. Kinnear, DTUPA
Kyeema CP (33)	1977	Vegetation	A. Robinson, DEHAA
Belair NP (34)	1978	Vegetation	A. Robinson, DEHAA
Para Wirra CP (35)	1978	Vegetation	A. Robinson, DEHAA
Morialta CP (38)	1977	Vegetation	A. Robinson, DEHAA
Cleland CP (36)	1988	Vegetation	A. Robinson, DEHAA
Horsnell Gully CP (37)	1977	Vegetation	A. Robinson, DEHAA
Happy Valley DC (56)	1992	Vegetation	M. Robertson, DEHAA
Stirling D.C. (57)	1993	Vegetation	C. Crawford, Adelaide Hills Council
Noalunga Christies Creek (65)	1994	Vegetation	P. Green, DC Onkaparinga
Noarlunga Field Creek (70)	1994	Vegetation	P. Green, DC Onkaparinga
Lofty Block Grasslands (83)	1995	Vegetation	M. Robertson, DEHAA
Coastal Dune and Clifftop (82)	1994	Vegetation	D. Fotheringham, DEHAA
Mt Lofty Emu-wren (52)	1996	Vegetation	R. Taplin, T.Littlely, P. Lang, DEHAA
Southern Fleurieu Peninsula (97)	1997	Vegetation & Fauna	D. McKenzie, Scientific Expedition Group
Fleurieu Roadside Vegetation (93)	1996	Vegetation & Fauna	M. Hyde
Temperate Grasslands (46)	1991	Vegetation	M. Hyde
Private Collections (42)	1987	Vegetation	R. Taplin and D. Murfett
Grassy Woodlands (54)	1993	Vegetation	M. Hyde
Private Collections (47)	1982	Vegetation	M. Hyde

METHODS

S. Croft[1]

The surveys included in this report collectively form part of the Biological Survey of South Australia. In general, methods are consistent with the methodology outlined in the following manuals:
Guide to a Native Vegetation Survey Using the Biological Survey of South Australia. (Heard and Channon 1997), and:
Guidelines for Vertebrate Surveys in South Australia: using the Biological Survey of South Australia (Owens 2000).

However, the vegetation surveys included in this report date from 1977 and incorporate a number of variations and/or additions to the "standard' Biological Survey methods.

Aims, quadrat selection, field methods and data analysis are outlined separately for vegetation, vertebrates and invertebrates.

VEGETATION

Five surveys comprise the vegetation component of the biological survey. Although each survey recorded floristic composition within defined quadrats, the aims, quadrat size and data recorded varied between surveys. Table 5 shows the dates, scope and number of quadrats within each survey.

Table 5.
Vegetation surveys included in SMLR study analysis.

Survey Number	Survey Name	Dates of Surveys	Type of Survey	Quadrats within study area	Quadrats outside study area
5	Mt Lofty	1/5/85 to 13/12/91	Vegetation	609	19
42	Mt Lofty - Private	8/1/87 to 29/7/91	Vegetation	292	34
52	Mt. Lofty – Emu Wren	Various dates between 1/10/93 to 31/3/94; and Oct. to Dec. 1996	Vegetation	50	3
97	Southern Fleurieu (Scientific Expedition Group)	14/1/1997 to 1/3/1999	Vegetation and Vertebrates	34	0
117	Southern Mt Lofty	1/11/77 to 10/5/01 (most quadrats surveyed in spring of 1999 and 2000)	Vegetation and Vertebrates	192	0
			Total	**1177**	**56**

[1] Biodiversity Survey and Monitoring Section, Science & Conservation Directorate, Department for Environment and Heritage, GPO Box 1047, Adelaide 5001.

The location of survey quadrats is shown in Fig. 5.

VEGETATION SURVEY OBJECTIVES, STUDY AREAS AND SITE SELECTION

The details of each survey are outlined below and the differences between surveys are summarised in Table 6.

Survey 5 (Mt Lofty)

Objective: To classify and map communities in the South Mount Lofty Ranges as part of a fire management system. High fire hazard communities, especially high rainfall forests and woodlands with a heath understorey were targeted. No coastal, wetland or grassland sites were sampled.

Study Region: Mount Lofty Ranges, south of the Gawler 1:50,000 map sheet to the coast and east as far as Goolwa in the south and Barossa in the north.

Site Selection: Based on an even geographical spread of sites. Selected within areas having tree or shrub cover. No coastal sites selected. Stratified sampling techniques were used to gain maximum variation.

Survey 42 (Private)

Objective: To record base-line data for remnant vegetation of:

- Southern Fleurieu Peninsula, targeting high rainfall Stringybark forest with a heath understorey,
- North-east of Adelaide, targeting Pink Gum, *Eucalyptus fasciculosa* – Long-leaved Box, *Eucalyptus goniocalyx* forest with a dry heath understorey (500 – 750mm rainfall), and
- Wet creekline and peat bog swamps of southern Fleurieu Peninsula

Study Region: Southern Fleurieu Peninsula and Adelaide hills northeast of Adelaide, including Kersbrook – Williamstown area.

Site Selection: Quadrats were located entirely within one aspect and plant community, and avoided disturbance and edge effects. Quadrats were numbered sequentially PC (for Private Collectors) and quadrat numbers were between 765 and 1100, inclusive.

Survey 52 (Mt. Lofty – Emu-wren)

Objective: To determine the vegetation structure and composition of Southern Emu-wren habitats. Compare swamps that have records of Emu-wrens present against those without Emu-wrens.

Study Region: Southern Fleurieu Peninsula, bounded by Yundi in the north and Cape Jervis in the south, west by the coast and east to the mouth of the Finniss River.

Site Selection: Quadrats were located within swamps providing existing or potential Emu-wren habitat. Site nomenclature follows Heard and Channon (1997).

Survey 97 (Southern Fleurieu (SEG))

Objective: To assess biodiversity of road reserves on the Southern Fleurieu Peninsula to assist in management of these road reserves.

Study Region: Southern Fleurieu Peninsula.

Site Selection: Quadrats were selected on both developed and undeveloped road reserves. Quadrat names were based on the first three letters of the 1:50,000 mapsheet and quadrats were numbered sequentially in an anti-clockwise direction.

Survey 117 (Southern Mt. Lofty Ranges)

Objective: To survey vegetation types and also National Parks and Wildlife Act reserves, inadequately surveyed by prior surveys within the Southern Mount Lofty Ranges.

Study Region: The area is bounded by Gawler River to the north, where the Ranges meet the Murray plain in the east, the Southern Ocean in the South and St Vincent's Gulf to the west.

Site Selection Criteria: Survey 117 has combined three separately conducted surveys:

- 81 quadrats comprised a series of 7 vegetation surveys conducted in Adelaide Hills parks in the late 1970's: Kyeema CP, Belair NP, Para Wirra CP, Morialta CP, Cleland CP and Horsnell Gully CP.
- 9 quadrats conducted by the NCSSA
- 102 quadrats coordinated by the Department for Environment and Heritage in 2000

The following comments relate to the latter mentioned 102 quadrats. Site selection for survey 117 avoided the more specialised areas of habitat surveyed during surveys 52 and 97, swamps and mainly smaller areas of privately owned remnant native vegetation in the Fleurieu District. Based on remnant vegetation mapping for the region, the survey quadrats were selected using the following broad criteria.

- To be concentrated within the larger intact patches of remnant vegetation, with a view that this would improve the possibility of sampling in the most complete ecosystems. This resulted in quadrats concentrated on land managed by National Parks and Wildlife South Australia (NPWSA), Forestry SA and SA Water. However, privately owned remnants (including Heritage Agreements) were also surveyed.
- Quadrats should be proportionately representative of the vegetation associations present.
- Quadrats should be reasonably spatially distributed across the survey area.
- Quadrats should be accessible within a reasonable distance by vehicle.
- At least one quadrat should be located in each NPWSA reserve, where possible and practical.

Vegetation survey quadrats were not always tied to fauna quadrats. Quadrats were numbered using the method described in Heard and Channon (1997).

Table 6.
Details of quadrat size and floristic recording methodology for each vegetation survey.

Survey Number	Size of quadrat	Methodology	Photo-points Established
5	10m x 10m	All species recorded. The three dominant species from each stratum (overstorey, shrub and grass/sedge) were scored using a relative percentage cover. Later converted to Braun Blanquet cover/abundance using quadrat photographs.	No
42	10m x 10m	All species recorded. Three dominants overstorey species were recorded and their relative percentage cover (not Braun/Blanquet), foliage height and depth. Plants species names were recorded under trees, shrubs >0.25m, shrubs <0.25m and grasses/herbs. The structure of each vegetation layer was recorded according to Specht's (1972) classification. Only unidentified species were collected for later identification and herbarium vouchers.	No
52	10m x 10m (or $100m^2$ configuration if 10m x 10m not suitable)	All species recorded along with a Braun/Blanquet cover abundance score. Overstorey heights and canopy cover not recorded.	No
97	30m x 30m (some quadrats adjusted to 20m x 45m)	Heard and Channon (1997)	No
117	30m x 30m	Heard and Channon (1997)	Yes

VEGETATION DATA MANAGEMENT
Table 7 shows data available in electronic form for each quadrat for each vegetation survey.

Table 7.
Data available for each quadrat for the five vegetation surveys included in the SMLR region Biological survey analysis.

Variable	5 (Mt Lofty)	42 (Private Collections)	52 (Emu-wren)	97 (Southern Fleurieu – SEG)	117 (Southern Mt Lofty)
Plant species	✔	✔	✔	✔	✔
Location - description	✔	✔	✔	✔	✔
Latitude and longitude	✔	✔	✔	✔	✔
Elevation	✔	✔	✔	✔	✔
Aspect	✔	✔	✔	✔	✔
Landform pattern description and landform description			✔	✔	✔
Surface strew size and strew cover description			✔	✔	✔
Slope			✔	✔	✔
Vegetation Structural Formations			✔	✔	✔
Braun/Blanquet score for each species			✔	✔	✔
Overstorey and understorey dominants			✔	✔	✔

Structural information and dominant species cover codes for Survey 5 (515 quadrats) has been entered into a Database spreadsheet, and analysed manually for the purpose of this report.

At the time of writing, only species present has been entered electronically for Survey 42. Species lists for each quadrat were analysed manually to determine overstorey, shrub and ground cover species present.

VEGETATION DATA ANALYSIS

The quadrat-based data for vegetation was analysed using PATN exploratory analysis software (Belbin 1994). Because cover/abundance information was not in electronic form for survey 5 and 42 (totalling 901 of the 1177 survey quadrats), the analysis was based on species presence/absence data only. This analysis clustered the quadrat species presence/absence data into groups based on similar floristic composition.

The PATN analysis procedure used was as per Brandle (2001). The results display a dendrogram of similarity between quadrats. The dendrogram can be cut off at any level of dissimilarity to display a desired number of groupings and should be cut off where the vegetation types represented by the quadrats in these groupings reflect ecologically meaningful groups (Robertson 1998). The purpose of the classification is to identify vegetation types in which many species commonly and repeatedly occur together due to particular environmental factors.

The PATN analysis software was also used to produce the [Observed frequency – Expected frequency]/Expected frequency (O-E/E) index values for each species by group. This index is an adaptation of the Chi-squared formula. The Expected frequency for a species in a particular category is determined by dividing the sum of frequencies within one category (ΣX) by the total of the sums of all categories ($\Sigma\Sigma X$), multiplied by the sum of the frequency for the species in all categories (ΣY), ie $\Sigma X/\Sigma\Sigma X*\Sigma Y$.

VEGETATION MAPPING

The area defined for mapping of the South Mount Lofty Ranges was the eleven 1:50,000 mapsheet boundaries from Vincent, Barossa and Gawler in the north to Cape Jervis, Torrens Vale, Encounter and Goolwa in the south. The northern boundary extends south from Tanunda (34.5 degree latitude) and Thompsons Beach and west from Kaiserstuhl Conservation Park (139 degree longitude). It is bounded on the west by St Vincent Gulf and south by the coastline and Lake Alexandrina. Within Lake Alexandrina the islands of the Murray Mouth Reserves were included.

Floristic vegetation mapping in the South Mt Lofty Ranges involved the identification of native vegetation from interpretation of 1:40,000 colour aerial photography taken in 1996, 1999, and 2000. Areas less than 1 hectare was generally not mapped. Within the mapping region larger scale mapping for small areas has since been completed that in some cases may have identified blocks of vegetation less than 1 hectare.

The mapping process was conducted prior to the floristic analysis presented within this report. The mapping project area extends to adjacent plains and coastal zones not within the Fleurieu and South Mount Lofty IBRA boundaries used for the analysis. The initial list of vegetation groups used for the mapping were derived from a vegetation analysis (PATN) conducted in 1986 from Biological Survey sites within the high rainfall zone of the Mount Lofty Ranges. This analysis provided an initial list of 40 vegetation groups for mapping. Vegetation sites surveyed since 1986 within the mapping region have extended the knowledge of vegetation communities within the region.

Further research of the literature provided vegetation details on a block basis. Of particular use were Davies (1982), Neagle (1995), numerous National Parks and Wildlife SA (NPWSA) management plans, heritage agreement and NPWSA reserves that provided lists of vegetation associations within blocks of vegetation. Roadside vegetation mapping existed for some roads and native species identified along a road was a guide for the adjacent blocks of vegetation.

Vegetation information found in the variety of sources indicated above was interpreted to provide an initial list of vegetation groups. All vegetation information was transcribed on reference maps beside the relevant blocks of native vegetation or the vegetation survey sites to aid in the vegetation interpretation process. Using stereo pairs of colour aerial photographs, viewed through a stereoscope, the vegetation was mapped extrapolating out from each site. Extrapolation relied heavily on the recognition of the textural (height, canopy size and spacing) and tonal (foliage colour) qualities characteristic to vegetation groups at a known location and any identifiable landform, soil and surface stone characteristics. This information was extrapolated into surrounding vegetation where no information was available. The vegetation was mapped with one vegetation type identified within an area. Boundaries between different vegetation associations were mapped onto mylar film. The cadastre, roads, drainage and forestry reserves boundaries were used as the reference base for the mapping.

In the identification of native vegetation from colour aerial photography some rare plant community types may not be adequately represented due to the difficulty in their detection from the imagery. The most under represented plant communities are grasslands, sedgelands/reedbeds, swamps, coastal shrubland vegetation and some less common or extensively cleared woodlands and open forest communities.

To aid the mapping process field checking was conducted where possible. The field checking was

limited to one day spent on a mapsheet and involved visual assessment of roadsides, NPWSA parks and reserves accessible to 2WD vehicles and distant observations from roadsides of vegetation within private land. Field checking was particularly useful for recognising and mapping rarer communities or areas where no vegetation information was available.

Larger scale mapping that existed within the mapping region has been incorporated without appropriate scaling. These included mapping of Morialta and Black Hill Conservation Parks using 1995 1:5,000 and 1:10,000 colour aerial photography, Kaiserstuhl Conservation Park using 1994 1:5,000 colour aerial photography, Mt Osmond reserve using 1:5,000 colour aerial photography and Hindmarsh island and surrounding islands using 2001 1:20,000 colour aerial photography. All these mapping projects involved extensive field checking. The Hindmarsh Island mapping was not always able to be assigned one vegetation group to a block. In these cases two floristic groups, in order of dominance and included an estimate of percent cover has been ascribed to the block. This is generally referred to as a mosaic. These project-based updates have followed the principles of the original mapping methods.

The vegetation data is stored and maintained as part of the Environmental Database of South Australia (EDBSA) by the Environmental Information Division, DEH.

VERTEBRATES & INVERTEBRATES

SURVEY SITES AND SUB-REGIONS

One hundred and fifty seven survey quadrats from three surveys (Table 8) were surveyed for mammals, reptiles, amphibians and birds. Figure 9 shows the location of survey quadrats. Appendix II provides vegetation and selected physical parameter details for each survey quadrat.

Table 8.
Surveys included in vertebrate analysis for SMLR, and number of survey quadrats.

Survey No.	Survey Name	Year	Number of quadrats from which vertebrate data recorded
117	Southern Mt. Lofty Ranges	2000	111
52	Mt. Lofty – Emu-wren	1993 - 1996	12
97	Southern Fleurieu (Scientific Expedition Group)	1997-99	34
			Total = 157

The SMLR survey area was divided into three sub-regions of "Barossa", "Adelaide Hills" and "Fleurieu" (Fig. 7). These show variations in the general climate and habitat types, and can be roughly separated on the following basis:

- Barossa: Gawler River south to the Torrens River.
- Adelaide Hills: Torrens River south to an east-west line through the most southerly portion of the Onkaparinga River
- Fleurieu: from the east-west line through the most southerly portion of the Onkaparinga River to the south coast.

Summaries of these surveys and their objectives are outlined below.

Southern Mt. Lofty Ranges survey (No. 117)

Of the 111 quadrats surveyed for vertebrates, 102 were undertaken by the Department for Environment and Heritage (DEH) Biodiversity Survey and Monitoring Section in the year 2000. The 102 quadrats were surveyed over three separate periods:

- 31 quadrats in the Fleurieu District in early autumn (between 20th February and 3rd March).
- 33 quadrats in the southern Barossa District and northern Adelaide Hills in mid-spring (between 22nd October and 3rd November).
- 38 quadrats in the remainder of the Adelaide Hills at the end of spring/early summer (between 26th November and 8th December).

An additional nine quadrats in the southern Barossa District were surveyed between the 23rd and 27th September 2000 by the Nature Conservation Society (NCS), for the South Para Biodiversity Plan. The majority of these quadrats were originally selected for the DEH survey, and consequently the data collected was included with the DEH survey number 117.

The intention in setting the timing of the survey of the three sub-regions was to facilitate comparable climatic conditions at the time of sampling. The general weather pattern within the region is for cooler, wetter conditions in the Fleurieu District in the south grading to warmer drier conditions to the north in the southern Barossa District. However, the higher altitude in much of the Adelaide Hills or central sub-region modifies this pattern, resulting in it drying out later in the year. Hence the timing of sampling of the two northern sub-regions is reversed. This was considered important as access to many of the survey quadrats was along four-wheel drive tracks, suitable for use only in dry conditions. Unfortunately, the average weather conditions did not prevail in 2000 and the Fleurieu district, expected to be at its driest in late summer-early autumn, received as much as 100mm of rain in some

areas during the survey period. Fortunately only one of the intended survey quadrats had to be abandoned as a result. An unexpected benefit was the high number of frog records obtained for the area. In addition, temperatures were below average during the sampling periods in the other two sub-regions later in the year.

Seven of the survey quadrats in the Adelaide Hills sub-region were long term monitoring quadrats originally established during the late 1970's and early 1980's to assess post bush-fire regeneration of fauna and flora. Four of these quadrats were in Cleland Conservation Park and three in Horsnell Gully Conservation Park. All standard sampling other than the usual trapping effort was carried out at these quadrats. Trapping data used was from the last trapping event of the post fire research, carried out in 1998.

Quadrats selected for survey 117 (including nine NCSSA quadrats) avoided specialised areas covered during surveys 52 and 97, namely swamps and mainly smaller areas of remnant vegetation in the Fleurieu district.

Mt. Lofty – Emu-wren survey (no. 52)
The 12 quadrats from the Nature Conservation Society of SA (NCSSA) Survey of the Fleurieu Peninsula Swamps (Survey No. 52), conducted from the 5th to the 9th of December 1996 were also included in the vertebrate analysis.

Southern Fleurieu survey (Scientific Expedition Group) (no. 97)
Thirty-four roadside quadrats of the Southern Fleurieu Peninsula surveyed by the Scientific Expedition Group were included in the vertebrate analysis. These quadrats were surveyed over separate visits to the area in November 1997, and March, May, August and October 1998.

HUMAN RESOURCES
Survey 117 (Southern Mt Lofty) required field involvement by approximately 70 biologists, equally divided between paid staff and volunteers. There were two groups of usually six people, in the field at a time, over three, two-week periods, for a total of six weeks field time.

SITE SELECTION CRITERIA
As discussed under vegetation methods above, quadrat selection for survey 117 avoided the more specialised areas of habitat surveyed during surveys 52 and 97, swamps and mainly smaller areas of privately owned remnant native vegetation in the Fleurieu District. Quadrats were selected within larger intact patches of remnant vegetation. At least one quadrat was located in each National Parks and Wildlife Act reserve, where possible and practical.

SURVEY METHODS - BIOLOGICAL SURVEY OF SA TECHNIQUES
At each quadrat vertebrates were surveyed using the Biological Survey of South Australia method (Owens 2000). This included the following techniques:

Reptiles and small mammals were surveyed using a single fenced pitfall line, 50m long and comprising six pitfall traps ten metres apart with each pit 15cm in diameter and 40cm deep. A separate line of Elliott traps and two cage traps was run in association with each pitline, about 20m away. Each quadrat was surveyed for 4 days and 4 nights.

Mammals and reptiles were also recorded by active searching of the area surrounding the trap-line for individuals or signs such as identifiable diggings, scats, tracks, bones or even scratches on trees were noted. In some cases material was collected or photographed for later confirmation. Spotlight searches were made for 20 to 30 minutes each night at the majority of survey quadrats.

The majority of bird records from each quadrat were made during a concentrated effort of approximately two hours at the prime activity times for birds (one hour in the early morning and another in the late afternoon). This was supplemented by additional observations, particularly of less frequently encountered species during the four day trapping period. These secondary observations were particularly relevant in obtaining records of nocturnal species during spotlighting. Opportunistic observations of significant species were also collected during reconnaissance trips within the region, and when travelling between survey quadrats during the survey.

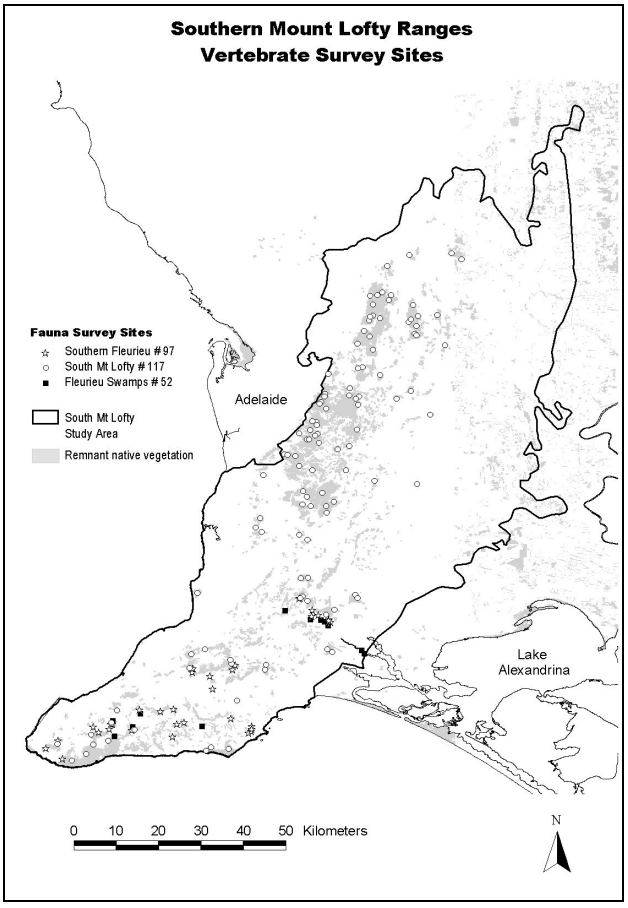

Figure 9.
Location of vertebrate survey quadrats within SMLR study region.

All information was recorded on standard data sheets and included location, method of capture or sighting, microhabitat, numbers of individuals and weight for small mammals.

Fauna encountered outside the specified quadrats were recorded as "opportunistic" sightings on separate data sheets. These records enabled compilation of a more thorough inventory of the biota (especially reptiles) of each area, including species' use of smaller or more heterogeneous habitat types not surveyed by quadrats. Opportunistic records, many in the form of road kills, collected while travelling between survey quadrats during the survey, provided important additional data for the larger mammal and reptile species.

BATS
Although some quadrat based and opportunistic bat trapping was carried out during the survey, information on bats within the region is largely based on the records of the South Australian Museum. A systematic approach to collection of records on this group is largely outside the scope of the Biological Survey of South Australia.

However, in addition to the Biological Survey, a bat survey of the Mount Lofty Region was conducted during the summer 2001/2002, by local residents using ANABAT bat detectors. This survey was organised by the South Australian Museum, the Natural Resources Centre, the Upper River Torrens Landcare Group and the Barossa Catchment Group. Thirty-one quadrats were surveyed for one to three nights and over 15 000 echolocation calls recorded (T. Reardon, pers. comm. 2002).

HAIR TUBE SAMPLING – MAMMALS
In an attempt to provide additional information on mammal species, hair tube sampling was carried out at 100 of the 111 survey sampling quadrats (Appendix IV). Nine of the excluded quadrats were surveyed by the Nature Conservation Society (NCS) survey in the Southern Barossa sub region during September 2000 where hair tubes were not installed. A further two quadrats in the Mount Bold Reservoir Catchment Reserve were excluded as they were on boggy ground along watercourses. In such situations pitfall trapping was impractical and as the pitfall line scar was used to assist in relocating the hair tubes (see below) they were not installed at these two locations.

The hair tube consisted of a 20cm length of 5cm diameter PVC pipe, with two pieces of 2-3cm double sided adhesive tape attached inside and parallel to both ends. Bait was contained in aluminium fly screen mesh in the center of the tube. A hole drilled through the centre of the tube enables a nail or pin to be passed through the tube and the bait parcel to secure the tube in place on a tree or on the ground and hold the bait in place. Hair samples were "captured" when mammals attempted to access the bait. At the time of installation of the standard trap line at each survey quadrat, four hair tubes were located at each of 100 quadrats. These were located, one on the ground and one on a tree, and one at each end of the pit trap line. These were then retrieved four to five weeks later and any hair samples collected and where possible identified, using the methods described in Brunner and Coman (1974). Some taxa are more easily identified than others from hair analysis (Lobert *et al*. 2001) and some taxa are more likely to lose hair when investigating a tube than others.

Some minor discrepancies occurred in the numbers of hair tubes set at each quadrat. Two of the four tubes set at sites in Mount Gawler North Native Forest Reserve (NFR) and Onkaparinga Gorge National Park either could not be relocated. Two sets of hair tubes were inadvertently set at the survey site in Cudlee Creek Conservation Park. Despite these anomalies, the overall effort was still 400 hair tubes set over 100 sites.

OTHER SOURCES OF RECORDS
South Australian Museum records: These records were extracted in 1999. The records of the South Australian Museum were a critical source of information on extinct species in the region. They also provided information on several species that now exist in heavily modified habitat, which was not considered suitable for sampling using the established biological survey approach. This applies particularly to the

heavily cleared eastern side of the ranges, and the hills face zone north of the city of Adelaide.
The Mammal Club of the Field Naturalists Society of South Australia's records were an important source of data overall.
Published references: The relatively few published references were also consulted.
Personal Communications: Information was also obtained from private individuals with emphasis on less common or poorly known species.
"Frogwatch Records". Frogwatch is annual community based event for recording frogs.
Reserves Database (administered by the South Australian Department for Environment and Heritage (DEH) and **The Atlas of Australian Birds** (Blakers *et al*. 1984).

BIRD SPECIES PATTERNS
PATN exploratory analysis (Belbin 1989) was conducted on presence/absence data of 75 bird species recorded from the 157 survey quadrats. Migratory species, raptors, waterbirds, and nocturnal species were not included in the analysis. The PATN analysis clustered the quadrat bird species presence/absence data into groups based on similarity. Refer to Vegetation methods above for further details of PATN.

INVERTEBRATES
Insects were collected from 74 quadrats within Biological Survey number 117, "Southern Mt Lofty" (refer Appendix II for a full list). Ants were collected from these 74 quadrats (plus an additional 21 of the vertebrate survey quadrats – refer Invertebrate chapter for quadrat details.)

Insects were collected from macro and micro pitfalls (as per Biological Survey of SA method (Owens 2000). Some hand collecting was also carried out.

AQUATIC MACROINVERTEBRATES
A large number of reference sites were selected and sampled from S.A. over the course of the Monitoring River Health Initiative (MRHI) and Australian River Assessment (AUSRIVAS) programs for the production of a database, which could be used to construct predictive bio-assessment computer models. Reference sites were identified on the basis of being 'least-disturbed' and unimpaired by significant human activities. Few pristine sites exist in this State, particularly in the MLR, as most catchments have been altered through land use changes and associated vegetation clearance associated with the concentration of people near Adelaide and along the coastline. Criteria used for reference site selection included the presence of the following: national benchmark hydrological monitoring stations; nationally significant riverine wetlands; National Parks and Conservation Parks; significant stream fauna; significantly unique water gauge stations, and representation of the gradients present in the morphology of the State's rivers.

Test sites were those sites identified to be of importance in assessing the condition of a river that were known or suspected to be experiencing a water quality problem or impact from some sort of habitat disturbance (Anon. 1994). A small number of test sites were sampled in 1994-95 to ensure that the models developed from the reference sites were sensitive enough to distinguish highly impacted sites. Later sampling in 1997-1999 focused on sampling as many sites in the State as possible, which are potentially impacted from some sort of disturbance.

Sampling, sample processing and identification
Sampling was carried out in South Australia twice yearly, during April-June (mostly autumn) and October-December (spring-early summer), to provide an indication of the types of animals and range of conditions present in streams over time. The main focus of this work was to ensure that sampling the different habitats present at a site captured the broadest range of macroinvertebrates. This was because different animals live in different parts of a stream, with some preferring turbulent flowing water (riffles), whereas others may occur in standing water (edges), or areas with rocks or macrophytes. Some animals occupy streams at different times of the year, making it important to sample the stream on more than one occasion in any one year.

Macroinvertebrate samples were taken using a pond net to capture those animals present in a total area of 10 linear metres in each habitat. Samples were then taken back to the laboratory where the macroinvertebrates were sorted, identified and counted.

Numerous water chemistry and physical habitat characteristics were also measured at each site to assist in the assessment process. These included such things as stream width and depth, composition of the sediments, current speed, conductivity, pH, nutrient and ion concentrations, temperature, colour and turbidity.

Classification and selection of predictor variables
- Reference sites were classified into groups with similar macroinvertebrate communities using multivariate classification methods.
- Another multivariate method called Stepwise Multiple Discriminant Function Analysis was then used to determine which sub-set of environmental variables best described the groups of sites. This sub-set of variables accounted for most of the variation between groups of sites and consisted of variables which were known to be largely unaffected by human activities. In most cases they were strongly related to location (e.g. latitude, longitude, altitude, distance from the source, etc.).

Using the predictive model(s)
- The predictive environmental variables were used to match the test sites with groups of reference

sites, and a calculation of the probability of each site belonging to each group was made.
- Once group membership of a test site was determined the taxa that should occur at an individual site were predicted.

The taxa that were actually collected were then compared with those that were predicted. The severity of any impact was assessed by the difference between how the predicted collection varied from what was observed.

Sampling sites

A total of 262 sites were sampled from the Mt Lofty Ranges study area (MLR) between 1994 and 1999 (Refer Figure 115 and Appendix XXVII for site details). Of the 983 samples collected, 391 were from riffles (shallow, fast-flowing water over a rocky substrate) and the rest were from pool/edge (non-flowing) or macrophyte (aquatic plant) habitats.

RESULTS

VEGETATION

S. Croft[1] and R. Brandle[1]

INTRODUCTION

This chapter has compiled the data from 1,177 survey quadrats sampled within the Southern Mount Lofty Ranges and Fleurieu IBRA regions into a single floristic analysis. The survey quadrats are derived from five surveys, conducted from 1977 to 2001. All survey quadrats recorded floristic composition within defined quadrats. The five surveys, however, did not cover grassy ecosytems - the subject of a separate biological survey (Robertson 1998). Similarly, although this report includes a few coastal quadrats, coastal vegetation has been the focus of a separate Biological Survey (Oppermann 1999).

The SMLR experience among the highest rainfall averages in the State. As might be expected, therefore, forests, woodlands and specialised wetland habitats dominate the floristic analysis. This domination also reflects the specific aims of each of the five vegetation surveys. The earliest Mt Lofty survey targeted high rainfall, high fire-risk communities. The second major Mt Lofty survey targeted swamps and other remnant vegetation of southern Fleurieu Peninsula and also Long-leaved Box communities (*Eucalyptus goniocalyx*). The Mt Lofty Emu-wren survey concentrated only on swamps of the southern Fleurieu Peninsula; the Southern Fleurieu (SEG) Survey only included roadsides of the southern Fleurieu Peninsula. The main aim of the present survey (Southern Mt Lofty) was to concentrate on under-surveyed vegetation communities (further details of the 5 surveys are in the Methods section). This survey bias, although largely a reflection of past clearance patterns, has tended to disproportionately represent some communities and plant species in the results, particularly Long-leaved Box, swamp communities and possibly Manna Gum (*E. viminalis* ssp. *viminalis*).

As can be seen from Fig. 4, the survey quadrats are concentrated in the western and southern halves of the SMLR study region. The lack of survey quadrats in the eastern third of the region reflects past extensive clearance of this area. The pre-European vegetation and remnant vegetation of this eastern zone are discussed later in this Chapter.

Prior to European settlement, savannah formations were "much more widespread" than dry sclerophyll forest formations (Specht *et al*. 1961). What appears to be largely cleared land in the central part of the SMLR region would have been extensive broad valley areas of SA Blue Gum and River Red Gum forest and woodland. The original limits of the dry sclerophyll forests were from the Barossa Valley (Tanunda) in the north, to Lobethal in the south, from the edge of the Ranges in the west to Mount Pleasant in the east (longitude 139^0 03") (Specht, Brownell and Hewitt 1961).

Today, the dominance of savannah woodland over dry sclerophyll forests has been reversed. Savannah remnants are few in number, small and usually degraded. Approximately 13% of native vegetation remains in the SMLR. Most of this remnant vegetation occurs on infertile soils and/or high rainfall upland regions. Species tolerant of infertile soils dominated survey records (*Eucalyptus fasciculosa*, *E. obliqua*, *E. cosmophylla*, *E. baxteri* and *E. goniocalyx*). Most of the remnant vegetation stands in the SMLR are characterised by a dense sclerophyllous understorey of relatively constant composition. Several of the floristic analysis (PATN) groups were distinguished not so much by differences in species present, but by the frequency of species. Several species were widespread and common or even dominant across a number of PATN groups – particularly *Xanthorrhoea semiplana*, *Acacia pycnantha*, *Lepidosperma semiteres*, *Platylobium obtusangulum*, *Leptospermum myrsinoides*, *Hakea rostrata*, *Acacia myrtifolia*, *Pultenaea daphnoides* and *Acrotriche serrulata*.

A detailed description of the vegetation ecology of the SMLR is beyond the scope of this chapter. Rather, the emphasis is upon presenting the results of the Biological Surveys in order to provide a "snap-shot' desciption of the abundance and distribution of plant communities and species. Prevous vegetation studies are outlined in the Introduction chapter. In particular, however ,excellent accounts of the vegetation ecology (describing species distributions in relation to environmental factors) include Adamson and Osborne (1924), Specht and Perry (1948), Specht, Brownell and Hewitt (1961). Specht (1972), Boomsma and Lewis (1980), and Nicolle (1997). They provide general information on the distribution and ecology of

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eucalypts and other structural dominants within South Australia.

TOTAL PLANT RECORDS AND TAXA

A total of 40,091 vascular plant records were made during the five surveys included in this data analysis of which:

- 35, 920 records were native taxa (90%) and
- 4,171 records (10%) were introduced.

Because of the numerous records identified only to generic level or species level (rather than sub-species or variety), it is not possible to determine the exact number of taxa recorded.

A **minimum of 992 taxa** were recorded of which 753 were native (76%) and 239 were introduced (24%). These figures ignore all taxa identified only to generic level (and where no other taxa of the same genus were recorded), and ignore all taxa identified only to "ssp." or "var" (and where no other taxa of the same species were identified). Seven hundred and eighty taxa were considered to be perennials.

A theoretical **maximum of 1 227 taxa** were recorded. This figure includes all taxa identified only to "sp.", "ssp." or "var" level and were not taxa already fully identified elsewhere in the results. For example, *Callitris* sp. identified in the survey records could be *Callitris canescens* (as this species occurs in the Southern Lofty botanical region and was not otherwise recorded during the survey). This possible maximum of 1,227 taxa is comprised of a possible **892 native taxa** and **335 introduced** taxa.

The actual number of taxa recorded is thought likely to be **about 1,100 taxa** (about **840 native** and **260 introduced**). Appendix III provides a list of all taxa recorded at survey quadrats within the study region. This list includes taxa name as recorded plus updated and grouped names used for this report, and the number of quadrats at which recorded.

The Southern Lofty herbarium region contains approximately 1 313 extant native taxa and 960 introduced taxa. These figures were derived from the Florlist software program (last updated in 2000), namely the total listed taxa minus all:

- taxa listed as "sp.",
- taxa listed to species level only (and duplicated by taxa identified to ssp., nothosp., var.,
- hybrid species,
- species crosses, and
- extinct species.

The number of native taxa recorded during the surveys was between 57% (753) and 68% (1,227) of all recorded taxa for the Southern Lofty herbarium region. When comparing these figures it should be noted that a large area of the St Vincent IBRA region, and smaller areas of the Murrary Mallee and Northern Lofty IBRA regions are also part of the Southern Lofty herbarium region and were not included in the study region survey quadrats. The Introduction to this report provides a definition of IBRA regions. These excluded regions contain landforms and hence flora not included in the survey region e.g. coastal mangroves, samphires and the northern Adelaide Plains.

Table 9.
Summary of native taxa, introduced species, quadrats and total number of plant records in other herbarium (botanical) regions surveyed.

Region	No. of native taxa recorded	No. of introduced species recorded	No. of quadrats in analysis	No. of plant records
Flinders Ranges	1165	263 (22%)	3273	90,698
Southern MLR (minimum estimated)	753	239 (24%)	1,177	40,039
Murray Mallee (Victorian and South Australian quadrats)	904	156 (15%)	1,813 (SA = 649; VIC = 1164)	?
Kangaroo Island	563	89 (16%)	369	10,370

Table 10.
Summary of readily determined plant species/taxa into taxonomic categories within the SMLR study area.

DIVISION	CLASS	FAMILIES	GENERA	NATIVE TAXA	INTRODUCED TAXA
Clubmosses	Lycopsida	1	1	2	0
Ferns	Filicopsida	9	14	18	0
Non-flowering	Gymnospermae	2	2	2	3
Flowering	Monocotolydonae	17	126	257	80
	Dicotyledonae	73	292	474	156
TOTALS		**102**	**435**	**753**	**239**

COMMON SPECIES

Table 11 shows the 20 most commonly recorded perennial species and Appendix IV shows perennial and annual species occurring in 10% or more of quadrats**.**

Because most of the remnant vegetation in the SMLR occurs on infertile soils, a large proportion of the most common plant species in the SMLR are sclerophyllous (including *Eucalyptus* species). Sclerophyllous vegetation (namely, "hard-leaved", and often smaller leaved plants) is associated with infertile soils - especially soils low in phosphorus and nitrogen. Approximately 75% of the species in Table 11 are sclerophyllous with the remainder being characteristic of the higher rainfall areas of South Australia (especially Liliaceae and Cyperaceae species).

Further, many of the remnant vegetation stands are characterised by a dense sclerophyllous understorey of relatively constant composition. This accounts for numerous species being widespread and common.

Seventy-five (9.6%) perennial species occurred in 10% or more quadrats and 20 (2.5%) species occurred in 30% or more quadrats. *Xanthorrhoea semiplana*, *Gonocarpus tetragynus* and *Lepidosperma semiteres* all occurred in over half of all quadrats. Six *Eucalyptus* species occurred in this list with *E. fasciculosa* (Pink Gum) most commonly recorded at 493 quadrats (42%), followed by *E. obliqua* (477 quadrats = 40%). Table 12 shows the frequency of all *Eucalyptus* species recorded at survey quadrats within the study area.

No perennial weeds occurred in the 20 most frequently recorded perennials, although three perennial weeds were recorded in 10% or more of quadrats. These were *Hypochaeris radicata* (198 quadrats = 17%), *Senecio pterophorus* var. *pterophorus* (167 quadrats = 14%) and *Rubus* sp. (128 quadrats = 11%). In contrast, four annual weeds (*Briza maxima*, *Aira cupaniana*, *Holcus lanatus* and *Briza minor*) were in the ten most frequently recorded annual species.

Table 11.
The twenty most frequently recorded perennial species from quadrats in the SMLR study area.

Species	Family	% of quadrats	Frequency of quadrats (out of 1,177)
Xanthorrhoea semiplana ssp.	Liliaceae	61	715
Gonocarpus tetragynus	Haloragaceae	58	688
Lepidosperma semiteres	Cyperaceae	51	594
Acacia pycnantha	Leguminosae	46	540
Platylobium obtusangulum	Leguminosae	44	510
Leptospermum myrsinoides	Myrtaceae	43	505
Hakea rostrata	Proteaceae	42	497
Eucalyptus fasciculosa	Myrtaceae	42	492
Astroloma humifusum	Epacridaceae	41	480
Eucalyptus obliqua	Myrtaceae	40	477
Acrotriche serrulata	Epacridaceae	39	461
Acacia myrtifolia var. *myrtifolia*	Leguminosae	38	450
Arthropodium strictum	Liliaceae	33	390
Isopogon ceratophyllus	Proteaceae	33	385
Goodenia blackiana	Goodeniaceae	32	378
Olearia ramulosa	Compositae	32	373
Lomandra micrantha ssp	Liliaceae	31	371
Hibbertia exutiacies	Dilleniaceae	31	366
Pultenaea daphnoides	Leguminosae	30	354
Thysanotus patersonii	Liliaceae	30	351

Figure 10.
Acacia pycnantha **(Golden Wattle), Australia's floral emblem, was the fourth most commonly recorded perennial on the SMLR survey. It occurs in a variety of habitats, sometimes occurring in dense thickets, especially post-fire. (Photo: A. Robinson).**

Figure 11.
Hakea rostrata **(Beaked Hakea) recorded at 42% of survey quadrats is a common understorey shrub of forest and woodland in high rainfall locations, often on sandy soils. (Photo: P. Lang).**

Figure 12.
Arthropodium strictum **(Vanilla-lily) occurs most commonly in woodland and was recorded at 33% of survey quadrats (Photo: A. Robinson).**

Figure 13.
Pultenaea daphnoides **(Large-leaved Bush-pea) most commonly occurs in open forests (especially Stringybarks) and often on drier hilly terrain with stony or sandy soils. (Photo: A. Robinson).**

Figure 14.
Goodenia blackiana **(Native Primrose) is widespread in the SMLR. It grows in clusters in forests and woodlands. (Photo: A. Robinson).**

Figure 15.
Isopogon ceratophyllus **(Cone Bush) is a prickly dense low shrub, most common in sandy heath or mallee. (Photo: P. Lang).**

Figure 16.
Astroloma humifusum **(Native Cranberry) was widespread and commonly recorded during the SMLR survey. (Photo: P. Lang).**

Figure 17.
Burchardia umbellata **(Milkmaids) is a bulb plant in the Liliaceae family. It is common in both grasslands and woodlands. (Photo: P.Lang).**

Figure 18.
Astroloma conostephioides **(Flame Heath) flowers autumn to spring, and provides nectar when few plants are flowering. (Photo: P. Lang).**

Figure 19.
Leucopogon parviflorus **(Coast Beard-heath) is a common and often dominant shrub of coastal vegetation. (Photo: P. Lang).**

Figure 20.
***Epacris impressa* (Common Heath) grows in forest and heath. (Photo: P. Lang).**

Figure 21.
***Hydrocotyle laxiflora* (Stinking Pennywort) grows in woodland in shady sites on fertile soil (Prescott 1988). (Photo: P. Lang).**

EUCALYPTUS SPECIES

Table 12 shows the frequency of all *Eucalyptus* species recorded at survey quadrats. Within the SMLR survey region, only 13% of native vegetation remains uncleared, the majority of which is on nutritionally poor upland soils, sand or in areas of steep terrain, all of which were unsuitable for agriculture. The survey results support this. *Eucalyptus* species tolerant of infertile soils dominated survey records: *Eucalyptus fasciculosa* (493 records) and *E. obliqua* (477 records) together accounted for 50% of all Eucalyptus species records from the 1,177 survey quadrats. *Eucalyptus cosmophylla*, *E. baxteri* and *E. goniocalyx* (261, 195 and 126 records, respectively) were the next most frequently recorded eucalypts. Species requiring more fertile soils were scarce, namely *E. dalrympleana* ssp. *dalrympleana*, *E. camaldulensis*, *E. ovata* and *E. viminalis* ssp. *viminalis*. (The four least frequently recorded species: *E. incrassata*, *E. conglobata*, *E. porosa* and *E. cneorifolia* are all mallee species recorded at either the drier north-western and/or south/eastern margins of the SMLR survey region.)

These "soil fertility" divisions (with the exception of *E. dalrympleana*) also coincide with species associated with either savannah woodland formation or sclerophyll forest formation. The following extract is from West (1977):

> "Topographically, the vegetation of the hills is associated with the western foothills, deeply dissected western slopes, the central Mount Lofty spine, and the broadly dissected highlands of the eastern scarp. The vegetation associated with these various landforms can broadly be described as (savannah) woodland and dry sclerophyll forest. In the Hills, the division between woodland and sclerophyll forest often corresponds to the change from red-brown earths to podsolised soils. Most of the Mount Lofty Ranges in their original condition were dominated by 10 species of *Eucalyptus…"* (West 1977).

Species associated with savannah woodlands are *Eucalyptus leucoxylon*, *E. viminalis* ssp., *E. odorata, E. microcarpa* and *E. camaldulensis*. Today these communities are very restricted (especially *E. odorata*). Species associated with dry sclerophyll forests are: *Eucalyptus obliqua*, *E. baxteri*, *E. cosmophylla*, *E. fasciculosa*, *E. goniocalyx* and *E. dalrympleana*. Specht (1964) notes however, that as all the eucalypts associated with dry sclerophyll forest are very sensitive to small changes in the environment, the pattern of their distribution is very complex.

Eucalyptus obliqua occurs in higher rainfall areas (>875mm) and *E. baxteri* in drier situations. *Eucalyptus fasciculosa* (Pink Gum) tolerates some of the driest parts of the hills, generally on sandy or shallow soils (West 1977). It occasionally occurs as pure stands towards its drier limit but as rainfall increases, it intermixes with a large range of eucalypts including *E. baxteri*, *E. obliqua*, *E. leucoxylon*, *E. cosmophylla* and *E. goniocalyx*. *Eucalyptus cosmophylla* (Cup Gum) occurs in limited areas throughout the Stringybark formation (mainly 875 – 1125mm rainfall). This species is a mallee form and tends to be limited in its extent by competition with other trees, and so it is often found on skeletal, lateritic soils where the scarcity of soil restricts the number of other eucalypts growing (West 1977). *Eucalyptus*

dalrympleana ssp. *dalrympleana* (Candlebark) is found in the valleys and some ridges of some of the wettest parts of the hills.

Table 12.
Frequency of *Eucalyptus* species recorded from quadrats in the SMLR study area.

Species	Common Name	# of quadrats	# of floristic groups in which eucalypt species occurs*
Eucalyptus fasciculosa	Pink Gum	492	31
Eucalyptus obliqua	Messmate Stringybark	477	26
Eucalyptus cosmophylla	Cup Gum	261	24
Eucalyptus baxteri	Brown Stringybark	195	18
Eucalyptus goniocalyx	Long-leaved Box	126	9
Eucalyptus leucoxylon ssp.	SA Blue Gum	121	25
Eucalyptus viminalis ssp. *viminalis*	Manna Gum	46	12
Eucalyptus camaldulensis var. *camaldulensis*	River Red Gum	32	12
Eucalyptus ovata	Swamp Gum	29	10
Eucalyptus microcarpa	Grey Box	24	6
Eucalyptus diversifolia	Coastal White Mallee	22	6
Eucalyptus odorata	Peppermint Box	18	9
Eucalyptus leptophylla	Narrow-leaf Red Mallee	15	8
Eucalyptus dalrympleana ssp. *dalrympleana*	Candlebark Gum	14	5
Eucalyptus viminalis ssp. *cygnetensis*	Rough-Bark Manna Gum	14	9
Eucalyptus incrassata	Ridge-Fruited Mallee	13	5
Eucalyptus conglobata	Port Lincoln Mallee	9	6
Eucalyptus porosa	Mallee Box	8	7
Eucalyptus cneorifolia	Kangaroo Island Narrow-Leaf Mallee	3	2

*Floristic Groups are discussed later in this chapter.

Figure 22.
***Eucalyptus baxteri* (Brown Stringybark) fruits have are often described as a teacup shape with a "Phillips screwdriver" cross on top. This species is a common overstorey dominant and the fourth most commonly recorded eucalypt in the survey. (Photo: P. Lang).**

Figure 23.
***Eucalyptus obliqua* (Stringybark), along with *E. baxteri* are the two dominant Stingybarks of the SMLR study region. *E. obliqua* was recorded at 477 of the 1,177 survey quadrats. This photo shows an original first growth Stringybark –now rare in the study region. (Photo: A. Robinson).**

NATIVE GRASSES

Prior to European settlement, extensive areas of grassy woodland occurred in the SMLR and grass species would have been more dominant than the survey results indicate. *Austrostipa* (Spear Grass) and *Danthonia* (Wallaby Grass) were the two most common perennial native grass genera recorded. Eleven species of *Danthonia* were recorded, totalling 235 records and with *Danthonia setacea* being the most common species. Fourteen species of *Austrostipa* were recorded, totalling 253 records. The most common *Austrostipa* species was *Austrostipa mollis* (72 records). *Themeda triandra* (Kangaroo Grass) was recorded at 100 quadrats.

FAMILY DIVERSITY AND ABUNDANCE

One hundred and two plant families were recorded in the survey region, of which 87 families contained either all or some native species. Conversely 15 families contained only introduced species. Leguminosae and Liliaceae were the two dominant families both in terms of overall records and in terms of native taxa. *Acacia pycnantha* and *Platylobium obtusangulum* comprise approximately 25% of the family Leguminosae records. The high number of Liliaceae, Cyperaceae and Orchidaceae records (2nd, 4th and 11th highest native taxa records respectively) reflects the high rainfall of the study region. The family Myrtaceae has the third highest number of native taxa records, largely due to the *Eucalyptus* and to a lesser extent, the *Leptospermum* genera. The family Gramineae had the third highest number of overall records, but the sixth highest number of native taxa records – introduced taxa comprised almost 43% of all records in this family. Five of the top 12 families contained five or less introduced records, including three families with no introduced taxa.

Four hundred and thirty five genera were recorded within the survey region. Families with the most genera represented were: Compositae (57 genera, at least 92 taxa), Gramineae (49 genera, at least 118 taxa), Leguminosae (29 genera, at least 87 taxa), Orchidaceae (23 genera, at least 66 taxa) and Liliaceae (16 genera, at least 34 taxa).

Families with the **most native taxa** represented were:

Orchidaceae	65
Gramineae	62
Leguminosae	62
Compositae	60
Cyperaceae	58
Myrtaceae	45
Liliaceae	30
Epacridaceae	22
Juncaceae	17
Umbelliferae	17

Table 13 shows families with over 1000 native taxa records. Appendix V shows similar details for all families. The number of taxa shown is the minimum taxa recorded – as explained above, the actual number is likely to be higher (refer "Total Plant Records and Taxa").

Table 13.
Families with most number of native taxa records within the SMLR study area.

Family	Total records (native and introduced)	Native records	Introduced records	Number genera	Native taxa	Alien taxa	Total taxa
LEGUMINOSAE	4827	**4402**	425	29	62	25	87
LILIACEAE	4180	**4093**	87	16	30	4	34
MYRTACEAE	3218	**3215**	3	8	45	2	47
CYPERACEAE	2377	**2376**	1	10	58	1	59
EPACRIDACEAE	2306	**2306**	0	8	22	0	22
GRAMINEAE	3791	**2176**	1615	49	62	56	118
PROTEACEAE	1823	**1820**	3	7	13	2	15
COMPOSITAE	2498	**1750**	748	57	60	32	92
DILLENIACEAE	1360	**1360**	0	1	9	0	9
HALORAGACEAE	1073	**1073**	0	4	9	0	9
ORCHIDACEAE	1041	**1036**	5	23	65	1	66

Figure 24.
Bursaria spinosa **(Christmas Bush) is a member of the Pittosporaceae family. It grows in a wide variety of habitats in the study region. It flowers generally in early summer, hence its common name. It is of value to many insect and bird species, providing nectar when relatively few other species are in flower. (Photo: P. Lang).**

Figure 25.
Persoonia juniperina **(Prickly Geebung), of the Proteaceae family, occurs in forests and woodlands in higher rainfall areas within the study region. It was recorded at 52 survey quadrats. (Photo: P. Lang).**

SPECIES RICHNESS

The average number of native taxa per quadrat was 30.6. This figure includes all taxa identified to generic level only, and therefore may be slightly greater than the actual number of taxa because it may include: taxa identified to generic level only which have been incorrectly assumed to be native and taxa identified to generic level only but which have already been listed to species level.

Excluding all taxa identified to genus only, the average number of native taxa per quadrat was 28.4 – however this figure is much less accurate than the above figure of 30.6 as it ignores many taxa, not otherwise recorded at a site (e.g. *Danthonia* sp. and *Austrostipa* sp.)

Native species diversity per quadrat ranged from 2 native species (at 2 quadrats) up to 79 and 80 native species (one quadrat each).
30 quadrats (2.5%) recorded less than 10 native species;
80 quadrats (7%) recorded at least 50 native species;
25 quadrats recorded at least 60 native species; and
8 quadrats recorded at least 70 native species.

Generally, quadrats containing the highest native species diversity were associated with *E. diversifolia* +/- *E. cosmophylla* Mallee and also *E. obliqua*, *E. fasciculosa*, *E. goniocalyx* Open Forest or *E. fasciculosa*, *E. cosmophylla* sclerophyll Woodlands. The lowest native species diversity quadrats were associated with *E. camaldulensis*, *E. viminalis* ssp. *viminalis*, *E. leucoxylon* savannah Woodlands and also coastal Shrublands.

The two quadrats with 2 native species each were:

- 5ML41 = A *E. leucoxylon* Woodland with only *Acaena* sp. native and 16 introduced species (= PATN group 11, located at Waterfall Gully, Cleland CP).
- 5ML735 = A *Melaleuca lanceolata* coastal Shrubland with *Muehlenbeckia gunnii* the only other native species recorded, and two introduced species (= PATN group 36, located 11.8 km WSW of Delamere).

(Appendix VI provides location and physical paramters for all quadrats.)

The two highest native species diversity quadrats were: 117BAR03201 and 117BAR03201. Both were *E. goniocalyx – E. fasciculosa* (+/- *E. obliqua*) Open Forest situated in the Williamstown – Kersbrook region – Mt Crawford Forest and Tower Forest (Forestry SA land).

ALIEN SPECIES

Within the survey area, 239 alien taxa were recorded (compared with 753 native taxa) of which almost half came from three families: Gramineae (56), Compositae (32) and Leguminosae (25). These figures ignore taxa identified to generic level only (and so may actually be slightly higher).

Weeds were recorded at 859 of the 1,177 survey quadrats (73%). The average number of weeds at these 859 quadrats was 4.5 and the average number of weeds over all quadrats was 3.3 (compared with 30.6 native species).

Eighty one quadrats (7%) recorded at least 10 weeds and six quadrats recorded at least 30 weeds. The highest number of weeds recorded at a quadrat was 33 (site 117NOA01001) – a *Eucalyptus obliqua* Woodland with 33 alien species and 10 native species.

In general, the greatest numbers of weeds (averaging at least 12 weeds per quadrat) were associated with *E. viminalis* ssp. *viminalis* (Manna Gum), *E. leucoxylon* (SA Blue Gum) and *E. camaldulensis* (River Red Gum) savannah Woodlands and also creeklines. The savannah woodlands are generally located on more fertile soils with a grassy understorey. This has made them susceptible to direct clearance, grazing and weed invasion. Above-average numbers of weeds (namely 6 – 10 species per quadrat) were also associated with drier woodlands quadrats e.g. containing *E. odorata*, *E. microcarpa*, *E. porosa* or *Allocasuaria verticillata*.

The lowest numbers of weeds per quadrat were associated with the high rainfall Stringybark (*E. obliqua*, *E baxteri*) and Pink Gum (*E. fasciculosa*) – Long-leaved Box (*E. goniocalyx*) Forests and Woodlands. These are the dry sclerophyll forest formations, associated with infertile soils and not as prone to woody weed invasion.

Table 14 below shows the most common alien species recorded (listed in descending order of frequency):

Table 14.
Most frequently recorded alien species from SMLR biological surveys.

Species	Common Name	Family	Annual (A) or Perennial (P)	No. of Survey Records
Briza maxima	Large Quaking Grass	Gramineae	A	453
Hypochaeris radicata	Rough Cat's Ear	Compositae	P	198
Senecio pterophorus var. *pterophorus*	African Daisy	Compositae	P	167
Holcus lanatus	Yorkshire Fog	Gramineae	A	150
Aira cupaniana	Silvery Hair-grass	Gramineae	A	146
Briza minor	Lesser Quaking Grass	Gramineae	A	128
*Rubus species**	Blackberry species	Rosaceae	P	128
Chrysanthemoides monilifera	Boneseed	Compositae	P	97
Hypochaeris glabra	Cat's Ear	Compositae	A	84
Trifolium campestre	Hop clover	Leguminosae	A	83
Avena barbata	Wild Oats	Gramineae	A	80
Cynosurus echinatus		Gramineae	A	80
Anagallis arvensis	Scarlet Pimpernel	Primulaceae	A	78
Myrsiphyllum asparagoides	Bridal Creeper	Liliaceae	P	78
Plantago lanceolata var. *lanceolata*	Ribwort	Plantaginaceae	P	68
Oxalis corniculata ssp. *corniculata*	Soursob	Oxalidaceae	A	65
Pentaschistis pallida	Pussy Tail	Gramineae	P	63
Olea europaea ssp. *europaea*	Olive	Oleaceae	P	62
Pinus radiata	Radiata Pine	Pinaceae	P	53
Vulpia sp.	Fescue`	Gramineae	A	53

*Includes *R. discolor*, *R. laciniatus*, *R. parvifolius* and *R. ulmifolius*

Figure 26.
African Daisy, *Senecio pterophorus* var. *pterophorus* is a perennial environmental weed, and the third most commonly recorded weed species during the SMLR survey. (Photo: A. Robinson).

Figure 27.
Boneseed (*Chrysanthemoides monilifera*) is a serious environmental weed in the SMLR study region, and also a weed of National Significance. It was the eighth most commonly recorded perennial weed species, being recorded at 97 survey quadrats. (Photo: A. Robinson).

Weeds of National Significance

Five "Weeds of National Significance" occur in the Mount Lofty Ranges (Blason and Carruthers in prep.). These were recorded at the following frequencies from the Biological Survey quadrats:

- Blackberry (*Rubus* spp.) 128 records
- Boneseed (*Chrysanthemoides monilifera* ssp. *monilifera*) – 97 records. (Fig. 27)
- Bridal Creeper (*Myrsiphyllum asparagoides*) 78 records
- Gorse (*Ulex europaeus*) – 38 records
- Willow (*Salix* sp.) – nil records

Priority Environmental Weeds in the Mount Lofty Ranges

Table 15 shows the number of Biological Survey quadrats in which "Priority Environmental Weeds" in the Mount Lofty Ranges (cited in Blason and Carruthers in prep.) were recorded. NB: It is important to note that over half the survey quadrats were conducted in 1985. It is quite likely that the distribution of many of the following weeds has expanded and the abundance of weeds is greater than that suggested below.

Table 15.
Priority Environmental Weeds in the Mount Lofty Ranges and their frequency of occurrence in SMLR Biological Survey Quadrats (listed in descending order of frequency within each sub-group).

Species	Common Name	Frequency
Environmental Weeds – Sub-group A - low occurrence found in isolated pockets		
Chrysanthemoides monilfera#	Boneseed	97
Erica spp.	Erica	21
Lycium ferocissimum	African Boxthorn	9
Pittosporum undulatum	Sweet Pittosporum	9
Acacia longifolia	Sydney Wattle	8
Asparagus declinatum	Bridal Veil	6
Polygala myrtifolia	Myrtle-leaf Milkwort	2
Arbutus unedo	Strawberry Tree	1
Asparagus scandens	Climbing Asparagus	1
Acacia cyclops		0 (one record only considered native)
Moraea flaccida, *M. miniata*	Cape Tulip	0
Nassella spp., *Jarava plumosa*	Introduced Stipoid Grasses	0
Cuscuta campestris	Golden Dodder	0
Hyparrhenia hirta	Coolatai Grass	0
Euryops abrotanifolius	Euryops	0
Senecio linearifolius	Fire Weed	0
Acacia saligna	Golden wreath Wattle	0
Acacia baileyana	Cootamundra Wattle	0
Trachyandra divaricata	Sticky Onion Weed	0
Environmental Weeds – Sub-group B - throughout but not reached ecological limits		
Rubus fruticosus sp. agg.	Blackberry	133
Olea europaea	Olive (wild)	78
Myrsiphyllum or *Asparagus asparagoides*	Bridal Creeper	78
Pinus ssp.	Pine	61
Genista monspessulana	Cape Broom	47
Ulex europaeus	Gorse/Furze	38
Galium ssp.	Bedstraw/Cleavers	23
Cytisus scoparius	English / Scotch Broom	18
Crataegus monogyna and C. sinaica	Hawthorn / May / Azzarola	14
Watsonia meriana var. *bulbillifera*	Bulbil Watsonia	6
Pennisetum macrourum	African Feathergrass	6
Rhamnus alaternus	Buckthorn	6
Scabiosa atropurpurea	Pincushion / Scabiosa	4

Species	Common Name	Frequency
Gladiolus spp.	Wild Gladiolus	4
Chamaecytisus palmensis	Tree Lucerne / Tagasaste	2
Eragrostis curvula	African Lovegrass	1
Lavandula stoechas	Topped Lavender	1
Delairea odorata	Cape Ivy	0
Disa bracteata	Monadenia	0
Fraxinus angustifolia	Desert Ash	0
Hedera helix	English Ivy	0
Salix spp.	Willows	0
Acacia longifolia var. *sophorae*	Coastal Wattle	0 (recorded but considered native)
Environmental Weeds - Subgroup C - throughout and reached ecological limits		
Rosa canina	Dog rose x	38
Ehrharta calycina	Perennial Veldt-grass	38
Oxalis pes-caprae	Soursob	30
Phalaris aquatica	Phalaris	10
Vinca major	Periwinkle	1

Figure 28.
***Erica baccans* invading intact native vegetation in Montacute CP, photographed during the SMLR survey. Until recently, this species of *Erica* has only occasionally been recorded in remnant vegetation. Currently, *Erica* species are considered a "sub-group A Environmental Weed" (low occurrence found in isolated pockets). (Photo: P. Lang).**

Families represented **only by alien** taxa were:

- Aponogetonaceae (Cape Pond Lily)
- Aquifoliaceae (Holly)
- Araceae (Arum Lily)
- Asclepiadaceae (Round-leaved Cotton Bush)
- Callitrichaceae (Common Starwort)
- Cannabaceae (e.g. Marijuana)• Dipsacaceae (e.g. *Scabius*)
- Ericaceae (e.g. Erica)
- Fumariaceae (e.g. White Fumatory)
- Melianthaceae (e.g. Honey Flower)
- Moraceae (Figs)
- Oleaceae (Olives)
- Pinaceae (Pines)
- Resedaceae (e.g. Cut-leaved Mignonette)
- Verbenaceae (*Verbena* spp.)

Of the 87 endemic families, 50 (57%) contained no alien taxa.

PLANT SPECIES OF CONSERVATION SIGNIFICANCE

Of the confirmed 753 native taxa recorded from the survey quadrats, 236 have a conservation rating. NB: This is a conservative analysis as many of the taxa not fully identified (e.g. identified only to genus or ssp. or var. level) may have a conservation rating. Table 16 compares the Australian, State and regional conservation ratings recorded during the five surveys with the known conservation rated plants for the Southern Lofty botanical region. Australian ratings are those in the *Environment Protection and Biodiversity Conservation Act 1999*, State ratings are those in the *National Parks and Wildlife Act 1972*, Schedules 7,8 or 9 (2000 update). Regional ratings are based on State herbarium regions and are taken from the unpublished database developed by Lang and Kraehenbuehl (1998 update). Appendix VII provides a full list of the conservation rated species recorded at survey quadrats and the number of survey records for each species.

Table 16.
Number of National, State and Regionally rated plant species recorded in biological survey quadrats in the Southern Lofty Herbarium Region.

	Australian	South Australian	Regional –Southern Lofty herbarium region
Survey records	9 Endangered = 4 Vulnerable = 5	105 Endangered = 8 Vulnerable = 19 Rare = 78	236 Threatened = 4 Endangered = 20 Vulnerable = 41 Rare = 147 "K" (Uncertain but at least Rare) = 24
SL herbarium region	25	280	610

Nationally Rated Plant Species

The nine Nationally rated plant species recorded from survey quadrats in the study area are shown in Table 17.

Table 17.
Nationally rated plant species recorded from survey quadrats in the SMLR study area.

Species	Common Name	Family Name	Aust. Rating	State Rating	Regional Rating	No. of Records in Survey Region
Olearia pannosa ssp. *pannosa*	Silver Daisy-bush	Compositae	V	V	V	2
Glycine latrobeana	Clover Glycine	Leguminosae	V	V	V	2
Prasophyllum pallidum	Pale Leek-orchid	Orchidaceae	V	V	V	2
Spyridium coactilifolium	Butterfly Spyridium	Rhamnaceae	V	V	V	19
Correa calycina	Hindmarsh Correa	Rutaceae	V		V	2
Acacia pinguifolia	Fat-leaved Wattle	Leguminosae	E	E	E	1
Caladenia argocalla	A Spider Orchid	Orchidaceae	E	E	E	1
Euphrasia collina ssp. *osbornii*	Eyrebright	Scrophulariaceae	E	E	E	1
Prasophyllum frenchii	Maroon Leek-orchid	Orchidaceae	E	E	E	2

Table 18 provides a general location description, Braun-Blanquet cover code (where available) and vegetation association details for each Nationally rated plant species recorded from survey quadrats. Blason and Carruthers (in prep.) provide details on each species' general distribution, biology and habitat, threats and management. The PATN groups refer to statistically similar floristic assemblages and are discussed later in this chapter.

Table 18.
Location, cover code and vegetation associations for Nationally rated plant species recorded from survey quadrats in the SMLR study area.

Species	General Location	Cover code[#]	Dominant Overstorey Species	PATN Group
Olearia pannosa* ssp. *pannosa	0.3 km NNW of Finniss	Not avail.*	*Eucalyptus odorata*, *E. phenax*	30
	4.5 km ENE of Finniss	Not avail.		30
Glycine latrobeana	Tarnma Creek Belair Recreation Park	Not avail.	*E. obliqua*, *E. viminalis* ssp. *viminalis*	13
	Mount Bold Reservoir	T	*Eucalyptus leucoxylon* ssp. leucoxylon, *E. viminalis* ssp *cygnetensis*	14
Prasophyllum pallidum	3.9 km ESE of Tea Tree Gully	Not avail.	*Eucalyptus fasciculosa*, *E. goniocalyx*	25
	Little Mt Crawford (Forestry SA)	T	*Eucalyptus fasciculosa*, *Allocasuarina verticillata*	18
Correa calycina	Myponga CP	Not avail.	*Eucalyptus cosmophylla*	27
	Mt Alam (6.1 km WSW of Spring Mount)	1	*Eucalyptus leucoxylon* ssp. *leucoxylon*, *E. viminalis* ssp. *cygnetensis*	14
Acacia pinguifolia	1.6 km ENE of Finniss	Not avail.	*Eucalyptus fasciculosa*, *E. leptophylla*, *E. incrassata*	30
Caladenia argocalla	Mt Gawler NFR (Forestry SA)	N	*Eucalyptus obliqua*	1
Euphrasia collina* ssp. *osbornii	0.3 km NNW of Mylor	Not avail.	*Eucalyptus obliqua*, *E. fasiciculosa*	8
Spyridium coactilifolium			Most quadrats had *E. fasciculosa*, *E. cosmophylla* and/or *E. diversifolia* as overstorey dominants	10 (x 9 quadrats) 14 (x 4 quadrats) 28 (x 4 quadrats) 31 (x 3 quadrats)
Prasophyllum frenchii	10.9 km ESE of Delamere	Not avail.	*Acacia retinodes*, *Leptospermum continentale*	41
	10.1 km SSE of Yankalilla	Not avail.	As above	40

[#] Cover Code:
N = Less than 10 individiduals
T = Trace, less than 1%
*Cover code not available at time of writing.

Figure 29.
***Olearia pannosa* ssp. *pannosa* (Silver Daisy-bush) has a National, State and Regional Vulnerable rating. It was recorded twice during the SMLR survey. It is most commonly associated with mallee habitats. (Photo: A. Robinson).**

Figure 30.
***Pterostylis cucullata* is rated as Nationally and State Vulnerable. It was not recorded during the survey. The Adelaide Hills form is confined to Belair NP and two quadrats near Lobethal. (D. Bickerton pers. comm. 2002). (Photo: P. Lang).**

State Endangered Plant Species
In addition to the Australian rated species, **4 State** (and regionally) **Endangered** species were recorded in the survey quadrats:

Crassula sieberiana* ssp. *sieberiana (Crassulaceae)
1 survey record
Overstorey dominants = *E. cosmophylla*, *E. fasciculosa*.
Location = 4.6 km NNW of Finniss
PATN group = 10

Helichrysum rutidolepis (Compositae)
7 survey records
Overstorey dominants = *E. obliqua*, *E. goniocalyx* and *E. fasciculosa*
PATN groups = group 1(4 quadrats), group 2 (1 quadrat), group 3 (1 quadrat) group 8 (1 quadrat)

Juncus prismatocarpus (Juncaceae)
2 survey records
Vegetation = swamps
PATN group = 40 (2 quadrats)

Lycopodiella serpentina (Lycopodiaceae)
1 survey record
Vegetation = swamp
PATN group = 40

Regionally Threatened Plant Species
Four regionally (Southern Lofty herbarium region) threatened species were recorded:

Austrostipa pilata (Gramineae)
1 quadrat
Location = South Para Reservoir
Overstorey dominant = *E. leucoxylon* ssp. *pruinosa*
PATN group = 22

Echinopogon ovatus* var. *ovatus (Gramineae)
Recorded at 4 quadrats

Baeckea behrii (Myrtaceae) (Fig.31)
Recorded at 8 quadrats, mainly in the south-east of the study region in mallee associations.

Pratia pedunculata (Campanulaceae)
Recorded at 2 quadrats
PATN group 37 (swamp vegetation) and PATN group 10 (*E. cosmophylla*, *E. fasciculosa*, – *E. leptophylla*)

Figure 31.
***Baeckea behrii* is rated at Threatened for the Southern Lofty herbarium region. It was recorded at 8 quadrats, mainly in the south-east of the study region in mallee associations. (Photo: A. Robinson).**

Figure 32.
***Acacia gunnii* (Polughshare Wattle) is rated Rare for the Southern Lofty herbarium region. It is most common on rocky hillsides in high rainfall areas, often associated with *E. obliqua* and *E. baxteri*. (Photo: P. Lang).**

Figure 33.
***Gleichenia microphylla* (Coral Fern) is rated Rare for the study region. It is associated with Fleurieu Peninsula swamps. (Photo: P. Lang).**

Previously Presumed Extinct
An opportune collection of *Eucalyptus congolobata* was recorded in Bullock Hill Conservation Park. Previously this species was presumed extinct from the Southern Lofty botanical region.

In addition, "*Eucalyptus conglobata*" was recorded from 9 quadrats within Survey 42 (in 1987 and 1988). However, due to taxonomic changes it is thought most likely that all these individuals are *Eucalyptus phenax*, and have been treated as such in this report.

Endemic Species
Thirteen native taxa are endemic to the Southern Lofty herbarium region. A further 25 extant native taxa are confined to the Southern Lofty herbarium region within South Australia. These are listed below, along with their frequency of occurrence within survey quadrats.

Table 19.
Southern Lofty endemic taxa and number of records from survey quadrats, ordered by frequency.

Species	Number of records from survey quadrats
Pultenaea involucrata	89
Olearia grandiflora	76
Poa umbricola	16
Danthonia clelandii	5
Juncus continuus	2
Senecio odoratus var. *obtusifolius*	2
Allocasuarina robusta	0
Caladenia rigida	0
Corybas dentatus	0
Hypericum calycinum	0
Prasophyllum pruinosum	0
Pterostylis aff. *aphylla*	0
Pterostylis aff. *obtusa*	0

Figure 34.
***Olearia grandiflora* is endemic to the Southern Lofty herbarium region. (Photo: A. Robinson).**

Two species, which are almost entirely confined to the Southern Lofty herbarium region are *Caladenia leptopchila* (a small population also occurs in the Flinders Ranges) and, *Acrotriche fasciculiflora* (Fig. 35). With the exception of a small population on Kangaroo Island, *A. fasciculiflora* is confined to the Southern Lofty herbarium region.

Figure 35.
With the exception of a small population on Kangaroo Island, *Acrotriche fasciculiflora* is confined to the Southern Lofty herbarium region. (Photo: P. Lang).

Table 20.
Taxa confined to Southern Lofty herbarium region within South Australia but occur elsewhere within Australia, ordered by frequency.

Species	Number of records from survey quadrats
Eucalyptus viminalis ssp. *viminalis*	46
Eucalyptus dalrympleana ssp. *dalrympleana*	14
Thelymitra venosa	10
Acaena agnipila var. *agnipila*	1 record listed as *Acaena agnipila* var.
Acaena agnipila var. *protenta*	see above
Acaena agnipila var. *tenuispica*	see above
Crassula sieberiana ssp. *sieberiana*	1
Lycopodiella serpentina	1
Persicaria strigosa	1
Acaena echinata var. *robusta*	0
Aristida australis	0
Aristida personata	0
Botrychium australe	0
Carex iynx	0
Correa sp. aff. *calycina*	0
Correa glabra ssp. *leucoclada*	0
Corybas fordhamii	0
Danthonia carphoides var. *angustior*	0
Danthonia procera	0
Danthonia richardsonii	0
Euphrasia collina ssp. *paludosa*	0
Lomandra caespitosa	0
Lycopodium deuterodensum	0
Psilotum nudum	0
Thelymitra circumsepta	0
Wahlenbergia gracilis	0

In addition there were no survey records of the following species:

- An endemic species presumed extinct is *Caladenia* "Finniss" (R. Bates 308).
- The following species confined to the SL region within South Australia are presumed extinct: *Calochilus cupreus* and *Galium propinquum*, and the three orchid crosses: *Pterostylis* x *ingens*, *Thelymitra* x *mackibbinii* and *Thelymitra* x *merranae*.
- *Ranunculus parviflorus* is the only introduced species confined only to the Southern Lofty region within South Australia.

Figure 36.
***Correa glabra* ssp. *leucoclada* is confined to the SMLR in South Australia. It also occurs in eastern and central NSW. It is associated with hilly situations and banks of streams. The photo specimen was growing in Morialta CP. (Photo: P. Lang).**

Figure 37.
A *Leptospermum continentale* (Prickly Tea-tree) dominated swamp in the Fleurieu Peninsula. This is a Nationally rated plant association. (Photo: NPWSA).

PLANT ASSOCIATIONS OF CONSERVATION SIGNIFICANCE

Nationally Nominated Threatened Ecological Communities

Two communities surveyed in the study region have been nominated as Threatened Ecological Communities under the *EPBC Act 1999*: Swamps of the Fleurieu Peninsula, and Peppermint Box (*Eucalyptus odorata*) Grassy Woodland. Temperate grasslands have also been nominated. However, grasslands and grassy woodlands of the Lofty Block bioregion are the subject of a specialist biological survey (Robertson, 1998) and are discussed in that report.

Fleurieu Peninsula Swamps

These were extensively surveyed within the study area. Survey 97 surveyed swamps exclusively and survey 42 also targetted swamps. The Fleurieu Peninsula swamps occurred within the following floristic (PATN) groups:

- approximately 15 quadrats within floristic group 37[2]
- all 10 quadrats within floristic group 38
- all 6 quadrats within floristic group 39
- at least 50 of the 63 quadrats in floristic group 40
- at least 7 of the 15 quadrats in floristic group 41

(refer below for further details on floristic groups)

[2] Because species cover abundance and other structural information is not available in electronic form for many survey quadrats (refer methods), it is not possible to ascertain the structure of all quadrats with certainty.

Eucalyptus odorata (Peppermint Box) Grassy Woodland

Eucalyptus odorata was recorded at 18 quadrats. However, based on the structural information available in electronic form, *Eucalyptus odorata* grassy woodland was only recorded at the following quadrat: 5ML323 – Sandy Creek CP (Floristic Group 20)

State Threatened Plant Communities

Two rating systems have been developed for State threatened plant communities:
1. Neagle (1995) assigned different conservation priority ratings to plant associations based on their distribution, condition and inclusion in National Parks and Wildlife Act reserves and/or Heritage Agreements.
2. DEH (2001) compiled a provisional list of State-threatened communities based on threats to their long-term survival. Plant communities are associated with particular soil types and landforms.

Both rating systems are used below.

- ***Eucalyptus goniocalyx* (Long-leaved Box) +/-*E. obliqua* (Messmate Stringybark), +/- *E. fasciculosa* (Pink Gum) Open Forest = Priority 10** (Neagle 1995).

Eucalyptus goniocalyx (Long-leaved Box) was recorded at 126 quadrats of which it occurred as a dominant in approximately half. The high number of quadrats in which this association was recorded reflects the survey sampling bias – *E. goniocalyx* Open Forest was one of the three, vegetation communities targetted by Survey 42.

Eucalyptus goniocalyx occurs as a dry sclerophyll forest or woodland formation on very infertile soils. In the SMLR survey region, Long-leaved Box is largely confined to the "Barossa" sub-region, occurring between about 680mm and 900mm isohyets (Specht *et al*. 1961) and mainly in the area bounded by Mount Crawford in the north and the River Torrens in the south. During the Biological Surveys, *E. goniocalyx*

was recorded either as a sole dominant, or equally common, as a co-dominant with *E. obliqua*, *E. fasciculosa*, and less commonly, with *E. leucoxylon*. Specht, Brownell and Hewitt (1961) provide a detailed description of the ecology of *Eucalyptus goniocalyx* within the SMLR.

• ***Eucalyptus viminalis* ssp. *cygnetensis* (Manna Gum) and/or *E. viminalis* ssp. *viminalis* (Rough-barked Manna Gum) Woodland** on alluvial soils in moist areas. **Vulnerable** (DEH 2001). *Eucalyptus viminalis* ssp. *cygnetensis* was recorded at 14 quadrats and *E. viminalis* ssp. *viminalis* was recorded at 46 quadrats.

Eucalyptus viminalis ssp. *cygnetensis* was recorded only once as the only eucalypt present in a quadrat. It was recorded as a co-dominant with *E. leucoxylon* ssp. *leucoxylon* at seven quadrats; with *E. fasciculosa* at two quadrats and with *E. obliqua* at one quadrat. The quadrats were (numbers in brackets indicate Floristic Group numbers):
117NOA02001 (11), 117ONK02601 (18), 117TOR00901 (13), 117WIL01501 (14), 117WIL02801 (17), 117YAN00501 (15), 117ADE02201 (23), 42PC1072 (14), 42PC907 (25), 42PC947 (14), 42PC964 (28)

Of the 46 quadrats in which *E. viminalis* ssp. *viminalis* was recorded, it generally occurred as a co-dominant with *E. obliqua*.

• ***Callitris gracilis* (Native Pine) +/- *Eucalyptus leucoxylon* (SA Blue Gum) grassy Low Woodland** on quartzite gravels on western footslopes of Adelaide Hills. **Vulnerable** (DEH 2001)
Although *Callitris gracilis* was recorded at 41 quadrats, no quadrats recorded the above association in the study region. A *Callitris gracilis* Low Woodland was recorded at site 117BAR00601 (2.4km WNW of Williamstown) on a sandy plain.

• ***Eucalyptus leucoxylon* ssp. *pruinosa* +/- *E. odorata* (Peppermint Box) grassy Low Woodland** on loams of hill slopes. **Vulnerable** (DEH 2001)
Eucalyptus leucoxylon ssp. *pruinosa* was recorded at three quadrats – all as a sole dominant. The quadrats were all in floristic group 22 and were: 117BAR00701 (South Para Reservoir), 117BAR02001(6.8km SSE of Tanunda) and 117BAR02601 (Para Wirra RP). All quadrats were on clay loam soils. *Eucalyptus leucoxylon* ssp. *pruinosa* occurs in two areas in South Australia; in the South East and in the northern Mount Lofty Ranges from the Barossa Valley area north to Dutchmans Stern in the southern Flinders Ranges (Nicolle 1997).

• ***Eucalyptus odorata* (Peppermint Box) +/- *E. leucoxylon* (SA Blue Gum) grassy Low Woodland** on loamy soils of low hills **Endangered** (DEH 2001). Not recorded in survey quadrats.

• ***Eucalyptus odorata* (Peppermint Box) +/- *Eucalyptus porosa* (Mallee Box) (Low) Woodland Priority 3** (Neagle 1995)
This association was recorded at one quadrat only: 117BAR02401 (floristic group 24) in Para Wirra RP.

Within the SMLR survey region, only two records of this association are in the Reserves database: Para Wirra CP (<1% of the Park), and a poor quality area in Sandy Creek CP, in association with *Callitris* sp., covering only 3.5% of the Park. Prior to European settlement, Peppermint Box was much more extensive, as it occupied fertile sites in areas of up to 700mm rainfall (Specht *et al*. 1961).

In the SMLR, however, Peppermint Box now occurs mainly on the rocky, drier eastern slopes (Nicolle 1997). Hyde (1999) states Peppermint Box is found along both sides of the Bremer River valley from just north of Harrogate southwards to the vicinity of Langhorne Creek. Grazing has, however, removed most of the native (grassy) understorey and weed infestation is extensive.

• ***Eucalyptus microcarpa* (Grey Box) grassy Low Woodland** on foothills and hill slopes of southern Mount Lofty Ranges. **Endangered** (DEH 2001) and ***E. microcarpa* Woodland Priority 4** (Neagle 1995)
Eucalyptus microcarpa was recorded at 24 quadrats. Of these quadrats, *E. microcarpa* was a sole dominant at the following 14 quadrats:
5ML558 (floristic group 17); 5ML591 (floristic group 28) and the remaining 12 quadrats were in floristic group 21 namely 5ML221, 5Ml520, 5ML557, 5ML577, 5ML578, 5ML579, 5ML581, 5ML585, 5ML586, 117NOA00701, 117NOA01201 and 117NOA02202.

Most quadrats were heavily modified by the presence of woody weeds, particularly Olives and Boneseed, and also herbaceous weeds including *Plantago lanceolata* and annual grasses. Within the SMLR, *E. microcarpa* occurs on the southern Adelaide plains and western slopes of the Adelaide Hills south to Willunga (Nicolle 1997), and occurs on heavier soils.

• ***Eucalyptus fasciculosa* (Pink Gum) +/- *Eucalyptus leucoxylon* (SA Blue Gum) heathy Woodland** on sandy loams of flats and slopes. **Vulnerable** (DEH 2001)
Insufficient soil data is available to determine the occurrence of this association within the survey quadrats.

• ***Allocasuarina verticillata* (Drooping Sheoak) grassy Low Woodland** on clay loams of low hills. **Vulnerable** (DEH 2001)
Not recorded in survey quadrats. *Allocasuarina verticillata* was recorded at 101 quadrats, but in nearly all cases was recorded either as a co-dominant or sub-dominant tree. No quadrats within Survey 52, 97 or 117 recorded *A. verticillata* grassy Low Woodland.

From the electronic data available, it was also not recorded within Survey 5 or 42 quadrats.

Prior to European settlement, Drooping Sheoak grew in the driest portions of the SMLR, including near the cliffs at Port Noarlunga and along the Palmer scarp on the eastern side of the region. In areas of higher rainfall, it also occurred on very steep slopes. Specht and Perry (1948) wrote: "On very steep cliffs such as occur in the Torrens Gorge, Morialta, Slape's Gully, near the first waterfall in Waterfall Gully, the Sturt and Onkaparinga gorges, pure communities may be developed on either aspect".

• ***Eucalyptus porosa*** **(Mallee Box) Woodland Priority 5** (Neagle 1995)
Not recorded in survey quadrats. However, *E. porosa* was recorded at 8 quadrats – either as a non-dominant tree with other eucalyptus species dominant, or as a co-dominant in a low woodland or very low woodland formation.

Within the SMLR, it is known to occur in Black Hill CP and Morialta CP (both with high levels of weed infestation) and in Aldinga Scrub CP.

• ***Eucalyptus ovata*** **(Swamp Gum) Low Open Forest and Low Woodland** (both with heath understorey). **Priority 8** (Neagle 1995)
Eucalyptus ovata was recorded at 29 quadrats and the above association was recorded at 5 quadrats (numbers in brackets are floristic group numbers):
117TOR00602 (40); 5ML38 (15); 5ML493 (38); 5ML632 (38); 5ML617 (5). All these quadrats are in the southern Fleurieu Peninsula.

Within the SMLR, Swamp Gum is confined to the southern Fleurieu Peninsula. It "grows in broad seasonally swampy creeks, and low swampy valleys. In such waterlogged sites it may be the only tree present, although it may sometimes be associated with *E. viminalis*, *E. cosmophylla*" (Nicolle 1997). Only 4% of the 482 hectares of this association currently mapped is within the reserves system in Waitpinga CP, but there are approximately 30 discrete patches of this swamp species scattered across the southern Fleurieu Peninsula, to the west of Victor Harbor (D. Armstrong pers comm.).

• ***Eucalyptus dalrympleana*** **ssp. *dalrympleana* (Mountain Gum or Candlebark) Open Forest Endangered** (DEH 2001); **Priority 3** (Neagle 1995)
This association was recorded at three quadrats :namely *Eucalyptus dalrympleana* ssp. *dalrympleana* was the only dominant tree present (numbers in brackets are floristic groups);
5ML259 (4); 5ML501 (4); 5ML507 (3)

Mountain Gum was recorded as a sub-dominant or co-dominant with *Eucalyputs obliqua* or *E. goniocalyx* at the following quadrats: 5ML137; 5ML28; 5ML29; 5ML395; 5ML45; 5ML571; 117ONK02901; 42PC1082; 42PC918; 5ML301; 5ML307
Eucalyptus dalrympleana ssp. *dalrympleana* was recorded at 14 survey quadrats.

Mountain Gum has a very limited distribution, largely confined to the wettest high valleys. It occurs sporadically in silty swamps and along gully heads on leached, grey-brown podsols in areas of rainfall greatern than 1,125mm per annum. In lower rainfalls (850mm), the species is usually confined to a strip of wet alluvial soils along creekbeds (West 1977). Nicolle (1997) states the distribution of Mountain Gum is as follows:

> "Occurs in the higher parts of the Mt Lofty Ranges, from near Gumeracha to about Mylor, with a few small isolated occurrences to the south in more swamp areas in and around Kyeema Conservation Park, near Mt Compass and around Parawa. It is common along the freeway between Stirling and Bridgewater. It occurs in tall forest sometimes with *E. obliqua* and *E. viminalis* ssp. *viminalis*."

Mountain Gum has been mapped in the group *E. viminalis* ssp. *viminalis* and/or *E. dalrympleana* ssp. *dalrympleana* +/- *E. viminalis* ssp. *cygnetensis* +/- *E. obliqua* Woodland (Smith 2000). There are 20 to 30 small areas mapped in the higher altitude central ranges, the largest including an area in the Wotton's Scrub section of Kenneth Stirling CP, part of Mylor CP and two along water courses in the Mt Bold Reservoir Reserve. It is probable that any attempt to separate *E. dalrympleana* from this combination of species would make it unmappable at at scale of 1:50,000.

Weed invasion is the major threat to Mountain Gum Woodlands.

• ***Leptospermum lanigerum*** **(Silky Tea-tree) Closed Shrubland**. **Endangered** (DEH 2001)
Leptospermum lanigerum was the dominant overstorey species at the following sites for surveys 52, 97 and 117(figures in brackets indicate floristic group number);
52TOR01001 (40); 117ADE02101 (37); 52MIL00203 (37); 52MIL0101 (38); 52TOR0301 (38); 52TOR0501 (40); 52TOR0601 (40); 52TOR0902 (40); 52WIL0501 (40); 52WIL1501 (40); 52YAN0101 (40).

Dominance information is not available in electronic form for Survey 42, however, *Leptospermum lanigerum* is likely to be an overstorey dominant in at least 10 quadrats from Survey 42. Survey 5 did not target wet heaths.

PLANT ASSOCIATIONS POORLY COVERED BY SURVEY
As discussed in the Introduction chapter, there are very few survey sites in the eastern third of the SMLR survey region (refer Figure 5). This area corresponds to the northern half of the Fleurieu Peninsula IBRA subregion and includes Scotts Hill and Eden Valley

Environmental Associations (refer Figure 2), which are estimated to retain less than 1% native vegetation. The area is bounded by Keyneton and Eden Valley in the north, Birdwood, Mt Torrens and Mt Barker to the west and Callington and Woodchester in the south-east. Hyde (1999) comprehensively surveyed this region and has mapped the pre-European vegetation. Rainfall varies from "about 800mm annually in the western portion at Mount Barker to 400mm in the south-east near Langhorne Creek. The topography varies from rolling hills in the north and west to rugged steep landscapes along the western scarp of the Bremer valley and finally give way to flat sandy and limestone plains in the south" (Hyde 1999). He estimated that grassy ecosystems comprised over 80% of this region (mainly River Red Gum Woodland, grassland and *Lomandra* tussocks).

Much of the eastern side of the region was originally River Red Gum (*Eucalyptus camaldulensis*) or SA Blue Gum (*E. leucoyxlon*) Open Woodlands with grassy understoreys, or grassland and Irongrass (*Lomandra*) communities (Hyde, 1999). The grasslands were interspersed with patches of woodland dominated by Peppermint Box (*E. odorata*), Pink Gum (*E. fasciculosa*) and Drooping Sheoak (*A. verticillata*). In the far south east of the region Mallee shrublands and patches of Native Pine (*C. gracilis*) encroach. This area, however, has been so heavily modified by agriculture and grazing that very only small areas of scrub remain.

To address the lack of surveys in this region, a small-scale biological survey was coordinated by the Nature Conservation Society of South Australia and conducted in October 2002. Results were not available at the time of writing.

SPECIES PATTERNS

The floristic analyis considered a total of 1,177 survey sites. Seven hundred and eighty (780) of the recorded taxa (totalling 31,596 records) at the 1,177 sites were considered perennial. All annual species were excluded from the floristic analysis. The Flora of South Australia was consulted to determine the annual status of plants. Perennial species recorded at one site only were also removed from the analysis. Taxa not identified to species were also masked out of the analysis except *Rubus* sp. (Blackberry), an important weed taxa, but rarely identified to species.

A total of 585 perennial species were selected for floristic (PATN) analyses and are listed for each floristic group in Appendix VIII.

Interpretation of the Dendogram

PATN an exploratory analysis program (Belbin 1994), was used to clump the 1,177 sites into 41 groups based on the similarity of their floristic composition (using species presence data only).

The results of PATN display a dendrogram that summarises the relationship of all quadrats to each other (Figure 38). The dendrogram can be "cut off" at any level of dissimilarity to display a desired number of groupings and should be cut at a level where the vegetation types represented by the quadrats in these groupings reflect ecologically meaningful groups (Robertson 1998). The purpose of the classification is to identify vegetation types in which many species commonly and repeatedly occur together due to particular environmental factors.

A dissimilarity cut-off value of approximately one defined 41 groups. This resulted in all groups differing in the **main** vegetation association they comprised. Further, the majority of sites within each group comprised the same vegetation association (namely, the same species as dominants or sub-dominants in the overstorey). A lower "cut-off" value would have tended to clump two, and frequently three or more, dissimilar vegetation associations within individual groups. Conversely a higher-cut off value would have resulted in the same or very similar associations occurring in a number of groups. Forty-one floristic groups is also similar to the number of floristic groups mapped for the Southern Lofty region (Vegetation Mapping section). The cut-off value of approximately one is also similar to the levels used for other regional surveys including Robinson *et al*. (1988); Brandle (1998); Robertson (1998) and Brandle (2001).

Naming of floristic groups

Each floristic group was named using overstorey dominant and sub-dominant species and structure, and in some cases further described using understorey dominant species.

DOMINANT SPECIES (generally overstorey) are perennial native species that frequently occurred with a cover/abundance score of 2 or higher (>5% cover), and were present in **50%** or more of the quadrats in the group.

SUB DOMINANT OVERSTOREY SPECIES are native perennial overstorey species that either occur frequently with a lesser cover/abundance than the dominant species, or occur occasionally in groups but are co-dominant when they do occur.

UNDERSTOREY DOMINANT species are species that occurred at nearly all sites and commonly have a cover/abundance of more than 5%.

STRUCTURE: there is often considerable variation in structure within floristic groups and the modal structure class was named for each floristic group. Structural formation classes are those used in the Biological Survey of South Australia and are shown in Appendix IX.

A well-defined group was considered to have:

- some dominant species that showed a high proportion of occurrence within the group and a relatively high number of cover/abundance values greater than 5%, or the same combination of overstorey species occurred in the majority of groups.
- some species, not necessarily dominant species, that had a low frequency in other groups and also a relatively high frequency within the group (Robertson 1998). These latter species, that particularly characterised a group, were defined as **indicator species.**

Symbols Used in Floristic Group Names

Commas separating taxa indicates they are co-dominant throughout the association.
A " +/-" indicates the following species is "sometimes present.
Sub-dominant species are listed last.

Table 21 lists the floristic groups under major structural formation categories with the number that represents the order they appeared down the dendrogram and includes the size of each group by the number of quadrats.

Some overstorey dominants have no structural formation listed. This is because structural formation and cover abundance data is not available in electronic form for many quadrats. Hence for some sub-groups , the structural formation could not be determined with certainty.

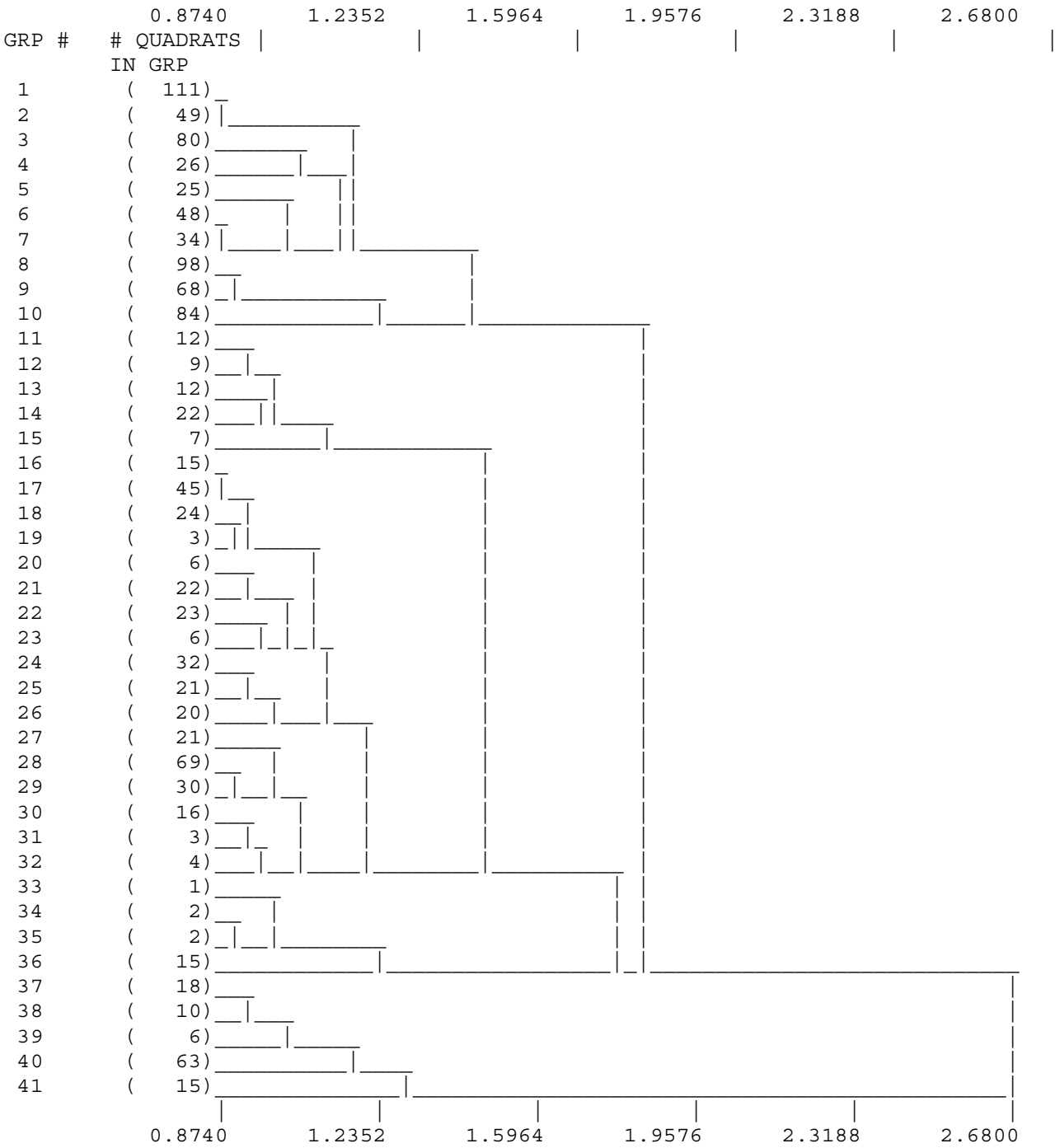


Figure 38.
Dendrogram from PATN analsysis showing 41 floristic groups.

Table 21.
Floristic vegetation groups resulting from the PATN analysis.

Floristic Group No.	No. quadrats in group	Vegetation association(s) within Group
1.	111	• ***Eucalyptus obliqua*, +/– *E. fasciculosa*, +/- *E. goniocalyx*** Open Forest and Low Woodland
2.	49	• *Eucalyptus goniocalyx*, +/– *E. fasciculosa* +/- *E. obliqua* Low Woodland
3.	80	• *Eucalyptus obliqua* +/– *E. baxteri* +/- *E. fasciculosa* Open Forest
4.	26	• *Eucalyptus obliqua*, +/– *E.s dalrympleana* ssp. *dalrympleana* Open Forest and Woodland
5.	25	• *Eucalyptus obliqua*, +/- *E. fasciculosa* Open Forest (20 quadrats) • *Eucalyptus baxteri*, +/- *E. cosmophylla*, +/- *E. fasciculosa* Low Open Forest (5 quadrats)
6.	48	• *Eucalyptus obliqua*, +/– *E. baxteri* +/- *E. fasciculosa* Open Forest and Low Open Forest
7.	34	• *Eucalyptus obliqua*, +/- *E. fasciculosa* Low Open Forest
8.	98	• *Eucalyptus obliqua*,+/– *E. cosmophylla*,+/– *E. fasciculosa* Open Forest AND Woodland (60 quadrats) • *Eucalyptus baxteri*, +/- *E. cosmophylla*, +/- *E. fasciculosa* Woodland (24 quadrats) • *Eucalyptus cosmophylla*, +/- *E. fasciculosa* , +/- *E. baxteri* Very Low Woodland (14 quadrats)
9.	68	• *Eucalyptus baxteri*, +/- *E. cosmophylla* Very Low Woodland (35 quadrats) • *Eucalyptus obliqua*, +/- *E. cosmophylla*, +/- *E. baxteri* and Low Open Forest (33 quadrats)
10.	84	• *Eucalyptus baxteri*, +/– *E. cosmophylla*, +/- *E. fasciculosa* Low Open Forest or Low Woodland (56 quadrats) • *Eucalyptus fasciculosa*, +/- *E. cosmophylla* +/- *E. diversifolia* Low Open Forest or Low Woodland (22 quadrats)
11.	12	• *Eucalyptus leucoxylon* (6 quadrats) OR • *Eucalyptus viminalis* ssp. *Viminalis* (2 quadrats) OR • *Eucalyptus obliqua* (3 quadrats) OR • *Eucalyptus camaldulensis* (1 site) Woodland over introduced shrubland over introduced grasses
12.	9	• *Eucalyptus viminalis* ssp. *viminalis*, +/- *E. leucoxylon* savannah Woodland
13.	12	• *Eucalyptus viminalis* ssp. *viminalis*, *E. obliqua* +/- *E. fasciculosa* Woodland along creeklines
14.	22	• *Eucalyptus leucoxylon*, +/- *E. viminalis* ssp. *viminalis*, +/- *E. obliqua* Open Forest and Woodland
15.	7	• *Eucalyptus camaldulensis* +/– *E. ovata* wet heath Open Forest
16.	15	• *Eucalyptus fasciculosa*, +/- *E. obliqua*, +/– *E. goniocalyx*, +/- *E. leucoxylon* Open Forest
17.	45	• *Eucalyptus fasciculosa*, +/– *E. leucoxylon*, +/- *E. obliqua* Woodland (28 quadrats); • *Eucalyptus goniocalyx* +/- *E. fasciculosa* Woodland (8 quadrats); • *Eucalyptus leucoxylon* +/- *E. fasciculosa* Woodland (9 quadrats) ALL over *Acacia pycnantha*
18.	24	• *Eucalyptus viminalis* ssp. *viminalis*, *E. leucoxylon* +/- *E. obliqua* +/- *E. camaldulensis* Woodland
19.	3	• *Eucalyptus obliqua* (Low) Open Forest
20.	6	• *Eucalyptus odorata* (2 quadrats) OR • *Eucalyptus fasciculosa* (3 quadrats) OR • *Eucalyptus leucoxylon* dry sclerophyll (1 site) Low Woodland
21.	22	• *Eucalyptus microcarpa*, +/- *E. fasciculosa* Savannah Woodland
22.	23	• *Eucalyptus camaldulensis* and/or *E. leucoxylon* savannah/sclerophyll Low Open Forest and Woodland
23.	6	• *Eucalyptus leucoxylon*, +/- *E. camaldulensis*, +/- *E. viminalis* ssp. *cygnetensis* savannah Woodland (4 quadrats); • *Eucalyptus porosa*, +/- *Allocasuarina verticillata* Low Woodland (2 quadrats)
24.	32	• *Eucalyptus fasciulosa*, +/- *Callitris gracilis* +/- *Allocasuarina verticillata* Low Woodland
25.	21	• *Eucalyptus fasciculosa*, *Allocasuarina verticillata*+/-*E. goniocalyx* Low Woodland AND Low Open Woodland
26.	20	• *Eucalyptus fasciculosa* Very Low Woodland and Very Low Open Woodland
27.	21	• *Eucalyptus cosmophylla*, +/- *E. fasciculosa* +/- *E. leptophylla* +/- *E. incrassata* Very Low Woodland and Very Low Open Woodland
28.	69	• *Eucalyptus fasciculosa*, +/- *E. cosmophylla* +/- *Acacia pycnantha* Low Woodland (61 quadrats) • *Eucalyptus fasciculosa*,*E. baxteri* +/- *Acacia pycnantha* Low Woodland (8 quadrats)
29.	30	• *Eucalyptus fasciculosa*, +/- *E. leucoxylon* Woodland (17 quadrats); • *Eucalyptus fasciculosa*, +/- *Allocasuarina verticillata* +/- *E. cosmophylla* Low Woodland (8 quadrats) • *Eucalyptus odorata*, +/- *E. fasciculosa*, +/- *E. phenax*, +/- *E. cosmophylla* Very Low Woodland/Mallee (5 quadrats)
30.	16	• *Eucalyptus fasciculosa*, +/– *E. leptophylla*, +/- *E. phenax*, +/- *E. incrassata*, +/- *E. odorata* Mallee
31.	3	• *Eucalyptus diversifolia*, +/- *E. cosmophylla* Mallee
32.	4	• *Eucalyptus leucoxylon*, +/- *E. viminalis*, +/- *E. ovata*, +/- *E. fasciculosa* (2 quadrats) • *Eucalyptus fasciculosa*, +/- *E. diversifolia*, +/- *E. cosmophylla*, +/- *E. odorata* (2 quadrats)
33.	1	• *Melaleuca lanceolata* Tall Shrubland
34.	2	• *Eucalyptus odorata*, *E. porosa*, *E. phenax* Mallee (1 quadrat)

Floristic Group No.	No. quadrats in group	Vegetation association(s) within Group
		• *Eucalyptus oleosa*, *E. leptophylla*, *E. fasciculosa* Mallee (1 quadrat)
35.	2	• *Allocasuarina verticillata*, +/- *Eucalyptus odorata*, +/- *E. leucoxylon* Low Woodland
36.	15	• *Olearia axillaris*, *Rhagodia candolleana*, *Acacia longifolia* var. *sophorae*, +/- *Leucopogon parviflorus*, +/- *E. diversifolia* Shrubland
37.	18	• *Eucalyptus viminalis* ssp. *viminalis* Open Forest (3 quadrats) • *Eucalyptus ovata*, *E. obliqua* (4 quadrats) • *Eucalyptus cosmophylla*, +/- *E. baxteri* over wet heaths/ sedgelands (3 quadrats) • *Phragmites australis*, *Leptospermum lanigerum* (7 quadrats)
38.	10	• *Eucalyptus ovata* Open Forest over wet heath
39.	6	• *Carex appressa*, *Juncus pallidus* closed sedgeland (swamps)
40.	63	• *Leptospermum continentale*, *Leptospermum lanigerum*, +/- *Phragmites australis* Shrubland +/- emergent *Eucalyptus ovata*
41.	15	• *Eucalyptus obliqua*, *E. ovata*, +/- *E. cosmophylla* Open Forest over wet heaths (gullies) (12 quadrats) • *Eucalyptus cosmophylla*, *E. baxteri* Open Forest over wet heaths (12 quadrats) • *Leptospermum continentale*, *Melaleucca decussata* closed shrubland (6 quadrats)

The groups have been arranged into **9 alliances**, that is possessing the same structural characteristics, related species as dominants in the uppermost stratum, and possibly the same or related species in the understorey (Specht, 1972). These are listed in Table 22.

Table 22.
Floristic groups resulting from SMLR survey PATN analysis, arranged by alliances.

Eucalyptus obliqua **dominated Open Forests and Woodlands**

Floristic Group	No. Quadrats	Vegetation Association
1.	111	*Eucalyptus obliqua*, +/– *E.s fasciculosa*, +/- *E. goniocalyx* Open Forest and Low Woodland
3.	80	*Eucalyptus obliqua* +/– *E. baxteri* +/- *E. fasciculosa* Open Forest
4.	26	*Eucalyptus obliqua* +/– *E. dalrympleana* ssp. *dalrympleana* Open Forest and Woodland
5(part)	20	*Eucalyptus obliqua*, +/- *E. fasciculosa* Open Forest
6.	48	*Eucalyptus obliqua*, +/– *E. baxteri* +/- *E. fasciculosa* Open Forest and Low Open Forest
7.	34	*Eucalyptus obliqua*, +/- *E. fasciculosa* Low Open Forest
8(part).	60	*Eucalyptus obliqua* +/– *E. cosmophylla* +/– *E. fasciculosa* Open Forest and Woodland
19.	3	*Eucalyptus obliqua* (Low) Open Forest
TOTAL QUADRATS = 382 (32% OF ALL SURVEY QUADRATS)		

Eucalyptus fasciculosa **dominated forests and woodlands**

Floristic Group	No. Quadrats	Vegetation Association
17part.	28	*Eucalyptus fasciculosa*, +/– *E. leucoxylon*, +/- *E. obliqua* Woodland
17part	9	*Eucalyptus leucoxylon* +/- *E. fasciculosa* over *Acacia pycnantha*
29(part).	17	*Eucalyptus fasciculosa*, +/- *E. leucoxylon* Low Woodland
10(part).	24	*Eucalyptus fasciculosa* +/- *E. cosmophylla* (+/- *E. diversifolia*) Low Open Forest or Low Woodland
26.	20	*Eucalyptus fasciculosa* Very Low Woodland and Very Low Open Woodland
28(part).	61	*Eucalyptus fasciculosa*, +/- *E. cosmophylla*, +/- *Acacia pycnantha* Low Woodland
28(part).	69	*Eucalyptus fasciculosa*, *E. baxteri*, +/- *Acacia pycnantha* Low Woodland
TOTAL QUADRATS = 228 (19% OF ALL SURVEY QUADRATS)		

***Eucalyptus goniocalyx* dominated forests and woodlands**

Floristic Group	No. Quadrats	Vegetation Association
16.	15	*Eucalyptus fasciculosa*, +/- *E. obliqua*, +/– *E. goniocalyx*, +/- *E. leucoxylon* Open Forest
17part	8	*Eucalyptus goniocalyx* +/- *E. fasciculosa* Woodland
2	49	*Eucalyptus goniocalyx*, +/- *E. fasciculosa* +/- *E. obliqua* Woodland
25	21	*Eucalyptus fasciculosa*, *Allocasuarina verticillata* +/- *E. goniocalyx* Low Woodland and Low Open Woodland
TOTAL QUADRATS = 93 (8% OF ALL SURVEY QUADRATS)		

***Eucalyptus baxteri*, *Eucalyptus cosmophylla*, *E. fasciculosa* Low Woodland/Low Open Forest**

Floristic Group	No. Quadrats	Vegetation Association
5(part).	5	*Eucalyptus baxteri*, +/- *E. cosmophylla*, +/- *E. fasciculosa* Low Open Forest
8(part).	24	*Eucalyptus baxteri*, +/- *E. cosmophylla*, +/- *E. fasciculosa* Woodland
8(part).	14	*Eucalyptus cosmophylla*, +/- *E. fasciculosa*, +/- *E. baxteri* Very Low Woodland
9(part).	24	*Eucalyptus baxteri*, +/- *E. cosmophylla* Very Low Woodland
9(part).	33	*Eucalyptus obliqua*, +/- *E. cosmophylla*, +/- *E. baxteri* and Low Open Forest
10(part).	60	*Eucalyptus baxteri*, +/– *E. cosmophylla*, +/- *E. fasciculosa* Low Open Forest or Low Woodland
TOTAL QUADRATS = 160 (13% OF ALL SURVEY QUADRATS)		

***Eucalyptus viminalis* ssp. *viminalis*, *Eucalyptus leucoxylon*, *E. camaldulensis* savannah Woodland**

Floristic Group	No. Quadrats	Vegetation Association
11.	12	*Eucalyptus leucoxylon* OR *E. viminalis* ssp. *viminalis* OR *E. obliqua* OR *E. camaldulensis* Woodland over introduced shrubland over introduced grasses
12	9	*Eucalyptus viminalis* ssp. *viminalis*, +/- *E. leucoxylon* savannah Woodland
22	23	*Eucalyptus camaldulensis*, +/- *E. leucoxylon* savannah/ sclerophyll Low Open Forest and Woodland
23 (part)	6	*Eucalyptus leucoxylon*, +/- *E. camaldulensis*, +/- *E. viminalis* ssp. *cygnetensis* savannah Woodland
TOTAL QUADRATS = 50 (4% OF ALL SURVEY QUADRATS)		

***Eucalyptus viminalis* ssp. *viminalis*, *Eucalyptus leucoxylon*, *E. ovata* Woodland OR Open Forest OVER wet heaths**

Floristic Group	No. Quadrats	Vegetation Association
13.	12	*Eucalyptus viminalis* ssp. *viminalis*, *E. obliqua* +/- *E. fasciculosa* Woodland along creeklines
14.	22	*Eucalyptus leucoxylon*, +/- *E. viminalis* ssp. *viminalis*, +/- *E. obliqua* Open Forest and Woodland
15	7	*Eucalyptus camaldulensis* +/– *E. ovata* wet heath Open Forest
18	24	*Eucalyptus viminalis* ssp. *viminalis*, *E. leucoxylon* +/- *E. obliqua* +/- *E. camaldulensis* Woodland
32(part).	2	*Eucalyptus leucoxylon*, +/- *E. viminalis* ssp., +/- *E. ovata*, +/- *E. fasciculosa*
37(part).	3	*Eucalyptus viminalis* ssp. *viminalis* Open Forest
37(part).	4	*Eucalyptus ovata*, +/- *E. obliqua* Woodland
TOTAL QUADRATS = 74 (6% OF ALL SURVEY QUADRATS)		

Tall Shrubland

Floristic Group	No. Quadrats	Vegetation Association
33.	1	*Melaleuca lanceolata* Tall Shrubland

Coastal Shrublands

Floristic Group	No. Quadrats	Vegetation Association
35.	2	*Olearia axillaris*, *Rhagodia candolleana*, *Acacia longifolia* var. *sophorae* Shrubland

Dry Savannah Woodlands

Floristic Group	No. Quadrats	Vegetation Association
20.	6	*Eucalyptus odorata* OR *E. fasciculosa* OR *E. leucoxylon* dry sclerophyll Low Woodland over *Chrysanthemoides monilifera*
21.	22	*Eucalyptus microcarpa*, +/- *E. fasciculosa* Savannah Woodland
23(part).	2	*Eucalyptus porosa*, +/- *Allocasuarina verticillata* Low Woodland
24	32	*Eucalyptus fasciculosa*, +/- *Callitris gracilis* +/- *Allocasuarina verticillata* Low Woodland
29(part).	8	*Eucalyptus fasciculosa*, +/- *Allocasuarina verticillata*, +/- *E. cosmophylla* Low Woodland
35.	2	*Allocasuarina verticillata*, +/- *Eucalyptus odorata*, +/- *E. leucoxylon* Low Woodland
TOTAL QUADRATS = 72 (6% OF ALL SURVEY QUADRATS)		

Mallee, Very Low Woodland

Floristic Group	No. Quadrats	Vegetation Association
27.	21	*Eucalyptus cosmophylla*, +/- *E. fasciculosa* +/- *E. leptophylla* +/- *E. incrassata* Very Low Woodland and Very Low Open Woodland
29(part).	5	*Eucalyptus odorata*, +/- *E. fasciculosa*, +/- *E. phenax*, +/- *E. cosmophylla* Very Low Woodland/Mallee
30.	16	*Eucalyptus fasciculosa*, +/– *E. leptophylla*, +/- *E. phenax*, +/- *E. incrassata*, +/- *E. odorata* Mallee
31.	3	*Eucalyptus diversifolia*, +/- *E. cosmophylla* Mallee
32(part)	2	*Eucalyptus fasciculosa*, +/- *E. diversifolia*, +/- *E. cosmophylla*, +/- *E. odorata*
34(part).	2	*Eucalyptus odorata*, *E. porosa*, *E. phenax* Mallee
34(part).	2	*Eucalyptus oleosa*, *E. leptophylla*, *E. fasciculosa* Mallee
TOTAL QUADRATS = 51 (4% OF ALL SURVEY QUADRATS)		

Swamps

Floristic Group	No. Quadrats	Vegetation Association
37(part).	3	*Eucalyptus cosmophylla*, +/- *E. baxteri* over wet heaths/ sedgelands
37(part).	8	*Phragmites australis*, *Leptospermum lanigerum*
38.	10	*Eucalyptus ovata* Open Forest over wet heath
39.	6	*Carex appressa*, *Juncus pallidus* closed sedgeland (swamps)
40.	63	*Leptospermum continentale*, *Leptospermum lanigerum*, +/- *Phragmites australis* Shrubland +/- emergent *Eucalyptus ovata*
41(part).	6	*Eucalyptus obliqua*, *E. ovata*, +/- *E. cosmophylla* Open Forest over wet heaths (gullies)
41(part).	3	*Eucalyptus cosmophylla*, *E. baxteri* over wet heaths
41(part).	6	*Leptospermum continentale*, *Melaleuca decussata* -Closed Shrubland
TOTAL QUADRATS = 105 (10% OF ALL SURVEY QUADRATS)		

FLORISTIC GROUP DESCRIPTIONS

Detailed descriptions of the 41 floristic groups defined using PATN are summarised in Table 23 and are presented in the following format in the remainder of this chapter:

- **Floristic (PATN) Group** number followed by the descriptive title that includes the dominant (and possibly also co-dominant) overstorey species, the vegetation structural classification for South Australia and the dominant understorey species (refer above for definitions of these elements)

- The **number of quadrats** contributing to the group, including a breakdown of the number of quadrats from each survey

- **Vegetation Description**, including most common overstorey, mid-stratum and groundcover structures and species. The frequency of overstorey species (generally *Eucalyptus* species) within the group.

- **Floristic Composition**

  The number of perennial taxa recorded at quadrats defining the group; the number of annual taxa within the group; and the total number of taxa at all quadrats within the group (NB: Taxa identified only to generic level have been excluded from these figures, thereby possibly under-estimating total taxa)

  The number of introduced taxa within the group; the total number of native taxa at all quadrats within the group.

  The average[3] number of total species per site including the maximum and minimum number of species recorded at any of the quadrats within the group.

  The average number of native taxa per site including the maximum and minimum number of species recorded at any of the quadrats within the group

  The average number of introduced taxa per site including the maximum and minimum number of species recorded at any of the quadrats within the group.

  Percentage of quadrats with weeds.

  Number of introduced perennials recorded at >40% of quadrats within the group

  The number of conservation significant species (rated at least Rare) recorded at quadrats in the group for the Australian, South Australian and Southern Lofty regional levels. Australian ratings = Biodiversity Act; South Australian = species listed in Schedules 7, 8 or 9 (rare, endangered, vulnerable) of the *NP&W Act, 1972*; Regional = Lang and Kraehenbuehl (unpublished).

- Important **Indicator Species** and/or species largely confined to the floristic group. Indicator species were native plant species whose occurrence in the group was relatively significant as indicated by:
  - a high "significance from random" value (observed – expected/expected) within the group, and
  - that occur relatively commonly within the group (frequency usually > 30%), and were relatively uncommon in most other groups.

- **Environmental Parameters:** A brief description of the location, landform, soils, elevation (metres) and variation across the group.

- **Distribution:** Main geographic locations of quadrats within the group and a **map** of the study area with the location of the quadrats contributing to the group.

- **Comments**: Miscellaneous comments highlighting features significant to the group.

- Where available, a **photo** of one of the quadrats representing the group.

Appendix VIII provides further tables including: a table of species that were present at >40% of quadrats comprising the group, a table of species that were present at <40% of quadrats **and** had a high value of significance to the group; tables showing structural, aspect, slope and soil information; and species with a State and/or Australian conservation rating.

The quadrats contributing to each group are detailed in Appendix VI.

[3] All average numbers of species have been rounded to the nearest whole unit. The average number of taxa and minimum and maximum numbers of taxa **include** taxa identified to genus level only.

Table 23.
Summary of Floristic Groups resulting from SMLR survey PATN analysis.

Group Number (& no. of quadrats)	Overstorey Dominants	No. of quadrats	Mean no. native taxa per quadrat *	Mean no. introduced taxa per quadrat *	Total Number of Native Species (Annuals & Perennials) in Group	Proportion (%) of total species as weeds	Average elevation (metres)	No. of species with a regional (and State) conservation rating
1 (111)	*E. obliqua*, *E. fasciculosa, E. goniocalyx*	111	36	3	266	14	400	19 (9)
2 (49)	*E. goniocalyx*, *E. fasciculosa*, *E. obliqua*	49	40	3	220	9	364	20 (2)
3 (80)	*E. obliqua*	80	30	3	189	18	463	17 (7)
4 (26)	*E. obliqua*, *E. dalrympleana*	26	22	5	104	26	424	7 (4)
5 (25)	*E. obliqua*, *E. fasciculosa*, *E. baxteri*, *E. cosmophylla*	25	24	3	133	15	290	6 (1)
6 (48(	*E. obliqua*, *E. baxteri*	48	30	2	169	11	331	14 (5)
7 (34)	*E. obliqua*, *E. fasciculosa*	34	34	4	204	16	281	17 (7)
8 (98)	*E. obliqua*, *E. cosmophylla*, *E. fasciculosa*, *E. baxteri*	98	33	2	197	9	345	14 (8)
9 (68)	*E. baxteri*, *E. cosmophylla*, *E. obliqua*	68	36	3	198	13	302	21 (6)
10 (84)	*E. baxteri*, *E. cosmophylla*, *E. fasciculosa*	84	36	3	274	12	162	45 (11)
11 (12)	*E. leucoxylon*, *E. viminalis* ssp. *viminalis*, *E. obliqua*, *E. camaldulensis*	12	13	17	72	50	390	9 (4)
12 (9)	*E. leucoxylon*, *E. viminalis* ssp. *viminalis*	9	15	7	55	33	442	4 (3)
13 (12)	*E. viminalis* ssp. *viminalis*, *E. obliqua*	12	25	12	129	32	227	12 (7)
14 (22)	*E. leucoxylon*, *E. viminalis* ssp. *viminalis*, *E. obliqua*	22	23	12	158	32	258	14 (6)
15 (7)	*E. camaldulensis*, *E. ovata*	7	13	12	42	53	183	2 (1)
16 (15)	*E. obliqua*, *E. fasciculosa, E. goniocalyx*, *E. leucoxylon*	15	28	4	220	18	417	4 (3)
17 (45)	*E. fasciculosa*. *E. obliqua*, *E. goniocalyx*, *E. leucoxylon*	45	23	5	175	23	247	15 (9)
18 (24)	*E. viminalis* ssp. *viminalis*, *E. leucoxylon*	24	38	7	202	22	448	16 (8)
19 (3)	*E. obliqua*	3	17	7	29	31	430	3 (1)
20 (6)	*E. odorata*, *E. fasciculosa*, *E. leucoxylon*	6	22	6	67	21	307	5 (0)
21 (22)	*E. microcarpa*, *E. fasciculosa*	22	25	6	123	24	221	6 (2)
22 (23)	*E. camaldulensis*, *E. leucoxylon*	23	24	14	170	33	352	15 (8)
23 (6)	*Eucalyptus leucoxylon*, *E. camaldulensis*, *E. viminalis* ssp. *cygnetensis*	6	18	14	65	39	223	6 (2)
24 (32)	*E. fasciculosa*, *Callitris gracilis*	32	32	5	193	18	255	19 (6)
25 (21)	*E. fasciculosa*	21	35	4	139	18	349	6 (2)
26 (20)	*E. fasciculosa*	20	27	3	133	12	82	10 (4)
27 (21)	*E. cosmophylla*, *E. fasciculosa*	21	35	2	148	5	210	14 (6)
28 (69)	*E. fasciculosa*, *E. cosmophylla*, *E. baxteri*	69	37	5	271	18	202	24 (9)
29 (30)	*E. fasciculosa*, *E. odorata*	30	29	5	193	20	187	12 (6)
30 (16)	*E. fasciculosa*, *E. leptophylla*, *E. phenax*	16	36	4	164	13	63	28 (8)
31 (3)	*E. diversifolia*, *E. cosmophylla*	3	42	1	81	2	80	17 (4)
32 (4)	*E. leucoxylon*, *E. fasciculosa*	4	22	6	65	17	114	6 (1)
33 (1)	*Melaleuca lanceolata*	1	9	9	5	62	180	0 (0)
34 (2)	*E. odorata*, *E. porosa*, *E. oleosa*, *E. leptophylla*	2	15	6	23	30	45	7 (1)

Group Number (& no. of quadrats)	Overstorey Dominants	No. of quadrats	Mean no. native taxa per quadrat *	Mean no. introduced taxa per quadrat *	Total Number of Native Species (Annuals & Perennials) in Group	Proportion (%) of total species as weeds	Average elevation (metres)	No. of species with a regional (and State) conservation rating
35 (2)	*Allocasuarina verticillata*, *E. odorata*, *E. leucoxylon*	2	25	7	27	29	70	4 (0)
36 (15)	*Olearia axillaris*, *Acacia longifolia*.	15	14	4	77	24	33	17 (2)
37 (18)	*E. viminalis* ssp. *viminalis*, *E. ovata*, *E cosmophylla*	18	23	5	113	24	260	25 (14)
38 (10)	*E. ovata*	10	19	4	86	17	253	14 (5)
39 (6)	*Carex appressa – Juncus pallidus*	6	18	7	61	32	220	10 (6)
40 (63)	*Leptospermum* spp.	63	25	4	153	15	235	56 (36)
41 (15)	*E. obliqua*, *E. ovata*, *E. cosmophylla*, *E. baxteri*, *Leptospermum* spp.	15	32	5	144	11	263	19 (16)

*The mean number of native taxa per site is not directly comparable between PATN groups because some quadrats contain different proportions of $900m^2$ vs $100m^2$ quadrats.
These figures for mean taxa per quadrat **include** taxa identified to genus level only (and therefore may be slightly over the actual number of taxa present – e.g. if taxa are duplicated, or if a taxa identified to genus level is incorrectly assumed to be natives).

Floristic Group 1.
Eucalyptus obliqua*, +/– *Eucalyptus fasciculosa*, +/- *Eucalyptus goniocalyx* Open Forest and Low Woodland over *Lepidosperma semiteres

Number of quadrats in group = 111 (Survey 5 (76 quadrats); Survey 42 (15); Survey 117 (20)

VEGETATION DESCRIPTION
Overstorey Structure and Dominant Species
Open forest, woodland and open woodland were equally dominant formations for this group. Apart from one mallee quadrat, other formations were all either forest or woodland types. The most commonly occurring combinations of dominant species were:

E. obliqua sole eucalypt present (24%)
E. obliqua – E. fasciculosa (23%)
E. goniocalyx – E. obliqua (9%)
E. fasciculosa – E. obliqua – E. goniocalyx (16%)
E. fasciculosa – E. goniocalyx (5%)

Frequency of *Eucalyptus* spp. occurring in group: *E. obliqua* (86%); *E. faciculosa* (62%); *E. goniocalyx* (40%); *E. cosmophylla* (8%); *E. leucoxylon* (7%); *E. baxteri* (2%), *E. viminalis* ssp. *viminalis* (2%), *E. dalrympleana* ssp. *Dalrympleana* (1%), *E. camaldulensis* (1%)

Typical Mid-stratum
Shrubland and Tall shrubland. Dominant species were *Acacia pycnantha*, *Xanthorrhoea semiplana*, *Leptospermum myrsinoides*, *Acacia myrtifolia*.

Typical Ground Cover
Structure is a mixture of grassland, herbland, heathland. Dominants are *Lepidosperma semiteres*, *Gonocarpos tetragynus*, *Acrotriche serrulata*, *Hibbertia exutiacies*.

FLORISTIC COMPOSITION

Perennial taxa defining group	220
Annual taxa in group	88
Total taxa	308
Introduced taxa	42 (14%)
Native taxa	266
Mean of taxa at quadrats and range	39 (13-74)
Mean of native taxa per quadrat	36 (7– 1)
Mean of introduced taxa per quadrat	3 (0 – 8)
Percentage of quadrats with weeds	81%

Number of conservation significant species
Australian: 1
SA: 9
SL region: 19

Important Indicator species
E. goniocalyx (Group 1 comprises about 1/3 of all occurrences within survey quadrats)

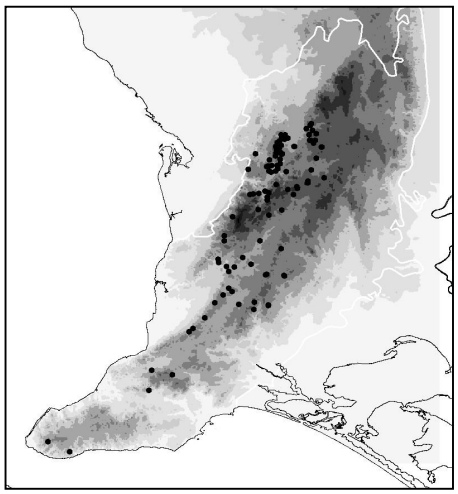
Although *Wahlenbergia communis* and *Austrostipa pubinodis* were only recorded 2 and 4 times respectively in this group, the total recorded frequencies for these species in all groups was 2 and 5 records, respectively.

ENVIRONMENTAL PARAMETERS
Typical Landform: Hill slopes
Typical Soil Type: a variety of soils with clay loams and sandy loams most common
Quadrat Slope: Ranges from 0 – 37^0 with most quadrats between 10 and 20^0
Aspect: no distinct pattern, wide range of aspects evenly represented
Mean Elevation (metres) (and range): 401 (210 - 565)

DISTRIBUTION
Higher rainfall and higher elevated regions in western and central part of the Range including: Kersbrook – Mount Gawler- Williamstown, Mount Torrens, Lobethal, Uraidla, Echunga, Meadows and Myponga districts.

COMMENTS
The largest floristic group, reflecting both survey sampling bias and remaining vegetation. No perennial weed species occurred at 40% or more of quadrats.

Figure 39.
Quadrat 117NOA02501. *Eucalyptus obliqua* Low Woodland over *Lepidosperma carphoides*.



Floristic Group 2.
Eucalyptus goniocalyx*, +/– *Eucalyptus fasciculosa* +/- *E. obliqua* Low Woodland over *Acacia pycnantha*, *Xanthorrhoea semiplana* and *Hakea rostrata

Number of quadrats in group = 49 quadrats (Survey 5(33 quadrats); Survey 42 (7); Survey 117 (9))

VEGETATION DESCRIPTION
Overstorey Structure and Dominant Species
Low woodland was a clear dominant formation. *Eucalyptus goniocalyx* and *E. fasciculosa* were recorded together at over 49% of quadrats. In most cases, *E. goniocalyx* was the dominant tree. These species also were recorded as sole dominants at a small number of quadrats. *E. obliqua* was recorded as a co-dominant with *E. goniocalyx* and/or *E. fasciculosa* at 12% of quadrats. These three species of eucalypts were recorded at the following frequencies: *E. fasciculosa* (94%), *E. goniocalyx* (86%) and *E. obliqua* (31%). *E. baxteri* and *E. cosmophylla* were also recorded at one quadrat each.

Typical mid-stratum
Shrubland with *Acacia pycnantha*, *Xanthorrhoea semiplana*, *Hakea rostrata* and *Leptospermum myrsinoides* common.

Typical ground cover
Low shrubland and sparse grassland with *Lepidosperma semiteres*, *Gonocarpus tetragynus* and *Hibbertia sericea* var. *sericea* common.

FLORISTIC COMPOSITION

Perennial taxa defining group	167
Annual taxa in group	75
Total taxa	242
Introduced taxa	22 (9%)
Native taxa	220
Mean of taxa at quadrats and range	43 (17-81)
Mean of native taxa per quadrat	40 (17-80)
Mean of introduced taxa per quadrat	3 (0 – 10)
Percentage of quadrats with weeds	63%

Number of conservation significant species
Australian: Nil
SA: 7
SL region: 20

Important Indicator species
Acrotriche depressa, *Acacia continua*

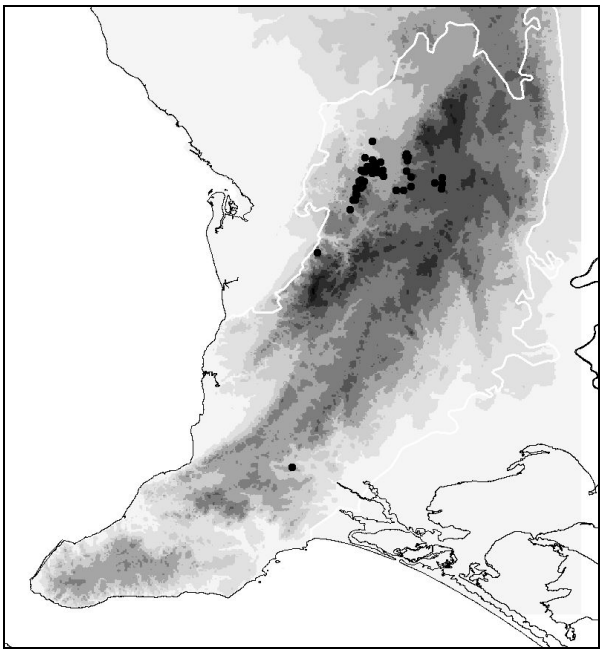
Callistemon teretifolius and *Sphaerolobium minus* were only recorded from this group (2 records each).

ENVIRONMENTAL PARAMETERS
Typical Landform: Hill slope
Typical Soil Type: a variety of soils with clay loams and sandy loams most common
Quadrat Slope: Ranges from 0 – 37^0 with most quadrats between 10 and 20^0
Aspect: no distinct pattern, wide range of aspects evenly represented
Mean elevation (metres) (and range): 364 (250 – 515)

DISTRIBUTION:
A well-defined group, with all but two clustered in the north-west of the region, including Warren CP, Para Wirra CP, Hale CP, South Para Reservoir, Mt Crawford Forest. The two isolated quadrats were near Nangkita and Morialta CP.

COMMENTS
No perennial weeds recorded at >40% of quadrats.
The quadrats reflect the main distribution area of *E. goniocalyx* within the Southern Lofty region.

Figure 40.
Quadrat 117BAR01601. *Eucalyptus goniocalyx* – *E. fasciculosa* Low Woodland over *Xanthorrhoea semiplana* ssp. *semiplana*, *Acacia pycnantha*, *Allocasuarina muelleriana* and *Hakea rostrata*.



Floristic Group 3.
Eucalyptus obliqua* +/– *Eucalyptus baxteri* +/- *E. fasciculosa* Open Forest over *Pultenaea daphnoides*, *Acacia myrtifolia

Number of quadrats in group = 80 (Survey 5(63 quadrats); Survey 42(1); Survey 117 (16))

VEGETATION DESCRIPTION
Overstorey Structure and Dominant Species
Open forest formations dominate but low woodland and woodland were also common.

E. obliqua was the sole dominant at 46 quadrats (58%). *E. obliqua – E. baxteri* occurred together 10 times (13%) and *E. obliqua – E fasciculosa* were both present at 7 quadrats (9%). *E. dalrympleana* ssp. *dalrympleana* occurred at 3 quadrats, two of which were with *E. obliqua*. The remaining quadrats were various combinations of the seven recorded eucalypts.

Eucalypts were recorded at the following frequencies: *E. obliqua* (94%), *E. baxteri* (20%), *E. fasciculosa* (11%), *E. cosmophylla* (10%), *E. dalrympleana* ssp. *dalrympleana* (*5%*), *E viminalis* ssp. *viminalis* (5%) and *E. leucoxylon* (4%).

Typical mid-stratum
Sclerophyllous shrubs ranging from very open to closed tall shrubland and very open to closed shrubland. Common shrubs are *Pultenaea daphnoides*, *Ixodia achillaedies* ssp. *alata*, *Leptospermum myrsionoides*.

Typical ground cover
A range of structural formations including grassland, sedgeland, herbland and fernland. Dominant ground covers include *Lepidosperma semiteres*, *Hibbertia sericea* var. *sericea*, *Lomandra multiflora* ssp. *dura* and *Pteridium esculentum*.

FLORISTIC COMPOSITION

Perennial taxa defining group	185
Annual taxa in group	46
Total taxa	231
Introduced taxa	42 (18%)
Native taxa	189
Mean of taxa at quadrats and range	32(11- 74)
Mean of native taxa per quadrat	29 (10-67)
Mean of introduced taxa per quadrat	3 (0 – 11)
Percentage of quadrats with weeds	66%

Number of conservation significant species
Australian: 1
SA: 7
SL region: 17

Important Indicator species
Acrotriche fasciculiflora

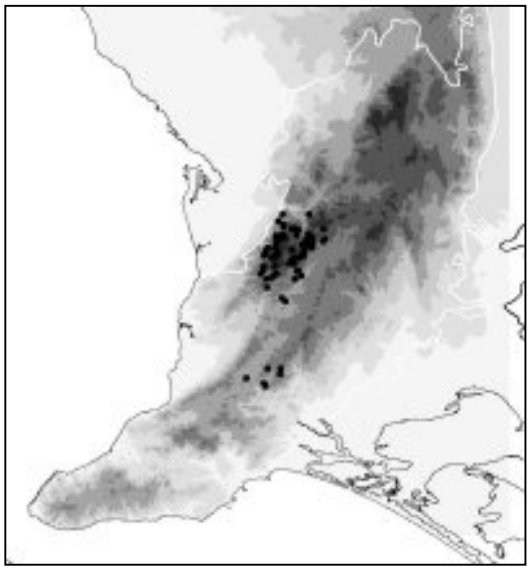
Pultenaea graveolens and the weed **Erica arborea* were only recorded from this floristic group (2 records each).

ENVIRONMENTAL PARAMETERS
Typical Landform: Hill slopes and Ridges in the ratio of 2:1
Typical Soil Type: sandy loams were clearly dominant
Quadrat Slope: over 50% in the range from 3^0 to 12^0
Aspect: full range of aspects, but 59% with a northerly aspect
Mean elevation (metres) (and range): 463 (250 – 633)

DISTRIBUTION
A large cluster of quadrats in the Ranges east of Adelaide, including Belair RP, Mark Oliphant CP, Black Hill CP, Bridgewater, Carey Gully, Rockdale Hill, Horsnell Gully CP. A smaller cluster of quadrats were near Yundi including Mount Magnificent CP and Kyeema CP.

COMMENT
A floristically diverse group, with an intact native understorey and few weeds of concern. It includes some of the higher rainfall areas within the ranges.

Figure 41.
Quadrat 117ADE01601. *Eucalyptus obliqua* – *E. fasciculosa* Low Woodland over *Hakea carinata*, *Hakea rostrata*, *Olearia ramulosa* and *Astroloma conostephioides*.



Floristic Group 4.
***Eucalyptus obliqua*, +/– *Eucalyptus dalrympleana* ssp. *dalrympleana* Open Forest and Woodland over *Pteridium esculentum*, **Rubus* spp.**

Number of quadrats in group = 26 (Survey 5 (25 quadrats); Survey 117 (1))

VEGETATION DESCRIPTION

Overstorey Structure and Dominant Species

Most commonly an open forest or woodland formation. However, open, low open, low, very low and very low open woodland formations, and low open and very low closed forest are also represented. *E. obliqua* was the only eucalypt present at 81% of quadrats, and with *E. dalrympleana* ssp. *dalrympleana* at 4 quadrats (19%). *E. dalrympleana* ssp. *dalrympleana* occurred as a sole dominant at 2 quadrats (10%). *Acacia melanoxylon* was occasionally present as a co-dominant or sub-dominant tree. Other eucalypts recorded in this group were present as sub-dominants.
Eucalypts were recorded at the following frequencies: *E. obliqua* (92%), *E. dalrympleana* ssp. *dalrympleana* (27%), *E. viminalis* ssp. *viminalis* (15%), *E. leucoxylon* (4%), *E. fasciculosa* (4%) and *E. baxteri* (4%).

Typical mid-stratum

Tall shrubs (>2m) are dominant with either closed or open canopies. *Pultenaea daphnoides*, *Acacia myrtifolia*, *Acacia melanoxylon* and the weeds, **Rubus* sp. and **Genista monspessulana* are dominant tall shrubs. Dominant smaller shrubs include *Ixodia achillaeoides* and *Acrotriche fasciculiflora*.

Typical ground cover

Generally grasslands and closed grasslands and fernlands, but herblands and low shrublands are also present. Dominant species include *Hibbertia exutiacies*, *Pteridium esculentum* and *Poa* spp.

FLORISTIC COMPOSITION

Perennial taxa defining group	118
Annual taxa in group	23
Total taxa	141
Introduced taxa	37 (26%)
Native taxa	104
Mean of taxa at quadrats and range	27 (14-65)
Mean of native taxa per quadrat	22 (9-47)
Mean of introduced taxa per quadrat	5 (0 – 18)
Percentage of quadrats with weeds	9.6%

Number of conservation significant species

Australian: Nil
SA: 4
SL region: 7

Important Indicator species

Eucalyptus dalrympleana, **Genista monspessulana*, **Cytisus scoparius*.

ENVIRONMENTAL PARAMETERS

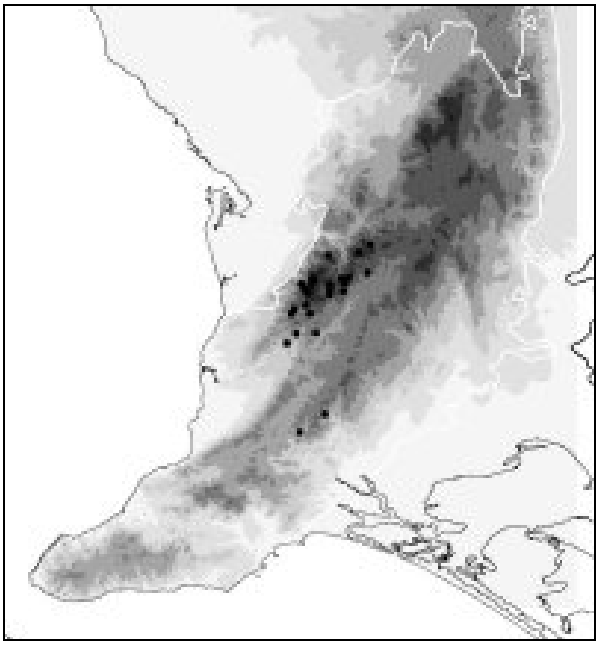
Typical Landform: Hill slope (2 quadrats)
Typical Soil Type: loamy sand (2 quadrats)
Quadrat Slope: 1 – 45^0, roughly a bell-shaped distribution
Aspect: Range = 138^0 to 270^0, no clear clustering
Mean elevation (metres) (and range): 424 (210 – 576)

DISTRIBUTION

Most quadrats were high rainfall and elevation quadrats in the central hills, including the Uraidla, Summertown, Lobethal, Bridgewater region. A few quadrats were near Kangarilla, Yundi and Ashbourne districts.

COMMENTS

Several environmental weeds are common in this group, including *Rubus* sp. (Blackberry), *Genista monspessulana* and *Senecio pterophorus* var. *pterophorus* (African Daisy). High rainfall and/or species associated with wetlands are also represented, including *Gahnia sieberiana*, *Patersonia occidentalis* and *Juncus* spp.



Floristic Group 5.
1 = *Eucalyptus obliqua*, *+/- E. fasciculosa* Open Forest
2 = *Eucalyptus baxteri*, +/- *E. cosmophylla*, +/- *E. fasciculosa* Low Open Forest
both over *Pultenaea daphnoides*, *Goodenia ovata*

Number of quadrats in group = 25 (Survey 5(16 quadrats); Survey 42(7); Survey 117(2))

VEGETATION DESCRIPTION

Overstorey Structure and Dominant Species

This is an ill-defined group with 7 vegetation formations ranging from open forest to very low open woodland. Similarly, there were 11 combinations of eucalypts recorded as dominants. It is thought, therefore, that at least 2 vegetation associations are present within this group (as named above).

Eucalypts recorded in this group were: *E. obliqua* (64%), *E. fasciculosa* (60%), *E. cosmophylla* (40%), *E. baxteri* (28%), *E. leucoxylon* (8%) and *E. ovata* (4%).

Typical mid-stratum

The most common structural formation was a low shrubland with *Goodenia ovata*, *Pultenaea daphnoides* and *Xanthorrhoea semiplana* dominant.

Typical ground cover

A wide range of structural formations, including low shrubland, grassland and fernland. Dominant species are *Hibbertia exutiacies*, *Gonocarpus tetragynus* and *Pteridium esculentum*.

FLORISTIC COMPOSITION

Perennial taxa defining group	118
Annual taxa in group	38
Total taxa	156
Introduced taxa	23 (15%)
Native taxa	133
Mean of taxa at quadrats and range	27 (12-48)
Mean of native taxa per quadrat	24 (12-40)
Mean of introduced taxa per quadrat	3 (0 – 12)
Percentage of quadrats with weeds	64%

Number of conservation significant species

Australian: Nil
SA: 1
SL region: 6

Important Indicator species

Goodenia ovata, *Correa aemula*.

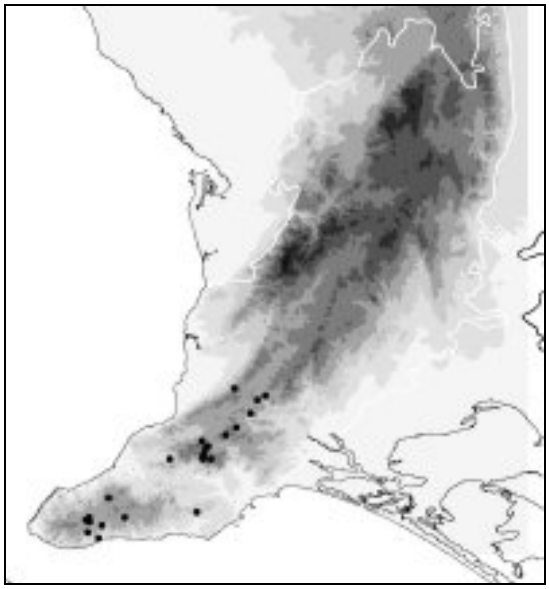
ENVIRONMENTAL PARAMETERS

Typical Landform: Hill slope
Typical Soil Type: Medium clay (1 quadrat); Sandy-loam (1 quadrat)
Quadrat Slope: A range of slopes, evenly spread between 1^0 and 21^0
Aspect: Wide range, no distinct clustering, ranging from 60^0 to 330^0
Mean elevation (metres) (and range): 290 (155 – 370)

DISTRIBUTION

All quadrats are on the Fleurieu Peninsula, with most in the Delamere, Spring Mount and Mount Compass region.

Figure 42.
Quadrat 117JER00701. *Eucalyptus obliqua* Open Forest over *Xanthorrhoea semiplana*, *Pultenaea daphnoides* and *Goodenia ovata*.



Floristic Group 6.
***Eucalyptus obliqua*, +/– *Eucalyptus baxteri* +/- *E. fasciculosa* Open Forest and Low Open Forest over *Hakea rostrata*, *Lepidosperma semiteres*, *Platylobium obtusangulum*.**

Number of quadrats in group = 48 (Survey 5 (22 quadrats); Survey 42(11); Survey 97(3); Survey 117 (12)

VEGETATION DESCRIPTION

Overstorey Structure and Dominant Species

Most quadrats were open forest or low open forest. The most common combinations of overstorey dominants were: *E. obliqua* as a sole dominant; *E. obliqua* with *E. baxteri* sub-dominant and *E. baxteri* as a sole dominant. *E. fasciculosa* and *E. cosmophylla* occurred at a few quadrats in conjunction with the previously mentioned eucalypts.

The frequency of eucalypts in this group was: *E. obliqua* (83%), *E. baxteri* (44%), *E. fasciculosa* (17%) and *E. cosmophylla* (13%).

Typical mid-stratum

Most quadrats had a sclerophyllous shrubland and closed shrubland understorey with *Hakea rostrata*, *Xanthorrhoea semiplana*, *Acacia myrtifolia* and *Pultenaea daphnoides* dominant.

Typical ground cover

Generally, sedgeland, herbland and low shrubland formations with *Lepidosperma semiteres* dominant at most quadrats.

FLORISTIC COMPOSITION

Perennial taxa defining group	148
Annual taxa in group	41
Total taxa	189
Introduced taxa	20 (11%)
Native taxa	169
Mean of taxa at quadrats and range	32(15- 53)
Mean of native taxa per quadrat	30 (15-49)
Mean of introduced taxa per quadrat	2 (0 – 10)
Percentage of quadrats with weeds	40%

Number of conservation significant species

Australian: Nil
SA: 5
SL region: 14

Important Indicator species

Pultenaea involucrata

This group recorded 5 of the 8 survey records for *Xanthosia tasmanica* and 6 of the 13 survey records for *Hibbertia empetrifolia* ssp. *radians*.

ENVIRONMENTAL PARAMETERS

Typical Landform: Evenly divided between hill slopes and hill crests.
Typical Soil Type: a variety of soils ranging from sandy loams to medium clays
Quadrat Slope: Most less than 20^0
Aspect: No clear trend
Mean elevation (metres) (and range): 330 (240 –410)

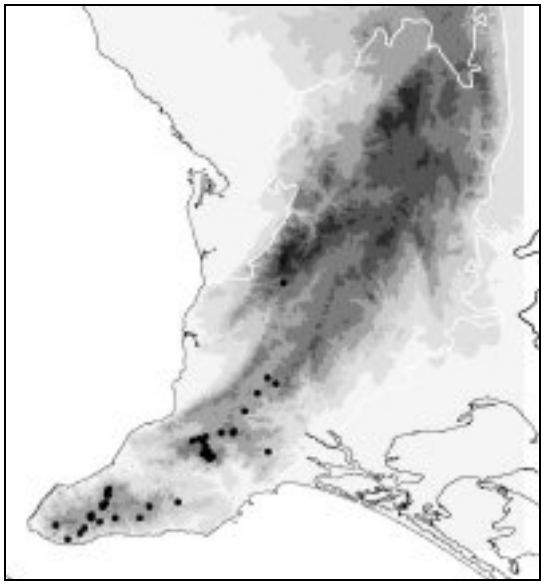
DISTRIBUTION

The majority of quadrats are clustered around Spring Mount, Delamere and Second Valley on the Fleurieu Peninsula. Two quadrats near Myponga Hill are the northern-most extension of this group, except for an isolated quadrat near Bridgewater.

COMMENT

A floristically diverse group, generally in good condition.

Figure 43.
Quadrat 117TOR01401. *Eucalyptus obliqua* – *E. baxteri* Open Forest over *Hakea rostrata*, *Xanthorrhoea semiplana* and *Pultenaea daphnoides*.



Floristic Group 7.
***Eucalyptus obliqua*, +/- *Eucalyptus fasciculosa* Low Open Forest over *Xanthorrhoea semiplana* ssp.**

Number of quadrats in group = 34 (Survey 5 (4 quadrats); Survey 42(18); Survey 97(6); Survey 117(6))

VEGETATION DESCRIPTION
Overstorey Structure and Dominant Species
Low open forest or open forest formations represented 75% of quadrats. *E. obliqua* was recorded at all but one quadrat, either alone or as the dominant species with *E. fasciculosa* a sub-dominant.
Eucalypts were recorded at the following frequencies: *E. obliqua* (97%), *E. fasciculosa* (59%), *E. cosmophylla* (9%), *E. leucoxylon* (6%) and *E. baxteri* (3%).

Typical mid-stratum
A sclerophyllous shrubland, with *Xanthorrhoea semiplana* occurring at all 34 quadrats. *Olearia ramulosa*, *Pultenaea daphnoides* and *Acacia pycnantha* were also prominent.

Typical ground cover
A sedgeland or low shrubland with *Lepidosperma semiteres*, *Lomandra micrantha*, *Gonocarpus tetragynus* and *Acrotriche serrulata* common.

FLORISTIC COMPOSITION

Perennial taxa defining group	169
Annual taxa in group	74
Total taxa	243
Introduced taxa	39 (16%)
Native taxa	204
Mean of taxa at quadrats and range	38 (7-88)
Mean of native taxa per quadrat	34 (7 - 72)
Mean of introduced taxa per quadrat	4 (0 – 18)
Percentage of quadrats with weeds	76%

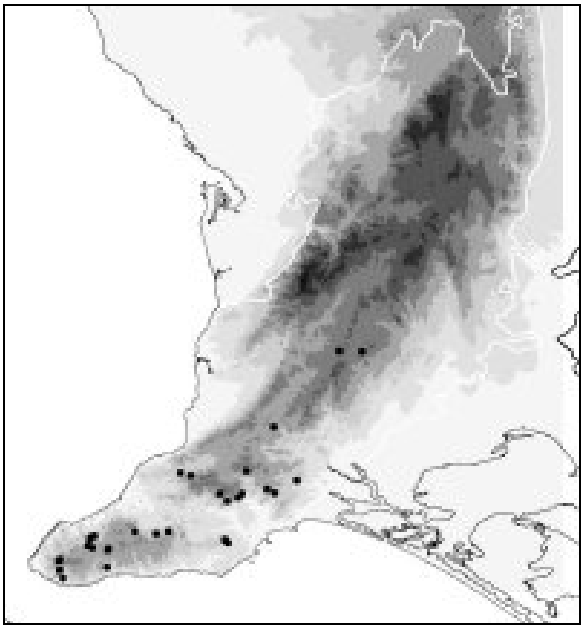
Number of conservation significant species
Australian Nil
SA: 7
SL region: 17

Important Indicator species
Viola sieberiana
This group recorded 3 of the 9 survey records for *Viola cleistogamoides*.

ENVIRONMENTAL PARAMETERS
Typical Landform: Hill slope
Typical Soil Type: 9 soil texture classes recorded with sandy clay loam most common.
Quadrat Slope: 22 quadrats between 0^{-} and 10^{0}; 11 quadrats between 11^{0} and 20^{0}; 2 over 20^{0}
Aspect: 62% of quadrats with a southerly aspect
Mean elevation (metres) (and range): 281 (165 – 455)

DISTRIBUTION
Most quadrats were in the southern Fleurieu Peninsula, in the Spring Mount, Delamere, Waitpinga districts. Two outlying quadrats were near Echunga and Macclesfield.

COMMENTS
The overstorey species is similar to Floristic Group 5 but differs in being low open forest rather than open forest (probably reflecting the more southerly distribution of quadrats and lower elevations), and is also distinguished by the presence of *Xanthorrhoea semiplana* at all quadrats.



Floristic Group 8.
1 = *Eucalyptus obliqua*, +/– *E. cosmophylla*, +/– *E. fasciculosa* Open Forest and Woodland
2 = *Eucalyptus baxteri*, +/- *E. cosmophylla*, +/- *E. fasciculosa* Woodland
3 = *Eucalyptus cosmophylla*, +/- *E. fasciculosa*, +/- *E. baxteri* Very Low Woodland - all sub-groups over *Leptospermum myrsinoides*, *Lepidosperma semiteres*

Number of quadrats in group = 98 (Survey 5 (80 quadrats); Survey 42(12); Survey 97(2); Survey 117 (4)

VEGETATION DESCRIPTION

Overstorey Structure and Dominant Species

Various woodland formations are dominant. At least three associations are thought to be represented in group 8 (as named above). This group contained all combinations of the above four eucalypt species, that is, each was recorded as a sole dominant; or in combination with 2 or 3 of the other eucalypt species. The most common combinations recorded were: *E. obliqua* alone (28% of quadrats); *E. obliqua* and *E. cosmophylla* (19% of quadrats); *E. baxteri – E. cosmophylla* (14 %) and *E. cosmophylla – E. fasciculosa* (8%).

Eucalypts were recorded at the following frequencies: *Eucalyptus obliqua* (67%), *E. cosmophylla* (65%), *E. baxteri* (29%), *E. fasciculosa* (28%), *E. leucoxylon* (1%) and *E. ovata* (1%).

Typical mid-stratum

Shrubland and closed shrubland with *Leptospermum myrsinoides*, *Hakea rostrata*, *Xanthorrhoea semiplana* ssp., *Acacia myrtifolia* and *Ixodia achillaeodies* ssp. *alata* dominant.

Typical ground cover

Low shrubland and sedgeland formations, with *Lepidosperma semiteres*, *Lomandra fibrata*, *Hibbertia sericea* var. *sericea* and *Pultenaea involucrata* dominant.

FLORISTIC COMPOSITION

Perennial taxa defining group	178
Annual taxa in group	38
Total taxa	216
Introduced taxa	19 (9%)
Native taxa	197
Mean of taxa at quadrats and range	35 (18-60)
Mean of native taxa per quadrat	33 (18-56)
Mean of introduced taxa per quadrat	2 (0 – 5)
Percentage of quadrats with weeds	33%

Number of conservation significant species

Australian: Nil
SA: 8
SL region: 14

Important Indicator species

Nil, however, this group recorded three of the four survey records for *Olearia ciliata* var. *ciliata*.

ENVIRONMENTAL PARAMETERS

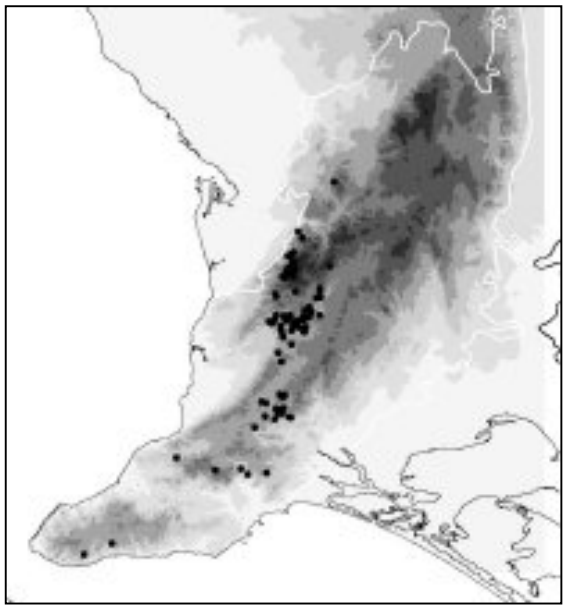
Typical Landform: Hill slope
Typical Soil Type: Loamy Sand
Quadrat Slope: 0 to 10^0 = 58% of quadrats; 11 to 20^0 = 20%; 21 to 30^0 = 6%; 31 to 40^0 = 15%; 0^0 = 1 quadrat
Aspect: Northerly aspect = 61% of quadrats
Mean elevation (metres) (and range): 345 (220 – 680)

DISTRIBUTION

A large group with quadrats concentrated along the western scarp (Black Hill, Morialta, Horsnell Gully); the central Mount Lofty Ranges (Cleland CP, Mount Bold Reservoir, Mount Lofty Summit, Scott Creek CP) and also Fleurieu region (Blackfellows Creek, east of Yundi, Finniss CP, Mount Maginficent CP, Kyeema CP). Two outlying quadrats were in Deep Creek CP.

COMMENTS

This is a large and loosely defined group containing 5 eucalypt species (including one occurrence of *E. ovata*) and spread over a large geographic range. The lack of indicator species and low significance values reflects this. Floristically very similar to group 9, but for the most part separated geographically from this group - with a zone of overlap in the Yundi/ Mt Compass region. Only 32% of quadrats contained any weeds, and weed abundance in the remaining quadrats was low.



Floristic Group 9.
***Eucalyptus baxteri*, +/- *E. cosmophylla* Very Low Woodland**
Eucalyptus obliqua*, +/- *E. cosmophylla*, +/- *E. baxteri* and Low Open Forest - both sub-groups over *Xanthorrhoea semiplana*, *Lepidosperma semiteres*, *Leptospermum myrsinoides

Number of quadrats in group = 68 (Survey 5(22 quadrats); Survey 42(29); Survey 97(9); Survey 117(8)

VEGETATION DESCRIPTION

Overstorey Structure and Dominant Species

Eucalyptus baxteri occurred as the sole eucalypts at 14 quadrats, *E. obliqua* at 7 quadrats and *E. cosmophylla* at 1 quadrat. *E. baxteri – E. cosmophylla* were recorded together at 7quadrats; *E. obliqua* and *E. cosmophylla* at 6 quadrats and *E. baxteri – E. obliqua* at 6 quadrats. All 3 species occurred at 3 quadrats.

Eucalypts were recorded at the following frequencies: *E. baxteri* (60%), *E. cosmophylla* (59%), *E. obliqua* (56%), *E. fasciculosa* (19%), *E. cneorifolia* (3% = 2 quadrats), *E. incrassata* (1% = 1 quadrat).

Typical mid-stratum

Low closed shrubland and low shrubland, with *Xanthorrhoea semiplana* ssp., *Leptospermum myrsinoides*, *Spyridium thymifolium*, *Hakea rostrata* and *Banksia marginata* dominant.

Typical ground cover

Open sedgeland and low shrubland with *Lepidosperma semiteres*, *Schoenus breviculmis*, *Lepidosperma carphoides*, *Hibbertia riparia* (*glabriuscula*) and *Micrantheum demissum* dominant or common.

FLORISTIC COMPOSITION

Perennial taxa defining group	177
Annual taxa in group	51
Total taxa	228
Introduced taxa	30 (13%)
Native taxa	198
Mean of taxa at quadrats and range	30 (20- 54)
Mean of native taxa per quadrat	36 (20-55)
Mean of introduced taxa per quadrat	3 (0 – 9)
Percentage of quadrats with weeds	51%

Number of conservation significant species

Australian: Nil
SA: 6
SL region: 21

Important Indicator species

Spyridium thymifolium, *Leucopogon concurvus*, *Pultenaea involucrata* and *Micrantheum demissum*.

This group recorded 2 of the 3 survey records for *Eucalyptus cneorifolia*, all 4 records of *Pultenaea viscidula* and 3 of the 5 records for *Boronia edwardsii*.

ENVIRONMENTAL PARAMETERS

Typical Landform: Hill slope most common, but also hill crest and ridge

Typical Soil Type: 7 soil texture classes represented ranging from light-medium-clay to loamy sand, with no single texture class dominating ie:
Quadrat Slope: 0 to 10^0 = 62% of quadrats; 11 to 20^0 = 32%; 21 to 30^0 = 6%
Aspect: Northerly aspect = 66% of quadrats

Mean elevation (metres) (and range): 302 (0 – 695)

DISTRIBUTION

All within Fleurieu Peninsula: Deep Creek CP, Spring Mount, Delamere, Lady Bay, Waitpinga, Myponga districts.

COMMENTS

Floristically very similar to group 8, but for the most part separated geographically - with a zone of overlap in the Yundi/ Mt Compass region. The quadrat slopes were on average lower than those of Group 8. Like Group 8, a wide range of structural formations were represented within group 9. However, group 9 contains a high number (32) of species occurring at >40% of quadrats within the group, suggesting a very similar understorey throughout this Floristic group. Most quadrats appear to be in good condition with 50% of quadrats containing no weeds, and few perennial weeds common in the remaining quadrats.

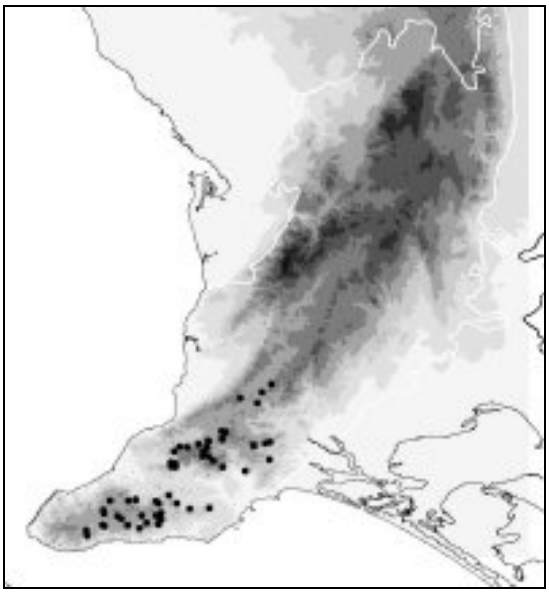


Figure 44.
Quadrat 117NOA01801 – Floristic Group 8. *Eucalyptus obliqua* Woodland over *Lepidosperma semiteres*, *Hibbertia incana*, *Pultenaea daphnoides* and *Hakea rostrata*.

Figure 45.
Quadrat WIL01701. – Floristic Group 9. *Eucalyptus cosmophylla* (- *E. baxteri* – *E. obliqua*) Open Mallee over *Ixodia achillaeoides*, *Acacia myrtifolia*, *Xanthorrhoea semiplana* ssp. *semiplana* and *Hakea rugosa*.

Floristic Group 10.
1 = *Eucalyptus baxteri*, +/– *Eucalyptus cosmophylla*, +/- *E. fasciculosa* Low Open Forest or Low Woodland
2 = *Eucalyptus fasciculosa*, +/- *E. cosmophylla* +/- *E. diversifolia* Low Open Forest or Low Woodland, both over *Xanthorrhoea semiplana* ssp., *Leptospermum myrsinoides*.

Number of quadrats in group = 84 (Survey 5(34); Survey 42(30); Survey 52(1); Survey 97(8); Survey 117(11))

VEGETATION DESCRIPTION

Overstorey Structure and Dominant Species

Of the 51 quadrats for which cover/abundance data is available, *E. baxteri* occurred as a sole-dominant 13 times and *E. baxteri – E. cosmophylla* occurred together 11 times. The next most common combinations of dominant eucalypts were: *E. baxteri – E. fasciculosa* (5 quadrats) and *E. cosmophylla – E. baxteri* (5 quadrats). Twelve associations were recorded in the 41 quadrats for which cover/abundance data is available.

Eucalypts were recorded at the following frequencies: *E. baxteri* (67%), *E. cosmophylla* (51%), *E. fasciculosa* (50%), *E. diversifolia* (15% = 6 quadrats), *E. obliqua* (6%), *E. incrassata* (5%), *E. odorata* (4%), *E. leptophylla* (2% = 1 quadrat), *E. phenax* (1% = 1 quadrat).

Typical mid-stratum

Closed shrubland and shrubland with *Xanthorrhoea semiplana* ssp., *Leptospermum myrsinoides*, *Acacia myrtifolia* and *Banksia marginata* dominant. *Phyllota pleurandroides* was a sub-dominant low shrub at about 40% of quadrats.

Typical ground cover

Sedgeland and open sedgeland, and to a lesser extent, low open shrubland, with *Hypolaena fastigiata*, *Lepidobolus drapetocoleus* and *Lepidosperma semiteres* dominant.

Floristic Composition

Perennial taxa defining group	234
Annual taxa in group	77
Total taxa	311
Introduced taxa	37 (12%)
Native taxa	274
Mean of taxa at quadrats and range	39 (15-70)
Mean of native taxa per quadrat	36 (15-64)
Mean of introduced taxa per quadrat	3 (0 – 9)
Percentage of quadrats with weeds	45%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

Australian: 1
SA: 10
SL region: 46

Important Indicator species

Hypolaena fastigiata, *Lepidobolus drapetocolus*, *Brachyloma ericoides* ssp. *ericoides*, *Banksia ornata*, *Adenanthos terminalis*, *Phyllota pleurandroides*.

This group contained **all** the survey records for the following species (numbers in brackets indicate total number of records): *Allocasuarina palludosa* (3), *Argentipalium obtusifolium* (3), *Brachyloma ciliatum* (7), *Leucopogon woodsii* (2) *Lomandra leucocephala* ssp. *robusta* (3), *Pultenaea teretifolia* var. *teretifolia* (2), *Spyridium phylicoides* (2), *Argentipallium blandowskianum* (5), *Boronia filifolia* (15), *Conospermum patens* (20) and *Allocasuarina pusilla* (12).

ENVIRONMENTAL PARAMETERS

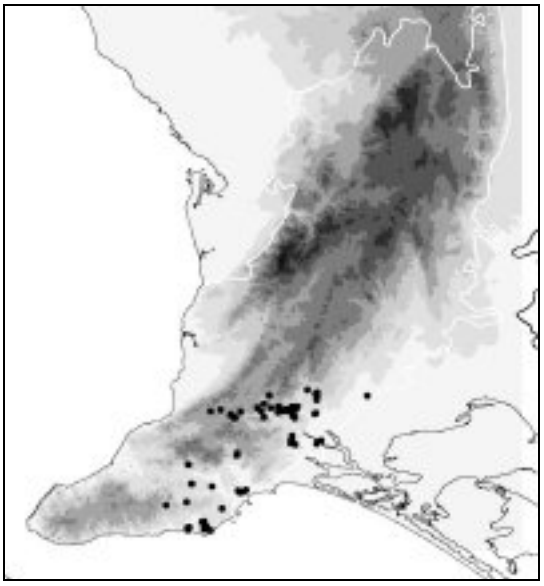
Typical Landform: Hill slope
Typical Soil Type: sandy soils clearly most frequent and also sandy loam and loamy sand are common.
Quadrat Slope: Gentle slopes with 70% of quadrats less than 5^0
Aspect: Northerly and southerly aspects evenly divided.
Mean elevation (metres) (and range): 161 (20 – 345)

DISTRIBUTION: 12 quadrats within Cox Scrub CP; also some quadrats in Newland Head CP, Bullock Hill CP and Scott CP; and in the Toopoerang, Nangkita, Ashbourne, Tooperang, Waitpinga, Ridgway Hill and Mount Compass districts.

COMMENTS: This group has the highest diversity of native species (including annuals – refer Table 23), with 274 native species. However, the average number of species per quadrat is in line with many other groups. This suggests a greater diversity between quadrats than for most groups.

The higher number of indicator species (refer above) and the high number of species recorded only from this group indicates the understorey is floristically very distinct from all other groups. The indicator species are those that are biogeographical outliers – normally associated with the South-East region (and sandy soils) - many quadrats are in Cox Scrub CP. The high number (45) of regionally rated plants also reflects this.

Figure 46.
Quadrat ENC00501 – Floristic Group 10. ***Eucalyptus baxteri* – *E. cosmophylla* Very Low Open Forest over *Acacia paradoxa*, *Xanthorrhoea semiplana* ssp., *Leptospermum myrsinoides* and *Pultenaea canaliculata* var. *canaliculata*.**



Quadrat locations for Floristic Group 10.

Floristic Group 11.
Eucalyptus leucoxylon OR Eucalyptus viminalis* ssp. *viminalis* OR *E. obliqua* OR *E. camaldulensis* Woodland over **Senecio pterophorus* var. *pterophorus*, **Rubus* sp. **Olea europaea

Number of quadrats in group = 12 (Survey 5(8 quadrats); Survey 117 (4))

VEGETATION DESCRIPTION

Overstorey Structure and Dominant Species

A relatively small group containing the above 4 eucalyptus species. *Eucalyptus leucoxylon* occurred at 50% of quadrats, and the remaining three occurred at 25% of quadrats, either occurring as sole-dominants at each quadrat or in various combinations of two or more eucalyptus species as co-dominants. Two quadrats contained only woody weeds as dominants. *Eucalyptus viminalis* ssp. *cygnetensis* (8%) was recorded at one quadrat.

Typical mid-stratum

A woody weed tall shrubland to very open shrubland with **Senecio pterophorus* var. *pterophorus* (African Daisy), **Rubus* sp. (Blackberry) and **Olea europaea* ssp. *europaea* (Olive) dominant. Some quadrats lacked a mid-stratum.

Typical ground cover

Grasslands and open grasslands or herblands dominated by introduced species, including **Hypericum perforatum*, **Avena* spp. and **Holcus lanatus*.

Floristic Composition

Perennial taxa defining group	87
Annual taxa in group	57
Total taxa	144
Introduced taxa	72 (50%)
Native taxa	72
Mean of taxa at quadrats and range	27(12-56)
Mean of native taxa per quadrat	13 (2-38)
Mean of introduced taxa per quadrat	17 (11-34)
Percentage of quadrats with weeds	100%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

Australian: Nil
SA: 4
SL region: 9

Important Indicator species

**Crataegus monogyna* (Hawthorn). This group contains 14 species recorded 4 or fewer times in survey quadrats, hence there are a high number of species with high significance values.

ENVIRONMENTAL PARAMETERS

Typical Landform: Hill slope, gully and stream channel
Typical Soil Type: clay loam
Quadrat Slope: Most quadrats between 11 and 20^0
Aspect: Northerly and southerly aspects = 50% each
Mean elevation (metres) (and range): 390 (270 – 500)

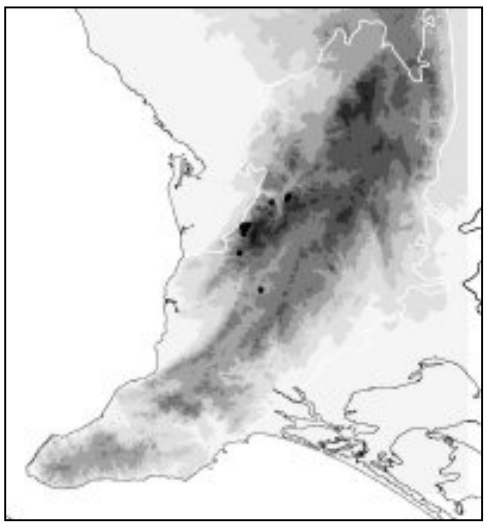
DISTRIBUTION

Cleland CP (Waterfall Gully, Chambers Gully, Long Ridge, Woolshed Gully), Mt. Bold Reservoir, near Montacute

COMMENT

Most quadrats in this group appear to have been grassy woodlands originally, with a smaller number being wetland quadrats (creeks or gullies). Now, however, woody weeds dominate the mid-stratum and grassy or herbaceous weeds dominate the ground cover. Seven of the top nine most frequently recorded species are weeds, including the top four being serious environmental weeds. Native species diversity is very low, averaging only 13 native taxa per quadrat (and 17 introduced taxa). A high proportion (40%) of species are annuals. The high number of species with high significance values indicates the understorey of group 11 is distinctive. Wetland species recorded for this group include *Acacia retinodes* var *retinodes*, *Rorippa nasturium-aquaticum*, *Lythrum hyssopifolia* and *Juncus* spp.

Figure 47.
Quadrat 117ADE02001. *Eucalyptus leucoxylon* Woodland over a largely introduced understorey including **Briza maxima*, **Avena barbata*, and **Holcus lanatus*.



Floristic Group 12.
Eucalyptus viminalis* ssp. *viminalis*, +/- *E. leucoxylon* savannah Woodland over *Acacia pycnantha*, **Senecio pterophorus* var. *pterophorus

Number of quadrats in group = 9 (Survey 5(8 quadrats); Survey 117 (1))

VEGETATION DESCRIPTION

Overstorey Structure and Dominant Species

A woodland formation with 7 of the 9 quadrats being *E. viminalis* ssp. *viminalis* (+/- *E. leucoxylon*). A further quadrat was *E. camaldulensis – E. obliqua* and the remaining quadrat was *E. fasciculosa - E. leucoxylon*.
Eucalypts were recorded at the following frequencies: *E. viminalis* ssp. *viminalis* (78%), *E. leucoxylon* (44%), *E. obliqua* (22%), *E. fasciculosa* (11%), *E. camaldulensis* (11%).

Typical mid-stratum

Tall open and very open shrubland of low diversity with woody weeds prominent. Common and dominant species are *Acacia pycnantha* and the weeds, **Senecio pterophorus* var. *pterophorus* and **Genista monspessulana*

Typical ground cover

A grassland with a high proportion of introduced species, including **Briza* spp., **Trifolium* spp. and **Holcus lanatus*. However, the native grass, *Themeda triandra* was present at 7 of the 9 quadrats.

Floristic Composition

Perennial taxa defining group	64
Annual taxa in group	18
Total taxa	82
Introduced taxa	27 (33%)
Native taxa	55
Mean of taxa at quadrats and range	22(7-30)
Mean of native taxa per quadrat	15 (6-20)
Mean of introduced taxa per quadrat	7 (1 – 13)
Percentage of quadrats with weeds	100%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

Australian: Nil
SA: 3
SL region: 4

Important Indicator species

Eucalyptus viminalis ssp. *viminalis*.

This group recorded 1 of the 3 survey records for *Juncus flavidus*.

ENVIRONMENTAL PARAMETERS

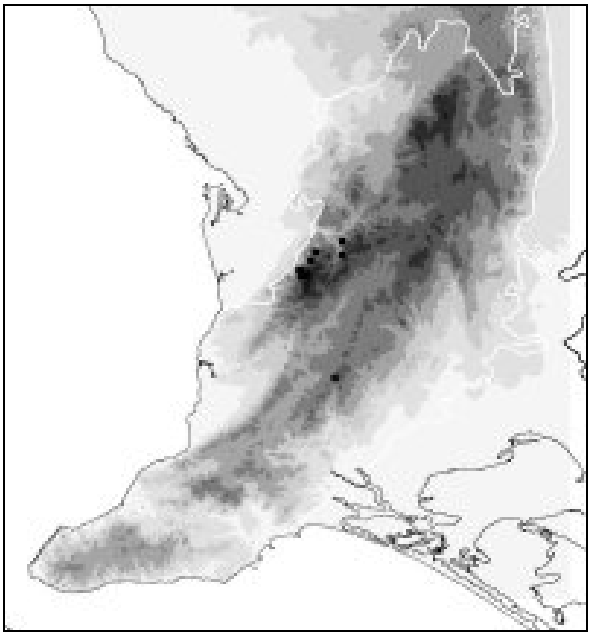
Typical Landform: Hill slope and gully
Typical Soil Type: sandy-clay-loam
Quadrat Slope: 62% of quadrats $<10^0$; 24% of quadrats 11 - 20^0
Aspect: 81% of quadrats with a southerly aspect.
Mean elevation (metres) (and range): 442 (350 – 530)

DISTRIBUTION

Very similar distribution to Group 11. A cluster of quadrats near the western scarp (east of Adelaide i.e. Cleland CP (Chambers Gully, Long Ridge), near Skye, plus one outlying quadrat near Meadows.

Comment

Most quadrats are grassy woodlands with a high proportion of introduced species. However, the native understorey is reasonably intact with an average of 15 species per quadrat (and 7 introduced species). Of the 9 most frequently occurring perennials, 3 were environmental weeds, **Senecio pterphorus* var. *pterophorus* (African Daisy), **Genista monspessulana* (Broom) and **Rubus sp*. (Blackberry).



Floristic Group 13.
Eucalyptus viminalis* ssp. *viminalis*, *E. obliqua* +/- *E. fasciculosa* Woodland along creeklines over *Pteridium esculentum

Number of quadrats in group = 12 (Survey 5(7 quadrats); Survey 42 (3); Survey 117 (2))

VEGETATION DESCRIPTION
Overstorey Structure and Dominant Species
Most commonly a woodland formation, but also open forest. In this small group, 5 eucalyptus species occur as dominants. The most common combination was *E. viminalis* ssp. *viminalis* and *E. obliqua*. Although *E. fasciculosa* occurs at 58% of the quadrats, it usually is a sub-dominant to another eucalypt.
Eucalypts were recorded at the following frequencies: *E. fasciculosa* (58%), *E. viminalis* ssp. *viminalis* (50%), *E. obliqua* (42%), *E. leucoxylon* (17%), *E. camaldulensis* (8%), *E. cosmophylla* (8%), *E. ovata* (8%), *E. viminalis* ssp. *cygnetensis* (8%).

Typical mid-stratum
Generally, a sparse shrub layer, most often open shrubland to low very open shrubland, or sometimes absent. Weeds are dominant with **Senecio pterophorus* var. *pterophorus*, **Rosa canina* (Dog Rose) and **Rubus* sp. (Blackberry) most common.

Typical ground cover
Either a grassland with introduced annual species dominant (**Holcus lanatus* and **Briza maxima*) or herbland in creeklines. Commonly occurring ground species are *Adiantum aethiopicum*, *Dichondra repens* and *Pteridium esculentum*.

Floristic Composition

Perennial taxa defining group	138
Annual taxa in group	52
Total taxa	190
Introduced taxa	61 (32%)
Native taxa	129
Mean of taxa at quadrats and range	37 (15-81)
Mean of native taxa per quadrat	25 (10-49)
Mean of introduced taxa per quadrat	12 (3 – 32)
Percentage of quadrats with weeds	100%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES
Australian: 1
SA: 7
SL region: 12

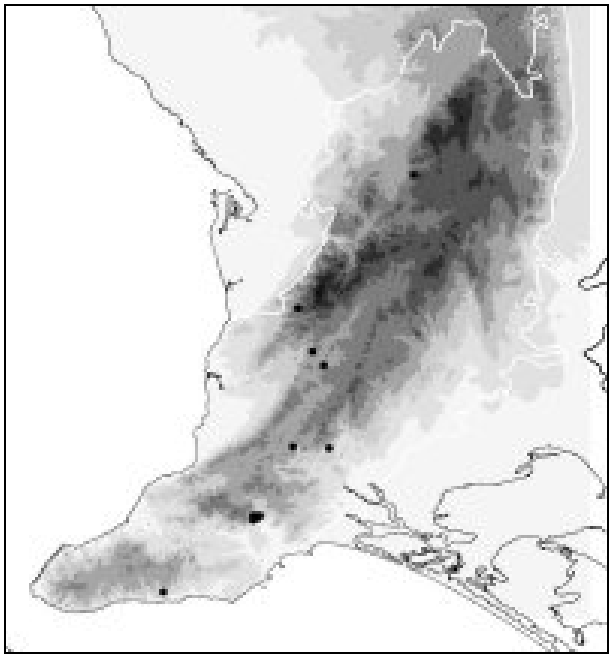
Important Indicator species
**Stellaria pallustris*

This group recorded 2 of the 3 survey records for *Samolus repens*. It also contains a high number of species recorded at low total frequencies for all groups.

ENVIRONMENTAL PARAMETERS
Typical Landform: 2 quadrats recorded in survey database only (both being a stream channel)
Typical Soil Type: loam and clay-loam
Quadrat Slope: Most quadrats $<5^0$.
Aspect: 67% of quadrats with a southerly aspect.
Mean elevation (metres) (and range): 227 (90 – 367)

DISTRIBUTION
The small number of quadrats in this group are highly scattered, ranging from Warren Conservation Park in the north, Belair RP (Tarnma Creek), 3 quadrats all within 2km of Hindmarsh Falls, quadrats south of Spring Mount and one quadrat near the southern coast line.

COMMENT
Weeds average approximately one third of all species at each quadrat. Many of the species in this group are associated with a wetland environment.



Floristic Group 14. *Eucalyptus leucoxylon*, +/- *Eucalyptus viminalis* ssp. *viminalis*, +/- *Eucalyptus viminalis* ssp. *cygnetensis*, +/- *E. obliqua* Open Forest and Woodland over *Dichondra repens*

Number of quadrats in group = 22 (Survey 5(7 quadrats); Survey 42(2); Survey 117 (13))

VEGETATION DESCRIPTION

Overstorey Structure and Dominant Species

Open forest and woodland were equally common. *Eucalyptus leucoxylon* was the most frequent dominant – either occurring as a sole-dominant or with *E. obliqua*, *E. fasciculosa* or *E. viminalis* sub-species.

Eucalypts were recorded at the following frequencies: *Eucalyptus leucoxylon* (77%), *E. obliqua* (32%), *E. viminalis* ssp. *cygnetensis* (18%), *E. viminalis* ssp. *viminalis* (14%), *E. fasciculosa* (9%), *E. camaldulensis* (5%), *E. cosmophylla* (5%) and *E. diversifolia* (5% = 1 quadrat).

Typical mid-stratum

A sparse low shrubland, or in some cases the mid-stratum was absent. *Olearia ramulosa* and *Xanthorrhoea semiplana* were dominant shrubs.

Typical ground cover

A grassland or sedgeland. Some quadrats contained a high proportion of introduced species, including **Hypericum perforatum*, **Hypochaeris radicata* and **Briza* species. *Dichondra repens* occurred at all quadrats.

Floristic Composition

Perennial taxa defining group	166
Annual taxa in group	67
Total taxa	233
Introduced taxa	75 (32%)
Native taxa	158
Mean of taxa at quadrats and range	35(12-82)
Mean of native taxa per quadrat	23 (8-51)
Mean of introduced taxa per quadrat	12 (2 – 31)
Percentage of quadrats with weeds	100%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

Australian: 2
SA: 6
SL region: 14

Important Indicator species

**Hypericum perforatum*

ENVIRONMENTAL PARAMETERS

Typical Landform: Hill slope most common, but also stream channel and gullies.
Typical Soil Type: A wide range (8) of soil texture classes represented with no single soil type dominant.
Quadrat Slope: Evenly distributed from 0 - 30^0
Aspect: Southerly aspect = 68%
Mean elevation (metres) (and range): 258 (75 – 500)

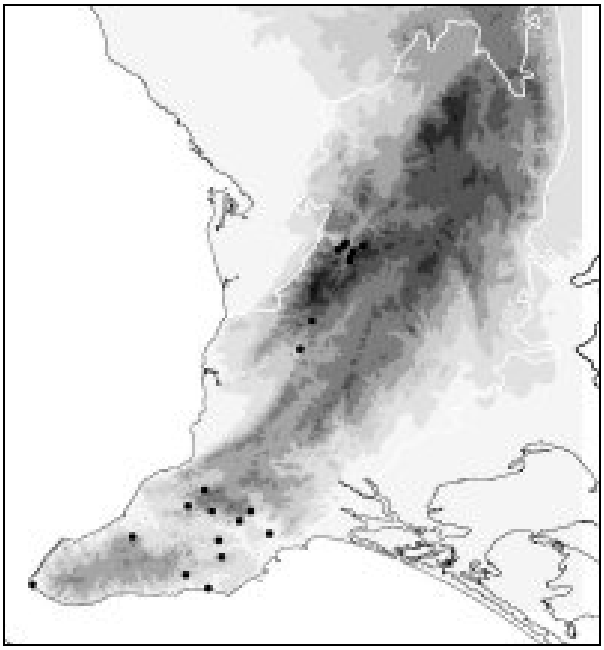
DISTRIBUTION

Two main clusters: western scarp and central hills east of Adelaide (Montacute CP, Kenneth Stirling CP and quadrats 7km WNW of Lobethal) and southern Fleurieu Peninsula (Myponga, Spring Mount, Hindmarsh Valley, and several quadrats 5 – 8 km west of Waitpinga).

Comments

This is a loosely defined group, linked largely by the presence of *Dichondra repens*. Group 14 contains a high number of species recorded at low total frequencies for all groups. One quadrat comprises a *Eucalyptus diversifolia* +/- *E. cosmophylla* +/- *E. leucoxylon* Low Open Forest on a limestone plateau, which is atypical of the group.

Figure 48.
Quadrat 117ONK02101. *Eucalyptus viminalis* ssp. *viminalis* – *E. leucoxylon* ssp. *leucoxylon* Open Forest over *Acacia pycnantha* and *Acacia retinodes* var. *retinodes* (hill form).



Floristic Group 15.
***Eucalyptus camaldulensis* +/– *Eucalyptus ovata* wet heath Open Forest over **Rubus* sp**.

Number of quadrats in group = 7 (Survey 5(5 quadrats); Survey 42(1); Survey 117 (1))

VEGETATION DESCRIPTION
Overstorey Structure and Dominant Species
Eucalyptus camaldulensis was recorded at 6 of the 7 quadrats, 5 of which were as the sole eucalyptus present. *Eucalyptus ovata* was recorded at 2 quadrats – once with *E. camaldulensis* and once as the sole eucalypt present.

Typical mid-stratum
Tall open shrubland or open shrubland with woody weeds dominant (**Rosa canina*, **Rubus* sp., and **Genista monspessulana*) and *Acacia retinodes* dominant at a few quadrats.

Typical ground cover
A grassland with **Pennisetum macrourum*, **Phalaris aquatica* and *Phragmites australis* dominant.

Floristic Composition

Perennial taxa defining group	67
Annual taxa in group	23
Total taxa	90
Introduced taxa	48 (53%)
Native taxa	42
Mean of taxa at quadrats and range	25 (8-34)
Mean of native taxa per quadrat	13 (4 - 18)
Mean of introduced taxa per quadrat	12 (4 –21)
Percentage of quadrats with weeds	100%

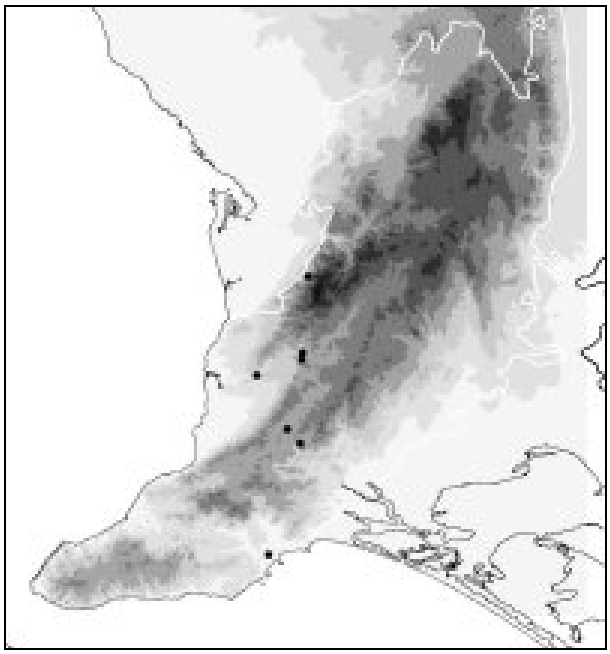
NUMBER OF CONSERVATION SIGNIFICANT SPECIES
Australian: Nil
SA: 1
SL region: 2

Important Indicator species
**Pennisetum macrorum*, **Foeniculum vulgare*, **Phalaris aquatica*, *Cyperus vaginatus* and *Callistemon sieberi*.

ENVIRONMENTAL PARAMETERS
Typical Landform: Gorge, creeks
Typical Soil Type: silt loam
Quadrat Slope: $<5^0$
Aspect: southerly = 60%
Mean elevation (metres) (and range): 183 (10 – 280)

DISTRIBUTION
Quadrats are widely scattered: Blackfellows Ck (near Yundi), Onkaparinga River and Onkaparinga NP, Meadows Creek, Slape Gully (Green Hill) and near Victor Harbor.

COMMENT
The small number of quadrats comprising this group reflects the scarcity of *E. camaldulensis* remaining and also the bias in survey quadrat selection. Most quadrats are associated with creeks, gullies and a high number of species are typically associated with wetlands. Like most other wetland associations (or associated with a wetland environment) weeds are a high component of the understorey. This group has the highest ratio of weed species to native species (53% of total). The average native species diversity per quadrat is also low (11). A high number of species within Group 15 have been recorded at less than four quadrats for all groups. The high significance values (partial chi-square) also suggest this is a floristically distinct group.



Floristic Group 16.
Eucalyptus fasciculosa*, +/- *E. obliqua*, +/– *E. goniocalyx*, +/- *E. leucoxylon* Open Forest over *Acacia pycnantha

Number of quadrats in group = 15 (Survey 5(11 quadrats); Survey 42 (1); Survey 117 (3))

VEGETATION DESCRIPTION
Overstorey Structure and Dominant Species
80% of quadrats in this relatively small group contained either *E. obliqua*, *E. fasciculosa, E. goniocalyx* or *E. leucoxylon* as sole dominants in the overstorey. However, because 12 of the 15 quadrats surveyed were only 10m x 10m quadrats, it is quite likely that within this floristic grouping, the above eucalyptus species occur commonly as co-dominants. The four eucalyptus species recorded for this group were recorded at the following frequencies: *E. fasciculosa* (27%), *E. goniocalyx* (33%), *E. leucoxylon* (27%) and *E. obliqua* (27%).

Typical Mid-stratum
The mid-stratum is generally a shrubland, ranging from low to tall open shrubland with *Acacia pycnantha* a dominant small tree at all quadrats. *Pultenaea largiflorens* and *Pultenaea daphnoides* were also common shrub dominants.

Typical Ground Cover
Gonocarpus tetragynus and *Hibbertia exutiacies* occurred at all quadrats. Other ground cover dominants were *Arthropodium strictum* and *Scaevola albida*.

FLORISTIC COMPOSITION

Perennial taxa defining group	103
Annual taxa in group	44
Total taxa	147
Introduced taxa	26 (18%)
Native taxa	220
Mean of taxa at quadrats and range	32(11- 77)
Mean of native taxa per quadrat	28 (9-69)
Mean of introduced taxa per quadrat	4 (1 – 8)
Percentage of quadrats with weeds	100%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES
Australian: Nil
SA:3
SL region:4

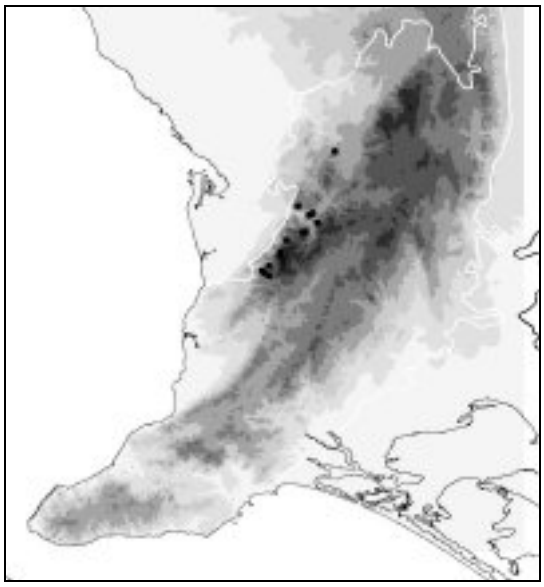
Important Indicator species
Nil, however, the *Cyrtostylis robusta* record is one of only 2 survey records.

ENVIRONMENTAL PARAMETERS
Typical Landform: Hill slope
Typical Soil Type: clay loam, clayey sand and silt loam
Quadrat Slope: Evenly distributed between 5^0 and 35^0
Aspect: no distinct pattern, wide range of aspects evenly represented.
Mean elevation (metres) (and range): 417 (290 – 540)

DISTRIBUTION
A relatively clustered distribution including Belair RP, Para Wirra RP, Montacute CP, Cleland CP (Chambers Gully), near Anstey Hill and quadrats 3km west of Summertown.

COMMENTS
The group is bound together by *Acacia pycnantha*, *Hibbertia exutiacies* and *Gonocarpus tetragynus* - all occurring at all 15 quadrats. The environmental weed **Senecio pterophorus* var. *pterophorus*, African Daisy was recorded at 47% of quadrats. The overstorey is similar to Group 1.

Figure 49.
Quadrat 117ONK01901. *Eucalyptus goniocalyx* Woodland over an open understorey including *Acacia pycnantha*, *Hibbertia exutiacies*, *Olearia ramulosa*, *Arthropodium strictum* and *Poa crassicaudex*.



Floristic Group 17.
1 = *Eucalyptus fasciculosa*, +/– *E. leucoxylon*, *+/- E. obliqua* Woodland
2 = *Eucalyptus goniocalyx* +/- *E. fasciculosa* Woodland
3 = *Eucalyptus leucoxylon* +/- *E. fasciculosa* Woodland – all sub-groups over *Acacia pycnantha*

Number of quadrats in group = 45 (Survey 5(41 quadrats); Survey 117 (4))

VEGETATION DESCRIPTION

Overstorey Structure and Dominant Species

Most commonly, a woodland formation, but six other forest and woodland formations also represented. This group also contains seven eucalypts recorded as dominants, and occurring in several combinations. At least five vegetation associations are likely to be present within this group, but the three most common combinations were:
E. fasciculosa as the dominant tree (either alone or with *E. obliqua or E. leucoxylon as* sub-dominants) – 18 quadrats;
E. goniocalyx as the dominant with or without *E. fasciculosa* as the sub-dominant – 8 quadrats and
E. leucoxylon as the dominant tree, with or without *E. fasciculosa* as the sub-dominant

Eucalypts were recorded at the following frequencies: *E. fasciculosa* (76%), *E. leucoxylon* (29%), *E. goniocalyx* (24%), *E. obliqua* (22%), *E. viminalis* ssp. *viminalis* (11%), *E. baxteri* (2%), *E. camaldulensis* (2%), *E. cosmophylla* (2%), *E. microcarpa* (2%), *E. porosa* (2%) and *E. viminalis* ssp. *cygnetensis* (2%).

Typical mid-stratum

A tall open or very open shrubland with *Acacia pycnantha*, *Xanthorrhoea semiplana* ssp. and *Bursaria spinosa* common and dominant. *Olearia ramulosa* and *Melaleuca decussata* are sub-dominant at several quadrats.

Typical ground cover

Low open shrubland and grassland, with **Briza maxima*, *Cheilanthes austrotenuifolia* or *Hibbertia exutiacies* dominant.

Floristic Composition

Perennial taxa defining group	165
Annual taxa in group	61
Total taxa	226
Introduced taxa	51 (23%)
Native taxa	175
Mean of taxa at quadrats and range	28(8-86)
Mean of native taxa per quadrat	23 (5-69)
Mean of introduced taxa per quadrat	5 (0 – 17)
Percentage of quadrats with weeds	96%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

Australian: Nil
SA: 9
SL region: 15

Important Indicator species: Nil

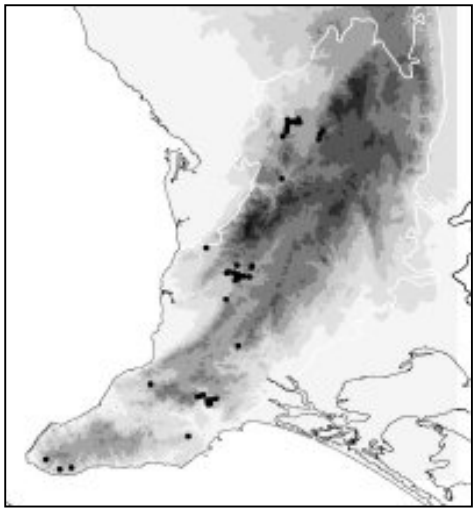
ENVIRONMENTAL PARAMETERS

Typical Landform: Hill slope, gully and crest
Typical Soil Type: sandy loam
Quadrat Slope: Quadrats evenly spread up to 15^0 and then a smaller number of quadrats evenly spread between 16^0 and 30^0
Aspect: No clear trend.
Mean elevation (metres) (and range): 247 (95 – 410)

DISTRIBUTION

A widely dispersed group with 4 main clusters:
Northern quadrats include Warren CP, Para Wirra CP (several quadrats), near South Para Reservoir, Warren Reservoir,
Central hills quadrats include Mount Bold Reservoir and several quadrats within 6km of Kangarilla.
Fleurieu Peninsula quadrats are centred around Mount Billy Hindmarsh Valley Reservoir, Hindmarsh Falls, near Spring Mount, and three quadrats within Deep Creek CP.

Figure 50.
Quadrat 117NOA01301. *Eucalyptus leucoxylon* ssp. *leucoxylon* Open Forest over *Acacia pycnantha* and *Bursaria spinosa*.



Floristic Group 18.
1 = *Eucalyptus goniocalyx*, +/- *E. fasciculosa* +/- *E. obliqua* Woodland
2 = *Eucalyptus viminalis* ssp. *viminalis*, *E. leucoxylon* +/- *E. obliqua* +/- *E. camaldulensis* Woodland, both sub-groups over *Acacia pycnantha*

Number of quadrats in group = 24 (Survey 5(14 quadrats); Survey 117 (10))

VEGETATION DESCRIPTION

Overstorey Structure and Dominant Species

This is an ill-defined group with 10 species of eucalypts recorded in the 24 quadrats. Fifteen different combinations of overstorey (eucalypt species) were recorded. The two most common were *E. fasciculosa* – *E. goniocalyx* (6 quadrats = 25%) and *E. viminalis* ssp. *viminalis* (4 quadrats = 17%). For this reason, this group is likely to represent at least two vegetation associations.

Eight eucalypt species were recorded at the following frequencies: *E. goniocalyx* (42%), *E. fasciculosa* (38%), *E. viminalis* ssp. *viminalis* (25%), *E. leucoxylon* (17%), *E. camaldulensis* (17%), *E. viminalis* ssp. *cygnetensis* (8%), *E. baxteri* (4%), *E. microcarpa* (4%) and *E. dalrympleana* ssp. *dalrympleana* (4%).

Typical mid-stratum

Either a shrubland, closed shrubland or tall shrubland. Dominant species are *Acacia pycnantha*, *Leptospermum myrsinoides* and *Xanthorrhoea semiplana*.

Typical ground cover

Grassland, sedgeland and low shrubland. Dominant ground covers include *Gonocarpus tetragynus*, *Hibbertia sericea* var. *sericea* and *Astroloma humisfusum*.

Floristic Composition

Perennial taxa defining group	168
Annual taxa in group	90
Total taxa	258
Introduced taxa	56 (22%)
Native taxa	202
Mean of taxa at quadrats and range	45 (19-83)
Mean of native taxa per quadrat	38 (16-72)
Mean of introduced taxa per quadrat	7 (1 – 24)
Percentage of quadrats with weeds	100%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

Australian: 1
SA: 8
SL region: 16

Important Indicator species

Leptorhynchus squamatus.

ENVIRONMENTAL PARAMETERS

Typical Landform: Hill slope
Typical Soil Type: Loams, especially sandy loams, are most common.
Quadrat Slope: 74% of quadrats were $< 5^0$
Aspect: No clear trend.
Mean elevation (metres) (and range): 448 (280 – 570)

DISTRIBUTION

Most quadrats are in the north of the region (Mount Crawford, Cromer CP, Charleston CP, Cudlee Creek CP, Kaisterstuhl CP); there is an isolated quadrat at Belair CP; and a small cluster of quadrats near Kuitpo.

COMMENTS

This group contains all three of the survey quadrats in the Murray Mallee botanical region (namely, east of longitude 139^0). All three quadrats are virtually on the boundary of the Murray Mallee and Southern Lofty regions:
Quadrat 5ML316 = latitude $34^0.88$ longitude $139^0.00872$
Quadrat 5ML317 = latitude $34^0.87$ longitude 139^0 .00036 and
Quadrat 117ANG00101 = latitude 34^0 .59 longitude $139^0.015$.
The quadrats are approximately 3km east of Mount Torrens and Birdwood. Because they are virtually on the boundary of the two botanical regions and because they are located at relatively high elevations and receive relatively high rainfall, they are considered to be ecologically part of the Mount Lofty Ranges. For this reason, Southern Lofty plant ratings have been applied to this group, rather than the more artificial Murray Mallee botanical region ratings. Technically, the record of *Eucalyptus viminalis* ssp. *viminalis* at quadrat 5ML316 would be the first for the Murray Mallee botanical region.

No environmental weeds recorded at >40% of quadrats. The northern quadrats are associated with *Eucalyptus goniocalyx*.

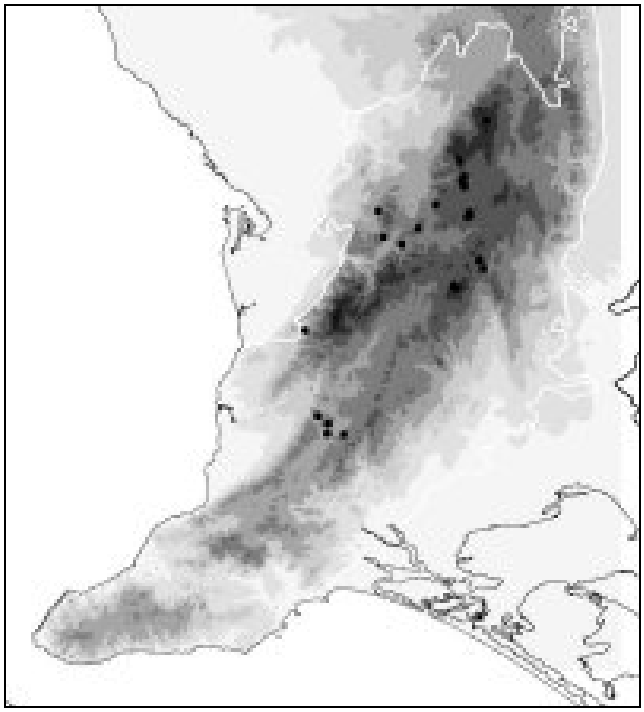


Figure 51
Quadrat 117ONK01501. *Eucalyptus goniocalyx - E. fasciculosa* Low Woodland over *Acacia paradoxa*, *Hibbertia incana*, *Xanthorrhoea semiplana* ssp. *semiplana*, *Calytrix tetragona* and *Leptospermum myrsinoides*.

Floristic Group 19.
Eucalyptus obliqua* Low Open Forest over *Xanthorrhoea semiplana*, *Hibbertia sericea* var. *sericea

Number of quadrats in group = 3 (Survey 5 (1 quadrat); Survey 117 (2))

VEGETATION DESCRIPTION
Overstorey Structure and Dominant Species
Either an open forest or low open forest formation. *Eucalyptus obliqua* was the sole dominant at all three quadrats. No other eucalypt species recorded.

Typical mid-stratum
A sclerophyllous shrubland with *Xanthorrhoea semiplana* present at all three quadrats.

Typical ground cover
A herbaceous low shrub formation with *Hibbertia sericea* var. *sericea* present at all three quadrats. *Pteridium esculentum* was common at two quadrats.

Floristic Composition

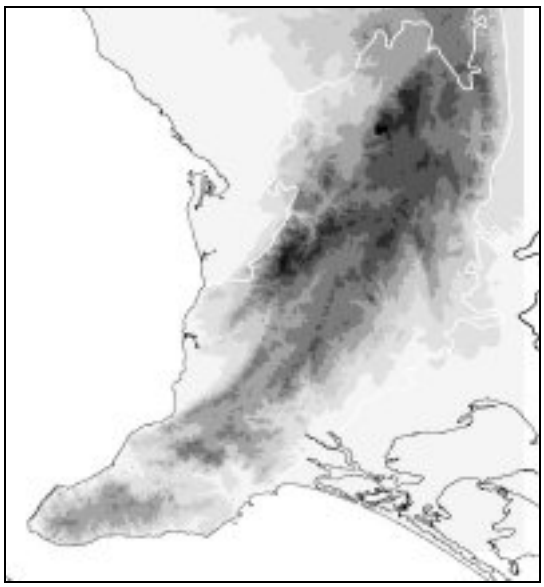
Perennial taxa defining group	32
Annual taxa in group	10
Total taxa	42
Introduced taxa	13 (31%)
Native taxa	29
Mean of taxa at quadrats and range	24(21- 27)
Mean of native taxa per quadrat	17 (14-19)
Mean of introduced taxa per quadrat	7 (7 – 8)
Percentage of quadrats with weeds	100%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES
Australian: Nil
SA: 1
SL region: 3

Important Indicator species
Hymenanthera dentata (2 of the 6 survey records), **Lactuca serriola* (2 of the 3 survey records).

ENVIRONMENTAL PARAMETERS
Typical Landform: Hillslope
Typical Soil Type: sandy loam and loamy sand
Quadrat Slope: 10^0, 15^0 and 25^0
Aspect: 90^0, 210^0 and 260^0
Elevation (metres): 430 (one site only available)

DISTRIBUTION
One tight cluster in northern part of region, all between 4.5 and 5.8 km east-north-east of Williamstown.



Floristic Group: 20.
Eucalyptus odorata* OR *E. fasciculosa* OR *E. leucoxylon* dry sclerophyll Low Woodland over *Chrysanthemoides *monilifera*, *Acacica pycnantha

Number of quadrats in group = 6 (Survey 5(5 quadrats); Survey 117 (1))

VEGETATION DESCRIPTION
Overstorey Structure and Dominant Species
This group contained the above three eucalypts only – each occurring at separate quadrats. *Eucalyptus odorata* and *E. fasciculosa* each occurred at two quadrats (33%) and *E. leucoxylon* occurred at one quadrat. One quadrat was an *Allocasuarina verticillata* (+/- *E. fasciculosa*) woodland. No eucalypt species were recorded at 2 quadrats – these being dominated by the weed **Chrysanthemoides monilifera* (Boneseed).

Typical mid-stratum
A dry sclerophyll very open shrubland dominated by **Chrsanthemoides monilifera*, *Acacia pycnantha*, and *Ixodia achillaeoides*. **Olea europaea* ssp. *europaea* (Olive) recorded at 4 quadrats.

Typical ground cover
Open grassland with *Agrostis avenacea* and *Poa clelandii* common.

Floristic Composition

Perennial taxa defining group	69
Annual taxa in group	16
Total taxa	85
Introduced taxa	18 (21%)
Native taxa	67
Mean of taxa at quadrats and range	28(16-36)
Mean of native taxa per quadrat	22 (10-30)
Mean of introduced taxa per quadrat	6 (3 – 9)
Percentage of quadrats with weeds	100%

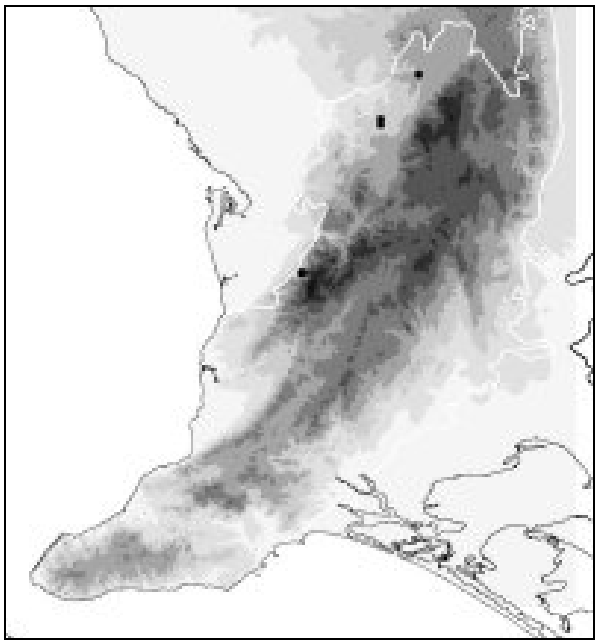
NUMBER OF CONSERVATION SIGNIFICANT SPECIES
Australian: Nil
SA: Nil
SL region: 5

Important Indicator species
Agrostis avenacea var., *Opercularia scabrida*

ENVIRONMENTAL PARAMETERS
Typical Landform: Insufficient survey data available to determine typical landform.
Typical Soil Type: clay loam and loamy sand
Quadrat Slope: 3 quadrats $<5^0$
Aspect: Southerly = 67%
Mean elevation (metres) (and range): 307 (220 – 350)

DISTRIBUTION
Although small, this is a relatively distinct group with many species having a low overall frequency of occurrence in the PATN analysis. Three quadrats are in Slape Gully (Green Hill, East of Adelaide), and 3 quadrats are in the Barossa Valley (namely Sandy Creek Conservation Park; 1.9km WNW of Tanunda; and 3.6km WSW of Lyndoch.

COMMENT
The Barossa Valley quadrats are in a district of low vegetation remnancy and the Tanunda quadrat is the northernmost quadrat in the PATN analysis (it is the only quadrat in the Northern Lofty botanical region). These quadrats receive amongst the lowest rainfall in the study region; hence the presence of some species associated with lower rainfalls such as *Ozothamnus retusus*, *Opercularia scabrida* and *Einadia nutans*.



Floristic Group: 21.
Eucalyptus microcarpa*, *+/- E. fasciculosa* savannah woodland over *Acacia pycnantha

Number of quadrats in group = 22 (Survey 5(18 quadrats); Survey 42 (1); Survey 117 (3))

VEGETATION DESCRIPTION
Overstorey Structure and Dominant Species
Woodland with *E. microcarpa* being the sole dominant at 71% of quadrats. *Eucalyptus fasiculosa* occurred with *E. microcarpa* at 14% of quadrats. One quadrat was an *Allocasuarina verticillata* woodland.
Four eucalypt species were recorded at the following frequencies: *E. microcarpa* (86%), *E. fasciculosa* (27%), *E. camaldulensis* (9%) and *E. porosa* (4% = 1 quadrat).

Typical mid-stratum
Open shrubland and shrubland with the woody weeds, **Chrysanthemoides monilifera* (Boneseed) and **Olea europaea* ssp. *europaea* (Olive) dominant at most quadrats. *Acacia pycnantha* and *Olearia ramulosa* were also common and dominant.

Typical ground cover
Open grassland or sedgeland or low open shrubland with the introduced annual, **Briza maxima* common and abundant. *Themeda triandra*, *Hibbertia exutiacies* and *Cheilanthes austrotenuifolia* are common.

Floristic Composition

Perennial taxa defining group	121
Annual taxa in group	41
Total taxa	162
Introduced taxa	39 (24%)
Native taxa	123
Mean of taxa at quadrats and range	31(5-48)
Mean of native taxa per quadrat	25 (3-44)
Mean of introduced taxa per quadrat	6(1 – 19)
Percentage of quadrats with weeds	100%

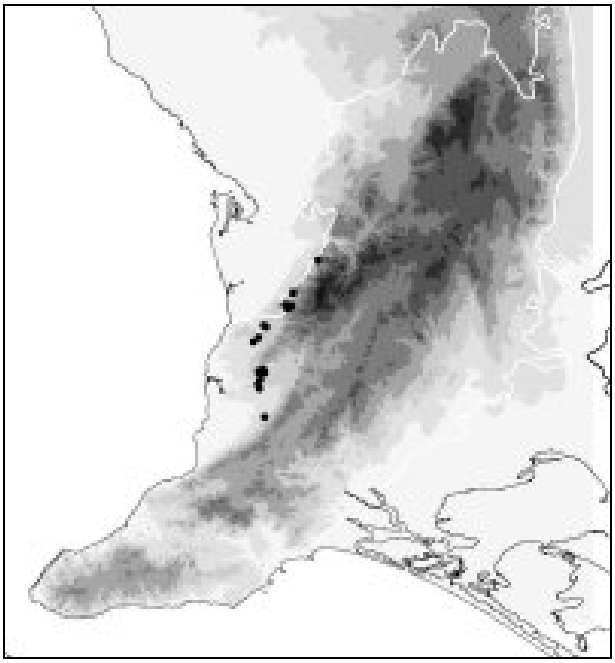
NUMBER OF CONSERVATION SIGNIFICANT SPECIES
Australian: Nil
SA: 2
SL region: 6

Important Indicator species
Eucalyptus microcarpa, *Acacia acinacea* and *Acacia rupicola*

ENVIRONMENTAL PARAMETERS
Typical Landform: Hill slope
Typical Soil Type: clay loam and sandy loam
Quadrat Slope: Most quadrats 5^0
Aspect: No clear trend
Mean elevation (metres) (and range): 21 (110 – 320)

DISTRIBUTION
Belair NP (several quadrats), Happy Valley Reservoir; 6 quadrats all about 3km NNW of Blewitt Springs, Morialta CP, Urrbrae, 5km ESE of McLaren Vale.

COMMENT
A well-defined group with all quadrats along the western scarp and footslopes. The *E. microcarpa* woodlands have generally been invaded by Olives and Boneseed**.**



Floristic Group 22.
***Eucalyptus camaldulensis*, +/- *Eucalyptus leucoxylon* savannah/sSclerophyll Low Open Forest and Woodland**

Number of quadrats in group = 23 (Survey 5(12 quadrats); Survey 42 (1); Survey 117 (10))

VEGETATION DESCRIPTION
Overstorey Structure and Dominant Species
A woodland or low open forest. *Eucalyptus camaldulensis* and *E. leucoxylon* occurred at 52% and 48% of quadrats respectively (the latter includes *E. leucoxylon* ssp. *leucoxylon* = 8 quadrats and *E. leucoxylon* ssp. *pruinosa* = 3 quadrats). *Eucalyptus obliqua*, *E. fasciculosa*, *E. viminalis* ssp. *viminalis* and *E. viminalis* ssp. *cygnetensis* all occurred once (at separate quadrats).

Typical mid-stratum
Open shrubland but sometimes absent. *Acacia pycnantha*, **Senecio pterophorus* var. *pterophorus* and *Dodonaea viscosa* ssp. *spatulata* were common.

Typical ground cover
Grassland with introduced annuals (**Briza maxima* and **Trifolium* species common)

Floristic Composition

Perennial taxa defining group	144
Annual taxa in group	111
Total taxa	255
Introduced taxa	85 (33%)
Native taxa	170
Mean of taxa at quadrats and range	38(18-81)
Mean of native taxa per quadrat	24 (6 – 61)
Mean of introduced taxa per quadrat	14 (3 – 32)
Percentage of quadrats with weeds	100%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES
Australian: Nil
SA: 8
SL region: 15

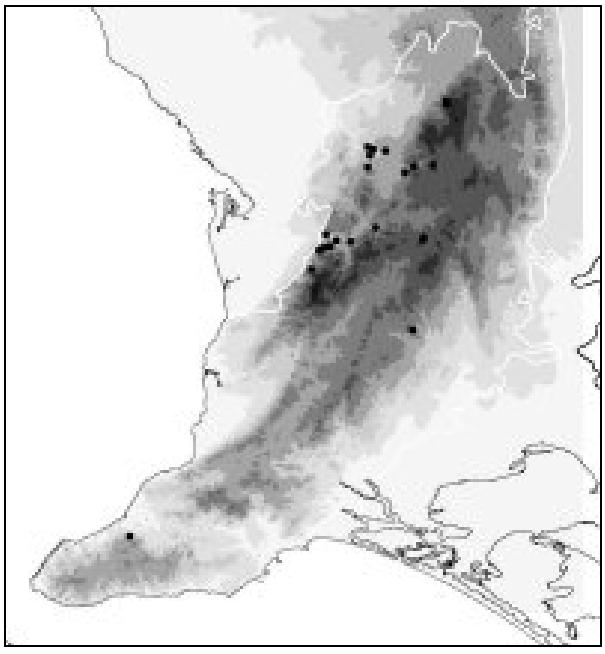
Important Indicator species
Eucalyptus camaldulensis

ENVIRONMENTAL PARAMETERS
Typical Landform: hill slope
Typical Soil Type: clay-loam
Quadrat Slope: a wide range of slopes from $<5^0$ to over 30^0
Aspect: northerly aspect = 74%
Mean elevation (metres) (and range): 352 (190 – 570)

DISTRIBUTION
Mostly in the north-west of the region, but with several isolated and highly scattered quadrats: Montacute, Morialta CP, Horsnell Gully CP, Black Hill CP, Torrens Gorge, near Kaisterstuhl, near Mount Torrens, near Lyndoch, Cudlee Creek CP, Parra Wirra RP (several), Warren CP, South Para Reservoir.

COMMENT
Quadrats contain a high proportion of weeds, and in some cases lack a mid-stratum. This group contains all three survey records of *Eucalyptus leucoxylon* ssp. *pruinosa*. Within the study region, this subspecies is confined to the Barossa district.

Figure 52.
Quadrat 117BAR02601. *Eucalyptus leucoxylon* ssp. *pruinosa* Low Woodland over *Acacia pycnantha*, *Hibbertia stricta* var. *stricta*, *Gonocarpus elatus*, *Dodonaea viscosa* ssp. *spatulata* and *Hibbertia exutiacies*.



Floristic Group 23.
1 = *Eucalyptus leucoxylon*, +/- *E. camaldulensis*, +/- *E. viminalis* ssp. *cygnetensis* savannah Woodland
2 = *Eucalyptus porosa*, +/- *Allocasuarina verticillata* Low Woodland,
both sub-groups over **Olea europaea* ssp. *europaea*

Number of quadrats in group = 6 (Survey 42 (1 quadrat); Survey 117 (5))

VEGETATION DESCRIPTION

Overstorey Structure and Dominant Species

A woodland or low woodland. Four eucalyptus species were recorded in this group at the following frequencies: *E. leucoxylon* (67%), *E. porosa* (33%), *E. camaldulensis* (17%) and *E. viminalis* ssp. *cygnetensis* (17%). The two quadrats containing *E. porosa* are considered to be a separate association.

Typical mid-stratum

A dry sclerophyll very open shrubland with **Asclepias rotundifolia* and **Olea europaea* ssp. *europaea* present at 5 of the 6 quadrats.

Typical ground cover

Possibly an open grassland or herbland, including *Themeda triandra*, **Plantago lanceolata* var. *lanceolata* and *Oxalis perennans*.

Floristic Composition

Perennial taxa defining group	72
Annual taxa in group	34
Total taxa	106
Introduced taxa	41 (39%)
Native taxa	65
Mean of taxa at quadrats and range	32(15-52)
Mean of native taxa per quadrat	18 (6 – 32)
Mean of introduced taxa per quadrat	14 (6 – 31)
Percentage of quadrats with weeds	100%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

Australian: Nil
SA: 2
SL region: 6

Important Indicator species

Convolvulus remotus, *Eucalyptus porosa*, and **Asclepias rotundifolia*

This group contained a high number of species recorded at low overall frequencies within the study region, including the only two survey records for *Aristida behriana* and one of four records for the following: *Enchylaena tomentosa*, *Pleurosorus rutifolius* and *Pultenaea scabra*.

ENVIRONMENTAL PARAMETERS

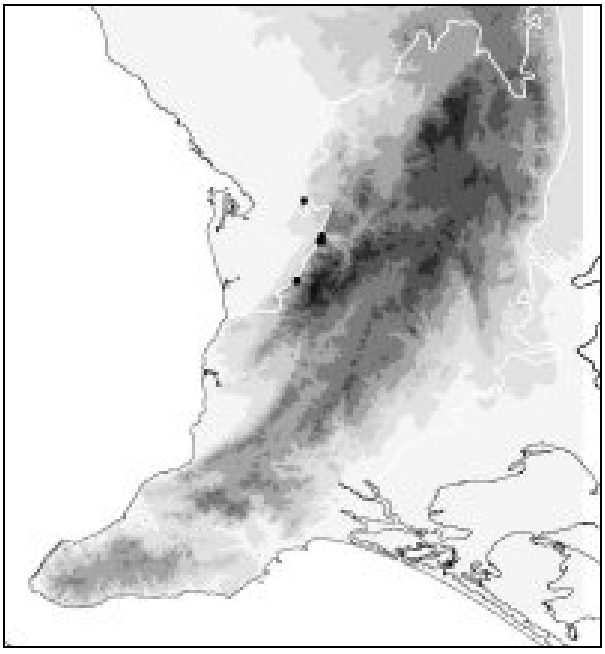
Typical Landform: Hill slope
Typical Soil Type: clay-loam most common, but also sandy loam and sandy-clay-loam
Quadrat Slope: Even spread of slopes from 10^0 to 30^0.
Aspect: northerly and southerly aspects each represented by 50% of quadrats.
Mean elevation (metres) (and range): 223 (160 – 285)

DISTRIBUTION

Mount Osmond Reserve (2 quadrats), Para Wirra RP (3 quadrats) and one quadrat 3.7km NNE of Para Hills.

COMMENTS

This small group contained a loose agglomeration of various overstorey species. The group is linked by the common presence of the woody weeds **Olea europea* (Olive) and **Asclepias rotundifolia* (Round-leaved Cotton-bush) in the understorey. The occurrence of *Allocasuarina verticillata* also suggests this group occurs on drier quadrats. The *Eucalyptus porosa* quadrats contain several species adapted to more arid climates, including *Enchylaena tomentosa* and *Santalum acuminatum*, and are atypical of the Southern Mount Lofty Ranges and Fleurieu Peninsula. Even allowing for the small number of quadrats, this group has a relatively low native species diversity (65 native species and 41 introduced species) and the second highest average number of weeds per quadrat (14 weed species).



Floristic Group 24.
Eucalyptus fasciculosa*, +/- *Callitris gracilis* +/- *Allocasuarina verticillata* Low Woodland over *Calytrix tetragona*, *Astroloma conostephioides

Number of quadrats in group = 32 (Survey 5(21 quadrats); Survey 117 (11))

VEGETATION DESCRIPTION

Overstorey Structure and Dominant Species

Most quadrats are *E. fasciculosa* low woodland and usually with *Callitris gracilis* as a co-dominant or sub-dominant. *Eucalyptus fasciculosa* occurred at 84% of quadrats and the mistletoe, *Amyema miquelii* was recorded at 75% of quadrats. *Callitris gracilis* occurred at 69% of quadrats and *Allocasuarina verticillata* at 34% of quadrats. *Eucalyptus odorata* and *E. porosa* were recorded at one quadrat as co-dominants (open mallee formation) and *E. microcarpa* was recorded at one quadrat (as a sub-dominant to *E, fasciculosa*). *Eucalyptus goniocalyx* and *E. leucoxylon* were each recorded at four quadrats and five quadrats, respectively.

Typical mid-stratum

A shrubland with *Calytrix tetragona*, *Astrloma conostephioides* and *Acacia pycnantha* dominant.

Typical ground cover

A low shrubland with *Gonocarpus elatus*, *Lomandra multiflora* ssp. *dura* and *Thysanotus patersonii* common.

Floristic Composition

Perennial taxa defining group	158
Annual taxa in group	78
Total taxa	236
Introduced taxa	43 (18%)
Native taxa	193
Mean of taxa at quadrats and range	37 (11-82)
Mean of native taxa per quadrat	32 (7 – 52)
Mean of introduced taxa per quadrat	5 (0 – 30)
Percentage of quadrats with weeds	91%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

Australian:	Nil
SA:	6
SL region	19

Important Indicator species

Callitris gracilis and *Baeckea behrii* (all 8 survey records in this group).

This group also contains the only two survey records for *Enneapogon nigricans*.

ENVIRONMENTAL PARAMETERS

Typical Landform: Plains (including sandy plain)
Typical Soil Type: Light-textured soils (and especially sandy loam) most common
Quadrat Slope: Over 50% of quadrats $<5^0$
Aspect: Northerly aspect = 56%
Mean elevation (metres) (and range): 255 (185 – 425)

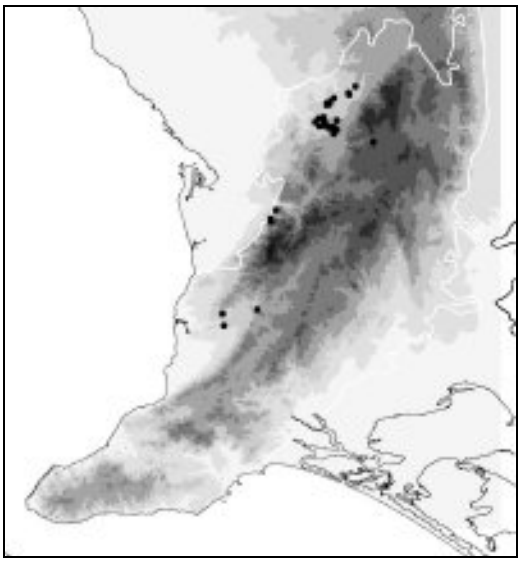
DISTRIBUTION

Most quadrats are in the Para Wirra – Williamstown district including Barossa Reservoir, Sandy Creek CP and Para Wirra RP. A small cluster of 3 quadrats is at Morialta CP and Black Hill CP. Three other quadrats are in Onkaparinga NP and 2.5km NNE of Kangarilla.

COMMENT

This group is defined largely by the presence of *Callitris gracilis* in the overstorey, containing 22 of the 41 survey records. Unlike many other groups, the majority of quadrats are on relatively flat land, or gently sloping land. Most quadrats appear to be relatively intact, with **Chrysanthemoides monilifera* being the only perennial weed recorded at >40% of quadrats.

Figure 53.
Quadrat 117BAR02201. *Callitris gracilis* – *Eucalyptus fasciculosa* Low Woodland over *Calytrix tetragona*, *Astroloma conostephioides* and *Lepidosperma viscidum*.



Floristic Group 25.
Eucalyptus fasciculosa*, *Allocasuarina verticillata +/-E. goniocalyx* Low Woodland and Low Open Woodland over *Acacia pycnantha

Number of quadrats in group = 21 (Survey 5(7 quadrats); Survey 42 (10); Survey 117 (4))

VEGETATION DESCRIPTION

Overstorey Structure and Dominant Species

A low woodland or low open woodland formation. *Eucalyptus fasciculosa* occurred at 76% of quadrats. *Allocasuarina verticillata* was recorded at 71% of quadrats, usually as a sub-dominant to *E. fasciculosa*. *Eucalyptus goniocalyx* was recorded at 38% of quadrats – usually with *E. fasciculosa*. Other eucalyptus species recorded in this group were: *E. leucoxylon* (24%), *E. obliqua* (5%), *E. camaldulensis* (5%) and *E. viminalis* ssp. *cygnetensis* (5%).

Typical mid-stratum

A low open shrubland with *Acacia pycnantha* dominant. *Exocarpos cupressiformis*, *Acacia paradoxa* and *Olearia ramulosa* also common.

Typical ground cover

An open grassland with **Pentaschistis pallida*, **Briza maxima*, and *Gonocarpus elatus* abundant. *Scaevola albida*, *Astroloma humifusum*, *Lomandra multiflora* ssp. *dura* also common.

Floristic Composition

Perennial taxa defining group	131
Annual taxa in group	38
Total taxa	169
Introduced taxa	30 (18%)
Native taxa	139
Mean of taxa at quadrats and range	39 (21-58)
Mean of native taxa per quadrat	35(23–58)
Mean of introduced taxa per quadrat	4 (1 – 14)
Percentage of quadrats with weeds	100%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

Australian	Nil
SA	2
SL region	6

Important Indicator species

**Pentaschistis pallida*

ENVIRONMENTAL PARAMETERS

Typical Landform: Hill slope
Typical Soil Type: loams most common
Quadrat Slope: Slopes spread evenly from 5 - 27^0
Aspect: northerly aspect = 67%
Mean elevation (metres) (and range): 349 (270 – 410)

DISTRIBUTION

All except one quadrat are in the Anstey Hill – Upper Hermitage district. Fifteen quadrats were within 2.2 km to 4.3 km east of Tea Tree Gully. The one outlying quadrat is 3.8 km ESE of Gumeracha.

COMMENT

The presence of *Allocasuarina verticillata* distinguishes the overstorey in this group. Most quadrats appear to have been in good condition with a high species diversity and relatively few weeds.

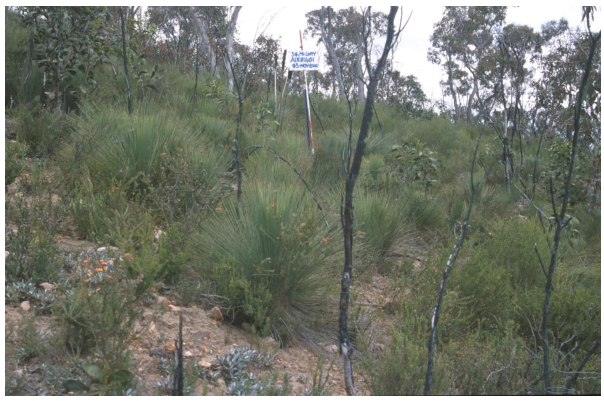
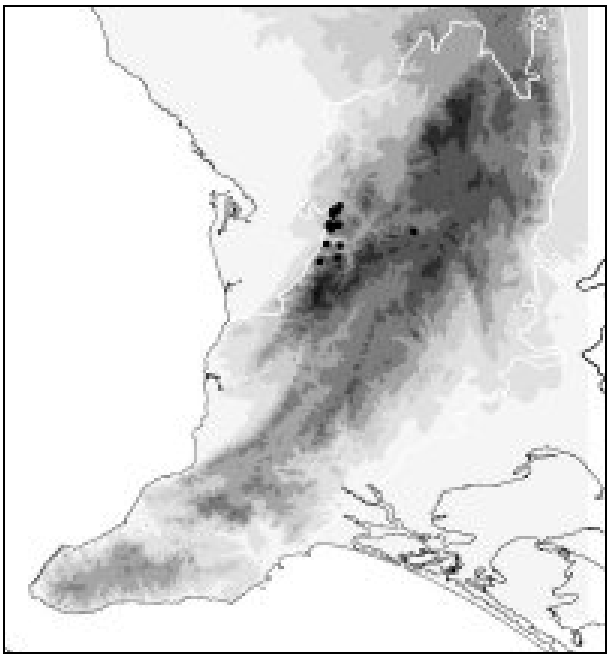


Figure 54.
Quadrat 117ADE01401. *Eucalyptus fasciculosa* Low Open Woodland over *Xanthorrhoea quadrangulata*, *Allocasuarina muelleriana*, *Opercularia turpis*, *Dillwynia hispida* and *Acacia pycnantha*.



Floristic Group 26.
Eucalyptus fasciculosa* Very Low Woodland and Very Low Open Woodland over *Acacia pycnantha

Number of quadrats in group = 20 (Survey 5 (11 quadrats); Survey 42 (8); Survey 117 (1))

VEGETATION DESCRIPTION
Overstorey Structure and Dominant Species
In most cases the quadrats were *E. fasciculosa* Very Low Woodlands with no other eucalypts present (*Eucalyptus fasciculosa* present at 90% of quadrats). *Amyema miquelii* was recorded at 55% of quadrats. The *E. fasciculosa* trees are probably of low height due to their coastal locations. *Allocasuarina verticillata* was present at 40% of quadrats and *Callitris gracilis* at 10% (2 quadrats).

Other eucalypts were recorded at the following frequencies: *E. leuxoxylon* (10%), *E. microcarpa* (5% = 1 quadrat), *E. baxteri* (5%) and *E. porosa* (5%).

Typical mid-stratum
Shrubland with *Leptospermum myrsinoides*, *Astroloma conostephoides*, *Xanthorrhoea semiplana* and *Calytrix tetragona* dominant. Several environmental weeds were recorded including **Olea europaea* (25% of quadrats), **Ehrharta calycina* (30%), **Chyrsanthemoides monilifera* (30%) and **Myrsiphyllum asparagoides* (35%).

Typical ground cover
Sedgeland or mat plants, including *Astroloma humifusum* and *Lepidosperma carphoides*.

Floristic Composition

Perennial taxa defining group	119
Annual taxa in group	32
Total taxa	151
Introduced taxa	18 (12%)
Native taxa	133
Mean of taxa at quadrats and range	30 (17-52)
Mean of native taxa per quadrat	27(13–46)
Mean of introduced taxa per quadrat	3 (1 – 6)
Percentage of quadrats with weeds	100%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

Australian	Nil
SA	4
SL region	10

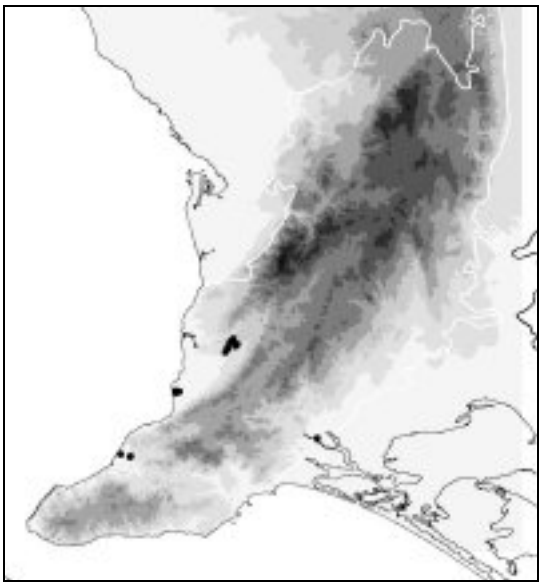
Important Indicator species
Prostanthera behriana (5 of the 8 survey records) and *Kunzea pomifera*

ENVIRONMENTAL PARAMETERS
Typical Landform: Data recorded for only 1 quadrat (a dune)
Typical Soil Type: Data recorded for 1 quadrat only (loamy sand)
Quadrat Slope: 13 quadrats $<5^0$; 5 quadrats 6 – 10^0 and 1 quadrat 15^0
Aspect: southerly aspect = 58%
Mean elevation (metres) (and range): 82 (10 – 170)

DISTRIBUTION
Three clusters plus one outlying quadrat as follows:
Aldinga Scrub (7 quadrats – adjoins coast)
Blewitt Springs/McLaren Vale district: 9 quadrats between 0.6km – 3.2km west of Blewitt Springs include Manning Scrub
Yankalilla/Normanville = 3 quadrats (one near coast)
1 quadrat 3.7km SSW of Finniss

COMMENT
The majority of these *E. fasciculosa* quadrats are of moderate diversity and ecological integrity, with several environmental weeds present.

Figure 55.
Quadrat 117YAN00901. *Eucalyptus fasciculosa* – *Allocasuarina verticillata* Low Woodland over *Calytrix tetragona* and *Leptospermum myrsinoides*.



Floristic Group 27. *Eucalyptus cosmophylla*. +/- *E. fasciculosa* +/- *E. leptophylla* +/- *E. incrassata* Very Low Woodland and Very Low Open Woodland over *Astroloma humifusum*, *Calytrix tetragona*

Number of quadrats in group = 21 (Survey 5(13 quadrats); Survey 42 (7); Group 52 (1))

VEGETATION DESCRIPTION

Overstorey Structure and Dominant Species

Generally, a very low woodland or very low open woodland. The most common combinations of overstorey dominants were either *E. fasciculosa* or *E. cosmophylla* or both these species occurring together. *Eucalyptus incrassata* and *E. leptophylla* occurred together at three quadrats (with either *E. phenax*, *E. fasciculosa* and/or *E. cosmophylla*). These species are typically of mallee formation and these quadrats contained species associated with drier soil-water regimes, including *Melaleuca uncinata*. Three quadrats lacked a tree overstorey and were open shrubland formations with *Allocasuarina muelleriana*, *Xanthorrhoea semiplana* and/or *Hakea rostrata* dominant.

Eucalypts were recorded at the following frequencies: *E. cosmophylla* (67%), *E. fasciculosa* (62%), *E. incrassata* (14%), *E. leptophylla* (14%), *E. obliqua* (10%), *E. baxteri* (5%), *E. cneorifolia* (5%), *E. phenax* (5%) and *E. odorata* (5%).

Typical mid-stratum

Shrubland and open shrubland with *Calytrix tetragona*, *Hakea rostrata* and *Allocasuarina muelleriana* ssp. *muelleriana* common and dominant.

Typical ground cover

Open sedgeland or open mat plants, with *Schoenus breviculmis*, *Astroloma humifusum* and *Lepidosperma carphoides* abundant.

Floristic Composition

Perennial taxa defining group	124
Annual taxa in group	31
Total taxa	155
Introduced taxa	7 (5%)
Native taxa	148
Mean of taxa at quadrats and range	37 (24-46)
Mean of native taxa per quadrat	35(24–46)
Mean of introduced taxa per quadrat	2 (0 – 5)
Percentage of quadrats with weeds	33%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

Australian	1
SA	5
SL region	15

Important Indicator species

Schoenus breviculmis, *Lepidosperma viscidum*, *Pultenaea canaliculata*, *Spyridium spathulatum*, *Styphelia exarrhena* and *Baeckea ramosissima* ssp. *ramosissima*.

ENVIRONMENTAL PARAMETERS

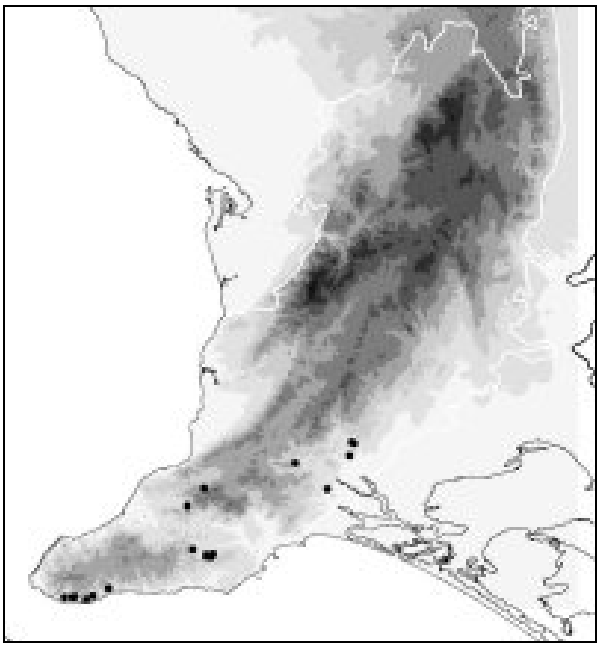
Typical Landform: Data for one quadrat only = hill slope
Typical Soil Type: Data for one quadrat only = medium clay
Quadrat Slope: Majority of quadrats are $<10^0$
Aspect: Southerly aspect = 67%
Mean elevation (metres) (and range): 210 (110 – 330)

DISTRIBUTION

All quadrats are in the south of the study region including: 6 near coastal quadrats in Deep Creek CP; 5 quadrats 3.4 to 4.4km ENE of Waitpinga; 2 quadrats SSE of Ashbourne, and quadrats in Myponga CP, Yulte CP and Scott CP. The eastern-most quadrats are near the eastern boundary of the Fleurieu IBRA region.

COMMENT

The quadrats contain a large number of eucalypts present in several combinations. However, the quadrats appear to be linked by the presence of sandy heath species including *Schoenus breviculmis*. The group quadrats are typically "heaths": characterised by a very high species diversity and are of high ecological integrity. This group has the second lowest ratio of weeds to native species (5%) and those weed species present were not considered to be serious threats to biodiversity. No weeds occurred at 67% of quadrats and no perennial weeds occurred at more than 40% of quadrats. "Mallee" eucalypts are present at 3 quadrats are in the south-east of the study region approaching the boundary with the Murray Darling Depression IBRA region.



Floristic Group 28.
1 = *Eucalyptus fasciculosa*, +/- *E. cosmophylla*, +/- *Acacia pycnantha* Low Woodland
2 = *Eucalyptus fasciculosa*, *E. baxteri*, +/- *Acacia pycnantha* Low Woodland – both sub-groups over *Xanthorrhoea semiplana* ssp., *Olearia ramulosa*

Number of quadrats in group = 69 (Survey 5 (20); Survey 42 (30); Survey 97(5); Survey 117 (14))

VEGETATION DESCRIPTION

Overstorey Structure and Dominant Species

Nine woodland and forest structural formations were represented with low woodland being the most common (9 quadrats) followed by low open forest (6 quadrats). Seventeen combinations of eucalyptus species were recorded as dominants with the most common being *E. fasciculosa* and *E. cosmophylla* occurring together (18 quadrats) followed by *E. fasciculosa* only (13 quadrats), then *E. fasciculosa* occurring with *E. baxteri* (8 quadrats). Because *E. baxteri* was recorded with *E. cosmophylla* at only two quadrats, this group has been split into the above two associations. *Acacia pycnantha* was a common sub-dominant within both associations. *Eucalyptus obliqua* most commonly occurred with *E. fasciculosa* (4 quadrats).

Eucalypts were recorded at the following frequencies: *E. fasciculosa* (87%), *E. cosmophylla* (43%), *E. baxteri* (17%), *E. obliqua* (14%), *E. leucoxylon* (10%), *E. viminalis* ssp. *cygnetensis* (3%), *E. viminalis* ssp. *viminalis* (3%), *E. diversifolia* (1%), *E. goniocalyx* (1%), *E. leptophylla* (1%) and *E. microcarpa* (1%).

Typical mid-stratum

Low shrubland and shrubland with *Xanthorrhoea semiplana* ssp. dominant and present at 88% of quadrats. Also abundant were *Olearia ramulosa*, *Acacia pycnantha*, *Acacia paradoxa* and *Hakea rostrata*.

Typical ground cover

Mat plants with *Gonocarpus tetragynus*, *Lepidosperma semiteres*, *Hibbertia riparia* (*glabriuscula*) and *Cheilanthes austrotenuifolia* abundant.

Floristic Composition

Perennial taxa defining group	236
Annual taxa in group	93
Total taxa	329
Introduced taxa	58 (18%)
Native taxa	271
Mean of taxa at quadrats and range	42 (19-81)
Mean of native taxa per quadrat	37 (16 – 70)
Mean of introduced taxa per quadrat	5 (0 – 14)
Percentage of quadrats with weeds	94%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

Australian	1
SA	9
SL region	24

Important Indicator species

Nil, however, 5 of the 6 survey records for the environmental weed, **Myrsiphyllum declinatum*, occurred in this group. Also five of the ten survey records for *Phyllanthus australis* were in Group 28.

ENVIRONMENTAL PARAMETERS

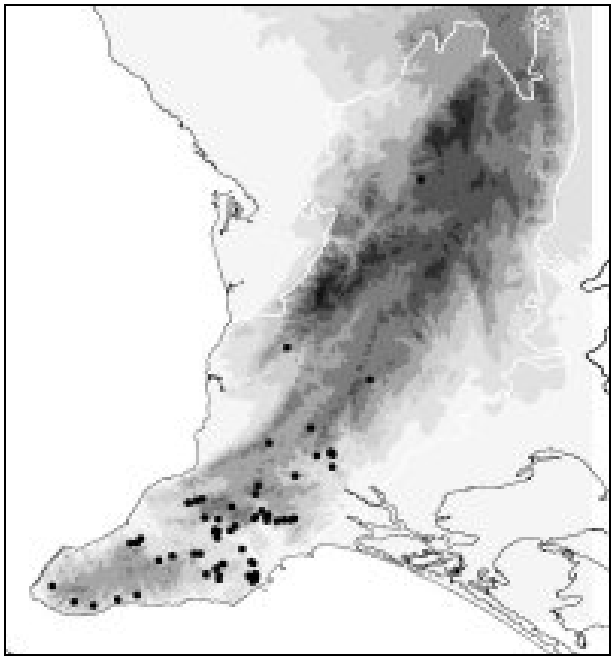
Typical Landform: Hill slope
Typical Soil Type: eight soil texture classes represented, ranging from light medium clay to sand, and with no single class dominant.
Quadrat Slope: Almost half the quadrats $<10^0$, but also an even spread of quadrats between 19^0 and 40^0.
Aspect: No trend evident.
Mean elevation (metres) (and range): 202 (100 – 500)

DISTRIBUTION

Most quadrats are in the south of the region including Mount Billy, Hindmarsh Valley Reservoir, Inman Valley, Spring Mount, Waitpinga, Lady Bay, Nangkita districts. Isolated, outlying quadrats are near Macclesfield, near Clarendon and near Warren Reservoir (atypical association for this group).

COMMENT

This group contains the highest total of native taxa (271 taxa) and the third highest average number of native taxa per quadrat.



Floristic Group 29.
1 = *Eucalyptus fasciculosa*, +/- *E. leucoxylon* Woodland over *Xanthorrhoea semiplana*
2 = *Eucalyptus fasciculosa*, +/- *Allocasuarina verticillata* +/- *E. cosmophylla* Low Woodland over *Xanthorrhoea semiplana*
3 = *Eucalyptus odorata*, +/- *E. fasciculosa*, +/- *E. phenax*, +/- *E. cosmophylla* Very Low Woodland and Mallee over *Acacia paradoxa* or *Allocasuarina verticillata*

Number of quadrats in group = 30 (Survey 5 (7 quadrats); Survey 42 (13); Survey 52(1); Survey 97 (1); Survey 117 (8))

VEGETATION DESCRIPTION

Overstorey Structure and Dominant Species

Seven structural formations present with woodland formations most common. In particular, low woodland, very low woodland and woodland each represented at four quadrats. A mallee and shrubland formation each represented at one quadrat. Within the 30 quadrats, 10 species were present as dominants or sub-dominants (8 eucalypts, *Acacia pycnantha* (recorded at 73% of quadrats) and *Allocasuarina verticillata* (recorded at 27% of quadrats).

Eucalypts were recorded at the following frequencies: *E. fasciculosa* (77%), *E. leucoxylon* (40%), *E. odorata* (17%), *E. cosmophylla* (17%), *E. phenax* (7%), *E. obliqua* (7%), *E. goniocalyx* (3%), *E. leptophylla* (3%) and *E. porosa* (3%).

Typical mid-stratum

Open shrubland and tall open shrubland with *Xanthorrhoea semiplana*, *Olearia ramulosa* and *Acacia paradoxa* dominant.

Typical ground cover

Open herbland with *Gonocarpus mezianus* dominant.

Floristic Composition

Perennial taxa defining group	172
Annual taxa in group	70
Total taxa	242
Introduced taxa	49 (20%)
Native taxa	193
Mean of taxa at quadrats and range	34 (12-55)
Mean of native taxa per quadrat	29 (9 –46)
Mean of introduced taxa per quadrat	5 (0 – 11)
Percentage of quadrats with weeds	93%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

Australian	Nil
SA	5
SL region	13

Important Indicator species

Nil

ENVIRONMENTAL PARAMETERS

Typical Landform: Hill slope
Typical Soil Type: Loam-dominated textures most common, particularly sandy loam.
Quadrat Slope: Bell-shaped distribution of quadrat slopes ranging from $4^0 – 25^0$ with most quadrats from $8^0 – 15^0$
Aspect: No clear trend.
Mean elevation (metres) (and range): 187 (50 - 3400

DISTRIBUTION

Quadrats are widely scattered, mostly within the southern half of the study region. Quadrats locations include: Deep Creek CP (several quadrats), Finniss CP and the Toooperang, Nangkita and Waitpinga districts. A northern isolated quadrat is 2.5km NNW of Mount Gawler, and 2 quadrats are near Macclesfield.

COMMENTS

Floristically and geographically similar to Group 28.

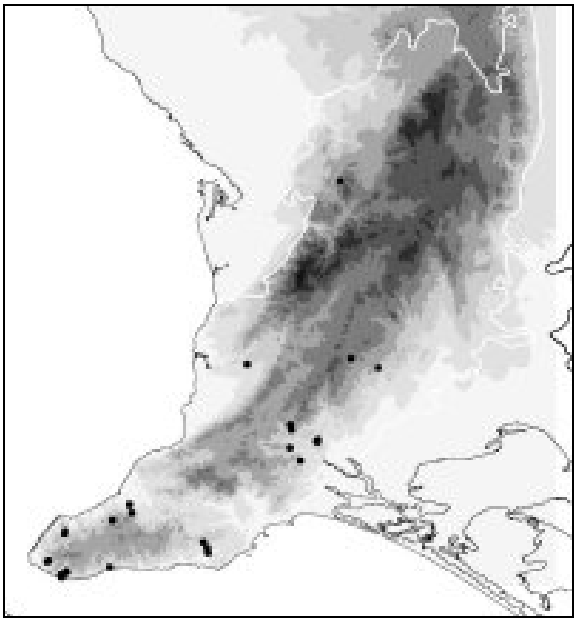


Figure 56.
Quadrat 117WIL01801 – floristic group 28. *Eualyptus cosmophylla – E. obliqua* (- *E. fasciculosa*) Low Open Forest over *Brachyloma ericoides* ssp. *ericoides*, *Hakea rostrata* and *Pultenaea daphnoides*.

Figure 57.
Quadrat 117WIL02101 – floristic group 29. *Eucalyptus fasciculosa* Low Woodland over *Hibbertia exutiacies*.

Floristic Group 30.
Eucalyptus fasciculosa*, +/–– *E. leptophylla*, +/- *E. phenax*, +/- *E. incrassata*, +/- *E. odorata* Mallee over *Astroloma humifusum

Number of quadrats in group = 16 (Survey 5 (5); Survey 42 (11))

VEGETATION DESCRIPTION
Overstorey Structure and Dominant Species
No structural information recorded electronically for this group.
This group of 16 quadrats contains nine eucalypt species, occurring in 13 combinations as dominants or sub-dominants. With the exception of *E. fasciculosa*, all the eucalyptus species are typically of mallee form and near the boundary of the Fleurieu and Mallee IBRA regions. *Eucalyptus fasciculosa* is the most common species (75% of quadrats), occurring either on its own (4 quadrats) or in combination with one or more of the mallee species. *Eucalyptus leucoxylon* was recorded once on its own and once with *E. incrassata*.

Eucalypts were recorded at the following frequencies: *E. fasciculosa* (75%), *E. leptophylla* (31%), *E. incrassta* (25%), *E. phenax* (19%), *E. leucoxylon* (13%), *E. odorata* (13%), *E. cosmophylla* (13%), *E. calycogona* (6%) and *E. socialis* (6% = 1 quadrat).

Typical mid-stratum
Tall open shrubland with *Acacia pycnantha*, *Xanthorrhoea semiplana*, *Olearia ramulosa*, *Acacia paradoxa*, *Acacia spinescens* and *Melaleuca uncinata* common.

Typical ground cover
Low open shrubland and open mat plants with *Lomandra multiflora* ssp. *dura*, *Astroloma humifusum*, *Hibbertia riparia* (*glabriscula*) and *Thysanotus patersonii* common.
Amyema miquelii was recorded at 75% of quadrats (every quadrat where *E. fasciculosa* was present).

Floristic Composition

Perennial taxa defining group	138
Annual taxa in group	50
Total taxa	188
Introduced taxa	24 (13%)
Native taxa	164
Mean of taxa at quadrats and range	40 (16-66)
Mean of native taxa per quadrat	36 (16-63)
Mean of introduced taxa per quadrat	4 (0 - 8)
Percentage of quadrats with weeds	81%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

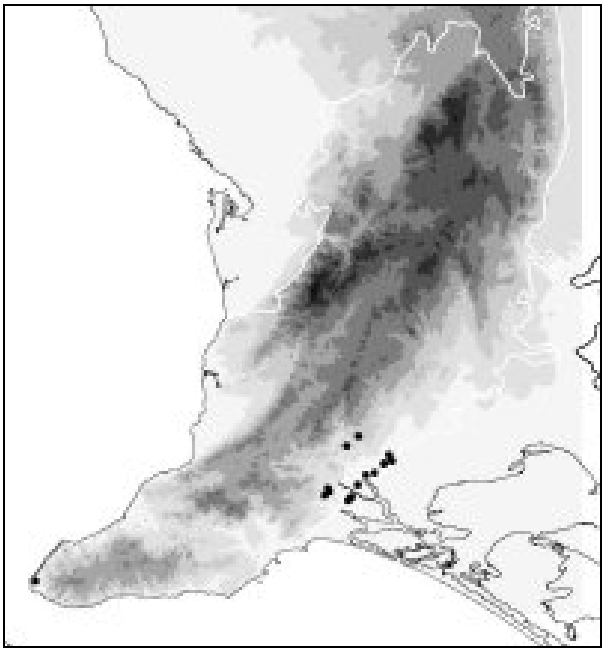
Australian	2
SA	8
SL region	29

Important Indicator species
Clematis microphylla and *Melaleuca uncinata*

ENVIRONMENTAL PARAMETERS
Typical Soil Type: No soil information available in electronic form
Quadrat Slope: Slope recorded for only 6 quadrats – all between 0^0 - 5^0
Aspect: Recorded for 6 quadrats only. Northerly Aspect = 50% Southerly Aspect = 50%
Mean elevation (metres) (and range): 63 (30 – 160)

DISTRIBUTION
All except one quadrat are clustered near the Kanmantoo and Murray Darling Depression IBRA region boundaries: within the Finniss – Ashbourne - Currency Creek district, including Scott CP (3 quadrats). One isolated quadrat was 10km WSW of Delamere.

COMMENT
This is a highly distinctive group, containing the mallee formations, atypical of the region (due to the quadrats being on the drier south-western boundary). This is reflected in the very high number of species with high significance values (refer Appendix X) and the high number of State and regionally rated plants. The native species diversity is relatively high. However, **Myrsiphyllum asparagoides* (Bridal Creeper) was recorded at 63% of quadrats. Mistletoe (*Amyema miquelii*) was recorded at 75% of quadrats, suggesting the Pink Gums may be under stress.



Floristic Group 31.
Eucalyptus diversifolia*, *+/- E. cosmophylla* Mallee over *Olearia axillaris

Number of quadrats in group = 3 (Survey 42 (3 quadrats))

VEGETATION DESCRIPTION
Overstorey Structure and Dominant Species
A mallee formation with *Eucalyptus diversifolia* dominant at all three quadrats: once on its own, once with *E. cosmophylla* and once with *E. cosmophylla*, *E. leptophylla* and *E. phenax*.

Typical mid-stratum
Correa pulchella, *Hibberita riparia* (*glabriuscula*), *Olearia axillaris and Spyridium coactilifolium* all recorded at all quadrats.

Typical ground cover
Lepidosperma congestum and *Gonocarpus mezianus*.

Floristic Composition

Perennial taxa defining group	65
Annual taxa in group	18
Total taxa	83
Introduced taxa	2 (2%)
Native taxa	81
Mean of taxa at quadrats and range	43 (27-51)
Mean of native taxa per quadrat	42 (26-51)
Mean of introduced taxa per quadrat	1 (0 - 1)
Percentage of quadrats with weeds	67%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

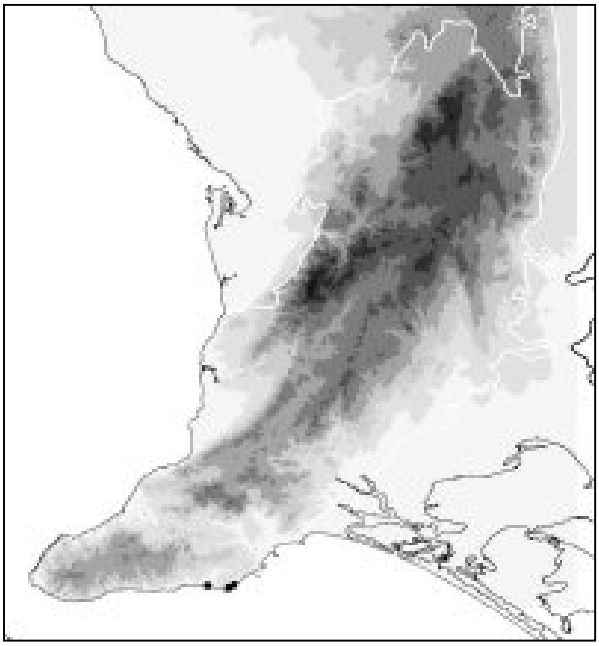
Australian	1
SA	3
SL region	18

Important Indicator species
Correa pulchella, *Dampiera lanceolata*, *Eriostemon pungens*, *Beyeria lechenaultii* and *Senecio odoratus* var. *obtusifolius*.

ENVIRONMENTAL PARAMETERS
Typical Landform: No landform information available in electronic form, however most likely to be coastal dunes.
Typical Soil Type: No soil information available in electronic form, but most likely to be sand and limestone
Quadrat Slope: Slope recorded for only 2 quadrats – 0^0 and 13^0
Aspect: Recorded for 2 quadrats only – 0^0 and 180^0
Mean elevation (metres) (and range): 80 (30 – 110)

DISTRIBUTION
The three quadrats are all recorded near the coast in Newland Head CP and Waitpinga Beach. One quadrat is likely to be on limestone-based soils due to the presence of *Acrotriche cordata* and *Gahnia deusta*.

COMMENT
These coastal mallee quadrats are of very high native species diversity and almost free of weeds. The 10m x 10m quadrats averaged at least 38 native species and only one introduced species.



Floristic Group 32.
1 = *Eucalyptus leucoxylon*, +/- *E. viminalis* ssp.,+/- *E. ovata*, +/- *E. fasciculosa*
2 = *Eucalyptus fasciculosa*, +/- *E. diversifolia*, +/- *E. cosmophylla*, +/- *E. odorata*, both sub-groups over *Acacia paradoxa*

Number of quadrats in group = 4 (Survey 42 = 4 quadrats)

VEGETATION DESCRIPTION

Overstorey Structure and Dominant Species

This is an ill-defined small group of four quadrats. Seven eucalypts were recorded in total with each probably representing a separate association:
E. fasciculosa - E. leucoxylon - E. ovata;
E. diversifolia - E. fasciculosa;
E. cosmophylla – E. fasciculosa – E. odorata; and
E. leucoxylon – E. viminalis.

The group is linked together by all quadrats containing *Acacia paradoxa* and the weed **Hypochaeris radicata* (Cat's Ear).

Typical mid-stratum

Acacia paradoxa present at all quadrats.

Typical ground cover

A sedgeland, herbland or matland

Floristic Composition

Perennial taxa defining group	64
Annual taxa in group	14
Total taxa	78
Introduced taxa	13 (17%)
Native taxa	65
Mean of taxa at quadrats and range	28 (17-39)
Mean of native taxa per quadrat	22 (11-35)
Mean of introduced taxa per quadrat	6 (4 - 8)
Percentage of quadrats with weeds	100%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

Australian	Nil
SA	1
SL region	6

Important Indicator species

Solanum laciniatum one of only two survey records.

ENVIRONMENTAL PARAMETERS

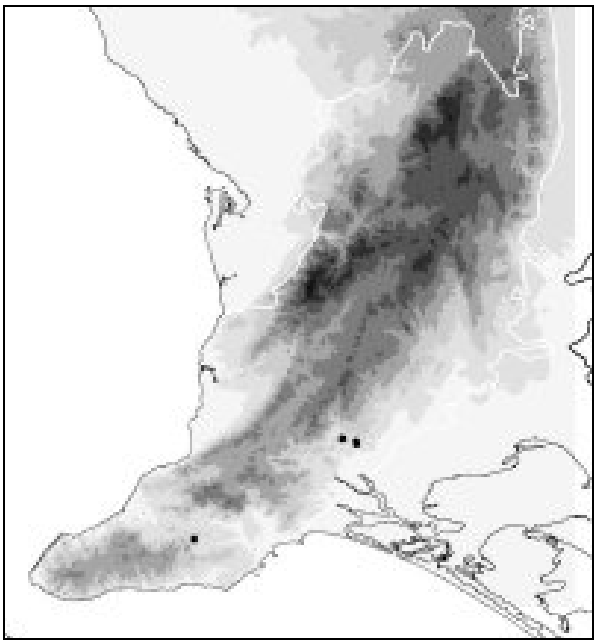
Typical Landform: No landform information available in electronic form
Typical Soil Type: No soil information available in electronic form
Quadrat Slope: Slope recorded for only 3 quadrats –$5^{0,}$ 18^0 and 80^0
Aspect: Recorded for 3 quadrats only – 4^0, 20^0 and 130^0
Mean elevation (metres) (and range): 114 (95 – 130)

DISTRIBUTION

A cluster of three quadrats, 3.1 to 5.6km SSE of Ashbourne and one quadrat 9.5km NNW of Waitpinga.

COMMENT

The two *E. leucoxylon +/– E. viminalis +/– E. ovata* quadrats are likely to be temporary wetlands, as several wetland species and/or high rainfall species were recorded including *Juncus* species and *Gratiola peruviana*, *Solanum laciniatum*, *Callistemon rugulosus* and *Eucalyptus ovata*, itself.



Floristic Group 33.
***Melaleuca lanceolata* Tall Shrubland**

Number of quadrats in group = 1 (Survey 5 = 1 quadrat)

VEGETATION DESCRIPTION
Overstorey Structure and Dominant Species
Melaleuca lanceolata tall shrubland

MID-STRATUM
Pultenaea daphnoides and *Dodonaea viscosa* ssp. *spatulata* dominant

Ground cover
Absent

Floristic Composition

Perennial taxa defining group	7
Annual taxa in group	6
Total taxa	18
Introduced taxa	9 (50%)
Native taxa	9

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

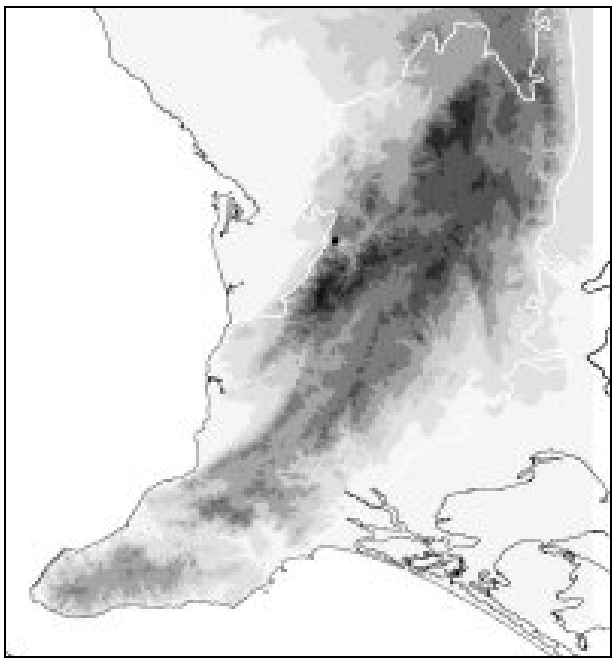
Australian	Nil
SA	Nil
SL region	Nil

Important Indicator species
**Carthamus lanatus* (Saffron thistle) and *Melaleuca lanceolata*

ENVIRONMENTAL PARAMETERS
Landform: No landform information available in electronic form
Soil type: No soil information available in electronic form
Quadrat Slope: 1 quadrat = $33^{0,}$
Aspect: 1 quadrat = 310^{0}
Elevation (metres): 180

DISTRIBUTION
Torrens Gorge, 5.8km ENE of Rostrevor (north-east of Athelstone)

COMMENT
Because this quadrat was based on a 10m x 10m quadrat, it is quite likely that this floristic grouping is part of a larger vegetation association or structure. The lack of ground cover, low native species diversity (5 species) and presence of the perennial weeds **Asclepias rotundifolia* and **Carthamus lanatus* suggests it was a relatively disturbed quadrat**.**



Floristic Group 34.
1 = *Eucalyptus odorata*, *E. porosa*, *E. phenax* Mallee
2 = *Eucalyptus oleosa*, *E. leptophylla*, *E. fasciculosa* Mallee

Number of quadrats in group = 2 (Survey 42 = 2 quadrats)

VEGETATION DESCRIPTION
Overstorey Structure and Dominant Species
Mallee formations with six eucalyptus species recorded, and representing two associations (as shown above).

Typical mid-stratum
Tall open shrubland with *Melaleuca lanceolata* common to both quadrats.

Typical ground cover
Tussock grassland/ sedgeland. *Lepidosperma viscidum* and *Lomandra effusa* common to both quadrats.

Floristic Composition

Perennial taxa defining group	22
Annual taxa in group	11
Total taxa	33
Introduced taxa	10 (30%)
Native taxa	23
Mean of taxa at quadrats and range	21 (16-24)
Mean of native taxa per quadrat	15 (11-18)
Mean of introduced taxa per quadrat	6 (5 - 6)
Percentage of quadrats with weeds	100%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

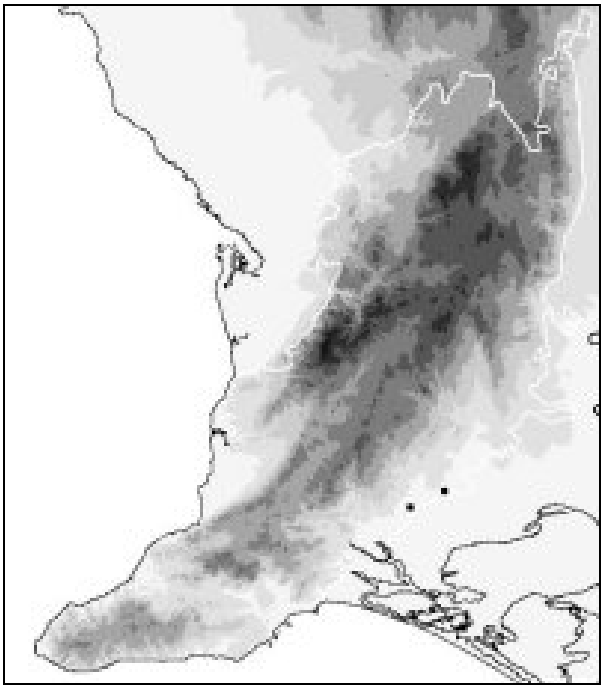
Australian	Nil
SA	Nil
SL region	8

Important Indicator species
Lomandra effusa (two of five survey records), *Melaleuca lanceolata*, *Einadia nutans*, *Gahnia lanigera*, *Gahnia deusta*, *Enchylaena tomentosa* and *Melaleuca acuminata*.

ENVIRONMENTAL PARAMETERS
Typical Landform: No landform information available in electronic form.
Typical Soil Type: No soil information available in electronic form.
Quadrat Slope: 1 quadrat = $0^{0,}$
Aspect: 1 quadrat = $0^{0,}$
Mean elevation (metres) (and range):45 (45 – 45)

DISTRIBUTION
Two quadrats near the boundary of the Fleurieu and Mallee IBRA regions: 6.3km SSW of Strathalbyn and 5.5km SSW of Bletchley.

COMMENT
Like group 30, this group represents the typical mallee eucalypts, and contains many species more typical of the Murray Darling Depression IBRA region rather than the study region. Most species recorded in Group 34 have a very low frequency of occurrence in the study region, which is reflected in the very high significance values (refer Appendix X). In both groups, the ratio of weeds to native taxa is relatively high, including the presence of **Myrsiphyllum asparagoides* and **Lycium ferocissimum*.



Floristic Group 35.
Allocasuarina verticillata*, *+/- Eucalyptus odorata*, *+/- E. leucoxylon* Low Woodland over *Acacia pycnantha

Number of quadrats in group = 2 (Survey 42 = 2 quadrats)

VEGETATION DESCRIPTION
Overstorey Structure and Dominant Species
A woodland

Typical mid-stratum
Sparse tall shrub layer with *Pittosporum phylliraeoides* var. *microcarpa* present at both quadrats.

Typical ground cover
An open (tussock) grassland/herbland including *Lomandra densiflora*, *Lomandra micrantha* ssp. *Austrostipa elegantissima* and *Themeda triandra*.

Floristic Composition

Perennial taxa defining group	29
Annual taxa in group	9
Total taxa	38
Introduced taxa	11 (29%)
Native taxa	27
Mean of taxa at quadrats and range	32 (29-34)
Mean of native taxa per quadrat	25(21–28)
Mean of introduced taxa per quadrat	7 (6 – 8)
Percentage of quadrats with weeds	100%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

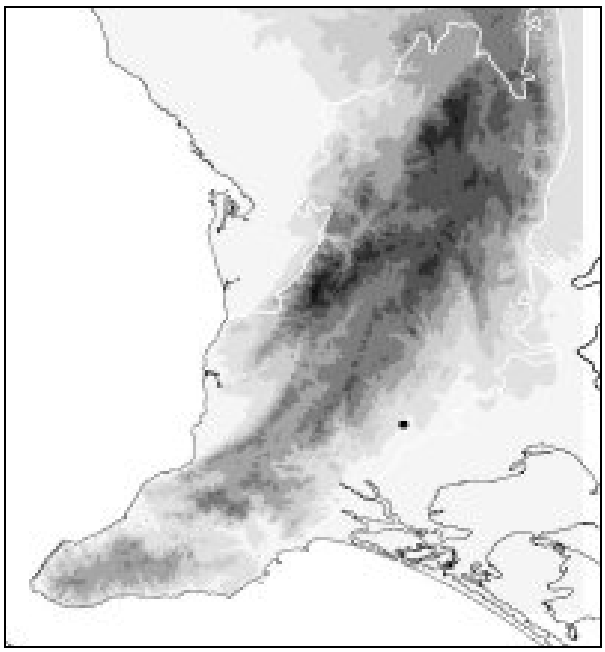
Australian	Nil
SA	Nil
SL region	4

Important Indicator species
Pittosporum phylliraeoides var. *microcarpa*, *Austrostipa elegantissima*, *Einadia nutans*, *Enchylaena tomentosa* and *Pomaderris paniculosa* ssp. *paniculosa*.

ENVIRONMENTAL PARAMETERS
Typical Landform: No landform information available in electronic form
Typical Soil Type: No soil information available in electronic form
Quadrat Slope: Slope recorded for only 1 quadrat = 4^0
Aspect: Recorded for 1quadrat only = 330^0
Mean elevation (metres) (and range): 70 (70 – 70)

DISTRIBUTION
The two quadrats are very close together: 1.1km SSE of Strathalbyn and 1.1km ESE of Strathalbyn.

COMMENT
The majority of species present at both quadrats are more typical of the mallee region (as do other quadrats in this district south of Strathalbyn - refer Groups 30 and 34). Weeds comprise 29% of all species recorded.



Floristic Group 36.
***Olearia axillaris*, *Rhagodia candolleana*, *Acacia longifolia* var. *sophorae*, +/- *Leucopogon parviflorus*, +/- E. *diversifolia* Shrubland**

Number of quadrats in group =15 (Survey 5 (2); Survey 42 (12); Survey 117 (1))

VEGETATION DESCRIPTION
Overstorey Structure and Dominant Species
A coastal shrubland.

TYPICAL MID-STRATUM
A low shrubland with *Pimelea serpyllifolia* ssp. *serpyllifolia* common.

Typical ground cover
Low shrubland or sedgeland with *Isolepis nodosa*, *Tetratheca implexicoma*, *Lepidosperma gladiatum*, *Muehlenbeckia gunnii* and the weed **Myrsiphyllum asparagoides* common.

Floristic Composition

Perennial taxa defining group	79
Annual taxa in group	22
Total taxa	101
Introduced taxa	24 (24%)
Native taxa	77
Mean of taxa at quadrats and range	18 (4-36)
Mean of native taxa per quadrat	14 (2 –33)
Mean of introduced taxa per quadrat	4 (0 – 8)
Percentage of quadrats with weeds	93%

IMPORTANT INDICATOR SPECIES
Rhagodia candolleana ssp. *candolleana*, *Tetratheca implexicoma*, *Muehlenbeckia gunnii*, *Acacia longifolia* var. *sophorae* and *Lepidosperma gladiatum*.

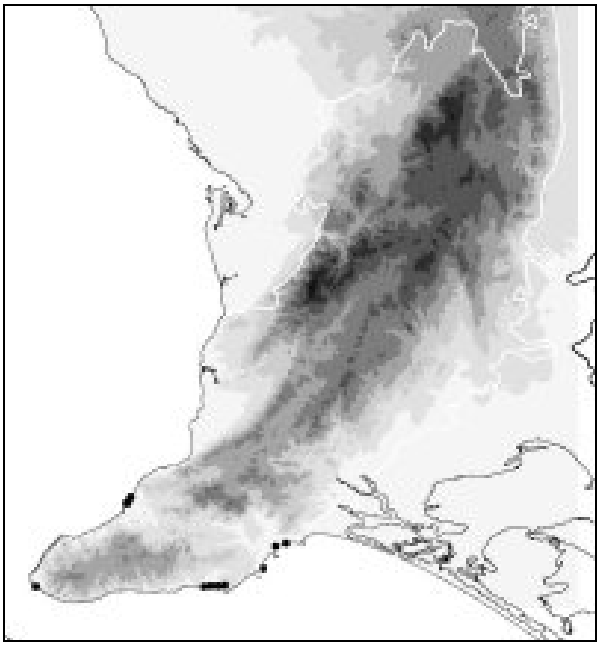
In addition, this group contained the only survey records for the following species:
**Cakile maritima* ssp. *maritima* (3 survey records), *Euphorbia paralias* (3 records), *Leucophyta brownii*, *Oenethera stricta* ssp. *stricta* (4 records), *Poa poiformis* (3 records), *Swainsona lessertiifolia* (4 records), *Threlkeldia diffusa* (5 records), *Adriana klotzschii* (2 records), *Myoporum insulare* (2 records), *Scaevola crassifolia* (2 records) and *Spinifex sericeus* (2 records).

ENVIRONMENTAL PARAMETERS
Typical Landform: Dune slope
Typical Soil Type: Sand
Quadrat Slope: Most quadrats $<5^0$
Aspect: Northerly aspect = 54%
Mean elevation (metres) (and range): 33 (0 – 170)

DISTRIBUTION
All quadrats were coastal in the south of the region with quadrats concentrated in the Port Elliot to Victor Harbor district (3 quadrats); Normanville (5 quadrats), Newland Head CP (5 quadrats) and south of Cape Jervis (2 quadrats)

COMMENT
This is a well-defined group, containing the distinctive assemblage of species associated with coastal dunes. At least 11 species were only recorded from this group (refer Appendix X). The exclusive presence of many species in a coastal environment helps account for the high number of regionally rated plants in this group.

Figure 58.
Quadrat 117TOR01801. *Olearia axillaris* – *Acacia longifolia* var. *sophorae* Shrubland over *Rhagodia candolleana* ssp. *candolleana*, *Myrsiphyllum asparagoides*, *Lepidosperma gladiatum*, *Pimelea serpyllifolia* ssp. *serpyllifolia* and *Tetragonia implexicoma*.



Floristic Group 37.
1 = *Eucalyptus viminalis* ssp. *viminalis* Open Forest
2 = *Eucalyptus ovata*, *+/- E. obliqua*
3 = *Eucalyptus cosmophylla*, *+/- E. baxteri* over wet heaths/ sedgelands
4 = *Phragmites australis*, *Leptospermum lanigerum*

Number of quadrats in group = 18 (Survey 5 (3); Survey 42 (10); Survey 52 (3) and Survey 117 (2)

VEGETATION DESCRIPTION
Overstorey Structure and Dominant Species
This group mainly includes wet creeklines. Six eucalypt species were recorded as follows (numbers in brackets indicate number of quadrats from which recorded): *E. obliqua* (5), *E. cosmophylla* (4), *E. ovata* (3), *E. viminalis* ssp. *viminalis* (3), *E. baxteri* (2) and *E. fasciculosa* (1). No eucalypt species were recorded as dominants in seven groups – these were swamps/stream channels. These quadrats are dominated by *Phragmites australis*, *Leptospermum continentale*, *Leptospermum lanigerum* and/or *Acacia retinodes*.

Typical Mid-stratum
Leptospermum continentale, *Leptospermum lanigerum* and **Rubus* sp. were dominant.

Typical ground cover
A sedgeland, including *Gahnia sieberiana*, *Pteridium esculentum*, *Carex appressa*, *Gratiola peruviana* and *Epilobium pallidiflorum*.

Floristic Composition

Perennial taxa defining group	118
Annual taxa in group	31
Total taxa	149
Introduced taxa	36 (24%)
Native taxa	113
Mean of taxa at quadrats and range	28 (14-57)
Mean of native taxa per quadrat	23 (11-45)
Mean of introduced taxa per quadrat	5(0 – 15)
Percentage of quadrats with weeds	94%

Number of conservation significant species

Australian	Nil
SA	14
SL region	25

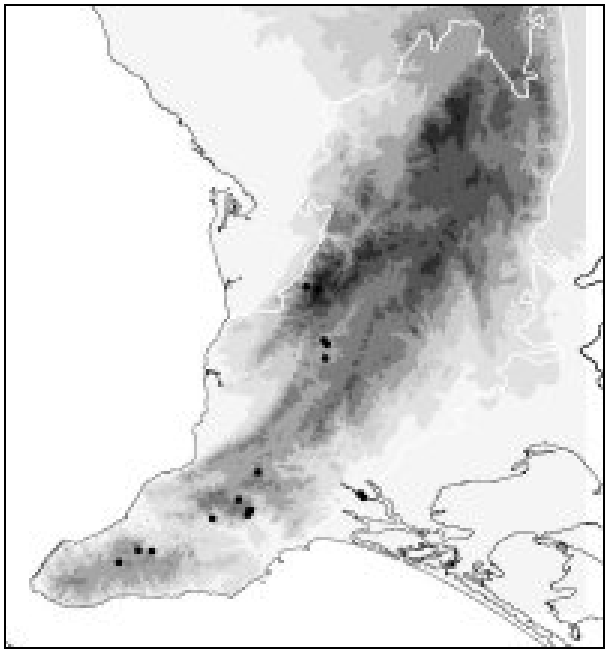
Important Indicator species
Carex appressa, *Phragmites australis*, *Epilobium pallidiflorum*, *Persicaria decipiens*, *Juncus pauciflorus*, *Blechnum nudum* and *Hypolepis rugulosa*

ENVIRONMENTAL PARAMETERS
Typical Landform: Stream channel
Typical Soil Type: Silty clay loam
Quadrat Slope: 16 of 18 quadrats $<5^0$
Aspect: Southerly aspect = 69%
Mean elevation (metres) (and range): 260 (10 – 608)

DISTRIBUTION
A widely dispersed group with 5 main clusters:
Mylor – Echunga district
One quadrat at Cleland CP
Currency Creek Winery and district
SE of Spring Mount
SW of Spring Mount

COMMENT
This group contains six eucalypts, which do not often occur together. However, all understorey species occurring in more than 40% of quadrats within the group are often associated with wetlands.

Figure 59.
Quadrat 117ADE02101. *Leptospermum lanigerum – Acacia retinodes* var. *retinodes* (swamp form) -Oxylobium lanceolatum* Tall Shrubland over *Blechnum minus*, *Gleichenia microphylla* and *Gahnia sieberiana*.**



Floristic Group 38. *Eucalyptus ovata* Open Forest over wet heath

Number of quadrats in group = 10 (Survey 5(3); Survey 42 (5); Survey 52 (2))

VEGETATION DESCRIPTION

Overstorey Structure and Dominant Species

Open Forest formation. *Eucalyptus ovata* (7 quadrats) and *E. fasciculosa* (1 quadrat) were the only eucalypt species recorded. Two quadrats were a *Leptospermum lanigerum* shrubland and one quadrat was a *Melaleuca decussata* closed shrubland with emergent *Acacia retinodes*. Many of these quadrats were swamps.

Typical mid-stratum

The dense, diverse understorey contains bushes, sedges and herbaceous plants. Common shrubs are *Goodenia ovata*, *Leptospermum lanigerum* and *Melaleuca decussata*.

Typical ground cover

A ground cover of sedges and rushes including *Baumea juncea*, *Pteridium esculentum*, *Juncus kraussii*, *Juncus pauciflorus*, *Juncus articulatus*, *Eleocharis gracilis*, *Gratiola peruviana* and *Acaena* sp.

Floristic Composition

Perennial taxa defining group	84
Annual taxa in group	19
Total taxa	103
Introduced taxa	17 (17%)
Native taxa	86
Mean of taxa at quadrats and range	23 (9-50)
Mean of native taxa per quadrat	19 (8-45)
Mean of introduced taxa per quadrat	4 (0-10)
Percentage of quadrats with weeds	70%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

Australian	Nil
SA	5
SL region	14

Important Indicator species

Eucalyptus ovata, *Gahnia trifida* and *Triglochlin striatum*.

ENVIRONMENTAL PARAMETERS

Typical Landform: Electronic data exists for 2 quadrats = a plain

Typical Soil Type: Data for 2 quadrats recorded electonically = loam

Quadrat Slope: Most quadrats $<5^0$

Aspect: Northerly aspect = 62%

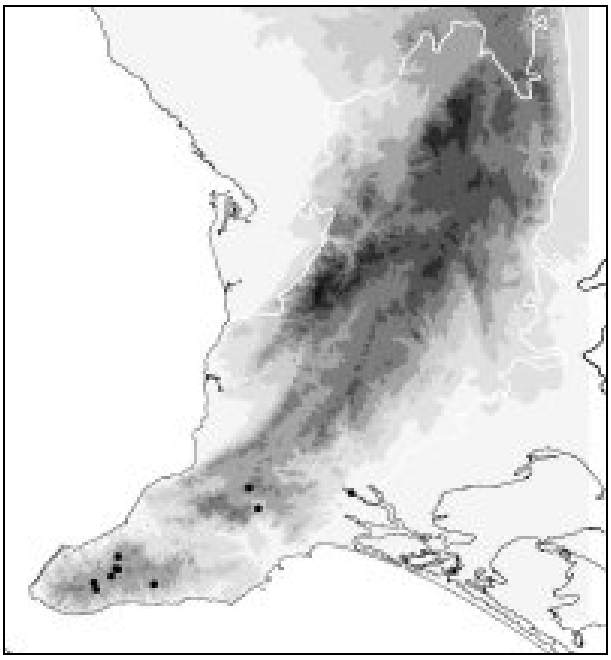
Mean elevation (metres) (and range): 252 (40 – 360)

DISTRIBUTION

Swamps and wide valleys of Southern Fleurieu Peninusula, including locations at Gold Diggings Swamp, Deep Creek CP, near Mt Compass, Second Valley Forest, Double Bridges, 4.8 km WSW of Finniss and 4 quadrats up to 6.8km ESE of Delamere**.**

COMMENT

All the survey quadrats were relatively weed-free and contain many plants of regional conservation value. Swamp Gum open forest is a plant association of State conservation value (refer above for further details). Boomsma and Lewis (1981) state that of all the eucalypts in South Australia, Swamp Gum occurs in some of the frostiest, wettest and most poorly drained quadrats.



Floristic Group 39. *Carex appressa*, *Juncus pallidus* Closed Sedgeland (swamps)

Number of quadrats in group = 6 (Survey 42 (3); Survey 52 (3))

VEGETATION DESCRIPTION

Overstorey Structure and Dominant Species

Absent

Typical mid-stratum

A closed sedgeland dominated by *Carex* and *Juncus* species.

Typical ground cover

Sedges including *Eleocharis gracilis* and *Isolepis inundata*.

Floristic Composition

Perennial taxa defining group	60
Annual taxa in group	15
Total taxa	75
Introduced taxa	24 (32%)
Native taxa	61
Mean of taxa at quadrats and range	25 (17-41)
Mean of native taxa per quadrat	18(13–28)
Mean of introduced taxa per quadrat	7 (3 – 13)
Percentage of quadrats with weeds	100%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

Australian	Nil
SA	6
SL region	10

Important Indicator species

Eleocharis gracilis, *Isolepis inundata*, *Juncus effusus* and *Glyceria australis*.

ENVIRONMENTAL PARAMETERS

Typical Landform: Swamp, stream channel, plain

Typical Soil Type: loam

Quadrat Slope: Most quadrats $<5^0$

Aspect: Southerly aspect = 60%

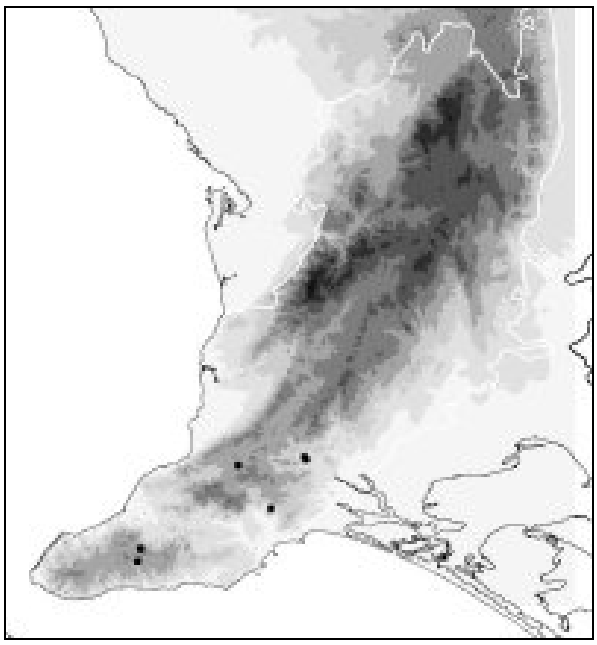
Mean elevation (metres) (and range): 220 (130 – 320)

DISTRIBUTION

Locations include two quadrats SE of Nangkita, 9.7km SSE of Lady Bay, 6.9km NNE of Spring Mount, 11.3km ESE of Delamere and 5km NNE of Hindmarsh Valley.

COMMENT

This group comprises swamps and wetlands of Fleurieu Peninsula including gullies and perched swamps. These landforms have a distinct floristic assemblage as shown by the high number of species largely confined to this group (or with few records outside of this group).



Floristic Group 40.
Leptospermum continentale*, *Leptospermum lanigerum*, +/- *Phragmites australis* Shrubland +/- emergent *Eucalyptus ovata

Number of quadrats in group = 63 (Survey 42 (25 quadrats); Survey 52 (36); Survey 117 (2))

VEGETATION DESCRIPTION

Overstorey Structure and Dominant Species

Typically, a tree layer is absent, but eucalypts were recorded at the following frequencies: *E. cosmophylla* (11%), *E. obliqua* (8%) and *E. ovata* (8%).

Typical mid-stratum

Tall wet shruland with *Leptospermum continentale*, *Viminaria juncea*, *Leptospermum lanigerum* and/or *Melaleuca decussata* dominant or sub-dominant.

Typical ground cover

Closed sedgleland and herbland with *Gahnia sieberiana*, *Lepidosperma longitudinale*, *Bamea rubiginosa*, *Empodisma minus* and *Gleichenia microphylla* dominant or abundant.

Floristic Composition

Perennial taxa defining group	142
Annual taxa in group	39
Total taxa	181
Introduced taxa	28 (15%)
Native taxa	153
Mean of taxa at quadrats and range	29 (11-61)
Mean of native taxa per quadrat	25 (10-54)
Mean of introduced taxa per quadrat	4 (0 – 10)
Percentage of quadrats with weeds	83%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

Australian	1
SA	36
SL region	56

Important Indicator species

Baumea tetragona, *Empodisma minus*, *Blechnum minus*, *Baumea rubiginosa*, *Viminaria juncea*, *Juncus planifolius*, *Leptocarpus tenax*, **Lotus uliginosus*, *Eleocharis gracilis*, *Gonocarpus micranthus*, *Melaleuca squamea*, *Sprengelia incarnata*, *Xyris operculata*, *Gleichenia microphylla*, *Baumea gunnii*, *Utricularia dichotoma*, *Schoenus lepidosperma* ssp. *lepidosperma* and *Scheonus carsei*.

ENVIRONMENTAL PARAMETERS

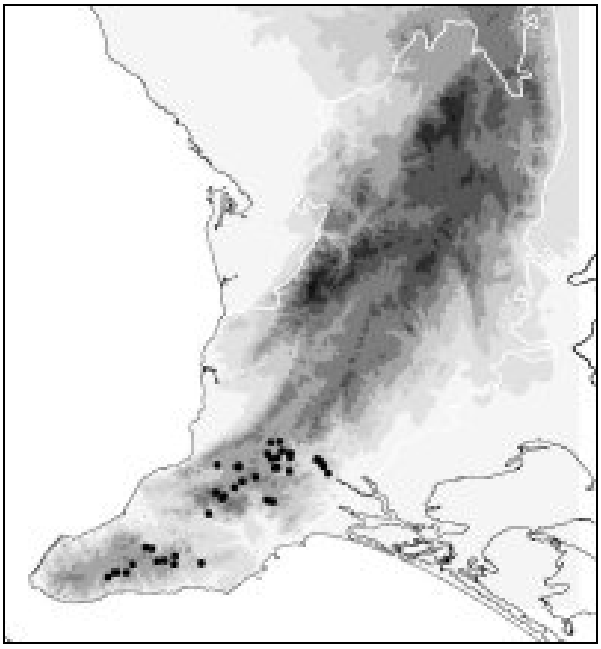
Typical Landform: Perched swamp and swamps
Typical Soil Type: Loam
Quadrat Slope: Most quadrats are $<5^0$.
Aspect: Southerly aspect = 77%.
Mean elevation (metres) (and range): 235 (80 – 470)

DISTRIBUTION

Fleurieu Peninsula gullies, ranging from 1.5km SSE of Myponga Hill in the north to Deep Creek in the south-west. Quadrats are concentrated in the Toooperang, Mount Compass and Yundi districts.

COMMENT

Most quadrats are typical Fleurieu Peninsula swamps. This group contains by far the most number of State and regionally conservation-rated plant species. This is because many species are found only in swamps (as reflected by the very high significance values – refer Appendix X). Most swamps appear to contain few perennial weeds. This is one of the few groups where there is a significant difference in aspect – 77% of quadrats were south facing, reflecting the cool, wet requirements of these swamp plants.



Floristic Group 41.
1 = *Eucalyptus obliqua*, *E. ovata*, +/- *E. cosmophylla* Open Forest over wet heaths (gullies)
2 = *Eucalyptus cosmophylla*, *E. baxteri* Open Forest over wet heaths
3 = *Leptospermum continentale*, *Melaleucca decussata* Closed Shrubland over *Lepidosperma longitudinale*, all sub-groups over *Acacia verticillata*, *Melaleuca decussata.*

Number of quadrats in group = 15 SS 5(4); 42(7); 52(3); 117(1))

VEGETATION DESCRIPTION
Overstorey Structure and Dominant Species
The following eucalyptus species were recorded (numbers in brackets indicate % frequency of occurrence): *E. ovata* (47%), *E. cosmophylla* (40%), *E. obliqua* (40%) and *E. baxteri* (13%).

Typical mid-stratum
Wet tall shrubland with *Acacia verticillata and Melaleuca decussata* present at all quadrats. *Leptospermum continentale* and *Hakea rostrata* were also common.

Typical ground cover
Closed sedgeland, low shrubland with *Patersonia occidentalis*, *Baumea juncea*, *Lepidosperma longitudinale* common.

Floristic Composition

Perennial taxa defining group	132
Annual taxa in group	30
Total taxa	162
Introduced taxa	18 (11%)
Native taxa	144
Mean of taxa at quadrats and range	37(17-67)
Mean of native taxa per quadrat	32(17-61)
Mean of introduced taxa per quadrat	5 (0 - 11)
Percentage of quadrats with weeds	47%

NUMBER OF CONSERVATION SIGNIFICANT SPECIES

Australian	1
SA	16
SL region	19

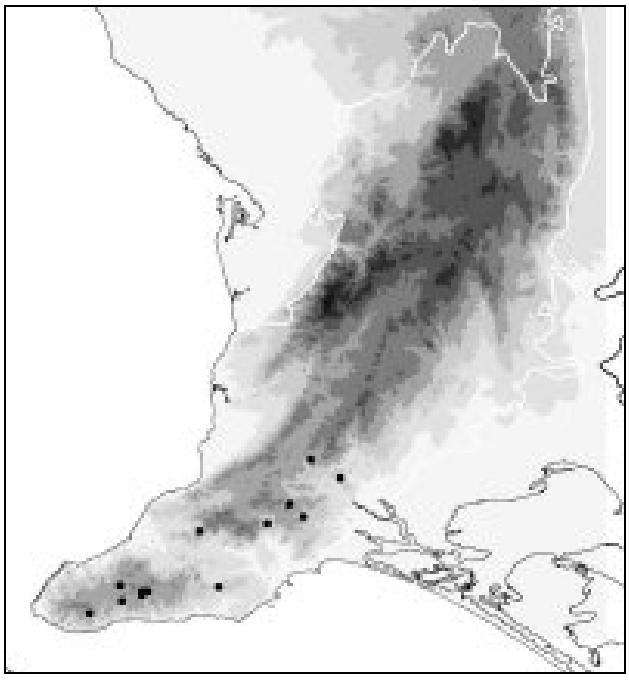
Important Indicator species
Patersonia fragilis, *Chorisandra enodis* and *Xanthosia tasmanica*

ENVIRONMENTAL PARAMETERS
Typical Landform: Swamps and gullies
Typical Soil Type: Loam
Quadrat Slope: Most quadrats $<5^0$
Aspect: Northerly aspect = 73%
Mean elevation (metres) (and range): 263 (140 – 310)

DISTRIBUTION
Fleurieu Peninsula including Deep Creek CP, Myponga CP, Hindmarsh Falls, several quadrats from 6 – 10km east of Delamere (including Second Valley Forest Reserves).

COMMENT
This group contains a mix of both wetland and non-wetland species. Some quadrats are swamps or gullies and some quadrats are also dryland hill slopes.

Figure 60.
Quadrat 117TOR01501. *Leptospermum continentale* Tall Closed Shrubland over *Lepidosperma longitudinale*.



VEGETATION MAPPING

F.M. Smith[1]

VEGETATION MAPPING GROUPS

The mapping project was conducted in 2000, prior to the floristic analysis presented in this report. The mapped area was also greater than the study area applicable to the remainder of this Biological Survey report (see Methods chapter). The vegetation groups that formed the basis for the mapping were derived from a PATN analysis of approximately 600 quadrats in 1986 (these quadrats constituted the Southern Mt Lofty Biological Survey, the majority of which were also included in the floristic analysis presented in the Vegetation section of this report). Since the 1985 PATN analysis, a further 900 quadrats have been surveyed providing extensive information of the vegetation within the Mount Lofty Ranges, surrounding plains and coastal region.

Throughout the mapping new vegetation groups were added to the list determined from the 1986 analysis. New groups were determined to cover several situations. These included known vegetation communities missed from the analysis, similar vegetation communities occurring in disjunct distributions or vegetation groups for highly disturbed areas of vegetation. Examples of the vegetation communities missed in the analysis were the mallee vegetation on the plains around Lake Alexandrina and coastal vegetation.

Additional vegetation groups were included to describe vegetation communities that existed in the area but had not been represented in the quadrats analysed. New groups were also added where there was uncertainty about whether the vegetation group was likely to be the same as one already described, because while the relevant aerial photography tones and textures appeared similar the two groups were geographically separated. Where possible new groups were described on the basis of existing literature, field knowledge and field checking. Some new groups were only briefly or generically described. This occurred particularly where there was little to no information available, making it difficult to be definitive about the species representative of the group.

While tree cover was apparent on the aerial photograph it was extremely difficult to estimate what the understorey may have been, without the ability to field check every location. In some cases vegetation groups were created specifically to represent areas of tree cover with an understorey which mainly consists of introduced grasses and pasture species. The interpretation of the photography relied predominantly on the detection of a texture for the tree layer or top layer of the vegetation. Photographic interpretation was not always able to detect differences in the condition of the understorey unless the understorey altered the texture of the photographic pattern.

On the basis of this ability to detect differences on the photography the original 1986 list of 40 PATN groups was refined to a list of commonly occurring overstorey species. New groups were added based on the composition of the overstorey species identified from the site data. The classification of the understorey species was secondary to this. Similarly the structure was also generalised for the overstorey composition. Distinctions between groups with similar overstorey species were based on distinct understorey differences, structural distinctions (such as coastal variation, open grassland understorey versus shrubland or heathland) or geographic differences.

The final list of 152 groups mapped in the region is provided in Table 25, with a unique numeric code, “mu_50”. This table provides details about the general physical or geographic aspects of each vegetation group. Twenty-eight vegetation groups relate to the groups from the 1986 PATN analysis and are identified in Table 24.

[1] F.M.Smith: Environmental Analysis and Research Unit, Environmental Information, Department for Environment and Heriage, PO Box 550, MARLESTON SA 5033.

Table 24.
Summary of the South Mount Lofty Ranges vegetation mapping groups including distribution information for each group and the origin to the 1986 PATN analysis.

MU_50	Detailed Floristic Description	Distribution details	Group from 1986 PATN analysis
101	*Eucalyptus obliqua* over *Pultenaea daphnoides, Lepidosperma semiteres, Hakea rostrata, Acrotriche serrulata, Platylobium obtusangulum, Pteridium esculentum, Xanthorrhoea semiplana* ssp. *semiplana* Open Forest	Common community in main spine of Mt Lofty Ranges	No
102	*Eucalyptus obliqua* over *Banksia marginata, Epacris impressa, Allocasuarina striata, Lepidosperma semiteres, L. carphoides, Hibbertia riparia* Very Low Open Woodland	Deep Creek conservation park community	No
103	*Eucalyptus obliqua* over *Xanthorrhoea semiplana* ssp. *tateana, Acacia myrtifolia* var. *myrtifolia, Hakea rostrata, Lepidosperma semiteres, Olearia teretifolia* Low Open Forest	Coastal community in southern Fleurieu	No
104	*Eucalyptus obliqua* over *Xanthorrhoea semiplana* ssp., *Acacia myrtifolia* var. *myrtifolia, Hibbertia riparia, Hakea rostrata, Platylobium obtusangulum, Lepidosperma semiteres, Pultenaea involucrata* Low Woodland	Kuitpo region	No
105	*Eucalyptus obliqua, +/- E. camaldulensis* var. *camaldulensis, +/- E. leucoxylon* ssp. over *Acacia pycnantha, *Linum trigynum, *Briza maxima* Open Forest	Found in north eastern side of ranges	No
201	*Eucalyptus baxteri, E. obliqua* over *Lepidosperma semiteres, Pultenaea daphnoides, Hakea rostrata, Epacris impressa, Acrotriche serrulata, Platylobium obtusangulum* Open Forest	Common community throughout main spine of Mt Lofty Ranges	Yes
202	*Eucalyptus baxteri, E. obliqua, E. cosmophylla* over *Lepidosperma semiteres, Pultenaea involucrata, Isopogon ceratophyllus, Platylobium obtusangulum, Tetratheca pilosa* ssp. *pilosa* Low Open Forest	Found in wet Kuitpo and southern Fleurieu area	Yes
203	*Eucalyptus baxteri, E. obliqua, E. fasciculosa* over *Acacia myrtifolia* var. *myrtifolia, Leptospermum myrsinoides, Hakea rostrata, Platylobium obtusangulum, Ixodia achillaeoides* ssp. *achillaeoides* Low Woodland	Southern Fleurieu along the eastern side of ranges	No
301	*Eucalyptus ovata* over *Goodenia ovata, Leptospermum continentale, Melaleuca decussata, Acacia retinodes* var. *retinodes* (swamp form), *Baumea juncea, Gahnia sieberiana* Open Forest	Found in swamps in the Southern Fleurieu	Yes
302	*Eucalyptus ovata, E. leucoxylon* ssp. over *Exocarpos cupressiformis, Goodenia ovata, Phragmites australis, *Crataegus monogyna* Woodland	Found in swamps in the southern Fleurieu	No
303	*Eucalyptus ovata, E. camaldulensis* var. *camaldulensis* over *Acacia retinodes* var. *retinodes* (swamp form), **Rosa canina, *Phalaris aquatica, *Olea europaea* ssp. *europaea, *Plantago lanceolata* ssp. *lanceolata* Woodland	Found in swamps in the southern Fleurieu	No
401	*Eucalyptus baxteri* over *Leptospermum myrsinoides, Platylobium obtusangulum, Hakea rostrata, Banksia marginata, Xanthorrhoea semiplana* ssp. *semiplana, Lepidosperma semiteres, Hibbertia riparia* Low Open Forest	Common to main spine of Mount Lofty Ranges	No
402	*Eucalyptus baxteri* over *Banksia marginata, Pultenaea trinervis, Spyridium thymifolium, Xanthorrhoea semiplana* ssp. *tateana, Lepidosperma semiteres, L. carphoides* Very Low Open Woodland	Southern Fleurieu community eastern side of ranges	No
403	*Eucalyptus baxteri, E. cosmophylla* over *Leptospermum myrsinoides, Platylobium obtusangulum, Hakea rostrata, Lepidosperma semiteres, Isopogon ceratophyllus* Very Low Woodland	Southern Fleurieu Nangkita to Encounter region eastern side of ranges	Yes
404	*Eucalyptus baxteri, E. fasciculosa, E. cosmophylla* over *Leptospermum myrsinoides, Hibbertia riparia, Xanthorrhoea semiplana* ssp. *semiplana, Isopogon ceratophyllus, Platylobium obtusangulum* Low Open Forest	Southern Fleurieu community Nangkita to Encounter region eastern side of ranges	No

MU_50	Detailed Floristic Description	Distribution details	Group from 1986 PATN analysis
405	*Eucalyptus baxteri, E. fasciculosa* over *Lepidosperma semiteres, Leptospermum myrsinoides, Xanthorrhoea semiplana* ssp. *semiplana, Astroloma conostephioides* Low Woodland	Generalist along ranges from Morialta region and east of Willunga hill	No
406	*Eucalyptus baxteri, +/- E. leucoxylon* ssp., *+/- Allocasuarina verticillata* over *Xanthorrhoea semiplana* ssp. *semiplana, Acacia pycnantha, Astroloma conostephioides, Geranium retrorsum, Pimelea humilis* Open Forest	Northern lofty region	No
501	*Avicennia marina* var. *resinifera* Low Open Forest	Coastal in Barker inlet	No
601	*Melaleuca halmaturorum* ssp. *halmaturorum* over *Samolus repens, Sarcocornia quinqueflora, Frankenia pauciflora* var., *Juncus kraussii, Suaeda australis* Low Open Forest	Salt areas and wet areas	No
701	*Callitris gracilis* over **Avena barbata, Astroloma conostephioides, Rhagodia parabolica, Austrostipa* spp., **Bromus diandrus* Low Open Forest	Northern Adelaide region	No
702	*Callitris gracilis +/- Eucalyptus odorata* over **Avena barbata, Astroloma conostephioides, Rhagodia parabolica, Austrostipa* spp., **Bromus diandrus* Low Open Forest	Northern Adelaide region	No
703	*Callitris gracilis +/- Eucalyptus porosa* over **Avena barbata, Astroloma conostephioides, Rhagodia parabolica, Austrostipa* spp., **Bromus diandrus* Low Open Forest	Northern Adelaide region	No
704	*Callitris gracilis +/- Eucalyptus socialis* over **Avena barbata, Astroloma conostephioides, Rhagodia parabolica, Austrostipa* spp., **Bromus diandrus* Low Open Forest	Northern Adelaide region	No
705	*Callitris gracilis* over *Leptomeria aphylla, Astroloma conostephioides, Rhagodia parabolica, *Briza maxima, *Avena barbata* Low Woodland	Northern ranges region in Barossa	No
706	*Callitris gracilis, +/- Eucalyptus camaldulensis* var. *camaldulensis* over *Leptomeria aphylla, Astroloma conostephioides, Rhagodia parabolica, *Briza maxima, *Avena barbata* Low Woodland	Northern ranges region in Barossa	No
801	*Eucalyptus obliqua, E. fasciculosa* over *Lepidosperma semiteres, Hakea rostrata, Pultenaea daphnoides, Acrotriche serrulata, Hibbertia exutiacies* Woodland	Common to eastern and main spine of Mount Lofty Ranges	Yes
802	*Eucalyptus obliqua, E. fasciculosa* over *Xanthorrhoea semiplana s*sp., *Acacia pycnantha, Acrotriche serrulata, Olearia ramulosa, Lepidosperma semiteres, Hibbertia exutiacies* Low Woodland	Common to southern Fleurieu	Yes
901	*Eucalyptus obliqua, E. goniocalyx, E. fasciculosa* over *Acacia pycnantha, Lepidosperma semiteres, Leptospermum myrsinoides, Hibbertia exutiacies, Xanthorrhoea semiplana* ssp. *semiplana* Woodland	Ranges and plains to east, north of Torrens Gorge	Yes
902	*Eucalyptus obliqua, E. goniocalyx* over *Platylobium obtusangulum, Lepidosperma semiteres, Hibbertia exutiacies, Acrotriche serrulata, Acacia myrtifolia* var. *myrtifolia, Xanthorrhoea semiplana* ssp. *semiplana* Woodland	Ranges and plains to east, north of Torrens Gorge	No
1001	*Eucalyptus leucoxylon* ssp. over *Acacia pycnantha, Hibbertia exutiacies, *Senecio pterophorus* var. *pterophorus, *Briza maxima, Olearia ramulosa, *Olea europaea* ssp. *europaea* Woodland	Generalist	Yes
1002	*Eucalyptus leucoxylon* ssp. over *Xanthorrhoea semiplana* ssp. *tateana, Acacia paradoxa, Acacia pycnantha, Pimelea serpyllifolia* ssp. *serpyllifolia, *Lagurus ovatus, Olearia ramulosa* Low Open Forest	Southern Fleurieu community	No
1003	*Eucalyptus leucoxylon* ssp. over **Medicago* sp. **Bromus rubens, *Avena barbata, *Lolium* sp. (pasture weeds) Open Woodland	Disturbed	No
1004	*Eucalyptus leucoxylon* ssp. *leucoxylon, +/- E. camaldulensis* var. *camaldulensis, +/- E. viminalis* ssp. *cygnetensis* over *Acacia pycnantha, +/- A. retinodes* var. *retinodes* (hill form), **Hypericum perforatum, *Vulpia* sp. Woodland	Morialta	No
1101	*Eucalyptus camaldulensis* var. *camaldulensis, E. leucoxylon* ssp. over *Acacia pycnantha, *Briza maxima, Astroloma humifusum, Themeda*	Found on plains and hills	Yes

MU_50	Detailed Floristic Description	Distribution details	Group from 1986 PATN analysis
	*triandra, Olearia ramulosa, *Senecio pterophorus* var. *pterophorus* Woodland		
1102	*Eucalyptus camaldulensis* var. *camaldulensis, +/- E. leucoxylon* ssp. over *Hibbertia exutiacies, Acacia pycnantha, *Vulpia* sp., *Astroloma humifusum, Themeda triandra.* Woodland	Mount Crawford region	No
1103	*Eucalyptus camaldulensis* var. *camaldulensis, +/- E. leucoxylon* ssp. over *Muehlenbeckia florulenta, *Lycium ferocissimum, *Foeniculum vulgare, *Piptatherum miliaceum, Cyperus gymnocaulos* Open Forest	North western creeks on plains	No
1104	*Eucalyptus camaldulensis* var. *camaldulensis, E. leucoxylon* ssp. over **Medicago* sp. **Bromus rubens, *Avena barbata, *Lolium* sp. (pasture weeds) Open Woodland	Disturbed	No
1201	*Eucalyptus camaldulensis* var. *camaldulensis* over *Acacia pycnantha, A. retinodes* var. *retinodes*, *Callistemon sieberi, Cyperus vaginatus, *Briza maxima, *Senecio pterophorus* var. *pterophorus, Themeda triandra* Woodland	Mainly found in hills region	Yes
1202	*Eucalyptus camaldulensis* var. *camaldulensis* over *Muehlenbeckia florulenta, *Phalaris aquatica* Open Forest	Swamp in Milang region	No
1203	*Eucalyptus camaldulensis* var. *camaldulensis* over *Juncus kraussii, Cyperus gymnocaulos, *Cynodon dactylon, Samolus repens* Woodland	Creeks	No
1204	*Eucalyptus camaldulensis* var. *camaldulensis, E. dalrympleana ssp. dalrympleana* over **Bromus rubens, *Medicago* sp., **Avena barbata, *Lolium* sp. (pasture weeds) Open Woodland	Disturbed east of ranges	No
1205	*Eucalyptus camaldulensis* var. *camaldulensis* over **Phalaris* sp., **Spartium juncea, *Bromus* sp. **Avena barbata* (pasture weeds) Open Woodland	Disturbed	No
1206	*Eucalyptus camaldulensis, +/- Banksia marginata* over *Isolepis nodosa* Woodland	Morialta	No
1301	*Eucalyptus leucoxylon* ssp., *E. viminalis* ssp. *cygnetensis,* over *Pteridium esculentum, Acacia pycnantha, *Briza maxima, Xanthorrhoea semiplana* ssp. *semiplana, *Senecio pterophorus* var. *pterophorus* Woodland	Generalist	Yes
1302	*Eucalyptus viminalis* ssp. *cygnetensis, E. leucoxylon* ssp., *Allocasuarina verticillata* over *Acacia pycnantha, Olearia ramulosa* Open Woodland	Mount Barker	Yes
1303	*Eucalyptus leucoxylon* ssp., *E. viminalis* ssp. *cygnetensis* over **Medicago* sp. **Bromus rubens, *Avena barbata, *Lolium* sp. (pasture weeds) Open Woodland	Disturbed	No
1401	*Eucalyptus camaldulensis* var. *camaldulensis, E. viminalis* ssp. *cygnetensis* over *Acacia pycnantha, Banksia marginata, Neurachne alopecuroidea, Hibbertia sericea* var. *sericea, Leptospermum myrsinoides* Woodland	Generalist hills and creeks	No
1501	*Eucalyptus fasciculosa, E. viminalis* ssp. *cygnetensis* over *Acacia pycnantha, Leptospermum myrsinoides, Xanthorrhoea semiplana* ssp., *Acrotriche serrulata, Hibbertia riparia* Woodland	Generalist	Yes
1502	*Eucalyptus fasciculosa, E. viminalis* ssp. *cygnetensis* over **Medicago* sp. **Bromus rubens, *Avena barbata, *Lolium* sp. (pasture weeds) Woodland	Disturbed in Wistow region	No
1601	*Eucalyptus viminalis* ssp. *cygnetensis, +/- E. obliqua* over *Pteridium esculentum, *Briza maxima, Acacia pycnantha, *Senecio pterophorus var. pterophorus, Hibbertia exutiacies, Acrotriche fasciculiflora* Woodland	Generalist: eastern flanks of ranges and southern region in creeks and hills	No
1602	*Eucalyptus viminalis* ssp. *cygnetensis, +/- E. obliqua, +/- E. fasciculosa, +/- E. leucoxylon* ssp. over *Acacia pycnantha, Pteridium esculentum, *Briza maxima, Danthonia* sp., *Xanthorrhoea semiplana* ssp. *semiplana* Open Forest	Barossa and western face of hills	No
1701	*Eucalyptus viminalis* ssp. *viminalis, +/- E. viminalis* ssp. *cygnetensis, +/- E. dalrympleana* ssp. *dalrympleana* over *Acacia retinodes* var.	Creeks in central ranges from Morialta to Mt	Yes

MU_50	Detailed Floristic Description	Distribution details	Group from 1986 PATN analysis
	retinodes (swamp form), *Leptospermum continentale, Pteridium esculentum, Leptospermum lanigerum, Melaleuca decussata* Woodland	Bold	
1702	*Eucalyptus dalrympleana* ssp. *dalrympleana, +/- E. obliqua* over *Pteridium esculentum, Hibbertia exutiacies, *Rubus ulmifolius* var. *ulmifolius, Leptospermum continentale, Pultenaea daphnoides* Woodland	Creeks in central ranges from Morialta to Mt Bold	No
1801	*Eucalyptus leucoxylon* ssp., *E. fasciculosa, E. odorata* over **Olea europaea* ssp. *europaea, Acacia pycnantha* Woodland	Northern Lofty Barossa region	Yes
1802	*Eucalyptus odorata, +/- E. leucoxylon* ssp. over *Acacia pycnantha, Acacia paradoxa, *Avena barbata, Danthonia setacea* var. *setacea, Austrostipa scabra* ssp. *falcata, Austrostipa elegantissima, Acacia acinacea* Woodland	Northern Lofty Barossa region	No
1803	*Eucalyptus leucoxylon* ssp., *+/- E. odorata* over *Xanthorrhoea semiplana* ssp. *semiplana, Acacia pycnantha, Austrostipa elegantissima, Astroloma conostephioides.* Low Woodland	Northern Lofty Barossa region	No
1804	*Eucalyptus leucoxylon* ssp., *Callitris gracilis, +/- E. odorata* over *Leptomeria aphylla, Astroloma conostephioides, Rhagodia parabolica, *Briza maxima, *Avena barbata* Low Woodland	Northern lofty - Barossa	No
1805	*Eucalyptus odorata +/- Eucalyptus fasciculosa* over *Astroloma humifusum, Lomandra multiflora ssp. dura, Acacia pycnantha, Melaleuca uncinata, A. paradoxa, *Ehrharta longiflora *Myrsiphyllum asparagoides* Low Woodland	Plains to east of ranges from Kanmantoo to Milang	No
1806	*Callistemon rugulosus, Eucalyptus odorata* over *Einadia nutans* ssp., **Ehrharta longiflora, Chenopodium album, Enchylaena tomentosa* var. *tomentosa, Salsola kali* Shrubland	Plains near Finniss River	No
1901	*Eucalyptus microcarpa* over *Acacia pycnantha, Olearia ramulosa, Astroloma humifusum, Acacia paradoxa, *Olea europaea* ssp. *europaea, Lomandra densiflora, *Briza maxima (Eucalyptus microcarpa x E. odorata* was noted) Low Woodland	South western slopes of ranges from Mount Osmond to McLaren Vale	Yes
1902	*Eucalyptus microcarpa, E. fasciculosa* over *Acacia pycnantha, A. paradoxa, A. acinacea, Astroloma humifusum, Olearia ramulosa* Woodland	South western slopes of ranges from Mount Osmond to McLaren Vale	Yes
1903	*Eucalyptus microcarpa, E. leucoxylon* ssp., *+/- Allocasuarina verticillata* over *Olearia ramulosa, Acacia pycnantha, *Chrysanthemoides monilifera, Astroloma humifusum* Woodland	South western slopes of ranges from Mount Osmond to McLaren Vale	No
2001	*Eucalyptus fasciculosa, E. leucoxylon* ssp. over *Acacia pycnantha, Hibbertia exutiacies, Cheilanthes austrotenuifolia, Lepidosperma semiteres* Open Woodland	Generalist in ranges from Mt Gawler to Sellicks Range, mainly on hills slopes	Yes
2002	*Eucalyptus fasciculosa, E. leucoxylon* ssp. over *Acacia pycnantha, Acrotriche serrulata, Hibbertia exutiacies, Cheilanthes austrotenuifolia, *Chyrsanthemoides monilifera, Lepidosperma semiteres* Woodland	Predominantly along creeklines	Yes
2003	*Eucalyptus fasciculosa, E. leucoxylon* ssp. over **Medicago* sp. **Bromus rubens, *Avena barbata, *Lolium* sp. (pasture weeds) Open Woodland	Disturbed	No
2004	*Eucalyptus fasciculosa, E. leucoxylon* ssp. over *Acacia pycnantha, A. paradoxa, Cheilanthes austrotenuifolia, Olearia ramulosa, Hibbertia riparia, Xanthorrhoea semiplana* ssp. *tateana* Open Woodland	Southern Fleurieu and Barossa region	Yes
2101	*Eucalyptus goniocalyx* over *Acacia pycnantha, A. myrtifolia* var. *myrtifolia, Xanthorrhoea semiplana* ssp. *semiplana, Gonocarpus tetragynus, Hibbertia exutiacies* Low Woodland	Ranges and plains to east, north of Torrens Gorge	No
2102	*Eucalyptus goniocalyx, E. fasciculosa* over *Acacia pycnantha, Leptospermum myrsinoides, Hakea rostrata, Calytrix tetragona, Hibbertia exutiacies, Lepidosperma semiteres* Low Woodland	Ranges and plains to east, north of Torrens Gorge	No

MU_50	Detailed Floristic Description	Distribution details	Group from 1986 PATN analysis
2103	*Eucalyptus fasciculosa, +/- E. goniocalyx* over *Allocasuarina muelleriana* ssp. *muelleriana, Acacia pycnantha, Gonocarpus elatus, Calytrix tetragona, Hibbertia riparia, H. sericea* var. *sericea, Xanthorrhoea semiplana ssp semiplana.* Low Woodland	Ranges and plains to east, north of Torrens Gorge	No
2201	*Allocasuarina verticillata* over *Acacia pycnantha, Bursaria spinosa, Lomandra densiflora, *Chrysanthemoides monilifera, Themeda triandra, Aristida behriana, Astroloma humifusum* Low Woodland	Generalist	No
2202	*Allocasuarina verticillata, +/- Melaleuca lanceolata* ssp. *lanceolata* over *Olearia axillaris, Acacia longifolia* var. *sophorae, Rhagodia candolleana* ssp., *Austrostipa curticoma, Isolepis nodosa, *Lagurus ovatus* Low Woodland	Coastal community	No
2203	*Allocasuarina verticillata, Xanthorrhoea quadrangulata* over *+/- Acacia rupicola, +/- A. retinodes* var. *retinodes (*hill form)*, +/- Dodonaea viscosa* ssp. *spatulata, +/- *Chrysanthemoides monilifera, +/- *Olea europaea* ssp. *europaea, Lomandra* spp. Very Low Woodland	Morialta	No
2204	*+/- Allocasuarina verticillata, +/- Santalum acuminatum, +/- Alyxia buxifolia* over *Banksia marginata, Grevillea lavandulacea* var. *lavandulacea, Xanthorrhoea semiplana* ssp. *tateana* Tall Open Shrubland	Aldinga	No
2205	*Allocasuarina verticillata, +/- Acacia pycnantha +/- Eucalyptus viminalis* over *+/- Xanthorrhoea semiplana* native and introduced grasses and herbs Low Open Forest	Kaiserstuhl	No
2206	*Acacia pycnantha, +/- Allocasuarina verticillata, +/- Banksia marginata* over *Xanthorrhoea semiplana* Low Woodland	Kaiserstuhl	No
2207	*Allocasuarina verticillata* over **Ehrharta calycina, *Ammophila arenaria, *Poa poiformis, Bursaria spinosa* Low Woodland	Hindmarsh island Disturbed community	No
2301	*Eucalyptus fasciculosa, Allocasuarina verticillata* over *Astroloma humifusum, Acacia paradoxa, A. pycnantha, Olearia ramulosa* Very Low Woodland	Southern Fleurieu coastal hills	Yes
2302	*Allocasuarina verticillata, +/- E. fasciculosa* over *Gonocarpus elatus, Calytrix tetragona, Banksia marginata, Hibbertia sericea* var. *sericea, Astroloma conostephioides, *Briza maxima.* Low Open Woodland	Northern ranges	No
2303	*Eucalyptus fasciculosa, Allocasuarina verticillata* over *Acacia pycnantha, Leptospermum myrsinoides, Astroloma conostephioides, Astroloma humifusum, Xanthorrhoea semiplana* ssp. *semiplana* Low Woodland	Generalist	No
2401	*Eucalyptus fasciculosa* over *Acacia pycnantha, Astroloma conostephioides, A. humifusum, *Briza maxima, Leptospermum myrsinoides* Woodland	Generalist	Yes
2402	*Eucalyptus fasciculosa* over *Acacia paradoxa, Xanthorrhoea semiplana* ssp. *tateana, Astroloma humifusum, Lepidosperma semiteres, Olearia ramulosa* Low Woodland	Southern Fleurieu	Yes
2403	*Eucalyptus fasciculosa* over *Acacia spinescens, A. pycnantha, *Myrsiphyllum asparagoides, *Ehrharta calycina, Lepidosperma carphoides, Astroloma conostephioides* Low Woodland	Sandy regions in McLaren vale and south eastern region around Echunga-Strathalbyn	No
2404	*Eucalyptus fasciculosa* over **Avena barbata, *Ehrharta calycina, *Briza maxima.* Open Woodland	Disturbed	No
2405	*Eucalyptus fasciculosa* over *Acacia paradoxa, A. pycnantha, Leptospermum myrsinoides, Platylobium obtusangulum, Astroloma humifusum, Hypolaena fastigiata, Hakea rostrata* Low Woodland	Milang region	No
2501	*Eucalyptus fasciculosa, Callitris gracilis* over *Centrolepis aristata, Gonocarpus elatus, Amyema miquelii, Calytrix tetragona, Acacia pycnantha, Thysanotus patersonii, Lomandra dura, Hakea carinata* Low Woodland	Northern lofty generally in Mt Gawler – Barossa region	Yes
2502	*Eucalyptus fasciculosa, Callitris gracilis* over *Amyema miquelii, Calytrix tetragona, Astroloma conostephioides* Woodland	Northern lofty generally in Mt Gawler – Barossa	Yes

MU_50	Detailed Floristic Description	Distribution details	Group from 1986 PATN analysis
		region	
2503	*Eucalyptus fasciculosa, Callitris gracilis, +/- E. leucoxylon* ssp. over *Calytrix tetragona, Astroloma conostephioides, *Chrysanthemoides monilifera, *Briza maxima* Low Woodland	Northern Lofty generally in Mt Gawler – Barossa region	No
2504	*Eucalyptus fasciculosa, Callitris gracilis, +/- E. goniocalyx* over *Calytrix tetragona, Astroloma conostephioides, *Chrysanthemoides monilifera, *Briza maxima* Low Woodland	Northern Lofty generally in Mt Gawler – Barossa region	No
2601	*Eucalyptus cosmophylla, +/- Allocasuarina muelleriana* ssp. *muelleriana* over *Platylobium obtusangulum, Leptospermum myrsinoides, Hakea rostrata, Lepidosperma semiteres, Astroloma conostephioides* Very Low Woodland	Generalist, eastern sides of ranges from – Mt bold to southern Fleurieu	Yes
2602	*Eucalyptus cosmophylla, E. fasciculosa* over *Hakea rostrata, Leptospermum myrsinoides, Allocasuarina muelleriana* ssp. *muelleriana, Xanthorrhoea semiplana* ssp. *semiplana, Hibbertia riparia, Astroloma humifusum* Low Woodland	Generalist, eastern sides of ranges from – Mt Bold to southern Fleurieu	No
2701	*Eucalyptus obliqua, E. fasciculosa, E. cosmophylla* over *Hakea rostrata, Acrotriche serrulata, Pultenaea daphnoides, Hibbertia exutiacies, Lepidosperma semiteres* Low Open Forest	Generalist eastern sides of ranges from – Mt bold to southern Fleurieu	Yes
2702	*Eucalyptus obliqua, E. cosmophylla* over *Platylobium obtusangulum, Leptospermum myrsinoides, Lepidosperma semiteres, Hakea rostrata, Hibbertia riparia, Xanthorrhoea semiplana* ssp. *semiplana* Low Woodland	Generalist south of Mt Barker	No
2801	*Eucalyptus porosa* over *Pittosporum phylliraeoides* var. *microcarpa, Senna artemisioides* nothossp. *coriacea, *Myrsiphyllum asparagoides, Danthonia caespitosa, Lomandra effusa* Low Woodland	Plains of Adelaide from Gawler River to Sellicks Ranges	No
2802	*Eucalyptus porosa, +/- E. leucoxylon* ssp., *+/- E. camaldulensis* var. *camaldulensis* over **Olea europaea* ssp. *europaea, Acacia pycnantha, Acacia paradoxa, Dodonaea viscosa* ssp. *spathulata.* Woodland	Western slopes of Morialta and Black Hill	No
2803	*Eucalyptus porosa* over *Acacia paradoxa, Xanthorrhoea semiplana* ssp. *tateana, Olearia axillaris, Pimelea serpyllifolia* ssp. *serpyllifolia, Rhagodia candolleana* ssp. *candolleana* Low Open Forest	Cape Jervis coastal community	No
2804	*Eucalyptus porosa, +/- E. odorata* over *Lomandra multiflora* ssp. *dura, *Avena barbata, *Critesion murinum* ssp. *glaucum, Austrostipa* sp. Low Woodland	Northern Adelaide plains	No
2805	*Eucalyptus porosa, +/- E. phenax, +/- E. oleosa* over *Senna artemisioides* nothossp. *coriacea, Rhagodia parabolica, Triodia* spp., *Enchylaena tomentosa* var. *tomentosa, Senna artemisioides* ssp. *petiolaris, Acacia hakeoides* Low Woodland	Northern Adelaide plains, north of Gawler River	No
2901	*Eucalyptus largiflorens, +/- E. odorata* over *Muehlenbeckia florulenta, *Avena barbata, *Ehrharta longiflora, Einadia nutans* ssp., *Atriplex semibaccata* Low Woodland	Plains in Finniss River catchment	No
2902	*Eucalyptus largiflorens, +/- E. odorata, +/- E. porosa* over *Muehlenbeckia florulenta, Rhagodia parabolica, Maireana* spp., *Austrostipa* spp. Low Woodland	Plains adjacent to Gawler River	No
3001	*Eucalyptus incrassata, E. leptophylla* over *Melaleuca uncinata, *Myrsiphyllum asparagoides, Clematis microphylla, Danthonia* sp., *Lomandra multiflora* ssp. *dura, *Ehrharta longiflora* Open Mallee	Eastern plains around Finniss to Strathalbyn region	No
3002	*Eucalyptus incrassata +/- E. socialis, +/- E. odorata, +/- Callitris gracilis* over *Melaleuca acuminata, M. lanceolata* ssp. *lanceolata, Santalum acuminatum, Lepidosperma viscidum, Triodia scariosa, Helichrysum leucopsideum* Open Mallee	Northern Adelaide plains (Two Wells to Kangaroo Flat region)	No
3003	*Eucalyptus oleosa, +/- E. gracilis, +/- E. phenax, +/- E. socialis* over *Sclerolaena diacantha, Enchylaena tomentosa* var. *tomentosa, Rhagodia parabolica, Atriplex stipitata* Mallee	Northern coastal plains	No
3004	*Eucalyptus socialis, +/- E. dumosa, +/- E. odorata +/- E. oleosa* over *Enchylaena tomentosa* var. *tomentosa, Danthonia caespitosa,*	Northern Adelaide plains (Two Wells to	No

MU_50	Detailed Floristic Description	Distribution details	Group from 1986 PATN analysis
	**Critesion murinum* ssp. *leporinum, *Vulpia myuros* forma *myuros, Austrostipa exilis, Rhagodia parabolica* Mallee	Kangaroo Flat region)	
3005	*Eucalyptus leptophylla, +/- E. oleosa, +/- E. socialis* over *Melaleuca uncinata, Danthonia* sp., *Dianella revoluta, *Myrsiphyllum asparagoides, Enchylaena tomentosa* var. *tomentosa* Open Mallee	Eastern plains around Finniss to Strathalbyn region	No
3006	*Eucalyptus gracilis, +/- E. socialis, +/- E. phenax, +/- E. brachycalyx, +/- E. porosa* over *Geijera linearifolia, Melaleuca lanceolata* ssp. *lanceolata, *Carrichtera annua, Austrostipa eremophila, Rhagodia parabolica, Enchylaena tomentosa* var. *tomentosa*, *Sclerolaena diacantha* Open Mallee	Northern Adelaide plains	No
3101	*Eucalyptus diversifolia* over *Acacia retinodes* var. *uncifolia, Leucopogon parviflorus, Hibbertia riparia (glabriuscula), Lepidosperma carphoides, Olearia ramulosa* Low Mallee	Southern Fleurieu	No
3102	*Eucalyptus diversifolia, E. cosmophylla, E. fasciculosa* over **Myrsiphyllum asparagoides, Brachyloma ericoides* ssp. *ericoides, Hibbertia riparia, Olearia ramulosa, Banksia marginata* Low Mallee	Waitpinga	No
3201	*Allocasuarina muelleriana, +/- emergent E. fasciculosa* over *Xanthorrhoea quadrangulata, Hakea* spp., *Calytrix tetragona, Pultenaea acerosa, Hibbertia* spp. Tall Closed Shrubland	Morialta	No
3301	*Acacia retinodes* var. *retinodes* (hill form) over *Pteridium esculentum* Tall Shrubland	Morialta	No
3302	*Acacia retinodes, +/- Xanthorrhoea semiplana +/- Banksia marginata* Tall Shrubland	Kaiserstuhl	No
3303	*Acacia calamifolia, Banksia marginata* over *Xanthorrhoea semiplana* Tall Shrubland	Kaiserstuhl	No
3401	*Maireana aphylla* over *Austrostipa nitida* Low Shrubland	Northern Adelaide plains	No
3402	*Xanthorrhoea quadrangulata*, *Maireana aphylla, Dodonaea viscosa* ssp. *spatulata* over *Austrostipa gibbosa, *Avena barbata* Tall Shrubland	Banks of south para river	No
3403	*Xanthorrhoea semiplana* Shrubland	Kaiserstuhl	No
3501	*Muehlenbeckia florulenta, +/- Gahnia filum* over *Samolus repens, Isolepis nodosa, Sarcocornia quinqueflora, *Cynodon dactylon* Tall Shrubland	Edges of Lake Alexandrina	No
3601	*Melaleuca lanceolata* ssp. *lanceolata* over **Myrsiphyllum asparagoides, Muehlenbeckia gunnii, Austrostipa eremophila* Low Woodland	Cape Jervis and Yankalilla coastal	No
3602	*Melaleuca lanceolata* ssp. *lanceolata, +/- Callitris gracilis, +/- Eucalyptus gracilis* over *Exocarpos aphyllus, Maireana oppositifolia, Threlkeldia diffusa, Atriplex paludosa* ssp. *cordata, Rhagodia candolleana* ssp. *candolleana, *Bromus rubens* Tall Open Shrubland	Northern Adelaide coastal	No
3603	*Melaleuca lanceolata* ssp. *lanceolata* Tall Open Shrubland	Hindmarsh island Disturbed	No
3701	*Melaleuca uncinata* Tall Open Shrubland	Finniss floodplain	No
3801	*Acacia paradoxa* over *Olearia ramulosa, Goodenia amplexans, Muehlenbeckia gunnii, Dianella breviculmis, Poa poiformis, *Lagurus ovatus* Closed Shrubland	Generalist	No
3802	*Acacia paradoxa, +/- A. pycnantha, +/-* emergent *Eucalyptus leucoxylon* ssp. *leucoxylon, +/-* emergent *E. odorata* Shrubland	Williamstown to Lyndoch region	No
3901	*Leptospermum continentale, &/or L. lanigerum, +/- Phragmites australis* over *Baumea rubiginosa, Lepidosperma longitudinale, B. tetragona, Gahnia sieberiana, Empodisma minus, Blechnum minus* Shrubland	Southern Fleurieu swamps	No
3902	*Acacia retinodes* var. *retinodes* (swamp form), *+/- Leptospermum continentale, +/- L. lanigerum* over *Baumea tetragona, Blechnum minus, Lepidosperma longitudinale, Phragmites australis, Viminaria juncea* Tall Shrubland	Southern Fleurieu swamps	No

MU_50	Detailed Floristic Description	Distribution details	Group from 1986 PATN analysis
4001	*Sarcocornia quinqueflora, Sclerostegia arbuscula, +/-Suaeda australis, +/- Sarcocornia blackiana* over *Atriplex paludosa* ssp., *Lawrencia squamata, Distichlis distichophylla, Maireana oppositifolia, Samolus repens* Low Open Shrubland	Coastal region	No
4002	*Halosarcia halocnemoides* ssp. *halocnemoides, Sarcocornia blackiana* Low Shrubland	Inland – higher ground Onkaparinga	No
4003	*Halosarcia halocnemoides* ssp. *halocnemoides, Sclerostegia arbuscula* over *Disphyma crassifolium* ssp. *clavellatum, Maireana oppositifolia* Low Shrubland	Hindmarsh Island	No
4004	*Halosarcia pergranulata* ssp. *pergranulata, Sarcocornia quinqueflora* over *Enchylaena tomentosa* var., *Frankenia pauciflora* Low Shrubland	Higher ground, Aldinga washpool, Lake Alexandrina and Torrens island	No
4005	*Halosarcia* sp., *Sarcocornia quinqueflora* over *Wilsonia humilis* var. *humilis, Disphyma crassifolium* ssp. *clavellatum, *Parapholis incurvus* Low Closed Shrubland	Northern Adelaide coastal region	No
4101	*Olearia axillaris, Acacia longifolia* var. *sophorae, +/- Myoporum insulare, +/- Leucopogon parviflorus* over *Pimelea serpyllifolia* ssp. *serpyllifolia, Rhagodia candolleana* ssp. *candolleana, Tetragonia implexicoma, Carpobrotus rossii, *Ehrharta longiflora* Shrubland	Coastal vegetation dunes from Richards peninsula and Encounter bay	No
4102	*Olearia axillaris, Leucopogon parviflorus, Acacia longifolia* var. *sophorae, +/- Myoporum insulare* over *Pimelea serpyllifolia* ssp. *serpyllifolia, Muehlenbeckia gunnii, Rhagodia candolleana* ssp. *candolleana, Dianella brevicaulis, Tetragonia implexicoma* Shrubland	Coastal vegetation dunes Young Husband Peninsula to Encounter Bay	No
4103	*Myoporum insulare* over *Acacia longifolia* var. *sophorae, Leucopogon parviflorus, Olearia axillaris, Exocarpos syrticola, Rhagodia candolleana* ssp. *candolleana* Shrubland	Coastal vegetation dunes Young Husband Peninsula	No
4104	*Leucopogon parviflorus, +/- Olearia axillaris, +/- Acacia paradoxa* over *Rhagodia candolleana* ssp. *candolleana, Clematis microphylla, Dianella brevicaulis, Muehlenbeckia gunnii* Tall Shrubland	Lonsdale Hill	No
4105	*Acacia leiophylla, +/- Acacia pycnantha, +/- Acacia longifolia* var. *sophorae, +/- Olearia axillaris* over **Oenothera stricta* ssp. *stricta, Isolepis nodosa, *Carpobrotus edulis* Tall Very Open Shrubland	Torrens Island	No
4106	*Olearia axillaris* over *Rhagodia candolleana* ssp. *candolleana, Threlkeldia diffusa, Tetragonia implexicoma, *Lagurus ovatus* Open Shrubland	Cape Jervis to Yankalilla coastal region	No
4107	*Olearia axillaris, +/- Acacia ligulata, +/- Exocarpos aphyllus, +/- Myoporum insulare, +/- Alyxia buxifolia, +/- Dodonaea viscosa* ssp. *spatula* over **Bromus* sp., **Vulpia myuros* forma, *Senecio lautus, Threlkeldia diffusa, Atriplex paludosa* ssp. *cordata, Tetragonia implexicoma* Tall Open Shrubland	Northern Adelaide coastal dunes	No
4108	*Ozothamnus turbinatus, Olearia axillaris* over *Spinifex sericeus, Isolepis nodosa, *Euphorbia paralias, Austrofestuca littoralis, Carpobrotus rossii* Low Very Open Shrubland	Young Husband Peninsula dunes	No
4201	**Lycium ferocissimum, +/- Myoporum insulare* over **Lavatera arborea, *Rhamnus alaternus* Shrubland	Barker Inlet, West Island in Encounter Bay	No
4301	*Nitraria billardierei* over *Atriplex cinerea, Tetragonia implexicoma, *Mesembryanthemum crystallinum, Threlkeldia diffusa* Open Shrubland	Aldinga to Sellicks coastal limestone	No
4302	*Nitraria billardierei, Maireana brevifolia, +/- Atriplex paludosa* ssp. *cordata* over *Enchylaena tomentosa* var. *tomentosa,* samphire species. Open Shrubland	Northern Adelaide Plains behind samphire vegetation	No
4303	*Nitraria billardierei, +/- Olearia ramulosa, +/- Atriplex cinerea, +/- Maireana aphylla* over *Threlkeldia diffusa, Tetragonia implexicoma, Rhagodia candolleana* ssp. *candolleana, Senecio lautus* Low Shrubland	Northern Adelaide Plains coastal region	No
4401	*Olearia ramulosa* over *Senecio lautus, Dianella brevicaulis, *Lagurus*	Onkaparinga to Cape	No

MU_50	Detailed Floristic Description	Distribution details	Group from 1986 PATN analysis
	ovatus, Rhagodia candolleana ssp. *candolleana, Pimelea serpyllifolia* ssp. *serpyllifolia, Acrotriche patula* Open Shrubland	Jervis and Encounter Bay coastal region	
4501	*Beyeria lechenaultii, +/- Allocasuarina verticillata* over *Acrotriche patula, Eutaxia microphylla* var. *microphylla, Pomaderris paniculosa* ssp. *paniculosa, Gahnia lanigera* Low Shrubland	Southern beaches limestone	No
4601	*Lomandra effusa* over *Austrostipa* sp. *Danthonia caespitosa, *Avena barbata, *Bromus rubens* Open Tussock Grassland	Eastern plains in Strathalbyn region	No
4602	*+/- Themeda triandra, +/- Danthonia* sp., *+/- Lomandra* sp., *+/- Poa* sp., *+/- Austrostipa* sp. Closed Tussock Grassland	Morialta	No
4701	*Spinifex sericeus* over *Elymus farctus, *Euphorbia paralias, *Cakile maritima* ssp. *maritima* Open Grassland	Coastal sand dunes	No
4702	*Austrostipa stipoides* Tussock Grassland	Coastal dunes on Hindmarsh island	No
4801	*Triodia compacta* over *Kunzea pomifera, Hibbertia sericea* var. Open Hummock Grassland	Coastal cliffs around Cape Jervis	No
4901	*Phragmites australis* &/or *Typha domingensis* over **Aster subulatus, *Paspalum distichum, Persicaria lapathifolia, Muehlenbeckia florulenta, Suaeda australis* Sedgeland	Edges of Lake Alexandrina	No
5001	*Gahnia trifida, Gahnia filum, Juncus kraussii* over *Sarcocornia* sp. Open Sedgeland	Saline wetlands in Encounter - Lake Alexandrina region	No
5002	*Juncus sarophorus, *Juncus effusus* over **Anthoxanthum odoratum, Eleocharis gracilis, *Lotus uliginosus* Sedgeland	Southern Fleurieu swamps	No
5003	*Lepidosperma longitudinale* and/or *L. concavum* Sedgeland	Kaiserstuhl	No
5101	*Pteridium esculentum* Fernland	Morialta	No

Despite the extensive sampling, there is no doubt that some rare community types have been missed. In particular there is under representation of several vegetation communities in this mapping as a result of difficulties in interpreting boundaries from aerial photography. The most under-represented communities are grasslands, sedgelands / reedbeds and some less common or extensively cleared woodlands, open forest and forest communities. Narrow strips of roadside vegetation, watercourse vegetation and small vegetated areas (<1ha) generally have not been mapped. In addition further knowledge of vegetation with limited field information is required to clarify some of the mapping groups. In particular, the mallee vegetation groups on the plains around Milang.

Native vegetation mapping is not an exact science. This mapping is based on the extrapolation of available data out from known points. As a result areas mapped may be found to be dominated by different communities when field inspected. Sources of error can occur in the extrapolation process and in the interpretation of the imagery. While some field checking is undertaken, it is not feasible to field check all mapping. This highlights the need for field checking and ongoing mapping refinements. It is also important to note that vegetation rarely changes as sharply as a boundary line suggests. The distinction between some floristic groups is often blurred by gradual transition from one community type to another.

In addition, native vegetation mapping is generally based on the dominant overstorey. As a result the understorey may vary in species composition or condition to what is described. The understorey may vary from relatively pristine to moderately degraded to predominantly replaced by introduced plant species. In the agricultural region, there are some cases where areas of (high and medium density) scattered trees may have been mapped.

Comparison of Mapped Groups with Biological Survey floristic (PATN) analysis

A preliminary comparison was undertaken with the PATN analysis presented in the Vegetation section of this report. The comparison highlighted differences in the methodology that underlies vegetation groups defined in the floristic analysis with the mapping groups. The floristic PATN analysis determined differences and similarities in species composition recorded at a site. In some cases this results in quadrats being associated together based on similarity in the understorey floristic composition. In contrast the mapping focussed on similarity of the structurally uppermost layer to define the vegetation groups rather than understorey similarity. Further distinctions were made to define vegetation groups with similar overstorey species but with distinct understorey differences (such as sclerophyllous understorey or grassy understorey), geographic differences or structural differences. For example vegetation group 1702 may be represented by part of PATN group 37 or PATN group 13 or PATN group 18. While vegetation groups 1901 and 1902 are both represented by PATN group 21. In contrast PATN group 8 is likely represented by mapping group 401, 402, 403, 404, 405, 2601, 2602, 2701, 2702.

Because the mapping groups also covered a larger geographic area (refer Methods), including the northern Adelaide Plains and adjacent coastline, the mapping included several distinct groups not included in the floristic analysis. Notable examples include *Maireana aphylla* Low Shrubland, samphire, mangrove and Speargrass communities.

Further comparison of the two classifications was not taken any further due to the differences in their derivation methodology.

VEGETATION MAPPING SUMMARY

The 152 vegetation groups described for the mapping region have been summarised into 51 groups for the purpose of map display according to common dominant overstorey species. The resultant map is in the back pocket of this report. These groups are provided in Table 26 and shown on the regional vegetation map in the back of this report. The relationship of the regional vegetation descriptions to the detailed vegetation groups is detailed in Table 25. Table 25 also shows the area of each vegetation group in the mapping region and the proportion of the group that is protected. Protected areas includes land formally protected under the *NP&W Act 1972, Crown Lands Act 1929, Forestry Act 1950* and *Native Vegetation Act 1991*.

It should be noted that there is a small area of vegetation mapping within the Hindmarsh Islands and surrounding islands that includes blocks of vegetation with multiple vegetation groups defined, known as mosaics (DEH 2003). The summary statistics is based only on the first group. A total of 80 hectares was mapped as mosaics and effects the total area estimates of the groups mapped as mosaics: 601, 2207, 3603, 4003, 4201, 4702, 4901, 5001.

Table 25.
Area estimates of the South Mount Lofty vegetation groups including protection status.

Regional Vegetation Description	MU_ 50	Detailed Vegetation Description	Number of Patches	Total Area (ha)	Total Area Protec-ted (ha)	% Area Pro-tected
FORESTS						
Eucalyptus obliqua Open Forest	101	*Eucalyptus obliqua* over *Pultenaea daphnoides, Lepidosperma semiteres, Hakea rostrata, Acrotriche serrulata, Platylobium obtusangulum, Pteridium esculentum, Xanthorrhoea semiplana* ssp. *semiplana* Open Forest	600	10358	2554	24.7
	102	*Eucalyptus obliqua* over *Banksia marginata, Epacris impressa, Allocasuarina striata, Lepidosperma semiteres, L. carphoides, Hibbertia riparia* Very Low Open Woodland	3	204	176	86.2
	103	*Eucalyptus obliqua* over *Xanthorrhoea semiplana* ssp. *tateana, Acacia myrtifolia* var. *myrtifolia, Hakea rostrata, Lepidosperma semiteres, Olearia teretifolia* Low Open Forest	105	1715	854	49.8
	104	*Eucalyptus obliqua* over *Xanthorrhoea semiplana* ssp., *Acacia myrtifolia* var. *myrtifolia, Hibbertia riparia, Hakea rostrata, Platylobium obtusangulum, Lepidosperma semiteres, Pultenaea involucrata* Low Woodland	11	419	318	76.0
	105	*Eucalyptus obliqua, +/- E. camaldulensis* var. *camaldulensis, +/- E. leucoxylon* ssp. over *Acacia pycnantha, *Linum trigynum, *Briza maxima* Open Forest	10	84	0	0.1
Eucalyptus baxteri, E. obliqua, +/- E. cosmophylla, +/- E. fasciculosa Open Forest	201	*Eucalyptus baxteri, E. obliqua* over *Lepidosperma semiteres, Pultenaea daphnoides, Hakea rostrata, Epacris impressa, Acrotriche serrulata, Platylobium obtusangulum* Open Forest	149	2026	610	30.1
	202	*Eucalyptus baxteri, E. obliqua, E. cosmophylla* over *Lepidosperma semiteres, Pultenaea involucrata, Isopogon ceratophyllus, Platylobium obtusangulum, Tetratheca pilosa* ssp. *pilosa* Low Open Forest	24	191	53	27.7
	203	*Eucalyptus baxteri, E. obliqua, E. fasciculosa* over *Acacia myrtifolia* var. *myrtifolia, Leptospermum myrsinoides, Hakea rostrata, Platylobium obtusangulum, Ixodia achillaeoides* ssp. *achillaeoides* Low Woodland	36	387	113	29.3
Eucalyptus ovata, +/- E. leucoxylon ssp. *+/- E. camaldulensis* var. *camaldulensis* Open Forest	301	*Eucalyptus ovata* over *Goodenia ovata, Leptospermum continentale, Melaleuca decussata, Acacia retinodes* var. *retinodes* (swamp form)*, Baumea juncea, Gahnia sieberiana* Open Forest	92	569	134	23.6

Regional Vegetation Description	MU_ 50	Detailed Vegetation Description	Number of Patches	Total Area (ha)	Total Area Protec-ted (ha)	% Area Pro-tected
	302	*Eucalyptus ovata, E. leucoxylon* ssp. over *Exocarpos cupressiformis, Goodenia ovata, Phragmites australis, *Crataegus monogyna* Woodland	5	23	3	12.5
	303	*Eucalyptus ovata, E. camaldulensis* var. *camaldulensis* over *Acacia retinodes* var. *retinodes* (swamp form), **Rosa canina, *Phalaris aquatica, *Olea europaea* ssp. *europaea, *Plantago lanceolata* ssp. *lanceolata* Woodland	4	51	4	8.5
Eucalyptus baxteri, +/- E. cosmophylla, +/- E. fasciculosa Low Open Forest	401	*Eucalyptus baxteri* over *Leptospermum myrsinoides, Platylobium obtusangulum, Hakea rostrata, Banksia marginata, Xanthorrhoea semiplana* ssp. *semiplana, Lepidosperma semiteres, Hibbertia riparia* Low Open Forest	84	848	168	19.8
	402	*Eucalyptus baxteri* over *Banksia marginata, Pultenaea trinervis, Spyridium thymifolium, Xanthorrhoea semiplana* ssp. *tateana, Lepidosperma semiteres, L. carphoides* Very Low Open Woodland	6	116	105	91.0
	403	*Eucalyptus baxteri, E. cosmophylla* over *Leptospermum myrsinoides, Platylobium obtusangulum, Hakea rostrata, Lepidosperma semiteres, Isopogon ceratophyllus* Very Low Woodland	67	616	99	16.1
	404	*Eucalyptus baxteri, E. fasciculosa, E. cosmophylla* over *Leptospermum myrsinoides, Hibbertia riparia, Xanthorrhoea semiplana* ssp. *semiplana, Isopogon ceratophyllus, Platylobium obtusangulum* Low Open Forest	64	1249	593	47.5
	405	*Eucalyptus baxteri, E. fasciculosa* over *Lepidosperma semiteres, Leptospermum myrsinoides, Xanthorrhoea semiplana* ssp. *semiplana, Astroloma conostephioides* Low Woodland	61	1116	449	40.2
	406	*Eucalyptus baxteri, +/- E. leucoxylon* ssp., *+/- Allocasuarina verticillata* over *Xanthorrhoea semiplana* ssp. *semiplana, Acacia pycnantha, Astroloma conostephioides, Geranium retrorsum, Pimelea humilis* Open Forest	9	71	27	38.7
Avicennia marina var. *resinifera* Low Open Forest	501	*Avicennia marina* var. *resinifera* Low Open Forest	23	3206	402	12.5
Melaleuca halmaturorum ssp. *halmaturorum* Low Open Forest	601	*Melaleuca halmaturorum* ssp. *halmaturorum* over *Samolus repens, Sarcocornia quinqueflora, Frankenia pauciflora* var., *Juncus kraussii, Suaeda australis* Low Open Forest	14	117	0	0.0

Regional Vegetation Description	MU_ 50	Detailed Vegetation Description	Number of Patches	Total Area (ha)	Total Area Protec-ted (ha)	% Area Pro-tected
Callitris gracilis Low Open Forest	701	*Callitris gracilis* over **Avena barbata, Astroloma conostephioides, Rhagodia parabolica, Austrostipa* spp., **Bromus diandrus* Low Open Forest	29	117	0	0.0
	702	*Callitris gracilis +/- Eucalyptus odorata* over **Avena barbata, Astroloma conostephioides, Rhagodia parabolica, Austrostipa* spp., **Bromus diandrus* Low Open Forest	3	21	0	0.0
	703	*Callitris gracilis +/- Eucalyptus porosa* over **Avena barbata, Astroloma conostephioides, Rhagodia parabolica, Austrostipa* spp., **Bromus diandrus* Low Open Forest	2	17	0	0.0
	704	*Callitris gracilis +/- Eucalyptus socialis* over **Avena barbata, Astroloma conostephioides, Rhagodia parabolica, Austrostipa* spp., **Bromus diandrus* Low Open Forest	8	37	0	0.0
	705	*Callitris gracilis* over *Leptomeria aphylla, Astroloma conostephioides, Rhagodia parabolica, *Briza maxima, *Avena barbata* Low Woodland	2	7	0	0.0
	706	*Callitris gracilis, +/- Eucalyptus camaldulensis* var. *camaldulensis* over *Leptomeria aphylla, Astroloma conostephioides, Rhagodia parabolica, *Briza maxima, *Avena barbata* Low Woodland	4	38	0	0.0
WOODLANDS						
Eucalyptus obliqua, E. fasciculosa Woodland	801	*Eucalyptus obliqua, E. fasciculosa* over *Lepidosperma semiteres, Hakea rostrata, Pultenaea daphnoides, Acrotriche serrulata, Hibbertia exutiacies* Woodland	289	3168	481	15.2
	802	*Eucalyptus obliqua, E. fasciculosa* over *Xanthorrhoea semiplana s*sp., *Acacia pycnantha, Acrotriche serrulata, Olearia ramulosa, Lepidosperma semiteres, Hibbertia exutiacies* Low Woodland	58	613	192	31.2
Eucalyptus obliqua, E. goniocalyx, +/- E. fasciculosa Woodland	901	*Eucalyptus obliqua, E. goniocalyx, E. fasciculosa* over *Acacia pycnantha, Lepidosperma semiteres, Leptospermum myrsinoides, Hibbertia exutiacies, Xanthorrhoea semiplana* ssp. *semiplana* Woodland	33	2487	1666	67.0
	902	*Eucalyptus obliqua, E. goniocalyx* over *Platylobium obtusangulum, Lepidosperma semiteres, Hibbertia exutiacies, Acrotriche serrulata, Acacia myrtifolia* var. *myrtifolia, Xanthorrhoea semiplana* ssp. *semiplana* Woodland	52	1022	517	50.6
Eucalyptus leucoxylon ssp. Woodland	1001	*Eucalyptus leucoxylon* ssp. over *Acacia pycnantha, Hibbertia exutiacies, *Senecio pterophorus* var. *pterophorus, *Briza maxima, Olearia ramulosa, *Olea europaea* ssp. *europaea* Woodland	175	2401	513	21.4

Regional Vegetation Description	MU_ 50	Detailed Vegetation Description	Number of Patches	Total Area (ha)	Total Area Protec-ted (ha)	% Area Pro-tected
	1002	*Eucalyptus leucoxylon* ssp. over *Xanthorrhoea semiplana* ssp. *tateana, Acacia paradoxa, Acacia pycnantha, Pimelea serpyllifolia* ssp. *serpyllifolia, *Lagurus ovatus, Olearia ramulosa* Low Open Forest	2	11	2	17.6
	1003	*Eucalyptus leucoxylon* ssp. over **Medicago* sp. **Bromus rubens, *Avena barbata, *Lolium* sp. (pasture weeds) Open Woodland	36	317	3	1.1
	1004	*Eucalyptus leucoxylon* ssp. *leucoxylon, +/- E. camaldulensis* var. *camaldulensis, +/- E. viminalis* ssp. *cygnetensis* over *Acacia pycnantha, +/- A. retinodes* var. *retinodes* (hill form), **Hypericum perforatum, *Vulpia* sp. Woodland	9	335	94	27.9
Eucalyptus camaldulensis var. *camaldulensis, E. leucoxylon* ssp. Woodland	1101	*Eucalyptus camaldulensis* var. *camaldulensis, E. leucoxylon* ssp. over *Acacia pycnantha, *Briza maxima, Astroloma humifusum, Themeda triandra, Olearia ramulosa, *Senecio pterophorus* var. *pterophorus* Woodland	39	935	177	19.0
	1102	*Eucalyptus camaldulensis* var. *camaldulensis, +/- E. leucoxylon* ssp. over *Hibbertia exutiacies, Acacia pycnantha, *Vulpia* sp., *Astroloma humifusum, Themeda triandra.* Woodland	42	661	48	7.3
	1103	*Eucalyptus camaldulensis* var. *camaldulensis, +/- E. leucoxylon* ssp. over *Muehlenbeckia florulenta, *Lycium ferocissimum, *Foeniculum vulgare, *Piptatherum miliaceum, Cyperus gymnocaulos* Open Forest	7	389	0	0.0
	1104	*Eucalyptus camaldulensis* var. *camaldulensis, E. leucoxylon* ssp. over **Medicago* sp. **Bromus rubens, *Avena barbata, *Lolium* sp. (pasture weeds) Open Woodland	107	2214	3	0.1
Eucalyptus camaldulensis var. *camaldulensis, +/- E. dalrympleana* ssp. *dalrympleana* Woodland	1201	*Eucalyptus camaldulensis* var. *camaldulensis* over *Acacia pycnantha, A. retinodes* var. *retinodes*, *Callistemon sieberi, Cyperus vaginatus, *Briza maxima, *Senecio pterophorus* var. *pterophorus, Themeda triandra* Woodland	189	2517	353	14.0
	1202	*Eucalyptus camaldulensis* var. *camaldulensis* over *Muehlenbeckia florulenta, *Phalaris aquatica* Open Forest	1	7	0	0.0
	1203	*Eucalyptus camaldulensis* var. *camaldulensis* over *Juncus kraussii, Cyperus gymnocaulos, *Cynodon dactylon, Samolus repens* Woodland	49	908	6	0.7

Regional Vegetation Description	MU_ 50	Detailed Vegetation Description	Number of Patches	Total Area (ha)	Total Area Protec-ted (ha)	% Area Pro-tected
	1204	*Eucalyptus camaldulensis* var. *camaldulensis, E. dalrympleana* ssp. *dalrympleana* over **Bromus rubens, *Medicago* sp., **Avena barbata, *Lolium* sp. (pasture weeds) Open Woodland	1	55	0	0.0
	1205	*Eucalyptus camaldulensis* var. *camaldulensis* over **Phalaris* sp., **Spartium juncea, *Bromus* sp. **Avena barbata* (pasture weeds) Open Woodland	75	1190	4	0.3
	1206	*Eucalyptus camaldulensis, +/- Banksia marginata* over *Isolepis nodosa* Woodland	5	13	6	47.4
Eucalyptus leucoxylon ssp., *E. viminalis* ssp. *cygnetensis, +/- Allocasuarina verticillata* Woodland	1301	*Eucalyptus leucoxylon* ssp., *E. viminalis* ssp. *cygnetensis,* over *Pteridium esculentum, Acacia pycnantha, *Briza maxima, Xanthorrhoea semiplana* ssp. *semiplana, *Senecio pterophorus* var. *pterophorus* Woodland	105	1589	590	37.1
	1302	*Eucalyptus viminalis* ssp. *cygnetensis, E. leucoxylon* ssp., *Allocasuarina verticillata* over *Acacia pycnantha, Olearia ramulosa* Open Woodland	2	64	0	0.0
	1303	*Eucalyptus leucoxylon* ssp., *E. viminalis* ssp. *cygnetensis* over **Medicago* sp. **Bromus rubens, *Avena barbata, *Lolium* sp. (pasture weeds) Open Woodland	27	332	38	11.6
Eucalyptus camaldulensis var. *camaldulensis, E. viminalis* ssp. *cygnetensis* Woodland	1401	*Eucalyptus camaldulensis* var. *camaldulensis, E. viminalis* ssp. *cygnetensis* over *Acacia pycnantha, Banksia marginata, Neurachne alopecuroidea, Hibbertia sericea* var. *sericea, Leptospermum myrsinoides* Woodland	25	841	136	16.2
Eucalyptus fasciculosa, E. viminalis ssp. *cygnetensis* Woodland	1501	*Eucalyptus fasciculosa, E. viminalis* ssp. *cygnetensis* over *Acacia pycnantha, Leptospermum myrsinoides, Xanthorrhoea semiplana s*sp., *Acrotriche serrulata, Hibbertia riparia* Woodland	45	368	35	9.6
	1502	*Eucalyptus fasciculosa, E. viminalis* ssp. *cygnetensis* over **Medicago* sp. **Bromus rubens, *Avena barbata, *Lolium* sp. (pasture weeds) Woodland	2	63	0	0.0
Eucalyptus viminalis ssp. *cygnetensis* Woodland	1601	*Eucalyptus viminalis* ssp. *cygnetensis, +/- E. obliqua* over *Pteridium esculentum, *Briza maxima, Acacia pycnantha, *Senecio pterophorus var. pterophorus, Hibbertia exutiacies, Acrotriche fasciculiflora* Woodland	62	669	165	24.7

Regional Vegetation Description	MU_ 50	Detailed Vegetation Description	Number of Patches	Total Area (ha)	Total Area Protec-ted (ha)	% Area Pro-tected
	1602	*Eucalyptus viminalis* ssp. *cygnetensis, +/- E. obliqua, +/- E. fasciculosa, +/- E. leucoxylon* ssp. over *Acacia pycnantha, Pteridium esculentum, *Briza maxima, Danthonia* sp.*, Xanthorrhoea semiplana* ssp. *semiplana* Open Forest	4	176	151	86.0
Eucalyptus viminalis ssp. *viminalis* &/or *E. dalrympleana* ssp. *dalrympleana, +/- E. viminalis* ssp. *cygnetensis*, *+/- E. obliqua* Woodland	1701	*Eucalyptus viminalis* ssp. *viminalis, +/- E. viminalis* ssp. *cygnetensis, +/- E. dalrympleana* ssp. *dalrympleana* over *Acacia retinodes* var. *retinodes* (swamp form)*, Leptospermum continentale, Pteridium esculentum, Leptospermum lanigerum, Melaleuca decussata* Woodland	24	191	0	0.0
	1702	*Eucalyptus dalrympleana* ssp. *dalrympleana, +/- E. obliqua* over *Pteridium esculentum, Hibbertia exutiacies, *Rubus ulmifolius* var. *ulmifolius, Leptospermum continentale, Pultenaea daphnoides* Woodland	20	56	33	59.6
Eucalyptus odorata, +/- E. leucoxylon ssp.*, +/- E. fasciculosa, +/- Callitris gracilis* Woodland	1801	*Eucalyptus leucoxylon* ssp.*, E. fasciculosa, E. odorata* over **Olea europaea* ssp. *europaea, Acacia pycnantha* Woodland	33	748	68	9.1
	1802	*Eucalyptus odorata, +/- E. leucoxylon* ssp. over *Acacia pycnantha, Acacia paradoxa, *Avena barbata, Danthonia setacea* var. *setacea, Austrostipa scabra* ssp. *falcata, Austrostipa elegantissima, Acacia acinacea* Woodland	84	1154	6	0.5
	1803	*Eucalyptus leucoxylon* ssp.*, +/- E. odorata* over *Xanthorrhoea semiplana* ssp. *semiplana, Acacia pycnantha, Austrostipa elegantissima, Astroloma conostephioides.* Low Woodland	43	780	2	0.3
	1804	*Eucalyptus leucoxylon* ssp.*, Callitris gracilis, +/- E. odorata* over *Leptomeria aphylla, Astroloma conostephioides, Rhagodia parabolica, *Briza maxima, *Avena barbata* Low Woodland	12	183	3	1.6
	1805	*Eucalyptus odorata +/- Eucalyptus fasciculosa* over *Astroloma humifusum, Lomandra multiflora ssp. dura, Acacia pycnantha, Melaleuca uncinata, A. paradoxa, *Ehrharta longiflora *Myrsiphyllum asparagoides* Low Woodland	81	543	39	7.2
	1806	*Callistemon rugulosus, Eucalyptus odorata* over *Einadia nutans s*sp.*, *Ehrharta longiflora, Chenopodium album, Enchylaena tomentosa* var. *tomentosa, Salsola kali* Shrubland	1	7	0	0.0

Regional Vegetation Description	MU_ 50	Detailed Vegetation Description	Number of Patches	Total Area (ha)	Total Area Protec-ted (ha)	% Area Pro-tected
Eucalyptus microcarpa, +/- E. fasciculosa, +/- E. leucoxylon ssp., *+/- Allocasuarina verticillata* Woodland	1901	*Eucalyptus microcarpa* over *Acacia pycnantha, Olearia ramulosa, Astroloma humifusum, Acacia paradoxa, *Olea europaea* ssp. *europaea, Lomandra densiflora, *Briza maxima (Eucalyptus microcarpa x E. odorata* was noted) Low Woodland	90	1395	441	31.6
	1902	*Eucalyptus microcarpa, E. fasciculosa* over *Acacia pycnantha, A. paradoxa, A. acinacea, Astroloma humifusum, Olearia ramulosa* Woodland	9	240	189	78.6
	1903	*Eucalyptus microcarpa, E. leucoxylon* ssp., *+/- Allocasuarina verticillata* over *Olearia ramulosa, Acacia pycnantha, *Chrysanthemoides monilifera, Astroloma humifusum* Woodland	7	121	50	41.3
Eucalyptus fasciculosa, E. leucoxylon ssp. Open Woodland	2001	*Eucalyptus fasciculosa, E. leucoxylon* ssp. over *Acacia pycnantha, Hibbertia exutiacies, Cheilanthes austrotenuifolia, Lepidosperma semiteres* Open Woodland	95	1848	635	34.3
	2002	*Eucalyptus fasciculosa, E. leucoxylon* ssp. over *Acacia pycnantha, Acrotriche serrulata, Hibbertia exutiacies, Cheilanthes austrotenuifolia, *Chyrsanthemoides austrotenuifolia, Lepidosperma semiteres* Woodland	47	399	78	19.7
	2003	*Eucalyptus fasciculosa, E. leucoxylon* ssp. over **Medicago* sp. **Bromus rubens, *Avena barbata, *Lolium* sp. (pasture weeds) Open Woodland	30	1203	0	0.0
	2004	*Eucalyptus fasciculosa, E. leucoxylon* ssp. over *Acacia pycnantha, A. paradoxa, Cheilanthes austrotenuifolia, Olearia ramulosa, Hibbertia riparia, Xanthorrhoea semiplana* ssp. *tateana* Open Woodland	63	719	42	5.8
Eucalyptus goniocalyx, +/- E. fasciculosa Low Woodland	2101	*Eucalyptus goniocalyx* over *Acacia pycnantha, A. myrtifolia* var. *myrtifolia, Xanthorrhoea semiplana* ssp. *semiplana, Gonocarpus tetragynus, Hibbertia exutiacies* Low Woodland	37	824	133	16.1
	2102	*Eucalyptus goniocalyx, E. fasciculosa* over *Acacia pycnantha, Leptospermum myrsinoides, Hakea rostrata, Calytrix tetragona, Hibbertia exutiacies, Lepidosperma semiteres* Low Woodland	78	2766	1447	52.3
	2103	*Eucalyptus fasciculosa, +/- E. goniocalyx* over *Allocasuarina muelleriana* ssp. *muelleriana, Acacia pycnantha, Gonocarpus elatus, Calytrix tetragona, Hibbertia riparia, H. sericea* var. *sericea, Xanthorrhoea semiplana ssp semiplana.* Low Woodland	3	442	238	54.0

Regional Vegetation Description	MU_ 50	Detailed Vegetation Description	Number of Patches	Total Area (ha)	Total Area Protec-ted (ha)	% Area Pro-tected
Allocasuarina verticillata Low Woodland	2201	*Allocasuarina verticillata* over *Acacia pycnantha, Bursaria spinosa, Lomandra densiflora, *Chrysanthemoides monilifera, Themeda triandra, Aristida behriana, Astroloma humifusum* Low Woodland	27	202	20	10.0
	2202	*Allocasuarina verticillata, +/- Melaleuca lanceolata* ssp. *lanceolata* over *Olearia axillaris, Acacia longifolia* var. *sophorae, Rhagodia candolleana* ssp., *Austrostipa curticoma, Isolepis nodosa, *Lagurus ovatus* Low Woodland	3	22	0	0.0
	2203	*Allocasuarina verticillata, Xanthorrhoea quadrangulata* over *+/- Acacia rupicola, +/- A. retinodes* var. *retinodes (*hill form*), +/- Dodonaea viscosa* ssp. *spatulata, +/- *Chrysanthemoides monilifera, +/- *Olea europaea* ssp. *europaea, Lomandra* spp. Very Low Woodland	8	125	54	43.3
	2204	*+/- Allocasuarina verticillata, +/- Santalum acuminatum, +/- Alyxia buxifolia* over *Banksia marginata, Grevillea lavandulacea* var. *lavandulacea, Xanthorrhoea semiplana* ssp. *tateana* Tall Open Shrubland	4	14	14	100.0
	2205	*Allocasuarina verticillata, +/- Acacia pycnantha +/- Eucalyptus viminalis* over *+/- Xanthorrhoea semiplana* native and introduced grasses and herbs Low Open Forest	5	31	30	97.1
	2206	*Acacia pycnantha, +/- Allocasuarina verticillata, +/- Banksia marginata* over *Xanthorrhoea semiplana* Low Woodland	3	9	9	99.9
	2207	*Allocasuarina verticillata* over **Ehrharta calycina, *Ammophila arenaria, *Poa poiformis, Bursaria spinosa* Low Woodland	5	36	0	0.0
Eucalyptus fasciculosa, Allocasuarina verticillata Low Woodland	2301	*Eucalyptus fasciculosa, Allocasuarina verticillata* over *Astroloma humifusum, Acacia paradoxa, A. pycnantha, Olearia ramulosa* Very Low Woodland	17	366	256	69.9
	2302	*Allocasuarina verticillata, +/- E. fasciculosa* over *Gonocarpus elatus, Calytrix tetragona, Banksia marginata, Hibbertia sericea* var. *sericea, Astroloma conostephioides, *Briza maxima.* Low Open Woodland	25	301	24	7.9
	2303	*Eucalyptus fasciculosa, Allocasuarina verticillata* over *Acacia pycnantha, Leptospermum myrsinoides, Astroloma conostephioides, Astroloma humifusum, Xanthorrhoea semiplana* ssp. *semiplana* Low Woodland	33	396	187	47.2
Eucalyptus fasciculosa Low Woodland	2401	*Eucalyptus fasciculosa* over *Acacia pycnantha, Astroloma conostephioides, A. humifusum, *Briza maxima, Leptospermum myrsinoides* Woodland	298	3080	813	26.4

Regional Vegetation Description	MU_ 50	Detailed Vegetation Description	Number of Patches	Total Area (ha)	Total Area Protec-ted (ha)	% Area Pro-tected
	2402	*Eucalyptus fasciculosa* over *Acacia paradoxa, Xanthorrhoea semiplana* ssp. *tateana, Astroloma humifusum, Lepidosperma semiteres, Olearia ramulosa* Low Woodland	128	2846	1499	52.7
	2403	*Eucalyptus fasciculosa* over *Acacia spinescens, A. pycnantha, *Myrsiphyllum asparagoides, *Ehrharta calycina, Lepidosperma carphoides, Astroloma conostephioides* Low Woodland	130	1422	146	10.3
	2404	*Eucalyptus fasciculosa* over **Avena barbata, *Ehrharta calycina, *Briza maxima.* Open Woodland	68	718	0	0.0
	2405	*Eucalyptus fasciculosa* over *Acacia paradoxa, A. pycnantha, Leptospermum myrsinoides, Platylobium obtusangulum, Astroloma humifusum, Hypolaena fastigiata, Hakea rostrata* Low Woodland	4	381	111	29.0
Eucalyptus fasciculosa, Callitris gracilis Low Woodland	2501	*Eucalyptus fasciculosa, Callitris gracilis* over *Centrolepis aristata, Gonocarpus elatus, Amyema miquelii, Calytrix tetragona, Acacia pycnantha, Thysanotus patersonii, Lomandra dura, Hakea carinata* Low Woodland	4	112	0	0.0
	2502	*Eucalyptus fasciculosa, Callitris gracilis* over *Amyema miquelii, Calytrix tetragona, Astroloma conostephioides* Woodland	14	452	173	38.2
	2503	*Eucalyptus fasciculosa, Callitris gracilis, +/- E. leucoxylon* ssp. over *Calytrix tetragona, Astroloma conostephioides, *Chrysanthemoides monilifera, *Briza maxima* Low Woodland	17	588	0	0.0
	2504	*Eucalyptus fasciculosa, Callitris gracilis, +/- E. goniocalyx* over *Calytrix tetragona, Astroloma conostephioides, *Chrysanthemoides monilifera, *Briza maxima* Low Woodland	3	105	2	1.7
Eucalyptus cosmophylla, +/- E. fasciculosa, +/- Allocasuarina muelleriana ssp. *muelleriana* Low Woodland	2601	*Eucalyptus cosmophylla, +/- Allocasuarina muelleriana* ssp. *muelleriana* over *Platylobium obtusangulum, Leptospermum myrsinoides, Hakea rostrata, Lepidosperma semiteres, Astroloma conostephioides* Very Low Woodland	77	470	204	43.5
	2602	*Eucalyptus cosmophylla, E. fasciculosa* over *Hakea rostrata, Leptospermum myrsinoides, Allocasuarina muelleriana* ssp. *muelleriana, Xanthorrhoea semiplana* ssp. *semiplana, Hibbertia riparia, Astroloma humifusum* Low Woodland	195	3012	752	25.0

Regional Vegetation Description	MU_ 50	Detailed Vegetation Description	Number of Patches	Total Area (ha)	Total Area Protec-ted (ha)	% Area Pro-tected
Eucalyptus obliqua, E. cosmophylla, +/- E. fasciculosa Low Woodland	2701	*Eucalyptus obliqua, E. fasciculosa, E. cosmophylla* over *Hakea rostrata, Acrotriche serrulata, Pultenaea daphnoides, Hibbertia exutiacies, Lepidosperma semiteres* Low Open Forest	81	1016	236	23.3
	2702	*Eucalyptus obliqua, E. cosmophylla* over *Platylobium obtusangulum, Leptospermum myrsinoides, Lepidosperma semiteres, Hakea rostrata, Hibbertia riparia, Xanthorrhoea semiplana* ssp. *semiplana* Low Woodland	100	2419	729	30.1
Eucalyptus porosa Low Woodland	2801	*Eucalyptus porosa* over *Pittosporum phylliraeoides* var. *microcarpa, Senna artemisioides* nothossp. *coriacea, *Myrsiphyllum asparagoides, Danthonia caespitosa, Lomandra effusa* Low Woodland	11	230	146	63.7
	2802	*Eucalyptus porosa, +/- E. leucoxylon* ssp., *+/- E. camaldulensis* var. *camaldulensis* over **Olea europaea* ssp. *europaea, Acacia pycnantha, Acacia paradoxa, Dodonaea viscosa* ssp. *spathulata.* Woodland	4	352	233	66.2
	2803	*Eucalyptus porosa* over *Acacia paradoxa, Xanthorrhoea semiplana* ssp. *tateana, Olearia axillaris, Pimelea serpyllifolia* ssp. *serpyllifolia, Rhagodia candolleana* ssp. *candolleana* Low Open Forest	2	17	0	0.0
	2804	*Eucalyptus porosa, +/- E. odorata* over *Lomandra multiflora* ssp. *dura, *Avena barbata, *Critesion murinum* ssp. *glaucum, Austrostipa* sp. Low Woodland	30	318	0	0.0
	2805	*Eucalyptus porosa, +/- E. phenax, +/- E. oleosa* over *Senna artemisioides* nothossp. *coriacea, Rhagodia parabolica, Triodia* spp., *Enchylaena tomentosa* var. *tomentosa, Senna artemisioides* ssp. *petiolaris, Acacia hakeoides* Low Woodland	9	37	0	0.0
Eucalyptus largiflorens, +/- E. odorata, +/- E. porosa Low Woodland	2901	*Eucalyptus largiflorens, +/- E. odorata* over *Muehlenbeckia florulenta, *Avena barbata, *Ehrharta longiflora, Einadia nutans* ssp., *Atriplex semibaccata* Low Woodland	3	12	0	0.0
	2902	*Eucalyptus largiflorens, +/- E. odorata, +/- E. porosa* over *Muehlenbeckia florulenta, Rhagodia parabolica, Maireana* spp., *Austrostipa* spp. Low Woodland	10	54	0	0.0
MALLEE						
+/- Eucalyptus incrassata, +/- E. leptophylla, +/- E. socialis, +/- E. oleosa, +/- E. gracilis Open Mallee	3001	*Eucalyptus incrassata, E. leptophylla* over *Melaleuca uncinata, *Myrsiphyllum asparagoides, Clematis microphylla, Danthonia* sp., *Lomandra multiflora* ssp. *dura, *Ehrharta longiflora* Open Mallee	31	230	32	13.8

Regional Vegetation Description	MU_ 50	Detailed Vegetation Description	Number of Patches	Total Area (ha)	Total Area Protec-ted (ha)	% Area Pro-tected
	3002	*Eucalyptus incrassata +/- E. socialis, +/- E. odorata, +/- Callitris gracilis* over *Melaleuca acuminata, M. lanceolata* ssp. *lanceolata, Santalum acuminatum, Lepidosperma viscidum, Triodia scariosa, Helichrysum leucopsideum* Open Mallee	45	228	0	0.0
	3003	*Eucalyptus oleosa, +/- E. gracilis, +/- E. phenax, +/- E. socialis* over *Sclerolaena diacantha, Enchylaena tomentosa* var. *tomentosa, Rhagodia parabolica, Atriplex stipitata* Mallee	4	54	17	31.8
	3004	*Eucalyptus socialis, +/- E. dumosa, +/- E. odorata +/- E. oleosa* over *Enchylaena tomentosa* var. *tomentosa, Danthonia caespitosa, *Critesion murinum* ssp. *leporinum, *Vulpia myuros* forma *myuros, Austrostipa exilis, Rhagodia parabolica* Mallee	8	41	18	44.0
	3005	*Eucalyptus leptophylla, +/- E. oleosa, +/- E. socialis* over *Melaleuca uncinata, Danthonia* sp., *Dianella revoluta, *Myrsiphyllum asparagoides, Enchylaena tomentosa* var. *tomentosa* Open Mallee	4	46	0	0.0
	3006	*Eucalyptus gracilis, +/- E. socialis, +/- E. phenax, +/- E. brachycalyx, +/- E. porosa* over *Geijera linearifolia, Melaleuca lanceolata* ssp. *lanceolata, *Carrichtera annua, Austrostipa eremophila, Rhagodia parabolica, Enchylaena tomentosa* var. *tomentosa*, *Sclerolaena diacantha* Open Mallee	2	17	0	0.0
Eucalyptus diversifolia, +/- E. cosmophylla, +/- E. fasciculosa Low Mallee	3101	*Eucalyptus diversifolia* over *Acacia retinodes* var. *uncifolia, Leucopogon parviflorus, Hibbertia riparia (glabriuscula), Lepidosperma carphoides, Olearia ramulosa* Low Mallee	9	792	661	83.5
	3102	*Eucalyptus diversifolia, E. cosmophylla, E. fasciculosa* over **Myrsiphyllum asparagoides, Brachyloma ericoides* ssp. *ericoides, Hibbertia riparia, Olearia ramulosa, Banksia marginata* Low Mallee	1	108	86	79.5
SHRUBLANDS						
Allocasuarina muelleriana, +/- emergent *Eucalyptus fasciculosa* Tall Closed Shrubland	3201	*Allocasuarina muelleriana, +/- emergent E. fasciculosa* over *Xanthorrhoea quadrangulata, Hakea* spp., *Calytrix tetragona, Pultenaea acerosa, Hibbertia* spp. Tall Closed Shrubland	2	71	70	98.5
Acacia retinodes var. *retinodes* (hill form) Tall Shrubland	3301	*Acacia retinodes* var. *retinodes* (hill form) over *Pteridium esculentum* Tall Shrubland	2	14	6	44.2

Regional Vegetation Description	MU_ 50	Detailed Vegetation Description	Number of Patches	Total Area (ha)	Total Area Protec-ted (ha)	% Area Pro-tected
	3302	*Acacia retinodes, +/- Xanthorrhoea semiplana +/- Banksia marginata* Tall Shrubland	1	8	7	83.5
	3303	*Acacia calamifolia, Banksia marginata* over *Xanthorrhoea semiplana* Tall Shrubland	2	2	2	97.0
Maireana aphylla, +/- Xanthorrhoea quadrangulata, +/- Dodonaea viscosa ssp. *spatula* Tall Shrubland	3401	*Maireana aphylla* over *Austrostipa nitida* Low Shrubland	1	3	0	0.0
	3402	*Xanthorrhoea quadrangulata*, *Maireana aphylla, Dodonaea viscosa* ssp. *spatulata* over *Austrostipa gibbosa, *Avena barbata* Tall Shrubland	4	8	0	0.0
	3403	*Xanthorrhoea semiplana* Shrubland	1	0	0	100.0
Muehlenbeckia florulenta, +/- Gahnia filum Tall Shrubland	3501	*Muehlenbeckia florulenta, +/- Gahnia filum* over *Samolus repens, Isolepis nodosa, Sarcocornia quinqueflora, *Cynodon dactylon* Tall Shrubland	22	131	83	63.2
Melaleuca lanceolata ssp. *lanceolata* Tall Open Shrubland	3601	*Melaleuca lanceolata* ssp. *lanceolata* over **Myrsiphyllum asparagoides, Muehlenbeckia gunnii, Austrostipa eremophila* Low Woodland	2	7	0	0.0
	3602	*Melaleuca lanceolata* ssp. *lanceolata, +/- Callitris gracilis, +/- Eucalyptus gracilis* over *Exocarpos aphyllus, Maireana oppositifolia, Threlkeldia diffusa, Atriplex paludosa* ssp. *cordata, Rhagodia candolleana* ssp. *candolleana, *Bromus rubens* Tall Open Shrubland	6	92	0	0.0
	3603	*Melaleuca lanceolata* ssp. *lanceolata* Tall Open Shrubland	5	8	0	0.0
Melaleuca uncinata Tall Open Shrubland	3701	*Melaleuca uncinata* Tall Open Shrubland	5	29	17	57.5
Acacia paradoxa, +/- A. pycnantha, +/- emergent Eucalyptus leucoxylon ssp. leucoxylon, +/- emergent *E. odorata* Closed Shrubland	3801	*Acacia paradoxa* over *Olearia ramulosa, Goodenia amplexans, Muehlenbeckia gunnii, Dianella breviculmis, Poa poiformis, *Lagurus ovatus* Closed Shrubland	4	24	4	17.8
	3802	*Acacia paradoxa, +/- A. pycnantha, +/-* emergent *Eucalyptus leucoxylon* ssp. *leucoxylon, +/-* emergent *E. odorata* Shrubland	6	64	0	0.0

Regional Vegetation Description	MU_ 50	Detailed Vegetation Description	Number of Patches	Total Area (ha)	Total Area Protec-ted (ha)	% Area Pro-tected
Leptospermum continentale, &/or L. lanigerum, +/- Phragmites australis, +/- Acacia retinodes var. *retinodes* (swamp form) Shrubland	3901	*Leptospermum continentale, &/or L. lanigerum, +/- Phragmites australis* over *Baumea rubiginosa, Lepidosperma longitudinale, B. tetragona, Gahnia sieberiana, Empodisma minus, Blechnum minus* Shrubland	77	592	30	5.1
	3902	*Acacia retinodes* var. *retinodes* (swamp form), *+/- Leptospermum continentale, +/- L. lanigerum* over *Baumea tetragona, Blechnum minus, Lepidosperma longitudinale, Phragmites australis, Viminaria juncea* Tall Shrubland	22	108	12	11.1
Sarcocornia sp., *Sclerostegia arbuscula, Suaeda australis, Halosarcia* sp. Low Shrubland	4001	*Sarcocornia quinqueflora, Sclerostegia arbuscula, +/- Suaeda australis, +/- Sarcocornia blackiana* over *Atriplex paludosa* ssp., *Lawrencia squamata, Distichlis distichophylla, Maireana oppositifolia, Samolus repens* Low Open Shrubland	51	1832	100	5.4
	4002	*Halosarcia halocnemoides* ssp. *halocnemoides, Sarcocornia blackiana* Low Shrubland	10	40	14	33.5
	4003	*Halosarcia halocnemoides* ssp. *halocnemoides, Sclerostegia arbuscula* over *Disphyma crassifolium* ssp. *clavellatum, Maireana oppositifolia* Low Shrubland	90	1179	12	1.0
	4004	*Halosarcia pergranulata* ssp. *pergranulata, Sarcocornia quinqueflora* over *Enchylaena tomentosa* var., *Frankenia pauciflora* Low Shrubland	23	266	12	4.6
	4005	*Halosarcia* sp., *Sarcocornia quinqueflora* over *Wilsonia humilis* var. *humilis, Disphyma crassifolium* ssp. *clavellatum, *Parapholis incurvus* Low Closed Shrubland	32	2916	12	0.4
COASTAL SHRUBLANDS						

Regional Vegetation Description	MU_ 50	Detailed Vegetation Description	Number of Patches	Total Area (ha)	Total Area Protec-ted (ha)	% Area Pro-tected
Olearia axillaris, +/- Acacia longifolia var. *sophorae, +/- Myoporum insulare, +/- Leucopogon parviflorus, +/- A. leiophylla, +/- Ozothamnus turbinatus* Shrubland	4101	*Olearia axillaris, Acacia longifolia* var. *sophorae, +/- Myoporum insulare, +/- Leucopogon parviflorus* over *Pimelea serpyllifolia* ssp. *serpyllifolia, Rhagodia candolleana* ssp. *candolleana, Tetragonia implexicoma, Carpobrotus rossii, *Ehrharta longiflora* Shrubland	4	445	1	0.2
	4102	*Olearia axillaris, Leucopogon parviflorus, Acacia longifolia* var. *sophorae, +/- Myoporum insulare* over *Pimelea serpyllifolia* ssp. *serpyllifolia, Muehlenbeckia gunnii, Rhagodia candolleana* ssp. *candolleana, Dianella brevicaulis, Tetragonia implexicoma* Shrubland	22	1346	1200	89.2
	4103	*Myoporum insulare* over *Acacia longifolia* var. *sophorae, Leucopogon parviflorus, Olearia axillaris, Exocarpos syrticola, Rhagodia candolleana* ssp. *candolleana* Shrubland	13	110	110	100.0
	4104	*Leucopogon parviflorus, +/- Olearia axillaris, +/- Acacia paradoxa* over *Rhagodia candolleana* ssp. *candolleana, Clematis microphylla, Dianella brevicaulis, Muehlenbeckia gunnii* Tall Shrubland	1	7	7	98.8
	4105	*Acacia leiophylla, +/- Acacia pycnantha, +/- Acacia longifolia* var. *sophorae, +/- Olearia axillaris* over **Oenothera stricta* ssp. *stricta, Isolepis nodosa, *Carpobrotus edulis* Tall Very Open Shrubland	2	13	0	0.0
	4106	*Olearia axillaris* over *Rhagodia candolleana* ssp. *candolleana, Threlkeldia diffusa, Tetragonia implexicoma, *Lagurus ovatus* Open Shrubland	4	29	12	40.1
	4107	*Olearia axillaris, +/- Acacia ligulata, +/- Exocarpos aphyllus, +/- Myoporum insulare, +/- Alyxia buxifolia, +/- Dodonaea viscosa* ssp. *spatula* over **Bromus* sp., **Vulpia myuros* forma, *Senecio lautus, Threlkeldia diffusa, Atriplex paludosa* ssp. *cordata, Tetragonia implexicoma* Tall Open Shrubland	36	701	0	0.0
	4108	*Ozothamnus turbinatus, Olearia axillaris* over *Spinifex sericeus, Isolepis nodosa, *Euphorbia paralias, Austrofestuca littoralis, Carpobrotus rossii* Low Very Open Shrubland	1	7	7	100.0

Regional Vegetation Description	MU_ 50	Detailed Vegetation Description	Number of Patches	Total Area (ha)	Total Area Protec-ted (ha)	% Area Pro-tected
**Lycium ferocissimum, +/- Myoporum insulare* Shrubland	4201	**Lycium ferocissimum, +/- Myoporum insulare* over **Lavatera arborea, *Rhamnus alaternus* Shrubland	14	67	3	5.2
Nitraria billardierei Open Shrubland	4301	*Nitraria billardierei* over *Atriplex cinerea, Tetragonia implexicoma, *Mesembryanthemum crystallinum, Threlkeldia diffusa* Open Shrubland	5	26	0	0.0
	4302	*Nitraria billardierei, Maireana brevifolia, +/- Atriplex paludosa* ssp. *cordata* over *Enchylaena tomentosa* var. *tomentosa,* samphire species. Open Shrubland	9	996	3	0.3
	4303	*Nitraria billardierei, +/- Olearia ramulosa, +/- Atriplex cinerea, +/- Maireana aphylla* over *Threlkeldia diffusa, Tetragonia implexicoma, Rhagodia candolleana* ssp. *candolleana, Senecio lautus* Low Shrubland	1	11	0	0.0
Olearia ramulosa Open Shrubland	4401	*Olearia ramulosa* over *Senecio lautus, Dianella brevicaulis, *Lagurus ovatus, Rhagodia candolleana* ssp. *candolleana, Pimelea serpyllifolia* ssp. *serpyllifolia, Acrotriche patula* Open Shrubland	23	172	72	41.8
Beyeria lechenaultii, +/- Allocasuarina verticillata Low Shrubland	4501	*Beyeria lechenaultii, +/- Allocasuarina verticillata* over *Acrotriche patula, Eutaxia microphylla* var. *microphylla, Pomaderris paniculosa* ssp. *paniculosa, Gahnia lanigera* Low Shrubland	16	117	13	11.3
GRASSLANDS						
Lomandra sp., *Danthonia* sp., *Austrostipa* sp., *+/- Themeda triandra, +/- Poa* sp. Tussock Grassland	4601	*Lomandra effusa* over *Austrostipa* sp. *Danthonia caespitosa, *Avena barbata, *Bromus rubens* Open Tussock Grassland	5	15	0	0.0
	4602	*+/- Themeda triandra, +/- Danthonia* sp., *+/- Lomandra* sp., *+/- Poa* sp., *+/- Austrostipa* sp. Closed Tussock Grassland	20	91	24	25.9
Spinifex sericeus or *Austrostipa stipoides* Open (Tussock) Grassland	4701	*Spinifex sericeus* over **Elymus farctus, *Euphorbia paralias, *Cakile maritima* ssp. *maritima* Open Grassland	18	159	107	67.5
	4702	*Austrostipa stipoides* Tussock Grassland	4	63	8	12.8
Triodia compacta Open Hummock Grassland	4801	*Triodia compacta* over *Kunzea pomifera, Hibbertia sericea* var. Open Hummock Grassland	1	8	0	0.0
SEDGELANDS						

Regional Vegetation Description	MU_ 50	Detailed Vegetation Description	Number of Patches	Total Area (ha)	Total Area Protec-ted (ha)	% Area Pro-tected
Phragmites australis &/or *Typha domingensis* Sedgeland	4901	*Phragmites australis* &/or *Typha domingensis* over **Aster subulatus, *Paspalum distichum, Persicaria lapathifolia, Muehlenbeckia florulenta, Suaeda australis* Sedgeland	136	2350	144	6.1
Gahnia sp. &/or *Juncus* sp. Open Sedgeland	5001	*Gahnia trifida, Gahnia filum, Juncus kraussii* over *Sarcocornia* sp. Open Sedgeland	59	400	93	23.3
	5002	*Juncus sarophorus, *Juncus effusus* over **Anthoxanthum odoratum, Eleocharis gracilis, *Lotus uliginosus* Sedgeland	2	6	0	0.0
	5003	*Lepidosperma longitudinale* and/or *L. concavum* Sedgeland	1	1	0	83.8
FERNLANDS						
Pteridium esculentum Fernland	5101	*Pteridium esculentum* Fernland	9	43	21	48.9

Note: Protected areas include NPWSA Reserves (GIS) April 2002, Heritage Agreements (GIS) April 2002 (DEH), SA Water Land (GIS) December 2001 (SA Water), Native Forest and Locality Reserves (GIS) March 2002 (PIRSA) Source: Smith F and Goodwins D (2001) South Mount Lofty Ranges Floristic Vegetation Mapping (GIS) current to December 2002 (EGI, DEH).

STRUCTURAL VEGETATION INFORMATION

The structural classification for each detailed vegetation group was determined from averages for the group using the site data where possible. This involved calculating the percentage foliage cover using the crown cover % (taken from a conversion table for the canopy type crown separation ratio (mean gap / mean width [diameter])) multiplied by the canopy type for each site then calculating the average for the group. The visual estimates of height were also averaged across the group and used in conjunction with the percentage foliage cover to determine the structural formation using the SA Structural Formation table (Appendix IX). Where there was inadequate data a subjective assessment based on canopy cover (Muir 1977) and height information was used to select the appropriate structural classification. The SA structural formation table is derived from Specht (1972) and Muir (1977).

The structural summary for each regional vegetation description defined for map display purposes was derived from generalising the detailed vegetation groups to provide the best overall structural description for those groups.

MAMMALS

D. M. Armstrong[1]

INTRODUCTION

Of the 31 species of native mammals known to reside in the Southern Mount Lofty Ranges (SMLR) at the commencement of European settlement in 1836, only 22 can now be confirmed as currently resident within the region (Table 26). These consist of nine species of marsupials, three rodent species, nine bat species and one monotreme (the Echidna). The status of the Platypus (*Ornithorhynchus anatinus*) is uncertain with only a few records in the last 10 years, all of which are unverified. Of the eight confirmed extinct species, seven are marsupials and one is eutherian (placental). The Koala (*Phascolarctos cinereus*) has been introduced to the region and become naturalised. Table 26 lists resident extinct and extant native and introduced taxa.

Long (1999) included several other species as occurring within the region. Examination of the supporting information associated with these records and lack of any additional records from the recent surveys led to them being disregarded as **resident** within the region. The species, which could not be substantiated were: Little Pygmy Possum (*Cercartetus lepidus*), Eastern Grey Kangaroo (*Macropus giganteus*), Red Kangaroo (*Macropus rufus*), Sugar Glider (*Petaurus breviceps*) and Silky Mouse (*Pseudomys apodemoides*). Some of these species may have been occasional inhabitants or vagrants and are discussed further below. Similarly, examination of records associated with several bat species records excluded three more species from those included in Long (1999). These were the Queensland Long-eared Bat (*Nyctophilus bifax*), the Greater Long-eared Bat (*Nyctophilus timoriensis*) and the Inland Forest Bat (*Vespadelus baverstocki*). A further three species included by Reardon and Butler (2001) as occurring in the wider region of the Ranges and adjacent plains may only be recorded infrequently in the study region.

Of the exotic species introduced to the region, nine have established wild or feral populations (Table 26). The remaining exotic species, including sheep, cattle, horses, some other domestic stock species and domestic dogs, which remain largely under the control of their owners, will not be discussed here.

The majority of current information for this summary of mammals was derived from the "Biological Survey of SA" surveys (refer Methods section for surveys and quadrats). Recording of "tracks and traces" at each survey quadrat provided the bulk of records of some species, in particular, Western Grey Kangaroo (*Macropus fuliginosus*), Echidnas (*Tachyglossus aculeatus*), Fox (*Vulpes vulpes*), and Rabbit (*Oryctolagus cuniculus*). Although it is not possible to positively distinguish between Western Grey Kangaroos and Euros based on tracks alone, it is assumed most tracks were those of Western Grey Kangaroos. Euros have a very restricted distribution in the SMLR and specific habitat requirements.

Spotlighting was essential in obtaining records of Common Brushtail (*Trichosurus vulpecula*), and Common Ringtail Possums (*Pseudocheirus peregrinus*). Opportunistic records, many in the form of road kills, collected while travelling between survey quadrats during the survey, provided important additional data for the larger species. Hair-tube analysis provided limited information. Other sources of information were South Australian Museum records, published references and interviews with local landholders.

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Table 26.

Summary of extinct and current resident mammals in the SMLR survey region, ordered by Family.

Table includes only species considered resident (either extant or extinct) – vagrants and occasional visitors are tabled separately.

Introduced species are preceded by an asterisk.

Extinct status applies to SMLR region only

Remaining Conservation Statuses are for South Australia (as per National Parks and Wildlife Act)

Species	Status	Common Name	Biological Survey		SA Museum
			Quadrat	Opportune	
ACROBATIDAE					
Acrobates pygmaeus	Extinct	Feathertail Glider			✓
BOVIDAE					
***Capra hircus*		Feral Goat	✓	✓	✓
BURRAMYIDAE					
Cercartetus concinnus		Western Pygmy Possum	✓	✓	✓
CANIDAE					
Canis lupus dingo	Extinct	Dingo			✓
**Vulpes vulpes*		Fox	✓	✓	✓
CERVIDAE					
**Cervus dama*		Fallow Deer	✓	✓	
DASYURIDAE					
Dasyurus viverrinus	Extinct	Eastern Quoll			✓
Phascogale tapoatafa	Extinct	Brushtailed Phascogale#			✓
Sminthopsis murina		Common Dunnart			✓
Sminthopsis crasicaudata		Fat-tailed Dunnart			✓
Antechinus flavipes		Yellow-footed Antechinus	✓		✓
FELIDAE					
**Felis catus*		Cat	✓	✓	✓
LEPORIDAE					
**Oryctolagus cuniculus*		Rabbit	✓	✓	✓
**Lepus capensis*		Brown Hare	✓	✓	✓
MACROPODIDAE					
Macropus eugenii ssp. *eugenii*	Extinct	Tammar Wallaby			✓
Macropus robustus		Euro		✓	✓
Macropus fuliginosus		Western Grey Kangaroo	✓	✓	✓
MURIDAE					
Rattus fuscipes		Bush Rat	✓	✓	✓
Rattus lutreolus		Swamp Rat	✓	✓	✓
Hydromys chrysogaster		Water Rat			✓
**Mus musculus*		House Mouse	✓	✓	✓
**Rattus rattus*		Black Rat	✓	✓	✓
**Rattus norvegicus*		Brown Rat		✓	✓
ORNITHORHYNCHIDAE					
Ornithorhynchus anatinus (Status in SMLR is uncertain)		Platypus			
PERAMELIDAE					
Isoodon obesulus	Vulnerable	Southern Brown Bandicoot	✓		✓
Macrotis lagotis	Extinct	Greater Bilby			✓
PHALANGERIDAE					
Trichosurus vulpecula	Proposed Rare (Draft Schedules)	Common Brushtail Possum	✓		✓
PHASCOLARCTIDAE					
**Phascolarctos cinereus* (native to SA but introduced to SMLR)	Rare	Koala	✓		✓
POTOROIDAE					
Bettongia lesueur	Extinct	Burowing Bettong[#]			✓
Bettongia penicillata	Extinct	Brushtailed Bettong[#]			
PSEUDOCHEIRIDAE					
Pseudocheirus peregrinus		Common Ringtail Possum	✓		✓

Species	Status	Common Name	Biological Survey		SA Museum
			Quadrat	Opportune	
TACHYGLOSSIDAE					
Tachyglossus aculeatus		Short-beaked Echidna	✓		✓
VESPERTILIONIDAE					
Chalinolobus gouldii		Gould's Wattled Bat	✓	✓	✓
Chalinolobus morio		Chocolate Wattled Bat	✓	✓	✓
Nyctophylus geoffroyi		Lesser Long-eared Bat	✓	✓	✓
Vespedelus darlingtoni		Large Forest Bat	✓		✓
Vespedelus regulus		Southern Forest Bat	✓	✓	✓
Vespedelus vulturnus		Little Forest Bat	✓	✓	✓
MOLOSSIDAE					
Mormopterus spp.@		Southern Freetail Bats	✓	✓	✓
Tadarida australis		White-striped Freetail Bat	✓	✓	✓
EMBALLONURIDAE					
Saccolaimus flaviventris		Yellow-bellied Sheathtail Bat			✓

@Formerly *Mormopterus planiceps*, now incorporated in *Mormopterus* spp., "a species complex which includes forms soon to become species in SA" (Robinson *et al.* 2000).
[#] Extinct in SMLR and formerly SA but reintroduced to SMLR or other parts of SA.

NATIVE MAMMALS WHICH MAY HAVE BEEN (OR ARE) OCCASIONAL INHABITANTS OF THE SMLR

Although discounted as being formerly or currently **resident** in the region, the following mammals may have occurred on the region's periphery and have been **occasional** inhabitants of the SMLR:

- **Southern Hairy-nosed Wombat (*Lasiorhinus latifrons*)**
  The recorded distribution of this species seems to be peripheral to the Mount Lofty Ranges rather than within the region and Hunwick (2002) considers it may have been an occasional visitor.
- **Eastern Grey Kangaroo (*Macropus giganteus*)**
  Aitken (1986) includes this species as having occurred in the region. It is likely to have been peripheral to the region.
- **Red Kangaroo (*Macropus rufus*)**
  Hunwick (2000) states: "The SMLR are on the southern edge of the range for the Red Kangaroo. It would seem to be an occasional inhabitant depending on local conditions rather than on a long-term resident."
- **Southern Bentwing Bat (*Miniopterus bassanii*)**, previously the Common Bentwing Bat (*Miniopterus schreibersii*) southern form (Reardon pers. comm), likely to be a vagrant visitor
- **Western Broad-nosed Bat (*Scotorepens balstoni*)** likely to be peripheral to the study region
- **Southern Myotis (*Myotis macropus*)**- likely to be peripheral to the study region.

Further details of the above three bat species are contained in the "Discussion" below.

EXTINCT MAMMAL TAXA IN SMLR

All of the eight resident native mammals that have disappeared from the SMLR still exist in some form in other parts of Australia, or in the case of the Tammar Wallaby (*Macropus eugenii* ssp. *eugenii*) on an island off the coast of New Zealand. Five species still occurring elsewhere in South Australia have a State conservation rating and two species have a National conservation rating[1] (Table 27).

The South Australian Museum (SAM) records are the primary source of information on the extinct mammals of the SMLR. It is therefore no coincidence that the authors of the few significant references available, Wood Jones (1925) and Finlayson (1953) and Aitken (1986) held the title of Honorary Curator of Mammals at the SAM and Aitken (1986) was Curator of Mammals at the SAM.

The previous status and distribution of mammals now extinct within the region is impossible to determine with any accuracy, due to the speed with which they disappeared. Their demise was so rapid that even species once regarded as common across much of the southern parts of the state are almost unrepresented in the records of the South Australian Museum. However, most of the extinct mammals appear to have disappeared from the SMLR at the same time - in the early 1900's. Wood Jones (1925) repeatedly refers to species as having been common about 20 years prior to the time of his writing. Whilst land clearing and habitat modification was extensive in the region by this time, a great deal was still intact by current day standards. It seems more likely that these factors would have created a more gradual process of extinction. The mystery of their relatively sudden disappearance at a time when the Dingo is believed to have also been locally extinct, is most likely explained by the arrival of the Fox in the region at some time in the previous decade.

[1] The National threatened status of species discussed is taken from the *Environment Protection and Biodiversity Conservation Act 1999*. The South Australian status is from the *National Parks and Wildlife Act 1972* schedules, which were reviewed in 2000.

Feathertail Glider (*Acrobates pygmaeus*)
There is only one SAM specimen from the region, collected in 1907 from near Houghton. Neither Finlayson (1953) nor Aitken (1986) included this species in their coverage of the region, and Wood Jones (1925) does not mention it occurring outside the lower South East of the state.

The Feathertail Glider's current distribution is concentrated in eastern Australia, preferring sclerophyll forest and woodland. Its occurrence in the far South East of South Australia and the River Murray represents the western limit of its current range. The isolation of the SMLR region from the South East and lack of additional specimens suggest the Houghton record may be doubtful, and its inclusion as an extinct species may be questionable. Its former occurrence, however, cannot be ruled out.

Burrowing Bettong *(Bettongia lesueur)*
Whilst there are a number of undated SAM records of the Burrowing Bettong from the northern Adelaide Plains, there are only two from within the SMLR region, from just north of Tea Tree Gully in 1902 and near Gawler in 1904. Aitken (1986) made no further comment but Finlayson (1953) considered that neither this species nor the Brush-tailed Bettong had been credibly recorded within the SMLR for at least 50 years.

Brush-tailed Bettong (*Bettongia penicillata*)
No SAM specimens exist for this species from within the region. Wood Jones (1925) stated that "20 years ago the dealers in Adelaide did a great trade in selling them (Brush-tailed Bettongs) by the dozen at ninepence a head for coursing on Sunday afternoons." Yet by 1925, Wood Jones wrote that they were extinct throughout the state with the possible exception of the extreme north-east. Aitken (1986) claimed that the Brushtailed Bettong was last recorded in the SMLR in 1903, the year before the last record of the Burrowing Bettong.

Eastern Quoll (*Dasyurus viverrinus*)
The only SAM record of Eastern Quoll for the region is from Mount Lofty in 1890. Wood Jones (1925) stated that although it had been "exceedingly common about Adelaide", its numbers started to rapidly decline in about 1900 and it had practically disappeared from South Australia by 1902. Wood Jones suggested an epidemic disease had contributed to its decline. As the Eastern Quoll is now regarded as extinct on mainland Australia (Maxwell *et. al*. 1996), recent records and sightings of the species in the SMLR, including a SAM record from Mylor in 1986 and a road killed specimen found near Bridgewater in March 2000 are probably captive escapes.

Brush-tailed Phascogale (*Phascogale tapoatafa*)
Although the semi-arboreal nature of *P. tapoatafa* would have enabled it to avoid introduced predators more effectively than the other species already mentioned as extinct within the region, its basic biology renders it vulnerable in other ways. As in *Antechinus* species, males die at the end of the first mating season. Soderquist (in Strahan 2000) stated that low population densities and the annual male die-off make it vulnerable to local extinctions. The Brush-tailed Phascogale prefers open forest with an open understorey. These areas (including large areas of Blue Gum and Red Gum savannah) would have been the first to have been grazed by domestic stock or directly cleared.

All SAM records are from the Adelaide Hills, including undated records from Crafers and Mount Lofty, and from Blackwood in 1906 and 1910. Despite a number of reported sightings of Brush-tailed Phascogale since that time, including one at Kaiserstuhl Conservation Park in 1960 (Long 1999), no further specimens are known from the SMLR. Many sightings of animals, which seem to fit the general description of Brush-tailed Phascogale, have been reported from locations across the region in recent years. Excitement about the possible continued existence of the species in the SMLR was aroused when a road-killed individual was collected near Bridgewater in 1999. This specimen was subsequently determined to have been an escaped pet. An extensive survey by researchers from Adelaide University, targeting Brush-tailed Phascogale over the last two years (1999-2000) using hair tube sampling techniques and nest boxes, has also failed to find any evidence of the species (P. Hornsby, pers. comm. 2001).

Red-tailed Phascogale (*Phascogale calura*)
Although Aitken (1986) cites the Red-tailed Phascogale (*Phascogale calura*) as being extinct in the region, the source of this record is not stated. There is no other evidence of this species as having occurred within the SMLR and it has not been included in the list of extinct species. The Red-tailed Phascogale is extinct in South Australia and considered Endangered in Australia.

Tammar Wallaby (*Macropus eugenii* ssp. *eugenii*)
There is only one SAM specimen of *M. eugenii* from the SMLR, originating from Hartley on the south-east boundary of the region in 1929. There is some doubt as to whether it was a wild specimen as the owner of the property, from which it came, was known to keep them as pets. However, Finlayson (1953) stated the Tammar Wallaby "…had many colonies in the hills, more particularly in the drier scrubs of the Barossa District, where it still exists in vanishingly small numbers". Yet Wood Jones (1925) commented "today it seems impossible to secure a single specimen for scientific study", adding that it still existed in the South East and on southern Eyre Peninsula. Whilst there is some confusion about the status of the species within the region in the early part of last century, Finlayson's comments at least confirm the Tammar Wallaby as a past resident of the SMLR.

Greater Bilby (*Macrotis lagotis*)
As with several of the extinct species, only a small number of SAM records exist as physical evidence that the Greater Bilby ever existed in the region. The two SAM records are from Dawesley near Nairne, with no collection date and from Tee Tree Gully in 1889. Aitken (1986) claimed that it was last recorded in the region in 1903, although does not state the source of this record. Finlayson (1953) merely wrote that of two species of bandicoot only one survived. Presumably, the one omitted in further discussion was the Greater Bilby. This general lack of information on the species within the region is particularly alarming when compared with Wood Jones' (1925) comments that it was probably extinct in South Australia, but 30 years earlier had been as commonly caught in rabbit traps in areas around Adelaide as had rabbits. Johnson (in Strahan 2000) also noted the rapid demise of the Greater Bilby nationally, and stated that there had been a sudden and widespread contraction of the species in the early 1900's.

Dingo (*Canis lupus dingo*)
There are no SAM specimens and almost no mention of the Dingo in the references to confirm that it ever existed within the SMLR. However, it is well known that this predator was persecuted because it was a danger to stock. Finlayson (1953) stated that it occurred throughout the hills and persisted in the unoccupied parts of the Fleurieu Peninsula, beyond the turn of the century. It was gradually exterminated from agricultural South Australia and has been kept from these regions for many years by fencing and baiting programs.

Table 27.
Mammals which have become extinct in the SMLR and their current State and National conservation status.

SPECIES	COMMON NAME	CONSERVATION STATUS		No. of SA Museum records for SMLR	Other sources of information
		SA	AUST		
ACROBATIDAE					
Acrobates pygmaeus	Feathertail Glider*	Endangered		One	
POTOROIDAE					
Bettongia lesueur	Burowing Bettong#	Endangered	Endangered (Robinson *et al*. 2000)##	Two	Finlayson(1953) Aitken (1986) Wood Jones (1925)
Bettongia penicillata	Brushtailed Bettong#	Rare		Nil	Finlayson(1953) Aitken (1986)
DASYURIDAE					
Dasyurus viverrinus	Eastern Quoll	Extinct		One	Wood Jones (1925)
Phascogale tapoatafa	Brushtailed Phascogale*	Endangered		Several	
*Phascogale calura***	Red-tailed Phascogale	Extinct			Aitken (1986)
MACROPODIDAE					
Macropus eugenii ssp. *eugenii*	Tammar Wallaby*	Extinct		One	Finlayson (1953)
PERAMELIDAE					
Macrotis lagotis	Greater Bilby	Endangered	Vulnerable	Two	Aitken (1986)
CANIDAE					
Canis lupus dingo	Dingo*			Nil	Finlayson (1953)

*****Extinct in SMLR but still occur naturally in other parts of SA (in the case of Tammar Wallaby, only the subspecies *Macropus eugenii decres* still exists – namely on Kangaroo Island).
Extinct in SMLR and formerly SA but reintroduced to SMLR or other parts of SA.
Not listed in the Environment Protection and Biodiversity Conservation Act 1999 (as at 9/9/02).
** Refer text – although listed as occurring in the region by Aitken (1986), there is no other evidence that this species occurred in the SMLR.

BATS

Because bat trapping was undertaken at only a limited number of survey quadrats, bat results are presented separately.

Systematic collection of bats within the region was beyond the scope of the Southern Mt Lofty survey. The considerable time required and specialist trapping and recording equipment necessary to achieve such a task would require a separate survey concentrating specifically on this one vertebrate order, over a lengthy period. However, limited bat trapping was undertaken at a small number of survey quadrats and opportunistically at a few other locations. Despite this minimal effort, eight of the nine bat species regarded as residents of the region were recorded. These were Gould's Wattled Bat (*Chalinolobus gouldii*) (Fig. 61), the Chocolate Wattled Bat (*C. morio*) (Fig. 62), Southern Freetail Bat (*Mormopterus* spp.), Lesser Long-eared Bat (*Nyctophilus geoffroyi*) (Fig.63), White-striped Freetail Bat (*Tadarida australis*) (Fig. 66), Little Forest Bat (*Vespadelus vulturnus*) (Fig. 64), Southern Forest Bat (*Vespadelus regulus*) and Large Forest Bat (*Vespadelus darlingtoni*).

In addition to the Biological Survey, a bat survey of the Mount Lofty Region was conducted during the summer 2001/2002, by local residents using ANABAT bat detectors. This survey was organised by the South Australian Museum, the Natural Resources Centre, the Upper River Torrens Landcare Group and the Barossa Catchment Group. Thirty-one quadrats were surveyed for one to three nights and over 15 000 echolocation calls recorded (T. Reardon, pers. comm. 2002).

Table 28 presents the bat records for the study region recorded by the Biological Survey and ANABAT and also those held by the SA Museum.

Table 28.
Records of the Nine confirmed resident Bat species for the Southern Mount Lofty Ranges.

Species	Common Name	Survey - Quadrats		Survey - Opportune		SA Museum	ANABAT
		# Quadrats	Records	Locations	Records	Locations	Sites
Chalinolobus gouldii	Gould's Wattled Bat	2	2	1	2	15	18
Chalinolobus morio	Chocolate Wattled Bat	3	12	2	6	7	18
Mormopterus spp.	Southern Freetail Bat	2	2	0	0	5	21
Nyctophylus geoffroyi	Lesser Long-eared Bat	5	6	3	7	27	18
Tadarida australis	White-striped Freetail Bat	7	9	0	4	5	22
Vespedelus darlingtoni	Large Forest Bat	2	2	0		9	20
Vespedelus regulus	Southern Forest Bat	2	3	3	7	12	18
Vespedelus vulturnus	Little Forest Bat	1	4	1	3	3	7
Saccolaimus flaviventris	Yellow-bellied Sheathtail bat	0	0	0	0	1?	1
	TOTAL RECORDS	**24**	**40**	**10**	**29**	**74**	**143**

Figure 61.
Gould's Wattled Bat, *Chalinolobus gouldii.* (Photo: P. Bird).

Figure 62.
Chocolate Wattled Bat, *Chalinolobus morio.* (Photo: T. Reardon).

Figure 63.
Lesser Long-eared Bat, *Nyctophylus geoffroyi.* (Photo: P. Canty).

Figure 65.
Yellow-bellied Sheathtail bat, *Saccolaimus flaviventris.* (Photo: S. Donnellan).

Figure 64.
Little Forest Bat, *Vespedelus vulturnus.* (Photo: T. Reardon)

Figure 66.
White-striped Freetail Bat, *Tadarida australis.* (Photo: A. Robinson).

MAMMALS, EXCLUDING BATS

Species Diversity and Abundance Recorded at Survey Quadrats

Nine of the 14[2] native mammal species currently inhabiting the region and the introduced koala were recorded at survey quadrats, namely the:

- Bush Rat (Fig. 70)
- Swamp Rat (Fig. 71)
- Southern Brown Bandicoot (Fig.67)
- Common Ringtail Possum (Fig. 74)
- Yellow-footed Antechinus (Fig. 72)
- Short-beaked Echidna (Fig. 77)
- Western Grey Kangaroo
- Common Brushtail Possum (Fig. 75)
- Western Pygmy Possum (Fig. 73)
- Koala (Fig. 69)

One other, the Euro (*Macropus robustus*) was recorded opportunistically on several occasions during the survey. Of the four species not recorded either at survey quadrats or opportunistically, the Common Dunnart (*Sminthopsis murina*) and Fat-tailed Dunnart (*Sminthopsis crassicaudata*) are both known to be only peripheral to the region, where no sampling was carried out. The Water Rat (*Hydromys chrysogaster*) relies upon well-vegetated permanent watercourses, a habitat type, which is rare in the region and was not sampled during the survey. The Platypus is possibly extinct from the region. Refer below for further discussion on each of these species.

Eight of the nine species of introduced mammals with established feral populations in the region were recorded both at survey quadrats and opportunistically. The remaining species, the Brown Rat (*Rattus norvegicus*) was recorded opportunistically only once during the survey, largely due to its preference for an urban environment on the Adelaide Plains, resulting in a restricted peripheral distribution within the ranges.

Appendix XI shows the frequency of all introduced and native mammals recorded (excluding bats) at all survey quadrats[3]. A total of 2027 mammal records of 18 species were made (excluding bats and domestic stock) over the 157 survey quadrats. Only one quadrat, WIL01001 from the Southern Fleurieu (SEG) survey (1997-99) recorded no mammal species. An average of 13 observations were made and an average of 3.9 species were recorded at the 156 quadrats. The highest number of observations at a quadrat was 53, of five species. This quadrat (117JER00901) was a Messmate Stringybark (*Eucalyptus obliqua*) Low Open Forest with an understorey of dense tall heath, in Deep Creek Conservation Park. Fifteen quadrats recorded only one species, whilst only three of these quadrats had a single record. The highest number of species recorded at a quadrat was ten. This was at an SA Blue Gum (*Eucalyptus leucoxylon)* and Rough-barked Manna Gum (*E. viminalis* ssp. *cygnetensis)* Low Open Forest with an unusually intact understorey of native shrubs, dominated by *Acacia pycnantha* and *Xanthorrhoea semiplana*, in Mount Billy Conservation Park (quadrat 117WIL02801).

The most frequently recorded species was the native Bush Rat accounting for 598 of the total of 2027 (29.5%) mammal records at survey quadrats. Although only fourth highest in the number of quadrats at which a species was recorded, with 65, it was second highest in number of quadrats at which it was trapped. The two species recorded at the most quadrats, Short-beaked Echidna and Western Grey Kangaroo were not trapped, but were recorded either by tracks and traces, or observed. The introduced House Mouse was recorded at 70 quadrats, but although second in number of records with 279 (13.7%) was recorded far less frequently than the native Bush Rat.

Whilst the summary figures presented in Table 29 of numbers of records and quadrats at which each mammal species was recorded are of considerable value in understanding the status of these species within the SMLR, the relative locations of the records of some species, are also of importance. The remainder of this chapter will discuss the survey findings, separately for each species, beginning with species of conservation significance.

[2] This figure of 14 current native mammals includes the Platypus whose status is uncertain.

[3] Appendix II shows vegetation and environmental details for each of the 157 vertebrate survey quadrats and Appendix VI shows location details for the survey quadrats.

Table 29.
Frequency of Mammal Records (excluding bats) at survey quadrats, arranged in descending order of frequency. Records include both captures and tracks/traces of mammals.

Species	Common Name	Records	# of Survey Quadrats from which recorded
Rattus fuscipes	Bush Rat	598	65
**Mus musculus*	House Mouse	279	70
Macropus fuliginosus	Western Grey Kangaroo	259	99
Pseudocheirus peregrinus	Common Ringtail Possum	217	44
Antechinus flavipes	Yellow-footed Antechinus	146	48
Tachyglossus aculeatus	Short-beaked Echidna	100	78
Rattus lutreolus	Swamp Rat	95	12
**Vulpes vulpes*	Fox	64	49
**Rattus rattus*	Black Rat	59	33
**Oryctolagus cuniculus*	Rabbit	55	30
Trichosurus vulpecula	Common Brushtail Possum	52	23
***Phascolarctos cinereus*	Koala	51	24
Isoodon obesulus	Southern Brown Bandicoot	25	11
Cercartetus concinnus	Western Pygmy Possum	10	7
**Lepus capensis*	Brown Hare	9	7
**Cervus dama*	Fallow Deer	4	2
**Capra hircus*	Feral Goat	3	2
**Felis catus*	Cat	1	1
Total Records		**2027**	**156**

*Introduced exotics
**Introduced native species

SPECIES OF CONSERVATION SIGNIFICANCE
Four of the extant resident mammal species have a threatened status at National or State level, and a fifth species (the Common Brushtail Possum) is in the process of being listed as Rare for the State (Table 30).

Table 30.
Extant resident mammal species in the SMLR with a current or proposed legislative conservation rating.

Species	National Rating	State Rating
Southern Brown Bandicoot	E	V
Platypus (current existence in SMLR is unconfirmed)		E
Koala (introduced to the SMLR)		R
Yellow-bellied Sheathtail Bat		R
Common Brushtail Possum		R*

E = Endangered; V = Vulnerable; R = Rare
R* = listed in Draft schedules to the *National Parks and Wildlife Act*, yet to be released for public comment (J. van Weenen, pers. comm., November 2002).

Southern Brown Bandicoot (*Isoodon obesulus*) (Fig. 67) – Nationally Endangered and State Vulnerable
The Southern Brown Bandicoot's rating as Endangered under the *Environment Protection and Biodiversity Conservation* (EPBC) *Act 1999* is recent, commencing from mid-2001. This resulted from recommendations by the Threatened Species Scientific Committee (TSSC) based largely on its continued decline in New South Wales and south-western Victoria.

The Southern Brown Bandicoot is the only species still naturally occurring in South Australia from eight bandicoot species known to have inhabited the state at the time of European settlement (Kemper 1990). Of these, only one other, the Greater Bilby (*Macrotis lagotis*) was known from the SMLR. The Southern Brown Bandicoot occurs on Kangaroo Island, the Mount Lofty Ranges, islands off the west coast of Eyre Peninsula, the South East of the state and historically, on Eyre Peninsula. Paull (1995) could find no recent evidence of it on Eyre Peninsula and considered its status there "unconfirmed". Its current distribution is much reduced from its former range, and confined to highly fragmented areas of suitable dense native vegetation remnants. While these remaining areas of habitat are protected under state legislation preventing further large scale clearing, and many are within state owned reserves, this fragmentation leads to isolation of populations and vulnerability to local extinction from

bushfires and introduced predators. Trapping by the Field Naturalists' Society of South Australian has confirmed the extinction of the population of Southern Brown Bandicoots in Kyeema Conservation Park, following the 1983 Ash Wednesday bushfires.

Paull (1995) carried out field surveys at 28 quadrats throughout the SMLR in the late 1980's, selected as known locations for past bandicoot records. He reported bandicoots present at 17, no evidence but populations known nearby at eight and total absence at three. The three at which no evidence of bandicoots could be found were the only quadrats north of the River Torrens. In fact, there have been no confirmed records north of the River Torrens since the 1960's. During this period, specimens were collected on two different occasions in Mount Crawford Native Forest Reserve in 1960. Bandicoots were also recorded in Hale Conservation Park in the same year, and Warren Conservation Park in 1969 (Paull 1995).

The Southern Mt Lofty Survey (conducted in 2000), which had sampling quadrats in 23 of the 28 blocks of remnant vegetation surveyed by Paull (1995) confirmed bandicoots at 11 of the 17 quadrats at which Paull had found evidence in the late 1980's. As the Southern Mt Lofty survey was not specifically targetting bandicoots, this should be seen as an encouraging and positive result. Bandicoots were also recorded in three remnant vegetation blocks not investigated by Paull: at Mount Billy Conservation Park, West Scrub Hill south of Myponga and along the Nangkita Creek, to the east of Mount Compass.

Table 31.
Comparison of results of Southern Brown Bandicoot survey by Paull (1995), with the Southern Mt Lofty Survey (Survey No. 117, conducted 2000).

PATCH NAME	1986-89 (Paull 1995)				Southern Mt Lofty Survey			
	Diggings	Trapped	Capture	Status	Oppor. obs	Trapped	Capture	Status
Hale CP	✗	✗		✗		✓	✗	✗
Warren CP	✗	✗		✗		✓	✗	✗
Mt Crawford NFR	✗	✗		✗		✓	✗	✗
Horsnell Gully CP	✓	✗		✓		✓	✗	✗ *
Ken Stirling CP	✓	✓	✗	✓	✓	✓	✗	✓
Wotton Scrub CP	✓	✓	✓	✓		✓	✗	✗
Ashton	✗	✗		✗ *		✗		
Uraidla	✗	✗		✗ *		✗		
Cleland CP	✓	✓	✗	✓		✓	✓	✓
Mount Lofty	✓	✗		✓		✓	✓	✓
Bridgewater	✗	✗		✗ *		✗		
Crafers	✗	✗		✗ *		✗		
Belair NP	✓	✗		✓	✓	✓	✗	✓
Upper Sturt	✓	✓	✓	✓		✓	✓	✓
Mark Oliphant CP	✓	✓	✗	✓		✓	✓	✓
Scott Creek CP	✓	✓	✓	✓	✓	✓	✗	✓
Mount Bold	✓	✗		✓	✓	✓	✗	✓
Kuitpo NFR	✗	✗		✗ *		✓	✗	✗
Kyeema CP	✗	✗		✗ *		✓	✗	✗
McHarg Creek	✗	✗		✗ *		✗		
Mt Magnificent CP	✗	✗		✗ *		✓	✗	✗ *
Cox Scrub CP	✓	✗		✓		✓	✓	✓
Myponga Tiers	✓	✓	✓	✓		✗		?
Myponga CP	✗	✗		✓		✓	✗	✓
Springmount CP	✓	✓	✗	✓		✓	✗	?
Second Valley NFR	✓	✓	✓	✓		✓	✗	?
Deep Creek CP	✓	✓	✓	✓		✓	✗	✓
Newland Head CP	✗	✗		✓		✓	✗	?
Mount Billy CP						✓	✓	✓
West scrub Hill					✓	✓	✗	✓
Nangkita Creek					✓	✗		✓
TOTALS				**17**				**14**

✓ = Bandicoots trapped or present.
✗ = Bandicoots not trapped/ or apparently absent.
✗ * = Bandicoots apparently absent but nearby colonies exist.
? = Bandicoots present 1986-89. Not recorded 2000. Require further effort.

In total the Southern Mt Lofty survey collected 25 bandicoot records from 11 of the 111 (10%) survey quadrats, plus another 16 opportunistic observations at other locations. The 25 survey records were as follows: Diggings = 2 records; Droppings = 9 records; Elliot trap = 6 records; Cage trap = 8 records.

Obviously, in some cases several records were made in each of the remnant vegetation blocks referred to in Paull (1995). Of the 12 of Paull's sites reconfirmed by the Southern Mt Lofty survey, eight were at established survey quadrats and four were made opportunistically at other locations within the remnant vegetation block.

In the area from Cleland Conservation Park, south to Mount Bold Reservoir, bandicoots appear to be relatively widespread and secure. In recent years, road-killed bandicoots have been seen frequently on both Summit Road through Cleland and on Upper Sturt Road between Belair National Park and the Sturt Valley. At least eight have been found on Summit Road between the South-East Freeway and Greenhill Road in the first six months of 2001 (personal observations of R. Gooch, pers. comm.). The apparent increase in bandicoot numbers in this area is mostly attributable to extensive fox baiting by National Parks and Wildlife staff in Cleland, Scott Creek and Mark Oliphant (previously Loftia) Conservation Parks and Belair National Park, and by SA Water staff in Mount Bold Reservoir Reserve.

Further contributing to the security of the Southern Brown Bandicoot in this area and throughout the region in general, could be the effects of a relatively dense and intact understorey, resulting from the absence of any large bushfires since the devastating events of the early 1980's. However, this post-fire succession is declining and with it so is the density of the understorey and the subsequent cover for bandicoots which it provides. There is some debate about the relationship between post-fire vegetation regimes and bandicoot populations. Certainly the large number and distribution of bandicoot diggings observed during the Southern Mt Lofty survey in Mark Oliphant Conservation Park, much of which was burned in the mid 90's seem to indicate a positive effect five to six years post fire.

It would appear that the distribution and status of the Southern Brown Bandicoot within the SMLR has been stable since the 1980's. However, in light of the recent nationally endangered classification of the Southern Brown Bandicoot, a survey to specifically determine its status in the SMLR is warranted.

Figure 67.
The Southern Brown Bandicoot, *Isoodon obesulus,* is a marsupial up to 330 mm in length. It is Nationally Endangered and State Vulnerable. The SMLR survey findings suggest its population and distribution within the study area has remained stable since the 1980's. It favours a dense low understorey. (Photo: P. Alexander).

Platypus (*Ornithorhynchus anatinus*) – State Endangered

Wood Jones (1925) wrote extensively about the Platypus and claimed that is occurred in south Australia, but gave no details of locations at which it had been recorded. But for an accumulation of extracts from newspapers, journals and other sources, published in the South Australian Naturalist (Hale and Somerville 1942) the past existence of the Platypus within the SMLR could have gone unrecognised. The list of 20 references to the Platypus in South Australia includes four from the SMLR, on the Onkaparinga River in 1867, a skin from Strathalbyn in the 1890's, several observations on the Finniss River and one on the Inman River in Back Valley, seen up to 1938. The Platypus's current status in the SMLR is uncertain. Although it is possibly extinct, the absence of confirmed records may in part be due to its secretive nature and because no survey has specifically targeted this species. There have been unconfirmed reports of the Platypus from Wellington and near Mount Compass in the last 10 years (C. Kemper, pers. comm., 2002).

Koala (*Phascolarctos cinereus*) (Fig. 69) – State Rare

The status of the Koala as Rare in South Australia is ambiguous, as the original populations were believed extinct by the late 1930's. Although subject to debate, the Koala's current distribution within South Australia is generally believed to result from introductions into a number of areas in which it did not naturally occur, including the SMLR. Details of these introductions are to be found in Robinson (1978).

The original distribution of the Koala in South Australia is believed to have been the lower South East of the state. The fur trade, which exported millions of koala skins during the early 20th century, and land clearing for agriculture, were probably the major contributing factors in the demise of the Koala in that region.

Koalas in the SMLR are the result of several releases, both deliberate and unintentional, from 1935 onwards. In that year an unknown number of koalas, believed to have originated in New South Wales, were illegally released in the Brownhill Creek area (Robinson 1978). Koalas are also known to have escaped over many years from Cleland Conservation Park, Native Fauna Zone, opened in 1965, and from a similar fauna enclosure in Belair National Park. The facility in Belair was established in 1958 and closed in 1972, at which time most of the inhabitants, including koalas, were released into the park (NPWS 1983). These animals originated from Flinders Chase on Kangaroo Island, where koalas from Victoria were released in the 1920's. In 1965, a further release of six koalas from Flinders Chase was carried out away from the central Adelaide Hills area, on private land near Ashbourne.

Robinson *et al*. (1989) reported koalas at relatively low densities in the Ashbourne-Kuitpo Forest and the Brownhill Creek, Belair National Park, Sturt River areas, including an estimate of a colony of between 20 and 30 in Belair National Park. Despite the devastating bush fires of the early 1980's, during which many perished, koalas appear to have thrived, and in the absence of any further major fires in the decades sincethen they have increased in number and distribution within the SMLR.

Figure 68, showing the locations of all quadrat and opportunistic Koala records from the 2000 survey and South Australian Museum records, indicates the extent of the expansion of koalas in the region. The most northerly of these was in Warren Conservation Park and the most southerly was between Bull Creek and Ashbourne. There are also recent reports of sightings further north around Para Wirra Recreation Park and several individual sightings further south in the Fleurieu District, on the northern side of Deep Creek Conservation Park, near Myponga Conservation Park and around Victor Harbor. Whilst some of those around Victor Harbor may be of escapees from the local fauna park, many of the other scattered reports can be substantiated as sightings of wild koalas.

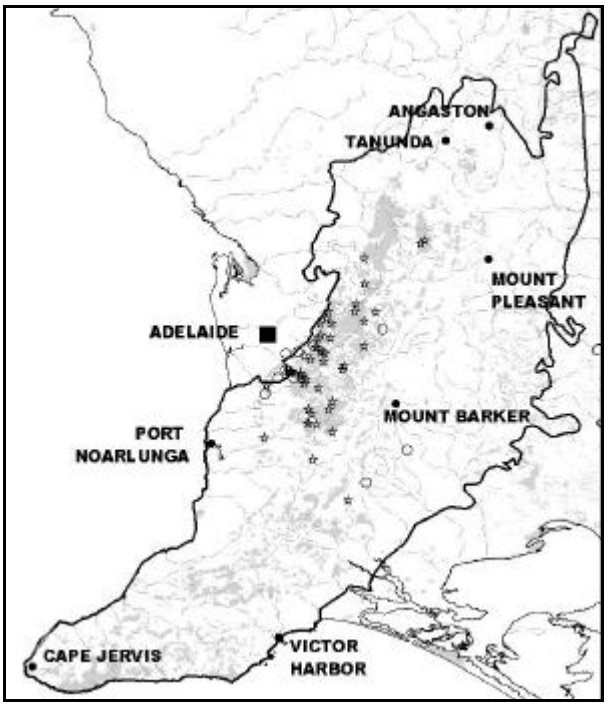

Figure 68.
SMLR Biological Survey (stars) and SA Museum (circles) record locations for the Koala.

While the stronghold area for koalas within the region is clearly in the Adelaide Hills, between the Torrens and Onkaparinga Rivers, where the larger and more continuous areas of suitable habitat are found, there appears to be an increasing expansion into some areas to both north and south. Residents of the Adelaide Hills may have become accustomed to the sight and sounds of koalas in their areas, but in recent years they have become a much more frequent sight at the base of

the ranges, in the eastern suburbs of Adelaide. One newspaper article (Sunday Mail 17/7/2000) reported an increase in public calls to Cleland Fauna Park about koalas, increasing from 52 in 1995 to 258 in 1999. In fact in July 2001 staff at the park adopted a newly developed database to assist with collating and understanding koala distribution.

During the Southern Mt Lofty survey, koalas were recorded at 24 of the 111 survey quadrats. Whilst quadrats were reasonably distributed across the region, the vast majority of Koala sightings were in the central Adelaide Hills. Table 32 illustrates this as a proportion of quadrats at which koalas were observed, in relation to the number of survey quadrats on the relevant 1: 50,000 maps sheets. Koala sightings were concentrated on the Adelaide, Noarlunga and Onkaparinga maps. Over half of all quadrats on the Noarlunga map sheet recorded koalas and about 1/3 of quadrats on each of the Onkaparinga and Adelaide map sheets recorded koalas. The additional 25 opportunistic observations made during the survey confirm this pattern.

Table 32.
Records of Koalas by 1: 50,000 map sheet in the SMLR survey area.

Map Sheet Name	Survey Quadrats	No. of Quadrats at which Koalas Observed	% of survey quadrats for each map sheet at which koalas observed	Opportunistic Observations
Noarlunga	20	11	55	12
Onkaparinga	19	7	37	1
Adelaide	15	5	33	10
Barossa	21	1	5	1
Milang	2	0	0	1
Totals	**77**	**24**		**25**

Koalas were recorded in a variety of eucalypt associations ranging from very low woodland to open forest. The majority of observations (54%) were made in open forest habitats. Despite the Stringybark eucalypt species, *Eucalyptus obliqua* and to a lesser extent *E. baxteri*, associations dominating the remaining uncleared areas of the SMLR, koalas showed a preference for areas of smooth barked ("gum") species of eucalypts. This includes *Eucalyptus leucoxylon* (SA Blue Gum), *E. viminalis* ssp. *viminalis* (Manna Gum), *E. camaldulensis* (River Red Gum) and *E. fasciculosa* (Pink Gum). The rough barked species included *E. goniocalyx* (Long-leaved Box) and *E. microcarpa* (Grey Box). Table 33 shows each vegetation group as a proportion of the total number of quadrats and the number of each group at which koalas were recorded. Whilst Stringybark species dominated at 42% of quadrats, they only accounted for 37.5% of koala records, or koalas were recorded at 9 of 47 (19%) of stringybark quadrats. Conversely, koalas were recorded at a much higher proportion of smooth barked quadrats, 12 of 36 (33%), accounting for 50% of records.

This well-known preferential feeding behaviour (Bryan 1995) has consequences for the future management of the remnant eucalypt woodlands in the SMLR. Damage to large *E. viminalis* and *E. camaldulensis* is already evident in Belair National Park, where koalas are now common. The largely cleared and unsuitable mallee areas to the north and east, and water of Gulf St Vincent create a virtual island, restricting expansion of koalas out from the region. It seems likely the koala management situation, which currently exists on Kangaroo Island, will eventually develop in the SMLR. Monitoring of representative areas of eucalypt species favoured by koalas should be undertaken in anticipation of this, particularly as these areas are a relatively small portion of the remaining habitat and therefore vulnerable to over browsing.

Table 33.
Proportion of Koala records in Woodland/Forest types based on broad vegetation type and proportion of survey quadrats in each vegetation type (figures in brackets indicate % of total (111) survey quadrats).

Vegetation Type	2000 Survey Quadrats	Koala Records at Quadrats
Stringybark eucalypts	47 (42.3%)	9 (37.5%)
Smooth-barked eucalypts	36 (32.4%)	12 (50.0%)
Rough-barked eucalypts	11 (9.9%)	3 (12.5%)
Mallee eucalypts	4 (3.6%)	0
Mixed Woodlands	5 (4.5%)	0
Shrublands	8 (7.2%)	0
Total	**111 (100%)**	**24 (100%)**

Figure 69.
Koalas were introduced in the SMLR in the mid 1930's. Their population and distribution within the study region is currently expanding. (Photo: A. Robinson).

Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*) - State Rare
This species has most commonly been recorded between March and June in the north of the State.

Specimens of the Yellow-bellied Sheathtail Bat have been recorded from the Adelaide Plains, including Para Hills, and one from the SMLR, on the lower hills-face at the Waite Institute in 1986. A further individual was found roosting in an artificial bird roosting box at Monarto (T. Reardon pers comm. 2002). Echolocation calls of this species were recorded at Belair (Ken Sanderson pers.comm., 2002). The Yellow-bellied Sheathtail Bat is thought to be migratory, seasonally passing through South Australia. The species is common in far north Australia (T. Reardon pers comm. 2002). Note: This species is the only Australian microchiropteran known to carry the potentially fatal human pathogen, Australian Bat Lyssavirus (Reardon and Butler 2001).

The Common Brushtail Possum
The Common Brushtail Possum is listed as State Rare in Draft Schedules to the *National Parks and Wildlife Act* (J. van Weenen, pers. comm., November 2002). This species is discussed below, in conjunction with the Common Ringtail Possum.

OTHER RESIDENT NATIVE MAMMAL SPECIES
In addition to the above four mammals with a current conservation rating (one of which is the introduced Koala) the other resident native mammals in the SMLR are:

- Bush Rat
- Swamp Rat
- Yellow-footed Antechinus
- Western Pygmy Possum
- Water Rat
- Common Dunnart
- Fat-tailed Dunnart
- Western Grey Kangaroo
- Euro
- Common Ringtail Possum
- Common Brushtail Possum
- Short-beaked Echidna
- Nine bat species (listed in table 28).

Small Native mammals recorded from survey quadrats – Bush Rat, Swamp Rat, Yellow-footed Antechinus, Western Pygmy Possum
The author's division of the SMLR into the three districts of Barossa, Adelaide Hills and Fleurieu (as described in the Introduction Chapter) is useful in understanding the distribution of the small mammal species recorded for the region. This separation is also important in interpreting the survey data, due to the different emphasis in site selection for the three surveys. Table 34 presents the small mammals recorded at the 157 Biological Survey quadrats. (Table 34 also includes the introduced Black Rat and House Mouse which are further discussed under Feral Mammals below).

There is clearly a progressive change in native species present and relative abundance from the Fleurieu district in the south to the Barossa district in the north. All four native species were present in the wetter Fleurieu district but only two species in the Adelaide Hills and one species in the Barossa district. The Western Pygmy Possum and Swamp Rat were only recorded from the Fleurieu district (however, the former is known to occur in the hills region).

The relative abundance of the other two native species, Yellow-footed Antechinus and Bush Rat, declines further north, with both recorded less frequently in the Adelaide Hills and the Bush Rat absent altogether from the drier Barossa district.

The introduced species, Black Rat and House Mouse were common in all regions.

Table 34.
Distribution and numbers of captures of the six species of small mammals from the three surveys conducted in the SMLR study area.
The left column shows the survey sub-region and the numbers in brackets represent the survey number: Survey 117 = Southern Mt Lofty; Survey 97 = Southern Fleurieu (Scientific Expedition Group); and Survey 52 = Mt Lofty -Southern Emu-wren.

Survey sub-region	No. of survey quadrats	No. of quadrats from which each species recorded (numbers in brackets are numbers of captures for each species					
		Western Pygmy Possum	Yellow-footed Antechinus	Swamp Rat	Bush Rat	House Mouse*	Black Rat*
Southern Barossa (117)	32	0	3 (8)	0	0	13 (26)	13 (24)
Adelaide Hills (117)	45	0	12 (36)	0	15 (97)	10 (37)	9 (17)
Fleurieu District (117)	34	5 (7)	17 (43)	1 (1)	29 (294)	28 (122)	2 (5)
Fleurieu Roadside (97)	34	2 (3)	14 (51)	0	19 (189)	11 (43)	7 (8)
Fleurieu Swamp (52)	12	0	2 (8)	11 (94)	2 (19)	8 (51)	2 (5)
Totals	**157**	**7(10)**	**48 (146)**	**12 (95)**	**65 (599)**	**70 (279)**	**33 (59)**

* Indicates introduced exotic species.

Bush Rat (*Rattus fuscipes*) (Fig. 70).
The Bush Rat was by far the most commonly recorded of the native species, with 598 records from 65 of 157 (41%) of quadrats. It was abundant in the Fleurieu District where it was recorded at 50 of 80 (62.5%) quadrats. The Bush Rat was recorded in a variety of vegetation associations from heath to forest, showing a marked preference for dense understorey. At a quadrat in Deep Creek Conservation Park (JER00901) where the highest number of captures was recorded (42), the understorey was almost impenetrable to humans and considerable labour was necessary to clear an area to install the trap-line. The Bush Rat showed little preference for swamp habitats. During the Mt Lofty Emu-wren survey, it was recorded at only two of the 12 (17%) quadrats which was a much lower proportion than the 62.5% at which it was recorded for the Fleurieu District overall.

In the Adelaide Hills the Bush Rat was recorded at only 15 of the 45 (33%) quadrats and in much lower numbers, with an average of 6.5 records per quadrat at which they were recorded, compared with 10 per quadrat in the Fleurieu district. The Southern Mt Lofty survey did not record the Bush Rat in the Barossa district, nor are there any South Australian Museum records from the area.

Despite Morialta and Blackhill Conservation Parks having a total of five survey quadrats between them during the Southern Mt Lofty survey, no Bush Rats were recorded in either park. However quadrats selected there were generally not in habitat types favoured by Bush Rats. Stewart (1993) trapped Bush Rats in Morialta Conservation Park in good numbers, whilst De Haan (1993) recorded them in Blackhill Conservation Park, but in low numbers (pre-survey fires in Blackhill may have been a contributing factor). In the absence of any major fires in the area since that time, Blackhill Conservation Park should be considered the northerly limit of the distribution of Bush Rats in the SMLR. Further into the ranges, Bush Rats were only recorded during the Southern Mt Lofty survey as far north as the Filsel Hill section of Kenneth Stirling Conservation Park.

Figure 70.
The Bush Rat, *Rattus fuscipes*, was the most abundant mammal recorded on the SMLR survey, with 598 individuals recorded. It was particularly common in the Fleurieu district, but was absent from the Barossa district. The Bush Rat was recorded in a variety of habitats, but favoured a dense understorey. (Photo: A. Robinson.)

Figure 71.
The Swamp Rat, *Rattus lutreolus*. Within the SMLR study region, suitable habitat is largely confined to the Fleurieu district. (Photo: A. Robinson).

Swamp Rat (*Rattus lutreolus*) (Fig. 71).
Wood Jones (1925) was somewhat confused in the early descriptions used to differentiate the Bush Rat from the Swamp Rat. Whilst these two similar sized species are often found side by side in areas of dense vegetation and may even be caught in neighbouring traps, the Swamp Rat has far more specific habitat requirements. It is darker in both skin pigmentation and in general fur colour, and as its common name suggests is generally found in association with swamps. It is therefore also far more restricted in the total area it inhabits within the region. Suitable habitat is largely confined to the Fleurieu District and has been greatly reduced through draining and clearing for agriculture.

Swamp Rats were recorded at 11 of 12 quadrats sampled during the Mt Lofty Emu-wren survey (targeting swamps), with an average of 8.5 captures per quadrat and a high of 29 captures over five nights trapping at MIL00203 on the eastern boundary of the

region near Finniss. Single records only, were obtained at three of the 11 quadrats. During the Southern Mt Lofty survey, which deliberately avoided swamps in quadrat selection due to the coverage of this habitat by survey 52, a single Swamp Rat was recorded at one quadrat and opportunistic records were collected at three other locations. These were all in the Fleurieu district and in close to permanent water or swamps.

The most northerly records of Swamp Rats are from Kyeema Conservation Park, collected by Ashbourne (1989) and the South Australian Field Naturalists Club (1970). Despite multiple trapping events in the same area in subsequent years, no further records of this species have been collected.

Yellow-footed Antechinus (*Antechinus flavipes*) (Fig. 72).

In line with the trend for the other native small mammal species within the region the Yellow-footed Antechinus is also most abundant in the Fleurieu district and becomes less common to the north. It is however the only species, which occurs in all three sub-regions. During the Southern Mt Lofty survey it was recorded at 17 of 34 (50%) quadrats in the Fleurieu District, 12 of 45 (27%) in the Adelaide Hills and three of 32 (9%) in the Barossa district. This may be partly explained by the different time of year for surveying each region. The Fleurieu District was surveyed in late summer; Adelaide Hills in late November to early December; and the Barossa district in spring (late September to early November). As *Antechinus* mate in spring, this is the least favourable time for trapping. Although its primarily arboreal habits lead to a preference for forest and woodland associations with relatively dense understorey, the Yellow-footed Antechinus was also recorded in lower densities in shrubland and tall heath associations in the Fleurieu District (in Cox Scrub and Deep Creek Conservation Parks). This indicates that the density of the understorey may be a critical factor in their local distribution.

Of particular interest is the apparent absence of Yellow-footed Antechinus from the large area of remnant native vegetation to the south-east of Williamstown, incorporating Hale and Warren Conservation Parks and Watt's Gully Native Forest Reserve. Despite the area being a large and continuous section of apparently suitable habitat, the Yellow-footed Antechinus was not recorded at any of the seven survey quadrats within this area. Possibly the drier conditions in the Barossa district are unsuitable for this species. Although occurring to the east in the larger area of habitat encompassing Para Wirra Recreation Park and several SA Water and Forestry SA reserves, they are relatively scarce there compared with areas to the south. As there are no South Australian Museum records for the Hale and Warren Conservation Parks and Watt's Gully Native Forest Reserve area, it is not certain that the Yellow-footed Antechinus occurred there in the past.

Figure 72.
The Yellow-footed Antechinus, *Antechinus flavipes*, a carnivorous marsupial. This is the most widespread Antechinus in Australia, occurring in a wide range of habitats. Within the SMLR study region, the Yellow-footed Antechinus was most common in the Fleurieu District but still occurs in the Adelaide Hills and Barossa districts. It was recorded at almost one third of survey quadrats. (Photo: A. Robinson).

Western Pygmy Possum (*Cercartetus concinnus*) (Fig. 73).
During the Southern Mt Lofty Survey the Western Pygmy Possum was recorded at only five of the 111 survey quadrats and once opportunistically. It was also recorded at two of 34 quadrats surveyed during the Southern Fleurieu (Scientific Expedition Group) Survey.

Although there are Museum records of this species scattered throughout the region, all recent records are from the Fleurieu District - in Cox Scrub, Yulte, Scott, Mount Billy, Myponga and Newland Head Conservation Parks and three other locations on private land. All but one of these was in heath understorey on sandy well-drained soil. The remaining quadrat in Yulte Conservation Park was in Blue Gum (*E. leucoxylon*) Low Open Forest on typically clay loam soil with a more open *Acacia* species and grass species understorey. This was a small portion of the park, adjacent to the majority area which was typical of the others areas where Western Pygmy Possums were recorded. The most recent Museum records to the north of the above areas are from near Mount Barker in 1957 and Reynella in 1945.

Figure 73.
The Western Pygmy Possum, *Cercatetus concinnus* lives mostly in heathland and dry sclerophyll forest over a shrubby understorey, feeding on nectar and insects. Being small and nocturnal it is seldom seen. Within the SMLR study area, all recent records are confined to the Fleurieu district, and mostly in sandy heath. (Photo: A. Robinson).

Water Rat (*Hydromys chrysogaster*)
No records of the Water Rat were made during any of the recent surveys. They are however a habitat specialist, restricted to permanent water, usually riparian, but they are also known in estuarine and occasionally protected coastal areas. These habitats were not sampled during the surveys, and would require a specific survey targeting them to gain an understanding of the Water Rat's distribution and abundance.

Changes in water flow regimes through reservoir construction and modifications to riparian vegetation associations through weed invasion, clearing and stock grazing may have had some effect on Water Rat populations within the region. However, Olsen in Strahan (2000), considered that on a national scale at least, the overall range of this species does not seem to have changed much since European settlement. The 13 SA Museum records of Water Rat from within the region are heavily concentrated in the Adelaide Hills, between the Torrens and Onkaparinga Rivers, with no Museum records from the Fleurieu District at all[4]. It is unlikely that this is an accurate indication of the distribution of the species within the region, rather that it is an effect of the higher concentration of human

[4] The Water Rat is, however, known from Granite Island although no specimens have been collected.

population in this central area increasing the chances of encountering the species.

Dunnarts – Fat-tailed Dunnart (*Sminthopsis crassicaudata*) and Common Dunnart (*Sminthopsis murina*)
The presence of both Fat-tailed Dunnart (*Sminthopsis crassicaudata*) and Common Dunnart (*Sminthopsis murina*) within the SMLR is only confirmed by a small number of South Australian Museum records from near to the eastern boundary of the region. Neither species was recorded during the recent surveys.

The Fat-tailed Dunnart was recorded at Towitta in 1903 and on the Bremer River to the north of Kanmantoo in 1974. The Common Dunnart was recorded at Hartley in 1969 and Harriot Hill in 1992. Both these locations are in an area approximately 20 kilometres south-east of Mount Barker. The Common Dunnart was also recorded in 1969 and 1971 from Victor Harbour. Although the eastern side of the region has been extensively cleared the Fat-tailed Dunnart favours open vegetation habitats and can live in introduced pastures (Cath Kemper, pers comm., 2002). It is possible, therefore, that it still persists in the region and due to its preference for open grasslands and low shrublands it is unlikely that it ever extended far into the ranges.

In contrast to the Fat-tailed Dunnart, the Common Dunnart favours woodland, open forest and heathland (Fox and Whitford 1982) and hence the extensive clearance of the eastern side of the region may have reduced the potential for this species to persist in the region. Both the Common Dunnart and Fat-tailed Dunnart have been recorded on the adjacent plains of the Western Murray Flats, in recent years.

Western Grey Kangaroo (*Macropus fuliginosus*)
The Western Grey Kangaroo was the most frequently recorded mammal species during the Southern Mt Lofty Survey. However, evidence of its occurrence at 91 of the 111 survey quadrats was often by the presence of droppings, or scats[5]. This was most often the case in the Adelaide Hills where they are in relatively low numbers. Although recorded throughout the region Western Grey Kangaroos are far more abundant in the southern Barossa and Fleurieu districts. The steep slopes; denser, more continuous vegetation and more heavily settled escarpment habitat of the Adelaide Hills appear less suitable for kangaroos. In this central area of the region they are usually seen singly or in small groups. One exception to this was found during the survey on the eastern side of Morialta Conservation Park where a group of around 30 Western Grey Kangaroos is known.

In the Fleurieu district, large groups of 100 or more are known at Newland Head and Cox Scrub Conservation Parks, two locations within Deep Creek Conservation Park, and on the southern side of Mount Bold reservoir. Similarly large groups are found in the Barossa district at Kaiserstuhl Conservation Park, Para Wirra Recreation Park and the Tower Native Forest Reserve. These locations are similar in that they provide shelter within the native vegetation and immediate access to adjacent pasture, away from areas of human occupation. Selective browsing on native plant species is evident, compromising the value of these reserves for both vegetation associations and other vertebrate species. *Banksia* and *Allocasuarina* seedlings and young trees, and *Lomandra* and *Acrotriche* understorey species are among the worst affected. Kangaroos are also known to feed on threatened orchid species in Para Wirra Recreation Park, where a management program for Western Grey Kangaroos has recently been put in place. Ultimately this will be used as a model to develop similar programs in other parts of the region.

Euro (*Macropus robustus*)
In the SMLR where it is uncommon, the Euro is at the southern extreme of its range in South Australia. It was not recorded at any of the survey quadrats during the Southern Mt Lofty survey, but was recorded opportunistically at six locations during the year. These records were all in or around the Para Wirra, Sandy Creek and Kaiserstuhl Conservation Parks. Records from the 1991 Biological Survey of the Murray Mallee and other previous observations confirm that the Euro also occurs in the hills along the eastern side of the region, almost as far south as Murray Bridge. It therefore appears to be restricted to the drier areas of rolling open hills in the north and east of the region.

Common Brushtail Possum (*Trichosurus vulpecula*) (Fig. 74) and Common Ringtail Possum (*Pseudocheirus peregrinus)* (Fig. 75)
It is commonly thought that the Common Brushtail Possum is more common than the Common Ringtail Possum within the SMLR, largely because the former is the most frequently encountered by people. The results of the Southern Mt Lofty survey seem to contradict this general public perception. For brevity and to prevent a misconception concerning the conservation status of these two species, they will be referred to as the Brushtail Possum and Ringtail Possum hereafter in this text.

Spotlighting for approximately 30 minutes targeting possums was carried out at 69 of the 111 survey quadrats. Given limited resources for nocturnal surveying, priority was given to areas thought most likely to contain possums (forest and woodland areas). The results are shown in Table 35.

[5] It was not possible to distinguish Western Grey Kangaroo from Euro from scats. However, unless scats were located in the few restricted areas known to provide habitat for Euros, scats were assumed to be from Western Grey Kangaroos.

Figure 74.
The Common Ringtail Possum, *Pseudocheirus peregrinus*, was recorded in 44 SMLR survey quadrats, generally in Stringybark habitats. (Photo: A. Robinson).

Figure 75.
The Common Brushtail Possum, *Trichosurus vulpecula* was less common than the Common Ringtail Possum. It seems to favour smooth-barked eucalypts and more fertile soils – habitats that have been heavily cleared in the survey region. This photo was from Beaumont Common in the residential foothills of Adelaide. (Photo: A. Robinson).

Table 35.
Comparison of methods used in obtaining records of Common Brushtail Possums and Common Ringtail Possums at survey quadrats during the SMLR survey.

Species	No. of Quadrats	Record Method			Total Records
		Spotlight	Trapped	Traces	
Common Ringtail Possum	44	204	1	12	217
Common Brushtail Possum	21	20	15	15	50

A total of 217 records between 44 quadrats were collected for the Ringtail Possum, but only 50 records from 21 quadrats were made for the Brushtail Possum. Both species were recorded at 11 quadrats. Whilst spotlighting observations provided for 94% of Ringtail Possum records, only 40% of Brushtail Possum records were made by spotlighting.

The highest number of spotlighting records of the Brushtail Possum at any one quadrat was eight, in Long-leaved Box (*Eucalyptus goniocalyx*) and Pink Gum (*E. fasciculosa*) Woodland at Little Mount Crawford Native Forest Reserve. Eight Ringtail Possums were also recorded at the same time at this quadrat. The highest number of spotlighting records for the Ringtail Possum was 21 in Brown Stringybark (*E. obliqua*) Woodland in Wilson's Bog in Cleland Conservation Park.

Figure 76.
The SMLR survey quadrat at Wilsons Bog recorded the highest number of Common Ringtail Possums. (Photo: A. Robinson).

The number of each species trapped is also significant, with 15 of 50 (30%) Brushtail Possum records achieved through cage trapping, but only one Ringtail Possum trapped from 217 (0.5%) records. That particular trap was set on top of a fallen tree, in a Blackberry (*Rubus* sp.) thicket. Presumably, this disparity in trap success results from the reluctance of the Ringtail Possum to leave the safety of the tree canopy, where it was recorded during the majority of spotlighting observations.

Notably, 25 of the 50 records of Brushtail Possum at survey quadrats, were from only eight quadrats on the Barossa 1:50,000 map sheet, indicating that it is more common in the Barossa district. As spotlighting effort at quadrats in this area was less than for the Adelaide Hills and Fleurieu districts this may be significant. Whether it could be related to the drier climatic conditions or the greater variety of vegetation associations in the Barossa district is beyond the scope of this document, but is worthy of future investigation.

Opportunistic possum records support the patterns discernible from the quadrat-based data. Only four of 58 (7%) opportunistic Ringtail Possum records were road kills, whereas for the Brushtail Possum it was 9 of 31 (29%), again illustrating the comparative reluctance of Ringtail Possums to descend to the ground and/or to cross roads. Also, 49 of the 58 (84%) opportunistic records of Ringtail Possums were obtained through spotlighting, whilst only 19 of 31 (61%) were obtained using this method for Brushtail Possums. Despite the absence of any trapping results in the opportunistic data, this still clearly indicates the need to include spotlighting as a survey method to obtain valid possum records, and that it is particularly essential for Ringtail Possums.

The survey results indicate a strong preference of Brushtail Possums for areas dominated by smooth-barked eucalypts (and conversely, avoidance of Stringybark eucalypts). This is shown in Table 36 for example, 68% of survey quadrats where Brushtail Possums were recorded were dominated by smooth-barked eucalypts. In Deep Creek Conservation Park where Stringybark dominates, no Brushtail Possums were recorded, whereas Ringtail Possums were extremely common. However the Ringtail Possum shows no distinct preference for bark type (Table 36).

The majority of the woodland and forest habitats remaining in the SMLR are dominated by Messmate Stringybark (*E. obliqua*), and to a lesser extent Brown Stringybark (*E. baxteri*). Basically, this is the result of the disproportionate clearing of the smooth barked eucalypt species, predominantly SA Blue Gum (*E. leucoxylon*) with lesser areas of River Red Gum (*E. camaldulensis*) and Manna Gum (*E. viminalis* ssp.

viminalis), because they grow on more fertile soils suitable for agricultural practices.

The two possum species have slightly different habitat requirements and behaviour, which result in the general impression that the Brushtail Possum is far more common and widespread than it actually is. The Brushtail Possum has higher nutritional needs, requiring a wider variety of plant species and is known to be partially omnivorous. The Ringtail Possum, however, lives principally on eucalypt foliage. In addition Brushtail Possums need large hollows for shelter, whereas Ringtail Possums, whilst preferring to use tree hollows, can build nests or dreys in dense foliage.

The result is that Brushtail Possums live on the more fertile soils which produce a variety of highly nutritious plant species, and the larger trees, providing the hollows they require (Braithwaite *et al*. 1984). Ringtail Possums on the other hand can survive well in the poorer quality stringybark woodlands, particularly as there they do not have to compete with Brushtail Possums. Therefore, Brushtail Possums are more commonly seen within the SMLR region by humans, partly because they are more confident on the ground, but principally because they live on the better soils which humans have modified and occupied. Where the Brushtail Possum does occur in stringybark dominated areas, it is generally adjacent to or in an ecotone with other eucalypt species. Alternatively, such occurrences are in semi-urban locations with low density housing, providing both the necessary variety of food sources, in the form of garden plants, and alternative shelter in and around houses and sheds.

Brushtail Possums have recently been upgraded from no conservation rating in South Australia, to now being listed as Rare in Draft Schedules (2002) to the *National Parks and Wildlife Act* (J. van Weenen, pers. comm., November 2002).

The survey results support a Rare conservation rating for the Brushtail Possum:

- Brushtail Possum records numbered less than 25% of Ringtail Possum records (further studies are required to determine population trends);
- Brushtail Possums prefer vegetation remnants based on more fertile soils, a much-reduced habitat type in the SMLR.
- Brushtail Possums require tree hollows – a relatively scarce resource.

Table 36.
Preference of Common Ringtail Possum and Common Brushtail Possum present at SMLR survey quadrats for a variety of dominant tree types.

Dominant Tree Type	Quadrats at Which Possum Species Present		
	Ringtail Possums	Brushtail Possums	Ringtail and Brushtail Possums
Smooth-barked eucalypts	17 (39%)	11 (58%)	9 (82%)
Smooth-barked eucalypts/ Sheoak	1 (2%)	2 (10.5%)	
Smooth-barked /Stringybark eucalypts	2 (4.5%)		
Stringybark eucalypts	18 (41%)	2 (10.5%)	
Rough-barked /Stringybark eucalypts	1 (2%)	1 (5.25%)	1 (9%)
Rough-barked eucalypts	3 (7%)	3 (15.75%)	1 (9%)
Swamp Wattle (*Acacia retinoides*)	2 (4.5%)		
Total	**44**	**19**	**11**

Short-beaked Echidna (*Tachyglossus aculeatus*) (Fig. 77).
The Short-beaked Echidna was recorded at 74 of the 111 survey quadrats during the Southern Mt Lofty survey. However, it was only seen at two of these. The remaining records were of diggings and occasionally scats. No measure of the age of the diggings was attempted, although many appeared fresh. Throughout the year a total of 18 opportunistic sightings were made during reconnaissance and other field activities within the region. Of these four were road kills, the remainder were observations of active animals.

The shy, slow and often nocturnal behaviour of the Short-beaked Echidna means they are not frequently seen, but evidence of where they have been is common. Within the SMLR they are more abundant in and around areas of native vegetation, which provide better shelter and feeding opportunities, but due to their secretive nature are infrequently seen there. They are most often seen, due to increased visibility, in partially cleared farmland adjacent to areas of native vegetation, and occasionally enter gardens in towns within the region and in the eastern suburbs of Adelaide along the base of the ranges. Augee, in Strahan (2000) stated that the distribution of the Short-beaked Echidna nationally is sparse, but that it remains ubiquitous and is in no apparent danger. This also seems to be the case within the SMLR.

Figure 77.
The Echidna, *Tachyglossus aculeatus*. Because of their shy and nocturnal behaviour, the Echidna is seldom seen. However, evidence of the echidna was recorded at almost three quarters of the Southern Mt Lofty survey quadrats. (Photo: P. Canty).

OTHER BAT RECORDS

The number of South Australian Museum bat records from the region is low (Table 28). This may reflect the difficulty in observing bats due to cryptic nocturnal and aerial behaviour and a general reluctance to physically handle bats[6]. In particular there are few bat records from the more sparsely human populated parts of the region. This is probably the result of bats being recorded when they are encountered roosting in houses or other buildings, rather than reflecting their natural distribution patterns. Most SA Museum records are of species well known for occupying artificial roosting habitats in buildings.

Of the 22 species of the insectivorous bats of the sub-order Microchiroptera (microbats), recognised as occurring in South Australia (Robinson *et. al*. 2000), 12 were associated with the Southern Mount Lofty Ranges by Reardon and Butler (2001). However, only the nine species listed in Table 28, can be confirmed as residents of the region. The remaining three species require some explanation.

The Southern Bentwing Bat (*Miniopterus schreibersii bassanii*), occurs naturally from about Geelong in Victoria, to the lower south-east of South Australia, where it congregates in large numbers to breed in spring at Bat Cave near Naracoorte. A small number of old records exist for more northern areas of the state, including the Flinders Ranges and lower Yorke Peninsula. One registered specimen in the South Australian Museum collection, was collected from Mount Lofty in 1895, and is discussed in (Wood Jones 1925). One explanation for these apparently anomalous records from the past is that the bats were accidentally transported to these areas on ships. It seems equally likely that the species may occasionally extend its range in response to climatic or other environmental factors. Banding studies have shown that the Southern Bentwing Bat is capable of large seasonal migrations. The Southern Bentwing Bat is an obligate cave dweller, and the absence of caves in the SMLR suggests that the species is unlikely to be a usual resident of the area. The Southern Bentwing Bat is classified in the Conservation Dependent category, under the EPBC Act, but has recently been nominated for classification as Endangered at the National and State level.

The Western Broad-nosed Bat (*Scotorepens balstoni*) has not been recorded within the SMLR, but has been recorded in the Adelaide region by a specimen registered in 1931. It is known from widely spaced localities across the state. Reardon and Butler (2001) considered that within the SMLR it is possibly confined to the drier foothills.

The Southern Myotis (*Myotis macropus*). Similarly, the Southern Myotis has only been recorded peripheral to the region, on the River Murray near where it is joined by the Marne River, which flows eastward out of the SMLR. It is usually confined to near fresh water creeks and rivers, where it feeds from the surface, so could possibly occur in such habitat within the region.

[6] Reardon and Butler (2001) provide the following warning: "…permits are required to handle or work with bats. The recent discovery of a rabies-like virus in Flying Foxes and Yellow-bellied Sheathtail Bat means that people should not handle bats…"

Except for the Yellow-bellied Sheathtail Bat, the other eight resident bat species appear to be relatively common, since all were trapped or recorded with minimal effort during the Southern Mt Lofty Survey. However, all are dependent upon tree hollows for their natural day roost quadrats, and some species are reliant on thick vegetation (providing high acoustic clutter) for foraging areas. The SMLR has had 94% of its native vegetation cleared since European settlement. The impact of habitat loss (including loss of hollows, large sheets of bark on old or dead trees) and habitat fragmentation on bat populations must have had a significant negative impact upon bat abundance and density in the region. The reduction in natural roosting spots is possibly responsible for bats adapting to occupying buildings as alternative shelter.

FERAL MAMMALS

The feral mammals that have established wild populations in the SMLR are the Rabbit, Brown Hare, Fallow Deer, Feral Goat, Cat, Fox, House Mouse, Black Rat and Brown Rat.

Introduced Rodents – Black Rat (*Rattus rattus*) (Fig. 78), House Mouse (*Mus musculus*) (Fig. 79) and Brown Rat (*Rattus norvegicus*)

Both the Black Rat and the House Mouse are distributed throughout the SMLR (refer Table 34 above). The Brown Rat is far more restricted in its range. This larger species was recorded only once during the Southern Mt Lofty survey, as an opportunistic road kill in an area of orchards just north of Summertown in the Adelaide Hills. South Australian Museum records of the Brown Rat for the region are concentrated on the hills face continuing on into the city. There is also a record from Belair National Park (Cath Kemper pers comm. 2002).

Although recorded in all three districts (Fleurieu, Adelaide Hills and Barossa), the Black Rat was most common in the Barossa district where it was recorded at 13 of 33 (39%) quadrats. In the Adelaide Hills it was recorded at 9 of 45 (20%) quadrats, and only 11 of 80 (14%) of quadrats from the Fleurieu district. Only eight of the 33 quadrats at which the Black Rat was recorded, also recorded the native Bush Rat, suggesting minimal overlap in the local distributions of these two species. Whether this is the result of marginally different specific habitat requirements, the inability of the two species to coexist or perhaps the more opportunistic nature of the introduced species is unclear but may be worthy of further investigation. Certainly, the Black Rat is most common in the north of the region where the Bush Rat is absent, and less common in the south where Bush Rats are abundant.

Of the small mammals, the House Mouse was recorded at the most quadrats, with an average of four records at each of 70 quadrats (refer Table 34 above). These quadrats were reasonably evenly distributed within the region, with no discernable habitat bias. Although appearing to show a liking for swamps in the Fleurieu district, where they were recorded at eight of the 12 swamp quadrats, they were also equally as frequently recorded as Black Rats in the drier Barossa district at 13 of the 32 quadrats surveyed.

Figure 78.
The Black Rat, *Rattus rattus* was recorded throughout the SMLR study region, but was most common in survey quadrats in the Barossa district. (Photo: A. Robinson).

Figure 79.
Of the small mammals, the House Mouse, *Mus musculus* was recorded at the most quadrats (70 in total), showing no particular regional or habitat preferences. (Photo: A. Robinson).

Ungulates – Feral Goats (*Capra hircus*) and Fallow Deer (*Cervus dama*) (Fig. 80).
Feral goats were recorded at five locations during the survey. All were associated with gorges or steep rocky areas. These were in Warren Gorge; the Onkaparinga Gorge and surrounding area of Mount Bold Reservoir; Norton Summit bluff; Waterfall Gully in Cleland Conservation Park; and a large group of up to 70 in Morialta Conservation Park. As they prefer to restrict their activities to relatively specific habitats, herds of goats can cause severe local damage to native vegetation. However, this restricted habitat preference and their highly gregarious nature causes them to be relatively easy to locate and control. This has been demonstrated on at least two occasions in the 1980's when groups of Goats in Mount Gawler North Native Forest Reserve and Para Wirra Recreation Park were removed.

The nature and extent of impact of Fallow Deer on native vegetation is uncertain. Generally scattered throughout the region, seen individually or in small groups and well camouflaged, control of this species is far more difficult than control of Feral Goats. Fallow Deer (*Cervus dama*) were released into Mount Crawford Forest in the Southern Barossa district in the first half of last century as sport for local hunters, and were probably introduced into other areas for the same purpose. While Fallow Deer have existed in small numbers in isolated areas within the region for many years, numbers and distribution appear to have increased noticeably within the last decade. This increase is partly attributable to escapes from a parallel increase in the number of deer farming enterprises within the region over the same period, rather than a population increase through breeding and dispersal of existing feral stock. Wild bred animals were however also observed.

Figure 80.
The Fallow Deer, *Cervus dama* appears to be increasing in numbers and extent within the SMLR. (Photo: A. Robinson)

Carnivores – Fox (*Vulpes vulpes*) and Feral Cat (*Felis catus*)
The Fox was imported to various locations within Australia on numerous occasions during the 1800's,

including two cubs being brought to Adelaide in 1869 as targets for "the hunt". However the Fox does not appear to have become established until the early 1870's when they were released around Ballarat and Point Cook in Victoria. In 1888 it was observed along the Coorong in South Australia (Rolls 1969). It therefore seems safe to assume that they would have expanded to and become established in the SMLR no later than at some time during the 1890's.

The Foxis now common throughout the SMLR and has been observed in all habitat types, including within towns and urban areas. During the Southern Mt Lofty survey Foxes were recorded at 46 of 111 quadrats, mainly from the presence of scats, which the Fox usually leaves in prominent locations as territorial markers.

The Feral Cat was recorded at only one quadrat and opportunistically twice during the survey. As the bait used in trapping during the survey was not directed towards the Feral Cat these probably do not reflect accurate Feral Cat numbers. Unlike the Fox, the Feral Cat buries its scats, therefore tracks and traces are extremely difficult to find. It is anticipated that *F. catus* exists as truly feral populations in at least the larger areas of remnant native vegetation within the region, and that a virtually continuous supply of unowned individuals is available to expand into such areas from the major human population centers nearby. Researchers from Adelaide University trapped both feral and partially domestic individuals in Belair National Park in 1991, whilst staff at Cleland Conservation Park report having observed and trapped feral and stray cats on multiple occasions over the last decade or more.

Lagomorphs – Rabbit (*Oryctolagus cuniculus*) and Brown Hare (*Lepus capensis*)

The Rabbit and Brown Hare are common and widespread within the SMLR. They were both established in the SMLR during the 1860's as the following extract from Rolls (1969) shows:

> "Although by 1864 domestic rabbits gone wild were a nuisance in gardens, breeders at Balhanna, a few miles east of Adelaide, were incensed at the frequent killing and stealing of their rabbits during 1867."
>
> "A writer to the Adelaide Observer in 1871 said that he had resisted the turning out of rabbits on the slopes of Mt Lofty for years because of the number of market gardens there, but now the market gardeners themselves were breeding them and had them running loose about their houses. A distinguished summer neighbour had been up during the winter to let a few go in the bush so that he would have something to shoot during his residence".
>
> "Hares were also being marketed in Adelaide. They were taken at Williamstown, south-east of Gawler, where Gilbert of Pewsey Vale had released several that he had imported from England in the middle sixties."

The Brown Hare was recorded 47 times and the Rabbit 52 times from a total of 516 opportunistic mammal records collected during the Southern Mt Lofty survey (most opportune records were along roadsides). There were relatively fewer survey quadrat records: the Rabbit was recorded at 28 of the 111 quadrats, but sighted at only nine of these, whilst the Brown Hare was recorded at only seven quadrats, but all were sightings. The characteristic warrens, diggings and territorial dung heaps of rabbits ensure that tracks and traces accounted for most of the quadrat based records of the Rabbit, whereas the Brown Hare leaves fewer obvious signs of its presence.

Casual observation indicates that the Rabbit shows a preference for sandy or loamy soils, which presumably provide easy digging and good drainage, and is particularly fond of vegetated areas along the edge of open farmland, which provide both shelter and grazing. The effects of the recent escape of the Rabbit Calici Virus into the Rabbit population have been limited within the SMLR due to the overall moderate climate, which is known to restrict the spread of the virus in some way.

RESULTS OF HAIR TUBE SAMPLING

The methodology for the hair tube sampling is outlined in the Methods section. Information on the condition of the bait in each hair tube in relation to its location (tree or ground) was only collected at quadrats in the Adelaide Hills and Barossa districts when the tubes were recovered. This data indicate a preference for ground baits over tree baits, with 35 of 138 (25%) ground baits having damage caused by chewing, but only 25 of 138 (18%) tree baits having similar damage (Table 37). Unfortunately the absence of comparable data for the Fleurieu district reduces the value of this finding.

Within the Adelaide Hills and Barossa districts, only 60 of 276 (21.5%) baits were chewed. In the Fleurieu district, where only the condition of the baits was noted, 82 of 124 (66.1%) baits had been chewed. This higher proportion of bait damage in the Fleurieu district is expected due to the higher number of species and captures of mammals there (Table 38).

Strangely, baits chewed did not appear to relate directly with presence of hair samples. Again, data relating to this is limited as it was only collected in the Adelaide Hills and Barossa districts. Of the 176 hair tubes retrieved in these districts which did not have hair samples attached, 12 had their bait chewed. Of the 95 which did have hair samples attached, 48 did not have damage to the bait container.

Table 37.
Location and condition of bait in hair tubes at time of retrieval during the SMLR Biological Survey.

Condition of Bait	Ground Baits	Tree Baits
Chewed	35	25
Intact	103	113
Unknown (Fleurieu District)	62	62
TOTALS	**200**	**200**

The greater density of mammals in the Fleurieu District over the Adelaide Hills and Southern Barossa sub-regions, seen in the survey trapping results is also reflected in the hair tube sampling results presented in Table 39.

Table 38.
Proportion of tubes containing hair from survey quadrats within the three sub-regions of the SMLR study region.

Sub-region	Tubes			Quadrats		
	With Hair Sample	Set	Proportion	With Hair Sample	Set	Proportion
Southern Barossa	31	132	23.5%	14	33	42.4%
Adelaide Hills	64	144	44.4 %	32	36	88.9%
Fleurieu District	83	124	67.0%	31	31	100.0%
Total	**178**	**400**		**77**	**100**	

A total of 195 individual samples were collected from 178 tubes over 77 survey quadrats (Table 39). Of the 176 tubes, 76 had only a single hair and were considered inadequate for identification. A further 22 samples could not be identified to species, and similarly due to insufficient quantity were considered questionable. One sample was identified to generic level only. In effect, only 96 useful samples or records were obtained using this technique.

Table 39.
Summary of mammal species identifications possible from hair tube sampling during the SMLR survey.

Identification	Number of Samples	Confirmed by Other Techniques	Not Confirmed by Other Techniques
Not Identifiable	76		
Rattus fuscipes, Bush Rat	46	33	13
**Rattus rattus*, Black Rat	30	13	17
Questionable	22		
Antechinus flavipes, Yellow-footed Antechinus	8	5	3
**Mus musculus*, House Mouse	4	3	1
Trichosurus vulpecula, Common Brushtail Possum	3	1	2
Pseudocheirus peregrinus, Common Ringtail Possum	3	2	1
Isoodon obesulus, Southern Brown Bandicoot	2	2	
Rattus sp.	1		
TOTAL	**195**	**59**	**37**

Discussion of Hair Tube Sampling Results

Considering the time and resources required in manufacturing, installation and retrieval of the hair tubes, and the analysis of hair tube samples, the results obtained from this technique were disappointing. Thirty-seven of the 96 samples identified to species could not be confirmed (additional trapping or spotlighting at these quadrats would be required to confirm these identifications). Particularly difficult to identify were *Rattus* species (see below).

Of the three new Yellow-footed Antechinus records, the two from Para Wirra Recreation Park and Finniss Conservation Park are within the established range and habitat of the species. However, the record for Little Mount Crawford Native Forest Reserve is significant as all previous records for Yellow-footed Antechinus in the Barossa district have come from the area of remnant native vegetation encompassing Para Wirra and Mount Gawler, 10kms to the west. The two additional records of the Common Brushtail Possum, from Eurilla and Mount Magnificent Conservation Parks are interesting as at both locations only Common Ringtail Possums were seen while spotlighting, although Common Brushtail Possums were recorded opportunistically near by. The additional record of the Common Ringtail Possum from Mount Gawler North Native Forest Reserve is also accepted as this species was expected at this location, but was not detected while spotlighting.

Contradictions occur between trapping results and hair tube sample identifications for the two most common and widespread small mammal species, the Bush Rat and Black Rat. In fact, at seven of the 17 sites at which hair tube sample identification indicated the presence of the Black Rat whereas trapping results did not, the Bush Rat was trapped. The number of Bush Rats trapped at these seven quadrats ranged from one to 42 with an average of 17.5.

Unfortunately, the Black Rat and Bush Rat account for 76 of the 96 hair samples identified to species. That such a large proportion of the hair samples for these two species are not substantiated by trapping results, 17 of 30 (67%) for Black Rat and 13 of 46 (28%) for Bush Rat raises is of concern. A possible explanation for the discrepancy between trapping results and hair tube identification for the Black Rat and the Bush Rat is that these two species may exclude each other from traps depending upon their relative abundance.

Hair tube sampling also recorded the Bush Rat at Little Mount Crawford Native Forest Reserve in the Barossa district. This is most unlikely, as there are no records of this species occurring north of Black Hill Conservation Park. While many of these hair tube identification records are undoubtedly valid, it is difficult in light of the discrepancies mentioned to be confident of which are valid. It appears that there is some difficulty in positively differentiating between these two species of rat based on hair samples alone. Lobert *et al*. (2001) emphasized that considerable experience in diagnostic techniques, hair characteristics of individual species and intra-specific variation, is necessary to maximize the reliability of identifications based on hair samples. In defence of the method, identifications were also made from minimal hair samples obtained during the biological survey.

The poor return for effort, in obtaining only 96 identifiable hair samples and the ambiguity in identification of the majority of these, lead to the conclusion that hair tube sampling in this situation did not provide significant additional information over and above trapping, opportunistic sitings and spotlighting results.

However, in achieving the goal of acquiring additional records of uncommon or less trappable species, for example, the Southern Brown Bandicoot and Common Brushtail Possum, hair tube sampling did provide further records of these species. Whilst some useful information was obtained, other methods are more reliable and less laborious.

BIRDS

D. M. Armstrong[1] and R. Brandle[1]

INTRODUCTION

The SMLR supports almost two thirds of the State's bird taxa, including 4 endemic sub-species. The region is also an important zoogeographic outlier of the "Bassian" faunal zone that encompasses the humid and subhumid regions of the east and south-east coast of Australia and the south-west corner of Western Australia (Paton and Reid 1977). Many of the Mount Lofty Ranges bird populations of typically Bassian forms are geographically isolated from their nearest populations in the south-east of South Australia by extensive areas of mallee and heath. Other Bassian taxa are at the extreme western limit of their distribution, in the SMLR, but not isolated. The Mount Lofty Ranges is one of 18 regions within Australia, six of which are off-shore islands, for which a coordinated conservation plan was recommended under The Action Plan for Australian Birds 2000 (Garnett and Crowley 2000). Fifty species are considered threatened under National and/or State legislation. A multi-bird-species recovery program ("Birds for Biodiversity – MLR") is now underway.

The ability to fly provides birds with great mobility and the option of migration, on a scale largely unavailable to other classes of animals. This ability to move seasonally between regions, states and in some cases countries, makes it difficult to give an accurate count of the species which inhabit the SMLR. Records of occasional vagrant individuals of species that ordinarily reside in adjacent regions, including wandering oceanic species, further complicate the situation. Locally extinct, or possibly totally extinct species, about which there is little historic and ecological data, also contribute to the confusion.

In contrast to other vertebrate groups, a great deal has been written about the birds of the region. At least four relatively recent summaries and numerous other writings are available. The most recent (Long 1999) recognized 279 species within the Mount Lofty Ranges, including 10 introduced species, but excluding from this total a further 40 oceanic or migratory species for which there are authentic records. Carpenter and Reid (1997) adopted similar standards, but only listed 264 species. Paton *et al*. (1994a,b) in discussing the results of two SAOA Surveys of the Adelaide Region, which encompassed the SMLR, carried out in 1974-75 and 1984-85, compared the distributions of 259 species, including oceanic species. Paton and Reid (1977) listed 225 species. The differences in the number of species between lists reflects, in part, the different boundaries used, with varying degrees of extension onto the plains around the ranges.

For the purposes of this Biological Survey Report, the boundaries of the SMLR are the Mount Lofty Ranges and Fleurieu IBRA regions (with minor modification), as described in the Introduction Chapter and shown in Figure 1. All survey quadrats and opportunistic sightings were located or collected from within these boundaries. Data from other sources is only included in the discussion if it was also recorded from within the IBRA region.

The resulting bird species list for the SMLR contains 293 species, including 36 oceanic species and 11 introduced species (Appendix XII). Oceanic species are based on South Australian Museum records of birds washed up on the SMLR boundary shoreline. A further breakdown of the association of these species within the region is included in Table 40 below

Table 40.
Summary of the numbers and proportions of resident, migratory, vagrant and oceanic birds from the SMLR.

Residency Status	Number of Species	% of Species
Resident	139	48
Migratory Breeders	18	6
Migratory Non-breeders	27	9
Occasional Visitors or Nomadic	58	20
Vagrant	15	5
Oceanic	36	12
Total	**293**	**100%**

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The 293, recorded species for the SMLR represents 63% (almost two thirds) of the 467 bird species recorded within South Australia (Robinson *et al*. 2000). The SMLR therefore support an extremely high proportion of the State's bird taxa, especially considering the region comprises only 0.6% of the area of the State.

TOTAL SURVEY RECORDS

The total number of bird species recorded at survey quadrats and opportunistically during the three surveys included in this analysis was 157 (Appendix XIII).

From 157 survey quadrats, a total of 6518 records of 127 bird species from 49 families and sub-families was recorded. This is an average of 42 records and an average of 20 species per quadrat. Of the 6518 records, 6487 were identified to species level (remainder identified to genus only).

Opportunistic records from the Southern Mt Lofty Survey totalled 1 218 records of 136 species representing 53 families or sub-families. These included 30 species not recorded at survey quadrats. The majority of these additional species were water-birds.

COMMON SPECIES

Most survey quadrats were in the larger intact areas of remnant native vegetation, with the view that these would contain the most complete fauna and flora assemblage. This resulted in a heavy bias towards quadrats being in forest and woodland habitats, as the open woodland and grassland areas within the region have largely been cleared or highly modified. This is clearly reflected in the results – most birds recorded were sedentary woodland and forest species.

Table 41 lists the 32 bird species (25% of the total recorded species) recorded at greater than 20% of survey quadrats. Six bird species were recorded at more than 100 of the 157 survey quadrats – the Superb Fairy-wren (140 quadrats), Adelaide/ Crimson Rosella (136 quadrats), Grey Fantail (120 quadrats), Grey Shrike-thrush (112 quadrats) Grey Currawong (105 quadrats) and Australian Magpie (105 quadrats). Fourteen species were recorded at more than 50% of survey quadrats. In contrast, 70 species (45%) were recorded at less than 10 quadrats. Appendix XIII lists all bird species recorded at survey quadrats, and opportunistically, along with the number of quadrats at which they were recorded, and the total number of records for each species.

A high proportion (48%) of bird species recorded in the SMLR are resident (Table 40). This is clearly evident in the survey results. Of the 60 species recorded at 10 or more quadrats, all but two were resident species. The remaining two, Horsfield's Bronze-Cuckoo (*Chrysococcyx basalis*), recorded at 20 quadrats, and the Fan-tailed Cuckoo (*Cacomantis flabelliformis*), recorded at 15 quadrats, are migratory species which breed in the region.

Figure 81.
The Superb Fairy Wren was the most commonly recorded bird species during the SMLR survey, being recorded at 140 of the 157 survey quadrats. (Photo: SAOA files).

Table 41.
Bird species recorded at >20% of quadrats (= > 31 quadrats) from combined SMLR survey data – surveys 52, 97 and 111.

COMMON NAME	No. quadrats	% of total quadrats	No. records at quadrats
Superb Fairy-wren	140	89	460
Crimson Rosella	136	87	414
Grey Fantail	120	77	338
Grey Shrike-thrush	112	72	209
Australian Magpie	105	67	184
Grey Currawong	105	67	213
Crescent Honeyeater	98	63	263
Brown Thornbill	94	60	215
Red Wattlebird	91	58	196
Striated Thornbill	88	56	217

COMMON NAME	No. quadrats	% of total quadrats	No. records at quadrats
Golden Whistler	83	53	162
Little Raven	83	53	133
Striated Pardalote	83	53	217
Yellow-faced Honeyeater	83	53	217
Galah	75	48	124
New Holland Honeyeater	74	47	225
Eurasian Blackbird	71	46	142
White-throated Treecreeper	68	44	157
Yellow-tailed Black-cockatoo	68	44	141
White-browed Scrubwren	67	43	184
Eastern Spinebill	64	41	119
Silvereye	62	40	160
Laughing Kookaburra	55	35	69
Rainbow Lorikeet	51	33	157
Scarlet Robin	50	32	80
Black-faced Cuckoo-shrike	45	29	55
Mistletoebird	44	28	110
Red-browed Finch	41	26	57
Tree Martin	39	25	66
Buff-rumped Thornbill	37	24	58
Common Bronzewing	37	24	51
White-naped Honeyeater	32	21	83

Figure 82.
The Adelaide/Crimson Rosella was recorded at 136 quadrats during the SMLR survey, making it the second most commonly recorded bird species. (Photo: H. Stichel)

ENDEMIC TAXA

The mobility provided by flight reduces the probability of endemism, particularly on a regional scale. There are, however, four sub-species endemic to the SMLR: the Mount Lofty Ranges Southern Emu-wren (*Stipiturus malachurus intermedius*), Spotted Quail-thrush (*Cinclosoma punctatum anachoreta)*, White-throated Treecreeper (*Cormobates leucophaeus grisescens*) and Chestnut-rumped Heathwren (*Calamanthus pyrrhopygius parkeri*) (Schodde and Mason 1999). However, the SMLR, once a large isolated "island" of woodland and forest, although now better described as an archipelago, is the western extreme of the range of many south-eastern Bassian species, some of which exist as isolated populations (see below under "Discussion" for further details).

SPECIES OF CONSERVATION SIGNIFICANCE

The confusion as to which species should be considered inhabitants of the SMLR, mentioned above, due to some being peripheral, migratory, occasional visitors or simply vagrants, also extends to a number of species with a National and/or State conservation rating.

Fifty of the bird species recorded within the SMLR, are classified as threatened under Commonwealth or South Australian legislation (Table 42)[7]. This is 19.5%, or almost one fifth of the 257 non-oceanic species. Twenty of the 50 species with legislated conservation ratings were recorded during the survey.

Extinct taxa: Eight taxa are considered extinct within the SMLR region. Seven of these are included in the threatened species lists (Table 43). These are the Glossy Black Cockatoo (Kangaroo Island sub-species), Swift Parrot and Regent Honeyeater which are classified as Endangered Nationally, the Azure Kingfisher, King Quail and Ground Parrot which are

[7] National ratings are those in the Environment Protection and Biodiversity Conservation Act, 1991 and State ratings are those in the National Parks and Wildlife Act, 1972 schedules (2000 upgrade).

Table 42.
Bird taxa with a National and/or State conservation rating and their frequency of occurrence in survey records (EX following species name indicates extinct in SMLR).
Birds are listed in order of conservation ranking.

Species	*Residency Status	National Rating	State Rating	Quadrat Records	Opportune Records
Spotted Quail-thrush (*Cinclosoma punctatum*)	R	Critically Endangered	Endangered		
Southern Emu-wren (Mount Lofty Ranges sub-species) (*Stipiturus malachurus intermedius*)	R	Endangered	Endangered	3	
Glossy Black-Cockatoo (Kangaroo Island sub-species) (*Calyptorhynchus lathami halmaturinus*) **(EX)**	R	Endangered	Endangered		
Regent Honeyeater (*Xanthomyza phrygia*) **(EX)**	I/N	Endangered	Endangered		
Swift Parrot (*Lathamus discolor*) **(EX)**	Mn	Endangered	Vulnerable		
Azure Kingfisher (*Alcedo azurea*) **(EX)**	R		Endangered		
Ground Parrot (*Pezoporus wallicus*) **(EX)**	R		Endangered		
King Quail (*Coturnix chinensis*) **(EX)**	R		Endangered		
Masked Owl (*Tyto novaehollandiae*)	V		Endangered		
Australian Bustard (*Ardeotis australis*) **(EX)**	R		Vulnerable		
Black-chinned Honeyeater (*Melithreptus gularis*)	R		Vulnerable		6
Bush-Stone-curlew (*Burhinus grallarius*)	R		Vulnerable		
Chestnut-rumped Heathwren (*Hylacola pyrrhopygia*)	R		Vulnerable	1	1
Crested Shrike-tit (*Falcunculus frontatus*)	R		Vulnerable	1	2
Diamond Firetail (*Stagonopleura guttata*)	R		Vulnerable	1	2
Hooded Plover (*Thinornis rubricollis*)	R		Vulnerable		
Lewin's Rail (*Rallus pectoralis*)	R		Vulnerable	1	
Painted Button-quail (*Turnix varia*)	R		Vulnerable	5	2
White-bellied Sea-eagle (*Haliaeetus leucogaster*)	R		Vulnerable		
Yellow-tailed Black Cockatoo (*Calyptorhynchus funereus*)	R		Vulnerable	68	40
Blue-winged Parrot (*Neophema chrysostoma*)	Mn		Vulnerable	1	3
Eastern Curlew (*Numenius madagascariensis*)	Mn		Vulnerable		
Latham's Snipe (*Gallinago hardwickii*)	Mn		Vulnerable		
Little Lorikeet (*Glossopsitta pusilla*)	Mn		Vulnerable		
Australasian Bittern (*Botaurus poiciloptilus*)	I/N		Vulnerable		
Brown Quail (*Coturnix ypsiliphora*)	I/N		Vulnerable		
Fairy Tern (*Sterna nereis*)	I/N		Vulnerable		
Freckled Duck (*Stictonetta naevosa*)	I/N		Vulnerable		
Square-tailed Kite (*Lophoictinia isura*)	V		Vulnerable		1
Eastern Reef Egret (*Egretta sacra*)	R		Rare		
Peregrine Falcon (*Falco peregrinus*)	R		Rare	6	11
Beautiful Firetail (*Stagonopleura bella*)	R		Rare	1	3
Bassian Thrush (*Zoothera lunulata*)	R		Rare	6	1
Shining Bronze Cuckoo (*Chrysococcyx lucidus*)	Mb		Rare	7	
White-throated Gerygone (*Gerygone olivacea*)	Mb		Rare		
Cape Barren Goose (*Cereopsis novaehollandiae*)	Mn		Rare		
Rock Parrot (*Neophema petrophila*)	Mn		Rare		
Flame Robin (*Petroica phoenicea*)	Mn		Rare	1	
Australasian Shoveler (*Anas rhynchotis*)	I/N		Rare		3
Musk Duck (*Biziura lobata*)	I/N		Rare		2
Blue-billed Duck (*Oxyura australis*)	I/N		Rare		
Great Crested Grebe (*Podiceps cristatus*)	I/N		Rare		2
Glossy Ibis (*Plegadis falcinellus*)	I/N		Rare		

Osprey (*Pandion haliaetus*)	I/N		Rare		
Baillon's Crake (*Porzana pusilla*)	I/N		Rare		
Painted Snipe (*Rostratula bengalensis*)	I/N		Rare		
Common Tern (*Sterna hirundo*)	I/N		Rare		
Golden-headed Cisticola (*Cisticola exilis*)	I/N		Rare	2	1
Western Gerygone (*Gerygone fusca*)	I/N		Rare		
Olive-backed Oriole (*Oriolus sagittatus*)	I/N		Rare		1

***Residency Status**
R = Resident (21 taxa)
Mb = Migratory Breeder (2 taxa)
Mn = Migratory Non-breeder (9 taxa)
I/N = Irregular Visitor or Nomadic (17 taxa)
V = Vagrant (2 taxa)

classified Endangered in South Australia and the Australian Bustard which is classified Vulnerable in this State. One other species, which has no threatened classification, the Rufous Fieldwren, is also Extinct within the SMLR. The Ground Parrot and King Quail are also considered extinct throughout the whole of South Australia (Carpenter and Reid 1997).

Nationally Critically Endangered (EPBC Act)
Spotted Quail-thrush (*Cinclosoma punctatum*)
This is a sedentary, ground frequenting and secretive bird, which inhabits eucalypt woodland with an open shrub layer and dense ground cover (Carpenter and Reid 1988). It is also classed as State Endangered and was not recorded during the 1974-75 surveys for the SAOA Bird Atlas of the Adelaide Region. However, at various times during the 1970's it was reported from the Cherry Gardens, Mt. Bold, Clarendon and Ashbourne districts, and Springmount and Waitpinga Conservation Parks (Carpenter and Reid 1988, David Harper, pers. comm. 2001). The last published account of the Spotted Quail-thrush in the SMLR was amongst the RAOU Atlas records (Blakers *et al*. 1984). Since then unconfirmed, but probably genuine records, are known from the Myponga Tiers, south-east of Spring Mount in 1982, near Mosquito Hill approximately 15 years ago and the Clarendon district in 1999 (David Harper, pers. comm. 2001).

The Spotted Quail-thrush of the SMLR was recently described as a sub-species (*C. p. anachoreta*) by Schodde and Mason (1999), who considered it to be on the verge of extinction. It is isolated from two other sub-species, one in Tasmania and the other in south-eastern Australia, extending into the lower south-east of South Australia, where it is probably extinct (Parker and Reid 1983). Although once regarded as "fairly numerous" (McGilp 1964), with SA Museum records from the north of the region at Angaston, south to Encounter Bay, at present this is probably the most threatened bird taxon in Australia as no sightings have been published since 1984.

Nationally Endangered (EPBC Act)
Three of the four species classified as Endangered under the commonwealth EPBC Act, the Spotted Quail-thrush, Glossy Black Cockatoo (Kangaroo Island sub-species), Regent Honeyeater and the Mount Lofty Ranges Southern Emu-wren are also classified Endangered under South Australian legislation, whilst the fourth, the Swift Parrot, is Vulnerable in South Australia. Only the Southern Emu-wren was recorded during the biological surveys.

Southern Emu-wren (Mount Lofty Ranges subspecies) (*Stipiturus malachurus intermedius*) (Fig. 83).
The Mount Lofty Ranges Southern Emu-wren is confined to the Fleurieu Peninsula, where it has been recorded from Kuitpo, south to Deep Creek and east to the Finniss River (Littlely and Cutten 1994). Within this area it occurs in both swamps and dry heath where the common characteristic is dense vegetation to one metre high (Littlely and Cutten 1994). There are approximately 20 sub-populations of this taxa, comprising a total population of around 500 individuals. These sub-populations are concentrated in two areas, a northern one in the Myponga, Mount Compass and Finniss River region, and a southern one in the Deep Creek and Parawa region. Most sub-populations are small, from one to several breeding pairs and occur in swamps on private property, but at least 60% of individuals occur in dry heath in Deep Creek Conservation Park (Pickett 2002).

During the 1995 Mt Lofty – Southern Emu Wren survey, the Mount Lofty Ranges Southern Emu-wren was recorded at three of the 12 survey quadrats. These were *Leptospermum continentale* and *Gahnia sieberiana* Open Shrubland, *Leptospermum lanigerum* and *Phragmites australis* Closed Shrubland and *Melaleuca decussata* and *Leptospermum continentale* Closed Shrubland. They were not recorded during the 2000 Southern Mt Lofty survey (which did not target swamp quadrats), but have since been recorded at two of the survey quadrats sampled during that survey (Marcus Pickett, pers. comm. 2001). These were in *Eucalyptus obliqua* Low Open Forest with dense *Allocasuarina stricta* and *Leptospermum continentale* dominated understorey, and *Allocasuarina muelleriana, Hakea rostrata* and *Xanthorrhoea semiplana* Shrubland.

The Mount Lofty Ranges Southern Emu-wren has been the subject of conservation management actions since

the production of a draft recovery plan in 1994 (Littlely and Cutten 1994). These actions recently included the first translocation of animals to re-populate an area in which a local extinction had resulted from the bushfires of Ash Wednesday 1983. In this case a total of 30 Emu-wrens (15 males and 15 females) were taken from three separate areas in Deep Creek Conservation Park to be released into Cox Scrub Conservation Park, where they are currently being monitored.

Fragmentation and continual degradation of their preferred habitat expose them to local extinctions and genetic isolation. Emu-wrens in general are poor flyers and therefore reluctant to cross open country, reducing the possibility of natural recolonisation of areas following catastrophic events such as major bushfires.

Figure 83.
Mount Lofty Ranges Southern Emu-wren is listed as Endangered in Federal and State legislation. It is confined to the Fleurieu Peninsula, occurring in low dense vegetation of swamps and heaths. (Photo: D. Hopton)

Glossy Black-Cockatoo (Kangaroo Island sub-species) (*Calyptorhynchus lathami halmaturinus*) (Extinct in SMLR)
Joseph (1989) summarised evidence of the past occurrence of a type of red-tailed black cockatoo within the SMLR, south of Adelaide, particularly on the Fleurieu Peninsula, quoting occasional sightings as late as the 1970's. He considered that these were part of a contiguous population of Glossy Black Cockatoos, which are now restricted to Kangaroo Island.

Unfortunately, no existing specimens of black-cockatoos from the SMLR are available to substantiate the identity of the birds reported by Joseph. However, the proximity of the Kangaroo Island Glossy Black-Cockatoo population, the distance (in excess of 200 kilometers to the nearest Red-tailed Black-Cockatoo population in the lower South East) and reports of these birds departing across Backstairs Passage towards Kangaroo Island (Joseph 1989), indicate that Joseph's identification is correct.

What is now referred to as the Kangaroo Island sub-species of the Glossy Black-Cockatoo, was listed as extinct in the SMLR by Carpenter and Reid (1997). However, there have been several reports of "red-tailed" black cockatoos from Fleurieu Peninsula in recent years, the most reliable being at Deep Creek Conservation Park (G. Carpenter, pers comm. 2002). The Glossy Black Cockatoo feeds almost exclusively on the seeds of the Drooping Sheoak (*Allocasuarina verticillata*) (Garnett and Crowley 2000). The possible disappearance of this sub-species on the mainland is probably due to the extensive clearance the sheoak woodlands, which provide their favoured food source, plus a decline in the breeding population on Kangaroo Island.

This sub-species is the subject of an intensive management program on Kangaroo Island, where it is also under threat through loss of Sheoak woodlands. Competition for nest hollows with, and predation of eggs and young by the Brush-tailed Possum, which is abundant on Kangaroo Island and have been shown to be the major causes of its decline there (Garnett and Crowley 2000).

Regent Honeyeater (*Xanthomyza phrygia*) (Extinct in SMLR)
The Regent Honeyeater was formerly a nomadic breeding visitor to the SMLR. It was distributed throughout the south-east of the continent in forest and woodland habitats and was at the western extreme of its range in the SMLR. It is regarded as probably extinct in South Australia (Garnett and Crowley 2000). Now only 1500 individuals remain (Garnett and Crowley 2000) and it is known to be still decreasing in numbers and range. Although described as numerous at times within the Mount Lofty Ranges (McGilp 1964), with breeding records in the region in 1958 and in the 1970's (Blakers *et al*. 1984), it was not recorded during the SAOA Bird Atlas Surveys of 1974-75 or 1984-85. Of the 13 SA Museum records for this species, the last was collected in 1936.

Habitat clearance and fragmentation are considered the major factors in the decline of the Regent Honeyeater. Compounding effects such as habitat disturbance, advantages the more aggressive Noisy Miner which may be displacing the Regent Honeyeater (Garnett and Crowley 2000). Carpenter and Reid (1997) also suggested that the Regent Honeyeater, and other nomadic or migratory species, have been disadvantaged by disturbances along migratory routes. It may therefore be possible to conclude that the continued clearance and degradation of woodland areas between the majority of the range of this species, in the south-east of the continent, and the SMLR, have contributed to the isolation of the region and prevented the arrival of these birds in recent decades.

Swift Parrot (*Lathamus discolor*) (Extinct in SMLR)
After breeding in Tasmania, the Swift Parrot disperses during autumn and winter to the eucalypt woodlands and forests of the south-eastern mainland. This migration extended as far west as the SMLR where it

was a regular visitor before 1950 (Blakers *et al*. 1984). They are similar to lorikeets in both diet and appearance. Swift Parrots feed noisily in the tree canopy on nectar, pollen and lerp, often in company with lorikeets, with which they can be easily confused. Despite being regarded as numerous at times (McGilp 1953), the Swift Parrot is considered extinct in the Adelaide region (Tyler *et al*. 1976). It was not recorded during either the 1974-75 or 1984-85 SAOA surveys, for the Atlas of the Adelaide Region.

The area used by the Swift Parrot is greatly reduced, with recent records irregular in South Australia - and all from the south-east of the State (Garnett and Crowley 2000). The Swift Parrot prefers areas of high soil fertility where large trees have high nectar production. Significant reduction in breeding habitat in Tasmania, through clearing and fragmentation of Tasmanian Blue Gum (*Eucalyptus globulus*) appears to be the primary cause of the decline of this species (Garnett and Crowley 2000).

Nationally Vulnerable (EPBC Act)
No bird taxa within the SMLR are listed as Nationally Vulnerable.

State Endangered
Four of the eight species rated as Endangered in South Australia, the Spotted Quail-thrush, Glossy Black Cockatoo (Kangaroo Island sub-species), Southern Emu-wren (Mount Lofty Ranges subspecies) and the Regent Honeyeater are rated Critically Endangered or Endangered Nationally and are discussed above. Eight of the 20 (40%) bird taxa classified as Endangered in South Australia have been recorded in the SMLR. However, the State Endangered list also includes the extinct Kangaroo Island Emu and two oceanic species. Of these eight species, only the Southern Emu-wren was recorded during the recent biological surveys. Five of them are Extinct in the region and two of these, the King Quail and Ground Parrot are considered extinct throughout South Australia (Carpenter and Reid 1997). The following species are rated Endangered in South Australia and are given regional ratings derived from Carpenter and Reid (1997).

King Quail (*Coturnix chinensis*) (Extinct in SMLR)
In the SMLR the King Quail was at the western end of its southern distribution and apparently existed as an isolated population (Blakers *et al*. 1984). This species has severely declined over the southern part of its range (Blakers *et al*.1984), and formerly occurred in the SMLR and south-east regions of South Australia. Although rated extinct in South Australia (Carpenter and Reid 1997) these authors also considered that as a secretive species it may still occur in rank swamp vegetation in these regions.

Azure Kingfisher (*Alcedo azurea*) (Extinct in SMLR)
This is a sedentary species requiring undisturbed watercourses with overhanging vegetation. In the SMLR the Azure Kingfisher was at the western extreme of its southern distribution and was probably an isolated population (Blakers *et al*. 1984). Although it was regarded as having become extinct in the region during the 1940's (Paton and Reid 1977), there are two SA Museum records from Lower Hermitage on the Little Para River, collected in 1954, and the most recent RAOU Atlas record was made in 1965 (Blakers *et al*. 1984).

Ground Parrot (*Pezoporus wallicus*) (Extinct in SMLR)
Part of the original range of the eastern sub-species of Ground Parrot once extended along the coast between Melbourne and Adelaide (Blakers *et al*. 1984). However, it appears that the distribution of the Ground Parrot in South Australia was discontinuous, as Condon (1942) considered that reports of this species on the Coorong and Lake Alexandrina were probably incorrect. It is a secretive and sedentary, ground dwelling species of dense coastal and sub-coastal heath and swamps. The Ground Parrot was known to occur in the swamps of the Mt. Compass district within the SMLR (Condon 1942). There is also a South Australian Museum specimen from the reed beds on the Adelaide Plains, near the outlet of the River Torrens at Fulham Gardens (G. Carpenter, pers comm. 2002). However, it appears to have become extinct in the SMLR during the late 1800's, as Condon (1942) stated that it was "probably fifty or more years since the species has been seen anywhere near Adelaide". Although it is also generally regarded as extinct throughout the remainder of its former range in South Australia (Blakers *et al*. 1984, Carpenter and Reid 1997), there is some possibility that it may still occur in the lower south-east of the State (Condon 1969, Reid and Vincent 1979, Robinson *et al*. 2000).

Masked Owl (*Tyto novaehollandiae*)
This species ranges from southern New Guinea into Australia where it is said to rarely extend further than 300 km inland (Blakers *et al*. 1984). It is most common in Tasmania, which is the stronghold for this species and is rarely observed on the Australian mainland (Blakers *et al*. 1984). The Masked Owl was not recorded during the biological surveys. Its presence in the SMLR region is confirmed by a single SA Museum specimen record, collected from near Aldinga Scrub in 1975.

State Vulnerable
Twenty one of the 34 (62%) non-oceanic species, which are classified as Vulnerable in South Australia have been recorded in the SMLR. Five of the 10 oceanic species rated Vulnerable in South Australia have also been recorded in the SMLR region. Of the 21 non-oceanic Vulnerable species recorded in the region, 11 are resident, five are migratory non-breeding, four nomadic or irregular visitors and one a vagrant species (Table 42). Two species, the **Australian Bustard** and **Swift Parrot** (see above in

"Nationally Endangered") are considered extinct within the region (Carpenter and Reid 1997).

State Vulnerable species recorded during the SMLR biological survey

Nine of the 21 species classified Vulnerable in South Australia were recorded during the biological surveys (Table 42). Seven were recorded at survey quadrats and eight opportunistically. Six species were recorded both at quadrats and opportunistically.

- **Black-chinned Honeyeater: (Fig. 84)**: All six records were opportune. However, five of the records were obtained from an Adelaide University PhD student, who was specifically searching for this species. The records were obtained during the time span of the survey but were not part of the actual survey.
- **Square-tailed Kite:** The single survey record was opportune. Two observers independently identified this bird between the South Para Reservoir and Barossa Reservoir in a drainage line of SA Blue Gum Woodland. This is typical habitat for the Square-tailed Kite. The typical hunting behaviour recorded, also confirmed the authenticity of this identification. The Square-tailed Kite is a rarely reported spring-summer visitor to South Australia, occurring in open forest and woodland (Carpenter and Reid 1997). Generally only one or two birds are seen at a time.
- **Lewin's Rail:** one survey record only (at a survey quadrat).
- **Chestnut-rumped Heathwren:** one quadrat and one opportune record.
- **Crested Shrike-tit** and **Diamond Firetail (Fig. 86):** one quadrat record each and two opportune records each.
- **Blue-winged Parrot:** one quadrat and three opportune records.
- **Painted Button-quail:** five quadrat and two opportune records.
- **Yellow-tailed Black-Cockatoo (Fig. 85):** Of the Vulnerable species only the Yellow-tailed Black-Cockatoo was frequently encountered. It was recorded at 68 of the 157 (43%) survey quadrats and a further 40 opportunistic records were collected. The Yellow-tailed Black-Cockatoo survey results are further analysed below under "Discussion".

Figure 84.
The Black-chinned Honeyeater is Vulnerable in SA. This species has declined in numbers markedly since the 1960's and 1970's when it was still frequently encountered in the SMLR. It was only recorded opportunistically on the survey. (Photo: NPWSA)

Figure 85.
The Yellow-tailed Black Cockatoo is Vulnerable in South Australia. This is a large slow-moving bird with a loud distinctive call, contributing to the high number of survey records. (Photo P. Canty)

State Rare

Twenty-one of the 62 (34%) non-oceanic species listed as Rare in SA have been recorded in the SMLR. Only one additional oceanic species, the Flesh-footed Shearwater (*Puffinus carneipes*), which has been recorded in the SMLR region, is listed as Rare in South Australia, for a total of 63 Rare species in the State. Of the 21 Rare, non-oceanic species, only four are residents, two are migratory species which breed in the

region, three are migratory species, which do not breed in the region, while the remaining majority of 12, are irregular visitors or nomadic species (Table 42).

Ten of the 21 species rated as Rare in South Australia were recorded during the survey. Six were recorded at survey quadrats, eight opportunistically and four both at quadrats and opportunistically. However, four or less records were made of seven of these species and most of these were collected opportunistically. These species were Beautiful Firetail, Flame Robin, Australasian Shoveler, Musk Duck, Great Crested Grebe, Golden-headed Cisticola and Olive-backed Oriole. Bassian Thrush (Fig. 87) and Shining Bronze Cuckoo were each recorded on seven occasions (Table 42).

Of the State Rare species, the largest number of records was for the Peregrine Falcon - six survey quadrats and eleven opportune records. This species has a distinctive flight and call, and is often observed flying above the tree canopy. Pairs are also known to nest in the same locations for many years. Their preference for nesting on cliff faces, particularly in the SMLR, enables observers to target such habitat in anticipation of locating this species. The Rare status of the Peregrine Falcon is partly a reflection of its international situation, as Australia is one of the strongholds for the species. Peregrine Falcon pairs are known to have large territories, and an estimated 3,000 to 5,000 pairs exist in Australia, of a world total of 12,000 to 18,000 pairs (Blakers *et al*. 1984). Records of this species at six of 157 survey quadrats within the SMLR, which is only 0.08% of the total area of Australia (0.6% of South Australia), indicates that the Peregrine Falcon is well represented in the region.

Figure 86.
The SMLR population of the Beautiful Firetail represents the western extreme of this species' natural distribution, and is an isolated population. It is rated Rare in South Australia. The Beautiful Firetail was recorded from one survey quadrat only, and there were three opportune records during the SMLR survey. (Photo: SAOA files).

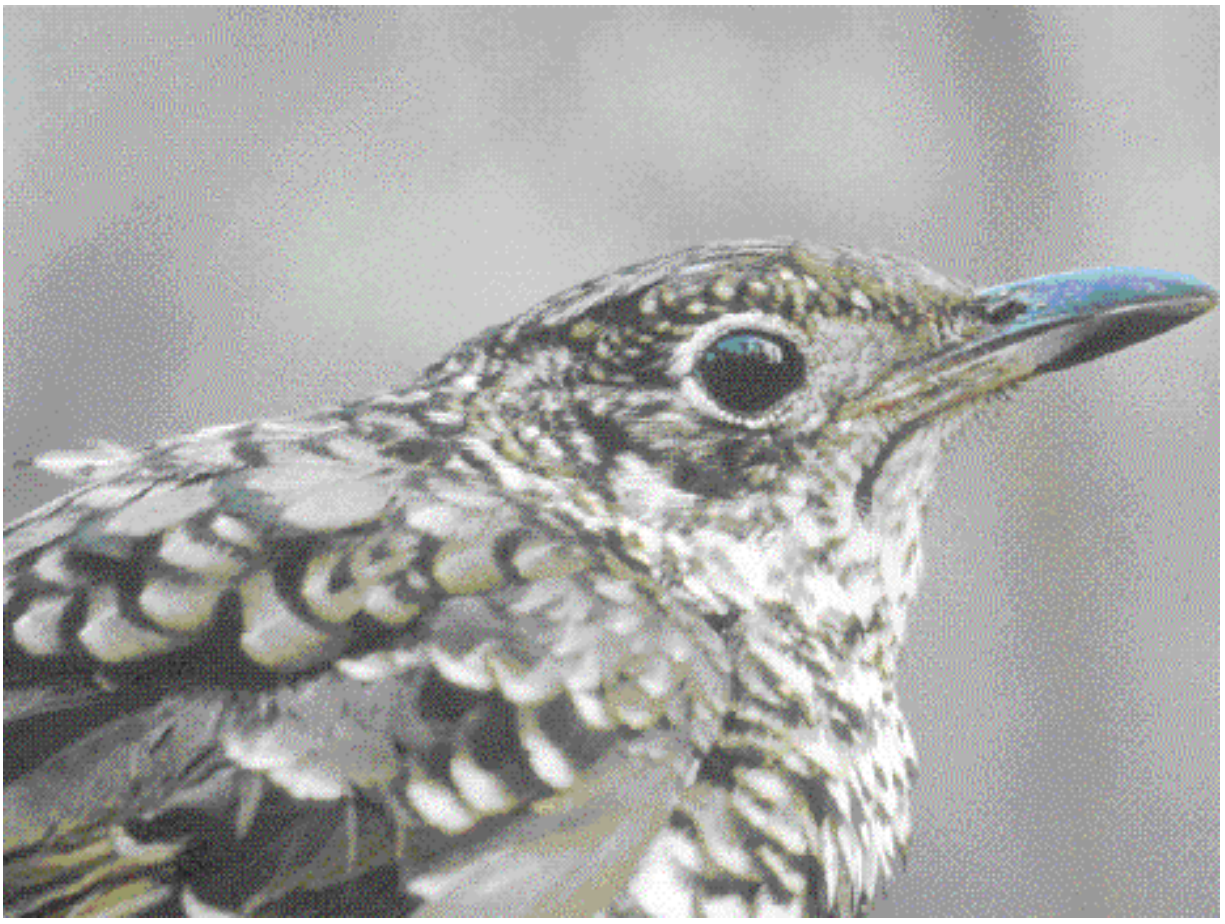


Figure 87.
The Bassian Thrush is rated Rare in South Australia. There were six quadrat and one opportune record of this species during the SMLR survey. As its name implies, this species has a Bassian zoogeographic distribution, and is at its western extreme of its natural range in the Mount Lofty Ranges. (Photo: D. Hopton).

DISCUSSION

Species Decline

In recent decades dramatic changes have been observed in the status and relative abundance of many bird species within the region. Two SAOA Bird Atlas surveys of the Adelaide Region (which encompassed the SMLR) were carried out in 1974-75 and 1984-85. The distribution of bird species recorded during these extensive surveys was compared and reported upon (Paton *et al*. 1994a,b). Almost all species showed some change. Most of these changes were explained by the generally drier conditions over the 1984-85 survey and corresponding movements of bird species in response to this climatic variation. However, reductions in the distributions of a number of woodland species, which nest or feed on or close to the ground could not be attributed to this. Some of these were species recorded as declining in other parts of Australia, including Painted Button-quail, Hooded Robin (Fig. 88), Jacky Winter, Restless Flycatcher (Fig. 89), and Diamond Firetail (Paton *et al*. 1994a,b).

Ford and Howe (1980) predicted that even without further land clearing in the region, between 35 and 50 of the original bird species inhabiting the Mount Lofty Ranges would become extinct within the region. This is possible through the fragmentation of the original habitat and subsequent local extinctions on the resulting smaller "islands", combined with isolation from source populations preventing recolonisation.

Various authors have documented changes in relative abundance and status of bird species inhabiting the SMLR during the later parts of the last century of many bird species. Baxter (1980) describes the local extinction of the Spotted Quail-thrush from Belair National Park, and the decline of the Swift Parrot and the Regent and Black-chinned Honeyeaters throughout the district. In comparing records of bird species in Aldinga Scrub Conservation Park, collected before and after 1983, Ashton (1996) describes considerable changes in the avifauna of the park. These include the absence of, or reduction in, records after 1983, of several species, which forage on or near the ground, including Restless Flycatcher, Flame Robin, Diamond Firetail and Zebra Finch. Over the same period he noted that various species of lorikeet, cockatoo and the introduced Eurasian Blackbird (*Turdus merula*) were increasing.

Contrary to this, ornithologists reporting on earlier similar surveys of local areas over extended periods, in

the 1960's and 70's, made no comments regarding the apparent disappearance of bird species. In fact, many species now scarce within the SMLR were recorded frequently at this time. Ford and Paton (1975) in comparing data collected in Para Wirra Recreation Park from 1963-65 and 1973-75, stated that remarkably few changes in status and abundance had occurred. Species such as the Restless Flycatcher, Jacky Winter, Hooded Robin, Crested Shrike-tit, Black-chinned Honeyeater and Diamond Firetail were "frequent" encounters, whilst the Brown Treecreeper was regarded as common. Similarly, Rix (1976) recorded these species on many occasions in Sandy Creek Conservation Park between 1962 and 1972. These species are all now rated Vulnerable or at best uncommon throughout the SMLR (Carpenter and Reid 1997).

These ratings are clearly reflected in the recent biological surveys. The Brown Treecreeper was recorded at two of the 157 survey quadrats and the Diamond Firetail and Crested Shrike-tit were each recorded at one quadrat. Hooded Robins and Black-chinned Honeyeaters were recorded opportunistically only, while the Jacky Winter and Restless Flycatcher were not recorded at all. It appears that the predictions of Ford and Howe (1980) were a timely forecast, which have been substantiated by the findings of Paton *et al*. (1994a,b), and the more recent biological surveys of the SMLR.

Mount Lofty Ranges Declining Birds Task Force and "Birds for Biodiversity – MLR"

Many of the species, which are known to be declining in the SMLR, do not have threatened status under State or Federal legislation. This may be because the species does not appear to be under threat in the remainder or greater part of its range, in other parts of the State or country. In attempting to address this situation, the Mount Lofty Ranges Declining Birds Task Force[8] has identified 59 species considered "at risk" within the Mount Lofty Ranges (this figure includes six species considered extinct from the Mount Lofty Ranges). With the exception of the Malleefowl and Striated Thornbill (Gulf St. Vincent) all have been recorded within the SMLR region.

Twenty-one of these species have a conservation rating under State legislation. One more, the Hooded Robin (south-eastern sub-species), whilst not having a legislated conservation rating, is classified Near Threatened by The Action Plan for Australian Birds 2000 (Garnett and Crowley 2000). These and the remaining 37 species with no legislated conservation rating are listed in Appendix XIV.

[8] The Mount Lofty Ranges Declining Bird Task Force is made up of people with ornithological and/or land management expertise from government, non-government, educational organisations and private individuals.

The Birds for Biodiversity - MLR is a multi-bird species recovery program for the threatened and declining birds of the MLR. The project was initiated in response to Garnett and Crowley (2000) National Bird Action Plan and driven by the Mount Lofty Ranges Declining Bird Task Force and the Conservation Council of SA. "The aim of the project is to coordinate a landscape restoration approach to the Mount Lofty Ranges using threatened and declining bird taxa as flagships for action and community engagement" (Blason and Carruthers, in prep).

Figure 88.
Although it does not have a State conservation rating, the MLR Declining Birds Task Force has identified the Hooded Robin as being "at risk" in the region. This species was only recorded opportunistically during the SMLR survey. (Photo: D. Hopton)

Figure 89.
The Restless Flycatcher is another woodland species that has declined markedly in the study region in the last 20 – 30 years. It has also been identified by the MLR Declining Birds Task Force as being "at risk" in the region. (Photo: L. Pedler)

Yellow-tailed Black-Cockatoo

Although the Yellow-tailed Black-Cockatoo has a State Vulnerable conservation rating, it was recorded at 68 of the 157 (43%) survey quadrats and a further 40 opportunistic records. However, it is a large, slow moving species with a distinctive loud call, which is

easily observed as it flies in the open sky above the tree canopy. These characteristics may present a misleading account of its abundance relative to the other more secretive and less visible species.

In the Mount Lofty Ranges, the Yellow-tailed Black-Cockatoo occurs in Stringybark Forest and adjacent exotic pine forest (Carpenter and Reid 1997). It's Vulnerable status is based largely on a presumed low population (< 10,000 individuals) and lowered reproductive potential, due to a reduction in the numbers of the large tree hollows required for nesting and also by a lack of suitable food near nesting areas[9]. Large tree hollows are a scarce resource in the SMLR due to selective timber cutting of larger trees and large-scale bushfires.

The apparent high numbers and long life span could be masking the effects of poor recruitment, which could ultimately lead to a population crash. Research into the basic ecology of the Yellow-tailed Black-Cockatoo populations in the SMLR is needed to clarify this situation.

Biogeographic Significance of SMLR

The Mount Lofty Ranges is one of 18 regions within Australia, six of which are off-shore islands, for which a coordinated conservation plan is recommended under The Action Plan for Australian Birds 2000 (Garnett and Crowley 2000). Four endemic sub-species occur within the region (Schodde and Mason 1999). An extremely high proportion, 293 of the 467 (63%), species of birds recorded in South Australia (Robinson *et al*. 2000) have been recorded in what is a relatively small part (0.6%) of the State.

In addition to this, 29 Bassian species are at, or near, the western extreme of their southern distribution. The populations of 24 species are isolated from the greater portion of their distribution in the south-east and eastern parts of the continent (Table 43). Sixteen species are both isolated and at the western extreme of their range in the SMLR. All 37 species in one or both of these two categories, with the exception of the Ground Parrot, are predominantly forest or woodland inhabitants.

Of the 37 species whose populations in the SMLR represent isolated and/or populations at the western extreme of their range, 27 (73%) are considered to be under threat (Table 43). Seventeen have threatened status under State legislation and another 10 are recommended to be considered "at risk" by the Mount Lofty Ranges Declining Birds Task Force. Twenty of 29 Bassian species at or near the western extreme of their southern range are under threat, as are 18 of 24 species, which are isolated in the SMLR. Eleven of 16 species, which are both isolated and at the western extreme of their range are considered to be under some level of threat. By comparison, of the remaining 220 non-oceanic species, which have been recorded in the SMLR, only 58 (26%) are conservation rated in some way. Thirty-three have threatened status under legislation and a further 25 are included in the recommendations of the Mount Lofty Ranges Declining Birds Task Force.

[9] Pine seeds, although eaten by Yellow-tailed Black-Cockatoos, do not meet all nutritional requirements (G. Carpenter, pers comm., 2002).

Table 43.

Bird species geographically isolated in the SMLR (24 species) and/or Bassian species, which in the SMLR are at or near the western extreme of their southern distribution (29 species) – and their conservation status (table based upon Paton and Reid 1977).

Western Extreme = Bassian species at or near western extreme of southern range.
Isolated Population = SMLR population is isolated from rest of species distribution.
At Risk = Recommendations of the Mount Lofty Ranges Declining Birds Task Force.
Legislation = Conservation rated under SA National Parks and Wildlife Act, 1972 (Schedules 7,8,9 updated 2000)

Species	Comments	Western Extreme	Isolated Population	At Risk	Legislation
Adelaide Rosella	North to southern Flinders Ranges	✓	✓		
Azure Kingfisher	Extinct in region	✓	✓		✓
Bassian Thrush	North to southern Flinders Ranges	✓	✓		✓
Beautiful Firetail	Possibly linked to South-East via Coorong (G. Carpenter, pers. comm. 2002)	✓	✓		✓
Black-chinned Honeyeater	North to southern Flinders Ranges		✓		✓
Brown Thornbill	Possibly linked to South-east via Coorong	✓	✓	✓	
Brown Treecreeper	North to Flinders Ranges	✓		✓	
Buff-rumped Thornbill		✓	✓		
Chestnut-rumped Heathwren	Also in southern Flinders Ranges	✓	✓		✓
Crescent Honeyeater		✓	✓		
Crested Shrike-tit	North to southern Flinders Ranges		✓		✓
Eastern Rosella	Possibly linked to South-East via Coorong (G. Carpenter, pers. comm. 2002)	✓	✓		
Eastern Spinebill	North to southern Flinders Ranges	✓	✓	✓	
Flame Robin	Regular winter visitor	✓			✓
Golden-headed Cisticola		✓			✓
Ground Parrot	Extinct in SA		✓		✓
King Quail	Extinct in SA	✓			✓
Leaden Flycatcher	Rare winter vagrant	✓			
Little Lorikeet	Migrant from eastern States	✓			✓
Little Wattlebird	Possibly linked to South-east via Coorong		✓	✓	
Musk Lorikeet			✓		
Noisy Miner	North to southern Flinders Ranges	✓			
Olive-backed Oriole	Breeding vagrant	✓			✓
Pink Robin	Rare winter visitor	✓			
Red-browed Firetail		✓	✓	✓	
Regent Honeyeater	Extinct in region	✓			✓
Rose Robin	Rare winter visitor	✓			
Scarlet Robin	Also in southern Flinders Ranges		✓	✓	
Southern Emu-wren	Endangered sub-species		✓		✓
Spotted Quail-thrush		✓	✓		✓
Striated Thornbill	Possibly linked to South-east via Coorong	✓	✓		
Swift Parrot	Extinct in region, migrant from Tasmania	✓			✓
White-naped Honeyeater			✓	✓	
White-throated Gerygone	An irregular breeding migrant to the MLR from the eastern states (G. Carpenter pers. comm. 2002)	✓	✓		✓
White-throated Treecreeper		✓	✓	✓	
Yellow Thornbill	North to Flinders Ranges	✓		✓	
Yellow-faced Honeyeater	North to southern Flinders Ranges	✓	✓	✓	

Introduced species or recent "arrivals" to the SMLR

Two frequently recorded species, the Eurasian Blackbird (*Turdus merula*), recorded at 71 quadrats and the European Goldfinch (*Carduelis carduelis*), recorded at 23 quadrats, were both introduced to Adelaide, in 1863 and 1879 respectively (Blakers *et al*. 1984).

At least two native species, the Crested Pigeon (*Ocyphaps lophotes*), recorded at 12 quadrats and the Galah (*Cacatua roseicapilla*), recorded at 75 quadrats are believed to have arrived in the region in the early 1900's. Land clearing for agriculture, particularly grain crops, in the SMLR, and more importantly, in the lower and mid north regions, provided more open habitat and a food source suitable for these ground-feeding seed-eating species. These advantageous conditions allowed them to extend their distribution from their original range in the upper and far northern areas of the State (McGilp 1937, Twidale *et al*. 1976).

It is also popularly believed that the Little Corella (*Cacatua sanguinea*) is a recent arrival in the SMLR, having extended its distribution into the south-east of the continent during the 1900's (Blakers *et al*. 1984). As a grass-seed eater, it would also have benefited from the changes in land management practices described above. It was recorded at nine of 157 survey quadrats, but earlier authors, in collating comprehensive lists of birds in parts of the region, based in part on observations during the first half of last century, made no mention of the Little Corella (McGilp 1964, Laybourne-Smith 1989). Terrill and Rix (1950) described the distribution of the Little Corella as the north-east of the State, south to the northern parts of the River Murray, Melrose and Port Augusta. They also mentioned an isolated colony at Buckland Park, on the northern Adelaide Plains, which was believed to have been deliberately introduced "many years ago".

The Eastern Rosella (*Platycercus exemius*), recorded at only three quadrats, has a limited distribution within the region. Most records are from the southern parts of the Adelaide Hills sub-region between Mount Lofty and Mount Bold, where it is found in open grassy environments and preferentially forages on the ground (Penck *et al*. 1995). It has been suggested that this isolated population established from aviary escapees (Blakers *et al*. 1984). However, it has also been postulated that similarly to the Crested Pigeon and Little Corrella, it may have extended its range into the SMLR following land clearing in the intervening areas (Parker 1988). In this case from the south-east or even originally from Victoria, as the first records in the region were from Cherry Gardens in 1912 and the first breeding record from Clarendon in 1934 (Parker 1988).

The Emu became extinct in the SMLR during the mid-1800's (G. Carpenter pers. comm., 2002). However, the Emu was re-released into Belair National Park from a former fauna enclosure within the Park (Baxter 1980), probably in 1972 when the fauna enclosure was closed. Emus were also re-introduced into Para Wirra Recreation Park, from Belair in 1967 (Ford and Paton 1976). They persist in both areas, with those from Para Wirra expanding throughout the Barossa district. They were recorded at ten survey quadrats, which along with numerous opportunistic records were concentrated in these two areas, Belair National Park and the Barossa district.

Species recorded from Mt Lofty – Southern Emu-wren and Fleurieu Peninsula surveys but not Southern Mt Lofty survey

The two earlier biological surveys (Mt Lofty- Southern Emu Wren and Fleurieu Peninsula (Scientific Expedition Group)) recorded 12 bird species not recorded during the Southern Mt Lofty survey. These additional species largely reflect differences in survey quadrat habitat, size and ecological condition.
Five species recorded only from the Mt Lofty – Southern Emu Wren survey are most commonly associated with swamps. These were the Golden-headed Cisticola, Lewin's Rail, Little Grassbird, Swamp Harrier and the Nationally Endangered Mount Lofty Ranges sub-species of the Southern Emu-wren. Three species, the Black-shouldered Kite, Masked Lapwing and Richard's Pipit inhabit open country, and were probably recorded in the earlier surveys due to the small area of the patches surveyed and the subsequent proximity of the edges of farm-land to the survey quadrat. The European Greenfinch was recorded at quadrats during both of these earlier surveys, is well known as inhabiting gardens and areas of introduced conifers. It was therefore much more likely to be recorded in these more fragmented and smaller areas than the more extensive areas of native vegetation selected for the Southern Mt Lofty survey quadrats. The remaining two species recorded only from the earlier surveys were the Silver Gull and the White-eared Honeyeater. Although the Silver Gulls often frequent larger rubbish dumps and areas of open water in the Adelaide Hills (G. Carpenter pers. comm., 2002), its preferred habitat is on the coast. The White-eared Honeyeater is considered a vagrant from its preferred habitat of mallee shrublands to the east of the SMLR.

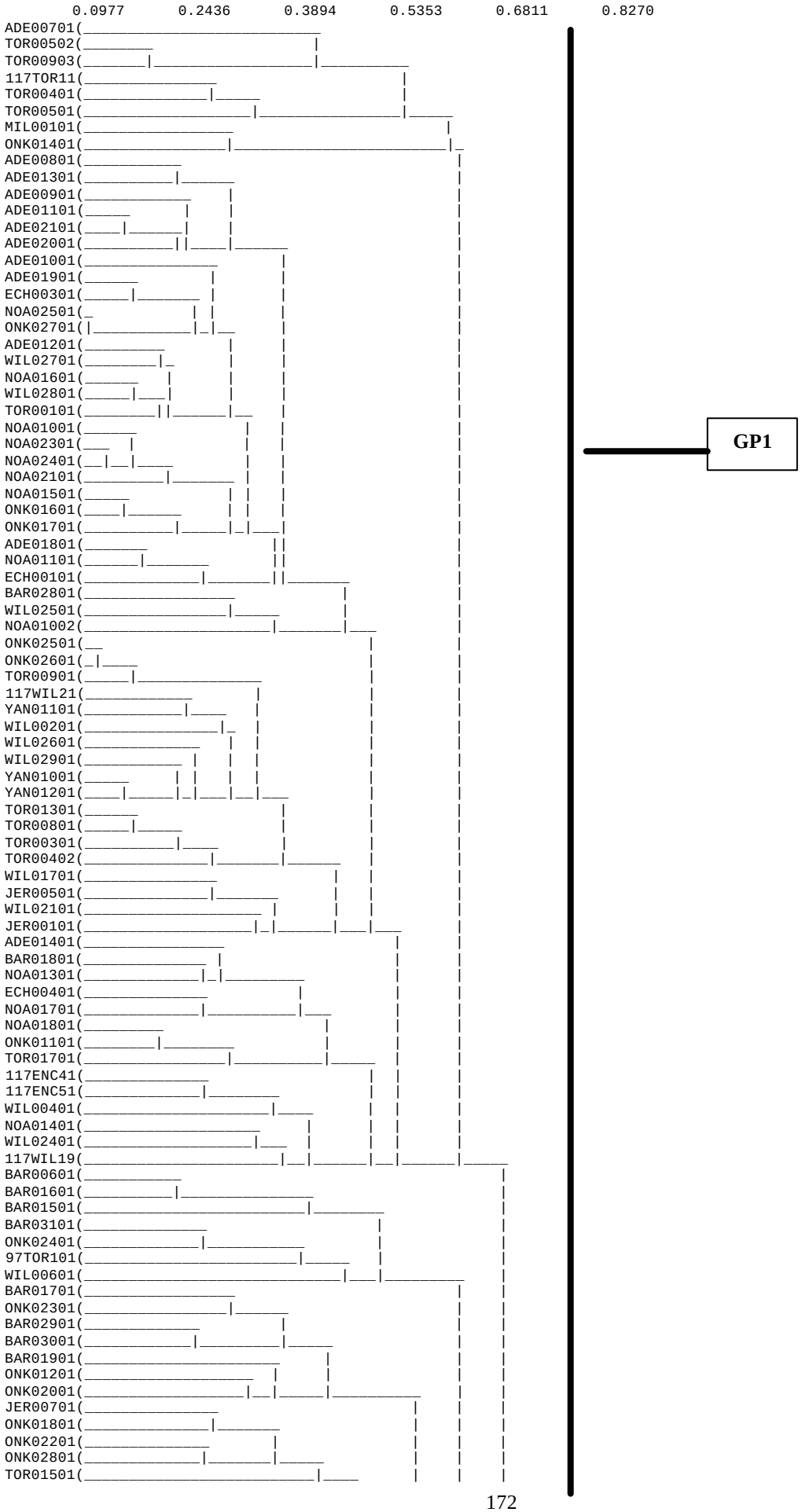
BIRD SPECIES PATTERNS

The 157 survey quadrats were grouped according to the similarity of their bird species using PATN analysis (Belbin 1994: see Methods Chapter). The groups can then be correlated with variables such as vegetation type and location. The PATN classification analysis was conducted on presence/absence data of 75 species recorded from the 157 survey quadrats. Migratory species, raptors, waterbirds and nocturnal species were not included in the analysis. Therefore, the analysis was of 5 674 of the 6 518 records collected at the survey quadrats.

The dendrogram produced from this analysis (Figure 90) shows the relationships or level of similarity between the survey quadrats. Using a quadrat dissimilarity of 0.7 three groupings were identified from the dendrogram. The overall similarity of 0.827 is extremely low, but is considered an accurate representation, resulting from the bias in the quadrat selection process concentrating on the most intact areas of remnant vegetation, which are predominantly forest and woodland associations. The low dissimilarity value, the few species significantly associated with each group and the high number of species represented in all groups indicates the bird communities are loosely defined. Table 45 shows the frequency of occurrence of quadrats from the three bird groups within the major vegetation formations.

Table 44.
Frequency of the occurrence of quadrats from the bird PATN groups within the major vegetation formations.

Vegetation Group	**Bird PATN Group**		
	1	**2**	**3**
1 = Stringybark *Eucalyptus* associations	68 (56.6%)	5 (20%)	3 (25%)
2 = Smooth barked *Eucalyptus* associations	26 (21.6%)	9 (36%)	0
3 = Rough barked *Eucalyptus* associations	8 (6.6%)	4 (16%)	0
4 = Other woodland types (including *Eucalyptus* co-dominant combinations)	10 (8.3%)	6 (24%)	0
5 = Shrubland	7 (5.8%)	1 (4%)	5 (42%)
6 = Sedgeland	1 (0.8%)	0	4 (33%)
Total Quadrats	**120**	**25**	**12**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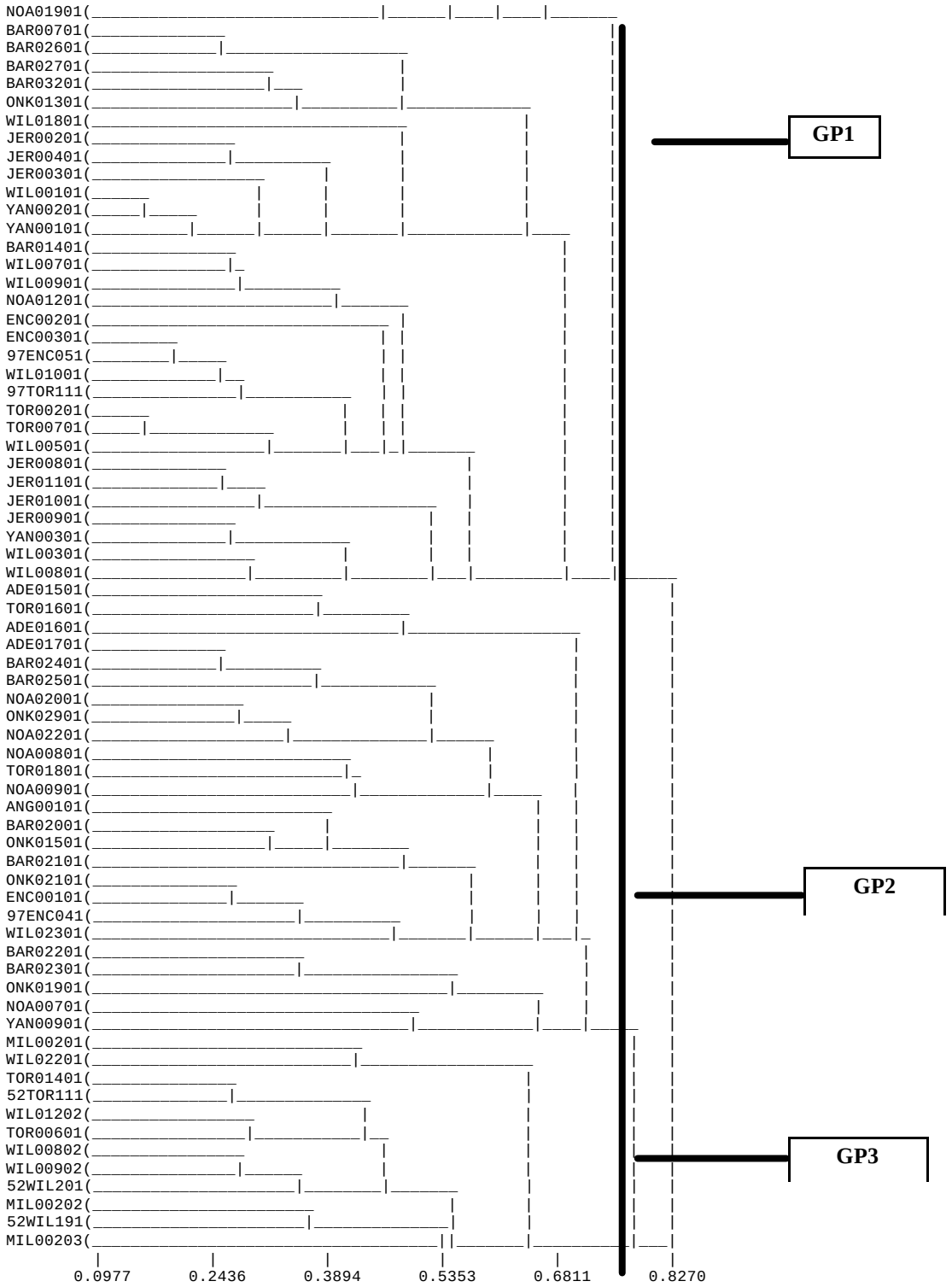


Figure 90.
Dendrogram from PATN analysis of bird data showing quadrat groups.

PATN GROUP DESCRIPTIONS

Each group has been named according to the dominant vegetation type at survey quadrats. Bird species that characterise each group are listed in order of their indicator value (the square of: [observed frequency – expected frequency] divided by expected frequency). Birds characteristic of a group had: (1) a high indicator value, (2) high frequency within the group and (3) relatively low frequency in the other 2 groups. Frequently occurring bird species (not necessarily those with a high indicator value) are also listed to help characterise the group.

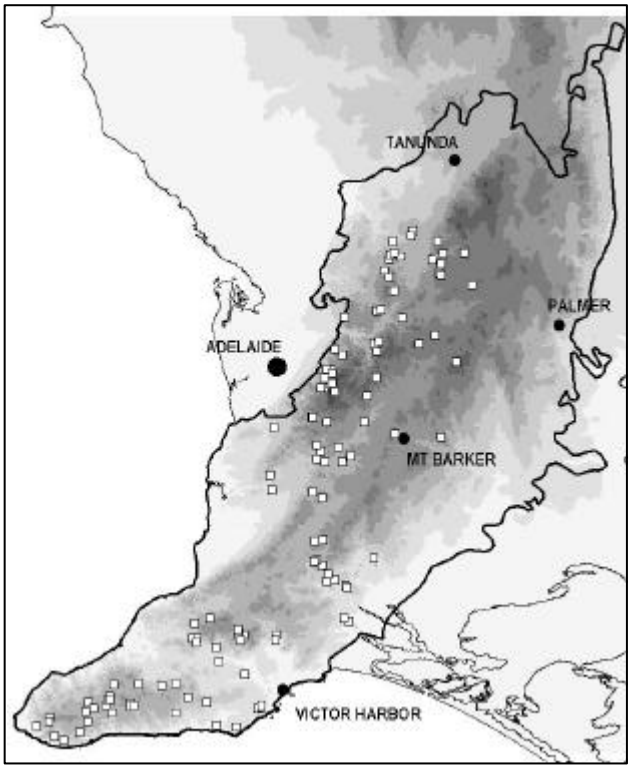
Appendix XV lists all bird species recorded in each pattern group, along with their chi-square value, frequency of occurrence within the group and overall at all quadrats. Appendix XVI also lists the frequency of dominant overstorey species and vegetation groups represented in the group.

GROUP NUMBER 1: Birds of Stringybark Woodland and Open Forest with a heath understorey

Number of quadrats	120
Number of species in group	64
Mean number of species at quadrats	16
Range of number of species at quadrats	4 - 39

Species	Indicator Value	Frequency (%)
White-throated Treecreeper	2.4	53
Brown Thornbill	1.9	68
Crescent Honeyeater	1.7	73
Golden Whistler	1.4	61
Grey Shrikethrush	1.3	80
Grey Currawong	1.2	76
Other frequently occurring species		
Superb Fairy-wren	0.0	90
Adelaide Rosella	0.0	88
Grey Fantail	0.2	80
Brown Thornbill	1.9	68

This is by far the largest of the three groups, containing 120 (76%) of the 157 survey quadrats. These quadrats are predominantly Stringybark Open forest and woodlands with heath understorey (Table 44) scattered throughout the region except in the extreme north, where Long-leaved Box (*Eucalyptus goniocalyx*) is common. As shown above, the bird species characteristic of this group are the Grey Shrikethrush, Grey Currawong, Crescent Honeyeater, Brown Thornbill, Golden Whistler and White-throated Treecreeper.

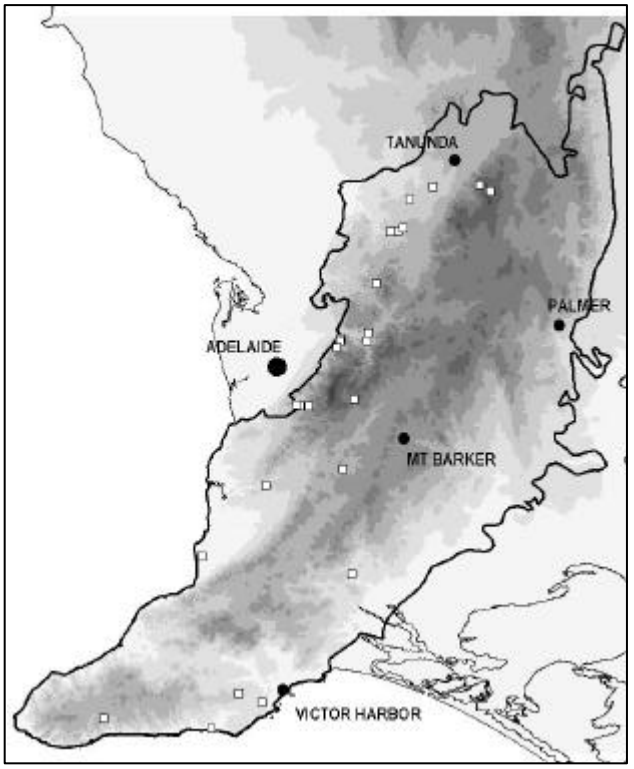


GROUP NUMBER 2: Birds of Savannah Woodland

Number of quadrats	25
Number of species in group	65
Mean number of species at quadrats	16
Range of number of species at quadrats	7 - 27

Species	Indicator Value	Frequency (%)
Mistletoe Bird	12.2	64
Rufous Whistler	10.3	44
White-plumed Honeyeater	12.8	32
Red Wattlebird	2.8	80
Other frequently occurring species		
Australian Magpie	1.1	80
Superb Fairy-wren	0.1	80
Crimson (Adelaide) Rosella	0.0	80
*Common Blackbird	3.7	68

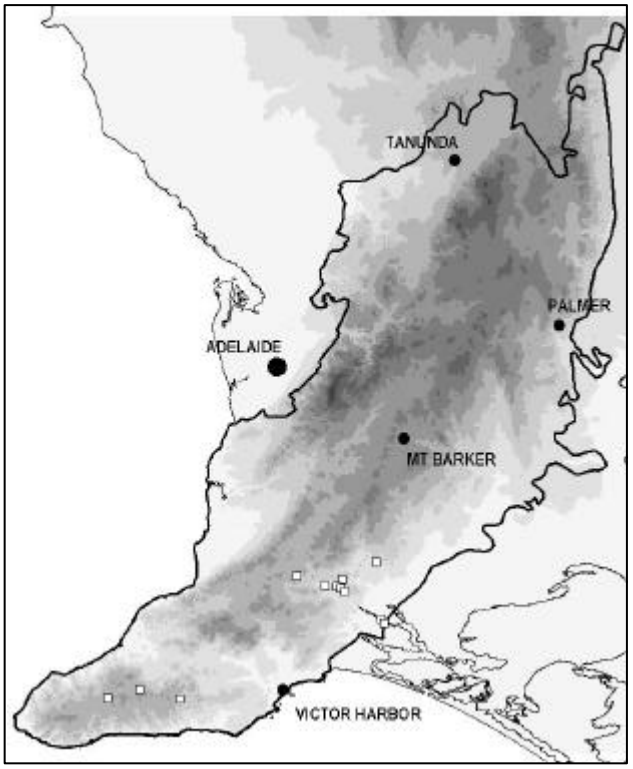
PATN group 2 contains 25 (16%) of the 157 survey quadrats. These are woodland quadrats with generally a more open, grassy understorey, in the drier, lower altitude or northern areas within the region. Species characteristic of this group are the Mistletoe Bird, Rufous Whistler and White-plumed Honeyeater.



GROUP NUMBER 3: Birds of dense low vegetation, often swamps

Number of quadrats	12
Number of species in group	55
Mean number of species at quadrats	18
Range of number of species at quadrats	8 - 29

This is the smallest of the three groups, containing only 12 (8%) of the 157 survey quadrats. These quadrats are all in the southern parts of the region, or Fleurieu district and typically consist of dense low vegetation with open overstorey, if any, often in swamps. Native species characteristic of this group are the Australian Reed-Warbler, Little Grassbird, Golden-headed Cisticola, Southern Emu-wren and Little Wattlebird. Several introduced exotic species have high significance in this group. These are the Common Starling, House Sparrow, European Greenfinch and European Goldfinch. This may be indicative of the level of disturbance at these quadrats and/or the isolation of the swamps common in this group, within surrounding cleared farm-land which provides the fragmented habitat favoured by these introduced species.



Species	Indicator Value	Frequency (%)
Australian Reed-Warbler	29.7	33
Little Grassbird	29.5	25
*Common Starling	24.0	58
Golden-headed Cisticola	20.1	17
*House Sparrow	18.5	33
*European Goldfinch	12.5	58
Southern Emu-wren	11.3	17
Little Wattlebird	11.3	17
*European Greenfinch	11.3	58
Other frequently occurring species		
Australian Magpie	1.0	100
Superb Blue Wren	0.0	100
White-browed Scrubwren	3.1	83
Galah	1.9	83
Adelaide (Crimson) Rosella	0.2	83
Grey Fantail	0.0	83
Tree Martin	6.5	67
New Holland Honeyeater	0.5	67

REPTILES

D. Armstrong[1]

INTRODUCTION

Previous herpetological summaries for the Southern Mount Lofty Ranges are surprisingly scarce, particularly considering their proximity to Adelaide. While the earliest was that of Mitchell (1953), the most comprehensive are those of Ehmann (1976a, 1976b) and Long (1999). Ehmann (1976a) recognized the occurrence of 36 reptile species within the SMLR, whereas Long (1999) listed 59 reptile and 10 frog species for the region. Investigation of the sources of this information, leading to some rationalisation of this list, and recent changes in taxonomy, reduced the number considerably. With the addition of two species, recorded opportunistically during the recent survey, there are now 48 native and two introduced reptile species confirmed for the region, of the 226 reptile recognized as occurring within South Australia. Taxonomy and common names used here follow Robinson *et al*. (2000) with additional information, particularly on national distribution, from Cogger (2000). The Methods chapter of this report, outlines the Biological Survey method and other sources of information used to compile this chapter.

TOTAL REPTILE SPECIES RECORDED FOR SMLR

Although 48 native species have been recorded for the SMLR only 43 are currently accepted as being resident (Tables 45 and 46). Resident species are those considered to permanently reside within the region (not vagrants or species occasionally occurring within the region). Of these, 38 were recorded during the survey. The five native species, confidently considered to be currently resident in the region, that were **not** recorded during the survey are:

Flinders Worm Lizard (*Aprasia pseudopulchella*)
Black Tiger Snake (*Notechis ater*)
Eastern Tiger Snake (*Notechis scutatus*)
Mallee Black-headed Snake (*Suta spectabilis*)
Southern Blind Snake (*Ramphotyphlops australis*)

Table 45.
Summary of total reptile species recorded for the SMLR study region.

Category	Number of reptile species
Native species currently considered resident	43
Native species recorded for region, but no longer considered resident	5
Introduced species	2
Native species recorded by Biological surveys	38
Introduced species recorded by Biological surveys	2

Questionable Records

There are five species, for which there are only SA Museum records for the region, of questionable status and are not currently considered resident in the region. This may be because their few records are extremely peripheral to the region, or they may be old records with poor support data, or both. These are discussed below.

Painted Dragon: There are two specimens of the Painted Dragon (*Ctenophorus pictus*) registered as from Mount Compass with very low SA Museum registration numbers, indicating that they were donated in the late 1800's. It seems unlikely that suitable habitat for this species ever existed in the area and most certainly no longer does. The nearest occurrence of Painted Dragons now being in sandy coastal areas on the Adelaide Plains to the north west, the two Mount Compass records should be disregarded as an original location error.

Yellow-faced Whipsnake: There is only one record of the Yellow-faced Whipsnake (*Demansia psammophis*), from just south of the Mount Crawford Forest headquarters in 1984. While this is a genuine record, without further specimens from the region, the status of this usually drier area species within the SMLR should be considered questionable.

Burton's Legless Lizard: Similarly, there is only one record of Burton's Legless Lizard (*Lialis burtonis*),

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from the foothills behind Wattle Park in 1961. It is possible that in the past this species extended south into the Adelaide plains and foothills, but as this area is now heavily developed and without further supporting records, it must be currently regarded as a doubtful occurrence in the region.

Mitchell's Short-tailed Snake: There is only a single record of Mitchell's Short-tailed Snake (*Suta nigriceps*) from Palmer in 1965, on the eastern edge of the ranges. Such a peripheral record of a species known from adjacent drier areas should preclude it from listing as resident in the region.

Five-lined Earless Dragon: There is only one record of the Five-lined Earless Dragon (*Tympanocryptis lineata*), which actually originates from within the ranges, at Fifth Creek, Montacute during the early part of last century. This species is known from grassland areas on both sides of and adjacent to the ranges. It is possible that in the past its distribution extended from the plains into similar habitat within the ranges, but most of the remnants of this grassland habitat are now severely degraded. Therefore it is unlikely that the species now occurs there.

Table 46.
Reptile species recorded for SMLR. Species taxonomy follows Hutchinson and Edwards (2000). Species are ordered alphabetically by genus within each family.

COMMON NAME	SPECIES	SURVEY		SA Museum Records
		Survey Quadrats	Opportune	
CHELIDAE – Side-necked Tortoises				
Chelodina longicollis	Common Long-necked Tortoise		✓	✓
Emydura macquarii(I)##	Murray River (or Macquarie) Tortoise (I)##		✓	NO
AGAMIDAE – Dragon Lizards				
Ctenophorus decresii	Tawny Dragon	✓	✓	✓
Ctenophorus pictus ?	Painted Dragon ?			✓
Physignathus lesueurii(I)	Water Dragon (I)		✓	NO
Pogona barbata	Eastern Bearded Dragon	✓	✓	✓
Tympanocryptis lineata ?	Five-lined Earless Dragon ?			✓
GEKKONIDAE – Geckos and Legless Lizards				
Aprasia pseudopulchella	Flinders Worm Lizard			✓
Aprasia striolata	Lined Worm Lizard	✓	✓	✓
Christinus marmoratus	Marbled Gecko	✓	✓	✓
Delma inornata	Olive Snake-lizard		✓	✓
Delma molleri	Adelaide Snake-lizard	✓	✓	✓
Diplodactylus vittatus	Eastern Stone Gecko	✓	✓	✓
Gehyra sp. "2N=44"	Southern Rock Dtella		✓	✓
Lialis burtonis ?	Burtons's Legless Lizard ?			✓
Nephrurus millii	Barking Gecko		✓	✓
Pygopus lepidopodus	Common Scaly-foot	✓	✓	✓
SCINCIDAE - Skinks				
Bassiana duperreyi	Eastern Three-lined Skink	✓	✓	✓
Cryptoblepharus plagiocephalus Includes forms currently identified as *Cryptoblepharus carnabyi* Speckled Wall Skink	Desert Wall Skink		✓	✓
Ctenotus orientalis	Eastern Spotted Ctenotus	✓	✓	✓
Ctenotus robustus	Eastern Striped Skink	✓	✓	✓
Egernia cunninghami	Cunningham's Skink		✓	✓
Egernia striolata	Eastern Tree Skink		✓	✓
Egernia whitii	White's Skink	✓	✓	✓
Eulamprus heatwolei	Yellow-bellied Water Skink	✓	✓	✓

COMMON NAME	SPECIES	SURVEY		SA Museum Records
		Survey Quadrats	Opportune	
Eulamprus quoyii	Eastern Water Skink	✓	✓	✓
Hemiergis decresiensis	Three-toed Earless Skink	✓	✓	✓
Hemiergis peronii	Four-toed Earless Skink	✓	✓	✓
Lamphropholis delicata##	Delicate Skink##		✓	NO
Lampropholis guichenoti	Garden Skink	✓	✓	✓
Lerista bougainvillii	Bougainville's Skink	✓	✓	✓
Lerista dorsalis	Southern Four-toed Slider	✓	✓	✓
Menetia greyii	Dwarf Skink	✓	✓	✓
Morethia adelaidensis	Adelaide Snake-eye		✓	✓
Morethia obscura	Mallee Snake-eye	✓	✓	✓
Pseudemoia entrecasteauxii	Southern Grass Skink	✓		✓
Tiliqua rugosa	Sleepy Lizard	✓	✓	NO
Tiliqua scincoides	Eastern Blue-tongue	✓	✓	✓
VARANIDAE - Goannas				
Varanus rosenbergi	Heath Goanna		✓	✓
BOIDAE - Boas and Pythons				
Morelia spilota	Carpet Python		✓	✓
ELAPIDAE - Elapid Snakes				
Austrelaps labialis	Pygmy Copperhead	✓	✓	✓
Demansia psammophis ?	Yellow-faced Whipsnake ?			✓
Notechis ater	Black Tiger Snake			✓
Notechis scutatus	Eastern Tiger Snake			✓
Pseudechis porphyriacus	Red-bellied Black Snake	✓	✓	✓
Pseudonaja textilis	Eastern Brown Snake	✓	✓	✓
Suta flagellum	Little Whip Snake	✓	✓	✓
Suta nigriceps ?	Mitchells Short-tailed Snake ?			✓
Suta spectabilis	Mallee Black-headed Snake			✓
TYPHLOPIDAE - Blind Snakes				
Ramphotyphlops australis	Southern Blind Snake			✓

(I) Introduced to the region (including pet escapees and releases) and have now established wild populations in the region
(?) Questionable records. Probably not presently resident in the region. Refer to text for details
The Biological survey records were new records for the SMLR study region.

SURVEY QUADRAT DATA

Forty species (38 native and two introduced) were recorded during the biological surveys, including 27 species at survey quadrats (Tables 46 and 47). Only one of the species recorded at survey quadrats, the Southern Grass Skink (*Pseudemoia entrecasteauxii*) was not also recorded opportunistically.

Reptiles were recorded at 150 of the 157 quadrats surveyed, totalling 2,051 records (Appendix XVII). At survey quadrats, most records were pitfall trap captures, supplemented by a physical search for reptiles under loose bark, rocks, fallen timber, leaf litter and other materials in similar habitat in the immediate area of the trap line.

Four small skink species were the most frequently and commonly recorded species (Table 47 and Figures 91-94) - comprising 78% of all records and being recorded at the most number of quadrats. These were the Garden Skink (*Lampropholis guichenoti*), the Three-toed Earless Skink (*Hemiergis decresiensis*), Bougainville's Skink (*Lerista bougainvillii*) and the Eastern Three-lined Skink (*Bassiana duperreyi*). The Garden Skink was the most abundant and widespread species, comprising 49% of all reptile records (1,003 of 2,051), and recorded at 76% of quadrats (120 of 157). It was also the species with the highest number of records at a quadrat, with 131 of 142 records from a quadrat in Horsnell Gully Conservation Park, and the highest daily record of 61, of which 52 were trapped (no recaptures), at the same quadrat.

Within South Australia, the Garden Skink is largely confined to forest and woodland habitats. This is a very active skink, darting across open areas between patches of cover in the daytime chasing the insects that make up its food. Like the Marbled Gecko, *L. guichenoti* also lays two to four eggs at a time, and in

communal aggregations. The Three-toed Earless Skink is also confined to Forest and Woodlands, and appears to favour habitats where there is a lot of rotting wood mixed with soil and litter. Their diet consists largely of ants, which are particularly common among rotting wood (Robinson 1986).

Seven survey quadrats provided no reptile records. Of the remaining 150 quadrats, the number of records per quadrat varied from the 142 mentioned above to only one record at seven quadrats, with an average of 13 records per quadrat (Appendix XVII). The average number of species recorded at quadrats was 3.5. The number of species per quadrat ranged from nine species (at two quadrats) to one species (at 21 quadrats).

Four species: the Pygmy Copperhead (*Austrelaps labialis*), the Eastern Stone Gecko (*Diplodactylus vittatus*), the Eastern Water Skink (*Eulamprus quoyii*) and the Little Whip Snake (*Suta flagellum*) were each recorded at only one quadrat. In attempting to clarify their status and distribution, other records were obtained opportunistically for these species, as was the case for most species that were poorly represented at quadrats, and for 13 others, which were not recorded at quadrats at all (Table 47).

Opportune Records

Thirty-nine species were recorded as opportune records. These included both of the introduced species recorded for the SMLR region. All opportune records are shown in Table 47.

Figure 91.
***Lampropholis guichenoti*, the Garden Skink, was the most commonly recorded reptile on the SMLR survey, comprising 49% of all reptile records and occurring in 76% of quadrats. Within South Australia, it is largely confined to forest and woodland habitats. (Photo: A. Robinson).**

Figure 92.
***Hemiergis decresiensis* was the second most commonly recorded species on the SMLR survey. It has a brilliant yellow belly, which may be used in defensive display when suddenly contrasted with the brown of the dorsal surface). (Photo: S. Doyle).**

Figure 93.
Like the other common small skinks recorded on the survey, *Lerista bougainvillii,* Bougainville's Skink, is adapted for burrowing in soil and leaf litter. It has a pointed and flattened snout and much-reduced limbs. (Photo: A. Robinson).

Figure 94.
***Bassiana duperreyi,* the Eastern Three-lined Skink was the fourth most commonly recorded species on the SMLR survey. As its scientific generic name implies, it is of typical Bassian distribution, i.e. southeastern Australia including Tasmania. It is ubiquitous within the study region, dwelling on the ground in a wide variety of habitats. (Photo: A. Robinson).**

Table 47.
Number of survey quadrat and opportune records for each reptile species. Species are arranged in descending order of number of survey quadrats at which represented.

Species	Common Name	No. Survey Quadrats (n=157)	Total No. Quadrat Records	No. Opportune Records
Lampropholis guichenoti	Garden Skink	120	1003	51
Hemiergis decresiensis	Three-toed Earless Skink	96	332	52
Lerista bougainvillii	Bougainville's Skink	49	131	38
Bassiana duperreyi	Eastern Three-lined Skink	48	135	8
Tiliqua rugosa	Sleepy Lizard	35	42	65
Christinus marmoratus	Marbled Gecko	31	58	41
Egernia whitii	White's Skink	28	68	30
Aprasia striolata	Lined Worm Lizard	19	34	9
Menetia greyii	Dwarf Skink	16	43	22
Morethia obscura	Mallee Snake-eye	15	59	7
Pseudonaja textilis	Eastern Brown Snake	11	12	26
Ctenophorus decresii	Tawny Dragon	7	10	23
Hemiergis peronii	Four-toed Earless Skink	7	20	4
Pogona barbata	Eastern Bearded Dragon	7	8	48
Ctenotus robustus	Eastern Striped Skink	6	12	9
Lerista dorsalis	Southern Four-toed Slider	6	15	3
Ctenotus orientalis	Eastern Spotted Ctenotus	5	22	9
Eulamprus heatwolei	Yellow-bellied Water Skink	5	7	5
Pygopus lepidopodus	Common Scaly-foot	5	7	1
Delma molleri	Adelaide Snake-lizard	4	10	6
Pseudechis porphyriacus	Red-bellied Black Snake	3	3	34
Tiliqua scincoides	Eastern Bluetongue	3	3	23
Pseudemoia entrecasteauxii	Southern Grass Skink	2	2	
Austrelaps labialis	Pygmy copperhead	1	1	6
Diplodactylus vittatus	Eastern Stone Gecko	1	2	5
Eulamprus quoyii	Eastern Water Skink	1	9	9
Suta flagellum	Little Whip Snake	1	1	10
Egernia cunninghami	Cunningham's Skink			11
Chelodina longicollis	Common Long-necked Tortoise			9
Cryptoblepharus plagiocephalus	Desert Wall Skink			8
Varanus rosenbergi	Heath Goanna			7
Egernia striolata	Eastern Tree Skink			4
Gehyra sp. '2n=44'	Southern Rock Dtella			4
Nephrurus milii	Barking Gecko			2
Delma inornata	Olive Snake-lizard			1
Emydura macquarii (I)	Murray River (or Macquarie) Tortoise			1
Lampropholis delicata	Delicate Skink			1
Morelia spilota	Carpet Python			1
Morethia adelaidensis	Adelaide Snake-eye			1
Physignathus lesueurii (I)	Water Dragon			1
Physignathus sp. (*P. lesueurii*?)				1
		Total Records	**2051**	**596**

(I) = Introduced to the region

BIOGEOGRAPHY

The reptile assemblage (50 species) recorded for the SMLR contains elements of groups of species with four distinct distribution patterns, resulting from the region being an overlap zone for Bassian and Eyrean bioregions (Table 48):

South-eastern Australia (western extreme of limit): 17 species are found mainly in the higher rainfall areas of eastern and south-eastern Australia and in the Mount Lofty Ranges are at or near the western extreme of their distribution. Several of these exist in isolation, with their nearest related populations to the east in Victoria (Table 48).

South-eastern to south-western Australia: ten species are distributed across the southern parts of the continent, from the south-east to the south-west, with continuous or separate populations.

South Australian/western NSW: six species in the region have their distribution centred on the Mount Lofty and Flinders Ranges and are confined to South Australia and the adjacent areas of western New South Wales.

Broader distribution: 17 species have generally wider distributions and are not specifically affiliated with the more temperate southern regions, and may extend into the extreme arid areas, or in a few cases even into the tropical north of the continent.

Table 48.
Biogegraphical groupings of reptile species recorded within the SMLR. Refer to text for explanation of group headings.

South-eastern (17 species)	South-eastern to South-western (10 species)	South Australia/western NSW (6 species)	Broader Distribution (17 species)
Bassiana duperreyi	*Aprasia striolata*	*Aprasia pseudopulchella*	*Cryptoblepharus* cf *carnabyi*
Chelodina longicollis	*Christinus marmoratus*	*Austrelaps labialis*	*Ctenophorus pictus* (?)
Delma inornata *	*Hemiergis peronii*	*Ctenophorus decresii*	*Ctenotus orientalis*
Diplodactylus vittatus	*Lerista dorsalis*	*Delma molleri*	*Ctenotus robustus*
Egernia cunninghami *	*Morethia obscura*	*Gehyra* sp. "2N=44"	*Demansia psammophis* (?)
Egernia whitii	*Notechis scutatus*	*Notechis ater* *	*Egernia striolata*
Emydura macquarii (I)	*Pygopus lepidopodus*		*Lialis burtonis* (?)
Eulamprus heatwolei *	*Suta nigriceps* (?)		*Menetia greyii*
Eulamprus quoyii	*Suta spectabilis*		*Morelia spilota*
Hemiergis decresiensis *	*Varanus rosenbergi*		*Morethia adelaidensis*
Lampropholis delicata			*Nephrurus millii*
Lampropholis guitchenoti *			*Physignathus lesueurii* (I)
Lerista bougainvillii			*Pseudonaja textilis*
Pogona barbata			*Ramphotyphlops australis*
Pseudechis porphyriacus *			*Tiliqua rugosa*
Pseudemoia entrecasteauxii			*Tiliqua scincoides*
Suta flagellum *			*Tympanocryptis lineata* (?)

* = Isolated – Dis-continuous distribution extending out from the ranges.
(?) = Questionable – Probably not presently resident in the region.
(I) = Introduced – Did not occur naturally within the region.

In addition to the south-eastern species isolated in the SMLR (Table 48) by the surrounding less suitable habitats, there are some species that prefer the drier regions, and therefore have distributions which include the periphery of the ranges only. In particular, these species avoid the wetter areas of Stringybark woodlands in the central Adelaide Hills and Fleurieu Peninsula, extending into the ranges only in drier locations such as the lower areas of the Barossa Valley and the northern and eastern foothills, usually on well-drained rocky or sandy soils. There are a number of cases of two similar species of small skink of the same genus occurring in the region. In these cases there is little or no overlap in distribution, as one is a broadly distributed species throughout the region and well adapted to the conditions there, whilst the other is a peripheral species, adapted to habitat types that are rare in the region. For example, the Three-toed Earless Skink (*Hemiergis decresiensis*) is found throughout the region whilst the Four-toed Earless Skink (*Hemiergis peronii*) is restricted to sandy soils around the edges of the Fleurieu district such as Newland Head and Aldinga Scrub Conservation Parks. Similar situations exist for Bougainville's Skink (*Lerista bougainvillii*) and the Four-toed Slider (*Lerista dorsalis*), and the Garden Skink (*Lamropholis guichenoti*) and the Delicate Skink (*Lampropholis delicata*).

Table 49 divides the reptile species recorded for the SMLR into three groups, based on their relative distribution and abundance within the region. Further distribution details are included below for the more

significant species . The division is largely based on the occurrence of records for each species within the following three sub-regions. (1) The southern Barossa, between the Gawler and Torrens Rivers, (2) the Adelaide Hills, between the Torrens and an east-west line running through the most southerly part of the lower Onkaparinga River and (3) the Fleurieu District, the remaining area south of this line to the south coast (refer Figure 7, Introduction). Habitat preference, and to a lesser extent, frequency of records were also taken into account in developing the following group definitions:

Ubiquitous: Records exist from all three sub-regions and are not restricted to specific habitat types of small area.

Restricted: The species occurs in only one or two of the sub-regions and/or has restricted distribution or habitat preference.

Peripheral: The broader distribution of the species abuts the ranges and records are only known from one or two sub-regions, usually on lower slopes or well-drained drier areas of rocky or sandy soils around the edges of the region.

Figure 95.
The Eastern Stone Gecko (*Diplodactylus vittatus*) was only recorded at one SMLR survey quadrat. It occurs in a variety of habitats from arid scrubs to wet sclerophyll forest and is commonly found in or under fallen timber, stones and litter. Its distribution is, however, largely peripheral to the SMLR. (Photo: A. Robinson).

Table 49.
Distribution categories of reptile species recorded within the SMLR.

Ubiquitous (17 species)	Restricted (18 species)	Peripheral (15 species)
Aprasia striolata	*Austrelaps labialis*	*Aprasia pseudopulchella*
Bassiana duperreyi	*Ctenotus orientalis*	*Cryptoblepharus cf carnabyi*
Chelodina longicollis	*Ctenotus robustus*	*Ctenophorus pictus* (?)
Christinus marmoratus	*Delma molleri*	*Delma inornata* *
Ctenophorus decresii	*Egernia cunninghami* *	*Demansia psammophis* (?)
Egernia whitii	*Egernia striolata*	*Diplodactylus vittatus*
Hemiergis decresiensis *	*Emydura macquarii* (I)	*Gehyra* sp. "2N = 44"
Lampropholis guichenoti *	*Eulamprus heatwolei* *	*Hemiergis peronii*
Lerista bougainvillii	*Eulamprus quoyii*	*Lampropholis delicata*
Morethia adelaidensis	*Menetia greyii*	*Lerista dorsalis*
Pogona barbata	*Morethia obscura*	*Lialis burtonis* (?)
Pseudechis porphyriacus *	*Notechis ater* *	*Morelia spilota*
Pseudonaja textilis	*Notechis scutatus*	*Nephrurus millii*
Pygopus lepidopodus	*Physignathus lesueurii* (*I*)	*Suta nigriceps* (?)
Suta flagellum *	*Pseudemoia entrecasteauxii*	*Tympanocryptis lineata* (?)
Tiliqua rugosa	*Ramphotyphlops australis*	
Tiliqua scincoides	*Suta spectabalis*	
	Varanus rosenbergi	

* = Isolated – Does not have continuous distribution extending out from the ranges.
(?) = Questionable – Probably not presently resident in the region.
= Introduced – Did not occur naturally within the region.

Figure 96.
The Sleepy Lizard, *Tiliqua rugosa* is common and ubiquitous in the region. It is also widespread throughout much of the southern half of Australia, except for eastern coast and ranges. The survey, however, provided the first South Australian Museum record for this species from the survey region. (Photo: A. Robinson).

Figure 97.
The Black Tiger Snake, *Notechis ater* was one of the five resident snake species within the SMLR, which was not recorded during the survey. There appears to be an isolated population along the Onkaparinga River between Woodside and Oakbank. (Photo: NPWSA).

SIGNIFICANT SPECIES
Six species have conservation ratings under state or federal legislation (Table 50).

Table 50.
Reptile species within the SMLR with a National or State Conservation Rating.

Species	Common Name	Rating*	
		Aus	SA
Aprasia pseudopulchella	Flinders Worm Lizard	V	
Egernia cunninghamii	Cunningham's Skink		V
Morelia spilota	Carpet Python		V
Eulamprus heatwolei	Yellow-bellied Water Skink		R
Delma inornata	Olive Snake-lizard		R
Varanus rosenbergi	Heath Goanna		R

* Australian Status is as per Environment Protection and Biodiversity Conservation Act (1999)
SA Status is as per National Parks and Wildlife Act, 1972 (schedules updated 2000)
V = Vulnerable; R = Rare

One species (Flinders Worm Lizard) is considered Nationally Vulnerable. Two are rated as State Vulnerable and three as State Rare. The Flinders Worm Lizard and five other species are of significance as they are endemic to South Australia: They include the Adelaide Snake-lizard, Pygmy Copperhead, Southern Rock Dtella, Tawny Dragon and Black Tiger Snake. The species of conservation significance and endemic species are discussed further below.

Figure 98.
The Eastern Bearded Dragon, *Pogona barbata* is largely restricted to the higher rainfall areas of eastern Australia. It is a relatively common species, often seen basking of roads, perched on fallen timber, stumps, fence posts or roadside verges where they forage for insects. They frequently feed on flowers and soft herbage. (Photo: P. Lang).

Nationally Vulnerable
Flinders Worm Lizard (*Aprasia pseudopulchella*)
While this is the only species recorded in the SMLR with a national conservation rating, it does not have a state rating. This results from a recent review of the conservation status of reptiles in South Australia (Hutchinson and Edwards 2000), which took into account the increase in records of the Flinders Worm Lizard in grazing land in the mid north in recent years. The increased number of records was largely a by-product of the work by Tim Milne and others on the Pygmy Bluetongue (*Tiliqua adelaidensis*).

No records of the Flinders Worm Lizard were obtained during the survey. However, a number of Museum records, obtained in recent years, show it occurring along the eastern foothills and slopes. During the 1960's it was known by amateur herpetologists to be common along the low hills, particularly under siltstone rocks on loamy soil, in the now urban area consisting of Salisbury Heights and Golden Grove (pers. obs.). It has been recorded from Cobbler Creek Conservation Park in this area and it is possible that within the SMLR it could still be found in similar habitat, further north, between Elizabeth and Gawler. In 1992 it was also collected in heath understorey woodland in Para Wirra Recreation Park, where it may be sympatric with the Lined Worm Lizard (*Aprasia striolata*), which is more usually associated with such habitats.

Vulnerable in South Australia
Cunningham's Skink (*Egernia cunninghami*)
This large rock crevice dwelling skink exists as an isolated population in the region. The nearest related

colonies are in the western sections of the Great Dividing Range in Victoria, from where it extends within these ranges north into southern Queensland to the south of Brisbane. This isolation, combined with the fragmented and discontinuous nature of the steep rock faces and boulder slopes where it lives within the region are the reasons for its vulnerable status in South Australia.

Within the SMLR, this species appears to be divided into two sub-populations. One sub-population is restricted to the coastal cliffs and nearby islands of the Fleurieu Peninsula from Normanville to Victor Harbor, and the other sub-population occurs on the steeper western Adelaide Hills escarpment from the Torrens Gorge to the Onkaparinga Gorge.

Although Cunningham's Skinks are relatively abundant on many of the rock faces along the southern coast and in the Adelaide Hills, no records are available from the intervening area. These two sub-populations were probably continuous prior to European settlement, but a combination of extensive land clearance in areas with suitable rock faces, timber cutting and too frequent hot bush fires have removed them from the intervening woodland areas. Fallen old trees act as refugia for this species on Australia's east coast, and a higher frequency of fires and timber cutting have contributed to the decline of Cunningham's Skink.

Furthermore, the species appears to have disappeared from the Adelaide Hills face around Belair and Blackwood, where they were known to occur in the 1970's, probably as a result of the combined impacts of urbanisation, although they still occur in the nearby Sturt Gorge Conservation Park.

Carpet Python (*Morelia spilota*)
The official basis for the occurrence of this species in the region consists of two South Australian Museum records, collected at Kanmantoo and Highland Valley in the Mount Barker area in the 1980's. Anecdotal information, from the Strathalbyn Naturalists Club (Eckert 2000) indicates scattered occurrences of Carpet Pythons in the general area of the south-eastern hills up to this time. It is probable that they extended into the hills from the River Murray valley where they are still known to exist, along the better-vegetated water-courses and have gradually disappeared from the area due to land clearance and other factors associated with European settlement.

During April 2000, several scats were found near the release quadrat of one of the 1980's records at Highland Valley (recorded as an opportune record). All were in sheltered locations in a small, disused quarry. This protection from the elements prevented determination of their age, although they certainly were not fresh. In view of this it is probably doubtful or at least unclear that Carpet Pythons still naturally occur within the region.

Rare in South Australia
Olive Snake-lizard (*Delma inornata*)
The hand-full of records of this species in the region, are from the rolling foothills to the south-east of Mount Barker, from where they extend out on to the lower Murray flats. This appears to be an isolated population as the only other records for South Australia are to the south-east of Bordertown at the western edge of the main area of distribution of the Olive Snake-lizard in Victoria and New South Wales. Extensive vegetation clearance has removed most of the suitable habitat for this species within the region[10]. During the survey period, specimens were collected opportunistically from beneath siltstone slabs in grassland along a watercourse from which stock had been excluded and as road kills adjacent to roadside grassland, at Highland Valley.

Yellow-bellied Water Skink (*Eulamprus heatwolei*) (Fig. 99).
This is another of the predominantly east coast of Australia species which has an isolated population in the SMLR. The major occurrence of this species extends from extreme eastern Victoria along the Great Dividing Range to northern New South Wales. In fact, except for records at Wellington on the River Murray, all South Australian records for the Yellow-bellied Water Skink are from the Fleurieu district. This is an interesting distribution within the area in relation to the Golden Water Skink (*Eulamprus quoyii*), as the two appear to live exclusively in separate but adjoining areas. The Golden Water Skink is found along watercourses, which at least retain permanent pools in the late summer, between and including the Rivers Torrens and Onkaparinga. In contrast, the Yellow-bellied Water Skink is found along watercourses and around permanent swamps only to the south of the Onkaparinga River.

The Rare status in South Australia for this species is the result of its isolation and limited distribution, and the reduction in area and ongoing degradation of the southern Fleurieu swamps, which form a major part of its preferred habitat. During the survey it was recorded at five survey quadrats, three of which were swamps, as well as opportunistically along two watercourses in Deep Creek Conservation Park. The remaining two survey quadrats at which it was recorded were however of the most interest. At these two quadrats, both in Spring Mount Conservation Park, it was recorded living some distance from permanent water, around large fallen dead trees. This was the first time this behaviour, common in the eastern populations (M. Hutchinson pers. comm. 2001), had been recorded in this State. It appears that in higher rainfall areas, large logs can retain enough moisture to act as refuges of suitable microclimate even into the driest times during late summer. Therefore, as for Cunningham's Skink, the Yellow-bellied Water Skink may also be

[10] The Olive Snake-lizard does, however, appear to persist in well-grazed habitats (Graham Armstrong, pers. comm. 2000).

susceptible to habitat fragmentation, through fire frequency changes and past timber cutting practices.

Figure 99.
The Yellow-bellied Water Skink, *Eulamprus heatwolei,* is Rare in South Australia. The southern Fleurieu swamps form a major part of its preferred habitat. (Photo: P. Canty).

Heath Goanna (*Varanus rosenbergi*)
The rarity of this relatively large and therefore easily observed species within the region is supported by the paucity of recent sightings. Only seven confirmed records, some dating back several years, was obtained during the SMLR survey. Two of these records were direct observations made by survey participants - one was in the Mount Gawler North Native Forest Reserve in the southern Barossa, the other was in a dense narrow strip of roadside vegetation on the eastern side of Myponga Conservation Park. The latter record, along with five additional records, was in the Fleurieu district. No recent record was obtained from the Adelaide Hills between the Torrens and Onkaparinga rivers, although there are very old SA Museum records from Blackwood and Aldgate. In fact nearly all records from the last few decades are from south of the Onkaparinga River in the Fleurieu district.

Historically there appears to have been some confusion between the Heath Goanna and the Tree Goanna (*Varanus varius*), which does not occur in the region, as claimed by both Mitchell (1953) and Spooner (1972). Spooner (1972) merely included the Tree Goanna in a list with the Sand Goanna (*Varanus gouldii*) as included in the region's herpetofauna. However, Mitchell stated "An occasional specimen of *Varanus varius*, the Lace Lizard, is still to be found in the higher parts of the Mount Lofty Ranges, usually living in a rabbit burrow near the base of a tree stump, upon which it is often to be seen sunning itself in the early morning." This confusion probably resulted from the similar dark coloration of the two species, which in the case of the Heath Goanna helps to differentiate it from the Sand Goanna of which it was previously regarded as a sub-species. The Tree Goanna, as its name suggests, is a highly arboreal species, which shelters in tree hollows. The behaviour described by Mitchell (1953), is more typically that of the Heath Goanna, which is principally a terrestrial, burrow dwelling species.

Other observations of goannas and their tracks have been made in both Sandy Creek Conservation Park and Para Wirra Recreation Park on a number of occasions over recent years, including during the SMLR survey period. Whilst positive identification of these has not yet been made, it is possible that they could be of the Sand Goanna, which is known to occur in drier areas adjacent to the ranges. As these parks are in the lower rainfall northern parts of the region, this species may become an addition to the species occurring within its boundaries.

The natural range of the Heath Goanna in South Australia is within the higher rainfall parts of the agricultural lands across the southern parts of the state. It is still common on Kangaroo Island, but in the SMLR, as throughout its mainland distribution, extensive clearing, habitat fragmentation and predation of young in particular by introduced predators cause it to be far less frequently encountered.

South Australian Endemic Species
Flinders Worm Lizard (*Aprasia pseudopulchella*)
Mentioned previously as the only Nationally threatened reptile species found in the SMLR, the Flinders Worm Lizard also has significance as a South Australian endemic species. It is found exclusively in the Mount Lofty and Flinders Ranges block, with the southern extreme of its range in the foothills just north of Adelaide.

Adelaide Snake-lizard (*Delma molleri*)
Records of the Adelaide Snake-lizard within the region are known largely from the hills face area on both sides of the ranges, south to about Sellicks Beach on the western side and to Strathalbyn on the east. The area around Strathalbyn is the only known location where it may be sympatric with the Olive Snake-lizard, which is found to the south. Outside the SMLR, its distribution is restricted to Yorke Peninsula and north into the central Flinders Ranges.

Grassland or woodland with grassy understorey appears to be the preferred habitat for the Adelaide Snake-lizard. Despite much of these habitat types now being converted to farmland, it is known to be common in some areas on unploughed gully slopes and roadsides, where it is often found sheltering under siltstone slabs. The concentration of SA Museum records along the hills face zone is coincident with the majority of remnants of these habitat types being located there. However, there was considerable variation between the four quadrats at which it was recorded during the recent survey. Three of these were in Morialta Conservation Park. They were Blue Gum (*Eucalyptus leucoxylon*) Woodland with grassy understorey, a Pink Gum (*E. fasciculosa*) and Stringybark (*E. baxteri*) Low Woodland on a rocky ridge and tall Stringbark (*E. baxteri*) Open Forest with

heath understorey. The remaining quadrat was in Pink Gum Low Open Woodland on a rocky slope in Montacute Conservation Park.

Pygmy Copperhead (*Austrelaps labialis*) (Fig. 100). Despite being rated vulnerable in The Action Plan for Australian Reptiles (Cogger *et al*. 1993) the Pygmy Copperhead currently has no threatened status under either State or Federal government legislation. Whilst this species is common on Kangaroo Island, on the mainland it is confined to the SMLR where most records are concentrated in a relatively small area of the higher rainfall central Adelaide Hills centered on the Piccadilly Valley. There are also a small number of records in the Fleurieu district to the south, and a single record just north of the River Torrens near Anstey Hill.

This pattern is clear in the South Australian Museum records, which have 36 of 40 locations recorded, from the Adelaide Hills district and four in the Fleurieu district (three in the Mount Compass area and one in Newland Head Conservation Park). The few records collected during the recent survey reinforced this situation, with one record at a survey quadrat in Cox Scrub, near Mount Compass and six opportunistic records, all from sources not related directly to the survey, from the central Adelaide Hills.

Following recommendations made in the Action Plan for Australian Reptiles (Cogger *et al*. 1993) the South Australian Herpetology Group (Foster and Littlely 2000) carried out an extensive investigation into the status of the Pygmy Copperhead in the SMLR. Additional significant records were obtained to extend the area in which the species is found in the central Adelaide Hills, to include Glenalta, Skye and Montacute Conservation Park. Similarly, new records were obtained on the lower Fleurieu Peninsula and at two locations between Mount Compass and the central hills, which although few and scattered, provide a more complete picture of the species overall distribution.

The habitat use of Pygmy Copperheads on the mainland is relatively restricted compared with the broader range of habitats occupied by this species on Kangaroo Island. Read and Bedford (1991) proposed that this is the result of competition or predation from the Eastern Brown Snake (*Pseudonaja textilis*) and the Red-bellied Black Snake (*Pseudechis porphyriacus*), neither of which are found on Kangaroo Island. They also proposed that this situation has probably been exacerbated by land clearing and agricultural practices that benefit the Eastern Brown Snake, a species that prefers open woodland or grassland habitats. Foster and Littlely's (2000) findings however, indicated that whilst the Pygmy Copperhead is frequently encountered in Stringybark woodlands with heath understorey, which dominates the central hills, it can survive in greatly altered habitats such as orchards and plant nurseries. It appears that it is more the understorey with patches of varying density, providing edge effect basking opportunities, which is critical.

TheSouth Australian herpetology Group (SAHG) report (Foster and Littlely 2000) also indicates that temperature probably plays an important part in quadrat and habitat selection, as Pygmy Copperheads suffer from dehydration and heat stress in conditions which are favourable to other snake species. Even though these factors combine to restrict the range of this species and their largely secretive behaviour reduces possibilities of sightings, it is nevertheless still obvious that with most records concentrated in one area the future of Pygmy Copperheads in the SMLR is of concern.

Figure 100.
The Pygmy Copperhead, *Austrelaps labialis* has a restricted distribution on mainland South Australia. Most records are confined to a relatively small area of high rainfall in the central Hills and south into Fleurieu Peninsula. It is a small snake, not exceeding 400mm in length. (Photo: P. Canty).

Southern Rock Dtella (*Gehyra* sp. "2N=44")
This as yet officially undescribed, but well-known species has the unusual distinction of being broadly known by its chromosome number. Whilst not collected at survey quadrats, it is a common rock crevice dweller along the drier eastern side of the ranges, although it has been recorded as far into the ranges as the Mount Barker summit, which receives 766 mm average annual rainfall. Its general distribution appears to be the drier rocky areas of southern South Australia. In the higher rainfall areas with cooler maximum temperatures it appears to be replaced by the Marbled Gecko (*Christinus marmoratus*). This pattern occurs across most of the range of both species, but is particularly evident in the SMLR. During the survey, the only known occurrence of this species on the western side of the region was recorded in a disused quarry on the hills face at Belair.

Tawny Dragon (*Ctenophorus decresii*)
The Tawny Dragon is not quite a totally endemic South Australian species, as its distribution extends east along the Olary Ranges into western New South Wales. However, the majority of its range is within the Flinders, Mount Lofty Ranges and Kangaroo Island block. In the SMLR it is one of only two Dragon

species that is reliably considered to inhabit the region. Two other Dragon species either were peripheral to the region or are probably no longer resident, as discussed below.

Tawny Dragons are one of a group of species of rock specialist dragon-lizards with representatives throughout much of arid and semi-arid southern Australia. They are common on and around rock out crops of all types, throughout the SMLR, where they shelter in crevices and under exfoliating or loose rocks. They occur in all types of vegetation associations, even in open grazing areas, provided the rock assemblage is complex and large enough to provide the necessary shelter. During the survey they were recorded at 10 survey quadrats and a further 23 opportunistic records were made.

Black Tiger Snake (*Notechis ater*) (Fig. 97).
This species occurs in South Australia as a series of isolated populations in cooler areas, remnants of a more extensive distribution during a previous cooler climatic time. These include the southern extremes of Yorke and Eyre Peninsulas, Kangaroo Island, many of the other off-shore Islands, a few locations in the southern Flinders Ranges and just one population in the SMLR. Their dark colouration and very distinctive narrow banding easily identify specimens, which are held in the South Australian Museum. All records, collected from six locations between 1967 and 1994 are from locations between Woodside and Oakbank, where the Onkaparinga River runs close to and parallel with the road between the two towns.

NEW RECORDS AND INTRODUCED SPECIES
Two species not previously included in the herpetofauna of the SMLR were recorded opportunistically during the survey: the Delicate Skink (*Lampropholis delicata*) and Murray (or Macquarie) River Tortoise (*Emydura macquarii*). The Murray River Tortoise and another species (the Water Dragon) are assessed as being the result of pet escapes or releases, which have established wild populations within the region.

The Delicate Skink was found to be relatively common under fallen vegetation and amongst leaf litter, around the boundary of Bullock Hill Conservation Park in the south-east of the region. Although relatively common in the lower Murray Mallee and south-east of the state, this was the first record on the western side of the Murray River and in the SMLR, other than a separate isolated population on lower Eyre Peninsula. The very similar Garden Skink was not found in the Bullock Hill area. It appears that these two species have adjacent but separate ranges within South Australia, with the Delicate Skink preferring drier areas. Where they are found together in the lower south-east, it chooses the better drained sandy soils. This pattern is similar in the SMLR, as the Garden Skink is abundant throughout the ranges, while the Delicate Skink was recorded on the edge of the region on sandy soil.

The second new species for the region was the Murray (or Macquarie) River Tortoise (*Emydura macquarii*), which was observed in the lower River Torrens Gorge. The scope of the recent survey did not include targetting aquatic species, resulting in the extent of the distribution of this species being unclear. However, anecdotal information from SA Water staff indicates that both short and long-necked tortoises are found in most of the local reservoirs. As the few historic records of tortoises within the region are only of the Common Long-necked Tortoise (*Chelodina longicollis*), and both species have been popular as pets for several decades, it is probable that the Murray River Tortoise is a recent human assisted arrival to the region. In fact, with the alteration of watercourses, through the construction of reservoirs and smaller farm and other dams, it is inevitable that there are artificially created populations of both tortoise species within the SMLR.

Another popular pet species, which appears to have established at least one population within the region, is the Water Dragon (*Physignathus lesueurii*). One was collected in the lower Torrens Gorge as far back as 1976. An observation of a large male was made further upstream during the survey and local herpetologists consider it common knowledge that they are established in the Torrens Gorge downstream of the Kangaroo Creek Reservoir. Recently, another individual was collected after being injured by a vehicle near Kuitpo. There are also unverified reports of Water Dragons, on at least two other watercourses on the eastern side of the ranges.

FURTHER COMMENTS
It is not necessary to make general comments about distribution and relative abundance of the remainder of species, as this information can be gleaned from data contained in tables presented here and in Appendix XVII. There are however, some points of interest that are worth emphasising.

Prior to this survey the only significant data set upon which to draw information on the herpetofauna of the region was the records of the South Australian Museum. As has been indicated above there were anomalies with some older records, which upon investigation were easily rectified. However there were also at least two large inadequacies in these records, which in the future may have given a completely incorrect representation of the present status of the species in question. Examination of the SA Museum records revealed there were no records of the Sleepy Lizard (*Tiliqua rugosa*) (Fig. 96) for the entire SMLR. Also, there were no records of the Eastern Bearded Dragon (*Pogona barbata*) (Fig. 98) south of Clarendon, virtually the southern half of the region, other than one from Newland Head Conservation Park, registered in 1997.

Bearing in mind that these are well-known species, in an area highly populated by humans and frequented by

amateur herpetologists, it is clear how easily the local fauna has been taken for granted. As a result of the recent survey, it is now confirmed that these large species, often seen on roads during the warmer months, are commonly found throughout the region, from the base of the ranges to the ridge tops, in a variety of habitats.

Of the four generally well known species of venomous snakes which receive so much publicity in the local media each spring, three are worthy of further discussion, at least in relation to their status in the SMLR. The majority of snake sightings in the region are of the widely distributed Eastern Brown Snake (*Pseudonaja textilis*). Most of the remainder are of the Red-bellied Black Snake (*Pseudechis porphyriacus*) (Fig. 101), which is relatively common within the region, particularly in the cooler areas and around water. However it is not widely known that within South Australia it is restricted to the SMLR. Certainly, at present the only confirmed records are from this region. Reports of Red-bellied Black Snakes from the South-East are attributable to colour forms of the Eastern Tiger Snake (*Notechis scutatus*), as was the case with specimens from Kangaroo Island (Schwaner 1984). It may be possible that they occur along the River Murray, but as yet no confirmed sightings have been made.

Pygmy Copperheads have been mentioned above and this species is well known to be restricted in distribution and infrequently encountered. Tiger Snakes are also poorly recorded within the region and have a similar profile, in that they too have an isolated population in the central Adelaide Hills, this time in the upper Onkaparinga Valley, and a few scattered records in the Fleurieu District. Even less well known, is that there are two species of Tiger Snake in the region, and those from the upper Onkaparinga are an isolated population of the Black Tiger Snake (*Notechis ater*). The few scattered Fleurieu district records are of the Eastern Tiger Snake, which in that area is at the western extreme of its distribution. Until recently they would have extended into the ranges along wetter gullies and watercourses from the lower River Murray. Their current scarcity within the region probably results from a dependence on swamps, which have been greatly reduced in extent and area as a result of land clearing for agriculture.

Figure 101.
Although relatively common in the study region, the Red-bellied Black Snake (*Pseudechis porphyriacus*) occurs only in the SMLR in South Australia. It is usually associated with diverse vegetation on the margins of creeks or farm dams where it feeds on frogs and small mammals. (Photo: A. Robinson).

FROGS

D. Armstrong[1]

INTRODUCTION

Of the 27 species of frogs known to occur in South Australia (Robinson *et al*. 2000) only six are confirmed as currently occurring and resident in the Southern Mt Lofty Ranges (SMLR):

- *Neobatrachus pictus*, Painted Frog, (Fig.102).
- *Limnodynastes tasmaniensis*, Marbled Frog (Fig. 103).
- *Crinia signifera*, Brown Froglet (Fig. 104).
- *Limnodynastes dumerili*, Bull Frog (Fig. 105).
- *Pseudophryne bibroni*, Brown Toadlet (Fig.106).
- *Litoria ewingi*, Brown Tree Frog (Fig. 107).

This poor representation of the 208 species recorded nationally (Tyler 1997) is a reflection of the overall aridity of the state and the geographic and climatic isolation of the survey region. These same six species of frogs are also the only species recorded for the remainder of the Mt Lofty Block as defineted by Laut *et al*. (1977), which includes Kangaroo Island and the ranges north to near Port Augusta. The only minor exception to this is a Flinders Ranges endemic, the Streambank Froglet, *Crinia riparia*, which has its southern limits in the northern extreme of the Mt. Lofty Block.

Five of these species are members of the family of Southern Frogs Myobatrachidae, which is exclusively Australian. The remaining species, the Brown Tree Frog is the sole member of the Tree Frog family Hylidae resident in the region. All six species are at or near the western extreme of their distribution. Only three of the six species, the Painted Frog, Marbled Frog and Brown Froglet, which extend onto Eyre Peninsula, are found west of the Mt Lofty Block.

Four of the species: the Bull Frog, Brown Toadlet, Brown Tree Frog and Brown Froglet are strictly Bassian in distribution. They are found in a broad band from the central east coast, arching southwards across Victoria into south-eastern and central southern South Australia, avoiding the drier inland areas but including Tasmania. Although the remaining two species have more extensive distributions into suitable habitat inland, all six species can be described as inhabitants of the south-eastern areas of the continent.

The Action Plan for Australian Frogs (Tyler 1997) classifies the Brown Toadlet as an "insufficiently known species that may be of concern." This status is probably the result of the draining or drying up of the low-lying damp areas, which are used by this species as breeding sites. No status has been attached to the other five species, which appear to be secure in suitable habitat within their respective ranges.

Non-resident Species – Peron's Tree Frog, Long-thumbed Frog, Eastern Sign-bearing Froglet and Golden Bell Frog.

There are a small number of infrequent records of other frog species from within the Southern Mount Lofty Ranges, which could not be considered resident to the area. On two occasions, Peron's Tree Frog, *Litoria peroni*, has been recorded by the Environment Protection Authority (EPA) Frog Watch program. These are almost certainly the result of specimens being transported, deliberately or accidentally by humans. The South Australian Museum collection contains two specimens of the Long-thumbed Frog, *Limnodynastes fletcheri* registered in 1948 from Sellicks Beach, at the base of the western side of the ranges, and another specimen from the south of Aldinga Conservation Park. This record will remain a mystery as while they were registered by a reputable collector of the time, all other South Australian records are along the River Murray, on the eastern side of the ranges. The Environment Protection Authority "Frog Watch" data contains one record of the Eastern Sign-bearing Froglet, *Crinia parinsignifera* just outside the boundary of the survey region at Goolwa. As with the Long-thumbed Frog all other known records of this species in South Australia are to the east of the ranges, mostly along the River Murray. While it is possible for all three of these species to expand along drainage lines from along the river into the ranges, there is currently insufficient evidence to suggest that this has occurred.

There are 14 records of the Golden Bell Frog, *Litoria raniformis* in the South Australian Museum collection, from within the Southern Mount Lofty Ranges survey area. All were collected between 1972 and 1979, with the majority from the upper reaches of the Onkaparinga River, above the Mount Bold Reservoir. In fact Tyler

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(1977) describes the Adelaide Hills population as centering upon the Onkaparinga drainage. Tyler (1978) also mentioned a second population, in the area of the Defence Research Center at Salisbury and considered that both had probably been introduced. This seems a reasonable conclusion, as this species was commonly sold in pet shops in Adelaide from the late 1960's into the 1970's. Several factors are thought to have contributed to the decline of this and related species nationally. These include susceptibility to increased ultra-violet light during diurnal basking, introduced Mosquito Fish, *Gambusia holbrooki,* feeding on its eggs, sensitivity to glyphosate in herbicides, habitat destruction and drought (Tyler 1987). Its disappearance from the southern Mount Lofty Ranges seems to have generally coincided with the drought of the early 1980's, which was probably a significant factor as Golden Bell Frog tadpoles grow to in excess of 10 cm and take as much as a year to metamorphose into adults. Whatever the cause or causes, the Golden Bell Frog no longer appears to be part of the natural frog fauna of the study region. The Golden Bell Frog is rated Vulnerable in South Australia, occurring in the South-East and the River Murray.

RESULTS

Summary of Frog Records from the Biological Survey, "Frog Watch" and SA Museum.

Combining the Southern Mount Lofty Ranges Survey data, "Frog Watch" data and the specimen records of the South Australian Museum provides a comprehensive overview of the relative abundance and status of the frog species of the region (Table 51 and Appendix XVIII).

Table 51.
Comparison of frog species recorded within the SMLR by "Frog Watch", Biological Survey and South Australian Museum, and the number and proportions of each species for each "method".

Species	Common Name	Frog Watch	No. Survey quadrats recorded	No. of individuals from survey quadrats	Survey Opportune	SA Museum
Crinia signifera	Brown Froglet	3467 (49.5%)	42	78 (49.7%)	22 (21.8%)	103 (25.9%)
Limnodynastes dumerili	Bull Frog	905 (12.9%)	17	38 (24.2%)	31 (30.7%)	56 (14.1%)
Limnodynastes tasmaniensis	Marbled Frog	1306 (18.6%)	7	11 (7.0%)	22 (21.8%)	61 (15.3%)
Litoria ewingi	Brown Tree Frog	1174 (16.8%)	5	8 (5.1%)	17 (16.8%)	53 (13.3%)
Litoria raniformis	Golden Bell Frog					14 (3.5%)
Neobatrachus pictus	Painted Frog	12 (0.2%)	7	12 (7.6%)	1 (1.0%)	47 (11.8%)
Pseudophryne bibroni	Brown Toadlet	141 (2.0%)	9	10 (6.4%)	8 (7.9%)	64 (16.1%)
TOTALS		**7005**		**157**	**101**	**398**

The SA Museum frog data shows very little bias towards any species, as it is intended to be representative of the existence of a species over time and distribution. It does however provide records in areas not covered by the Biological Survey of SA, and the evidence of the past occurrence of the Golden bell Frog within the survey area. That the highest number of specimens is of the Brown Froglet concurs with both survey and "Frog Watch" data to indicate that despite its small size, this is the most common and widely distributed species.

"Frog Watch" data also confirms that the Bull Frog, Marbled Frog and Brown Tree Frog are widespread within the region. Unfortunately, it gives a distorted view of the status of the Brown Toadlet and Painted Frog. This is partly explained by the timing of the community based recording program through which this data is collected and because most records are based on frog calls. The vast majority of the recordings were made in September (1994-2000), whereas both the Brown Toadlet and Painted Frog breed, and therefore call, during the autumn and winter months. The regional status of Brown Toadlet, although of concern, is much better than the 2% of "Frog Watch" records imply. Even though the Biological Surveys were also carried out largely outside their breeding and therefore peak activity periods, and during these surveys frogs are generally regarded as incidental (not targeted) records, the 18 Brown Toadlet records of 258 frog records (7%) could be considered a more accurate representation. Surveys using any technique during a more appropriate time of year would certainly support this. The same situation applies to the Painted Frog. This species avoids dehydration during drier times by burrowing underground, only emerging after suitable rains. It is therefore best adapted to sandy soils, where burrowing is relatively easy. The requirement for sandy soils restricts its distribution within the survey area. It is much more widespread in the sandy soils of the mallee and other more arid areas within its known range. Certainly, all seven quadrats at which the Painted Frog was recorded during the Biological Surveys (Appendix XVIII) were on sandy soils. These comprised three sites in the Williamstown, Para Wirra and Mount Gawler region, two sites near Waitpinga, and one site each in Cox Scrub and Scott Conservation Parks.

Figure 102.
***Neobatrachus pictus* (Painted Frog) was recorded at 7 of the 157 survey quadrats (totalling 12 specimens). It is a squat toad with a round head and body. Its habitat is near temporary pools and marshes, and spends the summer in a sealed cell below the ground. The Painted Frog is widespread in the agricultural regions with isolated records in the Flinders Ranges. Most SA Museum records are from the South-East, Kangaroo Island and Mount Lofty Ranges. (Photo: A. Robinson).**

Figure 103.
***Limnodynastes tasmaniensis* (Marbled Frog). This frog is up to 50 mm in length and can be highly variable in colour pattern. It occurs in or near to water, living beneath stones and rubbish on the beds of dry creeks, pools and dams during the summer months. Within South Australia, it is widespread in the eastern half of the State, including Eyre Peninsula, from the lower South-East to the extreme northwest, and including Eyre Peninsula. (Photo: A. Robinson).**

Figure 104.
Crinia signifera, **Brown Froglet was by far the most commonly recorded frog species both during the SMLR survey and "Frog Watch". This is a very small frog (maximum length of 22 mm) with long legs. It lives at the edge of pools, streams and rivers. Within South Australia, the Brown Froglet is widespread throughout the South-East, Mount Lofty Ranges, extending north to the southern Flinders Ranges and Kangaroo Island. It also occurs on southern Eyre Peninsula. (Photo: A. Robinson).**

Figure 105.
Limnodynastes dumerili, **Bull Frog is a robust frog up to 70 mm in length. It lives in a small hole beneath damp wood or stones and aetivates in a sealed burrow during the summer months. Although it breeds in deep permanent water bodies such as farm dams, at certain times of the year it can move extensively through forested areas on moist nights. At these times it can be caught in large numbers in pitfall traps. It was the second most commonly recorded frog during the SMLR survey. Within South Australia it is widely distributed in the South-East, Riverland, Mount Lofty Ranges and Kangaroo Island. (Photo: A. Robinson).**

Figure 106.
***Pseudophryne bibroni*, Brown Toadlet. This species is found beneath logs and stones in damp situations but not necessarily in the presence of permanent water. The Brown Toadlet comprised 7% of all the SMLR survey records. Within South Australia, it occurs in the South East, Kangaroo Island, Mount Lofty Ranges and Flinders Ranges. (Photo: A. Robinson).**

Figure 107.
***Litoria ewingi*, Brown Tree Frog. This is a slender frog up to 42mm in length. Although relatively common in the study region, it was only recorded in five survey quadrats (possibly due to this species ability to climb out of pitfalls). Its habitat is low vegetation near creeks, pools or swamps. (Photo: A. Robinson).**

DISCUSSION

Only 157 frog records were obtained from 66 of the 157 quadrats during the Biological Survey of SA (not including opportunistic records. This illustrates both: (1) the limitations of the Survey collection methods in relation to this specialist field, and (2) the non-optimal timing of the survey for recording frogs, i.e. late spring/autumn. Additional data sources are needed for a more accurate picture of species abundance and distribution. Despite considerable rainfall during one of the trapping periods, frog records were only obtained from 66 of the 157 quadrats, an average of 2.4 records per quadrat. This varied from 20 records at one quadrat in Tallisker Conservation Park, following heavy late summer rain, to only one record at 33 (50%) of the quadrats where frog records, which were mostly pitfall trap captures, were obtained. This also explains the paucity of Brown Tree Frog records during the survey, as this tree frog is able to climb the smooth sides of the traps, a talent not shared with the other five frog species resident in the southern Mount Lofty Ranges. It is clear that to obtain accurate and reliable information on the amphibian fauna of a region requires the use of several techniques, throughout the year and during appropriate weather conditions.

TERRESTRIAL INVERTEBRATES

L. Queale[1]

INTRODUCTION

Tyler *et al*. (1976) estimated there are approximately 10,000 invertebrates in the Mount Lofty Ranges, with distinct assemblages being associated with each of the major biomes (mangroves, swamps, sandy beaches, Adelaide Plains, and woodlands/forests). Because of the very large number of taxa present, general accounts of the invertebrates of the Mount Lofty Ranges have been few. However, general discussions have been included in a limited number of natural history publications (Entomological Department, South Australian Museum 1964; Tyler *et al*. 1976;Wallace 1986). Morgan (in Wallace 1986) presents a general account of the ecology of insects associated with South Australian forests.

Other accounts are confined to particular insect families or groups of families, for example, Greenslade (in Wallace 1986) describes the ecology of small arthropods in the forests and woodlands of South Australia. Greesnlade, P.J.M. (in Wallace 1986) provided a concise overview of ant diversity and ecology in the study region. Greenslade. (1986) stated the ant fauna of parts of the Mount Lofty Ranges are "fairly well known and have been reasonably thoroughly collected", however, little has been published about them.

It is estimated that there are over 100 000 species of native insects in Australia, of which only between one half and two thirds have been named (Waterhouse 1991). This chapter reports on the results of insects recorded from 74 quadrats conducted as part of the Southern Mt Lofty Ranges (SMLR) Biological survey (see Appendix II for quadrat details). The results are biased towards species associated with forests and woodlands and also ground-dwelling species because:

- Due to selective clearance patterns, dry sclerophyll forests and woodlands comprise the majority of remnant vegetation in the SMLR. Approximately 90% of quadrats were forest or woodland formations, with the remainder being mallee and shrubland.
- The insects were collected from macro and micro pitfalls, which favour the ground dwelling species. Some hand collecting was also carried out.

The invertebrate groups recorded commonly during the SMLR survey, include beetles (including a newly described "Tiny Dung Beetle"), weevils (Curculionidae), sucking bugs (Hemipterans), crickets (Orthopterans) and flies (Dipterans). Other common invertebrates recorded which prefer wetter conditions were Collembola (Poduroidea), amphipods, the common introduced earwig (*Forficula* sp.), and the introduced Portugese Millipede, *Ommatoiulus morelli*.

RESULTS

Because of different personnel identifying different groups of insects, for the purposes of this study, invertebrate results are presented under the following categories:

- Insects (other than flies and ants)
- Flies (Order Diptera)
- Ants.A. McArthur identified this group and provided text for this chapter
- Non-insect invertebrates (excluding spiders, pseudoscorpions and scorpions)
- Arachnids (excluding mites). D. Hirst identified this group and provided a summary text for this chapter.

INSECTS (OTHER THAN FLIES AND ANTS)

Total Records and Species Diversity

One thousand five hundred and fifty six (1 556) insect records (other than flies and ants), comprising at least 112 taxa were recorded. These were identified to the taxonomic levels shown in Table 52. Appendix XIX shows all insects (other than flies and ants) recorded at Southern Mt Lofty Survey quadrats.

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Table 52.
The taxonomic level that insects (other than flies and ants) were identified during the SMLR survey, and numbers of taxa identified at each level.

Taxonomic Level Identified To	Number of Taxa Identified
Order	4
Superfamily	1
Family	40
Genus	49
Species	18
Total	**112**

Including flies and ants, more than 112 species from 55 insect families and 11 orders were recorded (Table 53). The most commonly recorded insect Orders were Collembola (Springtails) and Coleoptera (Beetles). The most common families were:

- Entomobryidae (Springtails): 559 records (at least 1 species):
- Forficulidae (Earwigs): 159 records (at least 1 species)
- Carabidae (Ground Beetles): 149 records (11 species)
- Tenebrionidae (Tenebrionid Beetles): 99 records (10 species)
- Scarabaeidae (Scarab beetles): 96 records (11 species)

The average number of records per quadrat was 21.0 with a range of zero records (2 quadrats) to 115 records (quadrat WIL01801). The quadrat, which recorded most, included 100 records of a Collembola (family Entomobryidae) species and was located in a *Eucalyptus obliqua – E. cosmophylla – E. fasciculosa* Low Open Forest.

The average number of distinct taxa per quadrat was eight with a range of zero taxa (two quadrats) to 18 taxa (quadrat ONK01501 at Mt Gawler North Forestry Reserve). The latter quadrat was a *Eucalyptus goniocalyx – E. fasciculosa* Woodland over *Acacia paradoxa, Hibbertia* sp. *Calytrix tetragona, Leptospermum myrsinoides* on clayey sand.

Table 53.
Insect orders and families (other than flies), and number of records, identified during the SMLR survey, arranged in descending order of Insect Order abundance.

Order	Family	Common Name	Number of Species	Number of Family Records	Number of Order Records
COLLEMBOLA (Springtails)	Entomobryidae		1	559	
	Poduroidea		1	21	
	Sminthuridae		1	10	590
COLEOPTERA (Beetles)	Bostrychidae	Powderpost Beetles	2	5	
	Buprestidae	Jewel Beetles	1	1	
	Carabidae	Ground Beetles	11	149	
	Cerambycidae	Longicorn Beetles	1	1	
	Chrysomelidae	Leaf Beetles	2	3	
	Curculionidae	True Weevils	7	49	
	Dermestidae	Dermestid Beetles	1	4	
	Elateridae	Click Beetles	3	10	
	Family not identified		1	1	
	Family not identified		1	11	
	Nitidulidae	Sap-feeding or Fruit Beetles	1	1	
	Scarabaeidae	Scarabs	11	96	
	Staphylinidae	Rove Beetles	1	56	
	Tenebrionidae	Tenebrionid Beetles	10	99	486
DERMAPTERA (Earwigs)	Forficulidae	Introduced Earwig	1	159	159
HYMENOPTERA (Sawflies, Wasps, Bees and Ants)	Apidae	Bees	1	3	
	Chrysididae	Emerald or Cuckoo Wasps	1	1	
	Family not identified		1	7	

Order	Family	Common Name	Number of Species	Number of Family Records	Number of Order Records
	Mutillidae	Flower Wasps	1	29	
	Pergidae		1	2	
	Sphecidae	Club Wasps or Cicada Hunters	1	1	
	Thinnidae		1	2	45
HEMIPTERA (Bugs, Lerps, Aphids and Cicadas)	Aradidae	Flat and Bark Bugs	1	1	
	Cicadidae	Cicadas	1	3	
	Coccidae	Scale Insects, Mealy Bugs and Gall-makers	1	1	
	Cydnidae	Burrowing Bugs	1	37	
	Jassidae		1	26	
	Lygaeidae	Seed-eating and Chinch Bugs	1	8	
	Notonectidae	Back Swimmers	1	1	
	Pentatomidae	Shield and Stink Bugs	2	8	
	Psyllidae	Lerps or Lerp Insects	1	3	
	Reduviidae	Assassin Bugs	6	23	
	Scutelleridae		1	6	119
BLATTODEA (Cockroaches)	Blaberidae	Cockroach	3	37	
	Blattelidae	Cockroach	2	12	
	Blattidae	Cockroach	2	9	58
ORTHOPTERA (Grasshoppers and Crickets)	Acrididae	Short-horned Grasshoppers	3	23	
	Gryllacrididae	King and Cave Crickets	2	3	
	Gryllidae	True Crickets	5	19	
	Myrmecophilidae	Crickets	1	3	
	Pyrgomorphidae	Grasshoppers	1	1	
	Tetrigidae	Dun-coloured Grasshoppers	1	2	
	Tettigoniidae	Long-horned Grasshoppers	2	4	55
LEPIDOPTERA (Moths and Butterflies)	Arctiidae	Tiger Moths and Footmen	1	4	
	Family not identified		1	12	
	Hepialidae	Swift or Ghost Moths	1	1	
	Limacodidae	Cup Moths	1	1	18
THYSANURA (Silverfish)	Lepismatidae		2	16	16
ISOPTERA (Termites)	Family not identified		1	9	9
MANTODEA (Praying Mantids)	Mantidae	Mantids	2	3	3
		TOTALS	112	1556	1556

The Insect Orders recorded on the survey are presented below in the order that they appear in Table 53 (that is, from most to least numerous).

Order Collembola (Springtails)

Springtails (or Collembola) are soft-bodied arthropods and adults are usually 1-3mm long (Greenslade 1991). Collembola are virtually ubiquitous and are found

predominantly in soil and in leaf litter (Greenslade 1991). Approximately 2000 species are estimated to occur in Australia, of which only about 20% are described (New 1996).

Within the study area, the diversity of Collembola is high and in any small patch of forest or woodland of a few hectares, there may be nearly a 100 Collembolan species (along with 200 – 300 mite species) (Greenslade 1986).

Not surprisingly, therefore, Collembola was the most numerous insect Order collected on the survey with 590 records and three families identified (no taxon was identified beyond family level). Entomobryidae species were very widespread and abundant in the study region, with 559 records from 43 quadrats. The other families recorded were Poduroidea (21 records from two quadrats) and Sminthuridae (10 records from eight quadrats).

The size, shape and colour of Collembola are related to the position in which they live, on vegetation, in liter or in the soil (Greenslade 1986). The Sminthurids are coloured and globular, and with considerable springing ability. They live predominantly above ground, on low vegetation. The Entomobryidae species are elongate, flattened and cigar-shaped. "They are found mainly on the ground and in leaf litter but are also the most common Collembola under the loose bark of such eucalypts as *E. leucoxylon*. A few live on grasses and sedges (Greenslade 1986).

The greatest number of Collembolan species, however, live in humus and the upper layers of mineral soil. These were notspecifically sampled on the survey.

Order Coleoptera (Beetles)

Coleoptera are the largest insect order, and there may be more than 30,000 species in Australia (New 1996). Beetles were the second most numerous insect Order collected on the survey, with 486 records (Table 53). The most common Beetle family recorded was Carabidae, followed by Tenebrionidae, Scarabaeidae and Curculionidae. All Beetle families recorded on the survey are discussed below, in family alphabetical order.

Bostrichidae (Powderpost Beetles)

This family are woodborers of dead or dry plant material and have been known as "powderpost beetles". Two species were recorded from the survey: *Bostrychopsis jesuita* (one record) and *Xylion* sp. (four records from four quadrats). All five quadrats from which the species were recorded contained either *Eucalyptus obliqua* and/or *E. baxteri* – the two common and dominant stringybark species in the study region. *Bostrychopsis jesuita* is the largest member of this family in Australia, growing up to 20mm in length (Goode 1980). This species prefers wattles and eucalypts (Lawrence and Britton 1991). Its head resembles a that of a hooded monk in appearance, hence the specific name. *Xylion* are much smaller and the males have adapted wing covers to protect the female from predators while laying eggs.

Buprestidae (Jewel Beetles)

Jewel Beetles are brilliantly coloured, with a metallic sheen (Lawrence and Britton 1991), with about 1 250 species in Australia. They are commonly found on blossom, and their larvae bore in wood (New 1996). Only one Jewel Beetle was recorded on the survey, a *Castiarina* sp. from Quadrat NOA01501. This was located in Scott Creek CP in a *Eucalyptus obliqua* Low Open Forest with a loamy-sand soil. The *Castiarina* genus is the most diverse genus of Jewel Beetles in Australia (about 350 species) and most of the brightly coloured southeastern taxa belong in this genus (New 1996).

Carabidae (Ground or Carab Beetles)

Carab, or Ground Beetles, are ground-dwelling active predators (New 1996). They are most common in dry, sandy, coastal or inland areas. Other Ground Beetles are characteristic of grassland or forest areas (New 1996).

The more abundant species of Carabidae recorded from the Southern Mt Lofty Survey were *Carenum "blue"* sp., *Notagonum* sp., *Secatophus australis* and *Simodontus* sp. These species are reported by Matthews (1980) to be found in "dry sclerophyll" regions. In particular, *Carenum* species were commonly associated with *Eucalyptus baxteri* and *E. cosmophylla* communities, often with *Xanthorrhoea* sp. or *Hakea* sp. in the understorey. Excluding *Simodontus*, the above species were also amongst the most common Carabidae recorded during the South East Biological Survey (Foulkes and Heard in prep.). This may suggest there is a correlation between particular insect taxa and plant assemblages. However, further records are required for more definitive conclusions.

There also did not appear to be a preference for Carabidae to occur on sandy soils from the survey results. The number of records of Carabidae species was almost proportionate to the percentage of soil types represented in quadrats. For example, sand or sandy loam comprised 36% of survey quadrats and 41% of Carab beetle records: and light medium clay or medium clay soils comprised 6% of survey quadrats and 7% of Carab beetle records.

The most abundantly recorded beetle was *Secatophus australis* (Carabidae) with 77 records. It was also recorded at the second highest number of quadrats for all insect species, namely at 43 of the 74 quadrats. This species was recorded in woodland, forest and mallee habitats.

Cerambycidae (Longicorn Beetles)

Longicorn Beetles are widely distributed in Australia, with around 1 200 species (New 1996). Only one

Longicorn Beetle (in the sub-family Lamiinae) was recorded on the survey. This was at quadrat WIL02101 in Finniss CP – a *Eucalyptus fasciculosa* Low Woodland with sandy-clay-loam soil and 10-30% surface strew cover. Several species in the sub-family Lamiinae are *Acacia* feeders (Lawrence and Britton 1991). The large sub-family, *Cerambycinae* includes several pests of eucalypts (New 1996).

Chrysomelidae (Leaf Beetles)
Leaf Beetles are widely distributed in Australia and there are around 3 000 species (New 1996). The species are very difficult to identify accurately. As far as is known, all Chrysomelidae feed on plant tissues, including roots, foliage, herbaceous stems, leaves, flowers, pollen, fruits and seeds (Lawrence and Britton 1991). The only survey record was from Para Wirra RP – a *Eucalyptus leucoxylon* ssp. *pruinosa* Low Woodland with a diverse shrub understorey.

Curculionidae (Weevils)
Over 4 300 species of Curculionidae (Weevils) are described in Australia (Goode 1980). This makes it one of the largest beetle groups in Australia, and they are virtually ubiquitous (New 1996). Forty-nine records, comprising at least seven species were recorded during the survey. The three most numerous taxon collected were *Sclerorhinus* sp. (30 records from 21 quadrats), *Catasarcus impressipennis* (four records from three quadrats) and a small species (10 records from nine quadrats) thought to be *Ips grandicollis* (Five-spined Bark Beetle), a bark boring beetle. This species was accidentally introduced into South Australia through the Radiata Pine plantations around Wirrabara in the southern Flinders Ranges. *Ips grandicollis* has since spread to the Adelaide Hills and the South-East forests and has become a serious pest as it attacks Radiata Pine (Bungey 1986). Trees weakened by moisture stress are most commonly attacked, but populations may build up in forest affected by drought, overstocking, wind damage, fire or disease, and attack and kill apparently healthy trees (Bungey 1986).

Dermestidae (Dermestide Beetles)
All four survey records were larvae (three from Newland Head CP and one from Mt Magnificent CP). The larvae usually feed on dry material of animal origin, including insect remains, hair, feathers or dry carcasses, and they may occur in the nests of mammals, birds or social insects (Lawrence and Britton 1991). Many Dermestid species in Australia are introduced (New 1996).

Elateridae (Click Beetles)
Click Beetles are noted for their ability to jump using a click mechanism between their pointed pronutum and their elytra. Adult Click Beetles are leaf-eating. Larvae of the Click Beetles are known as "wireworms" and are pests of root crops and grasses (Goode 1980). Three taxa, totalling 11 records were identified on this survey.

Nitidulidae (Sap-feeding or Fruit Beetles)
The sole survey record was a *Carpophilus* species. There are seven *Carpophilus* species recorded from South Australia. They are Statewide and commonly occur in rotting and dried fruits (Matthews 1992). This was recorded in *Eucalyptus leucoxylon* ssp. *pruinosa* – *E. viminalis* ssp. *cygnetensis* Low Open Forest, 7 km SSE of Tanunda.

Scarabaeidae (Scarabs)
With more than 17,000 species throughout the world and over 2,100 scarabs described from Australia, this family is one of the largest among beetles (Goode 1980). Scarabs include Stag Beetles, Dung Beetles, Christmas Beetles and other Chafers. Scarabs are generally herbivorous, feeding on the faeces of various animals (Lawrence and Britton 1991). The larvae are adapted for burrowing, as are the adults, the latter possessing powerful front legs.

At least 11 species of Scarabs, totalling 96 records were recorded from the survey. Fifty seven records (comprising at least two species) from 21 quadrats could not be identified beyond family level.

The most numerous taxon identified to species level was the newly described *Lepanus loftyensis* or "Tiny Dung Beetle" with 42 records from two quadrats, both in the Barossa district on sandy loam soils in Forestry SA reserves, namely:

Quadrat BAR03201 (41 records), a *Eucalyptus fasciculosa* (Pink Gum) – *E. obliqua* (Stringybark) – *E. goniocalyx* (Long-leaved Box) Low Woodland over a sclerophyllous shrub understorey, approximately 7 km SSE of Williamstown

Quadrat BAR02901 (1 record), a *Eucalyptus fasciculosa* (Pink Gum) – *Allocasuarina verticillata* (Drooping Sheoak) Woodland over sclerophyllous shrub understorey, approximately 8 km ESE of Williamstown.

Five individuals of the "Tiny Dung Beetle" were also recorded from a quadrat (MAM00401) on the Flinders Ranges survey. Significantly, this quadrat was also located on a sandy loam soil (which would facilitate the burrowing habit of Scarab Beetles), with *Allocasuarina verticillata* the dominant overstorey species.

Of the remaining Scarab Beetles identified to species level, the next most numerous recorded were "*Heteronyx* near" (split-off from the taxa *Scitala* [20 records from 11 quadrats]), *Onthophagus gazella* (14 records from four quadrats) and *Phyllotocus rufipennis* (eight records from three quadrats).

Along with "*Heteronyx* near", three other taxa recorded during the survey are in the subfamily Melolonthinae (Cockchafers), namely *Colpolchila* sp. (one record), *Liparetrus* sp. (two records from two quadrats) and

Scitala sp. (two records from two quadrats) and are associated with eucalypts.

Staphylinidae (Rove Beetles)
Staphylinids, or Rove Beetles, are often quite small species, and superficially resemble earwigs, although lacking the abdominal "pincers" (Goode 1980). They are predatory and usually have short elytra (or modified forewings) and elongated abdomens. There are more than 1 500 Australian species, making this the fifth largest family in Australia, and many more species remain to be discovered (Lawrence and Britton 1991).

Fifty-six Rove Beetles were identified from the survey. However, this family could not be further identified to genus or species level. They were recorded from 21 of the 74 quadrats, with the highest number at a quadrat being 15 at quadrat 117ADE01501 (refer Appendix XIX). This quadrat was a *Eucalyptus leucoxylon* (SA Blue Gum) – *E. camaldulensis* (River Red Gum) Woodland. Many Rove Beetle species are found in litter or decaying plant material and in damp locations (Goode 1980) and the taxa collected on this survey probably prefer wetter conditions and abundant leaf litter. Other species are predatory or scavengers (New 1996).

Tenebrionidae (Piedish Beetles)
Known commonly as Piedish Beetles, Tenebrionids are mostly nocturnal. Tenebrionids are primarily scavengers, feeding on a variety of dead material or plant or fungal (rarely animal) origin, and they have been able to survive better than most beetles in arid habitats throughout the world (Lawrence and Britton 1991). Many species are found beneath stones, logs and bark. Like Scarab Beetles, Tenebrionids are also one of the largest beetle families, with about 1,500 species in Australia (New 1996).

At least 10 Tenebrionid species, totalling 99 records were identified from the survey. The most numerous were *Celibe australis*, (29 records from 16 quadrats), *Saragus interruptus* (28 records from 13 quadrats) and *Adelium brevicorne* (18 records from eight quadrats). *Adelium* species are shiny olive-green beetles that are common under bark or fallen logs in the south-east of Australia (New 1996). *Celibe australis* was most commonly recorded from *Eucalyptus obliqua* vegetation associations during the Southern Mt Lofty survey. *Saragus australis* also showed a preference for *E. obliqua* habitats, and also *E. baxteri* and *Xanthorrhoea* species.

Adelium and *Celibe* were also recorded on the Murray Mouth Reserves Biological Survey (Brandle in prep.). However, the suite of Tenebrionid genera recorded from the Southern Mt Lofty Survey was quite different from those collected during the South East Biological Survey.

Figure 108.
A *Saragus* sp. (Piedish Beetle). These Beetles are in the family Tenebrionidae. The species, *Saragus interruptus* was relatively common and widespread on the SMLR survey. (Photo: A. Robinson).

Order Dermaptera (Earwigs)
The common introduced Earwig, *Forficula* sp. was the only Dermaptera taxon recorded on the survey. There were 159 Earwig records from 44 quadrats, making this taxon the most widely collected on the survey (i.e. recorded from the most quadrats). The introduced Earwig is widespread in the cooler regions of Australia. It is the most abundant Earwig species in southeastern Australia, and can be a serious pest of gardens and vegetable crops because it eats many kinds of foliage, fruit and flowers (Rentz and McE.Kevan 1991).

Order Hymenoptera (Wasps, Bees and Ants)
Ant results from the survey are presented separately below.

Mutillidae (Flower Wasps)
The survey provided 29 records (from 17 quadrats) of Mutillidae, representing several species of *Ephutomorpha*. The females of these wasps are wingless and their large hairy bodies have earned them the name "velvet ants" (Goode 1980). The wingless females run on the ground and vegetation and look superficially like very hairy ants, and many have a powerful sting (New 1996). Males are winged.

Females search on the ground (especially bare, sandy areas), tree trunks and walls for the nests of other bee and wasp species, which they parasitise. Of the 29 Mutillidae survey records, 23 records were from quadrats on either sand, sandy-loam or sandy-clay-loam soils. Mutillid wasps also showed a preference for *Eucalyptus obliqua* and *Hakea* species.

Order Hemiptera (Sucking Bugs)
One hundred and nineteen Hemiptera records, comprising 11 families were recorded during the survey. The three most commonly recorded families were Cydnidae, Jassidae and Reduviidae, which together comprised 72% of all Hemiptera. Brief

comments on each family recorded during the survey follow (in alphabetical order by family).

Cicadidae (Cicadas)
Twenty-eight of the 38 Australian genera are endemic. Many species inhabit arid regions, commonly breeding on grasses and the adults appearing after heavy rains (Carver *et al*. 1991). Cicadas are best known for their communal chorus of "drumming" (Goode 1980).

The three survey records were at separate quadrats: Anstey Hill (Pink Gum Low Woodland); Morialta CP (SA Blue Gum Open Forest) and Para Wirra RP (Peppermint Box and Mallee Box Open Mallee).

Coccidae (Scale Insects, Mealy Bugs and Gall-makers)
There was only one survey record in this family. The specimen, from quadrat ONK02502, was not identified beyond family level.

Cydnidae (Burrowing Bugs)
The Cydnidae (Burrowing Bugs) were the most abundant Hemipteran family recorded during the-survey with 37 records from 15 quadrats. Cydnidae burrow in the soil and feed on roots, stems or fallen seeds (Carver *et al*. 1991). *Adrisa* is the most abundant genus in Australia and those recorded from the survey are thought to belong to this one genus. They were recorded across a wide range of habitats included forest, woodland, mallee and shrubland formations. Significantly, all 37 individuals were recorded on sand-based soil textures, including 19 individuals from sand and a further 14 on sandy loams. This would reflect their burrowing habit. Burrowing Bugs live in the soil but are often attracted to light in large numbers. Their hind legs have spines for digging and they may burrow rapidly into the soil when disturbed (Goode 1980).

Jassidae
Sometimes known as Iassinae (a subfamily of Cicadellidae), these insects are tiny leafhoppers. During the survey, a total of 26 individuals were recorded from eight quadrats, all from underneath eucalypts. These individuals could not be identified beyond family level. The most Jassidae individuals recorded at a quadrat was eight. This was at quadrat ADE02001 in Cleland Conservation Park - a *Eucalyptus leucoxylon* (SA Blue Gum) Woodland over an introduced understorey, on clay loam soils.

One Jassidae, *Batracomorphus angustatus*, transmits plant mycoplasma diseases in Australia (Grylls 1979, cited in Carver *et al*. 1991).

Lygaeidae (Lygaeids)
Eight Lygaeids in total were recorded during the survey, all from separate quadrats and all from leaf litter. This family could not be identified further to genus or species level.

Most Lygaeids feed on seeds, and this large family of insects includes some widespread pest species. *Euander lacertosus* is widespread in the Bassian zoogeographic region and can be a pest of strawberries (Carver *et al*. 1991). The Rutherglen bug, *Nysius vinitor*, can occur in vast numbers and infests many crops and ornamental plants. The bright red and black harlequin bug, *Dindymus versicolor* is found commonly feed on weeds and orchards in southeastern Australia (New 1996).

Notonectidae (Back Swimmers)
Notonectidae are aquatic, nymphs living wholly underwater and adults only near the surface to obtain oxygen. They can, however, fly (Goode 1980) and are most likely to be observed on warm humid nights. Because the Southern Mt Lofty survey was terrestrially-based, there was only one Notonectidae survey record was recorded. This was in Montacute CP, in Pink Gum (*Eucalyptus fasciculosa*) Low Woodland. Back Swimmers, were also recorded during the Monitoring River Health Initiative (MRHI) survey of aquatic invertebrates in the MLR (see next section).

Pentatomidae and Scutelleridae (Stink Bugs)
These 2 families are well known as "stink bugs": in self-defence they can exude a foul smelling fluid. They all use their probosci to extract nutrients from plant tissues, (probably from the phloem).

Eight Pentamtomids were recorded during survey (one specimen of *Kapunda troughtoni* and seven specimens not identified beyond family level). Six Scutelleridae, all of the species *Choerocoris paganus*, were recorded from five quadrats. *Choerocoris paganus* feeds on *Dodonaea* plant species. Of the five survey quadrats this species was recorded from, *Dodonaea viscosa* ssp. *spathulata* was recorded at one quadrat.

Psyllidae (Lerps)
Psyllidae includes the lerp insects, whose nymphs live below sugar "scales" (lerps) on eucalypt foliage. This family contains at least 300 Australian species (New 1996). The largest genus is *Glycaspis*, which along with *Cardiaspina* can cause dieback of eucalypts. In the study region, River Red Gums (*Eucalyptus camaldulensis*) and Pink Gums (*E. fasciculosa*) are most commonly infested by lerps.

Due to the collection methods (primarily pitfalls), only three Psyllidae records, from two quadrats, were recorded on the survey (these were not identified further to family level or genus level). Both quadrats were in the Williamstown – Kersbrook district; one being a Long-leaved Box (*E. goniocalyx*) Woodland and the other being a Pink Gum (*E.* fasciculosa) Low Woodland.

Reduviidae (Assassin Bugs)
This large family is well represented in Australia, with and is most diverse in tropical regions (Carver *et al*.

1991). All species are predacious, most attacking other arthropods. Several of the larger species can inflict a painful "bite" or sting to humans with the poison they inject (Goode 1980). Some species paralyse and kill small arthropods by injecting poisonous saliva into them. Many Assassin Bugs have brilliant red, black or yellow and black markings. Other species emit an offensive odour to deter predators (Goode 1980).

The survey yielded 23 records, comprising at least six taxa.

Order Blattodea (Cockroaches)
Fifty-eight cockroaches, comprising three families (Blaberidae, Blattidae and Blattellidae) were recorded from the survey (refer below). More than 420 species of cockroaches are known in Australia, and are classified into four families. Most species in southeastern Australia belong to one of the three families recorded in the SMLR study region (New 1996). Cockroaches are very difficult to identify as it often involves microscopic work on the genitalia, but it is possible all survey specimens were Australian natives.

Most Australian cockroaches are found on vegetation, in leaf litter, under bark, or in and under rotting wood (New 1996).

Blaberidae
Three genera totalling 37 records were obtained from the survey, including the two common genera of this family, *Calolampra* (29 records from 18 quadrats) and *Laxta* (seven records from seven quadrats). Individuals are flattened and live under bark. The males are usually winged and females wingless. *Laxta* is probably endemic to Australia and hides in leaf litter. The other genus recorded was a single record of *Robshelfordia*, also identified to generic level only.

During the Southern Mt Lofty Survey *Calolampra* species showed a preference for *Eucalyptus fasciculosa*, *E. viminalis* and *Xanthorrhoea* species.

Blattidae
Only the genus *Platyzosteria* was recorded during the survey: two records of *Platyzosteria circumducata* and seven records which could not be identified to species level. The species recorded were black, wingless and hide in the leaf litter. They are widespread and belong to one of the largest cockroach genera. Many species are undescribed.

Five of the most pestilential species found in east-coastal homes in Australia are in the family Blattidae (Goode 1980). These include the Oriental cockroach (*Blatta orientalis*) and the American cockroach (*Periplaneta americana*).

Blattellidae
There were twelve survey records of Blattellidae, which could not be identified further to genus level. Six specimens had a blue stripe and six had a yellow stripe.

Blattellids are nocturnal and can be attracted to light. Blattellidae includes long-legged, generally slender forms in which the antennae are longer than the body. The pestilential German cockroach (*Blattella germanica*) is from the family Blattellidae (Goode 1980). This cockroach is 10-15mm long and a pale buff-brown colour. In the male, the abdomen is exposed, whereas the fore-wings cover the abdomen in females. Native Blattelid species are generally smaller, and are difficult to identify (New 1996).

Order Orthoptera (Grasshoppers and Crickets)
Fifty-five Orthoptera records, comprising 7 families were recorded during the survey, representing only 3.1% of all insect records (other than flies). The relatively low number of Grasshoppers and Crickets recorded may partly be due to trapping bias, but more significant may be the lack of grasslands in the survey area. Savannah Woodlands with a grassy understorey were extensive in the study region prior to European settlement, but selective clearance has greatly reduced the area of this habitat. However, the rarely seen Ant-cricket, *Myrmecophilus* sp. was recorded (refer below).

Acrididae (Short-horned Grasshoppers)
Acrididae are known as the "short-horned" grasshoppers. The survey provided 23 Acrididae records, comprising at least three taxa. Seven specimens could not be identified beyond family level, five were tentatively identified as *Peakesia* sp. and the remaining 11 were identified as *Goniaea* sp. (Gumleaf Grasshoppers). While relatively few Grasshoppers were collected on this survey, they are known to be widespread in Australia, and would be found in warmer weather in more Open Grasslands or Grassy Woodlands vegetation. Under these conditions they can gather in large numbers. As suggested above, the small number of grasshoppers recorded from the study region probably reflects the dominance of forest and woodland with a sclerophyllous shrub understorey.

Gonieae species prefer woodland areas and are well camouflaged with a grey and brown speckled appearance. They also have a keel on the prothorax, which distinguishes them from other taxa. The 11 *Gonieaea* survey records were widespread (ranging from Barossa to Encounter Bay), with most from forest or woodland with a sclerophyllous shrub understorey. Overstorey trees were most commonly *Eucalyptus obliqua* (Stringybark), *E. baxteri* (Brown Stringybark), *E. fasciculosa* (Pink Gum) and *E. leucoxylon* (SA Blue Gum).

Tettigoniidae
The long-horned grasshoppers were represented by four survey records, three from the genus, *Hemisaga*, which are predatory species; and one record not identified beyond family level. *Hemisaga* belongs to a subfamily called Austrosaginae which have spines on

their forelegs to help them catch and hold their insect prey. They are wingless and often have striking markings. Members of this subfamily are not caught often. The three *Hemisaga* survey records were from Mt Bold Reservoir, Scott Creek CP and Black Hill CP. The unidentified Tettigoniidae species was recorded from Para Wirra RP.

An opportunistic siting of *Caedicia* (Fig. 109) was recorded from Inman Valley, where it was attracted to an artificial light source. It is a common genus, of large size and coloured bright green.

Figure 109.
A *Caedicia* sp. was collected opportunistically during the SMLR survey. (Photo: A. Robinson)

Gryllacrididae (Raspy Crickets)
Known as the "Raspy Crickets", these large species are predatory with large jaws and will bite the collector if provoked. Very few of the 200 or more known species in Australia have been described or studied biologically (Rentz, 1996). All species are nocturnal and specialised collecting is necessary if an area is to be properly sampled. Raspy Crickets spend the daylight hours in burrows or in shelters constructed of leaves, twigs, sand or other material bound together by silk produced by their mouthparts (Rents 1996). The females usually have long ovipositors, which may be mistaken for a stinging organ.

Two taxa were recorded on the Southern Mt Lofty survey. One specimen was a *Paragryllacris* sp., one of the genera that have marking patterns on the face. They also have spines on the forelegs for gripping prey. Two individuals, belonging to the same taxa were identified to family level only. *Paragryllacris* comprises at least four species in Australia, including *P. combusta*, which has been observed feeding on emerging cicadas on tree trunks after dark.

The two Gryllacrididae taxa found on this survey are winged.

Gryllidae (True Crickets)
True Crickets prefer a shrub understorey habitat and are found more commonly than grasshoppers, which seem to prefer grassland.

Nineteen Gryllidae survey records, comprising at least five taxa were obtained. Nine records were identified only to family level, and the remaining ten records identified to genus level: *Eurygryllodes* (seven records), and *Lepidogryllus*, *Teleogryllus* and *Trigoniinae* each yielding one record. *Teleogryllus* is a widespread genus in Australia (Rentz 1991).

Eurygryllodes and *Lepidogryllus* can be found across the State in a variety of habitats, whereas *Teleogryllus* prefers the wetter locations with clay soil components, where they hide in cracks. This is the common black cricket found in gardens and can be a pest in agricultural areas. The survey quadrat in which *Teleogryllus* was recorded was within Newland Head Conservation Park, on a sand dune slope.

The *Trigonidiinae* species (Leaf Running Crickets) are very small, usually less than 8 mm. They live on the surfaces of leaves above and on the ground. They are generally collected on Biological Surveys by raking of leaf litter or by having micro-pitfalls in leaf litter.

Myrmecophilidae ("Ant" Crickets)
Myrmecophilus sp. is a tiny creature resembling a round cricket. They are not often collected because they live as inquilines[1] in ant nests, feeding on secretions of ants (Rentz 1991). Three *Myrmecophilus* sp. individuals were recorded from two survey quadrats. Both quadrats were on sand dunes, in Scott CP and in Bullock Hill CP. *Myrmecophilus* sp. has been recorded on two other Biological Surveys and reflects the type of trapping method employed, namely digging to insert pit traps into the ground probably disturbs ant nests.

Order Lepidoptera (Butterflies and Moths)
Butterflies were not targetted specifically during the survey. However, there were 18 survey records of at least four taxa. Twelve records (from ten quadrats) were larvae and could not be identified beyond the level of Lepidoptera.

There were four records (from two quadrats) of *Spilosoma glatignyi*. This is a large species of Tiger Moth (family Arctiidae), common in southeastern Australia (New 1996).

There was a single survey record of a Ghost Moth (family Hepialidae) which is common in southeastern Australia (New 1996).

The remaining Lepidoptera survey record was a single specimen of *Doratifera quadriguttata*, a Cupmoth (family Limacodidae), also a common species in southeastern Australia. They get their common name from the spherical or near-spherical hard cocoon attached to bark (New 1996). Several species of

[1] An inquiline is an organism that lives in the home of another, sharing food.

Doratifera are important defoliators of eucalypts in southeastern Australia.

Blason and Carruthers (in prep.), include a section on butterflies, with recommendations for conservation measures. No coordinated butterfly survey has been conducted in the Mt Lofty Ranges north of Mt Lofty. Grund (2002, cited in Blason and Carruthers in prep.) estimates, however, that there could be up to 52 species of butterfly in the Mount Lofty Ranges, with approximately 22 species noted as threatened or extinct.

Order Thysanura (Silverfish)
There were 16 survey records of Silverfish, comprising at least two taxa (including eight records of an unidentified "brown species". The 16 records were relatively widespread, being recorded from 11 quadrats. The remaining eight records were all *Ctenolepisma* species, which are cosmopolitan household pests. The Australian Silverfish fauna is poorly known, partly due to their fragility, and party because of their extreme speed when disturbed which make their collection and preservation of intact specimens very difficult (Smith and Watson 1991).

Order Isoptera (Termites)
The nine survey records were identified only to the level of Order. Termites occupy a wide range of habitats in Australia. Their nests may be built in mounds, or if soil-dwelling species, completely underground, and other groups in wood (Goode 1980). Termites feed on dead wood, vegetable matter and fungi, both living and dead. Although termites are probably ubiquitous, sampling methods do not reflect this.

Order Mantodea (Praying Mantids)
Mantids occur in a wide range of habitats, ranging from tree canopies to shrubs, tree trunks, tall grasses or on the ground. They are strictly carnivorous and feed mainly on insects (Balderson 1991). The three survey records were from a quadrat in Kyeema CP and a quadrat in Mt Magnificent CP – both being in *Eucalyptus cosmophylla – E. obliqua* Low Open Forest.

Order Mecoptera (Scorpion-flies)
A number of Scorpion-flies were seen at a survey camp (Mac Creek Hut, southern section of Para Wirra Recreation Park). This was an opportunistic record, rather than a survey quadrat. The Scorpion-flies were flying around flowering Yacca, *Xanthorrhoea semiplana*. Several species fly among blossoms and prey on other insects including flies, bees, caterpillars and the larvae of other beetles (Goode 1980). Members of this group are rarely seen, so this is a significant record. Scorpion-flies are predatory and sometimes catch prey by ambushing them, hanging from their front legs and catching insects with their hind legs. Males tempt females by offering prey items - as the females in some species of *Harpobittacus* sp. do not catch prey themselves. *Harpobittacus* is the likely genus seen on this survey.

ANTS (ORDER HYMENOPTERA)
McArthur identified the Ants recorded from the survey, and provided much of the following text. Appendix XX shows the survey quadrats from which each ant genus was recorded (Appendix II provides vegetation and physical parameter details for these quadrats).

Ants were recorded from 103 pitfalls installed at 95 Southern Mt Lofty survey quadrats.

Thirty-one ant genera were collected during the survey (Table 54). This is surprisingly high, as only about sixty genera have been recorded for the whole of South Australia. It compares with 29 genera collected during the South East Biological Survey (Foulkes and Heard in prep.), including 21 genera, which were common to both the Southern Lofty and South East surveys.

Within the Mount Lofty Ranges, the greatest numbers of ant species are to be found in open forests with sclerophyll shrub understoreys on podzolic soils, where 100 or more species are to be found within a few hectares (Greenslade, P.J.M. 1986). Greenslade noted, however, that although these are rich ant faunas, they are not as rich as those of mallee regions.

Although, only the genus *Camponotus* was identified to species level (Table 55), the 30 other genera identified are likely to contain about 100 species (Greenslade, P.J.M. (1986) stated in humid wooded areas a total fauna of about 100 species is likely to contain 30 – 40 genera).

Table 54.
Frequency of ant genera recorded from 103 pitfalls (95 SMLR survey quadrats).

Genus	No. of Pitfalls	Genus	No. of Pitfalls
Amblyopone	4	*Monomorium*	21
Anonychomyrma	20	*Myrmecia*	68
Aphaenogaster	1	*Notoncus*	5
Calomyrmex	2	*Ochetellus*	2
Camponotus	52	*Paratrechina*	8
Ceraphachys	4	*Pachycondtla*	5
Colobstruma	2	*Pheidole*	44
Crematogaster	39	*Podomyrma*	8
Discothyrea	1	*Polyrhachis*	8
Dolichoderus	13	*Prolasius*	10
Hereroponera	2	*Rhytidoponera*	65
Iridomyrmex	38	*Stigmacros*	7
Leptogenys	2	*Tapinoma*	8
Melophorus	29	*Technomyrmex*	5
Meranoplus	11	*Tetramorium*	5
Mesostruma	1		

The most common genera collected were *Myrmecia*, 68 pitfalls, *Rhytidoponera*, 65 pitfalls, *Camponotus*, 52 pitfalls, *Pheidole*, 44 pitfalls, *Crematogaster*, 39 pitfalls, *Iridomyrmex*, 38 pitfalls, *Melophorus*, 29 pitfalls, *Monomorium*, 21 pitfalls, *Anonychomyrma*, 20 pitfalls

***Myrmecia* spp.(including Inch Ants and Jumpers)**
Myrmecia includes the "inch ants" and the "jumpers". These are very primitive ants with stings. Some people stung by the jumper ant *Myrmecia pilosula* have experienced breathing difficulties and have required urgent medical attention.

Myrmecia spp. was recorded from 68 pitfalls (66%). This compares with *Myrmecia* spp. being recorded from only two quadrats in the Biological Survey of the Anangu Pitjantjatjara Lands (Robinson *et al.* 2003), and they were not recorded during the South East or the Murray Mouth Reserves Biological Surveys. The Entomological Department, SA Museum (1963) implied *Myrmecia* species were very common in the reserves of the SMLR: "Picnickers in the reserves need to look carefully where they propose to sit, so as to avoid proximity to any nest of the large Bull-dog and Jumping Ant, *Myrmecia*."

Several species of *Myrmecia* were recorded. The jumpers are easily recognised by their jerky movement (they move in jumps of 20 mm when disturbed) and by their yellow legs and jaws contrasting with black other parts. They are ground nesting (often building mound nests) and common is southern Australia. In undisturbed sites, they often construct pyramids of soil and twigs around a low shrub to decorate their nest entrance. In disturbed sites they love rockeries. Adults feed on nectar and sugar, but larvae feed on insects (Goode 1980).

Figure 110.
A *Myrmecia* ("Inch Ant" or "Bull Ant") species. Inch Ants were widespread and commonly recorded on the SMLR survey. *Myrmecia* species are restricted to the Australian region and are the largest ants in the world. (Photo: A. Robinson).

***Rhytidoponera* spp.**
Rhytidoponera species are primitive ants with a sting. The most numerous in this survey were *Rhytidoponera metallica* so named because of its green iridescent reflection. Some *Rhytidoponera* species are known to transport seed.

***Pheidole* spp.**
Pheidole are seed harvesting ants and dimorphic. Minor workers collect seed, carry it to the nest where the major workers which are often three times the size of minors, crush the seed with their powerful jaws.

***Crematogaster* spp.**
When viewed from above, the posterior gaster of *Crematogaster* species is pointed, and when viewed from the side the petiole is attached to the upper part of the gaster. This differs from all other ants where the petiole is attached lower. Some species are tree dwellers.

***Iridomyrmex* spp.**
Several *Iridomyrmex* species were collected. *Iridomyrmex* were the most numerous of all ant genera collected in the survey. Most foraging is done in the early morning and later in the afternoon.

***Melophorus* spp.**
Melophorus species only forage during the hottest part of the day and so appear to share resources with *Iridomyrmex* species.

***Monomorium* spp.**
These genus is a monomorphic seed harvester.

***Anonychomyrma* spp.**
When Greenslade produced The Ants of South Australia in 1979, these ants were included in the genus *Iridomyrmex*. Shattuch has split the genus *Iridomyrmex* and one of the new genera is *Anonychomyrma*. It can be separated from *Iridomyrmex* by its more compact mesosoma and the placement of its eyes much closer to its jaws.

***Camponotus* spp.**
Camponotus was the only genus recorded on the SMLR survey, identified to species level (Table 55).

Table 55.
Frequency of *Camponotus* ants recorded from 103 pitfall traps (95 SMLR survey quadrats).

Camponotus species	No. of Pitfalls	*Camponotus* species	No. of Pitfalls
C. afflatus	1	*C. minimus*	6
C. ceriseipes	3	*C. oetkeri*	1
C. consobrinus	22	*C. piliventris*	9
C. claripes	4	*C. undescribed*	3
C. gasseri	2	*C. terebrans*	15
C. gibbinotus	7	*C. whitei*	1
C. lownei	1		

Camponotus ants are very advanced, with communication skills and a rigid caste system. Belonging to the sub-family Formicinae, the sting of primitive ants has been replaced by an organ which can spray defensive/offensive fluid some 200 mm or so. *Camponotus consobrinus* and *C. terebrans* were the most numerous *Camponotus* species collected in the survey.

Appendix XXI shows the quadrats at which each *Camponotus* species was recorded on the survey.

Camponous terebrans is common in sandy soil in the southern half of Australia. It is recognised as an early coloniser of stabilised sites after disturbance by rabbits, sand drift, mining etc. It has erect short hairs on its scape and legs, which are not present on *C consobrinus.* It is known to transport large seeds e.g. *Acacia* spp. 75 metres and contribute to revegetation of disturbed sites. While transporting the seed, it eats the aril. It is known to be associated with the butterfly *Ogyris idmo*.

Camponotus consobrinus is confined to heavier soil from the Gawler Ranges around the coast to Townsville including Tasmania. Near Para Wirra it has been observed tending larvae of the butterfly *Ogyris genoveva* climbing a eucalypt in search of mistletoe which the butterfly larvae feed on. The ant is easily recognised by the much lighter colour of the anterior part of the gaster compared with the darker posterior. They are nocturnal foragers. *Camponotus piliventris* is often seen foraging alone in daytime on paths and on tree trunks. It is red-brown and covered with short white erect dense hair.

Camponotus gasseri is a tree dwelling ant and is common from Perth around the coast to Townsville, including Tasmania. It is thought to forage exclusively on its host tree and is therefore rarely caught in pitfall traps. Workers are often observed foraging on trunks of red gums near Adelaide. Nests of these ants are generally found in galleries or tunnels, which had been constructed in trees and shrubs by another insect. The nests are common in dead and living branches where the diameter exceeds 40 mm. Nests usually have only one entrance, which is blocked in a remarkable way. A major worker uses its head like a cork to close the circular entrance, the diameter of which is only slightly greater than the worker's head. The heads of major workers and queens are more or less circular in cross section with the anterior portion truncated, flat and often deeply and coarsely sculptured, camouflaging the entrance when it is blocked. When the 'door keeper' removes its head from the hole, there is enough space to allow a nest mate to pass. Major workers are able to act as living doors because they have evolved a characteristic flat or phragmotic face (from Greek *phragmos*, 'fence' or 'fencing in'). A gallery in a River Red Gum with a capacity of less than 150 mL has been observed to shelter over a thousand *C. gasseri* workers as well as eggs and larvae.

FLIES (ORDER DIPTERA)

The Diptera form one of the larger insect orders and includes many common and familiar insects: mosquitoes, midges, sand flies, house flies and blowflies (Colless and McAlpine 1991).

Diptera recorded from the Southern Mt Lofty survey were identified to the level of family (except for the Blowfly family, Calliphoridae, where 2 taxa were identified to species level). Twenty-three families were identified totalling 473 records (Table 56). Appendix XXII provides details of all fly records.

Table 56.
Fly (Order Diptera) families identified during the SMLR survey and total number of records.

Family	Common Name	# Records
Anisopodidae		8
Anthomyiidae		1
Asilidae	Robber or Assassin Flies	1
Bibionidae		1
Calliphoridae	Blowflies	6
Cecidomyiidae	Gall midges or Gnats	49
Chloropidae		28
Dolichopodidae	Stilt Flies	47
Drosophilidae	Vinegar or Ferment Flies	1
Empididae	Water Cruisers	6
Ephydridae		5
Lauxaniidae		2
Muscidae	House Flies	48
Mycetophilidae	Fungus Gnats	1
Phoridae		129
Psychodidae	Moth Flies or Midges	4
Pyrgotidae		1
Sciaridae		40
Sphaeroceridae		89
Tabanidae	March or Horse Flies	3
Tachinidae		1
Tanyderidae		1
Tipulidae	Crane Flies (Daddy-long-legs)	1
	Total Records	**473**

Flies were recorded at 54 of the 74 insect survey quadrats with an average of 8.8 fly records per quadrat. The maximum number of flies recorded at a quadrat was 38. This was quadrat ONK01701 located in Milbrook Reservoir Reserve (6.6 km west of Kersbrook) in a *Eucalyptus obliqua* Open Forest with a sclerophyllous understorey. This quadrat contained eight identified fly taxa. The maximum number of fly taxa identified per quadrat was nine – occurring at

three quadrats: ONK01501; ONK01031 and BAR03001. It is however, difficult to compare fly diversity between quadrats due to varying weather conditions and differences in survey intensity between quadrats.

Surprising omissions from the survey were mosquitoes (family Culicidae) and house-flies (family Muscidae). The common house-fly (*Musca domestica*) and the bush-fly (*Musca vetustissima*) are major pests in Australia.

Most of the fly families prefer wetter habitats including the most commonly recorded families from the survey: Phoridae, (129 records), Sphaeroceridae (89) and Cecidomyiidae (49), Dolichopodidae (47) and Sciaridae (35).

Phoridae are small to minute flies. Many are scavengers in carrion and other decomposing organic matter (Colless and McAlpine 1991).

Sphaeroceridae are small to very minute flies, often found on animal dung or other organic matter in which the larvae live. Several species live in leaf litter (Colless and McAlpine 1991).

Cecidomyiidae (Gall midges) are a large, cosmopolitan family of small to minute flies. The adults are ubiquitous, and their small size and active flight habits make them very susceptible to dissemination by air currents (Colless and McAlpine 1991).

Dolichopodidae (Stilt flies) are a large family of flies with 36 genera recorded in Australia (Colless and McAlpine 1991). Sciaridae is an extremely widespread family, with members adapted to a wide variety of climates.
Brief comments on the remaining families recorded during the survey follow (from Colless and McAlpine 1991).

Anisopodidae: a small family with only two genera represented in Australia. All are stoutly built flies and all species breed in decomposing organic matter.

Anthomyiidae: all taxa are introduced in Australia.

Asilidae (Robber Flies): A very large family of predatory flies. The adults, which live mainly in open forest country, feed particularly on other Diptera and Hymenoptera (sawflies, wasps, bees and ants), but attack almost all insects. Eggs are laid in soil, or attached to foliage or bark.

Bibionidae: Flies of small to moderate size. Adults are rather sluggish and poor fliers, and most species inhabit forest. Flight activity is thought to be mainly crepuscular and nocturnal.

Calliphoridae (Blowflies): A large, cosmopolitan family of flies, and of large size. They are strongly attracted to moisture, and feed mainly on nectar, honeydew and other sweet liquids, and on the liquid products of organic decomposition. Many species breed in carrion, which can make them pests.

Chloropidae: Adults are almost ubiquitous in occurrence, and the larvae inhabit a wider range of habitats, though still little known.

Drosophilidae (Vinegar Flies): These small, yellowish flies are probably best known for the use which has been made of them in laboratories rather than for the native species whose larvae live mainly on decaying fruit or fungus (Goode 1980). The larvae of most species are fungivorous, some eating yeasts in decaying fruit.

Empididae (Water Cruisers): A very large family of flies, of moderate to minute size. At least half the Australian species are undescribed, but the family seems most abundant in the cooler southern and eastern states.

Ephydridae: These flies are often found near water, both salt and fresh, but some species occur on grasslands and lawns far from water.

Lauxaniidae: There were two survey records from separate quadrats. This large family occurs in a range of habitats in Australia, including sand dunes, mangroves, grasslands, forests and alpine areas. Most larvae live in fallen leaves or other rotting vegetation.

Mycetophilidae (Fungus gnats): This large family is widely distributed throughout the world in both tropical and temperate regions. Numbers, both of individuals and of species, are highest in temperate wet forests, but some are also quite abundant in the moister parts of open savannah and heath. The survey record was located in *Eucalyptus obliqua* Open Forest, near Lobethal (a high rainfall site).

Psychodidae (Moth flies or Midges): Adults frequent moist shady places, but are rarely seen flying and are most abundant in early summer.

Pyrgotidae: Although these flies are mainly nocturnal, adults of some species also visit flowers in the daytime.

Tabanidae (March flies or Horse flies): Most of the Australian species suck blood, and some species are pests of human and stock. The breeding places are extremely varied but are typically: among floating vegetation in open swamps; in the mud of rivers and in damp soil and rotting vegetation; in dry or beach sand. The three survey records were from Woodland in Para Wirra RP, Shrubland in Deep Creek CP and Woodland in Mt Bold Reservoir reserve.

Tachinidae: Although over 500 species have been recorded in Australia, this family is poorly known.

Tanyderidae: This primitive family is largely confined to Australasia. Adults are usually found in moist forest habitats.

Tipulidae (Crane flies, daddy-long-legs): In Australia, as elsewhere, this family is by far the richest in species of all Diptera families. Most are readily recognised by slim build and long legs. Most species in Australia have been described from the mountainous areas of the southeastern Australia. They favour areas of moisture, usually found resting on foliage, overhanging banks, etc., in damp shady places. The survey quadrat in which Tipulidae was recorded was in Montacute CP in an area of *Eucalyptus viminalis* ssp. *viminalis —E. leucoxylon* Open Forest over *Acacia pycnantha* and *Acacia retinodes* (hill form), which suggests the site was damp.

NON-INSECT INVERTEBRATES

Non-insect invertebrates were analysed as two groups:

- All non-insects excluding spiders and scorpions
- Arachnids (spider, scorpions, pseudoscorpions and opilionida)

Non-insects excluding spiders and scorpions

The Southern Mt Lofty survey yielded 416 non-insect invertebrate records made up of five Orders and at least 11 taxa (Table 57). These were mites, amphipods, slaters, a snail species, centipedes, millipedes and a worm. Appendix XXII provides details of non-insects recorded at survey quadrats.

The most numerous invertebrate found was, not surprisingly, the Portuguese Millipede, *Ommatoiulus moreletii*. The author noted the presence in the study region, of this creature in 1960. It has been spreading throughout the region, since its introduction at an unknown time before that. Initially populations were thought to be very numerous and were considered to be a serious pest. After research for some years the populations were found to spread in waves, which moved forward in a crest over time and behind in the "trough" the numbers subsided and became manageable in many situations. Forty native millipedes were also recorded (They probably belong to the genus *Oncocladosoma*)

Amphipods were the second most commonly recorded taxon with 45 records. Centipedes were relatively widespread and numerous with 25 survey records from 14 quadrats, and at least three taxa identified. Four centipedes were identified as *Scutigera* sp. ("House Centipedes"). House Centipedes are long-legged predators with 15 pairs of legs (Harvey and Yen 1989).

Table 57.
Non-insect invertebrates recorded during the SMLR survey, arranged alphabetically by Order.

Order	Common Name/ Species name	No.Survey Records
Acarina	Mite	4
Acarina	Mite erythraeid	12
Crustacea	Amphipod	45
Crustacea	Slater	15
Gastropoda	Snail: *Cupedora bednalli*	10
Myriapoda	Centipede - not blue	4
Myriapoda	Centipede - Scutigera	4
Myriapoda	Centipede -blue	17
Myriapoda	Portugese Millipede *Ommatoiulus moreletii*	252
Myriapoda	Millipede – native ?*Oncocladosoma*	40
Oligochaeta	A worm	13
Totals		**416**

They are generally found under rocks or logs, but occasionally enter human dwellings, hence their name. Their prey is commonly insects and spiders. Many species have blue longitudinal stripes (17 centipedes recorded from the survey were identified only as "Centipede – blue").

Sixteen mites, comprising at least two taxa were recorded during the survey. Many species of mite are known from the study region, but the casual observer is most likely to see the little red woolly mite, *Caenothrombium album*, crawling over leaf mould (Entomological Department of the SA Museum 1964).

ARACHNIDS (EXCLUDING MITES)

Four hundred and fifty one arachnid records (excluding mites) were recorded from the SMLR survey quadrats, comprising 30 families and 85 species as follows:

- Spiders: 78 species from 25 families, totalling 377 records.
- Scorpions: four species from three families, totalling 66 records.
- Pseudoscorpions: 1 species from one family, totalling two records, and
- Daddy-long-legs (Order Opilionida): 2 species from two families, totalling six records.

Figure 111.
A *Scutigera* sp. (House Centipede). Four collections were made on the SMLR survey. They are distinguished from other centipedes by the presence of only eight tergites (dorsal body plates) and 15 pairs of legs. (Photo: A. Robinson).

Arachnid records were obtained from 64 of the 74 survey quadrats (Appendix XXIV).

Table 58 provides the total number of records for each taxa recorded from survey quadrats. During the survey, there were also five opportune records (all spiders).

The highest number of records for a survey quadrat was 30 records at quadrat JER00801. This was a *Eucalyptus obliqua* Open Forest on a medium-clay soil. The highest number of taxa per quadrat was ten at quadrat ONK02501. Interestingly, this was also a *Eucalyptus obliqua* Open Forest on a light-medium-clay soil.

The trapdoor spiders (Mygolomorphae) were amongst the most numerous group recorded with 81 records and seven species. The following extract is from The Entomological Department, SAM (1964):

> " Living in holes covered by a little silk-lined trapdoor, and occasionally to be seen in broad daylight out foraging, are several species of the poisonous trapdoor spiders. The females are large (about 1 ½ in.) and brown, whereas the males are always smaller and may be the same colouring as the female, but the male of the commonest trapdor spider of the reserves, *Missulena occatoria*, has a red front half, while the abdomen and legs are distinctly dark blue."

The most numerous species recorded on the survey was a *Misgolas* sp. (a mygalomorph), of which 60 specimens were recorded at a total of six quadrats (see "Significant records" for further discussion). The most widespread taxa (i.e. recorded at most quadrats) were an *Aname* sp. (a mygalomorph) and *Venetrix roo* (a wolf spider), each recorded at 14 quadrats, followed by an unidentified ground spider in the family Gnaphosidae and *Artoria lineata* (a wolf spider), both recorded at 13 quadrats.

Table 58.
The total number of spider, scorpion, pseudoscorpion and opilione records for each taxa recorded from SMLR survey quadrats.

FAMILY	SPECIES	COMMON NAME	TOTALS
SPIDERS	MYGALOMORPHAE		
Actinopodidae	*Missulena* sp.	mouse spider	1
Hexathelidae	*Hadronyche adelaidensis*	Adelaide funnelweb	0
Idiopidae	*Misgolas andrewsi*	mygalomorph (no trapdoor)	4
Idiopidae	*Misgolas* sp. 2	mygalomorph (no trapdoor)	60
Nemesiidae	*Aname tepperi*	mygalomorph (no trapdoor)	1
Nemesiidae	*Aname* sp.	mygalomorph (no trapdoor)	21
Nemesiidae	*Teyloides bakeri*	mygalomorph (no trapdoor)	2
	ARANEOMORPHAE		0
Oonopidae	?genus	six-eyed spiders	1
Pholcidae	*Wugigarra kaurna*	native daddy-long legs	2
Segestriidae	*Segestria? s*p.		5
Desidae	*Toxopsoides* sp.		5
Desidae	sp. 2		2
Stiphidiidae	*Baiami loftyensis*		8
Hahniidae	*Scotospilus* sp.		1
Zoridae	*Argoctenus* sp.		1
Zoridae	*Hestimodema* sp.		3
Zoridae	sp. 3		1
Zoridae	sp. 4		6
Miturgidae	*Miturga* sp. 1	lined spider	3
Miturgidae	*Miturga* sp. 2	lined spider	1
Miturgidae	*Uliodon tarantulinus*	lined spider	12
Miturgidae	?genus sp. 4	lined spider	1
Miturgidae	?genus sp. 5	lined spider	3
Sparassidae	*Isopeda woodwardi*	huntsman spider	1
Sparassidae	*Neosparassus* sp. N49	badge-huntsman spider	1
Thomisidae	*Stephanopis* sp.	crab spider	12
Corinnidae	*Battalus* sp.		1
Corinnidae	*Supunna albomaculata?*		4
Corinnidae	*Supunna picta?*		1
Lamponidae	*Lampona cylindrata*	white-tailed spider	0
Lamponidae	*Lamponina loftia*	white-tailed spider	7
Lamponidae	*Asadipus kunderang*	ground spider	1
Lamponidae	*Longepi woodman*	ground spider	1
Lamponidae	*Prionosternum nitidiceps*	ground spider	12
Prodidomidae	*Myandra* sp.	ground spider	0
Gnaphosidae	*Encoptarthria* sp. 1	ground spider	12
Gnaphosidae	*Encoptarthria* sp. 2	ground spider	1
Gnaphosidae	*Encoptarthria* sp. 3	ground spider	5
Gnaphosidae	*Hemicloea*	ground spider	1
Gnaphosidae	sp. 4	ground spider	20
Gnaphosidae	sp. 5	ground spider	5
Gnaphosidae	sp. 6	ground spider	10
Gnaphosidae	sp. 7	ground spider	4
Gnaphosidae	sp. 8	ground spider	1
Salticidae	*Jotus* sp.	jumping spider	1

FAMILY	SPECIES	COMMON NAME	TOTALS
Salticidae	*Lycidas* sp.	jumping spider	4
Salticidae	*Maratus* sp.	jumping spider	0
Salticidae	*Opisthoncus* sp.	jumping spider	0
Salticidae	sp. 5	jumping spider	2
Zodariidae	*Habronestes* sp. 1	spotted ant spider	3
Zodariidae	*Habronestes* sp. 2	spotted ant spider	1
Zodariidae	*Neostorena* sp.	spotted ant spider	1
Zodariidae	*Storosa* sp.	spotted ant spider	1
Zodariidae	sp. 5	spotted ant spider	1
Zodariidae	sp. 6	spotted ant spider	3
Lycosidae	*Artoria flavimanus*	wolf spider	1
Lycosidae	*Artoria lineata*	wolf spider	18
Lycosidae	*Artoria* sp. 3	wolf spider	17
Lycosidae	*Artoria* sp. 4	wolf spider	11
Lycosidae	*Artoria* sp. 5	wolf spider	2
Lycosidae	*Artoria* sp. 6	wolf spider	1
Lycosidae	*Artoria* sp. 7	wolf spider	5
Lycosidae	*Lycosa gilberta*	wolf spider	5
Lycosidae	*Lycosa senilis*	wolf spider	1
Lycosidae	*Lycosa* sp. 3	wolf spider	1
Lycosidae	*Lycosa* sp. 4	wolf spider	1
Lycosidae	*Lycosa* sp. 5	wolf spider	7
Lycosidae	*Lycosa* sp. 6	wolf spider	2
Lycosidae	*Venatrix pseudospeciosa*	wolf spider	6
Lycosidae	*Venatrix roo*	wolf spider	28
Lycosidae	*Trochosa expolita*	wolf spider	2
Linyphiidae	*?Dunedinia* sp. 1	midget spider	3
Micropholcommatidae	*Micropholcomma*	midget spider	1
Theridiidae	*Steatoda* sp. 1	cupboard spider	1
Theridiidae	*Achaearanea* sp.	tangle-web weaver	1
Theridiidae	*Dipoena* sp.		2
Araneidae	*Austracantha minax*	spiny or Christmas spider	0
Araneidae	*Eriophora pustulosa*	garden orb-weaver	0
SCORPIONS			0
Urodacidae	*Urodacus armatus*		20
Urodacidae	*Urodacus manicatus*	jade scorpion	21
Buthidae	*Lychas* sp.	marbled scorpion	8
Bothriuridae	*Cercophonius squama*	wood scorpion	17
PSEUDOSCORPIONS			
Olpiidae	sp.		2
OPILIONES			
Triaenonychidae	*Callihamina adelaidia*	short-legged harvestmen (or daddy-long-legs)	1
Triaenonychidae	*Yatala hirsti*	short-legged harvestmen (or daddy-long-legs)	5

Significant Spider and Scorpion Records

The following information is based largely on written notes provided by David Hirst, SA Museum.

The Southern Mt Lofty Survey saw a number of rarely collected species being added to the Museum Collection, namely *Toxopsoides* sp., *Asadipus kunderang* and *Longepi woodman*. The habits of these species are unknown. There were five survey records (from five quadrats) of *Toxopsoides* sp – all quadrats were on the Onkaparinga 1:50,000 mapsheet, in either *E. obliqua* or *E. viminalis* Open Forest. Four quadrats were between Kersbrook and Lobethal and one was in Montacute CP. The single record of *Asadipus*

kunderang (a ground spider) was from Para Wirra RP in *Eucalyptus odorata – E. porosa* Open Mallee. The single record of *Longepi woodman* (also a ground spider) was from Black Hill CP in *E. leucoxylon – E. camaldulensis* Woodland.

Hadronyche adelaidensis (Adelaide Funnelweb) appears to be widespread in the Mt Lofty Ranges but is also seldom collected, and there were no survey records of this species. A number of female (six specimens from five quadrats) *Baiami loftyensis* were collected in pitfalls, which is unusual as they normally hunt within the boundaries of their web rather than on the ground. Two male *Baiami loftyensis* were also collected from separate quadrats. The *Neosparassus* sp. (N49) (a badge-huntsman spider) has only been previously recorded from a single specimen from each of the Murray Mallee, Upper South-East, southern Eyre Peninsula and western Victoria. The single SMLR survey record was from Morialta C P in *E. baxteri* Woodland on sandy-loam soil.

Misgolas sp. 2 (a mygalomorph) was previously known only from one female (collected many years ago from Kuitpo). As stated above, this species was also the most numerous taxon collected with 60 survey records. The 6 survey quadrats were all form the southern Fleurieu district (Deep Creek CP, Tallisker CP, Yulte CP and Congeratinga Forest Reserve).

The Segestriidae are also seldom collected but by chance males were wandering during the survey period resulting in five specimens being collected (from the Adelaide and Onkaparinga 1:50,000 map sheets).

There are several species of *Artoria* (wolf spiders) in the MLR and the undescribed species will soon be named as there is a paper in press dealing with them.

Scorpions were represented by four species, from three families, namely *Urodacus armatus, U. manicatus* (Jade Scorpion), *Lychas* sp. (Marbled Scorpion) and *Cercophoius squama* (Wood Scorpion). *Urodacus armatus* is normally found only in sandy areas. The 20 survey records of this species were from six quadrats, all of which were on sandy substrates. All records were from the Fleurieu District (Newland Head CP, Bullock Hill CP, Scott CP, Mount Billy CP and 5km WSW of Hindmarsh Valley).

Figure 112.
A Wood Scorpion (*Cercophonius squamea*) found under bark and in leaf litter. (Photo: A. Robinson).

The Entomological Department of the SA Museum (1964) noted the reserves of the Mt Lofty Ranges harbour several species of scorpions. Some of the smaller types (mostly *Lychas marmoreus*) live under bark, whereas the large scorpion of the reserves, the 2in. (5 cm) to 2 ½ in. (6.3 cm) long bluish black *Urodacus abruptus* is found in shallow tunnels under stones during the day.

Association between insect groups and physical parameters

The numbers of all invertebrate taxa collected were sorted on various physical parameters, including soil type, surface strew cover and percentage, and vegetation structural formation. The full results are shown in Appendices XXV, XXVI and XXVII. However, there were no clear associations evident, as exemplified by the following example. It was thought there may be an association between insects (particularly Beetles) and soil type. This was not the case however, as it appears number of Colleoptera are spread across substrate types (Table 59).

Table 59.
A comparison of insect records recorded by soil type with percentage of soil types occurring in the SMLR survey quadrats.

Soil Texture	% survey quadrats	% Colleoptera records occurring on soil type	% all Insect records occurring on soil type
clay loam	17.8	18.9	15.4
clay loam, sandy	1.4	2.1	2.3
clayey sand	8.2	7.3	6.6
light medium clay	2.7	2.9	3.3
loam	2.7	1.0	1.4
loamy sand	9.6	7.3	11.7
medium clay	4.1	5.2	2.9
sand	13.7	15.1	14.6
sandy clay loam	15.1	10.4	19.5
sandy loam	24.7	29.9	20.6

A similar exercise was conducted to investigate if there were possible associations between total number of fly records and vegetation structural formations. Table 60 indicates there were no clear differences between the total number of fly records and the major structural formations, such as mallee and forest. However, there did appear to be a higher proportion of fly records from woodland formations. Interestingly, there were no fly records from tall shrubland and very low woodland structural formations.

Table 60.
Comparison of fly records with structural formations recorded in SMLR survey quadrats.

Structural Formation	% Survey Quadrats	% of fly records recorded for each structural formation
Shrubland	4.1	2.3
Tall Shrubland	1.4	0.0
Low Mallee	2.7	0.6
Mallee	2.7	6.8
Open Mallee	8.2	8.3
Low Open Forest	17.8	17.4
Open Forest	26.0	26.8
Very Low Open Forest	4.1	1.5
Low Woodland	17.8	14.0
Very Low Woodland	1.4	0.0
Woodland	13.7	22.3

AQUATIC MACROINVERTEBRATES

Paul McEvoy[1], Peter Goonan[2] and Chris Madden[1]

INTRODUCTION

Hydrology of waterways in the Mt Lofty Ranges

Early accounts of the Adelaide Plains from 1839 to 1927 describe the frequency of winter flooding in the area (Holmes and Iversen 1976). Much of the original drainage pathways on the plains have been altered due to human settlement. In particular, the construction during the 1900's of artificial outfalls for the Little Para River, Dry Creek, Torrens River and Sturt River systems significantly changed water movement in the region. Many urban streams have been channelised, consist of artificial substrates, have 'U' shaped banks to facilitate draining to the sea, and are highly ephemeral environments. Towards the foothills and on the Fleurieu Peninsula, most streams show evidence of recent erosion in places although their channels are comprised of local sediments. These systems generally maintain permanent pools during summer, thereby providing important refuges for aquatic organisms and their associated habitats.

Despite popular views that there are few waterways in the State, there is a considerable network of creeks and streams that drain the multiple block-faulting slopes of the MLR. In their upper reaches, many maintain a permanent baseflow from April-May through to September-October, and then retract to permanent pools. Some retain a nearly permanent trickle of water throughout the year in places, typically in short stretches of several centimetres of stream channel. Other systems dry completely over large stretches of river channel, particularly in lowland sections, although groundwater flows may occur up to several metres below the surface.

In most streams there is a low base flow compared to the discharge that occurs after rain events. The ability to cope with disturbance due to floodwater flows may be the most significant determinant of whether a macroinvertebrate will be present in a stream at any one time. Other factors such as substrate type, water chemistry, food sources and presence of predators then interact to influence the macroinvertebrate composition of a stream. Human disturbances by point and diffuse pollution sources and habitat disturbances provide another set of factors that also determine whether specific species are able to persist in different waterways in the landscape.

Impacts on aquatic biota

There are many effects, which pollutants and disturbances can have on aquatic habitats. Those effects which are the most significant in terms of causing negative impacts on the biota in streams of the MLR are listed below, together with some of the activities which generate them:

- Physical smothering of habitats by the transport and deposition of sediment (e.g. vegetation clearance, land-use changes, riparian disturbance, unsealed roads);
- Increase in turbidity by increased suspended sediment concentrations (stock, erosion, water transfers of River Murray water);
- Reduction in dissolved oxygen concentrations by inputs of organic contaminants (stock, point source pollution from effluent discharges, diffuse pollution runoff);
- Promotion of algal blooms by the contribution of nutrients (stock, effluent);
- Promotion of changes in food webs by the introduction of microbial contaminants and nutrients (stock, effluent);
- Death of aquatic biota by toxic materials in the water (e.g. heavy metals from disused mines), or shifts in community structure through sub-lethal effects which can alter reproductive and development rates (e.g. changes in water temperatures, pesticides);
- Alteration of natural flow regimes through the changes in catchment hydrology (alteration or removal of vegetative cover, urbanisation, construction of farm dams, channelisation, metropolitan reservoirs, or water transfers from the River Murray).

What are macroinvertebrates?

Macroinvertebrates are aquatic animals without backbones that are large enough to be seen with the naked eye. They include insects, crustaceans, snails, worms, mites and sponges. The insects include the larvae of flying insects (e.g. midges, two-winged flies,

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dragonflies, mayflies, stoneflies and caddisflies) and adults of some groups (e.g. waterbugs, beetles, springtails). The more familiar crustaceans include yabbies and freshwater shrimps and prawns.

Why use macroinvertebrates?
Macroinvertebrates are most commonly used in biological monitoring studies because they are common, widely distributed, easily sampled and experienced biologists can readily identify a large proportion of them.

What is biological monitoring?
Biological monitoring involves studying the responses of animals or plants to changes in their environment. Aquatic organisms require both the quality and quantity of water to be good enough to meet their needs and enable them to complete their life-cycles. Any disturbance or pollution can lead to the death of some or most of the aquatic life in a waterway. Since many contaminants can pass through a stream over a short period of time, chemical monitoring programs will usually fail to detect such events. This is where biological monitoring is important, as the structure and composition of plant or animal communities provides a measure of the water conditions in a waterway over a period of time which is related to each organism's life-span.

There have been many changes in attitudes towards water quality assessment in Australia in recent times, with an increasing emphasis being placed on the use of aquatic biota to assess conditions more directly than traditional chemical and physical monitoring programs (Norris and Norris 1995). For example, biological indicators and monitoring have been incorporated into the National Water Quality Management Strategy (ANZECC/ARMCANZ 2000), the Natural Resources Management Ministerial Council standards and targets framework, and the Murray-Darling Basin Ministerial Council's Sustainable Rivers Audit. These initiatives advocate the inclusion of aquatic macroinvertebrates to provide an assessment of river health or condition, using the approach developed for the National River Health Program under the Monitoring River Health Initiative (MRHI). The MRHI involved sampling a large number of reference sites throughout Australia and government agencies within each State and Territory have been developing predictive models of the macroinvertebrate communities expected at different sites in the absence of significant human disturbance or impact. The Australian River Assessment System (AUSRIVAS) program followed on from the development of the models and has involved sampling at many potentially impacted test sites from throughout Australia, and then processing the data through predictive models to give the first national assessment of river health for Australia.

The MRHI and AUSRIVAS programs have provided a standardised biological monitoring protocol for rivers and streams throughout Australia that is based on the use of aquatic macroinvertebrates as biological indicators. This work aims to:

- Improve the knowledge of the ecological health of our rivers and streams;
- Assess the impact of pollution and other human-induced impacts on our rivers and streams;
- Assess the effectiveness of water and catchment management actions in the future; and
- Develop predictive models to assist in planning and pollution management.

In South Australia, the Environment Protection Agency and Australian Water Quality Centre (South Australian Water Corporation) have been working together on this State's component of the MRHI and AUSRIVAS programs since 1994. The work has covered the whole State and extends from Cooper Creek in the Far North to Eight Mile Creek in the lower South East.

In this chapter we discuss the progress of this program in relation to the rivers and streams of the Mt Lofty Ranges, from the Gawler River catchment in the north to the Finniss River in the south, hereafter referred to as the MLR. Details of the aquatic macroinvertebrates found in this region, locations of biodiversity 'hotspots', identification of rare species and a discussion about the threats and opportunities for addressing river health issues are also included.

RESULTS AND DISCUSSION

Macroinvertebrates

Appendix XXVIII provideds location and habitat details of the sites sampled. More than 350 aquatic macroinvertebrate taxa were collected from the MLR in 1994-1999. This was almost two thirds the total recorded from the MRHI State database. Given that this region represents less than 5% of the State, the MLR is clearly a biologically diverse part of the State, particularly in terms of macroinvertebrate biodiversity. Appendix XIX provides a summary of the number of macro-invertebrates found in the region.

The most common members found in the waterways of the MLR were oligochaetes (worms), the amphipod crustacean *Austrochiltonia australis*, hydrobiid snails, chironomid midge larvae (*Cricotopus*, *Thienemanniella*, *Rheotanytarsus*, *Paramerina*, *Polypedilum*, *Chironomus*, *Procladius*), *Simulium* blackfly larvae, nematodes (roundworms) and the corixid waterbug genus *Micronecta*.

There are several macroinvertebrate families which have a restricted distribution in South Australia, but which are widespread and common along the Great Dividing Range and in Tasmania. They live in permanently-flowing streams of cool, moist localities. Many of these families are caddisflies (Trichoptera) but beetles (Coleoptera) and worms (Oligochaeta) are also included. In eastern Australia, each of these families contains several genera that are in turn comprised of several species. In South Australia, the same families are much less diverse. For each of these families,

usually only one genus (often represented by only a single species) occurs here. Local species include the caddisfly larvae *Apsilochorema gisbum*, *Tasimia* sp., *Orphninotrichia maculata*, *Atriplectides dubius* (Figure 9) and *Anisocentropus latifascia*, beetles *Sclerocyphon fuscus* and *Simsonia leai*, and the worm *Antarctodrilus proboscidea*.

Figure 113.
The larva of the caddisfly *Atriplectides dubius*, shown removed from its portable sand grain case at top. (Photo: V. Tsymbal).

It may be that, in geological time, other species from these families did live in South Australia but only a few have persisted into present times. If so, past climatic changes are likely to have played a large part in such 'taxonomic sifting'. There are a number of sources of evidence that would support this. Firstly species that are found in South Australia are generally the most widely distributed members of their genus, and occur in many parts of the continent. As such, they are likely to have broader tolerances to environmental factors than their congeners. If conditions in South Australian streams became warmer and dryer than in eastern Australia, individuals from less tolerant species may have emigrated or become locally extinct. Secondly, within South Australia, these species possess a relict distribution. Such distributions are considered by biogeographers to be characteristic of species which evolved under different climatic conditions than those which occur at present. They live only in the permanent to near permanently flowing streams in cool climate regions such as Kangaroo Island, Fleurieu Peninsula and the southern Mount Lofty Ranges. Due to their mutual requirements, these relict species commonly occur together at a single stream site. These sites contain a microclimate that is far more similar to that of streams in eastern Australia than it is to most South Australian waterways.

There is some evidence that present climatic and hydrological conditions are more favourable for stream fauna than in the past. South Australian streams which seemingly offer very suitable habitat lack faunal elements which are associated with that stream type in eastern Australia. Such a case exists for the elmid beetles, where a single species (or none whatsoever) may occur at a site where several genera would be expected (A. Glaister, personal communication). Isolation (in both space and time) may also have been a factor in structuring the composition of the fauna. The physical isolation imposed by the semi-arid mallee region in the eastern sections of South Australia may have prevented colonisation of the MLR by species whose distributions had retracted east following the onset of aridity. However, it would seem that this degree of separation has not persisted for sufficient time for the development of high numbers of endemic species in the State, as they have done in long-isolated regions such as south western Western Australia.

Introduced Species

There are a number of introduced species that have been recorded from the MLR. They include snails such as the physid *Physa acuta* and hydrobiid *Potamopyrgus antipodarum*. Both are widespread and abundant in Australian freshwaters, particularly from waterways where the riparian zone has been significantly disturbed. Another snail that is common in urban streams in eastern Australia (Chessman and Williams 1999) but is relatively uncommon in the MLR is *Pseudosuccinea columella* (Lymnaeidae). This species has some economic significance for agriculture, as it is a potent vector of the parasitic sheep liver fluke (Smith 1996). The introduced worm species *Lumbriculus variegatus* was recorded from streams in the MLR whose catchments contained large proportions of urban areas (e.g. Sturt River) or intensive agriculture (e.g. Mt Barker and Lenswood creeks).

Specific macroinvertebrate groups with an emphasis on rare species

Most of the Acoelomate fauna (i.e. nematodes, flatworms and sponges) are commonly found throughout the MLR but are not well known at lower taxonomic levels. It is possible there are many species present in waterways around the State but the expertise to identify them is not widely available within Australia. Other components of the acoelomate fauna from the MLR include rarely collected worm-like animals such as nemerteans and nematomorphans, that are similarly difficult to identify to even family level.

There were many snails present in the MLR probably due to the abundance of permanent water in most streams. Snails from 14 genera in seven families were recorded (Appendix XIX). The most notable rare species was *Thiara balonnensis* (Thiaridae), which was collected from the North Para River at Willaston in 1981 (Suter 1984) but not re-collected from that catchment despite more recent intensive sampling during the 1990's. Other locations in South Australia where this species has been recorded include the lowland sections of the Torrens River and numerous sites on the Cooper Creek system in the Lake Eyre Basin. This snail was never consistently collected from any sites, and in some surveys, no samples contained the species. Thiarid snails are usually found in large

populations in muddy habitats (Smith 1996) and in dams and irrigation storages (Smith and Kershaw 1979). It is likely that the preferred habitat of *T. balonnensis* is rare in the MLR, thereby accounting for its very limited collection in the region. It is also possible that this species may have been introduced in the past into those MLR catchments that receive pipeline discharges from the lower River Murray, and that whatever populations that did establish have either died out over time or persisted in very limited locations. However, poor dispersal capacity may also be a factor determining the restricted distribution of this species in the MLR.

In a recent study of the aquatic oligochaetes of South Australia, McEvoy (2000) reported that most of the 36 species known from the State occurred in the MLR and that some taxa were restricted to the region. In further work, the unexpected occurrence of a tubificid worm (*Embolocephalus yamaguchii*) in the Onkaparinga River catchment has been documented (Pinder and M^{c}Evoy, in press). This is the first reported occurrence of the genus in Australia and the first record of this species beyond Lake Biwa, Japan.

Fifteen families of water mites (Hydracarina) were collected from the MLR, with the Hygrobatidae containing the most genera (Appendix XXIX). A significant water mite record for the State is the presence of a few specimens of the undescribed species *Austrotrombella* sp. nov. (Hydryphantidae) from Tanunda Creek in the Gawler River catchment (M. Harvey, pers. comm.). Very little is known about this genus. It has only one described species, *A. leprosa*, which was collected from from wet soil near a swamp in the Robe district (Southcott 1991) and another undescribed species from Western Australia (M. Harvey, pers. comm.).

Amphipods are commonly found throughout the study area and include the widespread ceinid *Austrochiltonia australis* and members of the family Eusiridae. Another family, the Perthiidae, had formerly only been recorded from Western Australia but has now been collected in South Australia from the Onkaparinga catchment and Woods Point on the Murray River (Figure 114). Their limited distribution seems to be due to their specific habitat preferences for slow flowing to still water, low conductivity (salinity), and catchments with relatively high rainfall.

Figure 114.
The amphipod *Perthia* sp. (Photo: V. Tsymbal).

A large part of the beetle diversity of the MLR (and of the whole State) is contained within the Dytiscidae, the predacious diving beetles. They are carnivorous in both the larval and adult stages of the life cycle, selecting prey about half their own size (Watts 1978). Among the rarer beetles is the family Psephenidae, which is represented by only one species in the State (*Sclerocyphon fuscus*). The disc-shaped larvae are known as 'water pennies' and have been collected from several upland streams in the MLR. The North Para River catchment is the northern boundary of the currently known distribution of *S. fuscus* in S.A. Another uncommon species is the riffle beetle *Simsonia leai* from the family Elmidae. It has been collected from a number of sites in the MLR, as both adults and the tubular larval stages. *Simsonia* species are gererally found among mosses and lichens on rocks in cool, fast flowing water (Glaister 1999) and larvae are known to feed by gouging wood (McKie and Cranston 1998). Streams of the MLR in which *S. leai* commonly occurs include First Creek in the Torrens catchment, and Scott Creek in the Onkaparinga catchment and streams in Deep Creek Conservation Park on the Fleurieu Peninsula.

There is a very diverse dipteran (fly) fauna in the MLR with over 75 genera from 18 families having been collected. Along with the other insect fauna, their ability to fly enables many types of dipterans to disperse readily and colonise newly wetted sites. None of the dipteran families are restricted in their distribution in the State, but the diversity and abundance of some taxa is of interest. Larvae of the Thaumaleidae are uncommon in the State and have only been collected from the Myponga River and First Creek in the MLR. The non-biting midge flies (family Chironomidae) are the most diverse group found in the MLR with 43 genera (see Appendix XIX). Chironomid larvae are found in virtually all aquatic habitats and while most genera are widespread throughout the State some species have rarely been collected and have restricted distributions. *Aphroteniella tenuicornis* has been recorded in First Creek at Waterfall Gully and the only other collections have been from Flinders Chase

National Park on Kangaroo Island. *Paraheptagyia tonnoiri* is restricted to the MLR and is usually only present in late autumn and spring. *Podonomopsis evansi* is usually one the first organisms to appear when streams begin to flow again after the first autumn rains. However, it is not often found at other times of the year and presumably has adaptations to survive dry summer periods. Larvae of the genus *Stempellina* are unusual because they construct portable cases rather than living in fixed tubes, as the majority of species do. *Stempellina* is commonly found on Kangaroo Island but has only been found at a few sites in the MLR.

Ephemeroptera (mayflies) generally prefer cool, unpolluted water except for members of the genera *Cloeon* and *Tasmanocoenis* which favour warm, still water and are tolerant of poor water quality. Most of the mayfly species known from S.A. can be found in the MLR. The single South Australian representative of the Oniscigastridae (*Tasmanophlebia* sp.) has only been collected fromthe Tookayerta Creek catchment and Waterfall Creek on Fleurieu Peninsula. This species apparently requires the sandy substrate that is an obvious feature of these waterways. The caenid species *Irpacaenis deani* was added to the State species list following its collection from Sixth Creek in the 1999 survey and may prove to be more widely distributed within the MLR after existing collections are re-examined. The baetid species *Centroptilum elongatum* is a species with a southern distribution in the State and does not occur north of the Fleurieu Peninsula (Suter 1986).

Aquatic hemiptera (waterbugs) are typically large-bodied and strong fliers and so tend to be able to disperse readily over large distances. They are best represented in warm, slow flowing or standing waters and most samples from the Mt Lofty Ranges have representatives from this group. Most of the species found in the study area are found throughout the State. Some of the more obvious include the backswimmers (Notonectidae) and water boatmen (Corixidae). The stick-like *Ranatra* can often be found among fringing emergent macrophytes along deep in-stream pools.

The MRHI has provided the first records of scorpion flies (Nannochoristidae) in S.A. Only a few specimens have been collected from First Creek and from Kangaroo Island.

Within the odonates (dragonflies and damselflies), most species present in the MLR are widely distributed in S.A., and indeed across south-eastern Australia. However, some species such as *Synthemis eustalacta* and *Hemigomphus gouldii* occur in S.A. only in the MLR.

Six species of Plecoptera (stoneflies) have been found in the MLR. Stoneflies prefer cool upland streams and are generally intolerant of pollution. They have eggs that can resist desiccation in a dry stream-bed but require flow for a period of 5-6 months to develop fully from nymphs to adults and complete their life-cycle (P. Suter, pers. comm.). Stonefly distributions in the State coincide with areas where the presence of fresh surface water is a reliable feature (Suter and Bishop 1990). Two species that are endemic to S.A. are known (*Riekoperla naso* and *Dinotoperla evansi*) and both are associated with streams that partially or completely dry over summer (Suter and Bishop 1990).

The trichopteran (caddisflies) fauna of the MLR is characterised by a number of commonly occurring case-dwelling species that includes leptocerids (*Triplectides* spp., *Notalina* spp. and *Lectrides varians*), hydroptilids (*Hydroptila* spp. and *Hellyethira* spp.) and hydropsychid larvae (*Cheumatopsyche* sp. 2). There are also a number of rarer caddisfly taxa that have been recorded from parts of the MLR from restricted habitats and catchment areas. According to the literature, *Orphninotrichia maculata* (Hydroptilidae) larvae are typically most abundant on the faces of natural or artificial waterfalls, among mosses, cyanobacteria and filamentous algae and their diet consists of attached algae (Wells 1985). MRHI surveys have revealed that the species also inhabits spring-fed streams in the MLR, Mid North and in the Flinders Ranges. *Apsilochorema gisbum*, a fairly rare hydrobiosid predator, has a similar distribution to *Orphninitrichia maculata*. Most of the hydrobiosid species that have been found in S.A. are restricted to the MLR. Larvae of *Leptorussa darlingtoni* (Leptoceridae) have been collected only from the MLR and from western Kangaroo Island at sites where flow occurs seasonally. An interesting caddisfly species resident in the MLR is *Atriplectides dubius* from the family Atriplectidae. The larva has a long slender head and also a long, flexible thorax together with strong midlegs (see Figure 113). Malicky (1997) noted that it is a specialized feeder on the carcases of other invertebrates, and its features are analagous to that of vultures.

AUSRIVAS bio-assessment results

The band ratings for sites in the study area are shown in Figure 115(refer Appendix XXVIII for site location and habitat details). Ratings have been summarised across different seasonal and habitat models to reflect the average band score for each site.

Most sites were rated as equivalent to reference condition, implying that they were similar to other "least-disturbed" sites in the State. Among the sites that showed moderate impacts were a range of sites from urban and rural waterways that were disturbed by a range of impacts that included stormwater runoff and poor water quality, changes to hydrology that included transfers of River Murray water, riparian disturbance, vegetation clearance, nutrient enrichment, trampling by stock, and leachate from disused mines.

The sites that were more biodiverse than predicted by the AUSRIVAS models included creeks from the Fleurieu Peninsula (Finniss River, Nangkita,

Tookayerta and Meadows creeks) in well-vegetated, high rainfall, permanently flowing systems. Similar well vegetated catchments that rated highly included an upland tributary stream of Hindmarsh River, Hadrian Creek in the Onkaparinga catchment, Chambers Creek in the Sturt River catchment and an upland tributary of the Little Para River. Three sites from the nutrient enriched North Para River catchment also had more taxa present than expected, indicating that a wide range of species have been able to exploit the high primary productivity of this waterway.

Biodiversity hotspots

Sites with a high number of species occurred across the region and were located in similar locations to the biodiverse catchments recognised by the AUSRIVAS models:

- Catchments of the Gawler, Torrens, Sturt, Onkaparinga and Hindmarsh rivers
- Brownhill Creek
- The streams of Fleurieu Peninsula - both those which flow directly to the sea and those flowing into Lake Alexandrina.

There are a number of conditions that explain the presence of high numbers of macroinvertebrate taxa. Some of the sites are in reaches that display high physical diversity in features such as stream-bed and channel structure, flow regime and riparian vegetation. It is likely that such sites represent remnant examples of the condition of many streams in the region prior to widespread human-induced changes to the landscape. Examples include some of the streams in conservation reserves. The Deep Creek in Deep Creek Conservation Park and streams adjacent to the park with similar catchment conditions (e.g. Callawonga and Coolawang creeks) contain high numbers of taxa. First Creek at Waterfall Gully (Figure 116) has been sampled extensively and has a very rich fauna, but this is probably biased by the greater sampling effort carried out at this site (it was sampled in every year of the program). Other sites with extensive native vegetation in their catchments, like those within Cleland Conservation Park, would also probably contain as many species. At other sites, high richness is a reflection of unique environmental conditions. For example, Suter (1987) noted that the permanent flow, slightly acid to neutral pH, low salinity, sandy substrate and closed swamp heath riparian vegetation of Tookayerta Creek catchment distinguish this stream from most others in S.A. As these conditions are favourable for many macroinvertebrate species, the creek supports a very rich fauna.

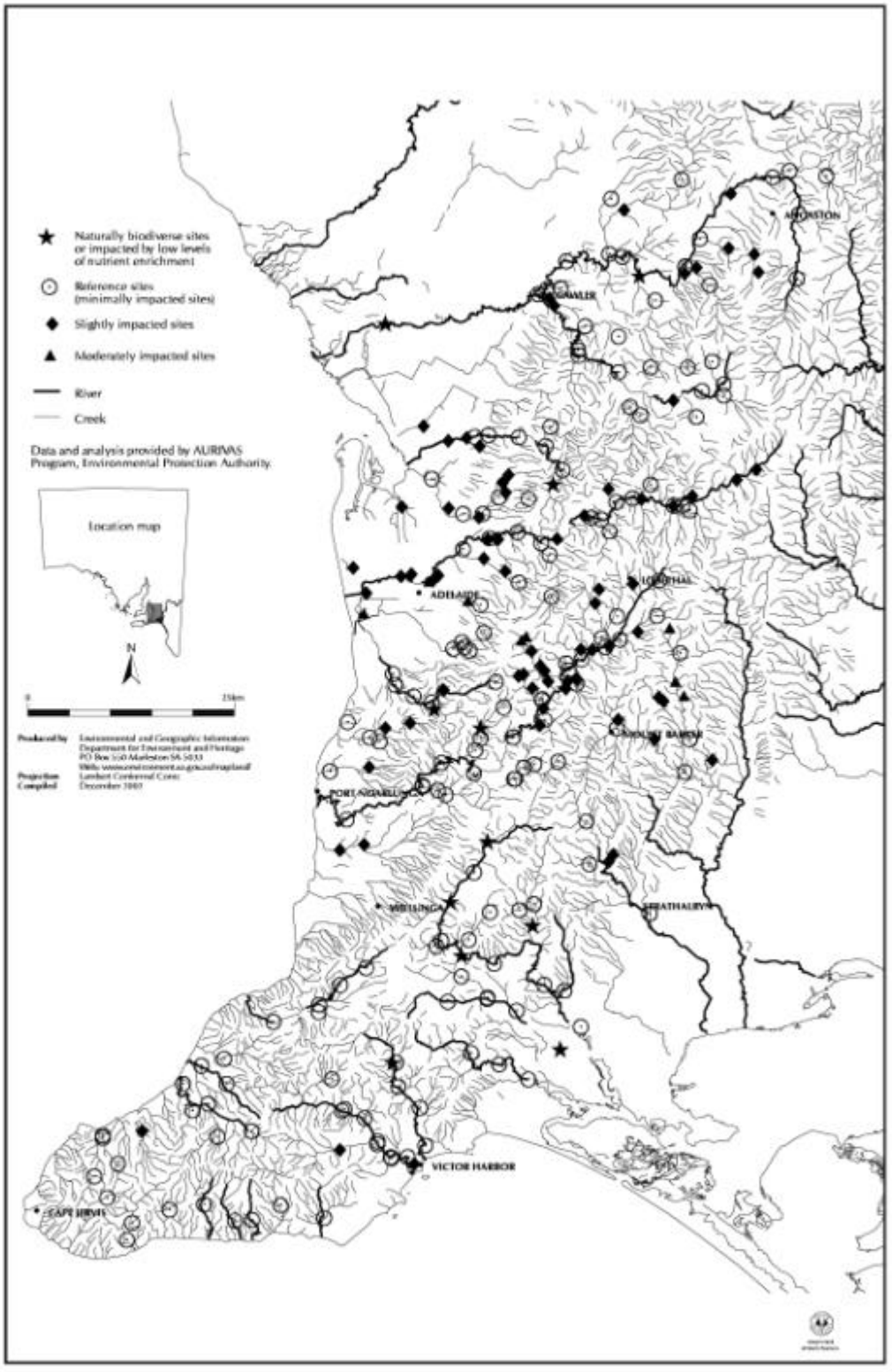

Figure 115.
Significant macro-invertebrate biodiversity areas for the greater Mount Lofty Ranges: Band Ratings for Sites in Study Area.

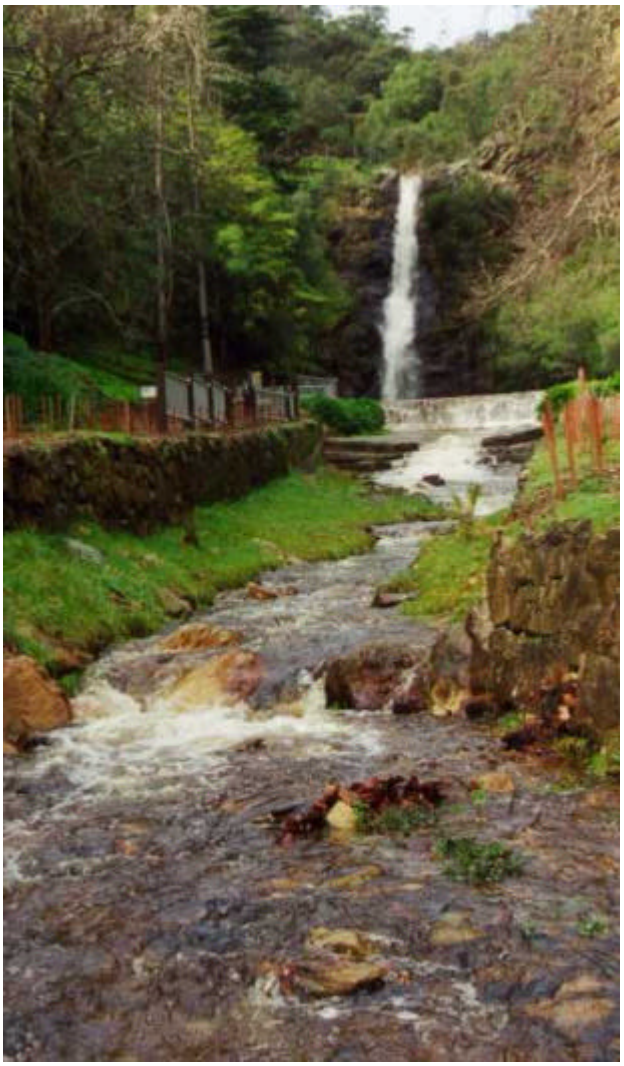

Figure 116.
First Creek at Waterfall Gully - a permanently flowing upland stream with extensive native vegetation in its catchment - contains a highly diverse fauna. (Photo: V. Tsymbal).

Many of the sites with high richness are in reaches that have been substantially modified from their natural condition, and display high primary productivity. They receive nutrients from agricultural runoff (containing fertilisers and manure from grazing stock), wastewater and runoff from urban areas. Modifications to light and thermal regimes (which accompany the removal of riparian vegetation and adjustments in channel morphology) are factors that promote the incorporation of available nutrients into microbiological matter. Productivity has been further enhanced where the permanency of water has been increased as a result of increased discharge to the reach, or conversely, decreased discharge from it because of flow impoundment. Low to moderate levels of nutrient enrichment can in some instances lead to increased biodiversity due to the promotion of more niches for secondary consumers to exploit (pers. observ.). Examples of sites experiencing these conditions are Malcolm Creek at Kersbrook Road, Second Creek at Stonyfell, Sturt River at Coromandel Parade, Spoehr Creek (Figure 117), several Hindmarsh River sites and Meadows Creek.

Figure 117.
Spoehr Creek, off Spoehr Road - a stream that has been substantially disturbed, but which receives a level of nutrient enrichment that supports a high number of invertebrate species. (Photo: S. Wade).

A small number of sites with a high biodiversity were located immediately downstream from a major impoundment, which had the effect of creating permanent water that is subject to limited or no flooding events. They included the Onkaparinga River: immediately downstream of Clarendon Weir and at Brooks Road, the South Para River at Plum Quarry Road (just downstream of the South Para Dam) and the Torrens River downstream of Gumeracha Weir. However, reduced disturbance caused by in-stream impoundments is only likely to favour macroinvertebrate populations in the short term. Those stream processes associated with medium to high flows are likely to be impacted by reduced flows are likely to affect the persistence of macroinvertebrates in the long term.

Threats to river health in the MLR

The major threats to river health in the region relate to factors that are known to impact on water quality, flow, sediment characteristics and riparian condition. Each of these can produce conditions in local waterways that make the persistence of some species impossible or limits their ability to maintain large enough population sizes to persist in the long term.

Given the range of land uses in the MLR and the growing human population in the region, it seems likely that substantial areas will continue to come under threat from urban encroachment, which invariably leads to changes in the landscape that degrade river health measurements. While some impacts that result from increasing urbanisation can be mitigated to some extent (e.g. stormwater wetlands to minimise water surges into waterways and provide some water quality treatment) there are invariably trade-offs in terms of

flood management that will degrade the health of local rivers and streams.

Opportunities to address invertebrate biodiversity

Programs such as AUSRIVAS that provide knowledge of the current condition of waterways are important because they give a baseline of river health that can be used to follow changes that occur to local catchments in the future. They can also help to inform management authorities of the choices that are available when planning re-developments and changes to the landscape in the future.

CONCLUSIONS AND CONSERVATION RECOMMENDATIONS

S. Croft[1]

THE STUDY REGION AND BIOGEOGRAPHIC VALUES

The Mt Lofty Ranges, of which the SMLR study area is a major component, is an island of forest and woodland surrounded by drier habitats to the north and east, and the ocean to the west and south. The SMLR, in particular, is in effect an outlier of the Bassian Zoogeographic region of temperate southern and eastern Australia. Within the SMLR many plant and vertebrate species exist as isolated populations from the greater areas of their natural distribution in the south-east of the continent.

The SMLR study region, covering an area of 6,282 square kilometres, represents just 0.6% of South Australia. Despite the relatively small size of the SMLR and extensive vegetation clearance, the region is highly biologically diverse, currently conserving:

- An estimated minimum of 1,100 native plant taxa[2]. The Biological Surveys within the region recorded nine plant species with a National conservation rating.
- Twenty-two resident native mammal taxa.
- 293 bird species (63% of the total bird species recorded for the State) including one of the largest concentrations of threatened bird taxa on mainland Australia (MLRINRMG 2002).
- 42 native reptiles, including one species with a National conservation rating and five species with a State conservation rating.
- Six of the State's 27 amphibian species.

VEGETATION COMMUNITIES

Vegetation mapping for the South Mt Lofty Ranges described 152 vegetation communities, which have been summarised into 51 groups for the purpose of map display according to common dominant overstorey species. The mapping region included a greater area than that defined for the Biological Survey study area.

The 152 described groups were defined using a combination of Biological Survey data, interpretation of aerial photography, ground truthing and literature survey.

In contrast, the floristic analysis presented in this report was based only on survey data, and did not include major ecosystems such as grasslands, mangroves and samphire communities. Forty-one vegetation groups were defined, based on similarity of their floristic composition (all perennial species at a quadrat were included in the analysis).

The majority of remnant vegetation within the study region occurs on soils least suitable for agriculture and/or urban development, and is dominated by Stringybarks (*Eucalypts obliqua* and *E. baxteri*), Long-leaved Box (*E. goniocalyx*) and Pink Gum (*E. fasciculosa*) forest and woodland formations. These communities also tend to be both the most floristically diverse and least modified vegetation remnants.

Poorly represented communities in the region tend to occur on the most fertile soils and/or were naturally restricted in area due to specific habitat requirements. They include River Red Gum (*E. camaldulensis*) and Manna Gum (*E. viminalis* ssp.) savannah Woodlands, once extensive in the region. Rare communities with naturally restricted distributions in the SMLR include swamps (often dominated by *Leptospermum* spp., sedges and rushes), Grey Box (*E. microcarpa*) Forest and Woodlands, Peppermint Box (*E. odorata*) Woodlands, and mallee communities (including those dominated by *E. socialis, E. incrassata, E. phenax* and *E. oleosa*). The poorly represented communities, including those associated with creeklines are generally highly weed-infested resulting in a loss of native plant diversity. The sampling effort across the major vegetation communities is shown in Table 61.

[1] Biodiversity Survey and Monitoring Section, Science & Conservation Directorate, Department for Environment and Heritage, GPO Box 1047, Adelaide 5001.

[2] Note, the study region is more restricted than the Mount Lofty Ranges region defined in the Integrated Natural Resource Management Plan (MLRINRMG in prep.) and the Biodiversity Plan (Blason and Carruthers in prep.). The SMLR study region is also more restricted than the Southern Lofty herbarium region. Hence biodiversity statistics are not directly comparable between the aforementioned documents/data sources.

Table 61.
Approximate proportion of structural vegetation communities surveyed during SMLR Biological Survey.

Structural Vegetation Community	Approximate % of survey quadrats
Eucalyptus obliqua dominated Open Forests and Woodlands	32
Eucalyptus fasciculosa dominated Forests and Woodlands	19
Eucalyptus goniocalyx dominated Forests and Woodlands	8
Eucalyptus baxteri, *E. cosmophylla*, *E. fasciculosa* Low Woodland or Low Open Forest	13
E. viminalis ssp.*viminalis, E. leucoxylon, E. camaldulensis* Savannah Woodland	4
E. viminalis ssp.*viminalis, E. leucoxylon, E. ovata* Woodland or Open Forest	6
E. odorata, *E. fasciculosa*, *E. leucoxylon*, *E. microcarpa*, *E. porosa* or *Allocasuarina verticillata* dry savannah Woodlands	6
Mallee species forming Mallee or Very Low Woodland	4
Coastal shrublands	<1
Swamps	9

SURVEY EXPECTATIONS AND NOTABLE FINDINGS

Flora

The flora of the region has been comprehensively surveyed. In addition to the 1,177 survey sites included in this analysis, numerous other smaller-scale surveys have been conducted. The Biological Surveys have contributed towards comprehensive vegetation mapping of the study region. This has enabled a more accurate assessment of conservation priorities e.g. many poorly represented vegetation associations are under threat due to weed invasion or other forms of indirect long-term clearance. Although no new flora records for the region were recorded during Biological Surveys, an opportune record of *Eucalyptus conglobata* confirmed the existence of this species, previously thought to be extinct from the Southern Lofty herbarium region.

The Biological Surveys have provided baseline data on species composition within the larger vegetation remnants. In general, however, the survey sites are within larger areas of more intact remnants. In particular, Crown Land is disproportionately surveyed[3]. Seventy seven percent of remnant vegetation is privately owned, of which only 3% is formally protected by Heritage Agreements. There is limited information concerning the condition of privately owned remnant vegetation.

The Biological Surveys aim to provide an inventory of the main vegetation communities (Table 61). Rare species and smaller areas of rare habitat are not specifically targetted.

Although the SMLR are an island of higher rainfall communities surrounded by drier habitat, only 13 endemic plant taxa are recognised. However, there are a number of species with small disjunct populations within the SMLR which appear morphologically distinct from populations outside the region (Peter Lang, pers. comm. 2002). These include:

- ***Pultenaea laxiflora*** On white sands in the Sandy Creek, Para Wirra area,
- ***Glycine tabacina*** **(Variable Glycine).** Within the SMLR, it occurs in the Sturt Gorge,
- ***Eucalyptus diversifolia*** **(White Mallee).** A very small disjunct population occurs in Blackhill Conservation Park,
- ***Eucalyptus brachcalyx* x *rugosa***. A small and isolated relict population occurs in Torrens Gorge,
- ***Eriostemon pungens, Eriostemon brevifolius*** and ***Olearia teritifolia***. Small, disjunct populations of these three species occur in Stoneyfell Quarry and/or the Horsnell Gully area, associated with quartzite, and
- ***Pultenaea hispidula*** occurs in the central Mt Lofty Ranges.

Further research is required to determine if the above species (and other species with similar relict populations) are actually new species. Regardless of their taxonomic status, however, conservation programs should recognise the genetic diversity of these disjunct populations.

Fauna

Although this survey was the single-most extensive fauna survey of the region to date, the bird fauna has been extensively studied, and to a lesser extent, mammals and reptiles are well known. The survey, therefore, was not expected to discover any new species or even new records for the region. However, it soon became clear that what is largely regarded as common knowledge, particularly of the fauna, of the "backyard" of Adelaide, was not supported by SA Museum specimens or database records. A major aim of the survey, therefore, was to update and add to these records.

[3] Approximately 23% of remaining native vegetation in the Mount Lofty Ranges occurs on Crown Land (MLRINRMG 2002).

Due to the genuine rarity of some species, and the criteria for site selection causing a bias against some habitat specialists, the overall results of the survey confirmed the status and distribution of the more common species, while highlighting a shorter list of species that warrant further investigation. These are as follows:

Mammals

- **Common Brushtail Possum (*Trichosurus vulpecula*)**

The Common Brushtail Possum is more commonly seen than the Common Ringtail Possum because it still occupies habitats that have been largely cleared for agriculture and/or urban development, namely areas occupied by humans. However, brushtail possums are actually less common than ringtail possums and are at least uncommon in the majority of remnant woodlands of the SMLR. The survey results support its Rare rating in draft *National Parks and Wildlife Act* schedules.

- **Koala (*Phascolarctos cinereus*)**

Conversely, the Koala (introduced to the SMLR) appears to be expanding its distribution and increasing in abundance in the study region. Because the Koala prefers to feed on a limited number of eucalypt species (all of which have been extensively cleared since European settlement), there is a danger of tree loss due to Koala feeding pressures.

- **Southern Brown Bandicoots (*Isoodon obesulus*)**

Bandicoots were recorded at 25 of the 102 SMLR survey sites. All recordings were south of the River Torrens, mostly centred on the area between Greenhill Road and Scott Creek CP. It seems that the distribution of this species has remained stable since Paull's (1985) survey. However, largely due to fox baiting, their populations seem to have increased within their area of distribution.

- **Rodents and Yellow-footed Antechinus**

The Swamp Rat, *Rattus lutreolus*, Bush Rat, *Rattus fuscipes*, and the introduced Black Rat, *Rattus rattus*, require relatively dense vegetation. However, it appears that as conditions become drier moving north within the SMLR, first the Swamp Rat, then the Bush Rat disappears and the Black Rat becomes dominant. As there are no SA Museum records of any native rat species north of the River Torrens, it is not possible to determine if the introduced Black Rat has displaced any native species in the drier Barossa/South Para region. The Yellow-footed Antechinus, *Antechinus flavipes*, which is often found in the same locations as the above rat species and prefers forest and woodland with a relatively dense understorey. This species also becomes progressively more rare travelling north, and they have only been recorded from four locations north of the River Torrens.

- **Platypus (*Ornithorhynchus anatinus*)**

Although the Platypus has not been recorded for over 50 years in the study region, its continued existence cannot be discounted. A survey specifically targetting this species (namely, suitable watercourses) is recommended.

Birds

The survey findings support the now widely accepted view that many once common woodland birds within the SMLR are declining. For example, very few records of the Diamond Firetail, Brown Treecreeper and Hooded Robin were made during the survey.

In addition to habitat loss and fragmentation, changes in vegetation and the spread of urbanisation on the Adelaide Plains has also affected the adjacent hills' fauna. Since the 1960's, a substantial increase in plantings of flowering Australian native trees in urban Adelaide has created an extensive open woodland. This has advantaged several of the more aggressive nectar feeding species and others that prefer this parkland style habitat. Unfortunately these relatively young trees do not as yet provide opportunities for hollow-nesting birds. So whilst providing an enormous food resource for species of lorikeets, these aggressive nesters also compete for hollows in the mature woodland areas in the adjacent ranges. Aggressive group-living birds such as New Holland Honeyeaters, Noisy Minors, Magpies and Red-wattle Birds also impact on the more timid woodland species in the ranges.

Reptiles

- **Rosenberg's Goanna (*Varanus rosenbergi*)**

No records were made during the six weeks of site-based field-work. However, the survey coordinator (D. Armstrong) saw one individual near Myponga CP and one individual at Mt Gawler North Native Forest Reserve, during reconnaissance trips. A further five verifiable sightings were made between 1999 and 2001. The paucity of records for this large easily recognisable species indicates that prospects for its long-term survival within the region are bleak.

- **Cunningham's Skink (*Egernia cunninghami*)** and **Yellow-bellied Water Skink (*Eulamphrus heatwoli*)**

Both these species occur as isolated populations within the study area. Cunningham's Skink appears to have disappeared from the Adelaide Hills face around Belair and Blackwood. In South Australia, the Yellow-bellied Water Skink is known only from the Fleurieu district where it is restricted to creek lines and swamps. Both species may be susceptible to habitat fragmentation, through increased fire frequency and past timber cutting practices.

- **Flinders Worm Lizard (*Aprasia pseudopulchella*)**

There were no records of the Flinders Worm Lizard obtained during the recent survey. However, a number

of SA Museum records, obtained in recent years, show it occurring along the eastern foothills and slopes. It is possible that within the SMLR it could still be found between Elizabeth and Gawler. Further surveys are required to determine the status of this Nationally Vulnerable species.

- **Carpet Python (*Morelia spilota*)**

It is probably doubtful, or at least unclear, that Carpet Pythons still naturally occur within the region. However, further searches in suitable habitat (eastern parts of the SMLR) may reveal its presence in the region.

- **Olive Snake-lizard (*Delma inornata*)**

During the survey period, specimens were collected opportunistically. These were from beneath siltstone slabs in grassland along a watercourse from which stock had been excluded, and as road kills adjacent to roadside grassland, at Highland Valley (south-east of Mount Barker). This appears to be an isolated population in the region, and its long-term persistence in the region is uncertain.

Invertebrates

An estimated 10,000 invertebrate species occur in the Mt Lofty Ranges. The majority are unable to be identified to species level and little is known of their ecology. The AusRivas program provided a relatively comprehensive survey of freshwater macro-invertebrates, enhancing knowledge of species distributions and habitat relationships. The Biological Survey was the first attempt to systematically survey all invertebrate families within the region. Although, still on a limited scale (74 survey sites, with a focus on ground-swelling species), the survey has provided new distribution and abundance data for many invertebrate taxa.

RECOMMENDATIONS FOR FURTHER RESEARCH/SURVEY WORK

Plants

1. A formal, wide-scale program to assess the condition of vegetation remnants, in particular targetting vegetation communities across all land tenures.
2. Identify locations of vegetation communities with a conservation rating. Where necessary, identify their tenure, ecological condition, size and biodiversity. Prioritise remnants desirable for inclusion in the Reserve System or to be placed under Heritage Agreement, or similar conservation covenant.
3. Implement mechanisms to increase the conservation tenure of privately owned remnants (not already under Heritage Agreement).
4. Determine the taxonomic status of several species with disjunct populations within the SMLR, and which appear morphologically distinct, from populations outside the region (see above for examples of species).

Mammals

1. Conduct further spotlighting surveys and monitoring programs to more accurately assess the population abundance, distribution and ecological requirements of the Common Brushtail Possum.
2. Monitor representative areas of eucalypt species favoured by koalas (especially *E. viminalis* and *E. camaldulensis*) that are vulnerable to over-browsing.
3. Conduct further searches for the Swamp Rat, Bush Rat and Yellow-footed Antechinus in the study area, primarily north of the River Torrens.
4. Identify watercourses that may still provide suitable habitat for the Platypus and intensively search of this species, widely regarded as extinct in the region.

Birds

1. To address the decline in many species of native birds the Mt Lofty Ranges "Bush for Birds" project is being implemented. This large-scale project aims to restore habitats for a range of species, rather than focussing on an individual species approach. Initially, the project aims to:
   - Create large areas of habitat with suitable vegetation structure by various means, including active revegetation, fencing and/or stock control to allow natural regeneration, weed and pest control.
   - Re-establish native vegetation on areas of more fertile soils, now largely cleared (MLRINRMG 2002).

2. Some individual species are the subject of current academic research e.g. Black-chinned Honeyeater.

The Spotted Quailthrush and Bush Stone Curlew could possibly be extinct in the SMLR. Further intensive searches of suitable habitat are required to determine their status.

Reptiles

1. Conduct further surveys to more accurately identify the distribution and population numbers of Rosenberg's Goanna, Cunningham's Skink, Yellow-bellied Water Skink, Flinders Worm Lizard, Carpet Python and Olive Snake-lizard (see above for discussion).

Invertebrates

The potential for further research is enormous with relatively few families being comprehensively surveyed and described taxonomically.

Even the existing survey records need considerable additional work to identify them to genus or species level.

CONSERVATION MANAGEMENT ISSUES

Due to the SMLR's proximity to Adelaide, and a high proportion of fertile soils, 87% of the pre-European vegetation has been cleared and the majority of the remainder is highly fragmented and/or modified to some degree. Very few first growth forest and woodland trees remain.

Historical factors contributing to the critical state of the SMLR remnant vegetation include clearance, fragmentation, grazing, logging, firewood collection and mining. Despite the implementation of the Native Vegetation Act (1991), intended to prevent broad acre clearance, degradation of remnant vegetation continues. The majority of this damage is not due to direct clearing or felling of individual old trees; rather it is a gradual process contributing to an ongoing reduction in habitat quality. Factors contributing to this degradation include clearance for house site construction and fire hazard reduction, weed and feral animal invasion, native herbivores, fire, rubbish dumping, *Phytophthora* (a root-rot fungus) and damming of waterways. The latter has increased significantly in recent years to provide water to irrigate extensive new areas planted with grape vines. Impacts from run-off containing pesticides, herbicides and sediment from peri-urban, roadside and horticultural/agricultural activities is also impacting upon remnant vegetation.

Simply retaining all existing stands of vegetation will not ensure a status quo in the natural biodivesity. An effect of past clearance is that much of the vegetation is now small fragmented blocks. Sixty-nine percent of remnant blocks in the Mt Lofty Ranges are ten hectares or less and 96% of remnants are less than 100 hectares (Blason and Carruthers in prep.). Many remnants are too small and isolated to maintain viable populations of native flora and fauna (MLRINRMG 2002). Sustained and active (often intensive) management is required to maintain the natural biodiversity of most remnants.

Both the Mount Lofty Ranges Biodiversity Plan (Blason and Carruthers in prep.) and the Integrated Natural Resource Management Plan (MLRINRMG 2002) contain comprehensive recommendations for conservation management. The Interim Natural Resource Management Strategy focuses upon developing a coordinated appoach to management, where natural resource management is closely integrated with all forms of land use. Conservation programs will encourage and assist landowners and the local community to actively participate, and be an essential element of biodiversity conservation (Robinson and Armstrong 1999). The Strategy recommends that an ongoing regional Natural Resource Management Group be established to promote a coordinated and integrated management approach by community groups, Local Government, Soil Conservation Boards, Catchment Water Management Boards, Animal and Plant Control Boards and other government departments. The Department for Environment and Heritage will play a key role in encouraging linkages and cooperation between conservation projects with the aim of achieving Landcare and biodiversity outcomes (Robinson and Armstrong 1999).

The Integrated Natural Resource Management Plan (MLRINRMG 2002) also outlines resource condition targets and provides detailed recommended actions for managing fragmentation and ongoing loss of habitat. Other than broad protection under the *Native Vegetation Act (1991)*, 66,450 hectares of remnant vegetation in the region, remains outside of Reserves, Heritage Agreement areas, and other protective mechanisms and have no formal protection. A key recommendation of the Integrated Natural Resource Management Plan (MLRINRMG 2002) is to place large areas of privately owned land under formal conservation agreements. Current programs and practices to manage remnant habitat are comprehensively outlined by MLRINRMG (in prep.).

Many of the threats to natural biodiversity in the SMLR, and hence management requirements, are applicable to remnant vegetation of the agricultural regions, in general. These include:

- Control of environmental weeds and/or weeds associated with threatened plant species
- Management of Total Grazing Pressure (both introduced and native species)
- Control of feral animals (particularly cats and foxes)
- Fire management
- Lack of habitat hollows and competition for existing hollows form introduced species
- Revegetation to provide corridors and buffer zones.

All of the above issues need to be addressed in the study region. However, there are also other management issues, which although not confined to the Mount Lofty Ranges, are particularly significant. These include:

- The wide distribution of many different weed species across the fragmented areas of natural vegetation is a major management problem. With a properly coordinated effort over a long period successful control of at least a range of woody weed species can however be achieved.
- The impact of *Phytophthora* spp. on native vegetation. Due to the generally high rainfall and widespread presence of susceptible native plants *Phytophthora* is now widespread throughout the study region. A *Phytophthora* project officer has been appointed for the region and an Action Plan has recently been produced.
- Inappropriate use of fire. Due to the very high human population in the region, minimising fire risk is a high priority in the Hills. However, this needs to be balanced against the adverse impacts of too-frequent burning for hazard reduction (e.g. increase in weeds, loss of native species).

- Disruption of water regimes and water contamination.
- Fox baiting is essential to prevent loss of native fauna and the spread of weeds. However, the indirect impacts of fox baiting also needs to be considered (e.g. increases in rabbit and, possibly, feral cat populations). Off-target impacts of poisoning baits also need to be managed. In a highly populated area such as the SMLR, baiting also needs to be managed very carefully to prevent off-target impacts such as loss of pets.
- Tree die-back, from a variety of causes, but particularly lerps, mistletoe infestation, Mundulla Yellows, increased insect attack, vegetation clearance and/or altered water regimes. Many of these factors are correlated. Trees particularly susceptible to die-back in the study region are Pink Gums (*E. fasciculosa*) and River Red Gums (*E. camaldulensis*).
- The collection of moss rocks from the eastern part of the study region has been an issue for many years (MLRINRMG 2002). "While a code of practice has been produced for moss rock collectors, there is still some concern regarding the habitat loss and landscape impact associated with the industry (MLRINRMG 2002).
- Loss of dead trees and associated tree hollows. This is also a significant issues in the South East of the State. Currently dead trees are not protected under clearance legislation. However, there are proposed amendments to the *Native Vegetation Act (1991)* to protect standing dead trees that are 600mm or more in diameter and 300mm above the ground and provide habitat for roosting and nesting for a range of species (MLRINRMG 2002).

Actions to conserve habitat will in the long-term also help ensure the long-term viability of fauna populations currently under threat. For example, increasing the area of remnant vegetation, enhancing its condition, and providing corridors and buffer zones linking remnant patches will assist in maintaining threatened fauna species.

The major challenge to arrest, and hopefully reverse, the ongoing decline in the biodiversity of the SMLR is still before us.

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APPENDIX I

DESCRIPTION OF ENVIRONMENTAL ASSOCIATIONS OCCURRING IN SURVEY REGION BOUNDARY.

Part 1. Environmental associations in study area occurring within FLEURIEU IBRA sub-region

Environmental Association		Total Area (ha)	% of vegetation remaining	Description
3.2.1	Mt. Rapid	12,763	3.9	Hills and ridges on interbedded shale and arkose, locally overlain by tillite. Relict fans form broad flat surfaces near Cape Jervis where some coastal cliffs occur. Open parkland with sown pasture is used for livestock grazing. The scenery of the coastline is dominated by tall cliffs that vary in form and steepness, the amount of rock outcrop and vegetative cover.
3.2.2	Deep Creek	12,984	30.2	A long dissected ridge of phyllite and greywacke with cliffs, or beaches and dunes along the coastline. The cover is predominantly open parkland over sown pasture with widespread remnants of woodland and forest. Inland views tend to be middle-ground panoramic, featuring grassy ridge crests and valley floors with bracken and reed or remnant forest vegetation.
3.2.3	Fleurieu	30,389	15.6	An undulating to hilly dissected tableland on lateritized sandstone. There is a mixed cover of open parkland, forest plantation and woodland.
3.2.4	Inman Valley	37,130	4.4	A series of low dissected ridges and spurs on tillite and arkose, with dunes and beaches or cliffs along the coast. The cover is open parkland over sown pastures and cereal crops.
3.2.5	Bob Tiers	15,761	21.3	Ridges on schist and gneiss with dissected slopes and remnants of laterite-capped tableland. Open parkland with an understorey of sown pastures and heath is used for grazing livestock. The smooth hill and ridge crests are generally cleared, but remnants of native forest are common on lower slopes and in valleys, and are frequently left along roadsides.
3.2.6	Kerby Hill	10,433	3.2	Ridges on greywacke and remnants of laterite-capped tableland. There is a cover of open parkland with an understorey of sown pastures, cereal crops and heath.
3.2.7	Sandergrove	53,774	2.9	An undulating plain on tillite with areas of calcrete merging into alluvial fans. The cover is open parkland and cropland. Remnants of mallee vegetation are local features in this predominantly agricultural landscape.
3.2.8	Scotts Hill	97,645	0.3	Structurally controlled ridges with steep slopes, on metasediments. There is cover of open parkland with an understorey of sown pasture. Views are often impressive due to the stark nature of the landscape, formed by grass covered hills, often without any tree growth, frequent rock outcrops, and steeply incised valleys, locally steepening into gorges.
3.2.9	Bull Knob	9,231	13.4	Ridges with dissected slopes on quartzite and arkose. The cover is parkland with an understorey of sown pasture. Below the crests landscape dimensions quickly diminish and views are frequently foreground enclosed or perspective along valley floors, which with willows, poplars, pine trees and blackberry undergrowth contrast sharply with the grasslands or open blue gum woodlands of the hills.
3.2.17	Eden Valley	68,882	0.5	An undulating upland plain on metasediments with broad interfluves and occasional higher hills. The cover is mainly open parkland over sown pastures, with some pine plantations and vineyards.

Part 2. Environmental associations in study area occurring within MT. LOFTY IBRA sub-region REGION

Environmental Association		Total Area (ha)	% of vegetation remaining	Description
3.2.10	Mt Compass	31,668	7.2	Hills and ridges on tillite and schist with isolated laterite-capped tableland remnants, broad floodplains and alluviated upland basins. The river valleys characteristically provide perspective views in which irrigated pastures are notable features.
3.2.11	Mt Wilson	15,284	1.5	Steep ridges and hills on interbedded metasediments and limestone, with beaches or coastal cliffs. The foreground is usually dominated by grassy, rounded hill crests and frequently steep, rocky sideslopes.
3.2.12	Aldinga	26,475	1.6	Fans with areas of calcrete on the surface, merging into a gently undulating plain with occasional laterite-capped tableland remnants. Cliffs alternate with beaches and dunes along the coastline. There are three major forms of cover: cropland pastures on the plain; horticultural plantations on the fans and open parkland over grazed pastures on the steeper slopes.
3.2.13	Clarendon	28,050	28.4	Hilly uplands with dissected lateritic tableland remnants. There is cover of mixed open parkland, forest and woodland, with small areas of orchards. Most of the association is used for grazing but much grazing land as well as forest and woodland areas are part of a recreational resource for metropolitan Adelaide.
3.2.14	Mt Terrible	17,903	33.2	Ridges and hills with steep slopes on metasediments. There is a mixed cover of open parkland over pastures and orchards. Much of the association is urban fringe, and is part of a recreational resource for metropolitan Adelaide.
3.2.15	Uraidla	14,411	22.0	Hilly uplands on sandstone and shale with long smooth slopes. The cover is parkland and orchards. Much of the association is urban and urban fringe, and is part of a recreational resource for metropolitan Adelaide. The combination of dissected topography, intensive land use and generally lush growth due to the high rainfall, has made this landscape intricate and unique, as a view from the Mt Lofty summit will show.
3.2.16	Hahndorf	61,693	3.5	An undulating to hilly high plain on shale with narrow, northerly trending quartzite strike ridges. There is a mixed cover of parkland with an understorey of sown pastures, orchards and some plantation forests.
3.2.18	Barossa	13,962	4.5	An intramontane basin below gentle footslopes and fans. There is a cover of vines and limited parkland with a pasture understorey.
3.2.19	Para	34,863	23.5	A hilly upland with broad crests and dissected slopes on schist and gneiss. There is a mixed cover of pine plantations and open parkland with an understorey of sown pasture.
3.2.20	Bare Hill	13,129	10.6	Densely dissected uplands on siltstone. The cover is predominantly open parkland over sown pasture with some orchards and vegetable cultivation.
3.3.1	Rosedale	32,888	2.2	An undulating to rolling plain on shale with broad floodplains. The cover is predominantly open parkland with an understorey of sown pastures and some vines.

APPENDIX II

FAUNA SURVEY QUADRATS SHOWING SELECTED VEGETATION AND PHYSICAL PARAMETER DETAILS. A TOTAL OF 157 QUADRATS WERE SURVEYED FROM THREE BIOLOGICAL SURVEYS.

Notes

The first two or three figures in "Quadrat No." column represent the survey number namely, 117 = survey 117, 52 = survey 52 and 97 = survey 97.

Vertebrates: All quadrats were surveyed for vertebrates. Hair tube sampling was conducted at 100 of the 111 survey 117 quadrats. The 11 quadrats at which hair tube sampling was **excluded** are followed by an asterisk. (*)

Invertebrates: Quadrats in bold were surveyed for invertebrates (74 quadrats).

Overstorey and Understorey Dominants: Numbers in brackets indicate Braun/Blanquet cover abundance code. N=not many 1-10 individuals, T=sparsely or very sparsely present (less than 5%), 1=plentiful but of small cover (less than 5%), 2=any number of individuals covering 5-25% of the area, 3= any number of individuals covering 25-50% of the area, 4=any number of individuals covering 50-75% of the area, 5=any number of individuals covering 75-100% of the area

Quadrat No.	Structural Formation	Overstorey Dominants	Understorey Dominants	Landform	Soil	Alti-tude (m)	Slope (^{0})	Aspect (^{0})
117ADE00701	Low Woodland	*Eucalyptus baxteri* (2)	*Hakea rostrata* (2), *Hakea carinata* (2)	ridge	sandy loam	482	3	308
117ADE00801	Low Open Forest	*Eucalyptus leucoxylon* spp. *leucoxylon* (3), *Acacia pycnantha* (3)	**Olea europaea* spp. (3)	hill slope	clay loam	378	0	0
117ADE00901	Open Forest	*Eucalyptus obliqua* (3), *Eucalyptus baxteri* (2)	*Hakea rostrata* (3), *Pultenaea daphnoides* (2), *Leptospermum lanigerum* (2)	hill slope	sandy loam	556	12	322
117ADE01001	Open Forest	*Eucalyptus viminalis* spp. *viminalis* (2), *Eucalyptus leucoxylon* spp. *leucoxylon* (2)	*Leptospermum continentale* (3), **Rubus ulmifolius* var. *ulmifolius* (2)	gully	sandy clay loam	530	10	270
117ADE01101	Open Forest	*Eucalyptus obliqua* (3), *Eucalyptus baxteri* (2)	*Pultenaea daphnoides* (2), *Acacia myrtifolia* var. *myrtifolia* (2), *Hibbertia incana* (2), *Acrotriche fasciculiflora* (2), *Platylobium obtusangulum* (2)	hill slope	sandy loam	549	12	270
117ADE01201	Tall Shrubland	*Acacia retinodes* var. *retinodes (swamp* form*)* (3)	*Leptospermum continentale* (3)	stream channel	silty clay loam	380	4	352
117ADE01301	Very Low Woodland	*Eucalyptus cosmophylla* (2)	*Allocasuarina muelleriana* spp. *muelleriana* (3), *Pultenaea acerosa* (1), *Lepidosperma viscidum* (1)	hill slope	loamy sand	428	40	350

Quadrat No.	Structural Formation	Overstorey Dominants	Understorey Dominants	Landform	Soil	Alti-tude (m)	Slope (^{0})	Aspect (^{0})
117ADE01401	Open Mallee	*Eucalyptus fasciculosa* (2)	*Xanthorrhoea quadrangulata* (2), *Allocasuarina muelleriana* spp. *muelleriana* (2), *Opercularia turpis* (2), *Dillwynia hispida* (2), *Acacia pycnantha* (2)	hill slope	loamy sand	326	23	10
117ADE01501	Woodland	*Eucalyptus leucoxylon* spp. *leucoxylon* (2), *Eucalyptus camaldulensis* var. *camaldulensis* (2)	*Allocasuarina verticillata* (2), *Acacia pycnantha* (2), **Plantago lanceolata* var. *lanceolata* (2), **Briza maxima* (2), **Avena barbata* (2)	hill footslope	clay loam	285	22	304
117ADE01601	Low Woodland	*Eucalyptus obliqua* (2), *Eucalyptus fasciculosa* (2)	*Hibbertia incana* (4), *Hakea carinata* (3), *Hakea rostrata* (2), *Olearia ramulosa* (2), *Astroloma conostephioides* (2)	hill slope	loamy sand	420	7	233
117ADE01701	Open Forest	*Eucalyptus leucoxylon* spp. *leucoxylon* (2)	*Acacia pycnantha* (3), *Olearia ramulosa* (2), *Astroloma conostephioides* (1)	hill slope	sandy loam	375	13	334
117ADE01801	Low Woodland	*Eucalyptus baxteri* (2)	*Hakea rostrata* (2)	ridge	sandy loam	464	3	282
117ADE01901	Open Forest	*Eucalyptus baxteri* (2), *Eucalyptus obliqua* (2)	*Pultenaea daphnoides* (2), *Xanthorrhoea semiplana* spp. *semiplana* (2), *Hakea rostrata* (2), *Hakea carinata* (1)	hill crest	sandy loam	495	1	304
117ADE02001	Woodland	*Eucalyptus leucoxylon* spp. (2)	**Briza maxima* (2), **Avena barbata* (1), **Holcus lanatus* (1)	gully	clay loam	400	18	250
117ADE02101	Tall Shrubland	*Leptospermum lanigerum* (3), *Acacia retinodes* var. *retinodes (swamp* form*)* (2), **Oxylobium lanceolatum* (2)	*Blechnum minus* (3), *Gleichenia microphylla* (3), *Gahnia sieberiana* (2)	gully	sand	608	19	100
117ANG00101	Mallee	*Eucalyptus baxteri* (3)	*Xanthorrhoea semiplana* spp. (3), *Hibbertia incana* (2)	hill slope	sandy clay loam	537	3	340
117BAR00601*	Low Woodland	*Callitris gracilis* (2), *Acacia pycnantha* (1), *Eucalyptus fasciculosa* (T)	*Baeckea behrii* (2), **Chrysanthemoides monilifera* (2), *Lepidosperma canescens* (2)	sandy plain	sand		0	0
117BAR00701	Open Forest	*Eucalyptus leucoxylon* spp. *pruinosa* (3)	*Acacia pycnantha* (2), **Chrysanthemoides monilifera* (2)	hill footslope	clay loam	268	3	270
117BAR01401*	Low Woodland	*Eucalyptus fasciculosa* (2), *Eucalyptus goniocalyx* (2)	*Calytrix tetragona* (3), *Acacia pycnantha* (2), *Allocasuarina muelleriana* spp. *muelleriana* (2), *Hakea rostrata* (2)	hill slope	loamy sand	360	4	195
117BAR01501*	Mallee	*Eucalyptus goniocalyx* (3), *Eucalyptus fasciculosa* (T)	*Xanthorrhoea semiplana* spp. *semiplana* (5), *Allocasuarina muelleriana* spp. *muelleriana* (T), *Acacia pycnantha* (T), *Hakea rostrata* (T)	hill slope	clayey sand	343	9	26

Quadrat No.	Structural Formation	Overstorey Dominants	Understorey Dominants	Landform	Soil	Alti-tude (m)	Slope (^{0})	Aspect (^{0})
117BAR01601*	Mallee	*Eucalyptus goniocalyx* (3), *Eucalyptus fasciculosa* (2)	*Xanthorrhoea semiplana* spp. *semiplana* (2), *Hakea rostrata* (2)	hill slope	loamy sand	396	3	304
117BAR01701*	Open Forest	*Eucalyptus obliqua* (4)	*Microlaena stipoides* var. *stipoides* (4), *Gramineae sp*. (4), **Briza maxima* (3), *Oxalis perennans* (1), *Dichondra repens* (1)	hill footslope	sandy loam		3	314
117BAR01801*	Woodland	*Eucalyptus camaldulensis* var. *camaldulensis* (3)	*Hydrocotyle laxiflora* (3), *Microlaena stipoides* var. *stipoides* (3), **Echium plantagineum* (2), *Senecio quadridentatus* (T)	hill slope	sandy clay loam		7	245
117BAR01901*	Low Open Forest	*Eucalyptus obliqua* (4)	*Acacia pycnantha* (2), *Xanthorrhoea semiplana* spp. *semiplana* (2), *Astroloma conostephioides* (2), *Hakea rostrata* (2)	hill slope	sandy loam	440	-6	50
117BAR02001	Low Open Forest	*Eucalyptus leucoxylon* spp. *pruinosa* (3), *Eucalyptus viminalis* spp. *cygnetensis* (N)	*Astroloma conostephioides* (2), *Xanthorrhoea semiplana* spp. (2), *Gonocarpus elatus* (2), *Acacia pycnantha* (1)	hill slope	clay loam	515	6	60
117BAR02101	Low Woodland	*Callitris gracilis* (2), *Eucalyptus fasciculosa* (2)	*Calytrix tetragona* (2), *Astroloma conostephioides* (2), *Lepidosperma viscidum* (2)	plain (incl undulating plain)	sandy loam	236	0	0
117BAR02201	Low Open Forest	*Callitris gracilis* (2), *Eucalyptus fasciculosa* (2)	*Calytrix tetragona* (2), *Astroloma conostephioides* (1)	plain (incl undulating plain)	clayey sand	210	2	343
117BAR02301	Low Woodland	*Callitris gracilis* (3), *Eucalyptus fasciculosa* (2)	*Acacia myrtifolia* var. *myrtifolia* (2), *Cheilanthes austrotenuifolia* (2)	hill slope	sandy loam	285	7	150
117BAR02401	Open Mallee	*Eucalyptus porosa* (2), *Eucalyptus odorata* (2)	*Acacia pycnantha* (2), *Hibbertia exutiacies* (2), *Spyridium parvifolium* (1), *Pultenaea largiflorens* (1)	hill slope	clay loam	303	4	345
117BAR02501	Woodland	*Eucalyptus camaldulensis* var. *camaldulensis* (2)	*Callistemon sieberi* (2), **Avena barbata* (2), *Dodonaea viscosa* spp. *spatulata* (1), *Acacia paradoxa* (1)	stream bank	medium clay	246	4	100

Quadrat No.	Structural Formation	Overstorey Dominants	Understorey Dominants	Landform	Soil	Alti-tude (m)	Slope (^{0})	Aspect (^{0})
117BAR02601	Low Woodland	*Eucalyptus leucoxylon* spp. *pruinosa* (2)	*Acacia pycnantha* (2), *Hibbertia stricta* var. *stricta* (2), *Gonocarpus elatus* (2), *Dodonaea viscosa* spp. *spatulata* (2), *Hibbertia exutiacies* (2)	hill slope	sandy clay loam	283	10	280
117BAR02701	Low Open Forest	*Eucalyptus obliqua* (2), *Eucalyptus goniocalyx* (2)	*Astroloma conostephioides* (2), *Xanthorrhoea semiplana* spp. *semiplana* (2), *Acrotriche depressa* (2), *Hibbertia exutiacies* (2)	hill slope	sandy loam		10	270
117BAR02801	Woodland	*Eucalyptus goniocalyx* (2)	*Acacia paradoxa* (2), *Dodonaea viscosa* spp. *spatulata* (2), *Pteridium esculentum* (2), *Xanthorrhoea semiplana* spp. *semiplana* (2), *Microlaena stipoides* var. *stipoides* (1)	gully	sandy loam		1	150
117BAR02901	Woodland	*Eucalyptus fasciculosa* (2), *Allocasuarina verticillata* (2)	*Acacia pycnantha* (2), *Leptospermum myrsinoides* (2), *Hibbertia incana* (2), *Lepidosperma semiteres* (1), *Schoenus apogon* (1)	hill slope	sandy loam	468	5	270
117BAR03001	Woodland	*Eucalyptus camaldulensis* var. *camaldulensis* (2), *Eucalyptus leucoxylon* spp. (2)	*Acacia pycnantha* (2), *Gonocarpus elatus* (2), *Cheilanthes austrotenuifolia* (2), **Aira cupaniana* (2)	hill slope	sandy clay loam	300	20	360
117BAR03101	Low Open Forest	*Eucalyptus goniocalyx* (2)	*Xanthorrhoea semiplana* spp. *semiplana* (2), *Hakea carinata* (2), *Pultenaea canaliculata* var. (2), *Acacia pycnantha* (2), *Leptospermum myrsinoides* (2)	hill slope	sandy clay loam	353	5	90
117BAR03201	Low Woodland	*Eucalyptus fasciculosa* (2), *Eucalyptus obliqua* (2), *Eucalyptus goniocalyx* (2)	*Calytrix tetragona* (2), *Acrotriche depressa* (2), *Hakea carinata* (2), *Xanthorrhoea semiplana* spp. *semiplana* (2), *Astroloma conostephioides* (2)	hill crest	sandy loam	515	0	0
117ECH00101	Open Forest	*Eucalyptus obliqua* (3)	*Acacia pycnantha* (4)	hill crest	clay loam	462	5	130
117ECH00301	Open Forest	*Eucalyptus obliqua* (3), *Eucalyptus baxteri* (3)	*Lepidosperma semiteres* (4), *Hakea carinata* (3), *Platylobium obtusangulum* (3), *Hakea rostrata* (2), *Daviesia leptophylla* (2)	hill slope	clay loam	375	3	140
117ECH00401	Tall Open Woodland	*Eucalyptus leucoxylon* spp. *leucoxylon* (2)	*Acacia pycnantha* (3), *Allocasuarina verticillata* (2), *Acacia paradoxa* (2), *Lomandra densiflora* (2), *Austrostipa semibarbata* (1)	hill slope	sandy clay loam	490	18	270

Quadrat No.	Structural Formation	Overstorey Dominants	Understorey Dominants	Landform	Soil	Alti-tude (m)	Slope (^{0})	Aspect (^{0})
117ENC00401	Low Mallee	*Eucalyptus diversifolia* (4)	*Xanthorrhoea semiplana* spp. *tateana* (3), *Hakea rostrata* (2), *Banksia ornata* (2), *Daviesia ulicifolia* spp. *incarnata* (2), *Hypolaena fastigiata* (2)	dune slope	sand		4	180
117ENC00501	Very Low Open Forest	*Eucalyptus baxteri* (3), *Eucalyptus cosmophylla* (3)	*Acacia paradoxa* (2), *Xanthorrhoea semiplana* spp. (2), *Leptospermum myrsinoides* (2), *Pultenaea canaliculata* var. *canaliculata* (2), *Pultenaea largiflorens* (1)	hill crest	sand		3	360
117JER00701	Open Forest	*Eucalyptus obliqua* (3)	*Xanthorrhoea semiplana* spp. (3), *Pultenaea daphnoides* (2), *Goodenia ovata* (1)	hill slope	medium clay		5	60
117JER00801	Open Forest	*Eucalyptus obliqua* (2)	*Acacia pycnantha* (2), *Pultenaea daphnoides* (2), *Olearia teretifolia* (2)	hill crest	medium clay		0	0
117JER00901	Low Open Forest	*Eucalyptus obliqua*	*Allocasuarina striata* (3), *Leptospermum continentale* (2), *Xanthorrhoea semiplana* spp. *tateana* (2), *Platylobium obtusangulum* (2), *Hibbertia riparia* (2)	hill slope	clayey sand		5	35
117JER01001	Low Woodland	*Eucalyptus obliqua* (2), *Eucalyptus fasciculosa* (T)	*Hakea rostrata* (3), *Daviesia leptophylla* (3)	hill slope	sandy clay loam		5	145
117JER01101	Shrubland		*Acacia paradoxa* (2), *Hakea rostrata* (2), *Cassinia uncata* (2), *Xanthorrhoea semiplana* spp. (2), *Allocasuarina muelleriana* spp. *muelleriana* (2)	hill crest	sandy clay loam		0	0
117MIL00101	Low Woodland		*Calytrix tetragona* (2), *Hakea carinata* (2), *Platylobium obtusangulum* (2)	dune crest	sand		4	180
117MIL00201	Shrubland	*Allocasuarina muelleriana* spp. *muelleriana* (2), *Eucalyptus cosmophylla* (1), *Acacia paradoxa* (1)	*Hakea carinata* (2), *Leptospermum myrsinoides* (2), *Calytrix tetragona* (2), *Xanthorrhoea semiplana* spp. *semiplana* (2)	swale	sand		4	280
117NOA00701	Low Woodland	*Eucalyptus microcarpa* (2)	*Acacia pycnantha* (3), *Pultenaea largiflorens* (3), *Acacia acinacea* (2), *Dianella revoluta* var. *revoluta* (1)	hill slope	sandy loam	295	3	200
117NOA00801	Woodland	*Eucalyptus leucoxylon* spp. *leucoxylon* (2), *Eucalyptus microcarpa* (T)	*Dodonaea viscosa* spp. *spatulata* (3), *Acacia pycnantha* (2), *Acrotriche serrulata* (1), *Hibbertia stricta* var. *stricta* (1)	hill slope	sandy loam	280	4	230
117NOA00901	Low Woodland	*Eucalyptus fasciculosa* (2), *Eucalyptus leucoxylon* spp. *leucoxylon* (T), *Eucalyptus obliqua* (T)	*Hibbertia exutiacies* (2), *Acacia pycnantha* (1), *Pultenaea largiflorens* (1), *Cassytha pubescens* (1), *Lepidosperma semiteres* (1)	hill slope	silt loam	430	2	30

Quadrat No.	Structural Formation	Overstorey Dominants	Understorey Dominants	Landform	Soil	Alti-tude (m)	Slope (^{0})	Aspect (^{0})
117NOA01001	Open Forest	*Eucalyptus obliqua* (N)	*Pteridium esculentum* (2), **Aira elegantissima* spp. *elegantissima* (2), **Holcus lanatus* (2), **Trifolium campestre* (1)	hill slope	loam	400	14	290
117NOA01002	Open Woodland	*Eucalyptus obliqua* (3), *Exocarpos cupressiformis* (N)	*Goodenia ovata* (2), *Poa clelandii* (2), **Rubus sp*. (2), *Pultenaea daphnoides* (2), **Genista monspessulana* (1)	hill slope	loamy sand	430	22	158
117NOA01101	Open Woodland	*Eucalyptus obliqua* (3)	*Pultenaea daphnoides* (3), *Acacia myrtifolia* var. *myrtifolia* (2), *Ixodia achillaeoides* spp. *alata* (1), *Daviesia leptophylla* (1)	hill crest	sandy clay loam	448	0	0
117NOA01201	Low Woodland	*Eucalyptus microcarpa* (3)	**Trifolium angustifolium* (2), **Avena barbata* (2), *Acacia pycnantha* (1), **Chrysanthemoides monilifera* (1), **Plantago lanceolata* var. *lanceolata* (1)	hill slope	sandy loam	196	6	320
117NOA01301	Open Forest	*Eucalyptus leucoxylon* spp. *leucoxylon* (3)	*Acacia pycnantha* (2), *Bursaria spinosa* (2)	hill slope	loam	305	11	240
117NOA01401	Low Open Forest	*Eucalyptus obliqua* (3)	*Lepidosperma semiteres* (2), *Hakea carinata* (1), *Leptospermum myrsinoides* (1), *Pultenaea involucrata* (1)	ridge	sandy loam	290	6	200
117NOA01501	Low Open Forest	*Eucalyptus obliqua* (3)	*Leptospermum myrsinoides* (2), *Calytrix tetragona* (2), *Xanthorrhoea semiplana* spp. *semiplana* (2)	hill slope	loamy sand	325	8	180
117NOA01601*	Open Forest	*Eucalyptus leucoxylon* spp. *leucoxylon* (3)	*Melaleuca decussata* (4), *Acacia retinodes* var. *retinodes (swamp* form*)* (3)	drainage depression	sandy loam		5	260
117NOA01701*	Open Forest	*Eucalyptus leucoxylon* spp. *leucoxylon* (2), *Eucalyptus fasciculosa* (2)	*Melaleuca decussata* (3), *Acacia pycnantha* (2), **Rubus sp*. (2), **Pennisetum macrourum* (2)	stream channel	clay loam, sandy	205	10	355
117NOA01801	Woodland	*Eucalyptus obliqua* (2)	*Platylobium obtusangulum* (3), *Lepidosperma semiteres* (3), *Hibbertia incana* (2), *Pultenaea daphnoides* (1), *Hakea rostrata* (1)	ridge	clayey sand	350	4	320
117NOA01901	Open Forest	*Eucalyptus obliqua* (3), *Eucalyptus leucoxylon* spp. *leucoxylon* (2)	*Lepidosperma semiteres* (3), *Acacia pycnantha* (2), *Hibbertia exutiacies* (2), *Gonocarpus tetragynus* (2)	hill slope	sandy loam	250	11	50
117NOA02001	Open Forest	*Eucalyptus viminalis* spp. *cygnetensis* (3), *Eucalyptus leucoxylon* spp. *leucoxylon* (3)	**Rosa rubiginosa* (2), **Rubus sp*. (2), *Hibbertia exutiacies* (1), *Microlaena stipoides* var. *stipoides* (1)	stream channel	light medium clay	270	2	240

Quadrat No.	Structural Formation	Overstorey Dominants	Understorey Dominants	Landform	Soil	Alti-tude (m)	Slope (^{0})	Aspect (^{0})
117NOA02101	Very Low Woodland	*Eucalyptus fasciculosa* (2)	*Allocasuarina muelleriana* spp. *muelleriana* (2), *Dodonaea viscosa* spp. *spatulata* (1), *Exocarpos cupressiformis* (1), *Acacia pycnantha* (1)	hill slope	sandy clay loam	285	3	90
117NOA02201	Open Forest	*Eucalyptus camaldulensis* var. *camaldulensis* (3)	**Phalaris aquatica* (4), **Pennisetum macrourum* (2)	gorge	silt loam	101	3	270
117NOA02301	Low Woodland	*Eucalyptus fasciculosa* (1), *Acacia pycnantha* (1)	*Xanthorrhoea semiplana* spp. *semiplana* (2), *Allocasuarina muelleriana* spp. *muelleriana* (2), *Dodonaea viscosa* spp. *spatulata* (2)	hill crest	sandy loam	190	2	270
117NOA02401	Open Forest	*Eucalyptus leucoxylon* spp. *leucoxylon* (3), *Eucalyptus obliqua* (2)	*Acacia pycnantha* (2)	hill footslope	sandy loam	310	4	210
117NOA02501	Low Woodland	*Eucalyptus obliqua* (2)	*Lepidosperma carphoides* (3)	hill slope	sandy loam	330	2	190
117ONK01101*	Open Forest	*Eucalyptus camaldulensis* var. *camaldulensis* (3), *Eucalyptus goniocalyx* (2)	**Genista monspessulana* (3), **Myrsiphyllum asparagoides* (3), *Acacia pycnantha* (T)	hill slope	loam		23	4
117ONK01201*	Low Open Woodland	*Eucalyptus goniocalyx* (N), *Eucalyptus fasciculosa* (N)	*Xanthorrhoea semiplana* spp. *semiplana* (3), *Calytrix tetragona* (2), *Acrotriche depressa* (1), *Acacia pycnantha* (T), *Banksia marginata* (N)	hill slope	loamy sand	475	-3	166
117ONK01301	Open Forest	*Eucalyptus obliqua* (3)	*Hakea carinata* (2), *Astroloma conostephioides* (2), *Lomandra fibrata* (2), *Acacia pycnantha* (1), *Xanthorrhoea semiplana* spp. *semiplana* (1)	hill crest	clay loam	430	5	315
117ONK01401	Mallee	*Eucalyptus obliqua* (3)	*Acacia pycnantha* (3), *Xanthorrhoea semiplana* spp. *semiplana* (3), *Hibbertia exutiacies* (3), *Pultenaea hispidula* (2)	hill slope	clay loam	447	8	308
117ONK01501	Open Mallee	*Eucalyptus goniocalyx* (2), *Eucalyptus fasciculosa* (2)	*Acacia paradoxa* (3), *Hibbertia incana* (3), *Xanthorrhoea semiplana* spp. *semiplana* (2), *Calytrix tetragona* (2), *Leptospermum myrsinoides* (1)	hill slope	clayey sand	340	5	342
117ONK01601	Open Forest	*Eucalyptus obliqua* (4)	*Hibbertia exutiacies* (3), *Pultenaea daphnoides* (2), *Lepidosperma semiteres* (2), *Tricoryne elatior* (1)	hill slope	clay loam	414	11	196
117ONK01701	Open Forest	*Eucalyptus obliqua* (3)	*Platylobium obtusangulum* (3), *Lepidosperma semiteres* (3), *Hibbertia exutiacies* (3), *Pultenaea daphnoides* (2)	hill slope	clay loam, sandy	438	5	180

Quadrat No.	Structural Formation	Overstorey Dominants	Understorey Dominants	Landform	Soil	Alti-tude (m)	Slope (^{0})	Aspect (^{0})
117ONK01801	Open Forest	*Eucalyptus goniocalyx* (3)	*Acacia pycnantha* (2), *Hibbertia incana* (2), **Pentaschistis pallida* (2), *Xanthorrhoea semiplana* spp. *semiplana* (1), *Olearia ramulosa* (1)	hill slope	sandy clay loam		15	360
117ONK01901	Woodland	*Eucalyptus goniocalyx* (3)	*Acacia pycnantha* (3), *Hibbertia exutiacies* (3), *Olearia ramulosa* (1), *Arthropodium strictum* (1), *Poa crassicaudex* (1)	hill slope	clay loam	300	16	174
117ONK02001	Open Forest	*Eucalyptus obliqua* (3)	*Lepidosperma semiteres* (3), *Acacia paradoxa* (2), *Hibbertia sericea* var. *sericea* (2), *Gonocarpus tetragynus* (2), *Tricoryne elatior* (2)	hill slope	sandy clay loam	486	8	30
117ONK02101	Open Forest	*Eucalyptus viminalis* spp. *viminalis* (3), *Eucalyptus leucoxylon* spp. *leucoxylon* (3)	*Acacia pycnantha* (2), *Acacia retinodes* var. *retinodes* (hill form) (2)	hill slope	loam	382	14	235
117ONK02201	Woodland	*Eucalyptus viminalis* spp. *viminalis* (2)	**Hypericum perforatum* (3), *Acacia retinodes* var. *retinodes* (hill form) (3), **Bromus diandrus* (3), **Sherardia arvensis*	hill slope	clay loam	500	15	360
117ONK02301	Open Forest	*Eucalyptus obliqua* (3)	*Lepidosperma semiteres* (2), *Pteridium esculentum* (2), *Hibbertia exutiacies* (2), *Microlaena stipoides* var. *stipoides* (2), *Banksia marginata* (2)	hill slope	medium clay	505	9	200
117ONK02401	Low Woodland	*Eucalyptus fasciculosa* (2)	*Spyridium parvifolium* (3), *Acacia pycnantha* (2), *Olearia ramulosa* (2), *Hibbertia incana* (2)	hill slope	clayey sand	515	10	310
117ONK02501	Open Forest	*Eucalyptus obliqua* (3)	*Acacia pycnantha* (3), *Hibbertia exutiacies* (2), *Pteridium esculentum* (2), *Gonocarpus tetragynus* (2), *Microlaena stipoides* var. *stipoides* (2)	hill slope	light medium clay	565	15	310
117ONK02601	Woodland	*Allocasuarina verticillata* (3), *Eucalyptus viminalis* spp. *cygnetensis* (2), *Eucalyptus leucoxylon* spp. *leucoxylon* (2)	*Banksia marginata* (2), *Acacia pycnantha* (2), *Hibbertia incana* (2), *Arthropodium strictum* (2), *Microlaena stipoides* var. *stipoides* (2)	hill slope	sandy loam	514	5	300
117ONK02701	Open Forest	*Eucalyptus obliqua* (3)	*Pteridium esculentum* (4), *Acacia pycnantha* (2), *Hakea rostrata* (2), *Leptospermum continentale* (2)	hill slope	clay loam	570	7	240
117ONK02801	Open Forest	*Eucalyptus obliqua* (3)	*Lepidosperma semiteres* (3), *Daviesia leptophylla* (2), *Pultenaea daphnoides* (1)	hill slope	sandy clay loam	440	14	60

Quadrat No.	Structural Formation	Overstorey Dominants	Understorey Dominants	Landform	Soil	Alti-tude (m)	Slope (^{0})	Aspect (^{0})
117ONK02901	Open Forest	*Eucalyptus obliqua* (3), *Eucalyptus dalrympleana* spp. *dalrympleana* (2)	*Bursaria spinosa* (1), **Anthoxanthum odoratum* (1), *Hibbertia exutiacies* (1), *Leptospermum continentale* (1), *Pultenaea daphnoides* (1)	hill slope	loam	460	13	300
117TOR01301	Low Open Forest	*Eucalyptus obliqua* (4)	*Xanthorrhoea semiplana* spp. *tateana* (2), *Hakea rostrata* (1), *Pultenaea daphnoides* (1), *Daviesia leptophylla* (1), *Hibbertia sericea* var. *sericea* (1)	hill slope	loam	340	3	152
117TOR01401	Open Forest	*Eucalyptus obliqua* (2), *Eucalyptus baxteri* (2), **Pinus radiata* (1)	*Hakea rostrata* (2), *Xanthorrhoea semiplana* spp. (2), *Pultenaea daphnoides* (1)	hill slope	sandy clay loam		7	20
117TOR01501	Tall closed Shrubland	*Leptospermum continentale* (4)	*Lepidosperma longitudinale* (4)	swamp	sandy loam		5	80
117TOR01601	Woodland	*Eucalyptus obliqua* (1)	*Pultenaea involucrata* (5), *Acacia paradoxa* (2)	hill slope	clay loam		7	20
117TOR01701	Low Mallee	*Eucalyptus diversifolia* (3), *Eucalyptus cosmophylla* (2)	*Hypolaena fastigiata* (3), *Xanthorrhoea semiplana* spp. *tateana* (2), *Correa reflexa* var. *reflexa* (2), *Platylobium obtusangulum* (2), *Lepidobolus drapetocoleus* (1)	hill slope	sand		2	360
117TOR01801	Shrubland	*Acacia longifolia* var. *sophorae* (4), *Olearia axillaris* (4)	*Rhagodia candolleana* spp. *candolleana* (3), **Myrsiphyllum asparagoides* (3), *Lepidosperma gladiatum* (2), *Pimelea serpyllifolia* spp. *serpyllifolia* (2), *Tetragonia implexicoma* (1)	dune slope	sand		5	180
117WIL01701	Open Mallee	*Eucalyptus cosmophylla* (2), *Eucalyptus baxteri* (1), *Eucalyptus obliqua* (1)	*Ixodia achillaeoides* spp. *alata* (3), *Acacia myrtifolia* var. *myrtifolia* (2), *Xanthorrhoea semiplana* spp. *semiplana* (2), *Hakea rugosa* (2)	hill slope	clayey sand		5	318
117WIL01801	Low Open Forest	*Eucalyptus obliqua* (2), *Eucalyptus cosmophylla* (2), *Eucalyptus fasciculosa* (1)	*Brachyloma ericoides* spp. *ericoides* (3), *Hakea rostrata* (2), *Pultenaea daphnoides* (2)	hill slope	sandy clay loam		6	150
117WIL01901	Low Open Forest	*Eucalyptus obliqua* (2), *Eucalyptus cosmophylla* (2)	*Acacia retinodes* var. *retinodes (swamp* form*)* (2)	hill slope	sandy loam		5	245
117WIL02001	Low Open Forest	*Eucalyptus baxteri* (2), *Eucalyptus obliqua* (2)	*Hakea carinata* (2), *Banksia marginata* (T)	hill slope	loamy sand		4	210
117WIL02101	Low Woodland	*Eucalyptus fasciculosa* (2)	*Hibbertia exutiacies* (3)	hill slope	sandy clay loam		18	30
117WIL02201	Open Mallee	*Eucalyptus arenacea* (2)	*Phyllota pleurandroides* (3), *Allocasuarina striata* (2), *Hakea rugosa* (2)	dune slope	sand		5	20

Quadrat No.	Structural Formation	Overstorey Dominants	Understorey Dominants	Landform	Soil	Alti-tude (m)	Slope (^{0})	Aspect (^{0})
117WIL02301	Open Mallee	*Eucalyptus cosmophylla* (2), *Eucalyptus fasciculosa* (2), *Eucalyptus baxteri* (2)	*Pultenaea trinervis* (3), *Hakea rugosa* (2), *Leptospermum myrsinoides* (2)	dune slope	sand		8	90
117WIL02401	Low Open Forest	*Eucalyptus fasciculosa* (4)	*Xanthorrhoea semiplana* spp. *tateana* (3), *Leptospermum myrsinoides* (3), *Acacia pycnantha* (2), *Acacia paradoxa* (2), *Calytrix tetragona* (2)	hill slope	loamy sand		5	270
117WIL02501	Very Low Open Forest	*Eucalyptus baxteri* (4)	*Leptospermum myrsinoides* (2), *Hibbertia riparia (glabriuscula)* (2), *Hypolaena fastigiata* (2), *Astroloma conostephioides* (2), *Xanthorrhoea semiplana* spp. *tateana* (1)	hill slope	loamy sand		5	135
117WIL02601	Low Open Forest	*Eucalyptus baxteri* (3), *Eucalyptus obliqua* (T)	*Hibbertia exutiacies* (3), *Platylobium obtusangulum* (2), *Lepidosperma semiteres* (2), *Hakea rostrata* (1), *Pultenaea daphnoides* (1)	hill slope	sandy loam	360	5	36
117WIL02701	Very Low Open Forest	*Eucalyptus baxteri* (3), *Eucalyptus cosmophylla* (1)	*Leptospermum myrsinoides* (3), *Hakea carinata* (2), *Xanthorrhoea semiplana* spp. (2), *Spyridium thymifolium* (1), *Platylobium obtusangulum* (1)	hill slope	sand		10	60
117WIL02801	Low Open Forest	*Eucalyptus viminalis* spp. *cygnetensis* (3), *Eucalyptus leucoxylon* spp. *leucoxylon* (3)	*Acacia paradoxa* (3), *Acacia pycnantha* (2), *Xanthorrhoea semiplana* spp. *tateana* (2), *Olearia sp*. (2), *Hibbertia sericea* var. *sericea* (1)	hill slope	sandy loam		5	140
117WIL02901	Low Open Forest	*Eucalyptus baxteri* (3), *Lepidosperma semiteres* (2), *Eucalyptus obliqua* (T)	*Pultenaea daphnoides* (2), *Hibbertia sericea* var. *sericea* (2), *Platylobium obtusangulum* (1), *Hakea rostrata* (1)	hill slope	sandy loam	385	2	294
117YAN00901	Low Woodland	*Eucalyptus fasciculosa* (3), *Allocasuarina verticillata* (2)	*Calytrix tetragona* (2), *Leptospermum myrsinoides* (1)	dune/consolidated dune	loamy sand	40	1	250
117YAN01001	Low Open Forest	*Eucalyptus leucoxylon* spp. *leucoxylon* (3)	*Acacia pycnantha* (2), *Microlaena stipoides* var. *stipoides* (2), *Acacia ramulosa* (1), *Juncus pallidus* (1), *Hibbertia sericea* var. *sericea* (1)	hill slope	sandy clay loam	310	4	196
117YAN01101	Low Open Forest	*Eucalyptus obliqua* (3)	*Pultenaea involucrata* (3), *Hakea rostrata* (3), *Eucalyptus cosmophylla* (1), *Lepidosperma carphoides* (1), *Micrantheum demissum* (1)	hill slope	sandy loam	270	4	212

Quadrat No.	Structural Formation	Overstorey Dominants	Understorey Dominants	Landform	Soil	Alti-tude (m)	Slope (^{0})	Aspect (^{0})
117YAN01201	Low Open Forest	*Eucalyptus obliqua* (3)	*Xanthorrhoea semiplana* spp. *semiplana* (2), *Platylobium obtusangulum* (2), *Lepidosperma semiteres* (2), *Eucalyptus cosmophylla* (1), *Hakea rostrata* (1)	hill slope	sandy loam	250	3	250
52MIL00202	Closed Sedgeland	*Phragmites australis* (3)	*Baumea rubiginosa* (5)	swamp	loam	10	0	0
52MIL00203	Closed Sedgeland	*Phragmites australis* (5), *Leptospermum lanigerum* (3)	*Isachne globosa* (2), *Lycopus australis* (T)	swamp	sandy loam	10	0	0
52TOR00402	Closed Shrubland	*Melaleuca decussata* (3), *Leptospermum continentale* (3)	*Lepidosperma longitudinale* (3), *Empodisma minus* (2)	stream channel	loam	300	0	0
52TOR00502	Closed Sedgeland	*Baumea rubiginosa* (4), *Baumea tetragona* (3)	*Eleocharis gracilis* (4)	swamp	loam	322	0	0
52TOR00903	Shrubland	*Leptospermum continentale* (3)	*Lepidosperma longitudinale* (4), *Empodisma minus* (3)	perched swamp	loam	270	7	220
52TOR01001	Tall Shrubland	*Leptospermum lanigerum* (3), *Leptospermum continentale* (2)	*Lepidosperma longitudinale* (4), *Baumea rubiginosa* (2), *Baumea tetragona* (2)	perched swamp	loam	220	12	70
52TOR01101	Sedgeland	*Juncus sarophorus* (3)	**Lotus uliginosus* (2), *Myriophyllum amphibium* (2), **Juncus articulatus* (2), *Eleocharis gracilis* (2)	swamp	loam	320	0	0
52WIL00802	Sedgeland	*Leptospermum continentale* (3), *Gahnia sieberiana* (2)	*Gleichenia microphylla* (3), *Empodisma minus* (3), *Xyris operculata* (3), *Baumea rubiginosa* (2)	swamp	loam	120	0	0
52WIL00902	Shrubland	*Leptospermum continentale* (3)	*Empodisma minus* (4), *Gleichenia microphylla* (3), *Baumea rubiginosa* (1)	swamp	loam	110	0	0
52WIL01202	Shrubland	*Leptospermum continentale* (3), *Melaleuca squamea* (2)	*Lepidosperma longitudinale* (4), *Leptocarpus tenax* (3), *Empodisma minus* (2)	perched swamp	loam	240	2	340
52WIL01901	Closed Sedgeland	**Juncus effusus* (3), *Juncus sarophorus* (2)	**Lotus uliginosus* (4), **Anthoxanthum odoratum* (T)	stream channel	loam	130	0	0
52WIL02001	Open Shrubland	*Leptospermum continentale* (2), *Gahnia sieberiana* (2)	*Empodisma minus* (3), *Baumea rubiginosa* (2)	swamp	loam	100	0	0
97ENC00101	Low Open Forest	*Eucalyptus baxteri* (3), *Eucalyptus cosmophylla* (2)	*Lepidosperma viscidum* (2), *Hakea rostrata* (1), *Hibbertia riparia* (1), *Hakea carinata* (1)	hill crest	clayey sand	220	2	100
97ENC00201	Low Open Forest	*Eucalyptus fasciculosa* (3)	*Xanthorrhoea semiplana* spp. (2), *Melaleuca decussata* (2)	plain (incl undulating plain)	clayey sand	120	0	0
97ENC00301	Very Low Open Forest	*Eucalyptus cosmophylla* (2), *Eucalyptus fasciculosa* (2)	**Ehrharta calycina* (3), *Acacia paradoxa* (2), *Acacia pycnantha* (1), *Hibbertia virgata* (T)	hill footslope	sand	140	2	180

Quadrat No.	Structural Formation	Overstorey Dominants	Understorey Dominants	Landform	Soil	Alti-tude (m)	Slope (^{0})	Aspect (^{0})
97ENC00401	Very Low Open Forest	*Eucalyptus cosmophylla* (2), *Exocarpos cupressiformis* (1)	*Acacia paradoxa* (1), *Allocasuarina striata* (1), *Acacia pycnantha* (1)	hill slope	clay loam	150	5	270
97ENC00501	Very Low closed Forest	*Eucalyptus cosmophylla* (1), *Eucalyptus diversifolia* (1)	*Xanthorrhoea semiplana* spp. (2), *Banksia marginata* (2), **Ehrharta calycina* (2)	hill crest	sand	170	2	100
97JER00101	Very Low Woodland	*Eucalyptus fasciculosa* (3), *Acacia verticillata* (2)	*Olearia axillaris* (4), *Xanthorrhoea semiplana* spp. (3), *Dodonaea viscosa* spp. (2), *Lepidosperma viscidum* (2)	hill slope	sandy loam	250	8	227
97JER00201	Open Forest	*Eucalyptus obliqua* (3), *Acacia pycnantha* (2)	*Acacia paradoxa* (3), *Hibbertia exutiacies* (3), *Hibbertia riparia* (2), *Xanthorrhoea semiplana* spp. (1)	hill crest	sandy clay loam	330	1	337
97JER00301	Low Woodland	*Eucalyptus obliqua* (3), *Eucalyptus fasciculosa* (3)	*Xanthorrhoea semiplana* spp. (4), *Hibbertia exutiacies* (2)	hill crest	sandy loam	250	2	272
97JER00401	Low Open Forest	*Eucalyptus obliqua* (4)	*Xanthorrhoea semiplana* spp. *tateana* (3), *Acacia pycnantha* (2), *Hakea rostrata* (2), *Allocasuarina striata* (2), *Banksia marginata* (1)	hill slope	sandy clay loam	320	2	340
97JER00501	Low Open Forest	*Eucalyptus obliqua* (4), **Pinus radiata* (3)	*Lepidosperma semiteres* (5), *Xanthorrhoea semiplana* spp. *tateana* (4), *Lepidosperma carphoides* (4), *Acacia pycnantha* (3)	flat	clay loam, sandy	325	2	336
97TOR00101	Low Open Forest	*Eucalyptus obliqua* (2), *Eucalyptus fasciculosa* (2)	*Xanthorrhoea semiplana* spp. *tateana* (4), *Hakea rostrata* (2)	hill slope	sandy clay loam	200	20	340
97TOR00201	Mallee	*Eucalyptus baxteri* (4)	*Pultenaea involucrata* (4), *Hakea rostrata* (2), *Spyridium thymifolium* (2), *Xanthorrhoea semiplana* spp. *tateana* (2), *Hibbertia riparia* (2)	ridge	silt loam	330	0	0
97TOR00301	Low Open Forest	*Eucalyptus baxteri* (3)	*Hibbertia riparia* (3), *Hakea rostrata* (2), *Pultenaea involucrata* (2), *Xanthorrhoea semiplana* spp. *tateana* (2)	hill crest	medium clay	340	1	302
97TOR00401	Low closed Forest	*Eucalyptus baxteri* (3)	*Banksia marginata* (2), *Hakea rostrata* (2), *Allocasuarina striata* (2)	hill footslope	light medium clay	320	6	146
97TOR00501	Mallee	*Eucalyptus obliqua* (4), *Eucalyptus cosmophylla* (T)	*Banksia marginata* (2), *Hakea rostrata* (2), *Allocasuarina striata* (2)	hill crest	sandy loam	250	6	60
97TOR00601	Mallee	*Eucalyptus baxteri* (4), *Eucalyptus obliqua* (T)	*Austrostipa muelleri* (4), *Xanthorrhoea semiplana* spp. *tateana* (2), *Pultenaea viscidula* (2), *Leptospermum myrsinoides* (2), *Hibbertia riparia* (2)	ridge	sandy loam	290	4	253

Quadrat No.	Structural Formation	Overstorey Dominants	Understorey Dominants	Landform	Soil	Alti-tude (m)	Slope (^{0})	Aspect (^{0})
97TOR00701	Low Open Forest	*Eucalyptus baxteri* (4), *Eucalyptus obliqua* (N)	*Xanthorrhoea semiplana* spp. *tateana* (3), **Anthoxanthum odoratum* (3), *Banksia ornata* (T), **Holcus lanatus* (T)	hill slope	loamy sand	200	5	350
97TOR00801	Open Forest	*Eucalyptus obliqua* (3)	*Xanthorrhoea semiplana* spp. (2), *Pteridium esculentum* (2), **Vulpia bromoides* (2), **Trifolium subterraneum* (1)	hill slope	sandy loam	350	14	250
97TOR00901	Open Forest	*Eucalyptus obliqua* (4)	*Xanthorrhoea semiplana* spp. *tateana* (3), *Pteridium esculentum* (3), *Microlaena stipoides* var. *stipoides* (3)	hill slope	loamy sand	310	7	40
97TOR01001	Low Open Forest	*Eucalyptus baxteri* (4)	*Hakea rostrata* (2), *Allocasuarina striata* (2), *Xanthorrhoea semiplana* spp. *tateana* (1)	hill crest	sandy clay loam	340	0	0
97TOR01101	Open Forest	*Eucalyptus leucoxylon* spp. (2)	*Acacia pycnantha* (1), *Allocasuarina verticillata* (1)	hill footslope	loamy sand	120	5	180
97WIL00101	Open Forest	*Eucalyptus baxteri* (4)	*Pultenaea daphnoides* (3), *Xanthorrhoea semiplana* spp. *semiplana* (3), *Hibbertia riparia* (3)	hill slope	clay loam, sandy	350	6	180
97WIL00201	Open Forest	*Eucalyptus baxteri* (3), *Eucalyptus obliqua* (3)	*Hibbertia riparia* (3), *Lepidosperma semiteres* (3), *Hakea rostrata* (3), *Pultenaea daphnoides* (3)	hill slope	sandy clay loam	400	1	210
97WIL00301	Low Open Forest	*Eucalyptus baxteri* (2), *Eucalyptus obliqua* (2)	*Hakea rostrata* (2), *Eucalyptus cosmophylla* (1)	hill slope	sand	230	4	360
97WIL00401		*Eucalyptus baxteri* (3), *Eucalyptus cosmophylla* (1)	*Platylobium obtusangulum* (1), *Leptospermum myrsinoides* (1), *Acacia verniciflua* (1), *Banksia marginata* (1)	hill crest	sand	230	4	360
97WIL00501	Low Open Forest	*Eucalyptus baxteri* (2), *Eucalyptus cosmophylla* (2)	*Brachyloma ericoides* spp. (2), *Banksia marginata* (1), *Lepidosperma semiteres* (1), *Adenanthos terminalis* (1)	hill crest	sand	210	0	0
97WIL00601	Low Open Forest	*Eucalyptus baxteri* (3)	*Banksia marginata* (2), *Lepidosperma semiteres* (2)	hill slope	clayey sand	165	4	140
97WIL00701	Low Open Woodland	*Eucalyptus baxteri* (2)	**Ehrharta calycina* (4), *Banksia ornata* (2)	hill slope	sand	170	7	72
97WIL00801	Low Open Forest	*Eucalyptus fasciculosa* (2), *Eucalyptus cosmophylla* (2)	*Bursaria spinosa* (2), *Platylobium obtusangulum* (1), *Lepidosperma viscidum* (1), *Xanthorrhoea semiplana* spp. (1), *Leptospermum myrsinoides* (1)	hill footslope	sandy loam	140	2	232
97WIL00901	Low closed Forest	*Eucalyptus cosmophylla* (2), *Eucalyptus baxteri* (2)	*Lepidosperma semiteres* (2), *Xanthorrhoea semiplana* spp. (1), *Astroloma humifusum* (1)	hill slope	sandy loam	150	4	258

Quadrat No.	Structural Formation	Overstorey Dominants	Understorey Dominants	Landform	Soil	Alti-tude (m)	Slope (^{0})	Aspect (^{0})
97WIL01001	Low closed Forest	*Eucalyptus cosmophylla* (2), *Eucalyptus fasciculosa* (1), *Eucalyptus leptophylla* (1)	*Micrantheum demissum* (2), *Lepidosperma semiteres* (2), *Allocasuarina muelleriana* spp. (2)	hill footslope	sandy loam	150	3	222
97YAN00101	Mallee	*Eucalyptus obliqua* (4)	*Xanthorrhoea semiplana* spp. *semiplana* (3), *Micrantheum demissum* (2)	hill slope	loamy sand	290	9	74
97YAN00201	Mallee	*Eucalyptus obliqua* (4)	*Lepidosperma semiteres* (3), *Hibbertia riparia* (3), *Hakea rostrata* (2), *Xanthorrhoea semiplana* spp. *semiplana* (2)	hill crest	loamy sand	300	10	10
97YAN00301	Open Forest	*Eucalyptus obliqua* (3), *Eucalyptus baxteri* (3)	*Hibbertia riparia* (4), *Acacia pycnantha* (3), *Xanthorrhoea semiplana* spp. *semiplana* (3), *Platylobium obtusangulum* (3)	hill slope	sandy loam	150	5	42

APPENDIX III

FREQUENCY OF ALL PLANT TAXA RECORDED AT SURVEY QUADRATS IN SPECIES ORDER WITH UPDATED AND GROUPED NAMES AS USED THROUGHOUT THIS REPORT. (NC) following recorded taxa name refers to "non-current" name.

Taxa name as recorded	Species name used for report	Perennial	No. Quadrats
Acacia acinacea	*Acacia acinacea*	p	39
Acacia calamifolia	*Acacia calamifolia*	p	9
Acacia continua	*Acacia continua*	p	24
Acacia cyclops	*Acacia cyclops*	p	1
Acacia dodonaeifolia	*Acacia dodonaeifolia*	p	4
Acacia gunnii	*Acacia gunnii*	p	7
Acacia hakeoides	*Acacia hakeoides*	p	1
Acacia iteaphylla	*Acacia iteaphylla*	p	1
Acacia ligulata (NC)	*Acacia ligulata*	p	1
Acacia longifolia var. *longifolia*	*Acacia longifolia* var. *longifolia*	p	8
Acacia longifolia var. *sophorae*	*Acacia longifolia* var. *sophorae*	p	11
Acacia melanoxylon	*Acacia melanoxylon*	p	47
Acacia myrtifolia var.	*Acacia myrtifolia* var. *myrtifolia*	p	16
Acacia myrtifolia var. *myrtifolia*	*Acacia myrtifolia* var. *myrtifolia*	p	92
Acacia myrtifolia (NC)	*Acacia myrtifolia* var. *myrtifolia*	p	342
Acacia paradoxa	*Acacia paradoxa*	p	224
Acacia pinguifolia	*Acacia pinguifolia*	p	1
Acacia podalyriifolia	*Acacia podalyriifolia*	p	1
Acacia pycnantha	*Acacia pycnantha*	p	540
Acacia ramulosa	*Acacia ramulosa*	p	1
Acacia retinodes var. *retinodes* (hill form)	*Acacia retinodes* var. retinodes (hill form)	p	14
Acacia retinodes var. *retinodes* (swamp form)	*Acacia retinodes* var. *retinodes* (swamp form)	p	22
Acacia retinodes var. *uncifolia*	*Acacia retinodes* var. *uncifolia*	p	7
Acacia rupicola	*Acacia rupicola*	p	12
Acacia spinescens	*Acacia spinescens*	p	73
Acacia verniciflua	*Acacia verniciflua*	p	33
Acacia verticillata	*Acacia verticillata*	p	159
Acaena agnipila var.			0
Acaena echinata var.	*Acaena echinata* var.	p	92
Acaena echinata var. *echinata*	*Acaena echinata* var.	p	33
Acaena novae-zelandiae	*Acaena novae-zelandiae*	p	71
Acetosella vulgaris	*Acetosella vulgaris*	p	26
Acianthus caudatus var.	*Acianthus caudatus* var.		16
Acianthus pusillus	*Acianthus pusillus*		46
Acrotriche affinis	*Acrotriche affinis*	p	8
Acrotriche cordata	*Acrotriche cordata*	p	4
Acrotriche depressa	*Acrotriche depressa*	p	61
Acrotriche fasciculiflora	*Acrotriche fasciculiflora*	p	117
Acrotriche patula	*Acrotriche patula*	p	1
Acrotriche serrulata	*Acrotriche serrulata*	p	461
Actinobole uliginosum	*Actinobole uliginosum*		3
Adenanthos terminalis	*Adenanthos terminalis*	p	45
Adiantum aethiopicum	*Adiantum aethiopicum*	p	56
Adriana klotzschii	*Adriana klotzschii*	p	2
Agrostis aemula	*Agrostis aemula*	p	12

Taxa name as recorded	Species name used for report	Perennial	No. Quadrats
Agrostis avenacea var.	*Agrostis avenacea* var.	p	9
Agrostis avenacea var. *avenacea*	*Agrostis avenacea* var.	p	27
Agrostis billardieri var. *filifolia*	*Agrostis billardieri* var.	p	1
Agrostis capillaris var. *capillaris*	*Agrostis billardieri* var.	p	1
Aira caryophyllea	*Aira caryophyllea*		23
Aira cupaniana	*Aira cupaniana*		146
Aira elegantissima spp. *elegantissima*	*Aira elegantissima* spp. *elegantissima*		5
Ajuga australis form *A*	*Ajuga australis* form *A*	p	2
Ajuga australis form *B*	*Ajuga australis* form *B*	p	3
Allocasuarina mackliniana spp. *mackliniana*	*Allocasuarina mackliniana* spp. *mackliniana*	p	2
Allocasuarina muelleriana spp. *muelleriana*	*Allocasuarina muelleriana* spp. *muelleriana*	p	110
Allocasuarina paludosa	*Allocasuarina paludosa*	p	3
Allocasuarina paradoxa (NC)			0
Allocasuarina pusilla	*Allocasuarina pusilla*	p	13
Allocasuarina striata	*Allocasuarina striata*	p	118
Allocasuarina verticillata	*Allocasuarina verticillata*	p	101
Alternanthera denticulata	*Alternanthera denticulata*	p	2
Alyxia buxifolia	*Alyxia buxifolia*	p	1
Ammophila arenaria	*Ammophila arenaria*	p	5
Amphipogon caricinus var. *caricinus*	*Amphipogon caricinus* var. *caricinus*	p	73
Amphipogon strictus var. *setifer*	*Amphipogon strictus* var. *setifer*	p	56
Amyema miquelii	*Amyema miquelii*	p	154
Amyema pendulum spp. *pendulum*	*Amyema pendulum* spp. *pendulum*	p	5
Amyema preissii	*Amyema preissii*	p	6
Anagallis arvensis	*Anagallis arvensis*		78
Angianthus milenei (NC)	*Angianthus milenei*	p	7
Anogramma leptophylla	*Anogramma leptophylla*		1
Anthocercis angustifolia	*Anthocercis angustifolia*	p	2
Anthoxanthum odoratum	*Anthoxanthum odoratum*	p	52
Aphelia pumilio	*Aphelia pumilio*		9
Apium prostratum spp. *prostratum* var.	*Apium prostratum* spp. *prostratum* var.	p	2
Aponogeton distachyos	*Aponogeton distachyos*	p	1
Arctotheca calendula	*Arctotheca calendula*		22
Argentipallium blandowskianum	*Argentipallium blandowskianum*	p	5
Argentipallium obtusifolium	*Argentipallium obtusifolium*	p	3
Aristida behriana	*Aristida behriana*	p	2
Arthropodium	*Arthropodium*	p	19

Taxa name as recorded	Species name used for report	Perennial	No. Quadrats
fimbriatum	*fimbriatum*		
Arthropodium strictum	*Arthropodium strictum*	p	390
Asclepias fruticosa	*Asclepias fruticosa*	p	2
Asclepias rotundifolia	*Asclepias rotundifolia*	p	45
Asparagus officinalis	*Asparagus officinalis*	p	1
Asperula conferta	*Asperula conferta*	p	5
Asphodelus fistulosus	*Asphodelus fistulosus*	p	2
Asplenium flabellifolium	*Asplenium flabellifolium*	p	7
Aster subulatus	*Aster subulatus*	p	4
Astroloma conostephioides	*Astroloma conostephioides*	p	301
Astroloma humifusum	*Astroloma humifusum*	p	480
Atriplex prostrata	*Atriplex prostrata*	p	1
Avellinia michelii	*Avellinia michelii*		8
Avena barbata	*Avena barbata*		80
Avena fatua	*Avena fatua*		2
Baeckea behrii	*Baeckea behrii*	p	8
Baeckea crassifolia	*Baeckea crassifolia*	p	10
Baeckea ramosissima spp. *ramosissima*	*Baeckea ramosissima* spp. *ramosissima*	p	45
Banksia marginata	*Banksia marginata*	p	244
Banksia ornata	*Banksia ornata*	p	63
Baumea acuta	*Baumea acuta*	p	10
Baumea arthrophylla	*Baumea arthrophylla*	p	2
Baumea articulata	*Baumea articulata*	p	3
Baumea gunnii	*Baumea gunnii*	p	13
Baumea juncea	*Baumea juncea*	p	44
Baumea laxa	*Baumea laxa*	p	6
Baumea rubiginosa	*Baumea rubiginosa*	p	51
Baumea tetragona	*Baumea tetragona*	p	64
Beyeria lechenaultii	*Beyeria lechenaultii*	p	2
Billardiera bignoniacea	*Billardiera bignoniacea*	p	95
Billardiera cymosa	*Billardiera cymosa*	p	152
Billardiera sericophora			0
Billardiera uniflora	*Billardiera uniflora*	p	14
Billardiera versicolor	*Billardiera versicolor*	p	8
Blechnum minus	*Blechnum minus*	p	64
Blechnum nudum	*Blechnum nudum*	p	7
Blechnum wattsii	*Blechnum wattsii*	p	1
Blennospora drummondii	*Blennospora drummondii*		12
Boronia coerulescens spp. *coerulescens*	*Boronia coerulescens* spp. *coerulescens*	p	22
Boronia edwardsii	*Boronia edwardsii*	p	5
Boronia filifolia	*Boronia filifolia*	p	15
Boronia nana	*Boronia nana*	p	1
Boronia parviflora	*Boronia parviflora*	p	4
Bossiaea prostrata	*Bossiaea prostrata*	p	89
Brachycome parvula var. *lissocarpa*	*Brachycome parvula* var. *lissocarpa*	p	1
Brachycome perpusilla	*Brachycome perpusilla*		4
Brachyloma ciliatum	*Brachyloma ciliatum*	p	7
Brachyloma ericoides spp. *ericoides*	*Brachyloma ericoides* spp. *ericoides*	p	35
Brachypodium distachyon	*Brachypodium distachyon*		18
Bracteantha bracteata	*Bracteantha bracteata*	p	4
Briza maxima	*Briza maxima*		453
Briza minor	*Briza minor*		128
Bromus diandrus	*Bromus diandrus*		15
Bromus hordeaceus spp. *hordeaceus*	*Bromus hordeaceus* spp. *hordeaceus*		12
Bromus madritensis	*Bromus madritensis*		12
Bromus rubens	*Bromus rubens*		5
Bromus sterilis (NC)	*Bromus sterilis*		7
Brunonia australis	*Brunonia australis*	p	71
Bulbine bulbosa	*Bulbine bulbosa*		24
Burchardia umbellata	*Burchardia umbellata*	p	312
Bursaria spinosa	*Bursaria spinosa*	p	163
Bursaria spinosa var. *macrophylla* (NC)	*Bursaria spinosa*	p	1
Bursaria spinosa var. *spinosa* (NC)	*Bursaria spinosa*	p	1
Caesia calliantha	*Caesia calliantha*	p	111
Cakile maritima spp. *maritima*	*Cakile maritima* spp. *maritima*	p	3
Caladenia argocalla	*Caladenia argocalla*		1
Caladenia cardiochila	*Caladenia cardiochila*		1
Caladenia carnea complex	*Caladenia carnea* complex		8
Caladenia carnea var. *carnea*	*Caladenia carnea* complex		2
Caladenia dilatata complex	*Caladenia dilatata* complex		4
Caladenia dilatata (NC)	*Caladenia dilatata* complex		23
Caladenia latifolia	*Caladenia latifolia*		4
Caladenia leptochila	*Caladenia leptochila*		7
Caladenia prolata	*Caladenia prolata*		1
Caladenia reticulata	*Caladenia reticulata*		2
Caladenia tentaculata	*Caladenia tentaculata*		29
Calandrinia calyptrata	*Calandrinia calyptrata*		2
Calandrinia granulifera	*Calandrinia granulifera*		1
Callistemon macropunctatus	*Callistemon rugulosus* var. *rugulosus*	p	1
Callistemon rugulosus var. *rugulosus*	*Callistemon rugulosus* var. *rugulosus*	p	1
Callistemon rugulosus (NC)	*Callistemon rugulosus* var. *rugulosus*	p	5
Callistemon sieberi	*Callistemon sieberi*	p	6
Callistemon teretifolius	*Callistemon teretifolius*	p	2
Callitriche stagnalis	*Callitriche stagnalis*		9
Callitris preissii	*Callitris gracilis*	p	41
Callitris rhomboidea	*Callitris rhomboidea*	p	10
Calocephalus citreus	*Calocephalus citreus*	p	5
Calochilus robertsonii	*Calochilus robertsonii*		8
Calostemma purpureum	*Calostemma purpureum*		5
Calystegia sepium	*Calystegia sepium*	p	1
Calytrix glaberrima	*Calytrix glaberrima*	p	6
Calytrix tetragona	*Calytrix tetragona*	p	224
Cardamine hirsuta	*Cardamine hirsuta*		1
Cardamine paucijuga	*Cardamine paucijuga*		2
Carduus tenuiflorus	*Carduus tenuiflorus*	p	10
Carex appressa	*Carex appressa*	p	30
Carex bichenoviana	*Carex bichenoviana*	p	2
Carex breviculmis	*Carex breviculmis*	p	18
Carex fascicularis	*Carex fascicularis*	p	17
Carex gaudichaudiana	*Carex gaudichaudiana*	p	5
Carex gunniana	*Carex gunniana*	p	1
Carex tereticaulis	*Carex tereticaulis*	p	6
Carpobrotus modestus	*Carpobrotus modestus*	p	3
Carpobrotus rossii	*Carpobrotus rossii*	p	12
Carthamus lanatus	*Carthamus lanatus*	p	4
Cassinia arcuata	*Cassinia arcuata*	p	1
Cassinia uncata	*Cassinia uncata*	p	14
Cassytha glabella forma *dispar*	*Cassytha glabella* forma *dispar*	p	334
Cassytha melantha	*Cassytha melantha*	p	46
Cassytha pubescens	*Cassytha pubescens*	p	229
Centaurium erythraea	*Centaurium erythraea*		22
Centaurium maritimum	*Centaurium maritimum*		4
Centaurium spicatum	*Centaurium spicatum*		9
Centaurium tenuiflorum	*Centaurium tenuiflorum*		19
Centella cordifolia s.str.	*Centella cordifolia*	p	3
Centella cordifolia (NC)	*Centella cordifolia*	p	24

Taxa name as recorded	Species name used for report	Perennial	No. Quadrats
Centipeda minima	*Centipeda minima*		2
Centrolepis aristata	*Centrolepis aristata*		99
Centrolepis fascicularis	*Centrolepis fascicularis*		30
Centrolepis polygyna	*Centrolepis polygyna*		3
Centrolepis strigosa	*Centrolepis strigosa*		70
Cerastium glomeratum	*Cerastium glomeratum*		22
Chamaecytisus palmensis	*Chamaecytisus palmensis*	p	2
Chamaescilla corymbosa var. *corymbosa*	*Chamaescilla corymbosa* var. *corymbosa*		205
Chasmanthe floribunda var. *floribunda*	*Chasmanthe floribunda* var. *floribunda*		1
Cheilanthes austrotenuifolia	*Cheilanthes austrotenuifolia*	p	229
Cheilanthes sieberi spp. *sieberi*	*Cheilanthes sieberi* spp. *sieberi*	p	1
Cheiranthera alternifolia	*Cheiranthera alternifolia*	p	55
Chenopodium desertorum spp. *microphyllum*	*Chenopodium desertorum* spp. *microphyllum*	p	1
Chenopodium glaucum	*Chenopodium glaucum*		1
Choretrum glomeratum var. *chrysanthum*	*Choretrum glomeratum* var. *chrysanthum*	p	2
Choretrum glomeratum var. *glomeratum*	*Choretrum glomeratum* var. *glomeratum*	p	5
Chorizandra enodis	*Chorizandra enodis*	p	6
Chrysanthemoides monilifera	*Chrysanthemoides monilifera*	p	97
Chrysocephalum apiculatum	*Chrysocephalum apiculatum*	p	31
Chrysocephalum baxteri	*Chrysocephalum baxteri*	p	21
Cirsium vulgare	*Cirsium vulgare*	p	32
Clematis microphylla	*Clematis microphylla*	p	41
Comesperma calymega	*Comesperma calymega*	p	17
Comesperma volubile	*Comesperma volubile*	p	1
Conospermum patens	*Conospermum patens*	p	20
Convolvulus erubescens	*Convolvulus erubescens*	p	6
Convolvulus erubescens (NC)	*Convolvulus erubescens*	p	24
Convolvulus remotus	*Convolvulus remotus*	p	12
Conyza albida	*Conyza albida*		4
Conyza bonariensis	*Conyza bonariensis*		2
Correa aemula s.str.	*Correa aemula*	p	6
Correa aemula (NC)	*Correa aemula*	p	21
Correa calycina	*Correa calycina*	p	2
Correa decumbens	*Correa decumbens*	p	3
Correa glabra	*Correa glabra* var. *leucoclada*	p	2
Correa pulchella	*Correa pulchella*	p	4
Correa reflexa	*Correa reflexa*	p	47
Correa reflexa var. *reflexa*	*Correa reflexa*	p	14
Correa schlechtendalii	*Correa glabra* var. *turnbullii*	p	3
Corybas diemenicus (NC)	*Corybas unguiculatus*		10
Corybas unguiculatus	*Corybas unguiculatus*		1
Cotoneaster glaucophyllus	*Cotoneaster glaucophyllus*	p	1
Cotula australis	*Cotula australis*		1
Cotula coronopifolia	*Cotula coronopifolia*	p	3
Craspedia glauca	*Craspedia glauca*	p	20
Crassula closiana	*Crassula closiana*		4
Crassula colorata var.	*Crassula colorata* var.		1
Crassula colorata var. *acuminata*	*Crassula colorata* var.		2
Crassula colorata var.	*Crassula colorata* var.		5
colorata			
Crassula decumbens var. *decumbens*	*Crassula decumbens* var. *decumbens*		9
Crassula natans var. *minus*	*Crassula natans* var. *minus*	p	1
Crassula peduncularis	*Crassula peduncularis*		2
Crassula sieberiana spp. *sieberiana*	*Crassula sieberiana* spp.	p	1
Crassula sieberiana spp. *tetramera*	*Crassula sieberiana* spp.	p	4
Crataegus azarolus	*Crataegus azarolus*	p	2
Crataegus monogyna	*Crataegus monogyna*	p	12
Crepis capillaris	*Crepis capillaris*		4
Critesion hystrix	*Critesion hystrix*		1
Critesion murinum spp. *leporinum*	*Critesion marinum*		5
Cryptandra hispidula	*Cryptandra hispidula*	p	18
Cryptandra leucophracta	*Cryptandra leucophracta*	p	1
Cryptandra tomentosa	*Cryptandra tomentosa*	p	16
Cryptandra tomentosa (NC)	*Cryptandra tomentosa*	p	16
Cryptostylis subulata	*Cryptostylis subulata*		14
Cullen australasicum	*Cullen australasicum*	p	1
Cullen cinereum	*Cullen cinereum*	p	1
Cyanicula deformis	*Cyanicula deformis*		2
Cymbonotus preissianus	*Cymbonotus preissianus*	p	6
Cynara cardunculus	*Cynara cardunculus*	p	3
Cynodon dactylon	*Cynodon dactylon*	p	2
Cynoglossum suaveolens	*Cynoglossum suaveolens*	p	14
Cynosurus echinatus	*Cynosurus echinatus*		80
Cyperus gunnii spp. *gunnii*	*Cyperus gunnii* spp. *gunnii*	p	1
Cyperus tenellus	*Cyperus tenellus*		20
Cyperus vaginatus	*Cyperus vaginatus*	p	12
Cyrtostylis reniformis	*Cyrtostylis reniformis*	p	24
Cyrtostylis robusta	*Cyrtostylis robusta*	p	2
Cytisus scoparius	*Cytisus scoparius*	p	18
Dactylis glomerata	*Dactylis glomerata*		6
Dampiera dysantha	*Dampiera dysantha*	p	25
Dampiera lanceolata var.	*Dampiera lanceolata* var.	p	3
Dampiera rosmarinifolia	*Dampiera rosmarinifolia*	p	5
Danthonia auriculata	*Danthonia auriculata*	p	1
Danthonia caespitosa	*Danthonia caespitosa*	p	34
Danthonia carphoides var. *carphoides*	*Danthonia carphoides* var. *carphoides*	p	10
Danthonia clelandii	*Danthonia clelandii*	p	5
Danthonia eriantha	*Danthonia eriantha*	p	4
Danthonia geniculata	*Danthonia geniculata*	p	45
Danthonia laevis	*Danthonia laevis*	p	4
Danthonia pilosa var.			0
Danthonia pilosa var. *paleacea*	*Danthonia pilosa* var. *paleacea*	p	17
Danthonia pilosa var. *pilosa*	*Danthonia pilosa* var. *pilosa*	p	13
Danthonia racemosa var. *racemosa*	*Danthonia racemosa* var. *racemosa*	p	10
Danthonia semiannularis	*Danthonia semiannularis*	p	3
Danthonia setacea var. *setacea*	*Danthonia setacea* var. *setacea*	p	90
Daucus glochidiatus	*Daucus glochidiatus*		63
Daviesia arenaria	*Daviesia arenaria*	p	1
Daviesia brevifolia	*Daviesia brevifolia*	p	104
Daviesia genistifolia	*Daviesia genistifolia*	p	3
Daviesia leptophylla	*Daviesia leptophylla*	p	157
Daviesia pectinata	*Daviesia pectinata*	p	1

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Daviesia ulicifolia spp. *incarnata*	*Daviesia ulicifolia* spp. *incarnata*	p	34
Daviesia ulicifolia (NC)	*Daviesia ulicifolia* spp. *incarnata*	p	146
Deyeuxia densa	*Deyeuxia densa*	p	30
Deyeuxia minor	*Deyeuxia minor*	p	8
Deyeuxia quadriseta	*Deyeuxia quadriseta*	p	96
Dianella brevicaulis	*Dianella brevicaulis*	p	4
Dianella longifolia var. *grandis*	*Dianella longifolia* var. *grandis*	p	1
Dianella revoluta var. *revoluta*	*Dianella revoluta* var. *revoluta*	p	111
Dichelachne crinita	*Dichelachne crinita*	p	18
Dichelachne inaequiglumis	*Dichelachne inaequiglumis*	p	5
Dichelachne micrantha	*Dichelachne micrantha*	p	4
Dichondra repens	*Dichondra repens*	p	176
Dillwynia hispida	*Dillwynia hispida*	p	212
Dillwynia sericea	*Dillwynia sericea*	p	41
Dipodium pardalinum	*Dipodium pardalinum*		1
Dipodium punctatum (NC)	*Dipodium roseum*		16
Dipodium roseum	*Dipodium roseum*		6
Disphyma crassifolium spp. (NC)	*Disphyma crassifolium*	p	1
Distichlis distichophylla	*Distichlis distichophylla*	p	1
Dittrichia graveolens	*Dittrichia graveolens*	p	5
Diuris aff. corymbosa	*Diuris aff. corymbosa*		5
Diuris aff. corymbosa x *pardina*			0
Diuris brevifolia	*Diuris brevifolia*		3
Diuris longifolia (NC)	*Diuris aff. Corymbosa*		8
Diuris maculata (NC)	*Diuris pardina*		3
Diuris pardina	*Diuris pardina*		6
Dodonaea baueri	*Dodonaea baueri*	p	4
Dodonaea hexandra	*Dodonaea hexandra*	p	1
Dodonaea viscosa spp. *cuneata*	*Dodonaea viscosa* spp. *cuneata*	p	6
Dodonaea viscosa spp. *spatulata*	*Dodonaea viscosa* spp. *spatulata*	p	35
Drosera auriculata	*Drosera auriculata*		124
Drosera binata	*Drosera binata*		37
Drosera glanduligera	*Drosera glanduligera*		11
Drosera macrantha spp. *planchonii*	*Drosera macrantha* spp. *planchonii*		135
Drosera peltata	*Drosera peltata*		32
Drosera pygmaea	*Drosera pygmaea*		16
Drosera whittakeri spp. *whittakeri*	*Drosera whittakeri* spp. *whittakeri*		17
Drosera whittakeri (NC)	*Drosera whittakeri* spp. *whittakeri*		174
Echinopogon ovatus var. *ovatus*	*Echinopogon ovatus* var. *ovatus*	p	4
Echium plantagineum	*Echium plantagineum*		15
Ehrharta calycina	*Ehrharta calycina*	p	38
Ehrharta longiflora	*Ehrharta longiflora*		29
Einadia nutans spp. *nutans*	*Einadia nutans* spp. *nutans*	p	1
Eleocharis acuta	*Eleocharis acuta*	p	5
Eleocharis gracilis	*Eleocharis gracilis*	p	44
Eleocharis sphacelata	*Eleocharis sphacelata*	p	2
Elymus scabrus var. *scabrus*	*Elymus scabrus* var. *scabrus*	p	11
Empodisma minus	*Empodisma minus*	p	63
Enchylaena tomentosa var.	*Enchylaena tomentosa* var. *tomentosa*	p	4
Enneapogon cylindricus	*Enneapogon cylindricus*	p	1
Enneapogon nigricans	*Enneapogon nigricans*	p	2
Epacris impressa	*Epacris impressa*	p	278

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Epilobium billardierianum spp. *billardierianum*	*Epilobium billardierianum* spp. *billardierianum*	p	9
Epilobium billardierianum spp. x *intermedium*	*Epilobium billardierianum* spp. x *intermedium*	p	1
Epilobium hirtigerum	*Epilobium hirtigerum*	p	6
Epilobium pallidiflorum	*Epilobium pallidiflorum*	p	33
Eragrostis benthamii	*Eragrostis benthamii*	p	1
Eragrostis curvula	*Eragrostis curvula*	p	1
Eremophila gibbifolia	*Eremophila gibbifolia*	p	1
Eremophila longifolia	*Eremophila longifolia*	p	1
Erica arborea	*Erica arborea*	p	2
Erica lusitanica	*Erica lusitanica*	p	11
Eriochilus cucullatus	*Eriochilus cucullatus*	p	51
Eriostemon angustifolius (NC)	*Eriostemon angustifolius* spp. *angustifolia*	p	7
Eriostemon pungens	*Eriostemon pungens*	p	2
Erodium botrys	*Erodium botrys*		6
Erodium cicutarium	*Erodium cicutarium*		1
Eryngium rostratum	*Eryngium rostratum*	p	1
Eryngium vesiculosum	*Eryngium vesiculosum*	p	1
Eucalyptus arenacea	*Eucalyptus baxteri*	p	1
Eucalyptus baxteri	*Eucalyptus baxteri*	p	194
Eucalyptus calycogona (NC)	*Eucalyptus calycogona*	p	1
Eucalyptus camaldulensis var.	*Eucalyptus camaldulensis* var. *camaldulensis*	p	1
Eucalyptus camaldulensis var. *camaldulensis*	*Eucalyptus camaldulensis* var. *camaldulensis*	p	32
Eucalyptus cladocalyx	*Eucalyptus cladocalyx*	p	1
Eucalyptus cneorifolia	*Eucalyptus cneorifolia*	p	3
Eucalyptus conglobata	*Eucalyptus phenax*	p	9
Eucalyptus cosmophylla	*Eucalyptus cosmophylla*	p	261
Eucalyptus diversifolia	*Eucalyptus diversifolia*	p	22
Eucalyptus fasciculosa	*Eucalyptus fasciculosa*	p	492
Eucalyptus foecunda (NC)	*Eucalyptus leptophylla*	p	13
Eucalyptus goniocalyx	*Eucalyptus goniocalyx*	p	126
Eucalyptus gracilis	*Eucalyptus gracilis*	p	1
Eucalyptus incrassata	*Eucalyptus incrassata*	p	13
Eucalyptus leptophylla	*Eucalyptus leptophylla*	p	2
Eucalyptus leucoxylon spp. *leucoxylon*	*Eucalyptus leucoxylon* spp.	p	53
Eucalyptus leucoxylon spp. *pruinosa*	*Eucalyptus leucoxylon* spp.	p	3
Eucalyptus leucoxylon (NC)	*Eucalyptus leucoxylon* spp.	p	63
Eucalyptus microcarpa	*Eucalyptus microcarpa*	p	24
Eucalyptus obliqua	*Eucalyptus obliqua*	p	100
Eucalyptus obliqua var. *obliqua* (NC)	*Eucalyptus obliqua*	p	290
Eucalyptus obliqua var. (NC)	*Eucalyptus obliqua*	p	87
Eucalyptus odorata	*Eucalyptus odorata*	p	18
Eucalyptus oleosa	*Eucalyptus oleosa*	p	1
Eucalyptus ovata	*Eucalyptus ovata*	p	29
Eucalyptus porosa	*Eucalyptus porosa*	p	8
Eucalyptus rubida spp. *rubida*	*Eucalyptus dalrympleana* spp. *dalrympleana*	p	14
Eucalyptus socialis	*Eucalyptus socialis*	p	1
Eucalyptus viminalis spp. *cygnetensis*	*Eucalyptus viminalis* spp. *cygnetensis*	p	14
Eucalyptus viminalis spp. *viminalis*	*Eucalyptus viminalis* spp. *viminalis*	p	46

Taxa name as recorded	Species name used for report	Perennial	No. Quadrats
Euchiton ensifer (NC)	*Euchiton gymnocephalus*	p	5
Euchiton gymnocephalus	*Euchiton gymnocephalus*	p	22
Euchiton gymnocephalus (NC)	*Euchiton gymnocephalus*	p	13
Euchiton involucratus	*Euchiton involucratus*	p	58
Euphorbia paralias	*Euphorbia paralias*	p	3
Euphorbia peplus	*Euphorbia peplus*		2
Euphrasia collina spp. *osbornii*	*Euphrasia collina* spp. *osbornii*	p	1
Eutaxia microphylla var. *microphylla*	*Eutaxia microphylla* var. *microphylla*	p	7
Exocarpos cupressiformis	*Exocarpos cupressiformis*	p	256
Exocarpos sparteus	*Exocarpos sparteus*	p	7
Festuca arundinacea	*Festuca arundinacea*	p	2
Ficus carica	*Ficus carica*	p	1
Foeniculum vulgare	*Foeniculum vulgare*	p	8
Frankenia pauciflora var.	*Frankenia pauciflora* var.	p	1
Freesia hybrid	*Freesia hybrid*		4
Fumaria bastardii	*Fumaria bastardii*		2
Fumaria capreolata spp. *capreolata*	*Fumaria capreolata* spp. *capreolata*		1
Fumaria muralis (NC)	*Fumaria muralis*		2
Gahnia ancistrophylla	*Gahnia ancistrophylla*	p	18
Gahnia deusta	*Gahnia deusta*	p	4
Gahnia filum	*Gahnia filum*	p	1
Gahnia lanigera	*Gahnia lanigera*	p	4
Gahnia sieberiana	*Gahnia sieberiana*	p	81
Gahnia trifida	*Gahnia trifida*	p	18
Galium aparine	*Galium aparine*		8
Galium divaricatum	*Galium divaricatum*		5
Galium gaudichaudii	*Galium gaudichaudii*	p	34
Galium migrans	*Galium migrans*	p	7
Galium murale	*Galium murale*		10
Gastrodia sesamoides	*Gastrodia sesamoides*		2
Genista monspessulana	*Genista monspessulana*	p	47
Genoplesium nigricans	*Genoplesium nigricans*		2
Genoplesium rufum	*Genoplesium rufum*		10
Geococcus pusillus	*Geococcus pusillus*		1
Geranium dissectum	*Geranium dissectum*	p	2
Geranium molle var. *molle*	*Geranium molle* var. *molle*		4
Geranium potentilloides var. *potentilloides*	*Geranium potentilloides* var. *potentilloides*	p	1
Geranium retrorsum	*Geranium retrorsum*	p	27
Geranium robertianum	*Geranium robertianum*	p	1
Geranium solanderi var. *solanderi*	*Geranium solanderi* var. *solanderi*	p	28
Gladiolus undulatus	*Gladiolus undulatus*		2
Gleichenia microphylla	*Gleichenia microphylla*	p	34
Glischrocaryon behrii	*Glischrocaryon behrii*	p	12
Glossodia major	*Glossodia major*		65
Glyceria australis	*Glyceria australis*	p	5
Glyceria declinata	*Glyceria declinata*	p	1
Glycine clandestina var.	*Glycine clandestina* var. *sericea*	p	1
Glycine latrobeana	*Glycine latrobeana*	p	2
Gnaphalium indutum	*Gnaphalium indutum*		4
Gnaphalium sp. (NC)			7
Gompholobium ecostatum	*Gompholobium ecostatum*	p	66
Gonocarpus elatus	*Gonocarpus elatus*	p	104
Gonocarpus mezianus	*Gonocarpus mezianus*	p	201
Gonocarpus micranthus spp. *micranthus*	*Gonocarpus micranthus* spp. *micranthus*	p	32
Gonocarpus tetragynus	*Gonocarpus tetragynus*	p	688
Goodenia affinis (NC)	*Goodenia willisiana*	p	1
Goodenia albiflora	*Goodenia albiflora*	p	1
Goodenia amplexans	*Goodenia amplexans*	p	8
Goodenia blackiana	*Goodenia blackiana*	p	378
Goodenia geniculata	*Goodenia geniculata*	p	95
Goodenia ovata	*Goodenia ovata*	p	126
Goodenia pinnatifida	*Goodenia pinnatifida*		1
Goodenia varia	*Goodenia varia*	p	8
Goodia lotifolia var. *lotifolia* (NC)	*Goodia medicaginae*	p	2
Goodia lotifolia var. (NC)	*Goodia medicaginae*	p	2
Gratiola peruviana	*Gratiola peruviana*	p	53
Grevillea ilicifolia var.	*Grevillea ilicifolia* var. *ilicifolia*	p	9
Grevillea ilicifolia var. *ilicifolia*	*Grevillea ilicifolia* var. *ilicifolia*	p	2
Grevillea lavandulacea var.	*Grevillea lavandulacea*	p	56
Grevillea lavandulacea var. *lavandulacea*	*Grevillea lavandulacea*	p	126
Grevillea lavandulacea var. *sericea*	*Grevillea lavandulacea*	p	3
Grevillea muricata	*Grevillea lavandulacea*	p	13
Grevillea rosmarinifolia	*Grevillea rosmarinifolia*	p	1
Gynandriris setifolia	*Gynandriris setifolia*		7
Hakea carinata	*Hakea carinata*	p	249
Hakea laurina	*Hakea laurina*	p	2
Hakea muelleriana	*Hakea muelleriana*	p	3
Hakea rostrata	*Hakea rostrata*	p	497
Hakea rugosa	*Hakea rugosa*	p	50
Halgania cyanea	*Halgania cyanea*	p	4
Haloragis acutangula forma *tetraptera*	*Haloragis acutangula*	p	1
Haloragis brownii	*Haloragis brownii*	p	3
Haloragis heterophylla	*Haloragis heterophylla*	p	2
Hardenbergia violacea	*Hardenbergia violacea*	p	38
Hedypnois rhagadioloides	*Hedypnois rhagadioloides*		2
Helichrysum leucopsideum	*Helichrysum leucopsideum*	p	6
Helichrysum rutidolepis	*Helichrysum scorpioides*	p	7
Helichrysum scorpioides	*Helichrysum scorpioides*	p	81
Hibbertia exutiacies	*Hibbertia exutiacies*	p	366
Hibbertia incana	*Hibbertia sericea* var. *sericea*	p	61
Hibbertia riparia (glabriuscula)	*Hibbertia riparia (glabriuscula)*	p	196
Hibbertia riparia (long-leaved aff. H. stricta)	*Hibbertia riparia (long-leaved aff. H. stricta)*	p	25
Hibbertia sericea var. *sericea*	*Hibbertia sericea* var. *sericea*	p	265
Hibbertia sp. B	*Hibbertia eupetrifolia* spp. *radians*	p	13
Hibbertia stricta var. *stricta*	*Hibbertia stricta* var. *stricta*	p	10
Hibbertia virgata	*Hibbertia virgata*	p	47
Holcus lanatus	*Holcus lanatus*		150
Homeria flaccida	*Homeria flaccida*		2
Hyalosperma demissum	*Hyalosperma demissum*		3
Hybanthus floribundus spp. *floribundus*	*Hybanthus floribundus* spp. *floribundus*	p	78
Hydrilla verticillata	*Hydrilla verticillata*	p	1
Hydrocotyle callicarpa	*Hydrocotyle callicarpa*		62
Hydrocotyle foveolata	*Hydrocotyle foveolata*		5
Hydrocotyle hirta	*Hydrocotyle hirta*	p	26

Taxa name as recorded	Species name used for report	Perennial	No. Quadrats
Hydrocotyle laxiflora	*Hydrocotyle laxiflora*	p	17
Hydrocotyle pterocarpa	*Hydrocotyle pterocarpa*	p	3
Hydrocotyle verticillata	*Hydrocotyle verticillata*	p	1
Hymenanthera dentata	*Hymenanthera dentata*	p	6
Hypericum gramineum	*Hypericum gramineum*		97
Hypericum japonicum	*Hypericum japonicum*	p	8
Hypericum perforatum	*Hypericum perforatum*	p	52
Hypochaeris glabra	*Hypochaeris glabra*		84
Hypochaeris radicata	*Hypochaeris radicata*	p	199
Hypolaena fastigiata	*Hypolaena fastigiata*	p	99
Hypolepis rugosula	*Hypolepis rugosula*	p	10
Hypoxis glabella var. *glabella*	*Hypoxis glabella* var. *glabella*		7
Hypoxis vaginata var. *vaginata*	*Hypoxis vaginata* var. *vaginata*		5
Ilex aquifolium	*Ilex aquifolium*	p	1
Indigofera australis var. *australis*	*Indigofera australis* var. *australis*	p	3
Isachne globosa	*Isachne globosa*	p	6
Isolepis aff. hookeriana	*Isolepis aff. hookeriana*		1
Isolepis cernua	*Isolepis cernua*		8
Isolepis congrua	*Isolepis congrua*		1
Isolepis fluitans	*Isolepis fluitans*	p	5
Isolepis hookeriana	*Isolepis hookeriana*		1
Isolepis inundata	*Isolepis inundata*	p	19
Isolepis inundata (NC)	*Isolepis inundata*	p	28
Isolepis marginata	*Isolepis marginata*		6
Isolepis nodosa	*Isolepis nodosa*	p	25
Isolepis platycarpa	*Isolepis platycarpa*	p	4
Isolepis stellata	*Isolepis stellata*		1
Isopogon ceratophyllus	*Isopogon ceratophyllus*	p	385
Ixia flexuosa	*Ixia flexuosa*		1
Ixia polystachya	*Ixia polystachya*		1
Ixodia achillaeoides spp. *achillaeoides*	*Ixodia achillaeoides* spp. *alata*	p	193
Ixodia achillaeoides spp. *alata*	*Ixodia achillaeoides* spp. *alata*	p	48
Juncus acutus	*Juncus acutus*	p	1
Juncus articulatus	*Juncus articulatus*	p	36
Juncus australis	*Juncus australis*	p	1
Juncus bufonius	*Juncus bufonius*	p	15
Juncus caespiticius	*Juncus caespiticius*	p	17
Juncus capitatus	*Juncus capitatus*		9
Juncus continuus	*Juncus continuus*	p	2
Juncus effusus	*Juncus effusus*	p	6
Juncus flavidus	*Juncus flavidus*	p	3
Juncus holoschoenus	*Juncus holoschoenus*	p	9
Juncus kraussii	*Juncus kraussii*	p	7
Juncus pallidus	*Juncus pallidus*	p	58
Juncus pauciflorus	*Juncus pauciflorus*	p	21
Juncus planifolius	*Juncus planifolius*	p	48
Juncus prismatocarpus	*Juncus prismatocarpus*	p	2
Juncus sarophorus	*Juncus sarophorus*	p	34
Juncus subsecundus	*Juncus subsecundus*	p	18
Juncus usitatus	*Juncus usitatus*	p	1
Kennedia prorepens	*Kennedia prorepens*	p	1
Kennedia prostrata	*Kennedia prostrata*	p	147
Kunzea pomifera	*Kunzea pomifera*	p	16
Lactuca serriola	*Lactuca serriola*	p	3
Lagenifera huegelii	*Lagenifera huegelii*	p	33
Lagenifera stipitata var. *stipitata*	*Lagenifera stipitata* var. *stipitata*	p	3
Lagurus ovatus	*Lagurus ovatus*		27
Lasiopetalum baueri	*Lasiopetalum baueri*	p	5
Lathyrus tingitanus	*Lathyrus tingitanus*		1
Lavandula stoechas	*Lavandula stoechas*	p	1
Lavatera plebeia	*Lavatera plebeia*	p	1
Laxmannia orientalis	*Laxmannia orientalis*	p	19
Laxmannia sessiliflora (NC)	*Laxmannia orientalis*	p	106
Leontodon taraxacoides spp. *taraxacoides*	*Leontodon taraxacoides* spp. *taraxacoides*	p	13
Lepidium africanum	*Lepidium africanum*	p	2
Lepidium pubescens			0
Lepidobolus drapetocoleus	*Lepidobolus drapetocoleus*	p	66
Lepidosperma canescens	*Lepidosperma canescens*	p	5
Lepidosperma carphoides	*Lepidosperma carphoides*	p	268
Lepidosperma concavum	*Lepidosperma concavum*	p	18
Lepidosperma congestum	*Lepidosperma congestum*	p	18
Lepidosperma curtisiae	*Lepidosperma curtisiae*	p	56
Lepidosperma gladiatum	*Lepidosperma gladiatum*	p	7
Lepidosperma laterale s.str.	*Lepidosperma laterale s.str.*	p	6
Lepidosperma laterale (NC)	*Lepidosperma laterale*	p	34
Lepidosperma longitudinale	*Lepidosperma longitudinale*	p	69
Lepidosperma semiteres	*Lepidosperma semiteres*	p	594
Lepidosperma viscidum	*Lepidosperma viscidum*	p	91
Leporella fimbriata	*Leporella fimbriata*		13
Leptocarpus brownii	*Leptocarpus brownii*	p	5
Leptocarpus tenax	*Leptocarpus tenax*	p	37
Leptoceras menziesii	*Leptoceras menziesii*		24
Leptochloa digitata			0
Leptomeria aphylla	*Leptomeria aphylla*	p	1
Leptorhynchos squamatus	*Leptorhynchos squamatus*	p	12
Leptospermum continentale	*Leptospermum continentale*	p	188
Leptospermum lanigerum	*Leptospermum lanigerum*	p	67
Leptospermum myrsinoides	*Leptospermum myrsinoides*	p	505
Leucophyta brownii	*Leucophyta brownii*	p	3
Leucopogon concurvus	*Leucopogon concurvus*	p	102
Leucopogon cordifolius	*Leucopogon cordifolius*	p	4
Leucopogon hirsutus	*Leucopogon hirsutus*	p	25
Leucopogon lanceolatus	*Leucopogon lanceolatus*	p	3
Leucopogon lanceolatus (NC)	*Leucopogon lanceolatus*	p	4
Leucopogon parviflorus	*Leucopogon parviflorus*	p	14
Leucopogon rufus	*Leucopogon rufus*	p	25
Leucopogon virgatus	*Leucopogon virgatus*	p	228
Leucopogon woodsii	*Leucopogon woodsii*	p	2
Levenhookia dubia	*Levenhookia dubia*		44
Levenhookia pusilla	*Levenhookia pusilla*		30
Levenhookia stipitata	*Levenhookia stipitata*		1
Lhotzkya glaberrima (NC)	*Calytrix glaberrima*	p	2
Lindsaea linearis	*Lindsaea linearis*	p	35
Linum marginale	*Linum marginale*	p	3
Linum trigynum	*Linum trigynum*		27
Lissanthe strigosa	*Lissanthe strigosa*	p	40
Lobelia alata	*Lobelia alata*	p	40
Lobelia gibbosa	*Lobelia gibbosa*		15
Logania linifolia	*Logania linifolia*	p	3
Logania recurva	*Logania recurva*	p	36
Logania saxatilis	*Logania saxatilis*	p	1
Logfia gallica	*Logfia gallica*	p	1

Taxa name as recorded	Species name used for report	Perennial	No. Quadrats
Lolium loliaceum	*Lolium loliaceum*		2
Lolium multiflorum	*Lolium multiflorum*		1
Lolium perenne	*Lolium perenne*	p	2
Lolium rigidum	*Lolium rigidum*		19
Lomandra collina	*Lomandra collina*	p	5
Lomandra densiflora	*Lomandra densiflora*	p	59
Lomandra effusa	*Lomandra effusa*	p	5
Lomandra fibrata	*Lomandra fibrata*	p	143
Lomandra glauca (NC)			0
Lomandra juncea	*Lomandra juncea*	p	14
Lomandra leucocephala spp. *robusta*	*Lomandra leucocephala* spp. *robusta*	p	3
Lomandra micrantha spp. *micrantha*	*Lomandra micrantha* spp.	p	172
Lomandra micrantha spp. *tuberculata*	*Lomandra micrantha* spp.	p	46
Lomandra multiflora spp. *dura*	*Lomandra multiflora* spp. *dura*	p	301
Lomandra nana	*Lomandra nana*	p	15
Lomandra sororia	*Lomandra sororia*	p	72
Lotus australis	*Lotus australis*	p	2
Lotus suaveolens	*Lotus suaveolens*	p	7
Lotus uliginosus	*Lotus uliginosus*	p	45
Luzula densiflora	*Luzula densiflora*	p	12
Luzula meridionalis	*Luzula meridionalis*	p	12
Luzula ovata	*Luzula ovata*	p	2
Lycium ferocissimum	*Lycium ferocissimum*	p	9
Lycopodiella lateralis	*Lycopodiella lateralis*	p	5
Lycopodiella serpentina	*Lycopodiella serpentina*	p	1
Lycopus australis	*Lycopus australis*	p	7
Lysiana exocarpi spp. *exocarpi*	*Lysiana exocarpi* spp. *exocarpi*	p	20
Lythrum hyssopifolia	*Lythrum hyssopifolia*	p	13
Lythrum junceum	*Lythrum junceum*	p	1
Lythrum salicaria	*Lythrum salicaria*	p	1
Malus sylvestris	*Malus sylvestris*	p	3
Medicago polymorpha var. *polymorpha*	*Medicago polymorpha* var. *polymorpha*		2
Melaleuca acuminata	*Melaleuca acuminata*	p	3
Melaleuca armillaris	*Melaleuca armillaris*	p	2
Melaleuca brevifolia	*Melaleuca brevifolia*	p	1
Melaleuca decussata	*Melaleuca decussata*	p	97
Melaleuca halmaturorum spp. *halmaturorum*	*Melaleuca halmaturorum* spp. *halmaturorum*	p	1
Melaleuca lanceolata spp. *lanceolata*	*Melaleuca lanceolata* spp. *lanceolata*	p	9
Melaleuca squamea	*Melaleuca squamea*	p	32
Melaleuca uncinata	*Melaleuca uncinata*	p	13
Melianthus comosus	*Melianthus comosus*	p	4
Melilotus indica	*Melilotus indica*		1
Mentha diemenica	*Mentha diemenica*	p	1
Mentha x *piperita* var. x *piperita*	*Mentha* x *piperita* var. x *piperita*	p	1
Micrantheum demissum	*Micrantheum demissum*	p	55
Microlaena stipoides var. *stipoides*	*Microlaena stipoides* var. *stipoides*	p	95
Microseris lanceolata	*Microseris lanceolata*	p	21
Microtis arenaria	*Microtis arenaria*		28
Microtis atrata	*Microtis atrata*		3
Microtis parviflora	*Microtis parviflora*		14
Microtis rara	*Microtis rara*		1
Microtis unifolia	*Microtis unifolia* complex		1
Microtis unifolia complex	*Microtis unifolia* complex		8
Microtis unifolia (NC)	*Microtis unifolia* complex		24

Taxa name as recorded	Species name used for report	Perennial	No. Quadrats
Millotia muelleri	*Millotia muelleri*		2
Millotia tenuifolia var.	*Millotia tenuifolia* var. *tenuifolia*		10
Millotia tenuifolia var. *tenuifolia*	*Millotia tenuifolia* var. *tenuifolia*		5
Mimulus repens	*Mimulus repens*	p	1
Mitrasacme paradoxa (NC)	*Mitrasacme paradoxa*		28
Moenchia erecta	*Moenchia erecta*		3
Monadenia bracteata	*Monadenia bracteata*		5
Muehlenbeckia adpressa	*Muehlenbeckia adpressa*	p	4
Muehlenbeckia gunnii	*Muehlenbeckia gunnii*	p	15
Myoporum insulare	*Myoporum insulare*	p	2
Myoporum viscosum	*Myoporum viscosum*	p	6
Myriophyllum amphibium	*Myriophyllum amphibium*	p	28
Myrsiphyllum asparagoides	*Myrsiphyllum asparagoides*	p	78
Myrsiphyllum declinatum	*Myrsiphyllum declinatum*	p	6
Myrtus communis	*Myrtus communis*	p	1
Neurachne alopecuroidea	*Neurachne alopecuroidea*	p	169
Nicotiana glauca	*Nicotiana glauca*	p	1
Oenothera stricta spp. *stricta*	*Oenothera stricta* spp. *stricta*	p	4
Olea europaea spp. *europaea*	*Olea europaea* spp. *europaea*	p	62
Olearia axillaris	*Olearia axillaris*	p	32
Olearia ciliata var.	*Olearia ciliata* var. *ciliata*	p	3
Olearia ciliata var. *ciliata*	*Olearia ciliata* var. *ciliata*	p	1
Olearia glandulosa	*Olearia glandulosa*	p	2
Olearia grandiflora	*Olearia grandiflora*	p	76
Olearia ramulosa	*Olearia ramulosa*	p	373
Olearia teretifolia	*Olearia teretifolia*	p	34
Olearia tubuliflora	*Olearia tubuliflora*	p	8
Opercularia ovata	*Opercularia ovata*	p	1
Opercularia scabrida	*Opercularia scabrida*	p	15
Opercularia turpis	*Opercularia turpis*	p	50
Opercularia varia	*Opercularia varia*	p	64
Ophioglossum lusitanicum	*Ophioglossum lusitanicum*	p	3
Orthoceras strictum	*Orthoceras strictum*		4
Oxalis perennans	*Oxalis perennans*	p	126
Oxalis pes-caprae	*Oxalis pes-caprae*		31
Oxalis purpurea	*Oxalis purpurea*		2
Oxylobium lanceolatum	*Oxylobium lanceolatum*	p	2
Ozothamnus retusus	*Ozothamnus retusus*	p	5
Parentucellia latifolia	*Parentucellia latifolia*		5
Parietaria debilis	*Parietaria debilis*	p	1
Paspalum dilatatum	*Paspalum dilatatum*	p	4
Paspalum vaginatum	*Paspalum vaginatum*	p	1
Patersonia fragilis	*Patersonia fragilis*	p	23
Patersonia occidentalis	*Patersonia occidentalis*	p	56
Pelargonium australe	*Pelargonium australe*	p	4
Pelargonium littorale	*Pelargonium littorale*	p	6
Pennisetum clandestinum	*Pennisetum clandestinum*	p	2
Pennisetum macrourum	*Pennisetum macrourum*	p	6
Pentapogon quadrifidus var. *quadrifidus*	*Pentapogon quadrifidus* var. *quadrifidus*	p	1
Pentaschistis airoides	*Pentaschistis airoides*		1
Pentaschistis pallida	*Pentaschistis pallida*	p	63
Persicaria decipiens	*Persicaria decipiens*	p	16
Persicaria strigosa	*Persicaria strigosa*	p	1

Taxa name as recorded	Species name used for report	Perennial	No. Quadrats
Persoonia juniperina	*Persoonia juniperina*	p	52
Petrorhagia velutina	*Petrorhagia velutina*		4
Phalaris aquatica	*Phalaris aquatica*	p	10
Phalaris minor	*Phalaris minor*		9
Phragmites australis	*Phragmites australis*	p	31
Phyllangium distylis	*Phyllangium distylis*		1
Phyllangium divergens	*Phyllangium divergens*		5
Phyllanthus australis	*Phyllanthus australis*	p	10
Phyllota pleurandroides	*Phyllota pleurandroides*	p	37
Physalis peruviana	*Physalis peruviana*	p	1
Pimelea curviflora var. *gracilis*	*Pimelea curviflora* var. *gracilis*	p	1
Pimelea flava spp. *dichotoma*	*Pimelea flava* spp. *dichotoma*	p	2
Pimelea flava spp. *flava*	*Pimelea flava* spp. *flava*	p	1
Pimelea glauca	*Pimelea glauca*	p	14
Pimelea humilis	*Pimelea humilis*	p	92
Pimelea linifolia spp. *linifolia*	*Pimelea linifolia* spp. *linifolia*	p	196
Pimelea micrantha	*Pimelea micrantha*	p	2
Pimelea octophylla	*Pimelea octophylla*	p	91
Pimelea phylicoides	*Pimelea phylicoides*	p	26
Pimelea serpyllifolia spp. *serpyllifolia*	*Pimelea serpyllifolia* spp. *serpyllifolia*	p	7
Pimelea stricta	*Pimelea stricta*	p	12
Pinus halepensis	*Pinus halepensis*	p	4
Pinus nigra	*Pinus nigra*	p	1
Pinus radiata	*Pinus radiata*	p	53
Piptatherum miliaceum	*Piptatherum miliaceum*	p	2
Pittosporum phylliraeoides var. *microcarpa*	*Pittosporum phylliraeoides* var. *microcarpa*	p	5
Pittosporum undulatum	*Pittosporum undulatum*	p	9
Plantago bellardii	*Plantago bellardii*		5
Plantago coronopus spp. *coronopus*	*Plantago coronopus* spp. *coronopus*	p	2
Plantago gaudichaudii	*Plantago gaudichaudii*	p	5
Plantago hispida	*Plantago hispida*	p	9
Plantago lanceolata var.	*Plantago lanceolata* var. *lanceolata*	p	3
Plantago lanceolata var. *lanceolata*	*Plantago lanceolata* var. *lanceolata*	p	68
Plantago major	*Plantago major*	p	2
Plantago sp. B	*Plantago sp. B*		1
Platylobium obtusangulum	*Platylobium obtusangulum*	p	510
Platysace heterophylla var.	*Platysace heterophylla* var. *heterophylla*	p	42
Platysace heterophylla var. *heterophylla*	*Platysace heterophylla* var. *heterophylla*	p	75
Pleurosorus rutifolius	*Pleurosorus rutifolius*	p	4
Poa clelandii	*Poa clelandii*	p	151
Poa crassicaudex	*Poa crassicaudex*	p	45
Poa labillardieri var. *labillardieri*	*Poa labillardieri* var. *labillardieri*	p	29
Poa poiformis	*Poa poiformis*	p	3
Poa tenera	*Poa tenera*	p	10
Poa umbricola	*Poa umbricola*	p	16
Podotheca angustifolia	*Podotheca angustifolia*		4
Polycarpon tetraphyllum	*Polycarpon tetraphyllum*		1
Polygala myrtifolia	*Polygala myrtifolia*	p	2
Polygonum aviculare	*Polygonum aviculare*	p	2
Polygonum sp. (NC)			1
Polypogon monspeliensis	*Polypogon monspeliensis*		3
Polypogon viridis	*Polypogon viridis*		1
Pomaderris obcordata	*Pomaderris obcordata*	p	1
Pomaderris oraria	*Pomaderris paniculosa*	p	3
(NC)	spp. *paniculosa*		
Pomaderris paniculosa spp. *paniculosa*	*Pomaderris paniculosa* spp. *paniculosa*	p	1
Poranthera ericoides	*Poranthera ericoides*		5
Poranthera microphylla	*Poranthera microphylla*		49
Prasophyllum australe	*Prasophyllum australe*		4
Prasophyllum elatum	*Prasophyllum elatum*		1
Prasophyllum fitzgeraldii	*Prasophyllum fitzgeraldii*		2
Prasophyllum frenchii	*Prasophyllum frenchii*		2
Prasophyllum odoratum	*Prasophyllum odoratum*		1
Prasophyllum pallidum	*Prasophyllum pallidum*		2
Pratia pedunculata	*Pratia pedunculata*	p	2
Prostanthera behriana	*Prostanthera behriana*	p	8
Prostanthera chlorantha	*Prostanthera chlorantha*	p	14
Prunella vulgaris	*Prunella vulgaris*	p	4
Prunus cerasifera	*Prunus cerasifera*	p	1
Pseudanthus micranthus	*Pseudanthus micranthus*	p	7
Pteridium esculentum	*Pteridium esculentum*	p	271
Pteris tremula	*Pteris tremula*	p	1
Pterostylis alata	*Pterostylis alata*		2
Pterostylis foliata	*Pterostylis foliata*		2
Pterostylis longifolia	*Pterostylis longifolia*		6
Pterostylis nana	*Pterostylis nana*		31
Pterostylis nutans	*Pterostylis nutans*		16
Pterostylis pedunculata	*Pterostylis pedunculata*		30
Pterostylis plumosa	*Pterostylis plumosa*		7
Pterostylis robusta	*Pterostylis robusta*		1
Pterostylis sanguinea	*Pterostylis sanguinea*		5
Pterostylis vittata (NC)	*Pterostylis vittata*		22
Ptilotus erubescens	*Ptilotus erubescens*	p	5
Ptilotus spathulatus forma	*Ptilotus spathulatus* forma *spathulatus*	p	1
Pultenaea acerosa	*Pultenaea acerosa*	p	45
Pultenaea canaliculata var.	*Pultenaea canaliculata* var.	p	38
Pultenaea canaliculata var. *canaliculata*	*Pultenaea canaliculata* var.	p	26
Pultenaea daphnoides	*Pultenaea daphnoides*	p	354
Pultenaea dentata	*Pultenaea dentata*	p	9
Pultenaea graveolens	*Pultenaea graveolens*	p	2
Pultenaea hispidula	*Pultenaea hispidula*	p	19
Pultenaea involucrata	*Pultenaea involucrata*	p	89
Pultenaea largiflorens	*Pultenaea largiflorens*	p	189
Pultenaea laxiflora	*Pultenaea laxiflora*	p	20
Pultenaea pedunculata	*Pultenaea pedunculata*	p	42
Pultenaea prostrata	*Pultenaea prostrata*	p	1
Pultenaea scabra	*Pultenaea scabra*	p	5
Pultenaea tenuifolia	*Pultenaea tenuifolia*	p	4
Pultenaea teretifolia var.	*Pultenaea teretifolia* var. *teretifolia*	p	2
Pultenaea trinervis		p	83
Pultenaea viscidula	*Pultenaea viscidula*	p	4
Pycnosorus globosus	*Pycnosorus globosus*	p	1
Pyrorchis nigricans	*Pyrorchis nigricans*		25
Quinetia urvillei	*Quinetia urvillei*		3
Ranunculus amphitrichus	*Ranunculus amphitrichus*	p	3
Ranunculus lappaceus	*Ranunculus lappaceus*		24
Ranunculus pachycarpus	*Ranunculus pachycarpus*	p	2
Ranunculus sessiliflorus var.	*Ranunculus sessiliflorus* var.		1
Raphanus raphanistrum	*Raphanus raphanistrum*		1
Rapistrum rugosum spp. *rugosum*	*Rapistrum rugosum* spp. *rugosum*		1

Taxa name as recorded	Species name used for report	Perennial	No. Quadrats
Reseda odorata	*Reseda odorata*		1
Rhagodia candolleana spp. *candolleana*	*Rhagodia candolleana* spp. *candolleana*	p	5
Rhamnus alaternus	*Rhamnus alaternus*	p	6
Romulea minutiflora	*Romulea minutiflora*		14
Romulea rosea var. *australis*	*Romulea rosea* var. *australis*		44
Rorippa microphylla	*Rorippa microphylla*	p	1
Rorippa nasturtium-aquaticum	*Rorippa nasturtium-aquaticum*	p	4
Rosa canina	*Rosa canina*	p	38
Rosa rubiginosa	*Rosa rubiginosa*	p	4
Rubus discolor	*Rubus sp.*	p	3
Rubus fruticosus (NC)	*Rubus sp.*	p	1
Rubus laciniatus	*Rubus sp.*	p	2
Rubus parvifolius	*Rubus sp.*	p	7
Rubus ulmifolius cv. inermis	*Rubus sp.*	p	9
Rubus ulmifolius var. *ulmifolius*	*Rubus sp.*	p	80
Rumex brownii	*Rumex brownii*	p	2
Rumex conglomeratus	*Rumex conglomeratus*	p	6
Rumex crispus	*Rumex crispus*	p	3
Rutidosis multiflora	*Rutidosis multiflora*		11
Sagina apetala	*Sagina apetala*		1
Sagina maritima	*Sagina maritima*		1
Salvia verbenaca form	*Salvia verbenaca* form	p	1
Samolus eremaeus	*Samolus repens*	p	1
Samolus repens	*Samolus repens*	p	2
Santalum acuminatum	*Santalum acuminatum*	p	8
Santalum murrayanum	*Santalum murrayanum*	p	1
Sarcocornia quinqueflora	*Sarcocornia quinqueflora*	p	1
Scabiosa atropurpurea	*Scabiosa atropurpurea*	p	4
Scaevola albida	*Scaevola albida* var. *albida*	p	67
Scaevola albida var. *albida*	*Scaevola albida* var. *albida*	p	145
Scaevola albida var. (NC)	*Scaevola albida* var. *albida*	p	36
Scaevola calendulacea	*Scaevola calendulacea*	p	1
Scaevola crassifolia	*Scaevola crassifolia*	p	2
Scaevola linearis spp. *confertifolia*	*Scaevola linearis* spp. *confertifolia*	p	3
Schizaea bifida	*Schizaea bifida*	p	6
Schizaea fistulosa	*Schizaea fistulosa*	p	2
Schoenus apogon	*Schoenus apogon*		297
Schoenus breviculmis	*Schoenus breviculmis*	p	223
Schoenus carsei	*Schoenus carsei*	p	21
Schoenus deformis	*Schoenus deformis*	p	1
Schoenus discifer	*Schoenus discifer*	p	1
Schoenus laevigatus	*Schoenus laevigatus*	p	3
Schoenus lepidosperma spp. *lepidosperma*	*Schoenus lepidosperma* spp. *lepidosperma*	p	16
Schoenus maschalinus	*Schoenus maschalinus*	p	21
Schoenus nanus	*Schoenus nanus*		6
Schoenus nitens	*Schoenus nitens*	p	1
Scirpus sp. (NC)			1
Scutellaria humilis	*Scutellaria humilis*	p	6
Sebaea ovata	*Sebaea ovata*		7
Senecio glomeratus	*Senecio glomeratus*	p	24
Senecio hispidulus var.	*Senecio hispidulus* var. *hispidulus*	p	2
Senecio hispidulus var. *hispidulus*	*Senecio hispidulus* var. *hispidulus*	p	5
Senecio hypoleucus	*Senecio hypoleucus*	p	11
Senecio lautus	*Senecio lautus*	p	7
Senecio minimus var. *minimus*	*Senecio minimus* var. *minimus*	p	6
Senecio odoratus var.	*Senecio odoratus* var. *odoratus*	p	7
Senecio odoratus var. *obtusifolius*	*Senecio odoratus* var. *obtusifolius*	p	2
Senecio odoratus var. *odoratus*	*Senecio odoratus* var. *odoratus*	p	7
Senecio picridioides	*Senecio picridioides*	p	23
Senecio pterophorus var. *pterophorus*	*Senecio pterophorus* var. *pterophorus*	p	168
Senecio quadridentatus	*Senecio quadridentatus*	p	112
Senecio squarrosus	*Senecio squarrosus*	p	4
Senecio tenuiflorus	*Senecio tenuiflorus*	p	38
*Senna artemisioides nothos*pp. *coriacea*	*Senna artemisioides nothos*pp. *coriacea*	p	1
Sherardia arvensis	*Sherardia arvensis*		15
Sigesbeckia orientalis spp. *orientalis*	*Sigesbeckia orientalis* spp. *orientalis*	p	1
Silene gallica var.	*Silene gallica* var.		1
Silene gallica var. *gallica*	*Silene gallica* var.		2
Silene gallica var. *gallica* (NC)	*Silene gallica* var.		1
Silybum marianum	*Silybum marianum*		2
Solanum hermanni (NC)	*Solanum hermanni* (NC)		1
Solanum laciniatum	*Solanum laciniatum*	p	2
Solanum nigrum	*Solanum nigrum*	p	11
Solenogyne dominii	*Solenogyne dominii*	p	3
Sollya heterophylla	*Sollya heterophylla*	p	1
Sonchus asper spp. *asper*	*Sonchus asper* spp.		1
Sonchus asper spp. *glaucescens*	*Sonchus asper* spp.		6
Sonchus hydrophilus	*Sonchus hydrophilus*	p	5
Sonchus oleraceus	*Sonchus oleraceus*		30
Sparaxis bulbifera	*Sparaxis bulbifera*		3
Sparaxis tricolor	*Sparaxis tricolor*		1
Spergularia diandra	*Spergularia diandra*		1
Sphaerolobium minus	*Sphaerolobium minus*	p	2
Spinifex sericeus	*Spinifex sericeus*	p	2
Spiranthes sinensis spp. *australis*	*Spiranthes sinensis* spp. *australis*	p	10
Spirodela punctata			4
Sprengelia incarnata	*Sprengelia incarnata*	p	34
Spyridium coactilifolium	*Spyridium coactilifolium*	p	19
Spyridium eriocephalum (NC)	*Spyridium eriocephalum* var. *eriocephalum*	p	4
Spyridium parvifolium	*Spyridium parvifolium*	p	114
Spyridium phylicoides	*Spyridium phylicoides*	p	2
Spyridium spathulatum	*Spyridium spathulatum*	p	13
Spyridium subochreatum (NC)	*Spyridium subochreatum*	p	1
Spyridium thymifolium	*Spyridium thymifolium*	p	158
Spyridium tricolor	*Spyridium tricolor*	p	3
Spyridium vexilliferum var.	*Spyridium vexilliferum* var. *vexilliferum*	p	7
Spyridium vexilliferum var. *vexilliferum*	*Spyridium vexilliferum* var. *vexilliferum*	p	32
Stackhousia aspericocca spp. *"Cylindrical inflorescence"(W.R.Barker 1418)*	*Stackhousia aspericocca* spp.	p	54
Stackhousia aspericocca spp. *"One-sided inflorescence"(W.R.Barker 697)*	*Stackhousia aspericocca* spp.	p	9
Stackhousia aspericocca (NC)	*Stackhousia aspericocca* spp.	p	24
Stackhousia monogyna	*Stackhousia monogyna*	p	11
Stellaria media	*Stellaria media*		4

Taxa name as recorded	Species name used for report	Perennial	No. Quadrats
Stellaria palustris var.	*Stellaria palustris* var.	p	2
Stellaria palustris var. *palustris*	*Stellaria palustris* var.	p	14
Stellaria pungens	*Stellaria pungens*	p	1
Stenotaphrum secundatum	*Stenotaphrum secundatum*	p	1
Austrostipa blackii	*Austrostipa blackii*	p	5
Austrostipa breviglumis	*Austrostipa breviglumis*	p	4
Austrostipa curticoma	*Austrostipa curticoma*	p	3
Austrostipa drummondii	*Austrostipa drummondii*	p	1
Austrostipa elegantissima	*Austrostipa elegantissima*	p	11
Austrostipa flavescens	*Austrostipa flavescens*	p	5
Austrostipa gibbosa	*Austrostipa gibbosa*	p	1
Austrostipa hemipogon	*Austrostipa hemipogon*	p	17
Austrostipa mollis	*Austrostipa mollis*	p	72
Austrostipa muelleri	*Austrostipa muelleri*	p	38
Austrostipa multispiculis	*Austrostipa multispiculis*	p	4
Austrostipa mundula	*Austrostipa mundula*	p	1
Austrostipa neesiana var. *neesiana*	*Austrostipa neesiana* var. *neesiana*	p	1
Austrostipa nodosa	*Austrostipa nodosa*	p	2
Austrostipa pilata	*Austrostipa pilata*	p	1
Austrostipa pubinodis	*Austrostipa pubinodis*	p	5
Austrostipa scabra spp. *falcata*	*Austrostipa scabra* spp. *falcata*	p	6
Austrostipa semibarbata	*Austrostipa semibarbata*	p	53
Austrostipa setacea	*Austrostipa setacea*	p	1
Austrostipa stipoides	*Austrostipa stipoides*	p	1
Stuartina muelleri	*Stuartina muelleri*		20
Stylidium calcaratum	*Stylidium calcaratum*		3
Stylidium calcaratum (NC)	*Stylidium calcaratum*		1
Stylidium despectum	*Stylidium despectum*		1
Stylidium graminifolium	*Stylidium graminifolium*	p	161
Stylidium inundatum	*Stylidium inundatum*		1
Styphelia exarrhena	*Styphelia exarrhena*	p	22
Suaeda australis	*Suaeda australis*	p	1
Swainsona formosa			0
Swainsona lessertiifolia	*Swainsona lessertiifolia*	p	4
Taraxacum officinale	*Taraxacum officinale*	p	9
Tetragonia implexicoma	*Tetragonia implexicoma*	p	12
Tetraria capillaris	*Tetraria capillaris*	p	1
Tetratheca pilosa spp. *pilosa*	*Tetratheca pilosa* spp. *pilosa*	p	338
Thelymitra antennifera	*Thelymitra antennifera*		17
Thelymitra aristata	*Thelymitra aristata*		3
Thelymitra benthamiana	*Thelymitra benthamiana*		1
Thelymitra grandiflora	*Thelymitra grandiflora*		3
Thelymitra holmesii	*Thelymitra holmesii*		1
Thelymitra ixioides	*Thelymitra ixioides*		12
Thelymitra juncifolia	*Thelymitra juncifolia*		4
Thelymitra luteocilium	*Thelymitra luteocilium*		4
Thelymitra mucida	*Thelymitra mucida*		2
Thelymitra nuda	*Thelymitra nuda*		47
Thelymitra pauciflora	*Thelymitra pauciflora*		81
Thelymitra rubra	*Thelymitra rubra*		21
Thelymitra venosa	*Thelymitra venosa*		10
Themeda triandra	*Themeda triandra*	p	90
Thomasia petalocalyx	*Thomasia petalocalyx*	p	15
Threlkeldia diffusa	*Threlkeldia diffusa*	p	5
Thysanotus baueri	*Thysanotus baueri*		1
Thysanotus juncifolius	*Thysanotus juncifolius*		27
Thysanotus patersonii	*Thysanotus patersonii*	p	351
Tolpis barbata	*Tolpis barbata*		5
Torilis nodosa	*Torilis nodosa*		1
Trachymene cyanopetala	*Trachymene cyanopetala*		3
Trachymene pilosa	*Trachymene pilosa*		7
Tragopogon porrifolius	*Tragopogon porrifolius*	p	2
Tricoryne elatior	*Tricoryne elatior*		43
Tricoryne elatior (NC)	*Tricoryne elatior*		101
Tricoryne tenella	*Tricoryne tenella*		13
Trifolium angustifolium	*Trifolium angustifolium*		37
Trifolium arvense var. *arvense*	*Trifolium arvense* var. *arvense*		28
Trifolium campestre	*Trifolium campestre*		83
Trifolium dubium	*Trifolium dubium*		15
Trifolium fragiferum var. *fragiferum*	*Trifolium fragiferum* var. *fragiferum*		1
Trifolium glomeratum	*Trifolium glomeratum*		21
Trifolium repens	*Trifolium repens*		8
Trifolium subterraneum	*Trifolium subterraneum*		16
Triglochin centrocarpum	*Triglochin centrocarpum*		3
Triglochin procerum	*Triglochin procerum*	p	6
Triglochin procerum var. *procerum* (NC)	*Triglochin procerum*	p	7
Triglochin striatum	*Triglochin striatum*	p	5
Triodia compacta	*Triodia compacta*	p	1
Triodia irritans var. (NC)			2
Triptilodiscus pygmaeus	*Triptilodiscus pygmaeus*		1
Triticum aestivum	*Triticum aestivum*		6
Typha domingensis	*Typha domingensis*	p	4
Ulex europaeus	*Ulex europaeus*	p	38
Urospermum picroides	*Urospermum picroides*		3
Urtica urens	*Urtica urens*		1
Utricularia dichotoma	*Utricularia dichotoma*	p	10
Utricularia dichotoma (NC)	*Utricularia dichotoma*	p	16
Utricularia lateriflora	*Utricularia lateriflora*		5
Vellereophyton dealbatum	*Vellereophyton dealbatum*		5
Verbascum virgatum	*Verbascum virgatum*	p	6
Verbena officinalis	*Verbena officinalis*	p	1
Veronica gracilis	*Veronica gracilis*	p	1
Veronica hillebrandii	*Veronica hillebrandii*	p	1
Veronica persica	*Veronica persica*	p	1
Vicia sativa spp. *nigra*	*Vicia sativa* spp. *nigra*		11
Vicia sativa spp. *sativa*	*Vicia sativa* spp. *sativa*		5
Villarsia reniformis	*Villarsia reniformis*	p	1
Villarsia umbricola var.	*Villarsia umbricola* var. *umbricola*	p	11
Villarsia umbricola var. *umbricola*	*Villarsia umbricola* var. *umbricola*	p	20
Viminaria juncea	*Viminaria juncea*	p	46
Vinca major	*Vinca major*	p	1
Viola cleistogamoides	*Viola cleistogamoides*	p	9
Viola hederacea	*Viola hederacea*	p	56
Viola sieberiana	*Viola sieberiana*	p	70
Vittadinia condyloides	*Vittadinia condyloides*	p	1
Vittadinia cuneata var.	*Vittadinia cuneata* var. *cuneata* forma *cuneata*	p	3
Vittadinia cuneata var. *cuneata* forma *cuneata*	*Vittadinia cuneata* var. *cuneata* forma *cuneata*	p	3
Vittadinia gracilis	*Vittadinia gracilis*	p	1
Vulpia bromoides	*Vulpia bromoides*		49
Vulpia ciliata	*Vulpia ciliata*		1
Vulpia muralis	*Vulpia muralis*		1
Vulpia myuros forma	*Vulpia myuros* forma		10
Vulpia myuros forma	*Vulpia myuros* forma		2

Taxa name as recorded	Species name used for report	Perennial	No. Quadrats
megalura			
Vulpia myuros forma *myuros*	*Vulpia myuros* forma		11
Wahlenbergia communis	*Wahlenbergia communis*	p	2
Wahlenbergia gracilenta	*Wahlenbergia gracilenta*		31
Wahlenbergia luteola	*Wahlenbergia luteola*	p	6
Wahlenbergia multicaulis	*Wahlenbergia multicaulis*	p	4
Wahlenbergia preissii			1
Wahlenbergia stricta spp. *stricta*	*Wahlenbergia stricta* spp. *stricta*	p	129
Watsonia bulbillifera (NC)	*Watsonia bulbillifera*		9
Watsonia meriana cv. Bulbillifera	*Watsonia meriana cv. Bulbillifera*		6
Watsonia pyramidata (NC)	*Watsonia pyramidata*		1
Wolffia australiana	*Wolffia australiana*	p	1
Wurmbea dioica spp. *dioica*	*Wurmbea dioica* spp. *dioica*		5
Wurmbea dioica spp. *dioica* (NC)	*Wurmbea dioica* spp. *dioica*		5
Xanthorrhoea quadrangulata	*Xanthorrhoea quadrangulata*	p	16
Xanthorrhoea semiplana spp. *semiplana*	*Xanthorrhoea semiplana* spp.	p	419
Xanthorrhoea semiplana spp. *tateana*	*Xanthorrhoea semiplana* spp.	p	201
Xanthosia dissecta var. *dissecta* (NC)	*Xanthosia dissecta* var. *floribunda*	p	5
Xanthosia dissecta var. *floribunda*	*Xanthosia dissecta* var. *floribunda*	p	2
Xanthosia dissecta (NC)	*Xanthosia dissecta* var. *floribunda*	p	4
Xanthosia pusilla	*Xanthosia pusilla*	p	180
Xanthosia tasmanica	*Xanthosia tasmanica*	p	8
Xyris operculata	*Xyris operculata*	p	31
Zaleya galericulata	*Zaleya galericulata*	p	1
Zaluzianskya divaricata	*Zaluzianskya divaricata*		3
Zantedeschia aethiopica	*Zantedeschia aethiopica*	p	2
Zieria veronicea	*Zieria veronicea*	p	11

APPENDIX IV

PERENNIAL AND ANNUAL SPECIES RECORDED IN 10% OR MORE OF SURVEY QUADRATS (*DENOTES INTRODUCED SPECIES), LISTED IN DESCENDING ORDER OF FREQUENCY.

Total quadrats in study region = 1,177

FAMILY	Species name	Annual (A) / Perennial (P)	# of quadrats	% of total quadrats
Liliaceae	*Xanthorrhoea semiplana* spp.	P	715	61
Haloragaceae	*Gonocarpus tetragynus*	P	688	58
Cyperaceae	*Lepidosperma semiteres*	P	595	51
Leguminosae	*Acacia pycnantha*	P	540	46
Leguminosae	*Platylobium obtusangulum*	P	510	44
Myrtaceae	*Leptospermum myrsinoides*	P	505	43
Proteaceae	*Hakea rostrata*	P	497	42
Myrtaceae	*Eucalyptus fasciculosa*	P	492	42
Epacridaceae	*Astroloma humifusum*	P	480	41
Myrtaceae	*Eucalyptus obliqua*	P	477	40
Epacridaceae	*Acrotriche serrulata*	P	461	39
Gramineae	**Briza maxima*	A	453	38
Leguminosae	*Acacia myrtifolia* var. *myrtifolia*	P	450	38
Liliaceae	*Arthropodium strictum*	P	390	33
Proteaceae	*Isopogon ceratophyllus*	P	385	33
Goodeniaceae	*Goodenia blackiana*	P	378	32
Compositae	*Olearia ramulosa*	P	373	32
Liliaceae	*Lomandra micrantha* ssp	P	371	31
Dilleniaceae	*Hibbertia exutiacies*	P	366	31
Leguminosae	*Pultenaea daphnoides*	P	354	30
Liliaceae	*Thysanotus patersonii*	P	351	30
Rutaceae	*Tetratheca pilosa*	P	338	29
Lauraceae	*Cassytha glabella* forma *dispar*	P	334	28
Dilleniaceae	*Hibbertia sericea* var. *sericea*	P	326	28
Liliaceae	*Burchardia umbellata*	P	312	27
Liliaceae	*Lomandra multiflora* spp. *dura*	P	301	26
Epacridaceae	*Astroloma conostephioides*	P	301	25
Cyperaceae	*Schoenus apogon*	A	297	25
Epacridaceae	*Epacris impressa*	P	278	24
Compositae	*Ixodia achillaedoides*	P	272	23
Dennstaedtiaceae	*Pteridium esculentum*	P	271	23
Cyperaceae	*Lepidosperma carphoides*	P	268	23
Myrtaceae	*Eucalyptus cosmophylla*	P	261	22
Santalaceae	*Exocarpos cupressiformis*	P	256	22
Proteaceae	*Hakea carinata*	P	249	21
Goodeniacae	*Scaevola albida*	P	248	21
Proteaceae	*Banksia marginata*	P	244	21
Lauraceae	*Cassytha pubescens*	P	229	20
Dennstaedtiaceae	*Cheilanthes austrotenuifolia*	P	229	19
Epacridaceae	*Leucopogon virgatus*	P	228	19
Myrtaceae	*Calytrix tetragona*	P	223	19
Cyperaceae	*Schoenus breviculmis*	P	224	19
Leguminosae	*Acacia paradoxa*	P	224	19
Droseraceae	*Drosera whittakeri* spp. *whittakeri*	A	222	19
Leguminosae	*Dillwynia hispida*	P	212	18
Liliaceae	*Chamaescilla corymbosa* var. *corymbosa*	A	205	17
Haloragaceae	*Gonocarpus mezianus*	P	201	17
Compositae	**Hypochaeris radicata*	P	199	17
Proteacae	*Grevillea lavandulacea*	P	197	17
Thymelaeaceae	*Pimelea linifolia* spp. *linifolia*	P	196	17

FAMILY	Species name	Annual (A) / Perennial (P)	# of quadrats	% of total quadrats
Dilleniaceae	*Hibbertia riparia (glabriuscula)*	P	196	17
Myrtaceae	*Eucalyptus baxteri*	P	194	17
Leguminosae	*Pultenaea largiflorens*	P	189	16
Proteacae	*Leptospermum continentale*	P	188	16
Leguminosae	*Daviesia ulicifolia*	P	180	15
Umbelliferae	*Xanthosia pusilla*	P	180	15
Convolvulaceae	*Dichondra repens*	P	176	15
Gramineae	*Neurachne alopecuroidea*	P	169	14
Compositae	**Senecio pterophorus* var. *pterophorus*	P	168	14
Casuarinaceae	*Allocasuarina muelleriana* spp. *muelleriana*	P	164	14
Pittosporaceae	*Bursaria spinosa*	P	163	14
Stylidiaceae	*Stylidium graminifolium*	P	161	14
Leguminosae	*Acacia verticillata*	P	159	14
Rhamnaceae	*Spyridium thymifolium*	P	158	13
Leguminosae	*Daviesia leptophylla*	P	157	13
Loranthaceae	*Amyema miquelii*	P	154	13
Pittosporaceae	*Billardiera cymosa*	P	152	13
Liliaceae	*Tricoryne elatior*	A	151	13
Gramineae	*Poa clelandii*	P	151	13
Gramineae	**Holcus lanatus*	A	150	13
Leguminosae	*Kennedia prostrata*	P	147	12
Gramineae	**Aira cupaniana*	A	146	12
Liliaceae	*Lomandra fibrata*	P	143	12
Droseraceae	*Drosera macrantha* spp. *planchonii*	A	135	11
Campanulaceae	*Wahlenbergia stricta* spp. *stricta*	P	129	11
Gramineae	**Briza minor*	A	128	11
Rosaceae	**Rubus* sp.	P	128	11
Goodeniaceae	*Goodenia ovata*	P	126	11
Myrtaceae	*Eucalyptus goniocalyx*	P	126	11
Oxalidaceae	*Oxalis perennans*	P	126	11
Droseraceae	*Drosera auriculata*	A	124	11
Rosaceae	*Acaena echinata* var.	P	125	11
Liliaceae	*Laxmania orientalis*	P	124	11
Myrtaceae	*Eucalyptus leucoxylon* spp.	P	121	10
Casuarinaceae	*Allocasuarina striata*	P	118	10
Umbelliferae	*Platsace heterophylla* var. *heterophylla*	P	118	10
Epacridaceae	*Acrotriche fasciculiflora*	P	117	10

APPENDIX V

FAMILY DIVERSITY, SORTED IN DECREASING ORDER OF NUMBER OF TAXA, SHOWING: NATIVE AND ALIEN TAXA TOTALS; NUMBER OF GENERA RECORDED FOR EACH FAMILY; AND TOTAL NUMBER OF NATIVE AND INTRODUCED RECORDS FOR EACH FAMILY.

Family	Total Taxa	Native Taxa	Alien Taxa	No. Genera	Total Records	Native Records	Introduced Records
GRAMINEAE	118	62	56	49	3791	2176	1615
COMPOSITAE	92	60	32	57	2498	1750	748
LEGUMINOSAE	87	62	25	29	4827	4402	425
ORCHIDACEAE	66	65	1	23	1041	1036	5
CYPERACEAE	59	58	1	10	2377	2376	1
MYRTACEAE	47	45	2	8	3218	3215	3
LILIACEAE	34	30	4	16	4180	4093	87
EPACRIDACEAE	22	22	0	8	2306	2306	0
JUNCACEAE	21	17	4	2	336	284	52
UMBELLIFERAE	19	17	2	10	548	539	9
RUTACEAE	16	16	0	4	238	238	0
PROTEACEAE	15	13	2	7	1823	1820	3
ROSACEAE	15	4	11	7	451	257	194
GOODENIACEAE	15	15	0	4	986	986	0
IRIDACEAE	14	2	12	9	190	80	110
RHAMNACEAE	13	12	1	4	418	412	6
THYMELAEACEAE	11	11	0	1	498	498	0
LABIATAE	11	8	3	8	51	48	3
RUBIACEAE	11	8	3	4	255	217	38
CARYOPHYLLACEAE	11	3	8	8	59	4	55
GERANIACEAE	10	5	5	3	143	128	15
CRUCIFERAE	10	2	8	7	17	3	14
POLYGONACEAE	10	5	5	6	86	48	38
DILLENIACEAE	9	9	0	1	1360	1360	0
HALORAGACEAE	9	9	0	4	1073	1073	0
EUPHORBIACEAE	9	7	2	7	141	136	5
PITTOSPORACEAE	9	7	2	5	580	570	10
CHENOPODIACEAE	9	7	2	8	40	38	2
CAMPANULACEAE	9	9	0	3	314	314	0
SCROPHULARIACEAE	9	5	4	7	71	56	15
CRASSULACEAE	8	7	1	1	42	41	1
DROSERACEAE	7	7	0	1	571	571	0
PLANTAGINACEAE	7	3	4	1	99	16	83
SANTALACEAE	7	7	0	4	281	281	0
LOGANIACEAE	6	6	0	3	75	75	0
SOLANACEAE	6	2	4	5	27	5	22
STYLIDIACEAE	6	6	0	2	244	244	0
CASUARINACEAE	5	5	0	1	413	413	0
CENTROLEPIDACEAE	5	5	0	2	211	211	0
RESTIONACEAE	5	5	0	4	270	270	0
ONAGRACEAE	5	4	1	2	55	51	4
RANUNCULACEAE	5	5	0	2	77	77	0
GENTIANACEAE	5	1	4	2	95	7	88
VIOLACEAE	5	5	0	3	220	220	0
ADIANTACEAE	4	4	0	3	287	287	0
CONVOLVULACEAE	4	4	0	3	219	219	0
SAPINDACEAE	4	4	0	4	114	114	0
LORANTHACEAE	4	4	0	3	189	189	0
MYOPORACEAE	4	4	0	2	11	11	0
OXALIDACEAE	4	1	3	1	242	145	97
AIZOACEAE	4	4	0	3	34	34	0
BLECHNACEAE	3	3	0	1	72	72	0
LAURACEAE	3	3	0	1	632	632	0
ERICACEAE	3	0	3	2	23	0	23
BORAGINACEAE	3	2	1	3	33	18	15
GUTTIFERAE	3	2	1	1	159	107	52
LYTHRACEAE	3	2	1	1	15	14	1

Family	Total Taxa	Native Taxa	Alien Taxa	No. Genera	Total Records	Native Records	Introduced Records
PINACEAE	3	0	3	1	61	0	61
POLYGALACEAE	3	2	1	2	20	18	2
DENNSTAEDTIACEAE	3	3	0	3	282	282	0
AMARANTHACEAE	3	3	0	2	8	8	0
PRIMULACEAE	3	2	1	2	89	3	86
STACKHOUSIACEAE	3	3	0	1	159	159	0
JUNCAGINACEAE	3	3	0	1	21	21	0
ASCLEPIADACEAE	2	0	2	1	47	0	47
PORTULACACEAE	2	2	0	1	3	3	0
CUPRESSACEAE	2	2	0	1	52	52	0
FUMARIACEAE	2	0	2	1	5	0	5
HYPOXIDACEAE	2	2	0	1	12	12	0
LINACEAE	2	2	0	1	30	3	27
LYCOPODIACEAE	2	2	0	1	6	6	0
ASPLENIACEAE	2	2	0	2	11	11	0
SCHIZAEACEAE	2	2	0	1	8	8	0
STERCULIACEAE	2	2	0	2	20	20	0
URTICACEAE	2	1	1	2	2	1	1
LENTIBULARIACEAE	2	2	0	1	31	31	0
MENYANTHACEAE	2	2	0	1	32	32	0
APOCYNACEAE	2	1	1	2	2	1	1
LEMNACEAE	2	2	0	2	5	5	0
APONOGETONACEAE	1	0	1	1	1	0	1
AZOLLACEAE	1	1	0	1	1	1	0
CALLITRICHACEAE	1	0	1	1	9	0	9
AMARYLLIDACEAE	1	1	0	1	5	5	0
CANNABACEAE	1	0	1	1	1	0	1
MORACEAE	1	1	0	1	1	0	1
FRANKENIACEAE	1	1	0	1	1	1	0
GLEICHENIACEAE	1	1	0	1	34	34	0
HYDROCHARITACEAE	1	1	0	1	1	1	0
AQUIFOLIACEAE	1	0	1	1	1	0	1
MALVACEAE	1	1	0	1	1	1	0
LINDSAEACEAE	1	1	0	1	35	35	0
MELIANTHACEAE	1	0	1	1	4	0	4
OLEACEAE	1	0	1	1	78	0	78
OPHIOGLOSSACEAE	1	1	0	1	3	3	0
PTERIDACEAE	1	1	0	1	1	1	0
RESEDACEAE	1	0	1	1	1	0	1
DIPSACACEAE	1	0	1	1	4	0	4
TREMANDRACEAE	1	1	0	1	340	340	0
TYPHACEAE	1	1	0	1	4	4	0
VERBENACEAE	1	0	1	1	1	0	1
XYRIDACEAE	1	1	0	1	31	31	0
ARACEAE	1	0	1	1	2	0	2

APPENDIX VI

SURVEY QUADRATS AND THEIR LOCATION, FLORISTIC GROUP, SOIL*, LANDFORM*, ALTITUDE* AND STRUCTURAL FORMATION*.

(*where available)

Floristic Group	Site Code #	Visit Date	Easting	Northing	Location	Altitude (m)	Landform	Soil Texture	Structural Formation
1	117ADE00501	23-Dec-99	294532	6135488	5.7 km ESE of Rostrevor		hill slope	sandy loam	low woodland
1	117BAR01101	10-Jan-00	301472	6154518	5.9 km NNW of Kersbrook, (Mt Crawford Forest (Forestry SA))		gully	clay loam	low woodland
1	117BAR01201	10-Jan-00	301952	6153708	5.0 km NNW of Kersbrook, (Mt Crawford Forest (Forestry SA))		hill crest	clay loam	low woodland
1	117BAR01901	27-Sep-00	309236	6152960	5.6 km NNE of Forreston, (Watts Gully NFR (Forestry SA))	440	hill slope	sandy loam	low open forest
1	117ECH00101	09-May-01	302232	6118248	2.8 km WNW of Mount Barker, (Totness RP)	462	hill crest	clay loam	open forest
1	117ECH00301	04-Dec-00	296572	6120598	Mylor CP	375	hill slope	clay loam	open forest
1	117NOA00601	16-Nov-99	291442	6100038	6.7 km WSW of Meadows, (Forestry SA land)		hill crest	clay loam	open forest
1	117NOA01401	05-Dec-00	292182	6115148	Mt Bold Reservoir	290	ridge	sandy loam	low open forest
1	117NOA01601	06-Dec-00	294472	6113078	Mt Bold Reservoir (SAWater)		drainage depression	sandy loam	open forest
1	117NOA01901	05-Dec-00	290062	6111978	Mt Bold Reservoir	250	hill slope	sandy loam	open forest
1	117NOA02501	06-Dec-00	289582	6104128	Knott Hill	330	hill slope	sandy loam	low woodland
1	117ONK00101	22-Dec-99	310822	6147378	2.9 km ESE of Forreston		hill slope	silty clay loam	low woodland
1	117ONK00201	22-Dec-99	309572	6143458	3.2 km ESE of Gumeracha		hill slope	silty clay loam	low open forest
1	117ONK00901	16-Dec-99	295892	6130558	2.1 km ENE of Uraidla		hill slope	sandy clay loam	open woodland
1	117ONK01401	01-Nov-00	300472	6152048	4.3 km NNW of Kersbrook, (Devils Gully NFR (Forestry SA))	447	hill slope	clay loam	mallee
1	117ONK01601	01-Nov-00	301262	6149068	1.4 km ESE of Mount Gawler, (Mt Gawler NFR (Forestry SA))	414	hill slope	clay loam	open forest
1	117ONK01701	02-Nov-00	298442	6144548	6.6 km WSW of Kersbrook, (Millbrook Reservoir (SA Water))	438	hill slope	clay loam, sandy	open forest
1	117ONK02001	01-Nov-00	308822	6139448	4.6 km WNW of Mount Torrens, (Adelaide Hills Council)	486	hill slope	sandy clay loam	open forest
1	117ONK02301	02-Nov-00	306102	6137618	2.2 km NNE of Lobethal	505	hill slope	medium clay	open forest
1	117ONK02501	31-Oct-00	298572	6135948	7.3 km WNW of Lobethal, (Sixth Creek NFR (Forestry SA))	565	hill slope	light medium clay	open forest
1	42PC1001	25-Jun-88	303172	6109628	3.9 km NNE of Macclesfield	410			
1	42PC1003	25-Jun-88	303242	6109428	3.7 km NNE of Macclesfield	425			
1	42PC840	03-Oct-87	299222	6100058	5.5 km SSE of Meadows	350			
1	42PC898	20-Jan-88	305122	6150928	2.7 km NNE of Kersbrook	310			
1	42PC899	20-Jan-88	305022	6151003	2.7 km NNE of Kersbrook	310			
1	42PC900	20-Jan-88	298297	6144503	6.7 km WSW of Kersbrook	420			
1	42PC901	20-Jan-88	298072	6144503	6.8 km ESE of Tea Tree Gully	420			
1	42PC908	22-Feb-88	297897	6144353	6.7 km ESE of Tea Tree Gully	410			
1	42PC909	22-Feb-88	297947	6144378	6.7 km ESE of Tea Tree Gully	420			
1	42PC910	22-Feb-88	298122	6144403	6.9 km WSW of Kersbrook	430			
1	42PC925	29-Mar-88	300597	6151328	2.4 km NNE of Mount Gawler	450			
1	42PC926	29-Mar-88	300772	6151628	3.7 km NNW of Kersbrook	410			
1	42PC927	29-Mar-88	312297	6150978	5.6 km ENE of Forreston	450			
1	42PC998	25-Jun-88	298622	6109938	3.3 km SSW of Echunga	460			
1	42PC999	25-Jun-88	298302	6109748	3.6 km SSW of Echunga	430			
1	5ML1	07-Apr-86	287222	6121878	6.3 km WSW of Bridgewater, (Belair RP.)	530			
1	5ML128	24-Apr-86	289242	6128158	3.7 km WSW of Summertown	486			
1	5ML138	24-Apr-86	298707	6128858	4.2 km NNW of Balhannah, (5 km. E. of Carey Gully.)	440			
1	5ML145	18-Apr-86	298282	6133638	5.9 km ENE of Uraidla	530			
1	5ML147	18-Apr-86	298182	6134508	6.5 km NNE of Uraidla	510			
1	5ML149	18-Apr-86	297642	6136478	7.9 km NNE of Uraidla	440			

Floristic Group	Site Code #	Visit Date	Easting	Northing	Location	Altitude (m)	Landform	Soil Texture	Structural Formation
1	5ML170	23-Apr-86	310722	6155088	7.3 km SSE of Williamstown	480			
1	5ML181	30-Apr-86	303032	6142788	3.9 km WSW of Gumeracha, (Cudlee Creek CP)	330			
1	5ML203	24-Apr-86	278672	6091028	3.3 km SSE of Willunga, (Willunga Hill Trig. Station)	382			
1	5ML225	30-Apr-86	305902	6138088	2.6 km NNE of Lobethal, (Nitschke Hill)	530			
1	5ML260	02-May-86	302072	6130528	4.0 km NNW of Oakbank	400			
1	5ML262	05-May-86	292122	6115088	6.0 km SSW of Mylor	260			
1	5ML289	09-May-86	288552	6110633	2.9 km NNE of Kangarilla	252			
1	5ML301	30-Apr-86	306122	6137538	2.1 km NNE of Lobethal, (Nitchke Hill)	480			
1	5ML302	30-Apr-86	305122	6135528	0.7 km WNW of Lobethal	440			
1	5ML303	30-Apr-86	303532	6137178	2.9 km WNW of Lobethal, (Stafford's Road)	490			
1	5ML315	02-May-86	313062	6141158	2.3 km NNW of Mount Torrens	470			
1	5ML318	02-May-86	308702	6139368	4.7 km WNW of Mount Torrens	480			
1	5ML319	02-May-86	308772	6139888	4.8 km WNW of Mount Torrens	480			
1	5ML321	07-May-86	309272	6158258	3.9 km SSE of Williamstown, (Warren Reservoir)	410			
1	5ML327	07-May-86	309022	6157788	4.2 km SSE of Williamstown, (Warren Reservoir)	430			
1	5ML345	12-May-86	292982	6143378	2.7 km SSE of Tea Tree Gully	380			
1	5ML350	12-May-86	294762	6148338	4.4 km ENE of Tea Tree Gully	340			
1	5ML359	14-May-86	300542	6138718	6.2 km WNW of Lobethal	500			
1	5ML361	15-May-86	298492	6142948	7.6 km ESE of Tea Tree Gully	380			
1	5ML362	15-May-86	299122	6142558	7.6 km SSW of Kersbrook	290			
1	5ML363	15-May-86	300222	6143038	6.5 km WSW of Gumeracha	310			
1	5ML364	15-May-86	298322	6144348	6.8 km WSW of Kersbrook	430			
1	5ML365	15-May-86	300562	6144748	5.0 km SSW of Kersbrook	330			
1	5ML367	16-May-86	300812	6143668	5.8 km WSW of Gumeracha	320			
1	5ML368	16-May-86	301302	6145288	4.2 km SSW of Kersbrook	350			
1	5ML369	16-May-86	301292	6146698	3.0 km WSW of Kersbrook	370			
1	5ML370	16-May-86	299152	6144638	6.0 km WSW of Kersbrook, (Millbrook Reservoir)	370			
1	5ML371	16-May-86	298582	6146468	2.9 km SSW of Mount Gawler	365			
1	5ML380	22-May-86	301802	6148278	1.7 km WSW of Kersbrook	380			
1	5ML381	22-May-86	301812	6148518	1.6 km WSW of Kersbrook	360			
1	5ML382	22-May-86	300162	6147738	1.3 km SSE of Mount Gawler, (1.5 km. S. of Mount Gawler Trig. Station)	440			
1	5ML383	22-May-86	300252	6148688	0.5 km SSE of Mount Gawler, (1 km. SE. of Mount Gawler Trig. Station.)	470			
1	5ML384	22-May-86	300372	6149828	0.9 km NNE of Mount Gawler, (1 km. N. of Mount Gawler Trig. Station.)	470			
1	5ML385	22-May-86	301062	6150508	2.8 km WNW of Kersbrook	410			
1	5ML386	22-May-86	300142	6150768	1.7 km NNE of Mount Gawler	470			
1	5ML390	23-May-86	301022	6152568	4.3 km NNW of Kersbrook	420			
1	5ML392	26-May-86	300512	6151998	4.2 km NNW of Kersbrook	460			
1	5ML394	26-May-86	301512	6151168	2.9 km NNW of Kersbrook	440			
1	5ML397	26-May-86	304872	6150928	2.5 km NNE of Kersbrook	315			
1	5ML399	28-May-86	301522	6153098	4.6 km NNW of Kersbrook	420			
1	5ML400	28-May-86	302362	6153098	4.3 km NNW of Kersbrook	390			
1	5ML401	30-Apr-86	279622	6092078	2.9 km SSE of Willunga, (Willunga Hill on Meadows Road)	360			
1	5ML403	30-Apr-86	282672	6095578	5.3 km ENE of Willunga	360			
1	5ML455	21-May-86	269172	6078478	2.3 km SSW of Myponga	245			
1	5ML46	10-Apr-86	293622	6135328	4.9 km ESE of Rostrevor	460			
1	5ML460	14-May-86	274672	6077128	2.6 km WNW of Spring Mount,	350			
1	5ML497	21-May-86	268572	6072028	8.8 km SSW of Myponga	290			
1	5ML53	11-Apr-86	295922	6135728	6.6 km NNE of Uraidla	500			
1	5ML566	26-May-86	287172	6120308	1.5 km. NW. of Ironbank	400			
1	5ML590	15-May-86	285732	6114453	6.4 km NNW of Kangarilla	300			
1	5ML593	15-May-86	285862	6113328	2.5 km. E. of Clarendon	263			
1	5ML600	14-May-86	288047	6112078	4.1 km NNE of Kangarilla	210			
1	5ML606	03-Jun-86	242622	6054928	0.5 km. W. of Silverton	330			
1	5ML611	03-Jun-86	248522	6051878	1 km. E. Tent Hill, DEEP Creek CP	235			

Floristic Group	Site Code #	Visit Date	Easting	Northing	Location	Altitude (m)	Landform	Soil Texture	Structural Formation
1	5ML69	10-Apr-86	287372	6103028	1 km. SE. of Wickham Hill E. of Mclaren Vale	380			
1	5ML701	28-May-86	303292	6153528	4.6 km NNE of Kersbrook	330			
1	5ML707	29-May-86	309032	6152928	5.5 km NNE of Forreston	440			
1	5ML708	29-May-86	310432	6153068	6.1 km NNE of Forreston	465			
1	5ML709	29-May-86	310092	6152128	5.1 km NNE of Forreston, (Horse Gully 5 km. W. of Cromer.)	460			
1	5ML710	29-May-86	312082	6150928	5.4 km ENE of Forreston, (4 km. W. of Cromer.)	440			
1	5ML715	30-May-86	302512	6154628	5.8 km NNW of Kersbrook	350			
1	5ML72	10-Apr-86	285122	6100528	0.5 km SSW of Mount Wilson	380			
1	5ML724	04-Jun-86	309612	6156138	1 km. S. of Warren Reservoir	470			
1	5ML726	04-Jun-86	308862	6154738	6.9 km SSE of Williamstown, (Warren CP)	380			
1	5ML729	04-Jun-86	308062	6156698	4.8 km SSE of Williamstown, (Warren CP)	390			
1	5ML81	14-Apr-86	288672	6105278	3.4 km SSE of Kangarilla	290			
1	5ML83	14-Apr-86	299272	6099978	5.6 km SSE of Meadows, (Goldmead' S. of Paris Creek)	350			
1	5ML84	14-Apr-86	295622	6100878	3.9 km SSW of Meadows, (0.5 km. S. of Reynell Hill)	410			
1	5ML85	11-Apr-86	295472	6098528	5.6 km NNW of Ashbourne, (2 km. SE. of Prospect Hill.)	380			
1	5ML9	08-Apr-86	300022	6150778	1.7 km NNE of Mount Gawler	500			
2	117BAR00901	10-Jan-00	303952	6156258	5.8 km SSW of Williamstown, (Mt Crawford Forest (Forestry SA))		hill slope	light clay	low open woodland
2	117BAR01301	07-Jan-00	299192	6153518	6.2 km NNW of Kersbrook, (Forestry SA land)		hill slope	clay loam	low woodland
2	117BAR01401	25-Sep-00	301050	6157003	7.1 km WSW of Williamstown, (Para Wirra RP)	360	hill slope	loamy sand	low woodland
2	117BAR01501	26-Sep-00	300336	6155832	7.5 km NNW of Kersbrook, (Para Wirra RP)	343	hill slope	clayey sand	mallee
2	117BAR01601	26-Sep-00	299416	6153316	5.9 km NNW of Kersbrook, (Mount Gawler North NFR (Forestry SA))	396	hill slope	loamy sand	mallee
2	117BAR02701	25-Oct-00	308812	6159618	2.6 km ESE of Williamstown, (Hale CP)		hill slope	sandy loam	low open forest
2	117BAR03101	25-Oct-00	302402	6156438	6.5 km SW of Williamstown, (Old Kersbrook Forest (Forestry SA))	353	hill slope	sandy clay loam	low open forest
2	117BAR03201	24-Oct-00	309562	6154738	7.1 km SSE of Williamstown, (Tower Forest (Forestry SA))	515	hill crest	sandy loam	low woodland
2	117ONK01301	23-Oct-00	309580	6152510	5.3 km NNE of Forreston, (Watts Gully NFR (Forestry SA))	430	hill crest	clay loam	open forest
2	42PC842	28-Dec-87	298822	6150328	1.7 km NNW of Mount Gawler	380			
2	42PC914	27-Feb-88	299997	6152353	4.8 km NNW of Kersbrook	420			
2	42PC920	15-Mar-88	298172	6149028	1.7 km WNW of Mount Gawler	350			
2	42PC921	15-Mar-88	298672	6149078	1.2 km WNW of Mount Gawler	450			
2	42PC922	15-Mar-88	298547	6149228	1.3 km WNW of Mount Gawler	400			
2	42PC923	15-Mar-88	299897	6152353	4.9 km NNW of Kersbrook	0			
2	42PC924	15-Mar-88	299672	6153903	6.2 km NNW of Kersbrook	340			
2	5ML154	21-Apr-86	300272	6159248	6.8 km WSW of Williamstown	310			
2	5ML156	21-Apr-86	301772	6158638	5.7 km WSW of Williamstown	315			
2	5ML165	23-Apr-86	302282	6158088	5.5 km WSW of Williamstown, (South Para Reservoir)	320			
2	5ML166	23-Apr-86	308482	6160328	2.0 km ESE of Williamstown, (Hale CP)	360			
2	5ML167	23-Apr-86	308782	6159338	2.8 km SSE of Williamstown, (Hale CP)	430			
2	5ML168	23-Apr-86	308742	6158648	3.3 km SSE of Williamstown, (Hale CP)	400			
2	5ML169	23-Apr-86	308382	6159738	2.2 km SSE of Williamstown, (Hale CP)	360			
2	5ML174	28-Apr-86	300782	6157078	7.3 km WSW of Williamstown, (Para Wirra RP.)	310			
2	5ML178	23-Apr-86	301732	6163208	5.4 km WNW of Williamstown	250			
2	5ML179	28-Apr-86	300152	6155808	7.6 km NNW of Kersbrook	340			
2	5ML206	28-Apr-86	287572	6084478	2.7 km WSW of Nangkita	250			
2	5ML372	16-May-86	297612	6146718	3.2 km WSW of Mount Gawler	345			
2	5ML387	22-May-86	299592	6151868	2.8 km NNW of Mount Gawler,	450			
2	5ML388	23-May-86	299532	6152968	5.6 km NNW of Kersbrook	380			

Floristic Group	Site Code #	Visit Date	Easting	Northing	Location	Altitude (m)	Landform	Soil Texture	Structural Formation
2	5ML389	23-May-86	300312	6153418	5.4 km NNW of Kersbrook	350			
2	5ML391	26-May-86	298762	6150568	1.9 km NNW of Mount Gawler	390			
2	5ML398	28-May-86	298712	6151838	3.0 km NNW of Mount Gawler	365			
2	5ML4	08-Apr-86	301052	6156756	7.3 km WSW of Williamstown, (Para Wirra RP.)	343			
2	5ML48	11-Apr-86	291422	6136078	2.6 km ESE of Rostrevor (Morialta CP)	420			
2	5ML6	08-Apr-86	299677	6156228	8.2 km NNW of Kersbrook, (Para Wirra RP.)	350			
2	5ML702	30-May-86	304132	6154868	6.0 km NNE of Kersbrook	310			
2	5ML704	29-May-86	306682	6151468	4.1 km NNW of Forreston	390			
2	5ML705	29-May-86	308102	6151578	4.0 km NNE of Forreston	430			
2	5ML711	30-May-86	303682	6155468	6.6 km NNE of Kersbrook	320			
2	5ML712	30-May-86	303512	6158178	4.5 km WSW of Williamstown, (South Para Reservoir)	300			
2	5ML713	30-May-86	302532	6156828	6.2 km WSW of Williamstown	320			
2	5ML714	30-May-86	301822	6155538	6.8 km NNW of Kersbrook	360			
2	5ML716	30-May-86	302932	6155698	6.8 km SSW of Williamstown	330			
2	5ML719	02-Jun-86	315722	6151978	6.0 km WNW of Mount Pleasant, (Cromer CP)	450			
2	5ML720	02-Jun-86	314302	6153348	7.8 km WNW of Mount Pleasant	440			
2	5ML721	02-Jun-86	315702	6153238	4.3 km WSW of Mount Pleasant, (on CRICKSMILL Road)	440			
2	5ML722	02-Jun-86	315712	6154628	4.3 km WNW of Mount Pleasant, (on WALPOLE Road)	440			
2	5ML728	04-Jun-86	308632	6156178	5.4 km SSE of Williamstown, (Warren CP)	460			
3	117ADE00601	16-Dec-99	294312	6133748	4.4 km NNE of Uraidla	580	hill slope	clay loam	open forest
3	117ADE00701	22-Nov-83	290582	6131808	3.5 km NNW of Summertown, (Horsnell Gully CP)	482	ridge	sandy loam	low woodland
3	117ADE00901	26-Nov-86	290760	6131019	2.8 km NNW of Summertown, (Horsnell Gully CP)	556	hill slope	sandy loam	open forest
3	117ADE01101	03-May-01	290492	6128628	2.4 km WSW of Summertown, (Cleland CP)	549	hill slope	sandy loam	open forest
3	117ADE01601	30-Oct-00	292104	6137802	3.5 km ENE of Rostrevor, (Black Hill CP)	420	hill slope	loamy sand	low woodland
3	117ADE01801	28-Nov-00	291112	6136048	Morialta CP	464	ridge	sandy loam	low woodland
3	117ADE01901	28-Nov-00	292482	6134938	Morialta CP	495	hill crest	sandy loam	open forest
3	117ADE02102	28-Nov-00	291312	6126988	Eurilla CP	608	gully	sandy loam	woodland
3	117NOA00101	14-Dec-99	288102	6122098	5.4 km WSW of Bridgewater, (Belair National Park)		hill slope	sandy clay loam	low open forest
3	117NOA00201	14-Dec-99	294072	6124258	1.5 km NNE of Bridgewater, (SA Water land)		hill slope	light clay	open forest
3	117NOA00401	14-Dec-99	289002	6117518	7.0 km SSW of Bridgewater		hill slope	loam	open woodland
3	117NOA01101	29-Nov-00	290122	6120368	Mark Oliphant CP	448	hill crest	sandy clay loam	open woodland
3	117ONK01001	16-Dec-99	297132	6127748	3.3 km ESE of Uraidla		hill slope	light clay	open forest
3	117ONK02701	01-Nov-00	298562	6130208	4.5 km ENE of Uraidla, (Filsell Hill (Kenneth Stirling C.P.))	570	hill slope	clay loam	open forest
3	117ONK02801	30-Nov-00	297122	6126258	Kenneth Stirling CP	440	hill slope	sandy clay loam	open forest
3	117ONK02901	30-Nov-00	294882	6125478	Mt George CP	460	hill slope	loam	open forest
3	42PC918	11-Mar-88	295347	6120053	0.3 km WNW of Mylor	330			
3	5ML100	18-Apr-86	288972	6091178	4.5 km ENE of Yundi, (Blackfellows)	250			
3	5ML112	21-Apr-86	290922	6130878	2.6 km NNW of Summertown	570			
3	5ML113	21-Apr-86	290722	6130828	2.7 km WNW of Summertown	520			
3	5ML116	21-Apr-86	292672	6131778	2.7 km N of Summertown, (Giles Range)	540			
3	5ML117	21-Apr-86	292222	6132178	3.1 km NNW of Summertown, (Giles Range)	500			
3	5ML118	23-Apr-86	291622	6131808	3.0 km NNW of Summertown	450			
3	5ML119	23-Apr-86	291782	6131328	2.5 km NNW of Summertown, (Rockdale Hill)	500			
3	5ML120	23-Apr-86	291402	6131278	2.6 km NNW of Summertown, (Rockdale Hill)	450			
3	5ML121	23-Apr-86	290982	6131753	3.2 km NNW of Summertown, (Rockdale Hill)	490			
3	5ML122	23-Apr-86	290622	6131778	3.5 km NNW of Summertown, (Rockdale Hill)	460			
3	5ML126	24-Apr-86	288672	6127978	4.3 km WSW of Summertown	470			
3	5ML127	24-Apr-86	288995	6128443	3.9 km WSW of Summertown	480			

Floristic Group	Site Code #	Visit Date	Easting	Northing	Location	Altitude (m)	Landform	Soil Texture	Structural Formation
3	5ML130	24-Apr-86	288122	6126448	5.4 km WSW of Summertown	462			
3	5ML131	24-Apr-86	288592	6127058	4.7 km WSW of Summertown	480			
3	5ML132	28-Apr-86	298342	6130378	4.3 km ENE of Uraidla	570			
3	5ML133	28-Apr-86	298472	6130048	4.3 km ENE of Uraidla	518			
3	5ML134	28-Apr-86	298122	6129088	3.9 km ESE of Uraidla	460			
3	5ML136	28-Apr-86	298622	6129558	4.4 km E of Uraidla	500			
3	5ML137	28-Apr-86	298887	6128918	4.1 km NNW of Balhannah	415			
3	5ML139	01-May-86	298992	6130328	4.9 km ENE of Uraidla,	510			
3	5ML152	18-Apr-86	298062	6138008	8.2 km WNW of Lobethal	470			
3	5ML16	10-Apr-86	290752	6126278	3.5 km SSW of Summertown, (Cleland CP)	633			
3	5ML191	23-Apr-86	284972	6092428	3.2 km NNE of Yundi, (Meadows Creek 2 km. SE. of HOPE FOREST.)	270			
3	5ML20	10-Apr-86	289932	6125828	4.4 km SW of Summertown, (Cleland CP)	500			
3	5ML250	01-May-86	297302	6129848	3.1 km ENE of Uraidla	595			
3	5ML251	01-May-86	296642	6129588	2.5 km ENE of Uraidla	528			
3	5ML253	01-May-86	297512	6130738	3.6 km ENE of Uraidla,	520			
3	5ML254	01-May-86	297872	6130808	4.0 km ENE of Uraidla	550			
3	5ML255	02-May-86	295442	6132228	3.1 km NNE of Uraidla	420			
3	5ML256	02-May-86	297972	6132578	5.0 km ENE of Uraidla	525			
3	5ML257	02-May-86	299012	6131518	5.3 km ENE of Uraidla	440			
3	5ML258	02-May-86	301822	6131178	4.7 km WNW of Woodside,	430			
3	5ML261	02-May-86	301482	6130758	4.5 km NNW of Oakbank	440			
3	5ML275	08-May-86	293292	6113808	5.8 km WNW of Echunga	326			
3	5ML278	08-May-86	292472	6114733	6.1 km SSW of Mylor	258			
3	5ML30	14-Apr-86	290752	6129088	2.1 km WNW of Summertown, (Cleland CP)	545			
3	5ML304	01-May-86	301392	6133858	4.7 km WSW of Lobethal, (Lenswood RP.)	450			
3	5ML44	10-Apr-86	292272	6134428	1 km. N. of Norton Summit	420			
3	5ML500	29-May-86	297012	6126548	4.0 km SSE of Uraidla	440			
3	5ML502	29-May-86	295097	6124168	2.0 km ENE of Bridgewater	415			
3	5ML503	29-May-86	294332	6125178	2.4 km NNE of Bridgewater	460			
3	5ML506	30-May-86	294917	6125818	3.2 km NNE of Bridgewater	436			
3	5ML507	30-May-86	294892	6124273	2.0 km ENE of Bridgewater	435			
3	5ML508	30-May-86	294977	6125338	2.8 km NNE of Bridgewater	495			
3	5ML510	30-May-86	294467	6127958	1.4 km SSE of Uraidla	545			
3	5ML512	02-Jun-86	295722	6122243	2.3 km NNE of Mylor	360			
3	5ML513	02-Jun-86	295922	6122413	2.4 km NNE of Mylor	362			
3	5ML517	02-Jun-86	296752	6120988	1.5 km ENE of Mylor	335			
3	5ML555	29-May-86	296692	6126853	3.5 km SSE of Uraidla	480			
3	5ML556	29-May-86	296177	6125963	3.9 km SSE of Uraidla	482			
3	5ML56	14-Apr-86	292072	6137818	3.4 km ENE of Rostrevor, (Black Hill CP)	470			
3	5ML563	28-May-86	288832	6119793	5.6 km WSW of Bridgewater	403			
3	5ML567	26-May-86	287557	6121303	6.1 km WSW of Bridgewater, ('Orana' 2km. SW. of Upper Sturt.)	380			
3	5ML570	22-May-86	290482	6121023	3.5 km WSW of Bridgewater, (Oliphant CP)	445			
3	5ML573	22-May-86	291222	6121298	2.8 km WSW of Bridgewater, (Oliphant CP)	450			
3	5ML574	22-May-86	290622	6123218	2.8 km WNW of Bridgewater	470			
3	5ML584	21-May-86	288212	6123328	5.3 km WNW of Bridgewater, (Belair RP.)	468			
3	5ML62	17-Apr-86	295722	6133528	4.5 km NNE of Uraidla	520			
3	5ML65	17-Apr-86	294902	6134038	4.8 km NNE of Uraidla	550			
3	5ML77	11-Apr-86	292652	6095348	5.0 km WNW of Ashbourne	415			
3	5ML78	11-Apr-86	292502	6093678	4.6 km WNW of Ashbourne	400			
3	5ML92	17-Apr-86	289722	6095178	7.6 km NNE of Yundi, (Kyeema CP)	340			
3	5ML96	18-Apr-86	289372	6090328	4.3 km NNW of Nangkita, (Mount Magnificent CP)	320			
4	117NOA01002	10-Mar-01	287552	6121578	Not stated	430	hill slope	loamy sand	open woodland
4	5ML135	28-Apr-86	298112	6129288	3.9 km ESE of Uraidla	449			
4	5ML141	01-May-86	297402	6128068	3.4 km ESE of Uraidla	440			
4	5ML21	10-Apr-86	290052	6125578	4.3 km WNW of Bridgewater, (Cleland CP)	510			
4	5ML23	11-Apr-86	289422	6126678	4.2 km WSW of Summertown,	428			

Floristic Group	Site Code #	Visit Date	Easting	Northing	Location	Altitude (m)	Landform	Soil Texture	Structural Formation
					(Cleland CP)				
4	5ML25	11-Apr-86	288882	6127628	4.2 km WSW of Summertown, (Cleland CP)	365			
4	5ML252	01-May-86	296772	6129198	2.6 km ESE of Uraidla	535			
4	5ML259	02-May-86	301972	6130708	4.2 km NNW of Oakbank	400			
4	5ML27	11-Apr-86	291022	6127898	2.2 km WSW of Summertown, (0.5 km. S. of Mount Bonython, Cleland CP)	575			
4	5ML28	11-Apr-86	291222	6128608	1.7 km WSW of Summertown, (0.5 km. N. of Mount Bonython, Cleland CP)	576			
4	5ML29	14-Apr-86	291032	6128958	1.8 km WSW of Summertown, (Cleland CP)	560			
4	5ML297	12-May-86	292087	6115858	5.4 km SSW of Mylor	325			
4	5ML305	01-May-85	302442	6137588	4.0 km WNW of Lobethal	460			
4	5ML307	01-May-86	299922	6135718	5.9 km WNW of Lobethal	550			
4	5ML45	10-Apr-86	294022	6134878	5.4 km ESE of Rostrevor	470			
4	5ML501	29-May-86	297262	6126178	4.3 km WNW of Balhannah	385			
4	5ML504	30-May-86	294592	6126248	3.1 km SSE of Uraidla	468			
4	5ML509	30-May-86	294512	6125278	2.6 km NNE of Bridgewater	425			
4	5ML511	30-May-86	294532	6127678	1.7 km SSE of Uraidla	510			
4	5ML565	26-May-86	286912	6120448	7.0 km WSW of Bridgewater, (STURT River)	300			
4	5ML569	22-May-86	289912	6122548	3.6 km WSW of Bridgewater, (STURT River)	425			
4	5ML571	22-May-86	290712	6120528	3.6 km WSW of Bridgewater, (Oliphant CP)	367			
4	5ML589	16-May-86	286257	6113278	5.1 km NNW of Kangarilla	210			
4	5ML595	15-May-86	288052	6115593	7.5 km NNE of Kangarilla	300			
4	5ML76	10-Apr-86	294222	6096278	4.2 km NNW of Ashbourne	300			
4	5ML94	18-Apr-86	289322	6091778	5.1 km ENE of Yundi, (Blackfellows Creek)	270			
5	117JER00701	23-Feb-00	249142	6057228	4.3 km SSE of Delamere, (Deep Creek CP)		hill slope	medium clay	open forest
5	117WIL00701	09-Dec-99	281282	6082788	4.0 km SSW of Mount Compass		hill footslope	sandy loam	low open forest
5	42PC1012	13-Aug-88	273162	6060028	3.3 km WNW of Waitpinga	155			
5	42PC1030	01-Oct-88	253992	6063308	7.0 km ESE of Second Valley	320			
5	42PC1037	26-Oct-88	250072	6056758	5.2 km SSE of Delamere	270			
5	42PC1040	26-Oct-88	249962	6057898	4.3 km SSE of Delamere	295			
5	42PC1069	10-Feb-90	274282	6075168	3.0 km WSW of Spring Mount	340			
5	42PC1070	10-Feb-90	274142	6074808	3.3 km WSW of Spring Mount	320			
5	42PC881	13-Nov-87	285632	6090158	1.2 km NNE of Yundi	280			
5	5ML186	21-Apr-86	287372	6091178	3.1 km ENE of Yundi, (1.5 km. W. of Blackfellows Creek)	250			
5	5ML402	30-Apr-86	280572	6093078	3.2 km ESE of Willunga	370			
5	5ML405	14-May-86	275222	6077578	2.3 km WNW of Spring Mount	310			
5	5ML435	01-May-86	284222	6086478	0.8 km NNE of Mount Compass	280			
5	5ML459	14-May-86	274722	6077278	2.6 km WNW of Spring Mount,	300			
5	5ML461	12-May-86	275822	6074278	2.4 km SSW of Spring Mount, (Spring Mount CP)	325			
5	5ML465	12-May-86	274122	6074228	3.6 km WSW of Spring Mount, (Boundary River, W of Spring Mount.)	320			
5	5ML466	12-May-86	274222	6074528	3.4 km WSW of Spring Mount, (Boundary River, W of Spring Mount.)	300			
5	5ML470	14-May-86	274672	6076828	2.5 km WNW of Spring Mount	370			
5	5ML473	16-May-86	267022	6073978	7.3 km SSW of Myponga, (Myponga CP)	280			
5	5ML490	22-May-86	278922	6080728	4.8 km NNE of Spring Mount	355			
5	5ML496	22-May-86	273922	6078978	1.6 km ENE of Myponga Hill,	330			
5	5ML615	03-Jun-86	252072	6052578	9.8 km SSE of Delamere, (Deep Creek CP)	160			
5	5ML617	04-Jun-86	249672	6054078	7.3 km SSE of Delamere (Deep Creek CP)	225			
5	5ML630	05-Jun-86	257572	6058178	11.1 km ESE of Delamere, (WAITPINGA CP)	280			
5	5ML757	20-Mar-87	252772	6055878	7.8 km ESE of Delamere	230			
6	117JER00801	23-Feb-00	242762	6054808	7.2 km SSW of Delamere, (Talisker CP)		hill crest	medium clay	open forest
6	117JER01001	23-Feb-00	248272	6052658	8.3 km SSE of Delamere, (Deep		hill slope	sandy clay	low woodland

Floristic Group	Site Code #	Visit Date	Easting	Northing	Location	Altitude (m)	Landform	Soil Texture	Structural Formation
					Creek CP)			loam	
6	117JER01101	23-Feb-00	245542	6051008	9.9 km SSW of Delamere, (Deep Creek CP)		hill crest	sandy clay loam	Shrubland
6	117TOR00301	11-Nov-99	269402	6061638	7.4 km WNW of Waitpinga		hill slope	sandy loam	low open forest
6	117TOR00401	10-Nov-99	263142	6060298	13.0 km WNW of Waitpinga		hill slope	clay loam	low open forest
6	117TOR00601	10-Nov-99	255702	6057148	9.6 km ESE of Delamere		hill slope	light medium clay	low open forest
6	117TOR00801	10-Nov-99	261162	6057288	14.8 km ESE of Delamere		hill crest	light clay	low mallee
6	117TOR01301	23-Feb-00	253942	6063048	7.0 km ESE of Second Valley, (Springs Road Reserve)	340	hill slope	loam	low open forest
6	117TOR01401	23-Feb-00	252962	6060198	6.2 km ESE of Delamere, (Congeratinga Forest Reserve)		hill slope	sandy clay loam	open forest
6	117TOR01601	22-Feb-00	252372	6055878	7.5 km SSE of Delamere, (Deep Creek CP)		hill slope	clay loam	woodland
6	117WIL01101	12-Nov-99	288742	6075518	4.3 km WSW of Currency Creek		hill crest	light clay	low open forest
6	117WIL02601	24-Feb-00	275632	6074608	2.2 km SW of Spring Mount, (Spring Mount CP)	360	hill slope	sandy loam	low open forest
6	42PC1026	01-Oct-88	253842	6064078	6.5 km ESE of Second Valley	240			
6	42PC1027	01-Oct-88	254272	6064668	6.6 km SSW of Lady Bay	330			
6	42PC1029	01-Oct-88	253992	6063838	6.8 km ESE of Second Valley	360			
6	42PC1038	26-Oct-88	250172	6057338	4.9 km SSE of Delamere	310			
6	42PC1041	26-Oct-88	250692	6056878	5.6 km SSE of Delamere	250			
6	42PC1054	15-Apr-89	253622	6060928	6.8 km ESE of Delamere	330			
6	42PC1060	29-Apr-89	253082	6060078	6.4 km ESE of Delamere	320			
6	42PC1061	29-Apr-89	252842	6060598	6.1 km ESE of Delamere	325			
6	42PC1062	29-Apr-89	253872	6062898	7.1 km ESE of Second Valley	350			
6	42PC1065	02-Feb-90	274982	6076378	2.1 km WNW of Spring Mount	330			
6	42PC966	15-Apr-88	281182	6080988	5.5 km SSW of Mount Compass	340			
6	5ML194	23-Apr-86	285972	6091228	2.3 km NNE of Yundi	320			
6	5ML421	08-May-86	275772	6075328	1.6 km WSW of Spring Mount, (Spring Mount CP)	390			
6	5ML434	01-May-86	283372	6086378	0.6 km NNW of Mount Compass	270			
6	5ML452	14-May-86	274522	6077878	3.1 km WNW of Spring Mount	350			
6	5ML462	12-May-86	276672	6074078	2.2 km SSW of Spring Mount	400			
6	5ML463	12-May-86	275322	6074328	2.6 km WSW of Spring Mount, (Spring Mount CP)	370			
6	5ML464	12-May-86	275372	6074128	2.7 km SSW of Spring Mount, (Spring Mount CP)	410			
6	5ML467	12-May-86	274372	6074728	3.1 km WSW of Spring Mount, (Boundary River, W of Spring Mount.)	300			
6	5ML469	14-May-86	275122	6076728	2.0 km WNW of Spring Mount,	330			
6	5ML487	22-May-86	280822	6080478	5.6 km NE of Spring Mount	320			
6	5ML488	22-May-86	278422	6080428	4.4 km NNE of Spring Mount	400			
6	5ML492	22-May-86	275072	6079428	3.8 km NNW of Spring Mount	300			
6	5ML495	22-May-86	273522	6078828	1.2 km ENE of Myponga Hill	360			
6	5ML498	21-May-86	272122	6078128	0.5 km SSW of Myponga Hill	400			
6	5ML572	22-May-86	291062	6120768	3.2 km WSW of Bridgewater, (Oliphant CP)	390			
6	5ML619	04-Jun-86	249172	6054128	7.1 km SSE of Delamere, (Deep Creek CP)	240			
6	5ML621	04-Jun-86	250522	6056678	5.6 km SSE of Delamere	250			
6	5ML626	05-Jun-86	253022	6060028	6.3 km ESE of Delamere, (Second Valley Forest)	335			
6	5ML627	05-Jun-86	254172	6063128	7.2 km ESE of Second Valley, (Second Valley Forest)	335			
6	5ML758	20-Mar-87	252472	6055928	7.5 km ESE of Delamere	255			
6	5ML86	17-Apr-86	288122	6095428	7.0 km NNE of Yundi, (Kyeema CP)	310			
6	5ML93	17-Apr-86	290072	6093878	6.9 km ENE of Yundi	330			
6	97JER00401	30-May-98	250623	6057884	4.8 km ESE of Delamere	320	hill slope	sandy clay loam	low open forest
6	97TOR00301	30-May-98	252903	6059925	6.2 km ESE of Delamere	340	hill crest	medium clay	low open forest
6	97WIL00101	07-Mar-98	275944	6073377	3.1 km SSW of Spring Mount	350	hill slope	clay loam, sandy	open forest
7	117JER00101	08-Nov-99	243112	6056098	6.0 km SSW of Delamere	240	hill slope	clay loam	low open forest
7	117JER00401	08-Nov-99	243102	6053468	8.2 km SSW of Delamere, (Tallisker CP)		hill slope	silty clay loam	low open forest
7	117JER00402	08-Nov-99	243022	6053528	8.2 km SSW of Delamere, (Tallisker CP)		ridge	light clay	mallee
7	117TOR00501	11-Nov-99	252842	6059198	6.3 km ESE of Delamere		hill slope	clay loam	open forest

Floristic Group	Site Code #	Visit Date	Easting	Northing	Location	Altitude (m)	Landform	Soil Texture	Structural Formation
7	117WIL00901	18-Nov-99	280282	6079348	4.4 km ENE of Spring Mount		hill slope	sandy clay loam	open forest
7	117WIL01201	18-Nov-99	275022	6073438	3.5 km SSW of Spring Mount		hill crest	medium clay	woodland
7	42PC1000	25-Jun-88	298402	6109578	3.7 km SSW of Echunga	455			
7	42PC1002	25-Jun-88	303122	6109518	3.8 km NNE of Macclesfield	420			
7	42PC1057	29-Apr-89	248472	6059718	2.0 km ESE of Delamere	300			
7	42PC1058	29-Apr-89	248652	6059868	2.1 km ESE of Delamere	290			
7	42PC1059	29-Apr-89	249532	6059178	3.2 km ESE of Delamere	320			
7	42PC1075	30-Mar-90	278862	6072498	4.1 km SSE of Spring Mount	220			
7	42PC1079	07-Apr-90	279522	6073588	3.6 km SSE of Spring Mount	230			
7	42PC1083	27-Apr-90	258062	6063508	8.5 km SSE of Lady Bay	300			
7	42PC1096	02-Mar-91	284682	6074708	6.9 km NNE of Hindmarsh Valley	280			
7	42PC832	19-Sep-87	286172	6073978	7.1 km WSW of Currency Creek	270			
7	42PC858	15-Oct-87	276912	6061148	2.9 km NNE of Waitpinga	165			
7	42PC859	15-Oct-87	276322	6061838	3.5 km NNE of Waitpinga	190			
7	42PC877	31-Oct-87	276512	6071588	4.7 km SSW of Spring Mount	280			
7	42PC880	13-Nov-87	285532	6090258	1.2 km NNE of Yundi	270			
7	42PC991	11-Jun-88	266872	6078438	3.6 km WSW of Myponga	220			
7	42PC995	11-Jun-88	249912	6062308	3.5 km ENE of Delamere	310			
7	42PC996	11-Jun-88	249082	6061908	2.6 km ENE of Delamere	280			
7	42PC997	11-Jun-88	248852	6061258	2.1 km ENE of Delamere	320			
7	5ML426	02-May-86	290522	6077078	2.8 km WNW of Currency Creek	220			
7	5ML476	16-May-86	269022	6077778	3.1 km SSW of Myponga	320			
7	5ML622	04-Jun-86	252672	6054528	8.6 km SSE of Delamere, (Deep Creek CP)	270			
7	5ML762	20-Apr-87	276272	6061978	3.6 km NNE of Waitpinga	210			
7	97JER00201	30-May-98	242868	6055810	6.3 km SSW of Delamere	330	hill crest	sandy clay loam	open forest
7	97JER00301	08-Jul-98	243826	6051586	9.7 km SSW of Delamere	250	hill crest	sandy loam	low woodland
7	97JER00501	30-May-98	249570	6059201	3.2 km ESE of Delamere	325	flat	clay loam, sandy	low open forest
7	97TOR00101	28-Aug-98	262338	6063157	10.3 km SSE of Yankalilla	200	hill slope	sandy clay loam	low open forest
7	97TOR00801	16-Nov-97	264881	6063778	10.7 km SSE of Yankalilla	350	hill slope	sandy loam	open forest
7	97TOR00901	07-Mar-98	252661	6058715	6.3 km ESE of Delamere	310	hill slope	loamy sand	open forest
8	117ADE01301	30-Jan-01	289343	6127691	3.7 km WSW of Summertown, (Cleland CP)	428	hill slope	loamy sand	very low woodland
8	117NOA01501	05-Dec-00	289242	6114178	Scott Ck CP	325	hill slope	loamy sand	low open forest
8	117NOA01801	05-Dec-00	292932	6112078	Mt Bold Reservoir	350	ridge	clayey sand	woodland
8	117WIL02001	29-Feb-00	288522	6090358	3.8 km ENE of Yundi, (Mt Magnificent CP)		hill slope	loamy sand	low open forest
8	42PC834	19-Sep-87	286032	6074838	7.1 km WSW of Currency Creek	260			
8	42PC841	28-Dec-87	298772	6150328	1.7 km NNW of Mount Gawler	400			
8	42PC843	29-Dec-87	294192	6117778	2.6 km SSW of Mylor	400			
8	42PC844	29-Dec-87	290072	6115528	7.1 km WSW of Mylor	390			
8	42PC845	29-Dec-87	289572	6114478	6.8 km NNE of Kangarilla	320			
8	42PC846	29-Dec-87	289222	6114528	6.7 km NNE of Kangarilla	310			
8	42PC878	13-Nov-87	288602	6103628	4.8 km SSE of Kangarilla	330			
8	42PC879	13-Nov-87	290652	6108068	3.7 km ESE of Kangarilla	300			
8	42PC911	26-Feb-88	288797	6125253	5.2 km WNW of Bridgewater	495			
8	42PC912	26-Feb-88	288772	6125178	5.2 km WNW of Bridgewater	490			
8	42PC913	26-Feb-88	288322	6125553	5.7 km WSW of Summertown	370			
8	42PC917	11-Mar-88	295522	6120278	0.3 km NNW of Mylor	350			
8	5ML10	09-Apr-86	288872	6115238	7.3 km NNE of Kangarilla, (Scott Creek CP)	275			
8	5ML11	09-Apr-86	289562	6115318	7.6 km NNE of Kangarilla, (Scott Creek CP)	345			
8	5ML110	18-Apr-86	289972	6131478	3.7 km WNW of Summertown, (Horsnell Gully CP)	450			
8	5ML114	21-Apr-86	289272	6131003	4.0 km WNW of Summertown	450			
8	5ML115	21-Apr-86	289922	6131003	3.5 km WNW of Summertown	450			
8	5ML12	09-Apr-86	289652	6115478	7.5 km WSW of Mylor, (Scott Creek CP)	325			
8	5ML123	23-Apr-86	290522	6131928	3.6 km NNW of Summertown	420			
8	5ML13	09-Apr-86	288872	6115478	7.5 km NNE of Kangarilla, (Scott Creek CP)	365			
8	5ML140	01-May-86	298152	6128418	4.1 km ESE of Uraidla	490			
8	5ML17	10-Apr-86	290472	6125773	4.1 km SSW of Summertown, (Cleland CP)	600			
8	5ML18	10-Apr-86	288992	6126878	4.4 km WSW of Summertown,	485			

Floristic Group	Site Code #	Visit Date	Easting	Northing	Location	Altitude (m)	Landform	Soil Texture	Structural Formation
					(Cleland CP)				
8	5ML183	21-Apr-86	288772	6090378	4.0 km ENE of Yundi, (Mt Magnificent CP)	265			
8	5ML184	21-Apr-86	288572	6090328	3.8 km ENE of Yundi, (Mt Magnificent CP)	260			
8	5ML185	21-Apr-86	287822	6091178	3.5 km ENE of Yundi	300			
8	5ML187	21-Apr-86	287722	6091378	3.5 km ENE of Yundi	350			
8	5ML188	21-Apr-86	288372	6090478	3.7 km ENE of Yundi	240			
8	5ML189	21-Apr-86	288272	6090328	3.5 km ENE of Yundi	240			
8	5ML19	10-Apr-86	289392	6126498	4.3 km WSW of Summertown, (Cleland CP)	480			
8	5ML190	23-Apr-86	285572	6092828	3.7 km NNE of Yundi	250			
8	5ML192	23-Apr-86	284672	6093128	3.9 km SSE of Yundi	330			
8	5ML195	23-Apr-86	287572	6088758	2.7 km ESE of Yundi	240			
8	5ML196	23-Apr-86	285472	6089378	0.6 km ENE of Yundi, (Finniss River)	225			
8	5ML2	07-Apr-86	290822	6127478	2.6 km WSW of Summertown, (Mt Lofty Summit.)	680			
8	5ML213	28-Apr-86	290822	6089178	3.3 km NNE of Nangkita, (Finniss CP)	240			
8	5ML214	28-Apr-86	290372	6089278	3.3 km NNE of Nangkita, (Finniss CP)	230			
8	5ML22	11-Apr-86	289102	6126938	4.3 km WSW of Summertown, (Cleland CP)	418			
8	5ML24	11-Apr-86	290222	6126178	3.9 km SW of Summertown, (Cleland CP)	610			
8	5ML265	05-May-86	291842	6114448	6.7 km SSW of Mylor	330			
8	5ML266	05-May-86	291022	6114048	7.1 km NNE of Kangarilla	390			
8	5ML269	07-May-86	293477	6112423	5.7 km WSW of Echunga, (Mount Bold Reservoir)	335			
8	5ML270	07-May-86	293507	6112613	5.6 km WSW of Echunga	330			
8	5ML271	07-May-86	291882	6112638	6.6 km ENE of Kangarilla, (Mount Bold Reservoir)	270			
8	5ML272	07-May-86	293342	6111463	6.0 km WSW of Echunga, (Mount Bold Reservoir)	287			
8	5ML273	07-May-86	293077	6111458	6.3 km WSW of Echunga, Mount Bold Reservoir)	323			
8	5ML276	08-May-86	292887	6114493	6.1 km SSW of Mylor, (Mount Bold Reservoir)	321			
8	5ML279	08-May-86	292897	6115238	5.5 km SSW of Mylor	315			
8	5ML280	08-May-86	294072	6115163	5.1 km SSW of Mylor	371			
8	5ML281	08-May-86	294572	6116308	3.8 km SSW of Mylor	326			
8	5ML282	08-May-86	294692	6116678	3.4 km SSW of Mylor	310			
8	5ML286	09-May-86	288572	6110198	2.6 km NNE of Kangarilla	350			
8	5ML287	09-May-86	288792	6110008	2.6 km ENE of Kangarilla	350			
8	5ML288	09-May-86	288522	6111378	3.6 km NNE of Kangarilla	240			
8	5ML293	12-May-86	290432	6111698	4.9 km ENE of Kangarilla, (Mount Bold Reservoir)	250			
8	5ML295	12-May-86	290737	6113088	6.2 km NNE of Kangarilla	370			
8	5ML296	12-May-86	293122	6116928	4.0 km SSW of Mylor	385			
8	5ML298	14-May-86	288097	6111728	3.7 km NNE of Kangarilla	220			
8	5ML31	14-Apr-86	290502	6129153	2.3 km WNW of Summertown, (Cleland CP)	510			
8	5ML32	14-Apr-86	290222	6129198	2.6 km WNW of Summertown, (Cleland CP)	485			
8	5ML40	21-Apr-86	288872	6090178	4.1 km ENE of Yundi, (Mount Magnificent CP)	280			
8	5ML409	05-May-86	282222	6074378	1 km. N. of Mount Billy Hindmarsh Valley	230			
8	5ML436	01-May-86	283372	6086528	0.7 km NNW of Mount Compass	310			
8	5ML450	07-May-86	280722	6075678	3.7 km ESE of Spring Mount, (O.5 km. N. of Hindmarsh Falls.)	225			
8	5ML468	12-May-86	275272	6075328	2.1 km WSW of Spring Mount, (Spring Mount CP)	390			
8	5ML47	10-Apr-86	292372	6135578	3.6 km ESE of Rostrevor (Morialta CP)	485			
8	5ML481	21-May-86	266972	6078328	3.6 km WSW of Myponga, (NIXon Skinner CP)	230			
8	5ML514	02-Jun-86	296222	6122618	2.7 km NNE of Mylor	382			
8	5ML515	02-Jun-86	296217	6121908	2.0 km NNE of Mylor	370			
8	5ML516	02-Jun-86	296427	6120349	0.9 km ENE of Mylor	365			
8	5ML518	02-Jun-86	296472	6115698	3.6 km NNW of Echunga,	350			

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					(Chapel Hill)				
8	5ML564	28-May-86	287052	6120368	6.9 km WSW of Bridgewater	350			
8	5ML568	26-May-86	286962	6121138	6.7 km WSW of Bridgewater	435			
8	5ML575	22-May-86	291107	6121808	2.6 km WSW of Bridgewater	445			
8	5ML58	11-Apr-86	291382	6137258	2.6 km ENE of Rostrevor, (Black Hill CP)	370			
8	5ML588	16-May-86	286422	6113428	5.3 km NNW of Kangarilla	225			
8	5ML594	15-May-86	285662	6113828	5.8 km NNW of Kangarilla	329			
8	5ML596	15-May-86	287212	6115498	7.3 km NNE of Kangarilla, (on FIRTH Road)	350			
8	5ML597	14-May-86	286882	6114413	6.2 km NNE of Kangarilla, (on Thorley Road)	335			
8	5ML599	14-May-86	288122	6112823	4.8 km NNE of Kangarilla	290			
8	5ML610	03-Jun-86	248222	6052728	8.2 km SSE of Delamere, (Deep Creek CP)	280			
8	5ML623	04-Jun-86	254022	6055778	8.8 km ESE of Delamere, (Boat Harbor Creek Deep Creek CP)	220			
8	5ML70	10-Apr-86	288472	6103528	4.9 km SSE of Kangarilla	330			
8	5ML80	14-Apr-86	287892	6105878	2.5 km SSE of Kangarilla	290			
8	5ML87	14-Apr-86	288372	6095178	6.9 km NNE of Yundi, (Kyeema CP)	320			
8	5ML88	17-Apr-86	288572	6094928	6.8 km NNE of Yundi, (KYEMMA CP)	350			
8	5ML89	17-Apr-86	288872	6094928	6.9 km NNE of Yundi, (Kyeema CP)	350			
8	5ML90	17-Apr-86	289372	6094978	7.3 km NNE of Yundi, (Kyeema CP)	365			
8	5ML91	17-Apr-86	289172	6094578	6.8 km NNE of Yundi, (Kyeema CP)	360			
8	5ML95	18-Apr-86	289422	6091678	5.1 km ENE of Yundi	250			
8	5ML98	18-Apr-86	289072	6090678	4.4 km ENE of Yundi, (Mount Magnificent CP)	270			
8	5ML99	18-Apr-86	288822	6091178	4.4 km ENE of Yundi	300			
8	97WIL00301	04-Dec-98	288556	6090505	3.9 km ENE of Yundi	230	hill slope	sand	low open forest
8	97WIL00401	04-Dec-98	288440	6090338	3.7 km ENE of Yundi	230	hill crest	sand	
9	117JER00901	20-Feb-00	249602	6054978	6.5 km SSE of Delamere, (Deep Creek CP)		hill slope	clayey sand	low open forest
9	117TOR00701	10-Nov-99	258392	6057038	12.2 km ESE of Delamere		hill slope	clay loam	low open forest
9	117WIL00101	09-Nov-99	286562	6092778	3.9 km NNE of Yundi		hill slope	clay loam	low woodland
9	117WIL01701	02-Mar-00	288502	6094998	6.8 km NNE of Yundi, (Kyeema CP)		hill slope	clayey sand	open mallee
9	117WIL02901	24-Feb-00	275352	6075548	1.9 km WSW of Spring Mount, (Spring Mount CP)	385	hill slope	sandy loam	low open forest
9	117YAN00301	23-Nov-99	267862	6076628	4.5 km SSW of Myponga		hill crest	sandy loam	low open forest
9	117YAN01101	22-Feb-00	267862	6076628	4.5 km SSW of Myponga	270	hill slope	sandy loam	low open forest
9	117YAN01201	23-Feb-00	267632	6073438	7.6 km SSW of Myponga, (Myponga CP)	250	hill slope	sandy loam	low open forest
9	42PC1031	01-Oct-88	254372	6063218	7.4 km ESE of Second Valley	350			
9	42PC1043	09-Dec-88	261392	6059558	13.5 km SSE of Lady Bay	280			
9	42PC1046	20-Jan-89	265589	6058518	10.4 km WNW of Waitpinga	210			
9	42PC1056	15-Apr-89	253062	6060758	6.3 km ESE of Delamere	300			
9	42PC1068	10-Feb-90	274122	6075528	3.1 km WSW of Spring Mount	380			
9	42PC1073	30-Mar-90	278522	6072868	3.7 km SSE of Spring Mount	310			
9	42PC1088	23-Jun-90	275342	6079618	3.8 km NNW of Spring Mount	340			
9	42PC1095	02-Mar-91	283372	6071858	3.8 km NNE of Hindmarsh Valley	240			
9	42PC773	24-Apr-87	288672	6079648	5.3 km WSW of Tooperang	290			
9	42PC829	19-Sep-87	285082	6078958	7.1 km SSE of Mount Compass	310			
9	42PC830	19-Sep-87	285062	6078548	7.5 km SSE of Mount Compass	300			
9	42PC835	19-Sep-87	288532	6075108	4.5 km WSW of Currency Creek	240			
9	42PC836	19-Sep-87	287662	6079378	6.3 km WSW of Tooperang	225			
9	42PC871	29-Oct-87	271712	6061538	5.4 km WNW of Waitpinga	200			
9	42PC873	31-Oct-87	259972	6063608	9.4 km SSE of Lady Bay	240			
9	42PC874	31-Oct-87	259952	6063718	9.3 km SSE of Lady Bay	250			
9	42PC882	13-Nov-87	285642	6090038	1.1 km NE of Yundi	320			
9	42PC884	11-Dec-87	281942	6091088	3.5 km WNW of Yundi	355			
9	42PC891	08-Jan-88	268932	6063008	8.5 km WNW of Waitpinga	240			
9	42PC940	19-Feb-88	278762	6082218	6.2 km NNE of Spring Mount	310			
9	42PC941	19-Feb-88	278932	6081928	6.0 km NNE of Spring Mount	330			
9	42PC942	19-Feb-88	278052	6082238	6.1 km NNE of Spring Mount	300			
9	42PC969	15-Apr-88	278192	6080238	4.1 km NNE of Spring Mount	370			

Floristic Group	Site Code #	Visit Date	Easting	Northing	Location	Altitude (m)	Landform	Soil Texture	Structural Formation
9	42PC985	28-May-88	264972	6057328	11.1 km WSW of Waitpinga	240			
9	42PC986	28-May-88	265042	6057728	11.0 km W of Waitpinga	240			
9	42PC987	28-May-88	265132	6057278	10.9 km WSW of Waitpinga	250			
9	42PC988	28-May-88	264412	6059638	11.7 km WNW of Waitpinga	310			
9	42PC989	28-May-88	264512	6059638	11.6 km WNW of Waitpinga	310			
9	42PC990	28-May-88	264272	6063288	10.8 km SSE of Yankalilla	360			
9	5ML406	14-May-86	275122	6077678	2.4 km WNW of Spring Mount,	360			
9	5ML407	14-May-86	274872	6077978	2.8 km WNW of Spring Mount,	370			
9	5ML457	21-May-86	270672	6077828	1.9 km WSW of Myponga Hill, (Yulte CP)	380			
9	5ML471	14-May-86	274172	6076878	3.0 km WNW of Spring Mount,	390			
9	5ML475	16-May-86	269072	6078028	2.8 km SSW of Myponga	300			
9	5ML478	16-May-86	267272	6073728	7.4 km SSW of Myponga, (Myponga CP)	330			
9	5ML486	22-May-86	278222	6080078	4.0 km NNE of Spring Mount, (0.5 km. SW. of MT. Cone.)	380			
9	5ML491	22-May-86	275222	6079678	3.9 km NNW of Spring Mount	330			
9	5ML494	22-May-86	273122	6078778	0.8 km ENE of Myponga Hill,	300			
9	5ML499	21-May-86	267322	6072678	7.8 km ESE of Yankalilla	340			
9	5ML616	04-Jun-86	249672	6053778	7.6 km SSE of Delamere (Deep Creek CP)	245			
9	5ML618	04-Jun-86	249472	6055228	6.2 km SSE of Delamere, (Deep Creek CP)	285			
9	5ML624	04-Jun-86	253422	6056528	7.9 km ESE of Delamere (Deep Creek CP)	275			
9	5ML625	04-Jun-86	252972	6056728	7.4 km ESE of Delamere (Deep Creek CP)	280			
9	5ML629	05-Jun-86	256122	6059178	9.5 km ESE of Delamere, (on Tunkalilla Road 1.5 km. from Range Road)	340			
9	5ML631	05-Jun-86	258372	6056778	12.3 km ESE of Delamere, (Eric Bonython CP)	200			
9	5ML633	05-Jun-86	264922	6057328	11.1 km WSW of Waitpinga, (Mount Scrub W. of Victor Harbor.)	250			
9	5ML742	20-Feb-87	264922	6062928	11.5 km SSE of Yankalilla	310			
9	5ML743	20-Feb-87	262422	6057578	13.6 km W of Waitpinga	300			
9	5ML744	20-Feb-87	261022	6056078	15.0 km ESE of Delamere	0			
9	5ML748	23-Feb-87	267072	6065128	10.9 km SSE of Yankalilla	330			
9	5ML760	20-Mar-87	275972	6061828	3.5 km NNE of Waitpinga	695			
9	97ENC00101	29-Aug-98	275924	6061823	3.5 km NNE of Waitpinga	220	hill crest	clayey sand	low open forest
9	97TOR00201	15-Nov-97	258331	6063391	8.7 km SSE of Lady Bay	330	ridge	silt loam	mallee
9	97TOR00401	15-Nov-97	256987	6058605	10.4 km ESE of Delamere	320	hill footslope	light medium clay	low closed forest
9	97TOR00501	14-Nov-97	264883	6057317	11.2 km WSW of Waitpinga	250	hill crest	sandy loam	mallee
9	97TOR00601	14-Nov-97	265600	6060346	10.6 km WNW of Waitpinga	290	ridge	sandy loam	mallee
9	97TOR01001	31-May-98	253218	6059886	6.5 km ESE of Delamere	340	hill crest	sandy clay loam	low open forest
9	97WIL00201	07-Mar-98	276461	6074391	2.0 km SSW of Spring Mount	400	hill slope	sandy clay loam	open forest
9	97YAN00101	07-Mar-98	268288	6072553	8.3 km SSW of Myponga	290	hill slope	loamy sand	mallee
9	97YAN00201	07-Mar-98	268321	6073430	7.5 km SSW of Myponga	300	hill crest	loamy sand	mallee
10	117ENC00401	29-Feb-00	275552	6054578	0.5 km WSW of Ridgeway Hill, (Newland Head CP)		dune slope	sand	low mallee
10	117ENC00501	01-Mar-00	276902	6066038	5.3 km WSW of Hindmarsh Valley		hill crest	sand	very low open forest
10	117MIL00101	01-Mar-00	299062	6091328	2.7 km SSE of Ashbourne, (Bullock Hill CP)		dune crest	sand	low woodland
10	117MIL00201	01-Mar-00	299512	6090638	3.5 km SSE of Ashbourne, (Bullock Hill CP)		swale	sand	shrubland
10	117TOR01701	29-Feb-00	272162	6054878	5.2 km WSW of Waitpinga, (Newland Head CP)		hill slope	sand	low mallee
10	117WIL01901	29-Feb-00	288892	6090738	4.3 km ENE of Yundi, (Mt Magnificent CP)		hill slope	sandy loam	low open forest
10	117WIL02201	02-Mar-00	293532	6086648	3.7 km NNE of Tooperang, (Cox Scrub CP)		dune slope	sand	open mallee
10	117WIL02301	02-Mar-00	295132	6087818	5.3 km NNE of Tooperang, (Cox Scrub CP)		dune slope	sand	open mallee
10	117WIL02401	28-Feb-00	293952	6078488	2.7 km NNE of Currency Creek, (Scott CP)		hill slope	loamy sand	low open forest
10	117WIL02501	28-Feb-00	294892	6077768	2.7 km ENE of Currency Creek, (Scott CP)		hill slope	loamy sand	very low open forest

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10	117WIL02701	29-Feb-00	282342	6074528	5.5 km ESE of Spring Mount, (Mount Billy CP)		hill slope	sand	very low open forest
10	42PC1010	08-Jul-88	299612	6077908	5.4 km SSW of Finniss	35			
10	42PC1021	27-Aug-88	299722	6078458	4.8 km SSW of Finniss	40			
10	42PC1048	03-Feb-89	287222	6086448	2.6 km WNW of Nangkita	200			
10	42PC765	21-Apr-87	276162	6054738	0.3 km ESE of Ridgeway Hill	138			
10	42PC766	21-Apr-87	276972	6054268	1.2 km ESE of Ridgeway Hill	50			
10	42PC767	21-Apr-87	275952	6055488	0.6 km NNE of Ridgeway Hill	135			
10	42PC768	21-Apr-87	275672	6055078	0.3 km WNW of Ridgeway Hill	155			
10	42PC771	22-Apr-87	275592	6054588	0.5 km WSW of Ridgeway Hill	140			
10	42PC774	26-Sep-87	294622	6084848	2.6 km ENE of Tooperang	150			
10	42PC775	26-Apr-87	294562	6085018	2.7 km ENE of Tooperang	150			
10	42PC793	06-Jun-87	271962	6054208	5.8 km WSW of Waitpinga	50			
10	42PC797	06-Jun-87	283122	6064528	1.9 km NNW of Victor Harbor	50			
10	42PC798	08-Jun-87	274962	6056488	2.1 km SSW of Waitpinga	105			
10	42PC799	08-Jun-87	275402	6056648	1.8 km SSW of Waitpinga	112			
10	42PC827	05-Sep-87	300552	6078818	4.1 km SSW of Finniss	35			
10	42PC837	03-Oct-87	310422	6091068	5.5 km SSE of Strathalbyn	55			
10	42PC866	28-Oct-87	299292	6086228	4.6 km NNW of Finniss	80			
10	42PC935	05-Feb-88	281682	6084528	2.5 km WSW of Mount Compass	300			
10	42PC936	05-Feb-88	280772	6085178	3.1 km WSW of Mount Compass	340			
10	42PC937	05-Feb-88	281032	6085008	2.9 km WSW of Mount Compass	310			
10	42PC954	19-Mar-88	282662	6065018	2.6 km NNW of Victor Harbor	60			
10	42PC956	19-Mar-88	283822	6064738	1.6 km NNW of Victor Harbor	65			
10	42PC957	19-Mar-88	284472	6065278	2.0 km NNE of Victor Harbor	20			
10	42PC959	02-Apr-88	271462	6061698	5.7 km WNW of Waitpinga	170			
10	42PC960	02-Apr-88	271582	6071698	7.2 km WSW of Spring Mount	150			
10	42PC965	02-Apr-88	272512	6066578	8.9 km NNW of Waitpinga	190			
10	42PC974	30-Apr-88	292762	6087098	3.1 km ENE of Nangkita	220			
10	42PC977	14-May-88	299452	6091018	3.2 km SSE of Ashbourne	170			
10	42PC978	14-May-88	299372	6091448	2.8 km ESE of Ashbourne	170			
10	42PC979	14-May-88	299492	6091768	2.8 km ESE of Ashbourne	170			
10	52WIL1101	31-Oct-93	293272	6086678	3.5 km ENE of Nangkita, (Cox Scrub CP)	180	hill slope	sand	very open shrubland
10	5ML197	23-Apr-86	287822	6088428	3.0 km ESE of Yundi	227			
10	5ML198	23-Apr-86	286372	6087378	2.4 km SSE of Yundi	220			
10	5ML201	24-Apr-86	276122	6086078	3.6 km ESE of Mount Terrible	295			
10	5ML202	24-Apr-86	278422	6086528	5.4 km WNW of Mount Compass	300			
10	5ML204	24-Apr-86	287272	6086478	2.6 km WNW of Nangkita	190			
10	5ML207	28-Apr-86	287872	6084778	2.3 km WSW of Nangkita	205			
10	5ML208	28-Apr-86	289272	6087378	1.5 km NNW of Nangkita	280			
10	5ML209	28-Apr-86	290872	6087378	1.7 km NNE of Nangkita	175			
10	5ML210	28-Apr-86	290922	6087678	2.0 km NNE of Nangkita, (Cox Scrub CP)	210			
10	5ML211	28-Apr-86	291422	6087628	2.3 km ENE of Nangkita, (Cox Scrub CP)	190			
10	5ML215	01-May-86	280572	6085328	3.2 km WSW of Mount Compass	345			
10	5ML404	09-May-86	294272	6087428	4.6 km NNE of Tooperang, (Cox Scrub CP)	190			
10	5ML410	05-May-86	282122	6074478	5.3 km ESE of Spring Mount, (1 km. N. of Mount Billy Hindmarsh Valley)	225			
10	5ML419	09-May-86	294572	6085028	2.7 km ENE of Tooperang	160			
10	5ML423	09-May-86	293872	6086178	3.3 km NNE of Tooperang, (Cox Scrub CP)	160			
10	5ML429	02-May-86	294672	6077878	2.6 km NNE of Currency Creek, (Scott CP)	95			
10	5ML430	02-May-86	293972	6078028	2.4 km NNE of Currency Creek, (Scott CP)	110			
10	5ML431	02-May-86	294122	6078778	3.1 km NNE of Currency Creek	110			
10	5ML437	01-May-86	282722	6086078	1.0 km WNW of Mount Compass	270			
10	5ML438	01-May-86	281272	6084528	2.8 km WSW of Mount Compass	300			
10	5ML439	01-May-86	294172	6079978	3.4 km SSE of Tooperang, (Scott CP)	100			
10	5ML440	09-May-86	294122	6086978	4.2 km NNE of Tooperang, (Cox Scrub CP)	155			
10	5ML443	07-May-86	282322	6075078	5.3 km ESE of Spring Mount, (2 km. N. of Mount Billy Hindmarsh Valley)	245			
10	5ML445	09-May-86	294872	6087228	4.7 km NNE of Tooperang, (Cox Scrub CP)	140			

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10	5ML446	09-May-86	295022	6087778	5.2 km NNE of Tooperang, (Cox Scrub CP)	160			
10	5ML447	09-May-86	294422	6086828	4.1 km NNE of Tooperang, (Cox Scrub CP)	140			
10	5ML448	09-May-86	293972	6087828	4.5 km ENE of Nangkita, (Cox Scrub CP)	210			
10	5ML636	05-Jun-86	271822	6054728	1 km. N. of Parsons Beach SW. of Victor Harbor	95			
10	5ML73	11-Apr-86	297272	6092358	0.8 km SSE of Ashbourne	150			
10	5ML74	11-Apr-86	299422	6089778	4.1 km SSE of Ashbourne, (HAINES Road)	160			
10	5ML745	23-Feb-87	272472	6066528	8.9 km NNW of Waitpinga	190			
10	5ML750	23-Feb-87	272222	6054928	5.1 km WSW of Waitpinga	60			
10	5ML763	20-Apr-87	279372	6060128	3.8 km ENE of Waitpinga	135			
10	5ML867	09-Dec-91	299022	6085998	4.6 km NNW of Finniss	70			
10	97TOR00701	15-Nov-97	266995	6060735	9.3 km WNW of Waitpinga	200	hill slope	loamy sand	low open forest
10	97WIL00501	04-Dec-98	290976	6087723	2.1 km NNE of Nangkita	210	hill crest	sand	low open forest
10	97WIL00601	04-Dec-98	290920	6086213	1.1 km ENE of Nangkita	165	hill slope	clayey sand	low open forest
10	97WIL00701	05-Dec-98	292230	6086585	2.5 km ENE of Nangkita	170	hill slope	sand	low open woodland
10	97WIL00801	05-Dec-98	294510	6084985	2.6 km NE of Tooperang	140	hill footslope	sandy loam	low open forest
10	97WIL00901	05-Dec-98	294195	6085559	2.9 km NNE of Tooperang	150	hill slope	sandy loam	low closed forest
10	97WIL01001	05-Dec-98	294235	6085278	2.7 km NNE of Tooperang	150	hill footslope	sandy loam	low closed forest
10	97YAN00301	07-Mar-98	271656	6071743	7.1 km WSW of Spring Mount	150	hill slope	sandy loam	open forest
11	117ADE02001	28-Nov-00	289452	6129788	Cleland CP	400	gully	clay loam	woodland
11	117NOA01001	10-Mar-01	287512	6121448	Not stated	400	hill slope	loam	open forest
11	117NOA02001	06-Dec-00	293082	6110468	Mt Bold Reservoir	270	stream channel	light medium clay	open forest
11	117ONK02201	31-Oct-00	298822	6137928	7.4 km WNW of Lobethal, (Mt Misery NFR (Forestry SA))	500	hill slope	clay loam	woodland
11	5ML101	17-Apr-86	288932	6128988	3.9 km WNW of Summertown, (Woolshed Gully, Cleland CP)	360			
11	5ML102	17-Apr-86	287992	6129588	4.8 km WNW of Summertown, (Long Ridge, Cleland CP)	373			
11	5ML26	11-Apr-86	288322	6127308	4.8 km WSW of Summertown, (Cleland CP)	450			
11	5ML35	14-Apr-86	289262	6129808	3.6 km WNW of Summertown, (Chambers Gully Cleland CP)	365			
11	5ML354	14-May-86	298992	6138238	7.4 km WNW of Lobethal	350			
11	5ML355	14-May-86	299272	6138928	7.4 km WNW of Lobethal	500			
11	5ML41	17-Apr-86	288022	6129028	4.8 km WNW of Summertown, (Waterfall Gully, Cleland CP)	305			
11	5ML60	11-Apr-86	295072	6136878	6.2 km E of Rostrevor, (1 km. E. of Montacute.)	410			
12	117ADE01001	01-May-01	290898	6129005	1.9 km W of Summertown, (Cleland CP)	530	gully	sandy clay loam	open forest
12	5ML103	17-Apr-86	289732	6128628	3.1 km WSW of Summertown, (Long Ridge, Cleland CP)	480			
12	5ML124	23-Apr-86	291502	6132378	3.5 km NNW of Summertown, (Giles Range)	425			
12	5ML146	18-Apr-86	297762	6133808	5.7 km NNE of Uraidla	460			
12	5ML151	18-Apr-86	297712	6137318	8.3 km WNW of Lobethal	450			
12	5ML34	14-Apr-86	289682	6130078	3.3 km WNW of Summertown, (Slape Gully, Greenhill)	430			
12	5ML36	14-Apr-86	289142	6129778	3.7 km WNW of Summertown, (Chambers Gully, Cleland CP)	350			
12	5ML43	10-Apr-86	292372	6134378	4.1 km SE of Rostrevor, (1 km. N. of Norton Summit.)	400			
12	5ML82	14-Apr-86	296972	6103778	1.2 km SSE of Meadows	450			
13	117TOR00901	09-Nov-99	262312	6054988	14.1 km WSW of Waitpinga		stream channel	loam	woodland
13	117WIL00201	19-Nov-99	286722	6089968	2.0 km ENE of Yundi		stream channel	silt loam	woodland
13	42PC1034	21-Oct-88	293622	6089858	4.8 km WSW of Ashbourne	220			
13	42PC1071	30-Mar-90	280322	6073098	4.5 km SSE of Spring Mount	90			
13	42PC1078	07-Apr-90	279442	6073558	3.6 km SSE of Spring Mount	200			
13	5ML14	09-Apr-86	289822	6112828	5.5 km NNE of Kangarilla	270			
13	5ML267	07-May-86	292122	6109548	5.3 km ENE of Kangarilla	287			
13	5ML414	08-May-86	279372	6072578	4.3 km SSE of Spring Mount	160			
13	5ML415	08-May-86	279872	6073528	3.9 km SSE of Spring Mount	200			

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13	5ML416	08-May-86	280672	6073578	4.5 km ESE of Spring Mount	140			
13	5ML582	21-May-86	287052	6122953	6.4 km WNW of Bridgewater, (Tarnma Creek, Belair RP.)	367			
13	5ML727	04-Jun-86	308782	6155208	6.4 km SSE of Williamstown, (Warren CP)	340			
14	117ENC00101	12-Nov-99	283512	6067898	1.9 km ESE of Hindmarsh Valley		stream channel	loamy sand	open forest
14	117ENC00301	11-Nov-99	274192	6062188	4.3 km NNW of Waitpinga		gully	loam	open forest
14	117JER00601	08-Nov-99	237372	6054318	11.4 km WSW of Delamere		limestone plain	loamy sand	mallee
14	117NOA00301	14-Dec-99	290622	6119408	4.5 km SSW of Bridgewater, (Morgan Rd)		hill slope	clay loam	woodland
14	117NOA01701	06-Dec-00	288422	6112408	Mt Bold Reservoir	205	stream channel	clay loam, sandy	open forest
14	117ONK00401	23-Dec-99	296872	6137978	8.1 km ENE of Rostrevor, (Montacute CP)		hill slope	sandy loam	open forest
14	117ONK00601	04-Jan-00	300152	6137488	6.0 km WNW of Lobethal, (Forestry SA)		hill slope	silty clay loam	open woodland
14	117ONK00701	04-Jan-00	298302	6136148	7.5 km WNW of Lobethal, (Forestry SA)		hill slope	clay loam	woodland
14	117ONK00801	04-Jan-00	297672	6133768	5.6 km NNE of Uraidla, (Kenneth Stirling CP)		hill slope	silty clay loam	woodland
14	117ONK02101	02-Nov-00	296832	6138188	8.1 km ENE of Rostrevor, (Montacute CP)	382	hill slope	loam	open forest
14	117WIL01501	18-Nov-99	277502	6070898	4.8 km WNW of Hindmarsh Valley		hill slope	sandy clay loam	woodland
14	117YAN00501	17-Nov-99	271962	6073008	6.1 km WSW of Spring Mount		gully	silt loam	woodland
14	117YAN01001	23-Feb-00	270412	6077908	3.0 km SSE of Myponga, (Yulte CP)	310	hill slope	sandy clay loam	low open forest
14	42PC1072	30-Mar-90	279672	6073178	4.0 km SSE of Spring Mount	210			
14	42PC947	03-Apr-88	256632	6066568	5.1 km SSE of Lady Bay	300			
14	5ML143	17-Apr-86	296182	6137088	7.3 km ENE of Rostrevor	210			
14	5ML148	18-Apr-86	297832	6134838	6.6 km NNE of Uraidla	500			
14	5ML474	16-May-86	267272	6074178	7.0 km SSW of Myponga, (Myponga CP)	200			
14	5ML54	11-Apr-86	295272	6136428	6.4 km ESE of Rostrevor	430			
14	5ML634	05-Jun-86	267322	6057678	8.7 km WSW of Waitpinga, (3 km. E. of Mount Scrub W. of Victor Harbor)	115			
14	5ML635	05-Jun-86	271672	6054428	0.5 km. N. of Parsons Beach SW. of Victor Harbor	75			
14	5ML746	23-Feb-87	273522	6066028	8.1 km NNW of Waitpinga	160			
15	117NOA02201	07-Dec-00	279532	6106678	Onkaparinga NP	101	gorge	silt loam	open forest
15	42PC953	19-Mar-88	282922	6063678	1.6 km WNW of Victor Harbor	10			
15	5ML107	18-Apr-86	289022	6130378	4.0 km WNW of Summertown, (Slape Gully Greenhill)	280			
15	5ML193	23-Apr-86	285772	6093928	4.8 km NNE of Yundi	268			
15	5ML284	09-May-86	288202	6110563	2.7 km NNE of Kangarilla	200			
15	5ML299	14-May-86	288257	6112228	4.3 km NNE of Kangarilla, (Onkaparinga River)	195			
15	5ML38	18-Apr-86	288322	6090578	3.7 km ENE of Yundi, (Blackfellows Creek)	230			
16	117NOA00901	30-Nov-00	286752	6123738	Belair NP	430	hill slope	silt loam	low woodland
16	117ONK01901	02-Nov-00	296910	6139830	Kangaroo Creek Reservoir (SA Water)	300	hill slope	clay loam	woodland
16	117ONK02401	31-Oct-00	298142	6137368	7.9 km WNW of Lobethal, (Montacute CP)	515	hill slope	clayey sand	low woodland
16	42PC919	11-Mar-88	287697	6125528	6.2 km WSW of Summertown	440			
16	5ML104	17-Apr-86	289972	6128488	2.9 km WSW of Summertown, (Chambers Gully, Cleland CP)	490			
16	5ML125	23-Apr-86	291422	6132678	3.8 km NNW of Summertown, (Rockdale Hill)	440			
16	5ML144	17-Apr-86	295532	6134828	5.6 km NNE of Uraidla	540			
16	5ML33	14-Apr-86	290112	6129128	2.7 km WNW of Summertown, (Chambers Gully, Cleland CP)	450			
16	5ML347	12-May-86	293762	6141798	4.5 km SSE of Tea Tree Gully, (0.5 km. SE. of Anstey Hill.)	390			
16	5ML352	14-May-86	296172	6139278	7.8 km ENE of Rostrevor	320			
16	5ML356	14-May-86	297082	6139848	8.1 km SSE of Tea Tree Gully	290			
16	5ML52	11-Apr-86	294922	6134878	5.6 km NNE of Uraidla	490			
16	5ML576	21-May-86	286222	6124228	7.1 km ESE of Edwardstown, (Belair RP.)	395			

Floristic Group	Site Code #	Visit Date	Easting	Northing	Location	Altitude (m)	Landform	Soil Texture	Structural Formation
16	5ML583	21-May-86	287687	6123033	5.8 km WNW of Bridgewater, (Belair RP.)	431			
16	5ML7	08-Apr-86	301492	6156608	7.1 km WSW of Williamstown, (Para Wirra RP.)	330			
17	117BAR01001	10-Jan-00	299032	6155198	7.6 km NNW of Kersbrook		hill crest	clay loam	low open woodland
17	117BAR02801	25-Oct-00	308471	6156218	5.3 km SSE of Williamstown, (Warren CP)		gully	sandy loam	woodland
17	117NOA01301	05-Dec-00	288402	6115458	Scott Creek CP	305	hill slope	loam	open forest
17	117WIL02801	01-Mar-00	282142	6073418	5.0 km NNE of Hindmarsh Valley, (Mount Billy CP)		hill slope	sandy loam	low open forest
17	5ML15	09-Apr-86	288772	6112578	4.8 km NNE of Kangarilla	250			
17	5ML153	21-Apr-86	300162	6158768	7.1 km WSW of Williamstown	220			
17	5ML155	21-Apr-86	300172	6160418	6.7 km WSW of Williamstown	280			
17	5ML157	21-Apr-86	302272	6159598	4.8 km WSW of Williamstown	290			
17	5ML158	21-Apr-86	300882	6159778	6.1 km WSW of Williamstown	280			
17	5ML159	21-Apr-86	301952	6159988	5.0 km WSW of Williamstown	265			
17	5ML173	28-Apr-86	300122	6157858	7.5 km WSW of Williamstown, (Para Wirra RP.)	280			
17	5ML263	05-May-86	292172	6115253	5.9 km SSW of Mylor	250			
17	5ML264	05-May-86	292112	6114828	6.2 km SSW of Mylor	260			
17	5ML283	09-May-86	288052	6110728	2.8 km NNE of Kangarilla	200			
17	5ML290	12-May-86	288662	6111098	3.4 km NNE of Kangarilla	262			
17	5ML291	12-May-86	288862	6111613	3.9 km NNE of Kangarilla, (0.5 km. W. of Mount Bold.)	290			
17	5ML292	12-May-86	290042	6112068	5.0 km NNE of Kangarilla, (Mount Bold Reservoir)	285			
17	5ML294	12-May-86	291542	6111973	5.9 km ENE of Kangarilla, (Mount Bold Reservoir)	268			
17	5ML300	14-May-86	288102	6112258	4.2 km NNE of Kangarilla, (Onkaparinga River CP)	203			
17	5ML326	07-May-86	309262	6157288	4.7 km SSE of Williamstown, (Warren Reservoir SE. of Williamstown.)	410			
17	5ML331	08-May-86	302932	6160728	3.9 km WSW of Williamstown, (1 km. N. of South Para Reservoir)	250			
17	5ML332	08-May-86	303302	6159718	3.8 km WSW of Williamstown, (0.5 km. N. of South Para Reservoir)	260			
17	5ML366	16-May-86	299142	6142138	7.7 km WSW of Gumeracha	310			
17	5ML412	05-May-86	281922	6073578	5.1 km NNE of Hindmarsh Valley, (Mount Billy Hindmarsh Valley Reservoir)	200			
17	5ML413	07-May-86	282222	6072378	3.9 km NNE of Hindmarsh Valley, (Hindmarsh Valley Reservoir)	110			
17	5ML418	08-May-86	282022	6072478	4.0 km NNE of Hindmarsh Valley, (Mount Billy Hindmarsh Valley Reservoir)	100			
17	5ML420	08-May-86	282822	6073778	5.4 km NNE of Hindmarsh Valley, (Mount Billy Hindmarsh Valley Reservoir)	130			
17	5ML424	05-May-86	282672	6072528	4.2 km NNE of Hindmarsh Valley, (Hindmarsh Valley Reservoir)	95			
17	5ML425	05-May-86	284122	6074178	6.2 km NNE of Hindmarsh Valley, (1 km. N. of Mount Billy)	220			
17	5ML441	07-May-86	280122	6075028	3.2 km ESE of Spring Mount	250			
17	5ML444	07-May-86	280772	6075278	3.8 km ESE of Spring Mount, (Hindmarsh Falls.)	240			
17	5ML451	07-May-86	279322	6074678	2.7 km ESE of Spring Mount	330			
17	5ML453	21-May-86	267472	6078278	3.3 km SSW of Myponga, (southern edge Myponga Reservoir)	260			
17	5ML5	08-Apr-86	300002	6156618	8.2 km WSW of Williamstown, (Para Wirra RP.)	345			
17	5ML558	28-May-86	280472	6120628	7.1 km S of Edwardstown	180			
17	5ML587	16-May-86	286322	6113178	5.0 km NNW of Kangarilla	240			
17	5ML592	15-May-86	285737	6113018	on FORMBY Road 2 km. E. of Clarendon	231			
17	5ML598	14-May-86	287662	6113108	5.0 km NNE of Kangarilla	215			

Floristic Group	Site Code #	Visit Date	Easting	Northing	Location	Altitude (m)	Landform	Soil Texture	Structural Formation
17	5ML605	03-Jun-86	241822	6054328	8.2 km SSW of Delamere, (1.5 km. SW. of Silverton E. of Cape Jervis)	285			
17	5ML607	02-Jun-86	245372	6051478	9.4 km SSW of Delamere, (1.5 km. E. of Cobblers Hill Deep Creek)	150			
17	5ML613	03-Jun-86	248322	6051978	9.0 km SSE of Delamere, (1 km. E. Tent Hill, Deep Creek CP)	220			
17	5ML68	10-Apr-86	285772	6104878	3.5 km SSW of Kangarilla	320			
17	5ML725	04-Jun-86	308282	6154508	6.9 km SSE of Williamstown, (Warren CP)	390			
17	5ML761	20-Apr-87	277372	6062378	4.2 km NNE of Waitpinga	145			
17	5ML97	18-Apr-86	289222	6090578	4.5 km ENE of Yundi, (Mount Magnificent CP)	310			
18	117ANG00101	24-Oct-00	317962	6170578	9.0 km SSE of Tanunda, (Kaiserstuhl CP)	537	hill slope	sandy clay loam	mallee
18	117BAR02901	24-Oct-00	313582	6157408	7.8 km ESE of Williamstown, (Little Mt Crawford (Forestry SA))	468	hill slope	sandy loam	woodland
18	117NOA00501	16-Nov-99	289892	6103408	5.6 km SSE of Kangarilla, (Knott Hill Forest (Forestry SA))		flat	clayey sand	woodland
18	117NOA00801	29-Nov-00	285282	6123928	Belair CP	280	hill slope	sandy loam	woodland
18	117NOA02401	06-Dec-00	287982	6105228	Mt Panorama	310	hill footslope	sandy loam	open forest
18	117ONK01101	28-Sep-00	299280	6144807	5.8 km WSW of Kersbrook, (Millbrook Reservoir (SA Water))		hill slope	loam	open forest
18	117ONK01201	29-Sep-00	315140	6150370	5.3 km NNE of Birdwood, (Cromer CP)	475	hill slope	loamy sand	low open woodland
18	117ONK01501	01-Nov-00	298150	6150370	2.2 km WNW of Mount Gawler, (Mt Gawler North NFR (Forestry SA))	340	hill slope	clayey sand	open mallee
18	117ONK01801	30-Oct-00	302740	6143110	4.0 km WSW of Gumeracha, (Cuddlee Creek CP)		hill slope	sandy clay loam	open forest
18	117ONK02601	02-Nov-00	312592	6134028	4.9 km SSW of Mount Torrens, (Charleston CP)	514	hill slope	sandy loam	woodland
18	5ML310	01-May-86	312502	6134378	4.6 km SSW of Mount Torrens, (Charleston CP)	485			
18	5ML311	01-May-86	313192	6133788	5.1 km SSW of Mount Torrens, (Charleston CP)	530			
18	5ML316	02-May-86	318022	6138078	4.7 km ESE of Mount Torrens	515			
18	5ML317	02-Apr-86	317222	6139868	3.9 km ENE of Mount Torrens	480			
18	5ML338	09-May-86	313222	6161768	6.5 km ENE of Williamstown, (Wirra Wirra Peaks E. of Williamstown.)	570			
18	5ML395	26-May-86	305782	6146588	2.3 km NNW of Gumeracha	490			
18	5ML706	29-May-86	308862	6152068	4.6 km NNE of Forreston	435			
18	5ML71	10-Apr-86	289872	6101278	1 km. NW. of Kuipto	290			
18	5ML717	02-Jun-86	314752	6149328	4.2 km NNE of Birdwood	440			
18	5ML718	02-Jun-86	315332	6149838	4.8 km NNE of Birdwood, (Cromer CP)	450			
18	5ML723	02-Jun-86	314032	6156068	8.9 km ESE of Williamstown, (1.5 km. S. Little Mount Crawford)	480			
18	5ML730	05-Jun-86	314032	6158338	7.8 km ESE of Williamstown, (Mount Crawford Summit)	490			
18	5ML733	05-Jun-86	313862	6156798	1 km. south of Little Mount Crawford	510			
18	5ML79	11-Apr-86	292872	6101278	4.8 km WSW of Meadows	315			
19	117BAR00401	06-Jan-00	312302	6163068	5.8 km ENE of Williamstown		hill slope	sandy loam	open forest
19	117BAR00501	06-Jan-00	311022	6162928	4.5 km ENE of Williamstown		hill slope	loamy sand	low open forest
19	5ML325	05-May-86	311232	6162288	4.6 km ENE of Williamstown, (Old Glen Road)	430			
20	117BAR00201	06-Jan-00	303772	6166858	3.6 km WSW of Lyndoch		hill slope	clay loam	woodland
20	5ML105	18-Apr-86	288822	6130228	4.1 km WNW of Summertown, (Slape Gully Greenhill)	340			
20	5ML106	18-Apr-86	289172	6130428	3.9 km WNW of Summertown, (Slape Gully Greenhill)	350			
20	5ML108	18-Apr-86	288722	6130428	4.3 km WNW of Summertown, (Slape Gully Greenhill)	350			
20	5ML323	05-May-86	303842	6168028	3.0 km WSW of Lyndoch, (Sandy Creek CP)	220			

Floristic Group	Site Code #	Visit Date	Easting	Northing	Location	Altitude (m)	Landform	Soil Texture	Structural Formation
20	5ML341	09-May-86	311322	6179148	1.9 km WNW of Tanunda, (Mount Barker)	275			
21	117NOA00701	29-Nov-00	284672	6124078	Belair NP	295	hill slope	sandy loam	low woodland
21	117NOA01201	28-Nov-00	280642	6119068	Sturt Gorge RP	196	hill slope	sandy loam	low woodland
21	117NOA02202	07-Dec-00	279762	6106768	Onkaparinga NP	126	hill slope	clay loam	low open forest
21	42PC816	04-Jul-87	279632	6104718	1.9 km WSW of Blewitt Springs	110			
21	5ML111	21-Apr-86	285707	6127333	1.5 km. SE. of Urrbrae SE. of Adelaide)	250			
21	5ML221	30-Apr-86	280822	6097838	4.9 km ESE of Mclaren Vale	155			
21	5ML42	10-Apr-86	290272	6135078	2.0 km SSE of Rostrevor, (Morialta CP)	250			
21	5ML519	04-Jun-86	279772	6108528	3.0 km NNW of Blewitt Springs	250			
21	5ML520	04-Jun-86	279422	6108478	3.2 km NNW of Blewitt Springs	210			
21	5ML521	04-Jun-86	280052	6108728	3.1 km NNW of Blewitt Springs	260			
21	5ML523	04-Jun-86	280572	6108478	2.7 km NNW of Blewitt Springs	180			
21	5ML524	04-Jun-86	280272	6108408	2.7 km NNW of Blewitt Springs	230			
21	5ML525	04-Jun-86	280352	6108928	3.2 km NNW of Blewitt Springs	250			
21	5ML557	28-May-86	280122	6119388	8.4 km SSW of Edwardstown	150			
21	5ML577	21-May-86	284387	6124648	5.3 km ESE of Edwardstown, (Perroomba Creek Belair RP.)	297			
21	5ML578	21-May-86	284942	6124488	5.9 km ESE of Edwardstown, (Perroomba Creek Belair RP.)	302			
21	5ML579	21-May-86	285527	6124448	6.4 km ESE of Edwardstown	320			
21	5ML580	21-May-86	285202	6123918	6.4 km ESE of Edwardstown, (Workanda Creek Belair RP.)	284			
21	5ML581	21-May-86	284747	6123588	6.3 km SSE of Edwardstown, (Belair RP.)	272			
21	5ML585	16-May-86	279172	6116528	10.8 km NNW of Blewitt Springs, (Happy Valley Reservoir)	150			
21	5ML586	16-May-86	278172	6115433	10.0 km NNW of Blewitt Springs, (Happy Valley Reservoir)	150			
21	5ML755	18-Feb-87	279372	6105678	1.8 km WSW of Blewitt Springs	170			
22	117ADE00801	02-May-01	289852	6131878	4.0 km NNW of Summertown, (Horsnell Gully CP)	378	hill slope	clay loam	low open forest
22	117ADE01701	27-Nov-00	291432	6136498	Morialta CP	375	hill slope	sandy loam	open forest
22	117BAR00701	07-Jan-00	304102	6160728	2.7 km WSW of Williamstown, (South Para Reservoir (SA Water))	268	hill footslope	clay loam	woodland
22	117BAR01701	27-Sep-00	308003	6155638	5.8 km SSE of Williamstown, (Warren CP)		hill footslope	sandy loam	open forest
22	117BAR01801	28-Sep-00	309805	6157067	5.2 km SSE of Williamstown, (Warren Reservoir)		hill slope	sandy clay loam	woodland
22	117BAR02001	24-Oct-00	316022	6171988	6.8 km SSE of Tanunda	515	hill slope	clay loam	low open forest
22	117BAR02501	25-Oct-00	300372	6161608	6.4 km WNW of Williamstown, (Para Wirra RP)	246	stream bank	medium clay	woodland
22	117BAR02601	26-Oct-00	300952	6159588	6.1 km WSW of Williamstown, (Para Wirra RP)	283	hill slope	sandy clay loam	low woodland
22	117BAR03001	26-Oct-00	300472	6156708	7.8 km WSW of Williamstown, (Para Wirra RP)	300	hill slope	sandy clay loam	woodland
22	117ECH00401	09-May-01	310382	6117608	Mt Barker Summit Reserve	490	hill slope	sandy clay loam	tall open woodland
22	42PC946	04-Mar-88	255992	6066838	4.6 km SSE of Lady Bay	200			
22	5ML160	21-Apr-86	301552	6161088	5.2 km WNW of Williamstown	210			
22	5ML180	30-Apr-86	302432	6142138	4.7 km WSW of Gumeracha, (Cudlee Creek CP)	350			
22	5ML313	02-May-86	311952	6139418	1.6 km WNW of Mount Torrens	510			
22	5ML314	02-May-86	312072	6140028	1.8 km WNW of Mount Torrens	570			
22	5ML339	09-May-86	315882	6172938	5.9 km SSE of Tanunda, (2 km. NE. of Lyndoch.)	220			
22	5ML340	09-May-86	315782	6172178	0.5 km. N. of Kaiserstuhl S. of Tanunda	490			
22	5ML353	14-May-86	297482	6138638	8.8 km ENE of Rostrevor	320			
22	5ML357	15-May-86	292582	6140228	5.2 km ENE of Rostrevor, (Torrens Gorge)	190			
22	5ML360	15-May-86	294772	6138998	1 km south of Castambul on Corkscrew Road	220			
22	5ML55	14-Apr-86	292452	6137108	3.6 km ENE of Rostrevor, (Black Hill CP)	380			
22	5ML59	11-Apr-86	293632	6137448	1 km. N. of Montacute	430			
22	5ML732	05-Jun-86	313532	6157538	0.5 km. W. of Little Mount	450			

Floristic Group	Site Code #	Visit Date	Easting	Northing	Location	Altitude (m)	Landform	Soil Texture	Structural Formation
					Crawford				
23	117ADE00101	20-Dec-99	292082	6139938	4.7 km ENE of Rostrevor, (Black Hill CP)		ridge	silty clay loam	very low woodland
23	117ADE00201	20-Dec-99	291642	6138698	3.5 km ENE of Rostrevor, (Black Hill CP)		hill slope	clay loam	low woodland
23	117ADE01501	31-Oct-00	292132	6138428	3.8 km ENE of Rostrevor, (Black Hill CP)	285	hill footslope	clay loam	woodland
23	117ADE02201	18-Apr-01	287340	6129060	Mount Osmond Reserve		hill slope	sandy loam	open woodland
23	117ADE02202	18-Apr-01	287220	6129090	Mount Osmond Reserve		hill slope	clay loam	woodland
23	42PC897	20-Jan-88	288322	6148228	3.7 km NNE of Para Hills	160			
24	117ADE00401	20-Dec-99	291982	6138318	3.6 km ENE of Rostrevor, (Black Hill CP)		ridge	clay loam	very low woodland
24	117BAR00101	06-Jan-00	302922	6167778	3.9 km WSW of Lyndoch, (Sandy Creek CP)		sandy plain	sandy loam	woodland
24	117BAR00301	06-Jan-00	305382	6163658	2.7 km NNW of Williamstown		sandy plain	loamy sand	woodland
24	117BAR00601	07-Jan-00	304432	6161818	2.4 km WNW of Williamstown, (SA Water land)		sandy plain	sand	low woodland
24	117BAR00801	07-Jan-00	313972	6157708	8.0 km ESE of Williamstown, (Jenkins Scrub (Forestry SA))		hill slope	loamy sand	low woodland
24	117BAR02101	26-Oct-00	307812	6171398	2.5 km NNE of Lyndoch	236	plain (incl undulating plain)	sandy loam	low woodland
24	117BAR02201	23-Oct-00	303622	6168678	3.0 km WSW of Lyndoch, (Sandy Creek CP)	210	plain (incl undulating plain)	clayey sand	low open forest
24	117BAR02301	25-Oct-00	302772	6162448	4.2 km WNW of Williamstown, (Barossa Reservoir (SA Water))	285	hill slope	sandy loam	low woodland
24	117BAR02401	26-Oct-00	301772	6161868	5.0 km WNW of Williamstown, (Para Wirra RP)	303	hill slope	clay loam	open mallee
24	117NOA02101	07-Dec-00	280262	6108918	Onkaparinga NP	285	hill slope	sandy clay loam	very low woodland
24	117NOA02301	06-Dec-00	280692	6105758	Onkaparinga NP	190	hill crest	sandy loam	low woodland
24	5ML175	28-Apr-86	301312	6161858	5.5 km WNW of Williamstown, (Para Wirra RP.)	240			
24	5ML176	28-Apr-86	300442	6162888	6.5 km WNW of Williamstown, (Para Wirra RP.)	250			
24	5ML177	28-Apr-86	301172	6163978	6.2 km WNW of Williamstown	240			
24	5ML224	05-Apr-86	303642	6168658	3.0 km WSW of Lyndoch, (SandyCreek CP)	210			
24	5ML226	05-May-86	303472	6168098	3.3 km WSW of Lyndoch, (SandyCreek CP)	210			
24	5ML285	09-May-86	288172	6110408	2.5 km NNE of Kangarilla	260			
24	5ML320	05-May-86	302862	6168368	3.8 km WSW of Lyndoch, (SandyCreek CP)	200			
24	5ML322	05-May-86	304562	6169828	2.1 km WNW of Lyndoch	185			
24	5ML328	07-May-86	304672	6159908	2.5 km WSW of Williamstown	270			
24	5ML329	07-May-86	304512	6160538	2.4 km WSW of Williamstown	270			
24	5ML330	07-May-86	305382	6160948	1.4 km WSW of Williamstown	280			
24	5ML333	08-May-86	303432	6161528	3.3 km WNW of Williamstown, (Barossa Reservoir)	260			
24	5ML334	08-May-86	302672	6162218	4.2 km WNW of Williamstown, (Barossa Reservoir)	270			
24	5ML335	08-May-86	302372	6163358	4.9 km WNW of Williamstown, (Barossa Reservoir)	230			
24	5ML336	08-May-86	302322	6164508	5.5 km WNW of Williamstown, (2 km. W. of Cudlee Creek.)	220			
24	5ML337	08-May-86	304802	6161578	2.0 km WNW of Williamstown	260			
24	5ML342	09-May-86	309482	6173128	4.9 km NNE of Lyndoch	245			
24	5ML343	09-May-86	307982	6170798	2.1 km NNE of Lyndoch	230			
24	5ML50	11-Apr-86	290722	6135728	2.0 km ESE of Rostrevor, (Rocky Hill Morialta CP)	425			
24	5ML51	11-Apr-86	290822	6134928	2.5 km ESE of Rostrevor, (Morialta CP)	350			
24	5ML8	08-Apr-86	301692	6161858	5.1 km WNW of Williamstown, (Para Wirra RP.)	280			
25	117ADE00301	20-Dec-99	292412	6138668	4.1 km ENE of Rostrevor, (Black Hill CP)		hill slope	loam	low woodland
25	117ADE01401	31-Oct-00	292732	6143128	2.8 km SSE of Tea Tree Gully, (Anstey Hill RP)	326	hill slope	loamy sand	open mallee
25	117ONK00301	22-Dec-99	309532	6142128	3.8 km ESE of Gumeracha		hill crest	silt loam	low open forest
25	117ONK00501	23-Dec-99	295102	6138458	6.5 km ENE of Rostrevor		hill slope	silt loam	woodland
25	42PC894	15-Oct-88	292772	6143178	2.8 km SSE of Tea Tree Gully	300			

Floristic Group	Site Code #	Visit Date	Easting	Northing	Location	Altitude (m)	Landform	Soil Texture	Structural Formation
25	42PC895	15-Jan-88	292897	6143428	2.6 km SSE of Tea Tree Gully	380			
25	42PC896	16-Jan-88	293597	6146278	2.4 km ENE of Tea Tree Gully	310			
25	42PC903	02-Jan-88	294797	6147778	4.1 km ENE of Tea Tree Gully	350			
25	42PC904	02-Jan-88	294872	6147903	4.3 km ENE of Tea Tree Gully	330			
25	42PC905	07-Feb-88	294522	6143253	3.9 km ESE of Tea Tree Gully	410			
25	42PC906	09-Feb-88	294547	6143403	3.9 km ESE of Tea Tree Gully	400			
25	42PC907	11-Feb-88	293197	6142263	3.8 km SSE of Tea Tree Gully	300			
25	42PC915	01-Mar-88	293347	6146478	2.2 km ENE of Tea Tree Gully	270			
25	42PC916	01-Mar-88	294772	6143403	4.1 km SE of Tea Tree Gully	380			
25	5ML3	07-Apr-86	291222	6134478	3.1 km ESE of Rostrevor, (Morialta CP)	390			
25	5ML344	12-May-86	292692	6143008	2.9 km SSE of Tea Tree Gully	350			
25	5ML346	12-May-86	293772	6143238	3.4 km SSE of Tea Tree Gully	350			
25	5ML348	12-May-86	294002	6146868	3.0 km ENE of Tea Tree Gully	350			
25	5ML349	12-May-86	293552	6145498	2.2 km ESE of Tea Tree Gully	360			
25	5ML351	12-May-86	294402	6146778	3.3 km ENE of Tea Tree Gully	350			
25	5ML61	11-Apr-86	294722	6135578	5.9 km ESE of Rostrevor	380			
26	117YAN00901	04-Dec-00	268622	6091088	Aldinga Scrub CP	40	dune/consolidated dune	loamy sand	low woodland
26	42PC1020	27-Aug-88	299762	6079798	3.7 km SSW of Finniss	38			
26	42PC782	01-May-87	256702	6074408	0.4 km NNE of Normanville	20			
26	42PC783	01-May-87	258972	6073848	1.0 km NNW of Yankalilla	120			
26	42PC784	01-May-87	258792	6073778	1.0 km NNW of Yankalilla	130			
26	42PC811	04-Jul-87	281642	6104428	1.5 km SSE of Blewitt Springs	115			
26	42PC812	04-Jul-87	281372	6104383	1.5 km SSE of Blewitt Springs	112			
26	42PC813	04-Jul-87	281162	6103978	1.9 km SSW of Blewitt Springs	110			
26	42PC814	04-Jul-87	279972	6105028	1.5 km WSW of Blewitt Springs	165			
26	5ML199	24-Apr-86	269172	6091528	2.0 km NNE of Silver Sands, (Aldinga Scrub.)	28			
26	5ML200	24-Apr-86	268522	6091128	1.3 km NNE of Silver Sands, (Aldinga Scrub.)	24			
26	5ML216	30-Apr-86	278922	6102378	3.5 km ENE of Mclaren Vale	115			
26	5ML217	30-Apr-86	279572	6103128	3.2 km SSW of Blewitt Springs, (Manning Flora And Fauna Reserve)	110			
26	5ML218	30-Apr-86	279422	6103578	2.9 km SSW of Blewitt Springs, (Manning Flora And Fauna Reserve)	149			
26	5ML219	30-Apr-86	280622	6105878	0.6 km WNW of Blewitt Springs	170			
26	5ML220	30-Apr-86	280222	6105328	1.1 km WSW of Blewitt Springs	150			
26	5ML776	18-May-87	268232	6091218	1.4 km NNE of Silver Sands	12			
26	5ML777	18-May-87	268282	6091418	1.6 km NNE of Silver Sands	10			
26	5ML778	18-May-87	268297	6091628	1.8 km NNE of Silver Sands	12			
26	5ML779	18-May-87	268372	6091608	1.8 km NNE of Silver Sands	19			
27	42PC862	15-Oct-87	272382	6061368	4.7 km WNW of Waitpinga	190			
27	42PC865	28-Oct-87	299302	6086748	5.0 km NNW of Finniss	115			
27	42PC870	29-Oct-87	271802	6061518	5.3 km WNW of Waitpinga	200			
27	42PC872	29-Oct-87	272832	6062068	4.9 km NNW of Waitpinga	190			
27	42PC892	08-Jan-88	268842	6063178	8.7 km WNW of Waitpinga	250			
27	42PC980	14-May-88	299672	6089988	4.1 km SSE of Ashbourne	195			
27	42PC981	14-May-88	300062	6089638	4.6 km SSE of Ashbourne	160			
27	52CAP0101	18-Dec-93	249372	6051478	9.7 km SSE of Delamere, (Deep Creek CP)	150	hill slope	medium clay	shrubland
27	5ML205	24-Apr-86	288522	6084678	1.9 km WSW of Nangkita	240			
27	5ML428	02-May-86	294972	6078328	3.2 km NNE of Currency Creek, (Scott CP)	110			
27	5ML456	21-May-86	270672	6078028	1.8 km WSW of Myponga Hill, (YULTE CP)	330			
27	5ML477	16-May-86	267422	6073878	7.2 km SSW of Myponga, (Myponga CP)	250			
27	5ML479	16-May-86	267422	6073628	7.5 km SSW of Myponga, (Myponga CP)	320			
27	5ML601	02-Jun-86	243872	6051078	10.1 km SSW of Delamere, (0.5 km. SE. Cobblers Hill Deep Creek CP)	255			
27	5ML608	03-Jun-86	245372	6050978	9.9 km SSW of Delamere, (2.5 km. SW. Tent Hill Deep Creek CP)	247			
27	5ML609	03-Jun-86	245622	6051028	9.8 km SSW of Delamere, (2.5 km. SW. Tent Hill Deep Creek CP)	235			

Floristic Group	Site Code #	Visit Date	Easting	Northing	Location	Altitude (m)	Landform	Soil Texture	Structural Formation
27	5ML612	03-Jun-86	245872	6051328	9.5 km SSW of Delamere, (2 km. SW. Tent Hill Deep Creek CP)	245			
27	5ML614	03-Jun-86	252422	6053378	9.3 km SSE of Delamere, (1.5 km. SE. Tapanappa Hill Deep Creek CP)	210			
27	5ML737	18-Feb-87	248072	6050678	10.2 km SSE of Delamere	190			
27	5ML868	12-Dec-91	271522	6061988	5.8 km WNW of Waitpinga	130			
27	5ML869	13-Dec-91	271462	6061568	5.6 km WNW of Waitpinga	190			
28	117ENC00201	11-Nov-99	277262	6066078	5.0 km WSW of Hindmarsh Valley		hill footslope	loamy sand	low open forest
28	117JER00501	08-Nov-99	245142	6052748	8.2 km SSW of Delamere		hill slope	clay loam	woodland
28	117TOR00101	16-Nov-99	255702	6066798	4.6 km SSE of Lady Bay		hill slope	sandy loam	low woodland
28	117TOR00201	11-Nov-99	263942	6063988	10.1 km SSE of Yankalilla		hill slope	loam	open forest
28	117TOR01001	09-Nov-99	257272	6054718	12.1 km ESE of Delamere		hill slope	sandy clay loam	low woodland
28	117WIL00601	12-Nov-99	287232	6083788	3.4 km WSW of Nangkita		hill slope	clay loam	open mallee
28	117WIL01001	18-Nov-99	279512	6079208	3.8 km NNE of Spring Mount		hill slope	loam	low woodland
28	117WIL01301	12-Nov-99	285322	6073158	5.9 km NNE of Hindmarsh Valley		hill slope	loam	low open forest
28	117WIL01401	12-Nov-99	287342	6073668	6.1 km WSW of Currency Creek		hill slope	light clay	low open forest
28	117WIL01601	17-Nov-99	274802	6070408	6.3 km SSW of Spring Mount		hill slope	clay loam	low woodland
28	117WIL01801	01-Mar-00	289862	6095198	7.5 km WNW of Ashbourne, (Kyeema CP)		hill slope	sandy clay loam	low open forest
28	117YAN00201	23-Nov-99	268040	6077460	3.7 km SSW of Myponga		hill slope	clay loam	low woodland
28	117YAN00401	23-Nov-99	269722	6073248	7.5 km SSW of Myponga		hill slope	clay loam	low open forest
28	117YAN00601	17-Nov-99	272382	6073088	5.7 km WSW of Spring Mount		hill slope	light medium clay	low woodland
28	42PC1004	25-Jun-88	301022	6106818	2.2 km WNW of Macclesfield	380			
28	42PC1011	13-Aug-88	272852	6059028	3.2 km WNW of Waitpinga	165			
28	42PC1014	13-Aug-88	272872	6059718	3.4 km WNW of Waitpinga	165			
28	42PC1032	21-Oct-88	294102	6089528	4.7 km SSW of Ashbourne	190			
28	42PC1033	21-Oct-88	293822	6089578	4.9 km WSW of Ashbourne	205			
28	42PC1035	21-Oct-88	293612	6089288	5.0 km ENE of Nangkita	170			
28	42PC1036	21-Oct-88	294202	6088908	5.2 km SSW of Ashbourne	160			
28	42PC1066	02-Feb-90	274952	6076198	2.2 km WNW of Spring Mount	320			
28	42PC1077	07-Apr-90	279742	6073838	3.6 km SSE of Spring Mount	250			
28	42PC1081	07-Apr-90	279422	6073478	3.6 km SSE of Spring Mount	270			
28	42PC1094	02-Mar-91	283812	6073018	5.0 km NNE of Hindmarsh Valley	270			
28	42PC788	03-May-87	280802	6075258	3.8 km ESE of Spring Mount	240			
28	42PC790	06-Jun-87	279702	6058918	3.7 km ENE of Waitpinga	130			
28	42PC791	06-Jun-87	279762	6058908	3.8 km ENE of Waitpinga	135			
28	42PC795	06-Jun-87	270402	6060028	5.9 km WNW of Waitpinga	210			
28	42PC833	19-Sep-87	286532	6073278	6.8 km ENE of Hindmarsh Valley	260			
28	42PC860	15-Oct-87	273462	6062398	4.8 km NNW of Waitpinga	170			
28	42PC861	15-Oct-87	273642	6062348	4.7 km NNW of Waitpinga	200			
28	42PC863	15-Oct-87	272252	6061228	4.7 km WNW of Waitpinga	195			
28	42PC883	11-Dec-87	281942	6091438	3.7 km WNW of Yundi	335			
28	42PC887	08-Jan-88	279482	6062708	5.0 km WSW of Victor Harbor	130			
28	42PC888	08-Jan-88	279062	6062948	5.4 km W of Victor Harbor	130			
28	42PC889	08-Jan-88	269102	6064718	9.4 km NNW of Waitpinga	174			
28	42PC944	04-Mar-88	257702	6067968	4.5 km SSE of Lady Bay	120			
28	42PC945	04-Mar-88	256922	6067178	4.7 km SSE of Lady Bay	200			
28	42PC948	19-Mar-88	280042	6060118	4.4 km ENE of Waitpinga	150			
28	42PC949	19-Mar-88	278762	6059728	3.1 km ENE of Waitpinga	110			
28	42PC963	02-Apr-88	272262	6068698	9.0 km SSW of Spring Mount	120			
28	42PC964	02-Apr-88	272382	6068658	8.9 km SSW of Spring Mount	115			
28	42PC968	15-Apr-88	279922	6081288	5.8 km NNE of Spring Mount	370			
28	5ML212	28-Apr-86	291072	6088678	2.9 km NNE of Nangkita, (Finniss River)	190			
28	5ML408	05-May-86	282222	6074378	5.4 km ESE of Spring Mount, (1 km. N. of Mount Billy Hindmarsh Valley)	260			
28	5ML411	05-May-86	281972	6074028	5.3 km ESE of Spring Mount, (Mount Billy Hindmarsh Valley Reservoir)	250			
28	5ML417	08-May-86	281972	6072928	4.5 km NNE of Hindmarsh Valley, (Mount Billy Hindmarsh Valley Reservoir)	110			
28	5ML422	09-May-86	294122	6086078	3.3 km NNE of Tooperang,	130			

Floristic Group	Site Code #	Visit Date	Easting	Northing	Location	Altitude (m)	Landform	Soil Texture	Structural Formation
					(Spring Mount CP)				
28	5ML442	07-May-86	281722	6073678	5.2 km NNE of Hindmarsh Valley, (Mount Billy Hindmarsh Valley Reservoir)	210			
28	5ML454	21-May-86	266572	6076728	1.5 km. due W. of West Scrub Hill S. of Myponga	250			
28	5ML458	12-May-86	275872	6071478	4.9 km SSW of Spring Mount, (Strangways Hill E. of Inman Valley.)	230			
28	5ML472	16-May-86	269172	6077728	3.1 km SSW of Myponga	290			
28	5ML482	23-May-86	271772	6070228	5 km. from Inman Valley on THE Victor Harbor Road	170			
28	5ML483	23-May-86	271872	6070528	5 km. from Inman Valley on THE Victor Harbor Road	190			
28	5ML484	23-May-86	272422	6070178	5 km. from Inman Valley on THE Victor Harbor Road	100			
28	5ML591	15-May-86	284892	6114023	2 km. NE. of Clarendon	262			
28	5ML703	28-May-86	309982	6154488	2.5 km. S. of Warren Reservoir	500			
28	5ML738	18-Feb-87	248922	6052128	8.9 km SSE of Delamere	200			
28	5ML739	20-Feb-87	240822	6056478	7.4 km WSW of Delamere	290			
28	5ML741	20-Feb-87	261272	6062928	10.3 km SSE of Yankalilla	150			
28	5ML747	23-Feb-87	268022	6064678	10.2 km WNW of Waitpinga	280			
28	5ML759	20-Mar-87	253522	6053528	9.9 km SSE of Delamere	200			
28	5ML764	20-Apr-87	279672	6058828	3.7 km ENE of Waitpinga	130			
28	97ENC00201	29-Aug-98	279421	6058623	3.4 km ENE of Waitpinga	120	plain (incl undulating plain)	clayey sand	low open forest
28	97ENC00301	28-Aug-98	279947	6058946	4.0 km ENE of Waitpinga	140	hill footslope	sand	very low open forest
28	97ENC00401	28-Aug-98	280042	6060087	4.4 km ENE of Waitpinga	150	hill slope	clay loam	very low open forest
28	97ENC00501	28-Aug-98	280019	6059422	4.1 km ENE of Waitpinga	170	hill crest	sand	very low closed forest
28	97TOR01101	29-Aug-98	272276	6068700	9.0 km SSW of Spring Mount	120	hill footslope	loamy sand	open forest
29	117ECH00201	13-Dec-99	301932	6106618	1.3 km WNW of Macclesfield		hill slope	loam	woodland
29	117JER00301	08-Nov-99	240942	6054178	8.8 km SW of Delamere		hill slope	clay loam	mallee
29	117WIL00301	19-Nov-99	289872	6089698	3.7 km NNE of Nangkita, (Finniss CP)		hill slope	clay loam	woodland
29	117WIL00401	19-Nov-99	290052	6088548	2.5 km NNE of Nangkita		hill slope	sandy clay loam	woodland
29	117WIL00501	25-Nov-99	289822	6083838	2.2 km SSW of Nangkita		hill slope	loamy sand	low open woodland
29	117WIL00801	13-Dec-99	291992	6080628	2.5 km SSW of Tooperang		hill footslope	clay loam	low woodland
29	117WIL02101	29-Feb-00	289872	6089698	3.7 km NNE of Nangkita, (Finniss CP)		hill slope	sandy clay loam	low woodland
29	117YAN00801	25-Nov-99	257152	6068668	3.7 km SSE of Lady Bay		hill footslope	loamy sand	woodland
29	42PC1013	13-Aug-88	272532	6059718	3.8 km WNW of Waitpinga	150			
29	42PC1015	13-Aug-88	273362	6058258	2.7 km WNW of Waitpinga	130			
29	42PC1028	01-Oct-88	253802	6064638	6.3 km ESE of Second Valley	290			
29	42PC815	04-Jul-87	280427	6104728	1.4 km SSW of Blewitt Springs	160			
29	42PC839	03-Oct-87	307582	6104348	4.9 km ESE of Macclesfield	280			
29	42PC847	03-Jan-88	298572	6151153	2.5 km NNW of Mount Gawler	340			
29	42PC970	30-Apr-88	295442	6086078	4.0 km NE of Tooperang	140			
29	42PC971	30-Apr-88	295419	6085438	3.6 km ENE of Tooperang	230			
29	42PC972	30-Apr-88	295292	6085608	3.6 km ENE of Tooperang	185			
29	42PC973	30-Apr-88	295162	6085708	3.6 km NE of Tooperang	200			
29	42PC992	11-Jun-88	244032	6061018	2.7 km WNW of Delamere	210			
29	42PC993	11-Jun-88	244062	6061458	2.8 km WNW of Delamere	190			
29	42PC994	11-Jun-88	244032	6061808	2.9 km WNW of Delamere	240			
29	52TOR0101	30-Oct-93	253572	6052928	10.4 km SSE of Delamere, (Deep Creek CP)	50	hill slope	sandy loam	shrubland
29	5ML485	02-Jun-86	244872	6051478	1 km E. of Cobblers Hill Deep Creek CP	170			
29	5ML489	02-Jun-86	244572	6051728	0.5 km. NE. of MT. Cone S. of Mount COMPASS	230			
29	5ML602	02-Jun-86	243872	6050528	1 km. S. Cobblers Hill Deep Creek CP	120			
29	5ML603	02-Jun-86	243672	6050178	1.5 km. S. Cobblers Hill Deep Creek CP	90			

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29	5ML604	02-Jun-86	243572	6050678	1 km. S. Cobblers Hill Deep Creek CP	130			
29	5ML628	05-Jun-86	257622	6066678	5.5 km SSE of Lady Bay	265			
29	5ML749	23-Feb-87	273472	6057078	2.9 km WSW of Waitpinga	60			
29	97JER00101	08-Jul-98	240585	6053910	9.3 km SW of Delamere	250	hill slope	sandy loam	very low woodland
30	42PC1008	08-Jul-88	303672	6083328	1.6 km ENE of Finniss	35			
30	42PC1016	27-Aug-88	298562	6076718	5.6 km ENE of Currency Creek	30			
30	42PC1017	27-Aug-88	298912	6077108	6.0 km ENE of Currency Creek	30			
30	42PC1018	27-Aug-88	299342	6077608	5.8 km SSW of Finniss	35			
30	42PC1019	27-Aug-88	300362	6080511	2.8 km SSW of Finniss	40			
30	42PC822	05-Sep-87	301982	6082818	0.3 km NNW of Finniss	40			
30	42PC850	08-Aug-87	307122	6086328	6.2 km ENE of Finniss	40			
30	42PC855	22-Aug-87	306542	6087708	6.7 km NNE of Finniss	40			
30	42PC856	22-Aug-87	305572	6085518	4.5 km ENE of Finniss	40			
30	42PC857	22-Aug-87	305772	6085758	4.8 km ENE of Finniss	40			
30	42PC976	14-May-88	300262	6092018	3.3 km ESE of Ashbourne	160			
30	5ML427	02-May-86	294872	6078678	3.4 km NNE of Currency Creek, (Scott CP)	95			
30	5ML432	02-May-86	294072	6077778	2.2 km NNE of Currency Creek, (Scott CP)	80			
30	5ML433	01-May-86	294572	6079428	3.9 km NNE of Currency Creek, (Scott CP)	85			
30	5ML734	18-Feb-87	237872	6055728	10.2 km WSW of Delamere	80			
30	5ML75	11-Apr-86	298102	6089778	3.5 km SSE of Ashbourne, (Haines Road)	145			
31	42PC792	06-Jun-87	272082	6054098	5.8 km WSW of Waitpinga	30			
31	42PC821	29-Aug-87	276182	6053588	1.4 km SSE of Ridgeway Hill	110			
31	42PC864	21-Oct-87	277312	6054488	1.4 km ESE of Ridgeway Hill	100			
32	42PC890	08-Jan-88	269232	6065038	9.5 km NNW of Waitpinga	130			
32	42PC982	14-May-88	300932	6089068	5.6 km SSE of Ashbourne	95			
32	42PC983	14-May-88	300832	6089548	5.2 km SSE of Ashbourne	110			
32	42PC984	14-May-88	297992	6090178	3.1 km SSE of Ashbourne	120			
33	5ML358	15-May-86	293492	6140048	5.8 km ENE of Rostrevor, (Torrens Gorge)	180			
34	42PC820	22-Aug-87	314652	6093918	5.5 km SSW of Bletchley	45			
34	42PC854	22-Aug-87	308032	6089838	6.3 km SSW of Strathalbyn	45			
35	42PC851	22-Aug-87	309142	6095398	1.1 km ESE of Strathalbyn	70			
35	42PC852	22-Aug-87	308957	6095268	1.1 km SSE of Strathalbyn	70			
36	117TOR01801	29-Feb-00	271332	6054048	6.4 km WSW of Waitpinga, (Newland Head CP)		dune slope	sand	shrubland
36	42PC1049	03-Feb-89	285142	6064078	1.1 km NNE of Victor Harbor	0			
36	42PC769	22-Apr-87	272522	6054248	3.5 km WSW of Ridgeway Hill	35			
36	42PC770	22-Apr-87	273842	6054268	2.2 km WSW of Ridgeway Hill	60			
36	42PC772	22-Apr-87	275382	6054568	0.7 km WSW of Ridgeway Hill	115			
36	42PC780	01-May-87	255872	6074438	0.8 km WNW of Normanville	7			
36	42PC781	01-May-87	256222	6075238	1.2 km NNW of Normanville	9			
36	42PC785	01-May-87	255532	6073668	1.1 km WSW of Normanville	5			
36	42PC786	01-May-87	255432	6073728	1.2 km WSW of Normanville	8			
36	42PC787	01-May-87	255382	6073768	1.2 km WSW of Normanville	8			
36	42PC794	06-Jun-87	271282	6054128	6.3 km WSW of Waitpinga	30			
36	42PC950	19-Mar-88	282862	6058578	4.9 km SSW of Victor Harbor	170			
36	42PC958	19-Mar-88	287262	6064808	2.9 km WSW of Port Elliot	5			
36	5ML735	18-Feb-87	237872	6053078	11.8 km WSW of Delamere	10			
36	5ML736	18-Feb-87	238022	6053078	11.7 km WSW of Delamere	5			
37	117ADE01201	03-May-01	288870	6127672	4.2 km WSW of Summertown, (Cleland CP)	380	stream channel	silty clay loam	tall shrubland
37	117ADE02101	30-Nov-00	291312	6126968	Eurilla Cons Park	608	gully	sand	tall shrubland
37	42PC1053	15-Apr-89	253692	6060538	6.9 km ESE of Delamere	320			
37	42PC1064	02-Feb-90	276772	6076348	0.4 km WNW of Spring Mount	340			
37	42PC1074	30-Mar-90	278592	6072778	3.8 km SSE of Spring Mount	290			
37	42PC1076	30-Mar-90	279042	6073988	3.0 km SSE of Spring Mount	290			
37	42PC1080	07-Apr-90	279152	6073678	3.3 km SSE of Spring Mount	290			
37	42PC1082	27-Apr-90	257422	6063578	8.2 km SSE of Lady Bay	250			
37	42PC1087	11-Jun-90	278742	6073868	2.9 km SSE of Spring Mount	320			
37	42PC875	31-Oct-87	260072	6063498	9.5 km SSE of Lady Bay	250			
37	42PC939	19-Feb-88	280352	6082978	4.5 km WSW of Mount Compass	335			
37	42PC961	02-Apr-88	271672	6071778	7.0 km WSW of Spring Mount	150			
37	52MIL00202	08-Dec-96	300592	6078348	4.6 km SSW of Finniss	10	swamp	loam	closed sedgeland
37	52MIL00203	08-Dec-96	301202	6077498	5.2 km SSW of Finniss	10	swamp	sandy loam	closed sedgeland

Floristic Group	Site Code #	Visit Date	Easting	Northing	Location	Altitude (m)	Landform	Soil Texture	Structural Formation
37	52MIL0201	18-Oct-93	300522	6078278	4.6 km SSW of Finniss	10	swamp	sand	
37	5ML268	07-May-86	293052	6110408	6.5 km ENE of Kangarilla	254			
37	5ML274	08-May-86	293276	6113853	5.9 km WNW of Echunga	320			
37	5ML277	08-May-86	292642	6114698	6.1 km SSW of Mylor	260			
38	42PC1025	01-Oct-88	253542	6063588	6.4 km ESE of Second Valley	310			
38	42PC1039	26-Oct-88	249172	6057288	4.3 km SSE of Delamere	265			
38	42PC1052	15-Apr-89	253562	6060608	6.8 km ESE of Delamere	310			
38	42PC1055	15-Apr-89	253172	6060778	6.4 km ESE of Delamere	290			
38	42PC789	03-May-87	280512	6075518	3.5 km ESE of Spring Mount	200			
38	52MIL0101	05-Oct-93	298442	6079678	4.8 km WSW of Finniss	40	plain (incl undulating plain)	loam	low shrubland
38	52TOR0301	19-Oct-93	252322	6058978	5.8 km ESE of Delamere, (Second Valley Forest Reserve)	290	plain (incl undulating plain)	loam	tall shrubland
38	5ML493	22-May-86	278722	6080578	4.6 km NNE of Spring Mount, (0.5 km. NE. of Mt. Cone S. of Mount Compass)	360			
38	5ML620	04-Jun-86	249672	6055728	5.9 km SSE of Delamere	250			
38	5ML632	05-Jun-86	260722	6057278	14.4 km ESE of Delamere, (Gold Diggings Swamp)	210			
39	42PC1093	02-Mar-91	284072	6072858	5.0 km NNE of Hindmarsh Valley	190			
39	42PC1098	02-Apr-91	258022	6059328	11.3 km ESE of Delamere	290			
39	42PC932	25-Jan-88	277392	6083108	6.9 km NNE of Spring Mount	260			
39	52TOR01101	07-Dec-96	258522	6062358	9.7 km SSE of Lady Bay	320	swamp	loam	sedgeland
39	52WIL01901	08-Dec-96	290582	6085358	1.0 km ESE of Nangkita	130	stream channel	loam	closed sedgeland
39	52WIL1801	11-Mar-94	290822	6084878	1.5 km SSE of Nangkita	130	plain (incl undulating plain)	clay loam	closed sedgeland
40	117TOR00402	10-Nov-99	263212	6060248	13.0 km WNW of Waitpinga		swamp	peat	tall shrubland
40	117TOR00602	10-Nov-99	255732	6057198	9.7 km ESE of Delamere		hill footslope	clay loam	low open woodland
40	42PC1044	20-Jan-89	265172	6059488	10.9 km WNW of Waitpinga	270			
40	42PC1045	20-Jan-89	265202	6061478	11.3 km WNW of Waitpinga	250			
40	42PC1047	03-Feb-89	287162	6086858	2.8 km WNW of Nangkita	180			
40	42PC1050	03-Mar-89	287412	6086538	2.5 km WNW of Nangkita	170			
40	42PC1051	03-Mar-89	276662	6078288	2.1 km NNW of Spring Mount	250			
40	42PC1063	02-Feb-90	274622	6076278	2.5 km WNW of Spring Mount	330			
40	42PC1067	10-Feb-90	274272	6075558	2.9 km WSW of Spring Mount	350			
40	42PC1089	23-Jun-90	278122	6079858	3.7 km NNE of Spring Mount	350			
40	42PC1090	10-Feb-91	283072	6075528	6.0 km ESE of Spring Mount	260			
40	42PC1091	10-Feb-91	283572	6075328	6.5 km ESE of Spring Mount	260			
40	42PC1092	10-Feb-91	284122	6075178	7.1 km ESE of Spring Mount	250			
40	42PC796	06-Jun-87	270352	6060028	5.9 km WNW of Waitpinga	205			
40	42PC876	31-Oct-87	260682	6063038	10.1 km SSE of Yankalilla	250			
40	42PC885	11-Dec-87	283352	6089398	1.6 km WNW of Yundi	268			
40	42PC886	11-Dec-87	282872	6086558	1.1 km WNW of Mount Compass	250			
40	42PC928	23-Jan-88	284502	6083338	2.7 km SSE of Mount Compass	225			
40	42PC929	23-Jan-87	284682	6083308	2.7 km SSE of Mount Compass	225			
40	42PC930	23-Jan-88	284322	6083068	2.9 km SSE of Mount Compass	230			
40	42PC931	25-Jan-88	277342	6083158	6.9 km NNE of Spring Mount	260			
40	42PC933	25-Jan-88	277432	6083218	6.9 km WSW of Mount Compass	260			
40	42PC934	05-Feb-88	283802	6085288	0.6 km SSE of Mount Compass	230			
40	42PC938	05-Feb-88	283812	6085348	0.5 km SSE of Mount Compass	230			
40	42PC943	19-Feb-88	277272	6083518	6.9 km WSW of Mount Compass	260			
40	42PC962	02-Apr-88	271572	6071858	7.1 km WSW of Spring Mount	150			
40	42PC967	15-Apr-88	280702	6080848	5.8 km NNE of Spring Mount	370			
40	52TOR00502	07-Dec-96	257062	6059228	10.4 km ESE of Delamere	322	swamp	loam	closed sedgeland
40	52TOR01001	07-Dec-96	270442	6059798	5.8 km WNW of Waitpinga	220	perched swamp	loam	tall shrubland
40	52TOR0201	06-Oct-93	252072	6056048	7.1 km SSE of Delamere, (Deep Creek CP - NPWS)	280	swamp	sandy loam	shrubland
40	52TOR0501	06-Oct-93	257022	6059268	10.4 km ESE of Delamere,	300	swamp	clay loam	open shrubland
40	52TOR0601	06-Oct-93	261792	6060048	13.2 km SSE of Yankalilla	280	perched swamp	loam	tall shrubland
40	52TOR0701	19-Oct-93	265322	6061478	11.1 km WNW of Waitpinga	250	swamp	loam	tall open shrubland
40	52TOR0801	30-Oct-93	259542	6063478	9.2 km SSE of Lady Bay	280	perched swamp	loam	shrubland

Floristic Group	Site Code #	Visit Date	Easting	Northing	Location	Altitude (m)	Landform	Soil Texture	Structural Formation
40	52TOR0802	30-Oct-93	260722	6063018	10.1 km SSE of Yankalilla	260	perched swamp	loam	shrubland
40	52TOR0901	18-Dec-93	253922	6057178	8.0 km ESE of Delamere	270	perched swamp	loam	shrubland
40	52TOR0902	18-Dec-93	253472	6057248	7.6 km ESE of Delamere	270	perched swamp	sandy loam	tall shrubland
40	52WIL00802	08-Dec-96	292682	6085288	2.2 km NNE of Tooperang	120	swamp	loam	sedgeland
40	52WIL00902	08-Dec-96	293402	6084838	1.9 km NNE of Tooperang	110	swamp	loam	shrubland
40	52WIL0101	03-Dec-93	273022	6083628	4.4 km ENE of Myponga	240	perched swamp	clay loam	open shrubland
40	52WIL01202	08-Dec-96	285692	6087318	2.1 km SSE of Yundi	240	perched swamp	loam	shrubland
40	52WIL02001	08-Dec-96	293992	6084028	1.6 km ENE of Tooperang	100	swamp	loam	open shrubland
40	52WIL0201	03-Dec-93	277022	6083378	7.1 km NNE of Spring Mount	260	swamp	loam	tall open shrubland
40	52WIL0202	03-Dec-93	277422	6083478	6.8 km WSW of Mount Compass	260	swamp	sandy loam	shrubland
40	52WIL0203	03-Dec-93	277372	6083378	6.8 km WSW of Mount Compass	260	swamp	loam	low shrubland
40	52WIL0301	12-Oct-93	283722	6085278	0.6 km SSW of Mount Compass, (Education Department-Mt Compass School)	230	swamp	loam	shrubland
40	52WIL0401	12-Oct-93	284322	6083178	2.8 km SSE of Mount Compass	240	swamp	loam	shrubland
40	52WIL0402	12-Oct-93	284522	6083078	2.9 km SSE of Mount Compass	240	swamp	loam	tall closed shrubland
40	52WIL0403	12-Oct-93	284872	6083128	3.0 km SSE of Mount Compass	240	swamp	loam	shrubland
40	52WIL0501	04-Dec-93	287272	6086578	2.6 km WNW of Nangkita	170	swamp	clay loam	tall open shrubland
40	52WIL0601	04-Dec-93	287372	6085678	2.5 km WSW of Nangkita	180	swamp	sandy loam	open shrubland
40	52WIL0701	18-Oct-93	292772	6085528	2.5 km NNE of Tooperang	120	swamp	clay loam	very low open woodland
40	52WIL0801	05-Oct-93	293142	6085278	2.3 km NNE of Tooperang	120	swamp	sandy loam	tall shrubland
40	52WIL0901	04-Dec-93	293422	6084878	1.9 km NNE of Tooperang	110	swamp	loam	tall open shrubland
40	52WIL1001	18-Oct-93	294072	6083778	1.5 km ENE of Tooperang, (former WR 35)	100	swamp	loam	very low open woodland
40	52WIL1201	02-Dec-93	285672	6087378	2.0 km SSE of Yundi	240	perched swamp	sandy loam	shrubland
40	52WIL1301	31-Dec-93	285172	6089578	0.4 km NNE of Yundi	250	perched swamp	loam	low shrubland
40	52WIL1401	31-Dec-93	287172	6082528	4.4 km SSW of Nangkita	200	perched swamp	loam	sedgeland
40	52WIL1501	03-Jan-94	293772	6084418	1.7 km NNE of Tooperang	100	perched swamp	loam	open shrubland
40	52WIL1601	03-Jan-94	294952	6082178	2.3 km ESE of Tooperang	80	perched swamp	loam	sedgeland
40	52WIL1701	11-Mar-94	284822	6085578	1.1 km ESE of Mount Compass	220	perched swamp	loam	low very open shrubland
40	52YAN0101	02-Dec-93	272722	6077028	1.5 km SSE of Myponga Hill	470	swamp	clay loam	tall shrubland
40	52YAN0102	02-Dec-93	272972	6076928	1.6 km SSE of Myponga Hill	380	perched	clay loam	closed shrubland
41	117TOR01501	24-Feb-00	257472	6058598	10.9 km ESE of Delamere, (Martins Reserve (Forestry SA))		swamp	sandy loam	tall closed shrubland
41	42PC1042	09-Dec-88	271812	6060738	4.8 km WNW of Waitpinga	200			
41	42PC1097	02-Apr-91	257372	6059248	10.7 km ESE of Delamere	300			
41	42PC1099	02-Apr-91	258492	6059328	11.8 km ESE of Delamere	310			
41	42PC1100	02-Apr-91	257472	6058678	10.9 km ESE of Delamere	290			
41	42PC828	19-Sep-87	284812	6080148	5.8 km SSE of Mount Compass	300			
41	42PC831	19-Sep-87	287292	6077388	5.9 km WNW of Currency Creek	240			
41	42PC975	30-Apr-88	294222	6086378	3.6 km NNE of Tooperang	140			
41	52TOR00402	07-Dec-96	253202	6060528	6.4 km ESE of Delamere	300	stream channel	loam	closed shrubland
41	52TOR00903	07-Dec-96	253642	6057028	7.8 km ESE of Delamere	270	perched swamp	loam	shrubland
41	52TOR0401	19-Oct-93	253372	6060578	6.6 km ESE of Delamere, (Second Valley Forest Reserve)	300	plain (incl undulating plain)	loam	low woodland
41	5ML39	18-Apr-86	288472	6090628	3.8 km ENE of Yundi	235			
41	5ML449	07-May-86	280622	6075478	3.6 km ESE of Spring Mount, (Hindmarsh Falls.)	220			
41	5ML480	16-May-86	268022	6073528	7.4 km SSW of Myponga, (Myponga CP)	310			
41	5ML740	20-Feb-87	247722	6053978	6.9 km SSE of Delamere	270			

APPENDIX VII

PLANT SPECIES WITH AUSTRALIAN, SOUTH AUSTRALIAN OR SOUTHERN LOFTY HERBARIUM REGION, CONSERVATION RATINGS.

Species	Common Name	Family	Aust. Rating[#]	SA Rating[$]	Southern Lofty Rating[@]	No. of Survey Records
Acacia pinguifolia	Fat-leaved Wattle	Leguminosae	E	E	E	1
Caladenia argocalla	White-beauty Spider Orchid	Orchidaceae	E	E	E	1
Euphrasia collina spp. *osbornii*	Osborn's Eyebright	Scrophulariaceae	E	E	E	1
Prasophyllum frenchii	Maroon Leek-orchid	Orchidaceae	E	E	E	2
Correa calycina	Hindmarsh Calycina	Rutaceae	V		V	2
Glycine latrobeana	Clover Glycine	Leguminosae	V	V	V	2
Olearia pannosa spp. *pannosa*	Silver Daisy-bush	Compositae	V	V	V	2
Prasophyllum pallidum	Pale Leek-orchid	Orchidaceae	V	V	V	2
Spyridium coactilifolium	Butterfly Spyridium	Rhamnaceae	V	V	V	19
Crassula sieberiana spp. *sieberiana*	Australian Stonecrop	Crassulaceae		E	E	1
Helichrysum rutidolepis	Pale Everlasting	Compositae		E	E	7
Juncus prismatocarpus	Branching Rush	Juncaceae		E	E	2
Lycopodiella serpentina	Bog Clubmoss	Lycopodiaceae		E	E	1
Correa eburnea	A Correa	Rutaceae		V	V	67
Eryngium rostratum	Blue Devil	Umbelliferae		V	V	
Senecio odoratus var. *obtusifolius*	Broad-leaf Scented Groundsel	Compositae		V	V	2
Thelymitra holmesii	Slender Blue Swamp Sun-orchid	Orchidaceae		V	V	1
Veronica gracilis	Slender Speedwell	Scrophulariaceae		V	V	
Austrostipa pilata		Gramineae		V	T	1
Cryptostylis subulata	Moose Orchid	Orchidaceae		V	E	14
Deyeuxia minor	Small Bent-grass	Gramineae		V	E	8
Olearia glandulosa	Swamp Daisy-bush	Compositae		V	E	2
Scaevola calendulacea	Dune Fanflower	Goodeniaceae		V	E	1
Schizaea bifida	Forked Comb-fern	Schizaeaceae		V	E	6
Schizaea fistulosa	Narrow Comb-fern	Schizaeaceae		V	E	2
Echinopogon ovatus var. *ovatus*	Rough Beard-grass	Gramineae		R	T	4

Species	Common Name	Family	Aust. Rating[#]	SA Rating[$]	Southern Lofty Rating[@]	No. of Survey Records
Boronia parviflora	Swamp Boronia	Rutaceae		R	V	4
Cardamine paucijuga	Bitter Cress	Cruciferae		R	V	2
Danthonia carphoides var. *carphoides*	Short Wallaby-grass	Gramineae		R	V	10
Dianella longifolia var. *grandis*	Pale Flax-lily	Liliaceae		R	V	1
Eremophila gibbifolia	Coccid Emubush	Myoporaceae		R	V	1
Haloragis brownii	Swamp Raspwort	Haloragaceae		R	V	3
Hypolepis rugosula	Ruddy Ground-fern	Dennstaedtiaceae		R	V	10
Lycopodiella lateralis	Slender Clubmoss	Lycopodiaceae		R	V	5
Melaleuca squamea	Swamp Honey-myrtle	Myrtaceae		R	V	32
Pteris tremula		Pteridaceae		R	V	1
Pultenaea dentata	Clustered Bush-pea	Leguminosae		R	V	9
Spiranthes sinensis spp. *australis*	Austral Lady's Tresses	Orchidaceae		R	V	10
Xyris operculata	Tall Yellow-eye	Xyridaceae		R	V	31
Anogramma leptophylla	Annual Fern	Adiantaceae		R	U	1
Acacia dodonaeifolia	Hop-bush Wattle	Leguminosae		R	R	4
Acacia gunnii	Ploughshare Wattle	Leguminosae		R	R	7
Anthocercis angustifolia	Narrow-leaf Ray-flower	Solanaceae		R	R	2
Baumea acuta	Pale Twig-rush	Cyperaceae		R	R	10
Baumea gunnii	Slender Twig-rush	Cyperaceae		R	R	13
Baumea laxa	Lax Twig-rush	Cyperaceae		R	R	6
Blechnum nudum	Fishbone Water-fern	Blechnaceae		R	R	7
Blechnum wattsii	A Water-fern	Blechnaceae		R	R	1
Brachycome parvula var. *lissocarpa*	A Brachycome	Compositae		R	R	1
Crassula peduncularis	A Crassula	Crassulaceae		R	R	2
Danthonia laevis	Smooth Wallaby-grass	Gramineae		R	R	4
Deyeuxia densa	Heath Bent-grass	Gramineae		R	R	30
Diuris brevifolia	Late Donkey-orchid	Orchidaceae		R	R	3
Drosera binata	Forked Sundew	Droseraceae		R	R	37
Eucalyptus dalrympleana spp. *dalrympleana*	Candlebark Gum	Myrtaceae		R	R	14
Eucalyptus viminalis spp. *viminalis*	Manna Gum	Myrtaceae		R	R	46
Gastrodia sesamoides	Cinnamon Bells	Orchidaceae		R	R	2
Gleichenia microphylla	Coral Fern	Gleicheniaceae		R	R	34
Gonocarpus micranthus spp. *micranthus*	Creeping Raspwort	Haloragaceae		R	R	32
Leucopogon hirsutus	Hairy Beard-heath	Epacridaceae		R	R	25
Logania saxatilis		Loganiaceae		R	R	1

Species	Common Name	Family	Aust. Rating[#]	SA Rating[$]	Southern Lofty Rating[@]	No. of Survey Records
Luzula ovata	Clustered Wood-rush	Juncaceae		R	R	2
Microtis atrata	Yellow Onion-orchid	Orchidaceae		R	R	3
Microtis rara	Sweet Onion-orchid	Orchidaceae		R	R	1
Myriophyllum amphibium	Broad Milfoil	Haloragaceae		R	R	28
Poa umbricola	Shade Tussock-grass	Gramineae		R	R	16
Prasophyllum australe	Austral Leek-orchid	Orchidaceae		R	R	4
Prostanthera chlorantha	Green Mintbush	Labiatae		R	R	14
Pseudanthus micranthus	Fringed Pseudanthus	Euphorbiaceae		R	R	7
Pterostylis foliata	Slender Greenhood	Orchidaceae		R	R	2
Ptilotus erubescens	Hairy-tails	Amaranthaceae		R	R	5
Pultenaea scabra	Rough Bush-pea	Leguminosae		R	R	5
Schoenus laevigatus	A Bog-rush	Cyperaceae		R	R	3
Schoenus lepidosperma spp. *lepidosperma*	Slender Bog-rush	Cyperaceae		R	R	16
Scutellaria humilis	Dwarf Skullcap	Labiatae		R	R	6
Sphaerolobium minus	Leafless Globe-Pea	Leguminosae		R	R	2
Sprengelia incarnata	Pink Swamp-heath	Epacridaceae		R	R	34
Spyridium spathulatum	Spoon-leaf Spyridium	Rhamnaceae		R	R	13
Austrostipa breviglumis	Cane Spear-grass	Gramineae		R	R	4
Austrostipa gibbosa		Gramineae		R	R	1
Austrostipa multispiculis	Spear-grass	Gramineae		R	R	4
Thelymitra mucida	Plum Orchid	Orchidaceae		R	R	2
Viminaria juncea	Native Broom	Leguminosae		R	R	46
Xanthosia tasmanica	Xanthosia	Umbelliferae		R	R	8
Zieria veronicea	Pink Zieria	Rutaceae		R	R	11
Eryngium vesiculosum		Umbelliferae		R	K	1
Hypericum japonicum	Matted St John's Wort	Guttiferae		R	K	8
Juncus australis		Juncaceae		R	K	1
Lythrum salicaria	Purple Loosestrife	Lythraceae		R	K	1
Mentha diemenica	Slender Mint	Labiatae		R	K	1
Pentapogon quadrifidus var. *quadrifidus*		Gramineae		R	K	1
Phyllangium distylis		Loganiaceae		R	K	1
Schoenus discifer	A Bog-rush	Cyperaceae		R	K	1
Choretrum glomeratum var. *chrysanthum*	Yellow-flower Sour-bush	Santalaceae		R	E	2
Corybas unguiculatus	Small Helmet-orchid	Orchidaceae		R	E	1
Daviesia pectinata	Barbed Wire Bush	Leguminosae		R	E	1
Ajuga australis form *A*	Australian Bugle	Labiatae			V	2

Species	Common Name	Family	Aust. Rating[#]	SA Rating[$]	Southern Lofty Rating[@]	No. of Survey Records
Boronia edwardsii	Edward's Boronia	Rutaceae			V	5
Boronia nana	Dwarf Boronia	Rutaceae			V	1
Brachyloma ciliatum	Fringed Brachyloma	Epacridaceae			V	7
Caladenia cardiochila	Thick-lipped Spider-orchid	Orchidaceae			V	1
Cassinia arcuata	Sticky Cassinia	Compositae			V	1
Dodonaea viscosa spp. *cuneata*	Wedge-leaf Hop-bush	Sapindaceae			V	6
Eleocharis sphacelata	Tall Spike-rush	Cyperaceae			V	2
Eremophila longifolia	Weeping Emubush	Myoporaceae			V	1
Eucalyptus cneorifolia	Kangaroo Island Narrow-leaf Mallee	Myrtaceae			V	3
Eucalyptus gracilis	Yorrell	Myrtaceae			V	1
Leptomeria aphylla	Leafless Currant Bush	Santalaceae			V	1
Leucopogon woodsii	Nodding Beard-heath	Epacridaceae			V	2
Melaleuca halmaturorum spp. *halmaturorum*	Swamp Paper-bark	Myrtaceae			V	1
Santalum acuminatum	Quandong	Santalaceae			V	8
Senecio minimus var. *minimus*	Fine-tooth Groundsel	Compositae			V	6
Tetraria capillaris	Hair Sedge	Cyperaceae			V	1
Vittadinia condyloides	Vittadinia	Compositae			V	1
Baeckea behrii	Silver Broombush	Myrtaceae			T	8
Pratia pedunculata	Matted Pratia	Campanulaceae			T	2
Acacia calamifolia	Wallowa	Leguminosae			R	9
Acacia retinodes var. *uncifolia*	Coast Silver-wattle	Leguminosae			R	7
Acrotriche affinis	Ridged Ground-berry	Epacridaceae			R	8
Acrotriche cordata	Blunt-leaf Ground-berry	Epacridaceae			R	4
Acrotriche depressa	Native Currant	Epacridaceae			R	61
Acrotriche patula	Shiny Ground-berry	Epacridaceae			R	1
Ajuga australis form B	Lesser Bugle	Labiatae			R	3
Allocasuarina pusilla	Dwarf Oak-bush	Casuarinaceae			R	13
Alyxia buxifolia	Sea Box	Apocynaceae			R	1
Argentipallium blandowskianum	Wooly Everlasting	Compositae			R	5
Baeckea crassifolia	Desert Baeckea	Myrtaceae			R	10
Baumea arthrophylla	Swamp Twig-rush	Cyperaceae			R	2
Baumea articulata	Jointed Twig-rush	Cyperaceae			R	3
Billardiera uniflora	One-flower Apple-berry	Pittosporaceae			R	14
Billardiera versicolor	Yellow-flower Apple-berry	Pittosporaceae			R	8
Boronia filifolia	Slender Boronia	Rutaceae			R	15
Bracteantha bracteata	Golden Everlasting	Compositae			R	4

Species	Common Name	Family	Aust. Rating[#]	SA Rating[$]	Southern Lofty Rating[@]	No. of Survey Records
Caladenia prolata		Orchidaceae			R	1
Callistemon teretifolius	Needle Bottlebrush	Myrtaceae			R	2
Callitris rhomboidea	Oyster Bay Pine	Cupressaceae			R	10
Calocephalus citreus	Lemon Beauty-heads	Compositae			R	5
Calytrix glaberrima	Smooth Heath-myrtle	Myrtaceae			R	6
Carex gunniana	A Sedge	Cyperaceae			R	1
Centella cordifolia s.str.	Native Centella	Umbelliferae			R	3
Cheilanthes sieberi spp. *sieberi*	A Rock Fern	Adiantaceae			R	1
Choretrum glomeratum var. *glomeratum*	White Sour-bush	Santalaceae			R	5
Correa aemula s.str.	Hairy Correa	Rutaceae			R	6
Correa decumbens	Spreading Correa	Rutaceae			R	3
Correa glabra	Correa	Rutaceae			R	2
Correa pulchella	Salmon Correa	Rutaceae			R	4
Cryptandra leucophracta	White Cryptandra	Rhamnaceae			R	1
Dampiera rosmarinifolia	Rosemary Dampiera	Goodeniaceae			R	5
Danthonia semiannularis	Wetland Wallaby-grass	Gramineae			R	3
Dodonaea baueri	Crinkled Hop-bush	Sapindaceae			R	4
Dodonaea hexandra	Horned Hop-bush	Sapindaceae			R	1
Eriostemon pungens	Prickly Wax-flower	Rutaceae			R	2
Eucalyptus diversifolia	Coastal White-mallee	Myrtaceae			R	22
Eucalyptus leptophylla	Narrow-leaf Red Mallee	Myrtaceae			R	2
Eucalyptus oleosa	Red Mallee	Myrtaceae			R	1
Exocarpos sparteus	Slender Cherry	Santalaceae			R	7
Gahnia deusta	Limestone Saw-sedge	Cyperaceae			R	4
Gahnia filum	Chaffy Saw-sedge	Cyperaceae			R	1
Gahnia lanigera	Black Grass Saw-sedge	Cyperaceae			R	4
Genoplesium nigricans	A Midge-orchid	Orchidaceae			R	2
Glyceria australis	Australian Sweet-grass	Gramineae			R	5
Gnaphalium indutum	A Cudweed	Compositae			R	4
Hakea muelleriana	Heath Needlebush	Proteaceae			R	3
Halgania cyanea	Rough Blue-flower	Boraginaceae			R	4
Hibbertia sp. B	A Guinea flower	Dilleniaceae			R	13
Hydrocotyle pterocarpa	Wing Pennywort	Umbelliferae			R	3
Hymenanthera dentata	Tree Violet	Violaceae			R	6
Isolepis hookeriana	A Club-rush	Cyperaceae			R	1

Species	Common Name	Family	Aust. Rating[#]	SA Rating[$]	Southern Lofty Rating[@]	No. of Survey Records
Isolepis stellata	A Club-rush	Cyperaceae			R	1
Juncus flavidus	Yellow-rush	Juncaceae			R	3
Lagenifera stipitata var. *stipitata*	Spreading Bottle-daisy	Compositae			R	3
Leucopogon cordifolius	Heart-leaf Beard-heath	Epacridaceae			R	4
Leucopogon lanceolatus	Lance Beard-heath	Epacridaceae			R	3
Leucopogon rufus	Ruddy Beard-heath	Epacridaceae			R	25
Logania linifolia	Flax-leaf Logainia	Loganiaceae			R	3
Lomandra collina	Sand Mat-rush	Liliaceae			R	5
Lomandra effusa	Scented Mat-rush	Liliaceae			R	5
Lomandra leucocephala spp. *robusta*	Woolly Mat-rush	Liliaceae			R	3
Luzula densiflora	Dense Wood-rush	Juncaceae			R	12
Lycopus australis	Australian Gipsy-wort	Labiatae			R	7
Melaleuca brevifolia	Mallee Honey-myrtle	Myrtaceae			R	1
Melaleuca uncinata	Broombush	Myrtaceae			R	13
Mimulus repens	Creeping Monkey-flower	Scrophulariaceae			R	1
Orthoceras strictum	Horned Orchid	Orchidaceae			R	4
Ozothamnus retusus	Notched-bush Everlasting	Compositae			R	5
Pimelea micrantha	Silky Riceflower	Thymelaeaceae			R	2
Pittosporum phylliraeoides var. *microcarpa*	Native Apricot	Pittosporaceae			R	5
Plantago gaudichaudii	Narrow-leaf Plantain	Plantaginaceae			R	5
Pomaderris obcordata	Wedge-leaved Pomaderris	Rhamnaceae			R	1
Poranthera ericoides	Poranthera	Euphorbiaceae			R	5
Prasophyllum fitzgeraldii	Fitzgeralds Leek-orchid	Orchidaceae			R	2
Pterostylis alata	Striped Greenhood	Orchidaceae			R	2
Pultenaea graveolens	Scented Bush-pea	Leguminosae			R	2
Pultenaea hispidula	Rusty Bush-pea	Leguminosae			R	19
Pultenaea tenuifolia	Narrow-leaf Bush-pea	Leguminosae			R	4
Quinetia urvillei	Quinetia	Compositae			R	3
Ranunculus amphitrichus	Small River Buttercup	Ranunculaceae			R	3
Ranunculus pachycarpus	Thick-fruit Buttercup	Ranunculaceae			R	2
Santalum murrayanum	Bitter Quandong	Santalaceae			R	1
Scaevola crassifolia	Cushion Fanflower	Goodeniaceae			R	2
Scaevola linearis spp. *confertifolia*	Rough Fanflower	Goodeniaceae			R	3
Schoenus deformis	A Bog-rush	Cyperaceae			R	1
Schoenus nanus	A Bog-rush	Cyperaceae			R	6
Schoenus nitens	Shiny Bog-rush	Cyperaceae			R	1

Species	Common Name	Family	Aust. Rating[#]	SA Rating[$]	Southern Lofty Rating[@]	No. of Survey Records
Senecio squarrosus	Squarrose Groundsel	Compositae			R	4
Sigesbeckia orientalis spp. *orientalis*	Indian Weed	Compositae			R	1
Solanum laciniatum	Cut-leaf Kangaroo-apple	Solanaceae			R	2
Spirodela punctata		Lemnaceae			R	4
Austrostipa muelleri	Tangled Spear-grass	Gramineae			R	38
Austrostipa mundula		Gramineae			R	1
Austrostipa stipoides		Gramineae			R	1
Styphelia exarrhena	Desert Heath	Epacridaceae			R	22
Swainsona lessertiifolia	Coast Swainson-pea	Leguminosae			R	4
Thelymitra benthamiana		Orchidaceae			R	1
Trachymene cyanopetala	Purple Trachymene	Umbelliferae			R	3
Triodia compacta	Porcupine Grass	Gramineae			R	1
Viola hederacea	Ivy-leaf Violet	Violaceae			R	56
Xanthosia dissecta var. *floribunda*	Cut-leaved Xanthosia	Umbelliferae			R	2
Acacia hakeoides	Hakea Wattle	Leguminosae			K	1
Allocasuarina mackliniana spp. *mackliniana*	Macklin's Oak-bush	Casuarinaceae			K	2
Centipeda minima		Compositae			K	2
Daviesia arenaria	Sand-hill Bitter-pea	Leguminosae			K	1
Dipodium pardalinum		Orchidaceae			K	1
Geranium potentilloides var. *potentilloides*	Cranes Bill	Geraniaceae			K	1
Goodenia varia	Sticky Goodenia	Goodeniaceae			K	8
Grevillea ilicifolia var. *ilicifolia*	Holly-leaf Grevillea	Proteaceae			K	2
Hydrocotyle verticillata		Umbelliferae			K	1
Isachne globosa	Swamp Millet	Gramineae			K	6
Isolepis congrua		Cyperaceae			K	1
Melaleuca acuminata	Mallee Honey-Myrtle	Myrtaceae			K	3
Phyllanthus australis	Southern Spurge	Euphorbiaceae			K	10
Pimelea flava spp. *flava*	Yellow Riceflower	Thymelaeaceae			K	1
Pultenaea viscidula	Dark Bush-pea	Leguminosae			K	4
Veronica hillebrandii	Coast Speedwell	Scrophulariaceae			K	1
Thelymitra venosa	Veined Sun-orchid	Orchidaceae			E	10
Thysanotus baueri	Mallee Fringe-lily	Liliaceae			E	1
Utricularia lateriflora	Small Bladderwort	Lentibulariaceae			E	5

[#]Australian ratings are those in the *Environment Protection and Biodiversity Conservation Act 1999*
[$]State ratings are those in the *National Parks and Wildlife Act 1972,* Schedules 7, 8 or 9 (2000 update)
[@]Regional ratings are based on State herbarium regions and are taken from the unpublished database developed by Lang and Kraehenbuehl (1998 update).

Explanation of Codes

X **Extinct/Presumed Extinct:** not located despite thorough searching of all known and likely habitats; known to have been eliminated by the loss of localised population (s); or not recorded for more than 50 years from an area where substantial habitat modification has occurred.

E **Endangered:** rare and in danger of becoming extinct in the wild.

V **Vulnerable:** rare and at risk from potential threats or long term threats which could cause the species to become endangered in the future.

T **Threatened:** likely to be either Endangered or Vulnerable but insufficient data for a more precise assessment.

R **Rare:** has a low overall frequency of occurrence (may be locally common with a very restricted distribution or may be scattered sparsely over a wider area. Not currently exposed to significant threats, but warrants monitoring and protective measures to prevent reduction of population sizes.

K **Uncertain:** likely to be either Threatened or Rare but insufficient data for a more precise assesment.

NB: The regional ratings are continually being revised. Please cite the date of update if referencing this work. Changes in these assessments may reflect improved knowledge rather than actual changes in conservation status.

APPENDIX VIII

PLANT SPECIES USED FOR THE PATN (FLORISTIC GROUPING) ANALYSIS AND THEIR FREQUENCY WITHIN EACH FLORISTIC GROUP.

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Acacia acinacea	wreath wattle	39	8	1						2											3		12		1	7					1	4											
Acacia calamifolia	wallowa	9																		1						5			1			2										
Acacia continua	thorn wattle	24	1	14						2		1							1							5																
Acacia dodonaeifolia	hop-bush wattle	4										2															1				1											
Acacia gunnii	ploughshare wattle	7	1		4													1	1																							
Acacia longifolia var. *longifolia*	sallow wattle	9	1		2					1		1				1							1					1														
Acacia longifolia var. *sophorae*	coastal wattle	11										2																									9					
Acacia melanoxylon	blackwood	47	3		12	12	2		1	2	1	1	1	1	3	2				2																		2			2	
Acacia myrtifolia var. *myrtifolia*	myrtle wattle	4 50	65	26	65	11	10	36	15	71	29	45		1				3	2	4		1	4		1	10	6	4	4	24	5	1	2								1	3
Acacia paradoxa	kangaroo thorn	224	22	12		1		5	12	1	5	16			3	5			13	4			16	6	1	9	13	4	9	31	22	8		4				2				
Acacia pycnantha	golden wattle	538	89	47	17	5	2	9	17	16	9	22	2	8	2	9	2	15	42	21	5		18	19	3	25	21	17	8	51	22	11	2	1			2					
Acacia retinodes var. *retinodes*	wirilda	14	2						1		1		2			2											2			1								1			2	
Acacia retinodes var. *retinodes*	swamp wattle	22	1									1	1		2	2	1													1								2			10	1
Acacia retinodes var. *uncifolia*	coast silver wattle	7										3																									4				
Acacia rupicola	rock wattle	12			1																		4			2		3			2										
Acacia spinescens	spiny wattle	72	7	3	1				1	1		22				1			1								5	7		4		8		1				1				1
Acacia verniciflua	varnish wattle	33	3		5	1				7					2	1	3		4		1		1						2	3											
Acacia verticillata	prickly Moses	1 60	6		10	7	7	10	9	15	7	3			3	3			3									4	16	7	1	1	1				6	4		22	15
Acaena echinata var.	sheep's burr	125	18	4	5	2	1	1	4	1	2	1	3	3	3	11	1	1	5	13		2	6	11			3			13	8	1				1					1
Acaena novae-zelandiae	biddy-biddy	70	2		1	6	5	4	4	1	7		1		9	3	3		2											3	4					1	6	4		3	2

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Acetosella vulgaris	sorrel	25					1	1	2		1	1	4	1	4	2				2		2		2					1										1				1	
Acrotriche affinis	ridged ground-berry	8	4	1																										1	2												
Acrotriche cordata	blunt-leaf ground-berry	4																													2	1					1					
Acrotriche depressa	native currant	61	18	21								2							4	3				1		9				2		1										
Acrotriche fasciculiflora	Mount Lofty ground-berry	117	7		47	21		1		15			2	1	1	1	2	6	7	1	1		1															3				
Acrotriche serrulata	cushion ground-berry	4 60	90	29	53	7	10	34	24	69	35	4		1	1	2		3	14	16	1	2	6			7	11	5	3	32								2				
Adenanthos terminalis	yellow gland-flower	45									1	36																6	1												1
Adiantum aethiopicum	common maiden-hair	56	1		5	15	8	1	1					1	1	2	1	2	3					2							3							1				
Adriana klotzschii	coast bitter-bush	2																																			2					
Agrostis aemula	blown-grass	12	1		2				1		1								1	1			1	1		1				1								1				
Agrostis avenacea var.	common blown-grass	36	3	1	1	3			1	1				1			1	1		2	5		2	3		1	2			4	1							2	1			
Agrostis billardieri var.	narrow-leaf blown-grass	2																													1									1		
Ajuga australis form *A*	Australian bugle	2			1	1																																				
Ajuga australis form *B*	lesser bugle	3											1			1															1											
Allocasuarina mackliniana spp. *mackliniana*	Macklin's oak-bush	2										1																													1		
Allocasuarina muelleriana spp. *muelleriana*	common oak-bush	164	12	32	3			4	1	24	17	9							2				2			15	8	3	14	15	3											
Allocasuarina paludosa	swamp oak-bush	3										3																															
Allocasuarina pusilla	dwarf oak-bush	12										12																		1												
Allocasuarina striata	stalked oak-bush	118	1	1			2	5	2	22	41	2																6	2	8	2	2	1							1	2
Allocasuarina verticillata	drooping sheoak	101	4	2						1		2	1		2		1	1	7	7	2		7	6	4	11	15	8	1	6	8					2	3					
Alternanthera denticulata	lesser joyweed	2															1							1																	
Ammophila arenaria	marram grass	5																										2									3				
Amphipogon caricinus var. *caricinus*	long grey-beard grass	72	8	2	16					21	8	1						1		2			7				5		2													

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Amphipogon strictus var. *setifer*	spreading grey-beard grass	56	3	4	2			2	4	8	11	1						1		1							4		5	7		3											
Amyema miquelii	box mistletoe	155	12	18	3		2		1	5	1	8	1	1	3	5	1		11	4			1	6		24	5	11	1	14	2	12		1									1
Amyema pendulum spp. *pendulum*	drooping mistletoe	4					1					1							1											1	1											
Amyema gracilis	wire-leaf mistletoe	6										1	1			1				1											1						1				
Angianthus milenei		7		1	3					1													1			1															
Anthocercis angustifolia	narrow-leaf ray-flower	2								1																1															
Anthoxanthum odoratum	sweet vernal grass	51			1		1		6		5	1			3	1				2																	4	1	4	21	2
Apium prostratum spp. *prostratum* var.	native celery	2													1																							1				
Argentipallium blandowskianum	woolly everlasting	5										5																														
Argentipallium obtusifolium	blunt everlasting	3										3																														
Aristida behriana	brush wire-grass	2																							2																
Arthropodium fimbriatum	nodding vanilla-lily	19	8	1			1													1					1	1	1	1	1	2		1										
Arthropodium strictum	common vanilla-lily	388	75	22	16	4	6	3	13	10	2	8	1	1	2	16		14	28	22	2		12	17	2	18	12	6	1	47	16	11	1									
Asclepias fruticosa	narrow-leaf cotton-bush	2																						2																		
Asclepias rotundifolia	broad-leaf cotton-bush	45		2					1				3	2		2		1	5	1			4	7	5	3	2	1			2			2	1			1					
Asperula conferta	common woodruff	5	3																					2																		
Asphodelus fistulosus	onion weed	2											2																													
Asplenium flabellifolium	necklace fern	7	1						1					1	2															1										1		
Aster subulatus	aster-weed	4													1		1																						1	1		
Astroloma conostephioides	flame heath	30	26	34	5	1		4	1	43	18	59			1				6	4	4		3	4	1	27	15	17	6	18		4	1									
Astroloma humifusum	cranberry heath	479	58	28	29	2	4	7	16	56	12	33	1	4		4		10	21	19	3		18	6	1	9	16	14	17	52	21	12	2	1								4
Austrostipa blackii	crested spear-grass	4						1		1	1	1									1																				
Austrostipa breviglumis	cane spear-grass	4										1																1			2										
Austrostipa curticoma	short-crest spear-grass	3																					1														2				

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Austrostipa elegantissima	feather spear-grass	11								1		1									2			3							1				1	2						
Austrostipa flavescens	coast spear-grass	5	1					1				1											1							1												
Austrostipa hemipogon	half-beard spear-grass	17	2				1			2														1		2	4			5												
Austrostipa mollis	soft spear-grass	72	9	3	2				3	4	3	12				2			2	4			1	3		5	3	1	1	12	2											
Austrostipa muelleri	tangled spear-grass	38			3		4	13	1		13																			1								1		2	
Austrostipa multispiculis		4										2													2																
Austrostipa nodosa	tall spear-grass	2														1					1																				
Austrostipa pubinodis	long-shaft spear-grass	5	4																	1																				
Austrostipa scabra spp. *falcata*	slender spear-grass	6										1											1	3			1														
Austrostipa semibarbata	fibrous spear-grass	53	8	4	2			2		2		5						1	2	1		2	2	2		5	5			8	1							1				
Baeckea behrii	silver broombush	8																								8															
Baeckea crassifolia	desert baeckea	10										8																			1	1									
Baeckea ramosissima spp. *ramosissima*	rosy baeckea	45	1					2	3	1	22																	8	5												3
Banksia marginata	silver banksia	245	11	4	22	3		23	2	45	49	37		1		2				13	1		1	2		6	4	6		4							1	1	2			4
Banksia ornata	desert banksia	63			1			2		7	5	42																2		2							1					1
Baumea acuta	pale twig-rush	10																1																				2			6	1
Baumea arthrophylla	swamp twig-rush	2																																				1			1	
Baumea articulata	jointed twig-rush	3																																				3				
Baumea gunnii	slender twig-rush	13																																							13	
Baumea juncea	bare twig-rush	43								1					1	1	1		2	2			1					1		1	1			1				1	3	9		7	11
Baumea laxa	lax twig-rush	6																																					1		5	
Baumea rubiginosa	soft twig-rush	51																																				5	1	1	42	2
Baumea tetragona	square twig-rush	64																																				8			53	3
Beyeria lechenaultii	pale turpentine bush	2																										1					1								
Billardiera bignoniacea	orange bell-climber	94	1		11	4	12	14	4	6	26	2																										2			4	9
Billardiera cymosa	sweet apple-berry	152	11		2		1	10	21	1	22	26				4			1	1			1	1		2		4	2	31	7	1	1					1				1
Billardiera uniflora	one-flower apple-berry	14	1					2	3	1	3												1							3												
Billardiera versicolor	yellow-flower apple-berry	8										1																1		2		4										

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Blechnum minus	soft water-fern	64				2									1																							13		1	45	2
Blechnum nudum	fishbone water-fern	7																																				6			1	
Boronia coerulescens spp. *coerulescens*	blue boronia	21								1		13																6	1		1											
Boronia edwardsii	Edwards' boronia	5			2						3																															
Boronia filifolia	slender boronia	15										15																														
Boronia parviflora	swamp boronia	4																																							2	2
Bossiaea prostrata	creeping bossiaea	89	11		20	4	3	1	1	2				1	1	7		5	1	2			4	1			2			8	7							1	1			6
Bracteantha bracteata	golden everlasting	4					2								1				1																						
Brachyloma ericoides spp. *ericoides*	brush heath	77		2							1	48				1				2						3		1	4	4	1	6	2				1				1
Brachyloma ciliatum	fringed brachyloma	7										7																													
Brunonia australis	blue pincushion	71	16	5	4	1	3	3	3		2	2				3		2	2	3		2		1		3	2	1		7	7										
Burchardia umbellata	milkmaids	313	40	13	23	1		12	7	36	19	33			1	3		6	2	13			7	2		6	6	8	11	35	7	5		1				1	1		6	7
Bursaria spinosa	sweet bursaria	164	21	2	12	15	3	3	2	2	1	6		2	5	3	3	4	25	4	4	1	4	2	1	8	2	1		11	9	4				1		3				
Caesia calliantha	blue grass-lily	111	19	7	1		4	1	8			1		1		1		1	3	10				5		4		5		21	14	3				2						
Cakile maritima spp. *maritima*	two-horned sea rocket	3																																			3					
Callitris gracilis	southern cypress pine	41		2								2							3	2	1			1		22	3	2				1				1	1					
Callitris rhomboidea	Oyster Bay pine	10	1	5											1								2							1												
Callistemon rugulosus var. *rugulosus*	scarlet bottlebrush	7										1														2					2		1								1
Callistemon sieberi	river bottlebrush	6													2		3							1																	
Callistemon teretifolius	needle bottlebrush	2		2																																					
Calocephalus citreus	lemon beauty-heads	5																		1	2		2																		
Calytrix glaberrima	smooth heath-myrtle	8										7																						1							
Calytrix tetragona	common fringe-myrtle	224	9	35	5			1	1	28	3	45						1	2	8			7	1		28	9	10	17	4	4	5	1								
Carduus tenuiflorus	slender thistle	10													3	3				1				1						1	1									
Carex appressa	tall sedge	30											1		2																1							11	3	5	7	
Carex bichenoviana	notched sedge	2											1			1																									
Carex breviculmis	short-stem sedge	18		1	1	1			1							1		1		3				2	1					5	1										

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Carex fascicularis	tassel sedge	17													2																							6	1	3	5	
Carex gaudichaudiana	fen sedge	5				1																																1	2	1	
Carex tereticaulis	rush sedge	6											1		1		1						1															2			
Carpobrotus modestus	inland pigface	3										2																		1											
Carpobrotus rossii	native pigface	12													1											1		4			1	1				4				
Carthamus lanatus	saffron thistle	4																	1		1					1								1							
Cassytha glabella forma *dispar*	slender dodder-laurel	335	60	29	15	2	3	23	7	39	49	41							3	2						4	4	2	4	17		5	3	1		1		1		2		6	11
Cassytha melantha	coarse dodder-laurel	46	2				1			3		10			1						1								1	11	7	6		1		1						1
Cassytha pubescens	downy dodder-laurel	2 30	29	19	28	4	11	1	3	42	8	22			2		2	4	7	4				2		6	8	14	1	5							1	1	1		1	3
Cassinia uncata	sticky cassinia	14						1				1																	4	4	2		1				1					
Centella cordifolia	native centella	27																																					3	2	21	1
Chamaecytisus palmensis	tree lucerne	2		1	1																																				
Cheiranthera alternifolia	hand-flower	55	11	9	6			1		9	4	1								1						1	2		3	5		1	1									
Cheilanthes austrotenuifolia	annual rock-fern	229	10	10	3	3	3	1	3	1	1	3			2	13		5	35	12	2	2	12	17	2	12	15	3	2	34	22	1											
Chorizandra enodis	black bristle-rush	6																													1		1								4
Choretrum glomeratum var. *chrysanthum*	yellow-flower sour-bush	2									1																				1										
Choretrum glomeratum var. *glomeratum*	white sour-bush	5									1	1									1										1				1						
Chrysocephalum apiculatum	common everlasting	32	2		7	3				5		3			1	1					2					1	1	1		2		2										
Chrysocephalum baxteri	white everlasting	20	2	1	1		1			5	2	1														1			4	3												
Chrysanthemoides monilifera	boneseed	96	4		8	4				6		4	2	3		1	1	3	7	1	6		12	6		18		6		3	1											
Cirsium vulgare	spear thistle	32	1			3		1			1		7		3	4	1		3					3															2	3	
Clematis microphylla	old man's beard	41										4				6								1	1			3		7	2	10	2				5					
Comesperma calymega	blue-spike milkwort	17	2	1						2	2	3								1								1	2	3											
Conospermum patens	slender smoke-bush	20										20																														
Convolvulus erubescens	Australian bindweed	30											1	3		4		1			2		4	6		1	5	1		2												

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Convolvulus remotus	grassy bindweed	12														2					1		2	2	3	2																	
Correa aemula	hairy correa	27	1				8	7		1	1								1										4									3				1
Correa calycina	Hindmarsh correa	2														1												1													
Correa decumbens	spreading correa	3			1	1				1																																
Correa glabra var. *leucoclada*	rock correa	2																						1		1																
Correa glabra var. *turnbullii*	mallee correa	3	1																1										1													
Correa pulchella	salmon correa	4																															3					1				
Correa reflexa	common correa	61						1	1	4	2	30														1		1	4	7	2	7										1
Cotula coronopifolia	water buttons	3													1																							2				
Craspedia glauca	billy-buttons	20	4	1				4	4		1					1			1	1				1					2	1												
Crassula sieberiana spp.	Australian stonecrop	13		1								2							2	1				1					1		5							1				
Crataegus azarolus	azarola thorn	2																							2																	
Crataegus monogyna	hawthorn	12	1										7	1			1										1		1														
Cryptandra hispidula	rough cryptandra	18								1	9	8																															
Cryptandra tomentosa	heath cryptandra	32		4					1			9								1						2	3	3	5	3		1										
Cymbonotus preissianus	austral bear's-ear	6														1				1				2						2												
Cynara cardunculus	artichoke thistle	3																						1	2																	
Cynodon dactylon	couch	2															1													1												
Cynoglossum suaveolens	sweet hound's-tongue	14	4										1			2				1				5						1												
Cyperus vaginatus	stiff flat-sedge	12				1									4	1	4						1	1																		
Cyrtostylis reniformis	small gnat-orchid	24	3	1			1	2	6		1	1																1	2	4	1	1										
Cyrtostylis robusta	robust gnat-orchid	2																1												1												
Cytisus scoparius	English broom	18			7	7	1							1			1			1																						
Dampiera dysantha	shrubby dampiera	25	1	3	2					10	2																	1	3		3											
Dampiera lanceolata var.	grooved dampiera	3																										1				2									
Dampiera rosmarinifolia	rosemary dampiera	5										1																		4											
Danthonia caespitosa	common wallaby-grass	34	4	5					1	4	1	1				2		1					1	2	2		2		7	1											
Danthonia carphoides var. *carphoides*	short wallaby-grass	10			1					4									4																			1				

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Danthonia clelandii	Cleland's wallaby-grass	5		3	2																																						
Danthonia eriantha	hill wallaby-grass	4			1						1																		2														
Danthonia geniculata	kneed wallaby-grass	45	3	4	1		1		2		4	7								2				1			2		1	11	3			2									1
Danthonia laevis	smooth wallaby-grass	4							1		2									1																							
Danthonia pilosa var. *paleacea*	velvet wallaby-grass	17	3		4								1			2		3		1				1						1	1											
Danthonia pilosa var. *pilosa*	velvet wallaby-grass	14	1		2			2	1							1				1				1						2	1									1	
Danthonia racemosa var. *racemosa*	slender wallaby-grass	10									1		2			2			1						1	1				2												
Danthonia semiannularis	wetland wallaby-grass	3																																				2			1	
Danthonia setacea var. *setacea*	small-flower wallaby-grass	89	11	2	3			2	3	4	9	9				2			1	2	1		2	1		4	10	1		13	7	1						1				
Daviesia brevifolia	leafless bitter-pea	104	2	6	1					26	21	28								1						6			4	4	1	3										1
Daviesia genistifolia	broom bitter-pea	3																														3										
Daviesia leptophylla	narrow-leaf bitter-pea	157	36	4	42	5	6	24	10	8			1			1		3	1				5			1	2		1	7	1											
Daviesia ulicifolia spp. *incarnata*		1 80	36	8	11		2	28	14	13	25	14						1	1	4						1	5	2	3	11										1	
Deyeuxia densa	heath bent-grass	30	1		9	6			1	7				1				1						2														1		1	
Deyeuxia minor	small bent-grass	8		3															2					3																	
Deyeuxia quadriseta	reed bent-grass	95	18	1	4			3	11	10	4	5						1		4			1	1		1				10	1			1					2		15	3
Dianella brevicaulis	short-stem flax-lily	4										2																									2				
Dianella revoluta var. *revoluta*	black-anther flax-lily	111	14	4	13	1	2	11	6	1	3	10	3		1	7		2		5	1		2		3	6	2	1		10	1							2				
Dichelachne crinita	long-hair plume-grass	18	2		3	1			2	1		1						1					1						5								1				
Dichelachne inaequiglumis	loose plume-grass	5	1																	1									1	2											
Dichelachne micrantha	short-hair plume-grass	4							1		2																		1												
Dichondra repens	kidney weed	176	9		3	9	7	1	9	1	1	3	5	4	10	22	3	3	27	6			4	8	2					13	15	4		1				1	3		1		1
Dillwynia hispida	red parrot-pea	212	30	24	29			2		31	12	13						6	2	4	1		1			13	11	1	10	14	3	3	1									1
Dillwynia sericea	showy parrot-pea	41			1					5		26								1						1		4						1								2

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Dittrichia graveolens	stinkweed	5													1		1	1														1							1				
Dodonaea baueri	crinkled hop-bush	4																											1			3											
Dodonaea viscosa spp. *cuneata*	wedge-leaf hop-bush	6										1													1		2	2															
Dodonaea viscosa spp. *spatulata*	sticky hop-bush	103	3	1						1		3		1	4	2	3	1	17	1	3		7	10	1	22	2	1	1	5	11	1			1								
Echinopogon ovatus var. *ovatus*	rough-beard grass	4							1				1			1								1																			
Ehrharta calycina	perennial veldt grass	38		1								11				1					1		1	1	1	2		6		7	1	2		2				1				
Einadia nutans spp. *nutans*	climbing saltbush	4																			1										1				1	1						
Eleocharis acuta	common spike-rush	5																																					2	2	1	
Eleocharis gracilis	slender spike-rush	44																																				2	4	6	32	
Eleocharis sphacelata	tall spike-rush	2																																						1	1	
Elymus scabrus var. *scabrus*	native wheat-grass	11										1				1			1				1		1					2	1	3										
Empodisma minus	tangled rope-rush	63			2																																			53	8
Enchylaena tomentosa var. *tomentosa*	ruby saltbush	4																							1						1				1	1						
Enneapogon nigricans	black-head grass	2																								2																
Epacris impressa	common heath	277	17		50	6	5	39	14	66	47	12	1		1	2			1										2	5								1			2	7
Epilobium billardierianum spp. *billardierianum*	robust willow-herb	9													1	1																					3	2	1	1	
Epilobium hirtigerum	hairy willow-herb	6				1							1		2																						1			1	
Epilobium pallidiflorum	showy willow-herb	33																																		10		3	20	
Erica arborea	tree heath	2			2																																			
Erica lusitanica	Spanish heath	11	1		5	2										2											1													
Eriostemon angustifolius spp. *angustifolia*	narrow-leaf wax-flower	7		2																									1			4									
Eriochilus cucullatus	parson's bands	50	19	7			1		1	1	1	7						2		3						6			1	1	1										
Eriostemon pungens	prickly wax-flower	2										1																					1								
Eucalyptus baxteri	brown stringybark	195	2	1	16	1	7	21	1	28	41	56							1	1						1		1	1	12								2				2
Eucalyptus camaldulensis var. *camaldulensis*	river red gum	33	1										3	1	1	1	6		1	4			2	11	1		1															

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Eucalyptus cneorifolia	Kangaroo Island narrow-leaf mallee	3									2																	1														
Eucalyptus conglobata	Port Lincoln mallee	9										1																	1		2	3	1			1							
Eucalyptus cosmophylla	cup gum	261	9	1	8		10	6	3	64	40	43			1	1		1	1	1								14	30	5	2	2	1				1	4			7	6
Eucalyptus dalrympleana spp. *dalrympleana*	candlebark gum	14	1		4	7														1																	1				
Eucalyptus diversifolia	coastal white mallee	21										13				1													1			3	1				3				
Eucalyptus fasciculosa	pink gum	493	69	46	9	1	15	8	20	27	13	42		1	7	2		4	34	9	2		6	1		27	16	18	13	60	23	12		3		1		1	1	1			
Eucalyptus goniocalyx	long-leaf box	126	44	42														5	11	10						4	8			1	1											
Eucalyptus incrassata	ridge-fruited mallee	13									1	4																	3			4	1									
Eucalyptus leptophylla	narrow-leaf red mallee	14		1								2																	3	1	1	5	1			1						
Eucalyptus leucoxylon spp.	South Australian blue gum	121	8		3	1	2		2	1			6	4	2	17		4	13	4	1			12	4	5	5	2		7	12	2		2			1					1
Eucalyptus microcarpa	grey box	23																	1	1			19			1		1		1											
Eucalyptus obliqua	messmate stringybark	477	95	15	75	24	16	40	33	66	38	5	3	2	5	7		5	10	3		3		1			1		2	10	2							5			5	6
Eucalyptus odorata	peppermint box	18										3									2					1			1		5	2		1		1	1				
Eucalyptus ovata	swamp gum	29	1				1			1					1		2																1				3	7		5	7
Eucalyptus porosa	mallee box	8																	1				1		2	1		1			1				1						
Eucalyptus viminalis spp. *cygnetensis*	rough-bark manna gum	14											1		1	4			1	2				1	1		1			2											
Eucalyptus viminalis spp. *viminalis*	manna gum	46	2		4	4							3	7	6	3			5	6				1						2							3				
Euchiton gymnocephalus	creeping cudweed	40	2		2		3	2	10		5		1		1	3				2										6	2			1							
Euchiton involucratus	star cudweed	58	16	1	3	5				2	1				3			2	4	6		1	1	2		2				1					1			2			6	
Euphorbia paralias	sea spurge	3																																			3				
Eutaxia microphylla var. *microphylla*	common eutaxia	23	1									1							1							1	2		3	4	2	6	2								
Exocarpos cupressiformis	native cherry	256	39	10	39	13	3	3	9	28	2	7		4	1	8		2	12	6			11	4		5	16	4		19	6			1				3				1
Exocarpos sparteus	slender cherry	7																							1		1					5									
Festuca arundinacea	tall meadow fescue	2															1																					1				

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Foeniculum vulgare	fennel	8				1							1				5							1																			
Gahnia ancistrophylla	curled saw-sedge	17									1	11														2			3	1												
Gahnia deusta	limestone saw-sedge	4										2																					1			1							
Gahnia lanigera	black grass saw-sedge	4														1																			1	1	1					
Gahnia sieberiana	red-fruit cutting-grass	81			3	1	3				3																											13	1		52	5
Gahnia trifida	cutting grass	18					1						1			1																						3	7		1	4
Galium gaudichaudii	rough bedstraw	34	9	1	3		1		1									4	2	2				2		1				5	2						1				
Galium migrans	loose bedstraw	7					1								1				1					1							3										
Genista monspessulana	Montpellier broom	48	3		8	15				1			2	5	1	4	4			1			1	2																		
Geranium dissectum	cut-leaf geranium	2											1																								1					
Geranium retrorsum	grassland geranium	27				1			3				3	2	1	5		1	1			1		6	1					1									1		
Geranium solanderi var. *solanderi*	austral geranium	28	2	1			1								3	5			1	1				1			1			5	5	1						1			
Gleichenia microphylla	coral fern	34				1																																4			29	
Glischrocaryon behrii	golden pennants	12		2								5														2			1			2									
Glyceria australis	Australian sweet-grass	5																																			1		3	1	
Glycine latrobeana	clover glycine	2													1	1																									
Gompholobium ecostatum	dwarf wedge-pea	66	8	3	7			5	3	18	16	4																		2											
Gonocarpus elatus	hill raspwort	102	6	12	7					1			1					2	11	3	2		1	16	1	23	14		1	1	1											
Gonocarpus mezianus	broad-leaf raspwort	202	6	16	7	1	13	10	4	9	12	8			1	2	1		8	1			5			9		3	16	38	19	6	2	1				2				1
Gonocarpus micranthus spp. *micranthus*	creeping raspwort	32																																					2	30	
Gonocarpus tetragynus	small-leaf raspwort	688	101	37	60	16	17	35	28	75	54	56	2	4	1	10		15	28	23		1	5	3		10	9	10	10	43	9	1	1	1				1			7	15
Goodenia amplexans	clasping goodenia	8																			1					1					4		1				1				
Goodenia blackiana	native primrose	379	65	24	30		4	32	15	52	48	16				1		9	4	4	2			2		8	6		14	33	8										
Goodenia geniculata	bent goodenia	94	27	10	7		1		1	15	4	14							1	4			1			2	3		1	3			1								
Goodia medicaginae	golden-tip	4													1				1				1								1										
Goodenia ovata	hop goodenia	126	1		6	12	22	16	1	3	1	1			2	1			3	1										8	2							14	8		19	5
Goodenia varia	sticky goodenia	8						3	1							1														2										1	
Gratiola peruviana	austral brooklime	53													1																1			2				11	4	4	30	

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Grevillea ilicifolia var. *ilicifolia*	holly-leaf grevillea	11									2	1																			6	2											
Grevillea lavandulacea	spider-flower	197	24	12	17			3	1	22	15	25		1				1	2	5	1		1			11	9	9	10	21		5	2									1
Hakea carinata	erect hakea	2 50	22	31	15		4	10	2	52	44	21							5	1			1		1	10	5	6	9	5	1									1	3
Hakea laurina	pincushion hakea	2																					2																			
Hakea muelleriana	heath needlebush	3																													2	1									
Hakea rostrata	beaked hakea	498	65	42	40	2	8	45	13	81	56	46			1			1	3	4	1	1	3			14	6	2	16	30	2	3	1						1		1	8
Hakea rugosa	dwarf hakea	50	2	3							2	6							2	3			3	1		6		4	3	3	3	4	2								2	1
Halgania cyanea	rough blue-flower	4																								1					3										
Haloragis brownii	swamp raspwort	3																																					1	1	1		
Haloragis heterophylla	variable raspwort	2																						1				1														
Hardenbergia violacea	native lilac	38	1		1	1			1			1	1	3		3		2	7				4		1		4	1		3	2						1	1				
Helichrysum leucopsideum	satin everlasting	6	1	1								1																			2				1							
Helichrysum scorpioides	pale everlasting	88	22	2	17		2	1	10	9	4	5						1		3	1					3		1		6		1										
Hibbertia eupetrifolia spp. *radians*	scrambling guinea-flower	13						6			3																														1	3
Hibbertia exutiacies	prickly guinea-flower	364	89	28	41	19	19	20	10	11		3	3	2	2	7	1	15	28	7	2	1	11	5		9	5			10	15								1			1
Hibbertia riparia glabriuscula	smooth guinea-flower	195	2	1			2	12	15	9	35	34											1	1	1		10	5	8	35	7	10	3	2					1			2
Hibbertia riparia long-leaved aff. H. stricta	bristly guinea-flower	25					1	6	3		2	5				1														7											
Hibbertia sericea var. *sericea*		326	73	37	55			4		55	5	6		2	1	2		6	9	21	2	3	6	10		14	9		2	3	1										
Hibbertia stricta var. *stricta*	stalked guinea-flower	10																1		2				4		2															1	
Hibbertia virgata	twiggy guinea-flower	48	4	1						3		19														7		7		2		1		2								1
Hybanthus floribundus spp. *floribundus*	shrub violet	78	16	17	2	1				13		3						1								15	8			1		1										
Hydrocotyle hirta	hairy pennywort	27	6			3	1								1				1	2				1									1				4		1	6	
Hydrocotyle laxiflora	stinking pennywort	17		2															2	3				6		3					1										
Hydrocotyle pterocarpa	wing pennywort	3																																						1	2	
Hymenanthera	tree violet	6																	1	1		2		2																		

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
dentata																																											
Hypericum japonicum	matted St John's wort	8																																				1			7	
Hypericum perforatum	St John's wort	53	3		2	2			1		1		7	2	4	11	1	2	3	1				3	2		1			4	2											
Hypolaena fastigiata	tassel rope-rush	98								11	1	70				1										1		1	2	5		2	1	2								2
Hypochaeris radicata	rough cat's ear	198	22	2	4	3	3	5	10	5	11	10	4		6	9	1	1	2	14		1	4	9	1	1	1	3		19	3	3	1	4				2	4	2	3	21	5
Hypolepis rugosula	ruddy ground-fern	10																																				5			5	
Indigofera australis var. *australis*	austral indigo	3							1							1														1												
Isachne globosa	swamp millet	6																																				3	1		2	
Isolepis fluitans	floating club-rush	5				1									1																							1		2	
Isolepis inundata	swamp club-rush	46													1															1								8		6	31	
Isolepis nodosa	knobby club-rush	25							1			1				3	3											2									12		2	1		
Isolepis platycarpa	flat-fruit club-rush	4													1																							1	2		
Isopogon ceratophyllus	horny cone-bush	385	20	31	5		2	38	16	67	60	56							1	3			2			8	3	2	17	42	4		1							1	6
Ixodia achillaeoides spp. *alata*	ixodia	272	33	24	67	13	8	9		64	12	3				2		4	3		3				2	4	5		4	5	2	1									3
Juncus articulatus	jointed rush	36				1																															6	4	4	20	1
Juncus bufonius	toad rush	15							1						1					1							1			1								1	1	2	5	1
Juncus caespiticius	grassy rush	16													1															1								2	1	1	11	
Juncus continuus	pithy rush	2																																							2	
Juncus effusus	soft rush	6																																				2		3	1	
Juncus flavidus	yellow rush	3											1	1																	1											
Juncus holoschoenus	joint-leaf rush	9				2									1															1	1								2	2	
Juncus kraussii	sea rush	7															1																				1		4		1	
Juncus pallidus	pale rush	58			2	6	1						1		6	4		1	3											1	1			2				7	3	5	12	3
Juncus pauciflorus	loose-flower rush	21													3																							8	4	3	3	
Juncus planifolius	broad-leaf rush	48													1																			2				3	1	4	37	
Juncus prismatocarpus	branching rush	2																																							2	
Juncus sarophorus		34			1															1			1															7		5	19	
Juncus subsecundus	finger rush	18			1	2			1			1	3	1	3	2							2	1									1									
Kennedia prostrata	scarlet runner	147	32	2	12		4	4	9	11	6	3		2		5		3	6	3	1			2			10	2		22	4	3	1									
Kunzea pomifera	muntries	16										1				1										3		7								4					
Lactuca serriola	prickly lettuce	3											1									2																				
Lagenifera huegelii	coarse bottle-daisy	32	6	2			1									2		1	2	4			4	6		2				1	2											

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Lagenifera stipitata var. *stipitata*	spreading bottle-daisy	3							1		1		1																														
Lasiopetalum baueri	slender velvet-bush	5										1																			3	1										
Laxmannia orientalis	dwarf wire-lily	124	6	4	4			3	3	21	15	31								4						1	3	3	12	12				1								2
Leontodon taraxacoides spp. *taraxacoides*	lesser hawkbit	13													1					1																		2	2	7	
Lepidium africanum	common peppercress	2																													2										
Lepidosperma canescens	hoary rapier-sedge	5										2														2							1								
Lepidosperma carphoides	black rapier-sedge	269	14	12	7			3	3	54	36	45								7			5			11	12	11	16	15	5	9	1	1								1
Lepidosperma concavum	spreading sword-sedge	18									1	15																									1	1					
Lepidosperma congestum	clustered sword-sedge	18								1		14																			1	2										
Lepidosperma curtisiae	little sword-sedge	55	10	7	2					4	3								2	5	1		8			3	4			5	2											
Lepidobolus drapetocoleus	scale shedder	66								3		57																1	1	1		2										1
Lepidosperma gladiatum	coast sword-sedge	7																																			7					
Lepidosperma laterale	sharp sword-sedge	34	1			3	1					8							3	1			4			1				1	2	3		1				1		2	2
Lepidosperma laterale s.str.	tall sword-sedge	6											1		1	2			1	1																						
Lepidosperma longitudinale	pithy sword-sedge	69							1																					1							8	1		49	9
Lepidosperma semiteres	wire rapier-sedge	595	103	40	67	8	9	45	21	84	64	44						4	10	11		1	1			7	6	6	9	41	5	2		2								4
Lepidosperma viscidum	sticky sword-sedge	90		5		1	1	1		5	3	12			1	2			1	2	1		1			10	1	4	13	11	5	7				2						2
Leptocarpus brownii	coarse twine-rush	5										1																			1		1				1				1
Leptospermum continentale	prickly tea-tree	188	4		22	11	2	11	2	11	6	2	1	1	4	1	1		3	2								3		6	3			1			13	6	1	60	11
Leptospermum lanigerum	silky tea-tree	66			5	2				1	1				3	1	2												1	1						13	7		28	2
Leptospermum myrsinoides	heath tea-tree	506	73	41	43	1	1	13	9	90	61	72		1				2	9	18			1			8	7	13	9	28	1	1		1								2
Leptorhynchos squamatus	scaly buttons	12	1	1												2				5			1	1							1										
Leptocarpus tenax	slender twine-rush	37																																			2			33	2
Leucophyta brownii	coast cushion bush	3																																			3				

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Leucopogon concurvus	scrambling beard-heath	102	2	4				13	2	16	50	2														1			5	5													2
Leucopogon cordifolius	heart-leaf beard-heath	4																								3	1															
Leucopogon hirsutus	hairy beard-heath	25						1																					1				1					2		15	5
Leucopogon lanceolatus	lance beard-heath	7													3													1									1	1		1	
Leucopogon parviflorus	coast beard-heath	14					1	1	1			1																2			1		1				5		1			
Leucopogon rufus	ruddy beard-heath	25		1					1	1	1	10														2		7					2								
Leucopogon virgatus	common beard-heath	228	39	19	18			1	1	53	30	37		1				2	1	2						2	4		2	14											2
Leucopogon woodsii	nodding beard-heath	2										2																													
Lindsaea linearis	screw fern	35				1		4		2	4				1				1																			18	4
Linum marginale	native flax	3																					1	1													1			
Lissanthe strigosa	peach heath	39	10	4		1				3	1				1	1		2	6	4			5				1			1										
Lobelia alata	angled lobelia	40													4		1																1				5	1	4	23	1
Logania linifolia	flax-leaf logania	3						1				1																			1									
Logania recurva	recurved logania	36	6		7		1	4	3	4	9																												3
Lolium perenne	perennial ryegrass	2							1							1																								
Lomandra collina	sand mat-rush	5		1						1	2	1																												
Lomandra densiflora	soft tussock mat-rush	60	9		6	1	1			1		1						1	3		2		9	2	2		5	1		8	3	2				2				
Lomandra effusa	scented mat-rush	5																														1			2	1	1				
Lomandra fibrata	Mount Lofty mat-rush	143	38	6	35		1	15	7	27	10							1	1	2																				
Lomandra juncea	desert mat-rush	14										9																				5									
Lomandra leucocephala spp. *robusta*	woolly mat-rush	3										3																												
Lomandra micrantha spp.	small-flower mat-rush	371	39	16	42	3	4	16	21	59	33	50	1			1		3	4	7	2		2	1		1	11	6	9	27	5	2	1	1			2				1
Lomandra multiflora spp. *dura*	many-flower mat-rush	305	59	13	46	5	5	4	3	15	3	5		1	1	2	1	7	18	10	3		9	2	1	19	16	1	9	31	3	13									
Lomandra nana	small mat-rush	14		1	3						1	2								2				2	1					3											
Lomandra sororia	sword mat-rush	71	7	6	7		1	3	3	7	1	1		5				3	4	3	1		1	2	1	1	6	1	1	7											
Lotus australis	austral trefoil	2																									1										1			

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Lotus suaveolens	hairy bird's-foot trefoil	7																																						1	6	
Lotus uliginosus	greater bird's-foot trefoil	45													1																								3	2	5	33	1
Luzula densiflora	dense wood-rush	12	1		2				2			1	1		1			1		2									1													
Luzula meridionalis	common wood-rush	12	2		1		1		2			1				1			1				1							2												
Luzula ovata	clustered wood-rush	2														1			1																							
Lycium ferocissimum	African boxthorn	9														1			1					1			1								1		4				
Lycopus australis	Australian gipsywort	7																																				3			4	
Lycopodiella lateralis	slender clubmoss	5																																							5	
Lysiana exocarpi spp. *exocarpi*	harlequin mistletoe	19	1	2								1			1	1				1			1	1	1	3		2		1	1	1					2					
Lythrum hyssopifolia	lesser loosestrife	13											1																		1							1	1	2	7	
Malus sylvestris	apple	3	1								1					1																										
Melaleuca acuminata	mallee honey-myrtle	3																													1	1				1						
Melaleuca armillaris	bracelet honey-myrtle	2		1									1																													
Melaleuca decussata	totem-poles	97	3		1		2	2	2	7	4	5			2	1			9									8	12	2		2						4	5		11	15
Melaleuca lanceolata spp. *lanceolata*	dryland tea-tree	9																												1		2		1	2		3					
Melaleuca squamea	swamp honey-myrtle	32																																					1	1	30	
Melaleuca uncinata	broombush	13										1														1			3			8									
Melianthus comosus	tufted honey-flower	4														1																	1				2				
Micrantheum demissum	dwarf micrantheum	55					1	2		2	28	17																1	2												2
Microseris lanceolata	yam daisy	21	7	3	2			1								1		2		3				1					1												
Microlaena stipoides var. *stipoides*	weeping rice-grass	95	14	2	1		2	1	3	2	3	3	1	1	3	8			3	9		1		9						12	7			1				2	1	1	3	2
Muehlenbeckia adpressa	climbing lignum	3										2																		1							1				
Muehlenbeckia gunnii	coastal climbing lignum	15													1													2		2							10				
Myoporum insulare	common boobialla	2																																				2				

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Myoporum viscosum	sticky boobialla	6													2										1	1	2																
Myriophyllum amphibium	broad milfoil	28																																					2	1	1	24	
Myrsiphyllum asparagoides	bridal creeper	80	1	1						1		8				5			7	3			3	2	2	7	1	7		6	5	10				1	1	7					
Myrsiphyllum declinatum		6														1														5												
Neurachne alopecuroidea	fox-tail mulga-grass	169	4	15	2		1	3	8	15	5	22			1				2	12			5	2		10	12	2	14	18	5	9		1								1
Oenothera stricta spp. *stricta*	common evening primrose	4																																			4					
Olearia axillaris	coast daisy-bush	32										2											2			2		8			3		3				12					
Olearia ciliata var. *ciliata*	fringed daisy-bush	4	1							3																																
Olea europaea spp. *europaea*	olive	78	2		1	1							8		1	2	3		10	1	4		16	9	5	6	2	5						1				1					
Olearia glandulosa	swamp daisy-bush	2																																						1	1	
Olearia grandiflora	Mount Lofty daisy-bush	76	12		29	5	1	10	11	2	1														1		1		1	2												
Olearia pannosa spp.*pannosa*	silver daisy-bush	2																													2											
Olearia ramulosa	twiggy daisy-bush	373	32	13	9		8	11	19	16	28	26			2	15		4	12	12			15	5	4	8	16	2	13	53	25	8		1				3	1	3		1	7
Olearia teretifolia	cypress daisy-bush	34					4	14	6	1	5																												2				2
Olearia tubuliflora	rayless daisy-bush	8	1	1						2						1				1									1	1												
Opercularia scabrida	stalked stinkweed	15	1							2		6									3					1	1	1															
Opercularia turpis	twiggy stinkweed	51	3	1	2	1		1		11	1	4						1	2				2			1	2	1	4	8		4	1									
Opercularia varia	variable stinkweed	64	6	2	2		4	4	10	1	6	5				1		2	1										1	12	1			1							1	4
Ophioglossum lusitanicum	austral adder's-tongue	3																	1					1		1																
Oxalis perennans	native sorrel	125	9	1	3	1	4		16		1	1	2		3	10		2	2	8	1		3	8	3		4			23	15	2					2			1			1
Oxylobium lanceolatum		2			1																																	1				
Ozothamnus retusus	notched bush-everlasting	5	1																		2					2																
Paspalum dilatatum	paspalum	4																																						1	3	
Patersonia fragilis	short purple-flag	23								1	1	10																		1									1		1	8
Patersonia occidentalis	long purple-flag	56			3	2		1		3																			1		1			1				4	1		26	13
Pelargonium australe	Australian pelargonium	4																																			3			1		

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Pelargonium littorale	native pelargonium	6					1		1						2															1			1										
Pennisetum clandestinum	kikuyu	2																											1							1							
Pennisetum macrourum	African feather-grass	6														1	3		2																								
Pentaschistis pallida	pussy tail	63	9	5	2					1		2				3				8		2	2	5	1	4	19																
Persicaria decipiens	slender knotweed	16				1									2																							9		2	2	
Persoonia juniperina	prickly geebung	51	2	1	4		1	2	2	15	19	2																	2	1												1
Phalaris aquatica	phalaris	10	1		1								1		1	1	3													1	1											
Phragmites australis	common reed	31			1	1									1	1	4							1														11	1	1	9	
Phyllanthus australis	southern spurge	10		1					1																				2	5			1									
Phyllota pleurandroides	heathy phyllota	37										35																		1												1
Pimelea flava spp. *dichotoma*	diosma riceflower	2		1																								1													
Pimelea glauca	smooth riceflower	14	2								1																	2	1	2	1	3					2						
Pimelea humilis	low riceflower	91	9	3	7			2	3	4		2		3		7		7	6	12		2		4	1	4	1			10	5											
Pimelea linifolia spp. *linifolia*	slender riceflower	196	33	24	38	8	9	11	4	17	2	1		1				1	10		1		1			10	6	1	2	10	6											
Pimelea micrantha	silky riceflower	2														1														1											
Pimelea octophylla	woolly riceflower	90	6	7	6			5	1	25	17	13														3		1	4	1	1											1
Pimelea phylicoides	heath riceflower	26		1				2		3	7	4																	4	4		1										
Pimelea serpyllifolia spp. *serpyllifolia*	thyme riceflower	7														1																					6					
Pimelea stricta	erect riceflower	12		1			1	2																1		4				1		1										1
Pinus halepensis	Aleppo pine	4	1							1	1								1																							
Pinus radiata	radiata pine	53	6	4	6	2		8	5	3	4	3							1	5			2	1		1				1										1	
Piptatherum miliaceum	rice millet	2															2																									
Pittosporum phylliraeoides var. *microcarpa*	native apricot	5																	1				1		1												2					
Pittosporum undulatum	sweet pittosporum	9			4										1				4																							
Plantago coronopus spp. *coronopus*	bucks-horn plantain	5														1															1					1		1		1	
Plantago gaudichaudii	narrow-leaf plantain	5			1																1			3																	
Plantago hispida	hairy plantain	9														2			2	3				1		1															

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Plantago lanceolata var. *lanceolata*	ribwort	70			1	4	1				1		8	1	1	4	7	2	7	1			10	4	5	1	3			3	3								1	1		1	1
Plantago major	greater plantain	2													1		1																										
Platysace heterophylla var. *heterophylla*	slender platysace	118	2		3		4	22	9	25	31	11																5	3													2
Platylobium obtusangulum	holly flat-pea	512	82	22	41	1	4	44	21	80	60	74							1	8		2	1			3	1	4	11	39	2	2											8
Pleurosorus rutifolius	blanket fern	4																	1						1					2												
Poa clelandii	matted tussock-grass	1 50	36	17	26	5	2	4	12	3	4		2		1	4	1	3	2	2	3					1	4			10	2								3			3	1
Poa crassicaudex	thick-stem tussock-grass	45	9		10	6									1	2		5		4		1		4			2				1										
Poa labillardieri var. *labillardieri*	common tussock-grass	28	11	1	1				1	5	1	2			1	1				1							3			1												
Poa poiformis	coast tussock-grass	3																																			3					
Poa tenera	slender tussock-grass	10	2	1				1	1		2				1	2																										
Poa umbricola	shade tussock-grass	16	9		3					1				1										1																	1	
Polygonum aviculare	wireweed	2											1				1																									
Polygala myrtifolia	myrtle-leaf milkwort	2															1										1														
Pomaderris paniculosa spp. *paniculosa*	coast pomaderris	4		1																																1	2					
Pratia pedunculata	matted pratia	2										1																										1				
Prostanthera behriana	downy mintbush	8																	1							1	1	5													
Prostanthera chlorantha	green mintbush	14		2								2														4			1			5									
Prunella vulgaris	self-heal	4													1																										3	
Pseudanthus micranthus	fringed pseudanthus	7										6																	1												
Pteridium esculentum	bracken fern	271	14		45	22	11	29	13	13	2	20	8	6	10	12	1	1	3	1		2		1				5	1	2			1					13	5	1	24	5
Ptilotus erubescens	hairy-tails	5																		1		1				3															
Pultenaea acerosa	bristly bush-pea	45	6	4	1			1		16	6	2															2		3	5												
Pultenaea canaliculata var.	soft bush-pea	63		12	1				1	1	9	12																	10	10		6	2								
Pultenaea daphnoides	large-leaf bush pea	356	65	5	71	16	22	35	19	37	16			3	1	5		8	3	3	1						2			12	7			1				7	1		8	6
Pultenaea dentata	clustered bush-pea	9																																						9	
Pultenaea graveolens	scented bush-pea	2			2																																				

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Pultenaea hispidula	rusty bush-pea	19	10	6	3																																						
Pultenaea involucrata	Mount Lofty bush-pea	89	2		3			23	4	19	34	2							2																								
Pultenaea largiflorens	twiggy bush-pea	188	44	27	4	1		3	4	5	1	2	1					11	15	1			7	2		7	12		5	23	11	2										1
Pultenaea laxiflora	loose-flower bush-pea	20	3	2	1	2	2			3									1							3													1			2
Pultenaea pedunculata	matted bush-pea	42	12	7	4			1	2		6							2		1			2				1			3		1									
Pultenaea scabra	rough bush-pea	4						2			1														1					1												
Pultenaea tenuifolia	narrow-leaf bush-pea	4		1																							1	1								1				
Pultenaea teretifolia var. *teretifolia*	terete-leaf bush-pea	2										2																														
Pultenaea viscidula	dark bush-pea	4									4																															
Ranunculus amphitrichus	small river buttercup	3																																				1	1	1	
Ranunculus pachycarpus	thick-fruit buttercup	2							1																													1			
Rhagodia candolleana spp. *candolleana*	sea-berry saltbush	18										1																4									13					
Rhamnus alaternus	blowfly bush	6																					2	1			1										2					
Rorippa nasturtium-aquaticum	watercress	4											1																									3				
Rosa canina	dog rose	38				2							2	1	7	6	6		3	1	1		1	3	2		1			1	1										
Rosa rubiginosa	sweet briar	4	1										1				1														1										
Rubus sp.	blackberry	128	3		23	20	1	1	1	1	1		9	4	6	9	5		4	1			1	2			1				1							10	2	1	19	2
Rumex brownii	slender dock	2											1			1																										
Rumex conglomeratus	clustered dock	6											1		1	1	2																							1		
Rumex crispus	curled dock	3				1											1																						1			
Samolus repens	desert samolus	3													2																						1				
Santalum acuminatum	quandong	8																							1	2		1		1		2					1				
Scabiosa atropurpurea	pincushion	4							1		1													1	1																	
Scaevola albida var. *albida*	pale fanflower	248	62	9	44	12	9	7	4	4	1		2	6		9		13	6	6	3		8	8	1	4	17			7	5						1					
Scaevola crassifolia	cushion fanflower	2																																			2				
Scaevola linearis spp. *confertifolia*	rough fanflower	8										3																		2		3									

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Schizaea bifida	forked comb-fern	6																																								6	
Schizaea fistulosa	narrow comb-fern	2																																								2	
Schoenus breviculmis	matted bog-rush	224	6	16			1	3	1	36	44	45				1			2	2			2			2	1		20	23	4	9	2				1					3
Schoenus carsei	wiry bog-rush	21			1										1																										18	1
Schoenus laevigatus		3																																							1	2
Schoenus lepidosperma spp. *lepidosperma*	slender bog-rush	16																																							15	1
Schoenus maschalinus	leafy bog-rush	21																																				1	1	2	17	
Scutellaria humilis	dwarf skullcap	6													2	1			2											1													
Senecio glomeratus	swamp groundsel	23					2	2	1		3		1			2				1				1						1	1							3			6	
Senecio hispidulus var. *hispidulus*	rough groundsel	6						1				1			1	1								1						1	1											
Senecio hypoleucus	pale groundsel	11			1	3								1		3		3																								
Senecio lautus	variable groundsel	7													1									1														5				
Senecio minimus var. *minimus*	fine-tooth groundsel	6	1	3															1			1																				
Senecio odoratus var. *obtusifolius*	broad-leaf scented groundsel	2																															1				1				
Senecio odoratus var. *odoratus*	scented groundsel	14					2		3			1			1	1													1		1						3	1				
Senecio picridioides	purple-leaf groundsel	23	2	1								1	1			1	1		2	2				5							5		1						1			
Senecio pterophorus var. *pterophorus*	African daisy	167	22	5	9	12	2	2	1	4	1		10	7	9	8	2	7	22	8	1		5	18	1	3	2			2	3							1				
Senecio quadridentatus	cotton groundsel	112	16	7	6	1	6	1	3	2	3	4		1	1	1		1	15	9	1		4	8		1	1	1		8	9	1							1				
Senecio squarrosus	squarrose groundsel	4						1								1														2												
Senecio tenuiflorus	woodland groundsel	39	4		2			1	6		1	1	1		1	3		2		4			1	3						4	4											
Solanum laciniatum	cut-leaf kangaroo-apple	2						1																										1								
Solanum nigrum	black nightshade	11	1			1						1	1				1		1	1				1						1								1		1		
Solenogyne dominii	smooth solenogyne	3		1																1				1																	
Sonchus hydrophilus	native sow-thistle	5							1				1												1														1		1	
Sphaerolobium minus	leafless globe-pea	2		2																																						
Spinifex sericeus	rolling spinifex	2																																				2				

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Spiranthes sinensis spp. *australis*	austral lady's tresses	10																																							10	
Sprengelia incarnata	pink swamp-heath	34																																								30	4
Spyridium coactilifolium	butterfly spyridium	19										12																		4			3									
Spyridium eriocephalum var. *eriocephalum*	heath spyridium	4																											1			3										
Spyridium parvifolium	dusty miller	114	27	21	7	4		1		28			1					1	5	4	3			1		7			1	1	2											
Spyridium phylicoides	narrow-leaf spyridium	2										2																														
Spyridium spathulatum	spoon-leaf spyridium	13	1																1							3			7	1												
Spyridium thymifolium	thyme-leaf spyridium	159	1				1	18	3	10	59	30																	9	20	1											6
Spyridium tricolor	rusty spyridium	3								1		1					1																									
Spyridium vexilliferum var. *vexilliferum*	winged spyridium	39	2	16						18		1																	1			1										
Stackhousia aspericocca spp.		85	10	5	12	2		6	7	5	22	2												1		2	1	1	1	7	1										1
Stackhousia monogyna	creamy candles	12	2									3													1		4									1						
Stellaria palustris var.	swamp starwort	16				2		1	1						5	2			1					1														3				
Stylidium graminifolium	grass trigger-plant	161	12	2	32	1		18	6	33	35	12															1			2	1										5	1
Styphelia exarrhena	desert heath	21									1	10																8	1		1	1									
Swainsona lessertiifolia	coast swainson-pea	4																																				4				
Taraxacum officinale	dandelion	9	1		2				1					1					1	1		2																				
Tetragonia implexicoma	bower spinach	12																										1									11				
Tetratheca pilosa spp. *pilosa*	hairy pink-bells	338	71	17	51	7	3	29	13	59	56	8				1		4	3								3		1	12												
Themeda triandra	kangaroo grass	90	10		10	1			1			2	2	7	1	3	1	2	4	3	1		13	2	3	2	10	1		4	1	3		1			2						
Thomasia petalocalyx	paper-flower	15										4																4	1	3		1	1	1								
Threlkeldia diffusa	coast bonefruit	5																																			5					
Thysanotus patersonii	twining fringe-lily	3 50	61	34	11		5	9	21	22	15	6			1	1		4	20	20	1	1	7	6	1	19	3	8	10	30	16	1 1	1	1		1			1			4
Tragopogon porrifolius	salsify	2																							2																	

Species	Common Name	Total all gps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	19	21	22	23	24	25	26	27	28	29	30	31	32	30	34	35	36	37	38	39	40	41
Triglochin procerum	water-ribbons	13													1		1																						3	1	1	6	
Triglochin striatum	streaked arrowgrass	5														1	1																							3			
Typha domingensis	narrow-leaf bulrush	4															1																								1	2	
Ulex europaeus	gorse	39			6	5			6		1			3		1	1	1		3				2						2	2							1	1		2	1
Utricularia dichotoma	purple bladderwort	26																																							25	1
Verbascum virgatum	twiggy mullein	6											3											1													2					
Villarsia umbricola var. *umbricola*	lax marsh-flower	31																																					4	3	1	21	2
Viminaria juncea	native broom	46																																					2	1		40	3
Viola cleistogamoides	shy violet	9	2				1	2	3		1																																
Viola hederacea	ivy-leaf violet	57	4		4	6	4	6	2	5	9				4														1	2	1								1			3	4
Viola sieberiana	tiny violet	70	4				2	16	16		19	1																		9													3
Vittadinia cuneata var. *cuneata* forma *cuneata*	fuzzy New Holland daisy	6														1									2	1					2											
Wahlenbergia communis	tufted bluebell	2	2																																								
Wahlenbergia luteola	yellow-wash bluebell	6	1					1	2																	1					1												
Wahlenbergia multicaulis	Tadgell's bluebell	4	1				1		1				1																														
Wahlenbergia stricta spp. *stricta*	tall bluebell	128	23	6	11	1		5	12	4		2				11		1	2	5	1	2		7	1	4	9			12	10											
Xanthosia dissecta var. *floribunda*	cut-leaved xanthosia	11										10																														1
Xanthosia pusilla	hairy xanthosia	1 80	16	11	8			8	5	44	35	27														1		2	12	10												2
Xanthorrhoea quadrangulata	rock grass-tree	16																	2		2		2	1		3	5							1								
Xanthorrhoea semiplana spp.	yacca	715	80	47	29	4	18	45	34	79	67	76			5	13		3	29	15	1	3	6	7		11	9	14	14	61	27	8	1	2					2				5
Xanthosia tasmanica	southern xanthosia	8						5	1		1																															1
Xyris operculata	tall yellow-eye	31																																							30	1
Zantedeschia aethiopica	white arum lily	2							1																														1				
Zieria veronicea	pink zieria	11										8																2														1

Total records = 31596

Group No.	Total Records
1	3,403
2	1584
3	2220
4	554
5	498
6	1287
7	960
8	2816
9	2150
10	2596
11	188
12	145
13	30
14	532
15	126
16	336
17	885
1`8	721
19	125
20	51
21	498
22	485
23	119
24	861
25	678
26	461
27	623
28	2049
29	715
30	470
31	94
32	83
33	7
34	24
35	39
36	226
37	422
38	175
39	124
40	1544
41	421

APPENDIX IX

SOUTH AUSTRALIAN VEGETATION STRUCTURAL FORMATIONS [ADAPTED FROM FORWARD & ROBINSON (1996)].

Life Form/ Height Class	Projective Foliage Cover of Tallest Stratum			
	Dense (70 – 100%)	Mid-dense(30-70%)	Sparse (10-30%)	Very sparse (<10%)
Trees >30m	Tall closed forest	Tall open forest	Tall woodland	Tall open woodland
Trees 10 – 30m	Closed forest	Open forest	Woodland	Open woodland
Trees 5-10m	Low closed forest	Low open forest	Low woodland	Low open woodland
Trees <5m	Very low closed forest	Very low open forest	Very low woodland	Very low open woodland
Mallee (>3m)	Closed mallee	Mallee	Open mallee	Very open mallee
Low Mallee (<3m)	Closed low mallee	Low mallee	Open low mallee	Very open low mallee
Shrubs >2m	Tall closed shrubland	Tall shrubland	Tall open shrubland	Tall very open shrubland
Shrubs 1-2m	Closed shrubland	Shrubland	Open shrubland	Very open shrubland
Shrubs <1m	Low closed shrubland	Low shrubland	Low open shrubland	Low very open shrubland
Mat plants	Closed mat plants	Mat plants	Open mat plants	Very open mat plants
Hummock grasses	Closed Hummock grassland	Hummock grassland	Open Hummock grassland	Very open hummock grassland
Tussock grasses	Closed (tussock) grassland	(Tussock) grassland	Open (tussock) grassland	Very open (tussock) grassland
Sedges	Closed sedgeland	Sedgeland	Open sedgeland	Very open sedgeland
Herbs	Closed herbland	Herbland	Open herbland	Very open herbland
Ferns	Closed fernland	Fernland	Open fernland	Very open fernland

[Note: Table originally derived from Specht (1972) and Muir (1977]

Trees Woody; perennial; erect; canopy raised well above the ground. Depth of canopy is usually less than or equal to two thirds of the total tree height. Single stemmed, or if multi-stemmed, fewer than five individual trunks resulting from branching of a single short trunk, that is not a mallee-like lignotuber. Height usually 2m

Mallees Genus Eucalyptus; multi-stemmed, trunks arising from lignotuber. Low mallee <3m. Mallee >3m.

Shrubs Woody; perennial; erect, procumbent or weeping; foliage occupies all or part of total plant height; multiple stems and branches arising from a rootstock or very short common trunk; generally <5m tall.

Mat Plants Herbaceous or woody plants of prostrate habit, with major stems growing along the ground. Rarely exceeds 10cm in height. Examples of mat plants are *Kunzea pomifera, Myoporum parvifolium, Carpobrotus rossii* and *Mimulus repens.*

Hummock Grass Genera Triodia or Plectrachne only.

Grasses (tussock) Family Poaceae (Gramineae); leaf sheath always split.

Sedges Herbaceous, usually perennial, erect, generally tufted; arise from stolons, tubers, bulbs, rhizomes or seeds. Leaf sheath never split. Includes Cyperaceae, Juncaceae, Restionaceae, Typhaceae and Xyridaceae and other sedge-like forms.

Herbs Herbaceous or slightly woody; annual or sometimes perennial; erect or creepers; rarely exceeds 0.5m height.

Ferns Ferns and fern allies, i.e. non-vascular cryptograms of classes Filicopsida and Lycopsida. This category includes *Ophioglossum* spp., *Lycopodium* spp. *Selaginella* spp. and *Isoetes* spp.

Source: Heard and Channon (1997) Appendix 3G
Adapted from Forward, L.R. and Robinson, A.C. (eds) (1996). *A Biological Survey of the South Olary Plain South Australia,* 1991 – 1992. Biological Survey and Research, Natural Resources Group, Department of Environment and Natural Resources, South Australia.

APPENDIX X

SOUTHERN MOUNT LOFTY RANGES FLORISTIC GROUPS SPECIES AND PHYSICAL CHARACTERISTICS TABLES.

PATN analysis was used to clump 1178 survey sites from five separate surveys into 41 groups based on the similarity of their floristic composition (using species presence data). All survey sites were within the Mount Lofty Ranges and Fleurieu IBRA regions. **For each group**, the title is followed by:

- A table of **perennial** species that were present at >40% of sites comprising the group
- A table of **perennial** species that were present at <40% of sites **and** had a high value of significance to the group. The significance value was the significance from random and calculated as observed frequency – expected frequency / expected frequency (O-E/E). A high value was taken to be greater than 7 (refer Robertson 1998).

These two tables include for each species**: percentage of sites recorded from within the group, the number of sites recorded from within the group (frequency), frequency for all groups; the significance from random (O-E/E) and the frequency for all groups.**

- A table listing species (including annual and perennials) with either a State conservation rating (listed as Rare, Vulnerable or Endangered in the National Parks & Wildlife Act 1972) and/or Australian conservation rating (Environment Protection and Biodiversity Conservation Act 1999)
- Tables detailing physical parameters for each group – landform, soil texture, slope, aspect and vegetation structure. NB: these details are available for approximately 75% of sites within each group (refer Methods – Chapter 2).
- Introduced species are preceded by an asterisk

To differentiate more clearly, the significance value in the table of common perennial species includes one decimal place. The four highest significance values in this same table are highlighted in bold. All other numbers have been rounded to the nearest whole unit (ie zero decimal places).

GROUP 1 (111 SITES): *EUCALYPTUS OBLIQUA*, +/– *E. FASCICULOSA*, +/- *E. GONIOCALYX* OPEN FOREST AND LOW WOODLAND

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Lepidoserma semiteres	93	103	595	0.6
Gonocarpus tetragynus	91	101	688	0.4
Eucalyptus obliqua	86	95	477	0.9
Acrotriche serrulata	81	90	460	0.8
Acacia pycnantha	80	89	538	0.5
Hibbertia exutiacies	80	89	364	**1.3**
Platylobium obtusangulum	74	82	512	0.5
Xanthorrhoea semiplana spp.	72	80	715	0.0
Arthropodium strictum	68	75	388	0.8
Hibbertia sericea var. *sericea*	66	73	326	1.1
Leptospermum myrsinoides	66	73	506	0.3
Tetratheca pilosa	64	71	338	1.0
Eucalyptus fasciculosa	62	69	493	0.3
Acacia myrtifolia	59	65	450	0.4
Goodenia blackiana	59	65	379	0.6
Hakea rostrata	59	65	498	0.2
Pultenaea daphnoides	59	65	356	0.7
Scaevola albida	56	62	248	**1.3**
Thysanotus patersonii	55	61	350	0.6
Cassytha glabella forma *dispar*	54	60	335	0.7
Lomandra multiflora spp. *dura*	53	59	305	0.8
Astroloma humifusum	52	58	479	0.1
Eucalyptus goniocalyx	40	44	126	**2.3**
Pultenaea largiflorens	40	44	188	**1.2**

Species with a frequency of < 40% but with a high significance to group (partial partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Wahlenbergia communis	2	2	2	8
Austrostipa pubinodis	4	4	5	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating.

Species Name	Family	NPW Act Rating	Australian Rating
Stellaria pungens	CARYOPHYLLACEAE	Rare	
Helichrysum rutidolepis	COMPOSITAE	Endangered	
Deyeuxia densa	GRAMINEAE	Rare	
Poa umbricola	GRAMINEAE	Rare	
Acacia gunnii	LEGUMINOSAE	Rare	
Eucalyptus dalrympleana spp. *dalrympleana*	MYRTACEAE	Rare	
Eucalyptus viminalis spp. *viminalis*	MYRTACEAE	Rare	
Caladenia argocalla	ORCHIDACEAE	Endangered	Endangered
Spyridium spathulatum	RHAMNACEAE	Rare	

LANDFORM	Frequency
Gully	1
Hill crest	4
Hill slope	14
Ridge	1

SOIL TYPE	Frequency
clay loam	8
clay loam, sandy	1
light medium clay	1
medium clay	1
sandy clay loam	2
sandy loam	6
silty clay loam	2

SITE SLOPE	Frequency
0^0 - 5^0	30
6^0 –10^0	25
11^0 - 15^0	31
16^0-20^0	14
20^0-25^0	4
26^0-30^0	5
$>30^0$	3

STRUCTURE	Frequency
Low open forest	7
Low woodland	25
Mallee	1
Open forest	25
Open woodland	1
Low open woodland	3
Very low open woodland	3
Woodland	21

ASPECT
Northerly Aspect = 59%
Southerly Aspect = 41%

GROUP 2 (49 SITES): *EUCALYPTUS GONIOCALYX*, +/– *E. FASCICULOSA* +/- *E. OBLIQUA*) LOW WOODLAND OVER *ACACIA PYCNANTHA, XANTHORRHOEA SEMIPLANA, HAKEA ROSTRATA.*

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Acacia pycnantha	96	47	538	0.7
Xanthorrhoea semiplana spp.	96	47	715	0.0
Eucalyptus fasciculosa	94	46	493	0.9
Hakea rostrata	86	42	498	0.7
Eucalyptus goniocalyx	86	42	126	**5.7**
Leptospermum myrsinoides	84	41	506	0.6
Lepidosperma semiteres	82	40	595	0.3
Gonocarpus tetragynus	76	37	688	0.1
Hibbertia sericea var. *sericea*	76	37	326	1.1
Calytrix tetragona	71	35	224	2.1
Thysanotus patersonii	69	34	350	0.9
Astroloma conostephioides	69	34	300	1.2
Allocasuarina muelleriana spp. *muelleriana*	65	32	164	**2.9**
Hakea carinata	63	31	250	1.5
Isopogon ceratophyllus	63	31	385	0.6
Acrotriche serrulata	59	29	460	0.3
Cassytha glabella forma *dispar*	59	29	335	0.7
Hibbertia exutiacies	57	28	364	0.5
Astroloma humifusum	57	28	479	0.1
Pultenaea largiflorens	55	27	188	1.9
Acacia myrtifolia	53	26	450	0.2
Goodenia blackiana	49	24	379	0.3
Pimelea linifolia spp. *linifolia*	49	24	196	1.4
Ixodia achillaeoides spp. *alata*	49	24	272	0.8
Dillwynia hispida	49	24	212	1.3
Platylobium obtusangulum	45	22	512	-0.1
Arthropodium strictum	45	22	388	-0.1
Spyridium parvifolium	43	21	114	**2.7**
Acrotriche depressa	43	21	61	**6**

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7).

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Callistemon teretifolius	4	2	2	19
Sphaerolobium minus	4	2	2	19
Acacia continua	29	14	24	11
Danthonia clelandii	6	3	5	10.
**Chamaecytisus palmensis*	2	1	2	10
Callitris rhomboidea	10	5	10	10
**Melaleuca armillaris*	2	1	2	9
Pimelea flava spp. *dichotoma*	2	1	2	9
Senecio minimus var. *minimus*	6	3	6	9
Spyridium vexilliferum var. *vexilliferum*	33	16	39	7
Deyeuxia minor	6	3	8	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating.

Species	Family	NPW Act Rating	Australian Rating
Helichrysum rutidolepis	COMPOSITAE	Endangered	
Deyeuxia minor	GRAMINEAE	Vulnerable	
Prostanthera chlorantha	LABIATAE	Rare	
Sphaerolobium minus	LEGUMINOSAE	Rare	
Logania saxatilis	LOGANIACEAE	Rare	
Correa eburnea	RUTACEAE	Vulnerable	
Levenhookia stipitata	STYLIDIACEAE	Rare	

LANDFORM Frequency SOIL TYPE Frequency SITE SLOPE Frequency

Hill slope	7	clay loam	2	0^0 - 5^0	15
Hill crest	2	clayey sand	1	6^0 –10^0	14
		light clay	1	11^0 - 15^0	4
		loamy sand	2	16^0 - 20^0	6
		sandy clay loam	1	21^0-25^0	3
		sandy loam	2	26^0-30^0	nil
				$>30^0$	1

STRUCTURE	**Frequency**
Low open forest	2
Low open woodland	2
Low woodland	11
Mallee	2
Open forest	1

ASPECT
Southerly Aspect: 40%
Northerly Aspect: 60%

GROUP 3 (80 SITES) *EUCALYPTUS OBLIQUA* +/– *E. BAXTERI* +/- *E. FASCICULOSA* OPEN FOREST OVER *PULTENAEA DAPHNOIDES*, *ACACIA MYRTIFOLIA*

Species	% Frequency of Species >40% within group	Frequency ithin group	Frequency all groups	Significance to group
Eucalyptus obliqua	94	75	477	1.2
Pultenaea daphnoides	89	71	356	1.9
Ixodia achillaeoides spp. *alata*	84	67	272	**2.5**
Lepidosperma semiteres	84	67	595	0.6
Acacia myrtifolia	81	65	450	1.1
Gonocarpus tetragynus	75	60	688	0.2
Hibbertia sericea var. *sericea*	69	55	326	1.4
Acrotriche serrulata	66	53	460	0.6
Tetratheca pilosa	64	51	338	1.2
Epacris impressa	63	50	277	1.6
Acrotriche fasciculiflora	59	47	117	**4.7**
Lomandra multiflora spp. *dura*	58	46	305	1.2
Pteridium esculentum	56	45	271	1.4
Scaevola albida	55	44	248	1.5
Leptospermum myrsinoides	54	43	506	0.2
Daviesia leptophylla	53	42	157	**2.8**
Lomandra micrantha spp.	53	42	371	0.6
Hibbertia exutiacies	51	41	364	0.6
Platylobium obtusangulum	51	41	512	0.1
Hakea rostrata	50	40	498	0.1
Exocarpos cupressiformis	49	39	256	1.2
Pimelea linifolia spp. *linifolia*	48	38	191	1.8
Lomandra fibrata	44	35	143	**2.5**
Stylidium graminifolium	40	32	161	1.8

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7).

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
**Erica arborea*	3	2	2	13
Pultenaea graveolens	3	2	2	13

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Euphrasia collina spp. *osbornii*	SCROPHULARIACEA	Endangered	Endangered
Helichrysum rutidolepis	COMPOSITAE	Endangered	
Danthonia carphoides var. *carphoides*	GRAMINEAE	Rare	
Deyeuxia densa	GRAMINEAE	Rare	
Poa umbricola	GRAMINEAE	Rare	
Acacia gunnii	LEGUMINOSAE	Rare	
Eucalyptus dalrympleana spp. *dalrympleana*	MYRTACEAE	Rare	
Eucalyptus viminalis spp. *viminalis*	MYRTACEAE	Rare	

LANDFORM	Frequency
Gully	1
Hill crest	2
Hill slope	39
Ridge	18

SOIL TYPE	Frequency
clay loam	2
light clay	2
loam	2
loamy sand	1
sandy clay loam	3
sandy loam	50

SITE SLOPE	Frequency
0^0 - 5^0	30
6^0 –10^0	17
11^0 - 15^0	46
16^0-20^0	13
20^0-25^0	8
26^0-30^0	6
$>30^0$	3

STRUCTURE	Frequency
Low open forest	2
Low woodland	14
Open forest	39
Very low woodland	1
Open woodland	2
Woodland	19

ASPECT
Southerly Aspect: 41%
Northerly Aspect: 59%

GROUP 4 (26 SITES): *EUCALYPTUS OBLIQUA*, +/– *E. DALRYMPLEANA* SPP. *DALRYMPLEANA* OPEN FOREST AND WOODLAND

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Eucalyptus obliqua	92	24	477	1.9
Pteridium esculentum	85	22	271	3.6
Acrotriche fasciculiflora	81	21	117	**9.3**
**Rubus* sp.	77	20	128	7.9
Hibbertia exutiacies	73	19	364	2.0
Gonocarpus tetragynus	62	16	688	0.3
Pultenaea daphnoides	62	16	356	1.6
Bursaria spinosa	58	15	164	**14.3**
**Genista monspessulana*	58	15	48	4.2
Adiantum aethiopicum	58	15	56	**17.1**
Ixodia achillaeoides spp. *alata*	50	13	272	1.9
Exocarpos cupressiformis	50	13	256	1.7
Scaevola albida	46	12	248	**13.7**
**Senecio pterophorus* var. *pterophorus*	46	12	167	4.4
Acacia melanoxylon	46	12	47	1.7
Goodenia ovata	46	12	126	3.1
Acacia myrtifolia	42	11	450	0.4
Leptospermum continentale	42	11	188	2.3

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Ajuga australis form A	4	1	2	31
Eucalyptus dalrympleana spp. *dalrympleana*	27	7	14	27
**Cytisus scoparius*	27	7	18	21
Correa decumbens	4	1	3	20
**Rumex crispus*	4	1	3	18
Senecio hypoleucus	12	3	11	15
Juncus holoschoenus	8	2	9	14
Isolepis fluitans	4	1	5	11
Deyeuxia densa	23	6	30	10
Carex gaudichaudiana	4	1	5	10
**Erica lusitanica*	8	2	11	10
Epilobium hirtigerum	4	1	6	8

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Gleichenia microphylla	GLEICHENIACEAE	Rare	
Deyeuxia densa	GRAMINEAE	Rare	
Eucalyptus dalrympleana spp. *dalrympleana*	MYRTACEAE	Rare	
Eucalyptus viminalis spp. *viminalis*	MYRTACEAE	Rare	

LANDFORM	Frequency
Hill slope	2

SOIL TYPE	Frequency
loamy sand	2

SITE SLOPE	Frequency
0^0 - 5^0	9
6^0 –10^0	4
11^0 - 15^0	nil
16^0 - 20^0	3
21^0-25^0	5
26^0-30^0	3
$>30^0$	3

STRUCTURE	Frequency
Open woodland	2
Low open woodland	3
Low open forest	3
Low woodland	1
Open forest	15
Very low open woodland	1
Very lowclosed forest	1
Very low woodland	2
Woodland	12

ASPECT
Southerly Aspect: 78%
Northerly Aspect: 22%

GROUP 5 (25 sites): 1 = *EUCALYPTUS OBLIQUA*, +/- *E. FASCICULOSA* OPEN FOREST OVER *PULTENAEA DAPHNOIDES*

2 = *EUCALYPTUS BAXTERI*, +/- *E. COSMOPHYLLA*, +/- *E. FASCICULOSA* LOW OPEN FOREST OVER *PULTENAEA DAPHNOIDES*

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Goodenia ovata	88	22	126	**10.1**
Pultenaea daphnoides	88	22	356	**2.9**
Hibbertia exutiacies	76	19	364	2.3
Xanthorrhoea semiplana spp.	72	18	715	0.6
Gonocarpus tetragynus	68	17	688	0.6
Eucalyptus obliqua	64	16	477	1.1
Eucalyptus fasciculosa	60	15	493	0.9
Gonocarpus mezianus	52	13	202	**3.1**
Billardiera bignoniacea	48	12	94	**7.1**
Cassytha pubescens	44	11	230	2.0
Pteridium esculentum	44	11	271	1.6
Acacia myrtifolia	40	10	450	0.4
Acrotriche serrulata	40	10	460	0.4
Eucalyptus cosmophylla	40	10	261	1.4

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Bracteantha bracteata	8	2	4	32
Correa aemula	32	8	27	18
Wahlenbergia multicaulis	4	1	4	15
Amyema pendulum spp. *pendulum*	4	1	4	14
Pelargonium littorale	4	1	6	10
Galium migrans	4	1	7	8
Senecio odoratus var. *odoratus*	8	2	14	8
Adiantum aethiopicum	32	8	56	8

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Correa eburnea	RUTACEAE	Vulnerable	

LANDFORM	Frequency	SOIL TYPE	Frequency	SITE SLOPE	Frequency
Hill slope	1	medium clay	1	0^0 - 5^0	6
Hill footslope	1	sandy loam	1	6^0 –10^0	2
				11^0 - 15^0	7
				16^0 - 20^0	7
				21^0-25^0	1
				26^0-30^0	nil
				>30^0	1

STRUCTURE	Frequency
Low open forest	4
Open forest	6
Low open woodland	1
Very low open woodland	1
Very low woodland	2
Woodland	**2**
Low woodland	1

ASPECT
Southerly Aspect: 43%
Northerly Aspect: 57%

GROUP 6 (48 sites): *EUCALYPTUS OBLIQUA*, +/– *EUCALYPTUS BAXTERI* +/- *E. FASCICULOSA* OPEN FOREST AND LOW OPEN FOREST.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Xanthorrhoea semiplana spp.	94	45	715	0.5
Hakea rostrata	94	45	498	1.2
Lepidosperma semiteres	94	45	595	0.9
Platylobium obtusangulum	92	44	512	1.1
Eucalyptus obliqua	83	40	477	1.0
Epacris impressa	81	39	277	2.4
Isopogon ceratophyllus	79	38	385	1.4
Acacia myrtifolia	75	36	450	1.0
Gonocarpus tetragynus	73	35	688	0.2
Pultenaea daphnoides	73	35	356	1.4
Acrotriche serrulata	71	34	460	0.8
Goodenia blackiana	67	32	379	1.1
Tetratheca pilosa	60	29	338	1.1
Pteridium esculentum	60	29	271	1.6
Daviesia ulicifolia	58	28	180	**2.8**
Daviesia leptophylla	50	24	157	**2.7**
Cassytha glabella forma *dispar*	48	23	335	0.7
Banksia marginata	48	23	245	1.3
Pultenaea involucrata	48	23	89	**5.4**
Platysace heterophylla var. *heterophylla*	46	22	118	**3.6**
Eucalyptus baxteri	44	21	195	1.7
Hibbertia exutiacies	42	20	364	0.4

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Xanthosia tasmanica	10	5	8	15
Solanum laciniatum	2	1	2	11
Hibbertia eupetrifolia spp. *radians*	13	6	13	11
Pultenaea scabra	4	2	4	10
Olearia teretifolia	29	14	34	9
Logania linifolia	2	1	3	8

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Leucopogon hirsutus	EPACRIDACEAE	Rare	
Pultenaea scabra	LEGUMINOSAE	Rare	
Diuris brevifolia	ORCHIDACEAE	Rare	
Gastrodia sesamoides	ORCHIDACEAE	Rare	
Xanthosia tasmanica	UMBELLIFERAE	Rare	

LANDFORM	Frequency
Hill crest	8
Hill slope	10

SOIL TYPE	Frequency
clay loam	2
clay-loam, sandy	1
light clay	2
light medium clay	1
loam	1
medium clay	5
sandy clay loam	1
sandy loam	2

SITE SLOPE	Frequency
0^0 - 5^0	20
6^0 –10^0	10
11^0 - 15^0	6
16^0-20^0	5
20^0-25^0	6
26^0-30^0	nil
$>30^0$	1

STRUCTURE	Frequency
Low open forest	13
Low woodland	3
Open forest	15
Shrubland	**1**
Woodland	5
Low mallee	1
Very low woodland	1

ASPECT
Southerly Aspect: 44%
Northerly Aspect: 56%

GROUP 7 (34 SITES): *EUCALYPTUS OBLIQUA*, +/- *EUCALYPTUS FASCICULOSA* LOW OPEN FOREST OVER *XANTHORRHOEA SEMIPLANA* SPP.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Xanthorrhoea semiplana spp.	100	34	715	0.6
Eucalyptus obliqua	97	33	477	1.3
Gonocarpus tetragynus	82	28	688	0.3
Acrotriche serrulata	71	24	460	0.7
Billardiera cymosa	62	21	152	**3.6**
Lepidosperma semiteres	62	21	595	0.2
Lomandra micrantha spp.	62	21	371	0.9
Platylobium obtusangulum	62	21	512	0.4
Thysanotus patersonii	62	21	350	1.0
Eucalyptus fasciculosa	59	20	493	0.3
Olearia ramulosa	56	19	373	0.7
Pultenaea daphnoides	56	19	356	0.8
Acacia pycnantha	50	17	538	0.0
Astroloma humifusum	47	16	479	0.1
Isopogon ceratophyllus	47	16	385	0.4
Oxalis perennans	47	16	125	**3.2**
Viola sieberiana	47	16	70	**6.5**
Acacia myrtifolia	44	15	450	0.1
Goodenia blackiana	44	15	379	0.3
Hibbertia riparia (*glabriuscula*)	44	15	195	1.5
Daviesia ulicifolia	41	14	180	**1.6**
Epacris impressa	41	14	277	0.7

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Ranunculus pachycarpus	3	1	2	16
**Zantedeschia aethiopica*	3	1	2	15
**Lolium perenne*	3	1	2	15
Lagenifera stipitata var. *stipitata*	3	1	3	12
Indigofera australis var. *australia*	3	1	3	11
Viola cleistogamoides	9	3	9	10
Wahlenbergia luteola	6	2	6	10
**Scabiosa atropurpurea*	3	1	4	8
Dichelachne micrantha	3	1	4	8

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Pycnosorus globosus	COMPOSITAE	Vulnerable	
Danthonia laevis	GRAMINEAE	Rare	
Deyeuxia densa	GRAMINEAE	Rare	
Echinopogon ovatus var. *ovatus*	GRAMINEAE	Rare	
Corybas unguiculatus	ORCHIDACEAE	Rare	
Gastrodia sesamoides	ORCHIDACEAE	Rare	
Xanthosia tasmanica	UMBELLIFERAE	Rare	

LANDFORM	Frequency
Flat	1
Hill crest	5
Hill slope	10
Ridge	1

SOIL TYPE	Frequency
clay loam	2
clay-loam, sandy	1
light clay	1
loamy sandy	1
medium clay	1
sandy clay loam	7
sandy loam	3
silty clay loam	1

SITE SLOPE	Frequency
0^0 - 5^0	8
6^0 –10^0	14
11^0 - 15^0	6
16^0 - 20^0	5
21^0-25^0	2
26^0-30^0	1
>30^0	1

STRUCTURE	Frequency
Low open forest	9
Low woodland	3
Mallee	1
Open forest	6
Woodland	1

ASPECT
Southerly Aspect: 62%
Northerly Aspect: 38%

GROUP 8 (98 SITES): 1 = *EUCALYPTUS OBLIQUA*, +/– *E. COSMOPHYLLA*, +/– *E. FASCICULOSA* OPEN FOREST AND WOODLAND

2 = *EUCALYPTUS BAXTERI*, +/- *E. COSMOPHYLLA*, +/- *E. FASCICULOSA* WOODLAND

3 =*EUCALYPTUS COSMOPHYLLA*, +/- *E. FASCICULOSA*, +/- *E. BAXTERI* VERY LOW WOODLAND

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Leptospermum myrsinoides	92	90	506	1.0
Lepidosperma semiteres	86	84	595	0.6
Hakea rostrata	83	81	498	0.8
Platylobium obtusangulum	82	80	512	0.8
Xanthorrhoea semiplana spp.	81	79	715	0.2
Gonocarpus tetragynus	77	75	688	0.2
Acacia myrtifolia	72	71	450	0.8
Acrotriche serrulata	70	69	460	0.7
Isopogon ceratophyllus	68	67	385	0.9
Eucalyptus obliqua	67	66	477	0.5
Epacris impressa	67	66	277	**1.7**
Ixodia achillaeoides spp. *alata*	65	64	272	**1.6**
Eucalyptus cosmophylla	65	64	261	**1.7**
Tetratheca pilosa	60	59	338	1.0
Lomandra micrantha spp.	60	59	371	0.8
Astroloma humifusum	57	56	479	0.3
Hibbertia sericea var. *sericea*	56	55	326	0.9
Lepidosperma carphoides	55	54	269	1.3
Leucopogon virgatus	54	53	228	**1.6**
Hakea carinata	53	52	250	1.3
Goodenia blackiana	53	52	379	0.5
Banksia marginata	46	45	245	1.1
Xanthosia pusilla	45	44	180	**1.8**
Astroloma conostephioides	44	43	300	0.6
Cassytha pubescens	43	42	230	1.1
Cassytha glabella forma *dispar*	40	39	335	0.3

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Olearia ciliata var.*ciliata*	3	3	4	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Helichrysum rutidolepis	COMPOSITAE	Endangered	
Danthonia carphoides var. *carphoides*	GRAMINEAE	Rare	
Deyeuxia densa	GRAMINEAE	Rare	
Poa umbricola	GRAMINEAE	Rare	
Spyridium tricolor	RHAMNACEAE	Vulnerable	
Correa eburnea	RUTACEAE	Vulnerable	
Euphrasia collina spp. *osbornii*	SCROPHULARIACEAE	Endangered	
Anthocercis angustifolia	SOLANACEAE	Rare	

LANDFORM	Frequency	SOIL TYPE	Frequency	SITE SLOPE	Frequency
Hill slope	16	loamy sand	15	0^0 - 5^0	33
Ridge	1	clayey sand	1	6^0 –10^0	26
Hill crest	1	sand	2	11^0 - 15^0	14
				16^0 - 20^0	10
				21^0-25^0	4
				26^0-30^0	3
				>30^0	19

STRUCTURE	Frequency	ASPECT
Very low woodland	19	Southerly Aspect: 39%
Low open forest	11	Northerly Aspect: 61%
Woodland	23	
Low open woodland	8	
Low woodland	17	
Open forest	9	
Open woodland	3	
Very low open woodland	5	
Shrubland	2	

GROUP 9 (68 sites): EUCALYPTUS BAXTERI, +/- E. COSMOPHYLLA VERY LOW WOODLAND OVER XANTHORRHOEA SEMIPLANA.

***EUCALYPTUS OBLIQUA*, +/- *E. COSMOPHYLLA*, +/- *E. BAXTERI* AND LOW OPEN FOREST OVER *XANTHORRHOEA SEMIPLANA*..**

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Xanthorrhoea semiplana spp.	99	67	715	0.4
Lepidosperma semiteres	94	64	595	0.6
Leptospermum myrsinoides	90	61	506	0.8
Isopogon ceratophyllus	88	60	385	1.3
Platylobium obtusangulum	88	60	512	0.7
Spyridium thymifolium	87	59	159	**4.5**
Hakea rostrata	82	56	498	0.6
Tetratheca pilosa	82	56	338	1.4
Gonocarpus tetragynus	79	54	688	0.1
Leucopogon concurvus	74	50	102	**6.3**
Banksia marginata	72	49	245	1.9
Cassytha glabella forma *dispar*	72	49	335	1.1
Goodenia blackiana	71	48	379	0.9
Epacris impressa	69	47	277	1.5
Hakea carinata	65	44	250	1.6
Schoenus breviculmis	65	44	224	1.9
Allocasuarina striata	60	41	118	4.1
Eucalyptus baxteri	60	41	195	2.1
Eucalyptus cosmophylla	59	40	261	1.3
Eucalyptus obliqua	56	38	477	0.2
Lepidosperma carphoides	53	36	269	1.0
Acrotriche serrulata	51	35	460	0.1
Hibbertia riparia (*glabriuscula*)	51	35	195	1.6
Stylidium graminifolium	51	35	161	2.2
Xanthosia pusilla	51	35	180	1.8
Pultenaea involucrata	50	34	88	**4.6**
Lomandra micrantha spp.	49	33	371	0.3
Platysace heterophylla var. *heterophylla*	46	31	118	2.9
Leucopogon virgatus	44	30	228	0.9
Acacia myrtifolia	43	29	450	0.0
Micrantheum demissum	41	28	55	**6.5**
Olearia ramulosa	41	28	373	0.1

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Pultenaea viscidula	6	4	4	14
Eucalyptus cneorifolia	3	2	3	9
Dichelachne micrantha	3	2	4	7
Boronia edwardsii	4	3	5	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Danthonia laevis	GRAMINEAE	Rare	
Pultenaea scabra	LEGUMINOSAE	Rare	
Grevillea muricata	PROTEACEAE	Vulnerable	
Correa eburnea	RUTACEAE	Vulnerable	
Choretrum glomeratum var. *chrysanthum*	SANTALACEAE	Rare	
Xanthosia tasmanica	UMBELLIFERAE	Rare	

LANDFORM	Frequency
Hill slope	10
Ridge	2
Hill crest	5
Hill footslope	1

SOIL TYPE	Frequency
clay loam	2
clayey sand	4
light medium clay	1
loamy sand	2
sandy clay loam	2
sandy loam	6
silt loam	1

SITE SLOPE	Frequency
0^0 - 5^0	22
6^0 –10^0	19
11^0 - 15^0	14
16^0 - 20^0	7
21^0-25^0	3
26^0-30^0	1
>30^0	nil

STRUCTURE	Frequency	ASPECT
Very low woodland	18	Southerly Aspect: 66%
Low open forest	5	Northerly Aspect: 34%
Low woodland	3	
Very low open forest	**1**	
Very low open woodland	6	
Woodland	1	

GROUP 10 (84 sites): 1 = *EUCALYPTUS BAXTERI*, +/– *E. COSMOPHYLLA*, +/- *E. FASCICULOSA* LOW OPEN FOREST OR LOW WOODLAND.

2 = *EUCALYPTUS FASCICULOSA*, +/- *E. COSMOPHYLLA* +/- *E. DIVERSIFOLIA* LOW OPEN FOREST OR LOW WOODLAND.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Xanthorrhoea semiplana spp.	90	76	715	0.3
Platylobium obtusangulum	88	74	512	0.8
Leptospermum myrsinoides	86	72	506	0.7
Hypolaena fastigiata	83	70	98	**7.6**
Astroloma conostephioides	70	59	300	1.4
Lepidobolus drapetocoleus	68	57	66	**9.5**
Gonocarpus tetragynus	67	56	688	0.0
Isopogon ceratophyllus	67	56	385	0.8
Eucalyptus baxteri	67	56	195	2.5
Lomandra micrantha spp.	60	50	371	0.7
Brachyloma ericoides spp. *ericoides*	57	48	77	6.6
Hakea rostrata	55	46	498	0.1
Calytrix tetragona	54	45	224	1.5
Acacia myrtifolia	54	45	450	0.2
Schoenus breviculmis	54	45	224	1.5
Lepidosperma carphoides	54	45	269	1.1
Lepidosperma semiteres	52	44	595	-0.1
Eucalyptus cosmophylla	51	43	261	1.0
Eucalyptus fasciculosa	50	42	493	0.0
Banksia ornata	50	42	63	7.2
Cassytha glabella forma *dispar*	49	41	335	0.5
Leucopogon virgatus	44	37	228	1.0
Banksia marginata	44	37	245	0.8
Adenanthos terminalis	43	36	45	**8.8**
Phyllota pleurandroides	42	35	37	**10.6**
Hibbertia riparia (*glabriuscula*)	40	34	195	1.1

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Allocasuarina paludosa	4	3	3	11
Argentipallium obtusifolium	4	3	3	11
Brachyloma ciliatum	8	7	7	11
Leucopogon woodsii	2	2	2	11
Lomandra leucocephala spp. *robusta*	4	3	3	11
Pultenaea teretifolia var. *teretifolia*	2	2	2	11
Spyridium phylicoides	2	2	2	11
Argentipallium blandowskianum	6	5	5	11
Boronia filifolia	18	15	15	11
Conospermum patens	24	20	20	11
Allocasuarina pusilla	14	12	12	10
Xanthosia dissecta var. *floribunda*	12	10	11	10
Calytrix glaberrima	8	7	8	10
Pseudanthus micranthus	7	6	7	9
Lepidosperma concavum	18	15	18	9
Baeckea crassifolia	10	8	10	9
Lepidosperma congestum	17	14	18	9
Zieria veronicea	10	8	11	8
Lomandra juncea	11	9	14	7
Dillwynia sericea	31	26	41	7
Gahnia ancistrophylla	13	11	17	7
Carprobrotus modestus	2	2	3	7
Spyridium coactilifolium	14	12	19	7

Species with a State conservation rating (listed as either Rare, Endangered or Vulnerable in NPW Act, 1972

Species	Family	NPW Act Rating	Australian Rating
Pseudanthus micranthus	EUPHORBIACEAE	Rare	
Austrostipa breviglumis	GRAMINEAE	Rare	
Austrostipa multispiculis	GRAMINEAE	Rare	
Prostanthera chlorantha	LABIATAE	Rare	

Acacia dodonaeifolia	LEGUMINOSAE	Rare	
Grevillea muricata	PROTEACEAE	Vulnerable	
Spyridium coactilifolium	RHAMNACEAE	Vulnerable	Vulnerable
Spyridium tricolor	RHAMNACEAE	Vulnerable	
Correa eburnea	RUTACEAE	Vulnerable	
Zieria veronicea	RUTACEAE	Rare	

LANDFORM	**Frequency**	**SOIL TYPE**	**Frequency**	**SITE SLOPE**	**Frequency**
Hill crest	2	sand	11	0^0 - 5^0	54
Dune crest	1	clayey sand	1	6^0 –10^0	17
Hill slope	11	sandy loam	5	11^0 - 15^0	4
Hill footslope	2	loamy sand	3	16^0 - 20^0	nil
Dune slope	3			21^0-25^0	1
Swale	1			26^0-30^0	1
				>30^0	1

STRUCTURE	**Frequency**
Low closed forest	2
Low mallee	2
Low open forest	9
Low open woodland	4
Low woodland	9
Open forest	1
Open mallee	**2**
Shrubland	1
Very low open forest	3
Very low open woodland	7
Very low woodland	7
Very open shrubland	1
Woodland	2

ASPECT

Southerly Aspect: 49%

Northerly Aspect: 51%

GROUP 11 (12 sites): *EUCALYPTUS LEUCOXYLON OR E. VIMINALIS* SPP. *VIMINALIS* OR *E. OBLIQUA* OR *E. CAMALDULENSIS* WOODLAND OVER INTRODUCED SHRUBLAND OVER INTRODUCED GRASSES.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
**Senecio pterophorus* var. *pterophorus*	83	10	167	9.0
**Rubus sp.*	75	9	128	10.8
**Olea europaea* spp. *europaea*	67	8	78	16.2
**Plantago lanceolata* var. *lanceolata*	67	8	70	**18.2**
Pteridium esculentum	67	8	271	4.0
**Cirsium vulgare*	58	7	32	**35.4**
**Crataegus monogyna*	58	7	12	**98.1**
**Hypericum perforatum*	58	7	53	**21.1**
Eucalyptus leucoxylon spp.	50	6	121	7.3
Dichondra repens	42	5	176	3.8

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
**Asphodelus fistulosus*	17	2	2	167
**Verbascum virgatum*	25	3	6	85
**Melaleuca armillaris*	8	1	2	82
**Polygonum aviculare*	8	1	2	82
**Geranium dissectum*	8	1	2	81
Carex bichenoviana	8	1	2	77
Rumex brownii	8	1	2	77
Lagenifera stipitata var. *stipitata*	8	1	3	60
Juncus flavidus	8	1	3	55
Ajuga australis form *B*	8	1	3	53
**Lactua serriola*	8	1	3	53
**Rosa rubiginosa*	8	1	4	40
Echinopogon ovatus var. *ovatus*	8	1	4	39
**Rorippa nasturium-aquaticum*	8	1	4	39
Wahlenbergia multicaulis	8	1	4	38
Danthonia racemosa var. *racemosa*	17	2	10	34
Sonchus hydrophilus	8	1	5	30
Juncus subsecundus	25	3	18	28
Lepidosperma laterale s.str.	8	1	6	27
Amyema gracilis	8	1	6	26
Carex tereticaulis	8	1	6	26
**Rumex conglomeratus*	8	1	6	26
**Acetosella vulgaris*	33	4	25	25
Epilobium hirtigerum	8	1	6	24
Acacia retinodes var. *retinodes* (hill form)	17	2	14	24
**Foeniculum vulgare*	8	1	8	19
Geranium retrorsum	25	3	27	18
**Phalaris aquatica*	8	1	10	16
**Solanum nigrum*	8	1	11	14
Eucalyptus camaldulensis var. *camaldulensis*	25	3	33	14
Luzula densiflora	8	1	12	12
Lythrum hyssopifolia	8	1	13	12
Eucalyptus viminalis spp. *cygnetensis*	8	1	14	11
Cynoglossum suaveolens	8	1	14	10
**Asclepias rotundifolia*	25	3	45	10
Eucalyptus viminalis spp. *viminalis*	25	3	46	10
Danthonia pilosa var. *paleacea*	8	1	17	9
**Rosa canina*	17	2	38	8
Gahnia trifida	8	1	18	8

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Echinopogon ovatus var. *ovatus*	GRAMINEAE	Rare	
Juncus australis	JUNCACEAE	Rare	
Eucalyptus viminalis spp. *viminalis*	MYRTACEAE	Rare	
Veronica gracilis	SCROPHULARIACEAE	Vulnerable	

LANDFORM	Frequency
Hill slope	3
Gully	2
Stream channel	1

SOIL TYPE	Frequency
clay loam	3
light medium clay	1
loam	2

SITE SLOPE	Frequency
0^0 - 5^0	1
6^0 –10^0	1
11^0 - 15^0	4
16^0 - 20^0	4
21^0-25^0	3
26^0-30^0	1
$>30^0$	nil

STRUCTURE	Frequency
Open forest	3
Woodland	7
Low open woodland	1
Open woodland	2
Open shrubland	1

ASPECT

Southerly Aspect: 50%

Northerly Aspect: 50%

GROUP 12 (9 sites): *EUCALYPTUS VIMINALIS* SPP. *VIMINALIS*, +/- *E. LEUCOXYLON* SAVANNAH WOODLAND.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Acacia pycnantha	89	8	538	2.2
**Senecio pterophorus* var. *pterophorus*	78	7	167	8.2
Themeda triandra	78	7	90	**15.9**
Eucalyptus viminalis spp. *viminalis*	78	7	46	**32.0**
Scaevola albida	67	6	248	4.3
Pteridium esculentum	67	6	271	3.8
Lomandra sororia	56	5	71	**14.3**
**Genista monspessulana*	56	5	48	**22.1**
Gonocarpus tetragynus	44	4	688	0.3
Astroloma humifusum	44	4	479	0.8
Exocarpos cupressiformis	44	4	256	2.4
Dichondra repens	44	4	176	3.9
Eucalyptus leucoxylon spp.	44	4	121	6.1
**Rubus sp.*	44	4	128	5.7

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Juncus flavidus	11	1	3	75
Asplenium flabellifolium	11	1	7	29
**Taraxacum officinale*	11	1	9	22
Convolvulus erubescens	33	3	30	21
Senecio hypoleucus	11	1	11	19
**Crataegus monogyna*	11	1	12	17
Hardenbergia violacea	33	3	38	16
**Ulex europaeus*	33	3	39	16
Geranium retrorsum	22	2	27	15
Poa umbricola	11	1	16	12
Juncus subsecundus	11	1	18	11
**Cytisus scoparius*	11	1	18	11
**Asclepias rotundifolia*	22	2	45	9
**Acetosella vulgaris*	11	1	25	7
**Hypericum perforatum*	22	2	53	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Deyeuxia densa	GRAMINEAE	Rare	
Poa umbricola	GRAMINEAE	Rare	
Eucalyptus viminalis spp. *viminalis*	MYRTACEAE	Rare	

LANDFORM	Frequency
Gully	13

SOIL TYPE	Frequency
sandy clay loam	13

SITE SLOPE	Frequency
0^0 - 5^0	nil
6^0 –10^0	13
11^0 - 15^0	3
16^0 - 20^0	2
21^0-25^0	nil
26^0-30^0	1
>30^0	2

STRUCTURE	Frequency
Open forest	1
Open woodland	2
Woodland	6

ASPECT
Southerly Aspect: 81%
Northerly Aspect: 19%

GROUP 13 (12 sites): *EUCALYPTUS VIMINALIS* SPP. *VIMINALIS*, *E. OBLIQUA* +/- *E. FASCICULOSA* WOODLAND ALONG CREEKLINES.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Adiantum aethiopicum	83	10	56	**17.7**
Dichondra repens	83	10	176	4.9
Pteridium esculentum	83	10	271	2.9
Acaena novae-zelandiae	75	9	70	12.5
**Senecio pterophorus* var. *pterophorus*	75	9	167	4.7
Eucalyptus fasciculosa	58	7	493	0.5
**Rosa canina*	58	7	38	**18.3**
Eucalyptus viminalis spp. *viminalis*	50	6	46	**12.7**
**Hypochaeris radicata*	50	6	198	2.2
Juncus pallidus	50	6	58	9.9
**Rubus sp.*	50	6	128	3.9
Bursaria spinosa	42	5	164	2.2
Eucalyptus obliqua	42	5	477	0.1
**Stellaria palustris* var.	42	5	16	**32.2**
Xanthorrhoea semiplana spp.	42	5	715	-0.3

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Samolus repens	17	2	3	68
**Plantago major*	8	1	2	51
Apium prostratum spp. *prostratum* var.	8	1	2	51
Glycine latrobeana	8	1	2	48
Leucopogon lanceolatus	25	3	7	42
Scutellaria humilis	17	2	6	36
Pelargonium littorale	17	2	6	35
Callistemon sieberi	17	2	6	35
Myoporum viscosum	17	2	6	34
Cyperus vaginatus	33	4	12	33
**Cotula coronopifolia*	8	1	3	33
Epilobium hirtigerum	17	2	6	33
**Carduus tenuiflorus*	25	3	10	32
Asplenium flabellifolium	17	2	7	29
Bracteantha bracteata	8	1	4	25
Goodenia medicaginae	8	1	4	25
Isolepis platycarpa	8	1	4	25
Prunella vulgaris	8	1	4	24
**Aster subulatus*	8	1	4	23
Isolepis fluitans	8	1	5	20
**Dittrichia graveolens*	8	1	5	19
Juncus subsecundus	25	3	18	17
Lepidosperma laterale s.str.	8	1	6	17
Carex tereticaulis	8	1	6	16
**Rumex conglomeratus*	8	1	6	16
**Acetosella vulgaris*	33	4	25	15
Senecio hispidulus var. *hispidulus*	8	1	6	15
Juncus pauciflorus	25	3	21	14
Galium migrans	8	1	7	14
Senecio lautus	8	1	7	14
Persicaria decipiens	17	2	16	12
Carex fascicularis	17	2	17	12
Juncus holoschoenus	8	1	9	11
Geranium solanderi var. *solanderi*	25	3	28	10
**Pittosporum undulatum*	8	1	9	10
Epilobium billardierianum spp. *billardierianum*	8	1	9	10
**Phalaris aquatica*	8	1	10	10
Callitris rhomboidea	8	1	10	9
Lobelia alata	33	4	40	9
Poa tenera	8	1	10	9
Acacia retinodes var. *retinodes* (*swamp* form)	17	2	22	9
**Cirsium vulgare*	25	3	32	9
Carpobrotus rossii	8	1	12	7
Luzula densiflora	8	1	12	7
**Hypericum perforatum*	33	4	53	7
**Leontodon taraxacoides* spp. *taraxacoides*	8	1	13	7
Triglochin procerum	8	1	13	7

Species with a State conservation rating (listed as either Rare, Endangered or Vulnerable in NPW Act, 1972

Species	Family	NPW Act Rating	Australian Rating
Scutellaria humilis	LABIATAE	Rare	
Glycine latrobeana	LEGUMINOSAE	Vulnerable	Vulnerable
Eucalyptus viminalis spp. *viminalis*	MYRTACEAE	Rare	
Samolus eremaeus	PRIMULACEAE	Rare	
Pteris tremula	PTERIDACEAE	Rare	
Correa eburnea	RUTACEAE	Vulnerable	

LANDFORM	Frequency
Stream channel	2

SOIL TYPE	Frequency
loam	1
Clay loam	1

SITE SLOPE	Frequency
0^0 - 5^0	6
6^0 –10^0	nil
11^0 - 15^0	nil
16^0 - 20^0	2
21^0-25^0	1
26^0-30^0	1
>30^0	1

STRUCTURE	Frequency
Woodland	5
Low open woodland	1
Open forest	2

ASPECT
Southerly Aspect: 67%
Northerly Aspect: 33%

GROUP 14 (22 sites): *EUCALYPTUS LEUCOXYLON*, +/- *E. VIMINALIS* SPP. *VIMINALIS*, +/- *E. OBLIQUA* OPEN FOREST AND WOODLAND.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Dichondra repens	100	22	176	**6.4**
Eucalyptus leucoxylon spp.	77	17	121	**7.3**
Arthropodium strictum	73	16	388	1.5
Olearia ramulosa	68	15	373	1.4
Cheilanthes austrotenuifolia	59	13	229	2.4
Xanthorrhoea semiplana spp.	59	13	715	0.1
Pteridium esculentum	55	12	271	1.7
Acaena echinata var.	50	11	125	**4.2**
**Hypericum perforatum*	50	11	53	**11.4**
Wahlenbergia stricta spp. *stricta*	50	11	128	4.1
Gonocarpus tetragynus	45	10	688	-0.1
Oxalis perennans	45	10	125	3.7
Acacia pycnantha	41	9	538	0.0
**Hypochaeris radicata*	41	9	198	1.7
**Rubus sp.*	41	9	128	3.2
Scaevola albida	41	9	248	1.2

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Luzula ovata	5	1	2	32
Pimelea micrantha	5	1	2	32
Carex bichenoviana	5	1	2	31
Glycine latrobeana	5	1	2	31
Rumex brownii	5	1	2	31
**Lolium perenne*	5	1	2	30
Austrostipa nodosa	5	1	2	30
Correa calycina	5	1	2	29
Indigofera australis var. *australia*	5	1	3	22
**Malus sylvestris*	5	1	3	22
Ajuga australis form *B*	5	1	3	21
Lepidosperma laterale s.str.	9	2	6	19
**Carduus tenuiflorus*	14	3	10	18
Eucalyptus viminalis spp. *cygnetensis*	14	3	14	16
Senecio hypoleucus	14	3	11	16
Echinopogon ovatus var. *ovatus*	5	1	4	15
**Melianthus comosus*	5	1	4	15
Senecio squarrorus	5	1	4	15
Gahnia lanigera	5	1	4	15
Plantago hispida	9	2	9	12
Triglochin striatum	5	1	5	12
**Plantago coronopus* spp. *coronopus*	5	1	5	11
Danthonia racemosa var. *racemosa*	9	2	10	11
Poa tenera	9	2	10	11
Geranium retrorsum	23	5	27	10
Scutellaria humilis	5	1	6	10
Amyema gracilis	5	1	6	10
**Pennisetum macrourum*	5	1	6	10
**Myrsiphyllum declinatum*	5	1	6	10
Rumex conglomeratus	5	1	6	10
Geranium solanderi var. *solanderi*	23	5	28	10
Vittadinia cuneata var. *cuneata* forma *cuneata*	5	1	6	10
**Erica lusitanica*	9	2	11	10
Cymbonotus preissianus	5	1	6	9
Senecio hispidula	5	1	6	9
Convolvulus remotus	9	2	12	9
Leptorhynchos squamatus	9	2	12	9
**Rosa canina*	27	6	38	8
Pimelea serpyllifolia spp. *serpyllifolia*	5	1	7	8
Acacia retinodes var. *retinodes* (hill form)	9	2	14	8
Clematis microphylla	27	6	41	8

Species with a State conservation rating (listed as either Rare, Endangered or Vulnerable in NPW Act, 1972

Species	Family	NPW Act Rating	Australian Rating
Correa calycina	RUTACEAE	Not rated	Vulnerable
Echinopogon ovatus var. *ovatus*	GRAMINEAE	Rare	
Luzula ovata	JUNCACEAE	Rare	
Scutellaria humilis	LABIATAE	Rare	
Glycine latrobeana	LEGUMINOSAE	Vulnerable	Vulnerable
Eucalyptus viminalis spp. *viminalis*	MYRTACEAE	Rare	
Correa eburnea	RUTACEAE	Vulnerable	

LANDFORM	Frequency
Gully	2
Hill Slope	8
Limestone Plain	1
Stream Channel	2

SOIL TYPE	Frequency
Loam	2
Clay loam	2
Clay loam, sandy	1
Loamy-sand	2
Sandy-clay-loam	2
Sandy-loam	1
Silt-loam	1
Silty-clay-loam	2

SITE SLOPE	Frequency
$0 - 5^0$	5
$6 – 10^0$	4
$11 - 15^0$	3
$16-20^0$	3
20^0-25^0	2
$26-30^0$	4
$>30^0$	1

STRUCTURE	Frequency
Low open forest	2
Mallee	1
Low woodland	1
Open forest	7
Open woodland	1
Woodland	7

ASPECT

Northerly Aspect = 32%

Southerly Aspect = 68%

GROUP 15 (7 sites): *EUCALYPTUS CAMALDULENSIS* +/– *E. OVATA* WET HEATH OPEN FOREST.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
**Plantago lanceolata* var. *lanceolata*	100	7	70	23.9
Eucalyptus camaldulensis var. *camaldulensis*	86	6	33	44.2
**Rosa canina*	86	6	38	38.7
**Rubus sp.*	71	5	128	8.7
**Foeniculum vulgare*	71	5	8	**156.3**
**Genista monspessulana*	57	4	48	20.0
Cyperus vaginatus	57	4	12	**81.3**
Phragmites australis	57	4	31	31.5
Bursaria spinosa	43	3	164	3.6
Dodonaea viscosa spp. *spatulata*	43	3	103	6.3
Dichondra repens	43	3	176	3.3
Acacia verniciflua	43	3	33	21.5
**Olea europaea* spp. *europaea*	43	3	78	8.6
Acaena novae-zelandiae	43	3	70	9.7
**Phalaris aquatica*	43	3	10	77.9
**Pennisetum macrourum*	43	3	6	**126.2**
Isolepis nodosa	43	3	25	29.1
Callistemon sieberi	43	3	6	**124.9**

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
**Piptatherum miliaceum*	29	2	2	249
**Cynodon dactylon*	14	1	2	129
Alternanthera denticulata	14	1	2	128
**Plantago major*	14	1	2	125
**Polygonum aviculare*	14	1	2	125
**Polygala myrtifolia*	14	1	2	120
**Festuca arundinacea*	14	1	2	118
Spyridium tricolor	14	1	3	86
**Rumex conglomeratus*	29	2	6	83
**Rumex crispus*	14	1	3	78
Typha domingensis	14	1	4	62
**Rosa rubiginosa*	14	1	4	61
**Aster subulatus*	14	1	4	57
**Dittrichia graveolens*	14	1	5	48
Triglochin striatum	14	1	5	47
Carex tereticaulis	14	1	6	40
Juncus kraussii	14	1	7	33
**Solanum nigrum*	14	1	11	22
**Crataegus monogyna*	14	1	12	20
Triglochin procerum	14	1	13	17
Eucalyptus ovata	29	2	29	16
**Cytisus scoparius*	14	1	18	12
Acacia retinodes var. *retinodes* (*swamp* form)	14	1	22	10
Senecio picridioides	14	1	23	10
Leptospermum lanigerum	29	2	66	7
**Cirsium vulgare*	14	1	32	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Spyridium tricolor	RHAMNACEAE	Vulnerable	

LANDFORM	Frequency	SOIL TYPE	Frequency	SITE SLOPE	Frequency
Gorge	1	Silt loam	1	0- 5^0	6

STRUCTURE	Frequency	ASPECT
Open forest	3	Northerly Aspect = 60%
Woodland	**2**	**Southerly Aspect = 40%**

GROUP 16 (15 sites): *EUCALYPTUS FASCICULOSA*, +/- *E. OBLIQUA*, +/– *E. GONIOCALYX*, +/- *E. LEUCOXYLON* OPEN FOREST OVER *ACACIA PYCNANTHA*.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Acacia pycnantha	100	15	538	1.6
Gonocarpus tetragynus	100	15	688	1.0
Hibbertia exutiacies	100	15	364	2.9
Arthropodium strictum	93	14	388	2.4
Scaevola albida	87	13	248	3.9
Pultenaea largiflorens	73	11	188	4.5
Astroloma humifusum	67	10	479	1.0
Goodenia blackiana	60	9	379	1.2
Pultenaea daphnoides	53	8	356	1.1
Lomandra multiflora spp. *dura*	47	7	305	1.2
**Senecio pterophorus* var. *pterophorus*	47	7	167	3.0
Pimelea humilis	47	7	91	6.2
Hibbertia sericea var. *sericea*	40	6	326	0.7
Dillwynia hispida	40	6	212	1.7
Burchardia umbellata	40	6	313	0.8
Acrotriche fasciculiflora	40	6	117	3.8

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Cyrtostylis robusta	7	1	2	50
Senecio hypoleucus	20	3	11	25
**Dittrichia graveolens*	7	1	5	19
Danthonia pilosa var. *pilosa*	20	3	17	16
Acacia gunnii	7	1	7	13
Galium gaudichaudii	27	4	34	10
Hibbertia stricta	7	1	10	9
Baumea acuta	7	1	10	8
Microseris lanceolata	13	2	21	8

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Caladenia argocalla	ORCHIDACEAE	Not rated	Endangered
Baumea acuta	CYPERACEAE	Rare	
Deyeuxia densa	GRAMINEAE	Rare	
Acacia gunnii	LEGUMINOSAE	Rare	

LANDFORM	Frequency
Hill slope	3

SOIL TYPE	Frequency
clay loam	1
clayey sand	1
silt loam	1

SITE SLOPE	Frequency
0^0 - 5^0	1
6^0 –10^0	3
11^0 - 15^0	2
16^0-20^0	3
20^0-25^0	nil
26^0-30^0	3
$>30^0$	3

STRUCTURE	Frequency
Low woodland	4
Woodland	5
Low open woodland	1
Open forest	1
Open woodland	2

ASPECT
Southerly Aspect: 47%
Northerly Aspect: 53%

GROUP 17 (45 sites):1.= *EUCALYPTUS FASCICULOSA, +/- E. LEUCOXYLON, +/- E. OBLIQUA* WOODLAND
2.= *E. GONIOCALYX* +/- *E. FASCICULOSA*
3.= *E. LEUCOXYLON* +/- *E. FASCICULOSA* ALL OVER *ACACIA PYCNANTHA*

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Acacia pycnantha	93	42	538	1.8
Cheilanthes austrotenuifolia	78	35	229	**4.5**
Eucalyptus fasciculosa	76	34	493	1.5
Xanthorrhoea semiplana spp.	64	29	715	0.4
Arthropodium strictum	62	28	388	1.6
Gonocarpus tetragynus	62	28	688	0.4
Hibbertia exutiacies	62	28	364	1.7
Dichondra repens	60	27	176	**4.5**
Bursaria spinosa	56	25	164	**4.5**
**Senecio pterophorus* var. *pterophorus*	49	22	167	**3.7**
Astroloma humifusum	47	21	479	0.6
Thysanotus patersonii	44	20	350	1.0

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Luzula ovata	2	1	2	15
**Pittosporum undulatum*	9	4	9	15
Danthonia carphoides var. *carphoides*	9	4	10	14
Correa glabra var. *turnbullii*	2	1	3	11
Ophioglossum lusitanicum	2	1	3	11
Scutellaria humilis	4	2	6	10
**Pennisetum macrourum*	4	2	6	10
**Pinus halepensis*	2	1	4	8
Bracteantha bracteata	2	1	4	7
Goodenia medicaginae	2	1	4	7
Deyeuxia minor	4	2	8	7
**Carthamus lanatus*	2	1	4	7
Pleurosorus rutifolius	2	1	4	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Danthonia carphoides var. *carphoides*	GRAMINEAE	Rare	
Deyeuxia minor	GRAMINEAE	Vulnerable	
Luzula ovata	JUNCACEAE	Rare	
Scutellaria humilis	LABIATAE	Rare	
Acacia gunnii	LEGUMINOSAE	Rare	
Dianella longifolia var. *grandis*	LILIACEAE	Rare	
Eucalyptus viminalis spp. *viminalis*	MYRTACEAE	Rare	
Pterostylis foliata	ORCHIDACEAE	Rare	
Spyridium spathulatum	RHAMNACEAE	Rare	

LANDFORM	Frequency
Gully	1
Hill Slope	2
Hill Crest	1

SOIL TYPE	Frequency
Loam	1
Clay loam	1
Sandy loam	2

SITE SLOPE	Frequency
0^0 - 5^0	10
6^0 –10^0	9
11^0 - 15^0	10
16^0-20^0	7
21^0-25^0	4
26^0 - 30^0	3
>30^0	2

STRUCTURE	Frequency
Low open forest	1
Low woodland	6
Low open woodland	2
Open forest	4
Open woodland	3
Very low open woodland	1
Woodland	16

ASPECT
Northerly Aspect = 52%
Southerly Aspect = 48%

GROUP 18 (24 sites): 1 = *EUCALYPTUS GONIOCALYX*, +/- *E. FASCICULOSA* +/- *E. OBLIQUA* WOODLAND OVER *ACACIA PYCNANTHA.*

2 = *EUCALYPTUS VIMINALIS* SPP. *VIMINALIS*, *E. LEUCOXYLON* +/- *E. OBLIQUA*, +/- *E. CAMALDULENSIS* WOODLAND OVER *ACACIA PYCNANTH.*

3 = *EUCALYPTUS OBLIQUA*, +/– *E. FASCICULOSA* +/- *E. GONIOCALYX* OPEN FOREST.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Gonocarpus tetragynus	96	23	688	0.5
Arthropodium strictum	92	22	388	1.5
Acacia pycnantha	88	21	538	0.7
Hibbertia sericea var. *sericea*	88	21	326	1.8
Thysanotus patersonii	83	20	350	1.5
Astroloma humifusum	79	19	479	0.7
Leptospermum myrsinoides	75	18	506	0.6
Acrotriche serrulata	67	16	460	0.5
Xanthorrhoea semiplana spp.	63	15	715	-0.1
**Hypochaeris radicata*	58	14	198	2.1
Acaena echinata var.	54	13	125	**3.6**
Banksia marginata	54	13	245	1.3
Burchardia umbellata	54	13	313	0.8
Cheilanthes austrotenuifolia	50	12	229	1.3
Neurachne alopecuroidea	50	12	169	2.1
Olearia ramulosa	50	12	373	0.4
Pimelea humilis	50	12	91	**4.8**
Lepidosperma semiteres	46	11	595	-0.2
Caesia calliantha	42	10	111	**3.0**
Eucalyptus goniocalyx	42	10	126	**2.5**
Lomandra multiflora spp. *dura*	42	10	305	0.4

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Leptorhynchos squamatus	21	5	12	17
Plantago hispida	13	3	9	15
Solenogyne dominii	4	1	3	14
Danthonia laevis	4	1	4	9
Dichelachne inaequiglumis	4	1	5	8
Calocephalus citreus	4	1	5	8
Ptilotus erubescens	4	1	5	8

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Ptilotus erubescens	AMARANTHACEAE	Rare	
Brachycome parvula var. *lissocarpa*	COMPOSITAE	Rare	
Cardamine paucijuga	CRUCIFERAE	Rare	
Danthonia laevis	GRAMINEAE	Rare	
Eucalyptus dalrympleana spp. *dalrympleana*	MYRTACEAE	Rare	
Eucalyptus viminalis spp. *viminalis*	MYRTACEAE	Rare	
Diuris brevifolia	ORCHIDACEAE	Rare	
Prasophyllum pallidum	ORCHIDACEAE	Vulnerable	Vulnerable

LANDFORM	Frequency
Flat	1
Hill footslope	1
Hill slope	8

SOIL TYPE	Frequency
clayey sand	2
loam	1
loamy sand	1
sandy clay loam	2
sandy loam	4

SITE SLOPE	Frequency
0^0 - 5^0	17
6^0 –10^0	1
11^0 - 15^0	2
16^0-20^0	1
20^0-25^0	2
26^0-30^0	nil
$>30^0$	nil

STRUCTURE	Frequency	ASPECT
Low open woodland	1	Southerly Aspect: 58%
Low woodland	1	Northerly Aspect: 42%
Mallee	1	
Open forest	4	
Open mallee	3	
Woodland	11	

GROUP 19 (3 sites): *EUCALYPTUS OBLIQUA* (LOW) OPEN FOREST OVER *XANTHORRHOEA SEMIPLANA.*

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Xanthorrhoea semiplana spp.	100	3	715	1.6
Hibbertia sericea var. *sericea*	100	3	326	4.7
Eucalyptus obliqua	100	3	477	2.9
Acrotriche serrulata	67	2	460	1.7
Platylobium obtusangulum	67	2	512	1.4
Cheilanthes austrotenuifolia	67	2	229	4.4
Wahlenbergia stricta spp. *stricta*	67	2	128	8.7
Brunonia australis	67	2	71	16.6
**Pentaschistis pallida*	67	2	63	18.8
Acaena echinata var.	67	2	125	9.0
Austrostipa semibarbata	67	2	53	22.4
Pimelea humilis	67	2	91	12.6
Pteridium esculentum	67	2	271	3.6
**Taraxacum officinale*	67	2	9	**131.6**
**Acetosella vulgaris*	67	2	25	**47.9**
Hymenanthera dentata	67	2	6	**208.6**
**Lactua serriola*	67	2	3	**418.3**

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Ptilotus erubescens	33	1	5	126
Senecio minimus var. *minimus*	33	1	6	102
Geranium retrorsum	33	1	27	22
Poa crassicaudex	33	1	45	13
Euchiton involucratus	33	1	58	10

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Ptilotus erubescens	AMARANTHACEAE	Rare	

LANDFORM	Frequency	SOIL TYPE	Frequency	SITE SLOPE	Frequency
Hill slope	2	loamy sand	1	0^0 - 5^0	nil
		sandy loam	1	6^0 –10^0	1
				11^0 - 15^0	1
				16^0 - 20^0	nil
				21^0-25^0	1
				26^0-30^0	nil
				>30^0	nil

STRUCTURE	Frequency	ASPECT
Low open forest	1	Southerly Aspect: 33%
Open forest	1	Northerly Aspect: 67%

GROUP 20 (6 sites): *EUCALYPTUS ODORATA* OR *E. FASCICULOSA OR E. LEUCOXYLON* DRY SCLEROPHYLL LOW WOODLAND OVER *CHRYSANTHEMOIDES MONILIFERA.*

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
**Chrysanthemoides monilifera*	100	6	96	**14.7**
Acacia pycnantha	83	5	538	1.3
Agrostis avenacea var.	83	5	36	**33.7**
Astroloma conostephioides	67	4	300	2.4
Bursaria spinosa	67	4	164	5.2
**Olea europaea* spp. *europaea*	67	4	78	12.0
Acacia acinacea	50	3	39	**18.5**
Astroloma humifusum	50	3	479	0.6
Dodonaea viscosa spp. *spatulata*	50	3	103	6.4
Ixodia achillaeoides spp. *alata*	50	3	272	1.8
Lomandra multiflora spp. *dura*	50	3	305	1.5
Opercularia scabrida	50	3	15	**49.5**
Poa clelandii	50	3	150	4.0
Scaevola albida	50	3	248	2.0
Spyridium parvifolium	50	3	114	5.6

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Austrostipa nodosa	17	1	2	120
Calocephalus citreus	33	2	5	100
Ozothamnus retusus	33	2	5	99
**Carthamus lanatus*	17	1	4	65
Einadia nutans	17	1	4	64
Austrostipa blackii	17	1	4	56
Choretrum glomeratum var. *glomeratum*	17	1	5	56
Plantago gaudichaudii	17	1	5	52
Austrostipa elegantissima	33	2	11	45
Goodenia amplexans	17	1	8	31
Xanthorrhoea quadrangulata	33	2	16	31
Eucalyptus odorata	33	2	18	27
Convolvulus remotus	17	1	12	20
Convolvulus erubescens	33	2	30	16
Chrysocephalum apiculatum	33	2	32	15
Lomandra densiflora	33	2	60	7
Acacia verniciflua	17	1	33	7

LANDFORM	Frequency	SOIL TYPE	Frequency	SITE SLOPE	Frequency
Hill slope	1	clay loam	1	0^0 - 5^0	3
		loamy sand	1	6^0 –10^0	nil
				11^0 - 15^0	nil
				16^0- 20^0	nil

STRUCTURE	Frequency	ASPECT		
Woodland	1	Northerly Aspect = 33%	21^0 25^0	1
Low open woodland	1	Southerly Aspect = 67%	26^0 – 30^0	3
Low woodland	2		$>30^0$	1

GROUP 21 (22 sites) *EUCALYPTUS MICROCARPA, +/- E. FASCICULOSA* SAVANNAH WOODLAND OVER *ACACIA PYCNANTHA.*

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Eucalyptus microcarpa	86	19	23	**50.3**
Acacia pycnantha	82	18	538	1.1
Astroloma humifusum	82	18	479	1.4
Acacia paradoxa	73	16	224	3.6
**Olea europaea* spp. *europaea*	73	16	78	**12.0**
Olearia ramulosa	68	15	373	1.5
Themeda triandra	59	13	90	8.1
Acacia acinacea	55	12	39	**18.8**
Arthropodium strictum	55	12	388	1.0
Cheilanthes austrotenuifolia	55	12	229	2.4
**Chrysanthemoides monilifera*	55	12	96	7.0
Exocarpos cupressiformis	50	11	256	1.7
Hibbertia exutiacies	50	11	364	0.9
**Plantago lanceolata* var. *lanceolata*	45	10	70	7.9
Lomandra densiflora	41	9	60	**8.6**
Lomandra multiflora spp. *dura*	41	9	305	0.9

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
**Hakea laurina*	9	2	2	62
Calocephalus citreus	9	2	5	25
Linum marginale	5	1	3	22
Austrostipa curticoma	5	1	3	22
Acacia rupicola	18	4	12	20
**Rhamnus alaternus*	9	2	6	20
Goodenia medicaginae	5	1	4	17
Austrostipa flavescens	5	1	5	13
Pittosporum phylliraeoides var. *microcarpa*	5	1	5	13
Callitris rhomboidea	9	2	10	12
Austrostipa scabra spp. *falcata*	5	1	6	11
Carex tereticaulis	5	1	6	11
Convolvulus remotus	9	2	12	10
Angianthus milenei	5	1	7	9
Lepidosperma curtisae	36	8	55	8
Eucalyptus porosa	5	1	8	8
Convolvulus erubescens	18	4	30	7
Acacia longifolia var. *longifolia*	5	1	9	7
Lissanthe strigosa	23	5	39	7
Xanthorrhoea quadrangulata	9	2	16	7
Lagenifera huegelii	18	4	32	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Austrostipa gibbosa	GRAMINEAE	Rare	
Eryngium rostratum	UMBELLIFERAE	Vulnerable	

LANDFORM	Frequency
Hill slope	4

SOIL TYPE	Frequency
clay loam	1
sandy loam	2

SITE SLOPE	Frequency
$0 - 5^0$	13
$6^0 - 10^0$	4
$11 - 15^0$	1
$16^0 - 20^0$	1
$21^0 - 25^0$	1
$26^0 - 30^0$	1
$>30^0$	1

STRUCTURE	Frequency
Low open forest	1
Low woodland	2
Low open woodland	3
Open woodland	1
Woodland	13

ASPECT

Northerly Aspect = 52%
Southerly Aspect = 48%

GROUP 22 (23 sites): *EUCALYPTUS CAMALDULENSIS* AND/OR– *E. LEUCOXYLON* SAVANNAH/SCLEROPHYLL LOW OPEN FOREST AND WOODLAND.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Acacia pycnantha	83	19	538	1.3
**Senecio pterophorus* var. *pterophorus*	78	18	167	**6.0**
Arthropodium strictum	74	17	388	1.9
Cheilanthes austrotenuifolia	74	17	229	3.8
Gonocarpus elatus	70	16	102	9.3
Eucalyptus leucoxylon spp.	52	12	121	**5.4**
Acaena echinata var.	48	11	125	4.8
Eucalyptus camaldulensis var. *camaldulensis*	48	11	33	**20.6**
Dodonaea viscosa spp. *spatulata*	43	10	103	**5.3**
Hibbertia sericea var. *sericea*	43	10	326	1.0

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
**Asclepias fruticosa*	9	2	2	64
Plantago gaudichaudii	13	3	5	40
Austrostipa scabra spp. *falcata*	13	3	6	32
Correa glabra var. *leucoclada*	4	1	2	31
Alternanthera denticulata	4	1	2	31
Haloragis heterophylla	4	1	2	30
Hibbertia stricta var. *stricta*	17	4	10	24
Deyeuxia minor	13	3	8	24
Asperula conferta	9	2	5	24
Hydrocotyle laxiflora	26	6	17	22
Cynoglossum suaveolens	22	5	14	22
Hymenanthera dentata	9	2	1	22
Cymbonotus preissianus	9	2	6	21
Ophioglossum lusitanicum	4	1	3	21
Solenogyne dominii	4	1	3	20
**Cynara cardunculus*	4	1	3	20
Linum marginale	4	1	3	19
Austrostipa elegantissima	13	3	11	17
**Scabiosa atropurpurea*	4	1	4	15
Echinopogon ovatus var. *ovatus*	4	1	4	14
Geranium retrorsum	26	6	27	14
Senecio picridioides	22	5	23	13
Convolvulus erubescens	26	6	30	12
Lagenifera huegelii	26	6	32	11
Convolvulus remotus	9	2	12	10
**Verbascum virgatum*	4	1	6	9
**Rhamnus alaternus*	4	1	6	9
Callistemon sieberi	4	1	6	9
**Asclepias rotundifolia*	30	7	45	9
Lomandra nana	9	2	14	8
Senecio hispidulus var. *hispidulus*	4	1	6	8
Galium migrans	4	1	7	8
Senecio lautus	4	1	7	8
**Foeniculum vulgare*	4	1	8	7
Carex breviculmis	9	2	18	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Cardamine paucijuga	CRUCIFERAE	Rare	
Deyeuxia densa	GRAMINEAE	Rare	
Deyeuxia minor	GRAMINEAE	Vulnerable	
Echinopogon ovatus var. *ovatus*	GRAMINEAE	Rare	
Poa umbricola	GRAMINEAE	Rare	
Austrostipa pilata	GRAMINEAE	Vulnerable	
Mentha diemenica	LABIATAE	Rare	
Eucalyptus viminalis spp. *viminalis*	MYRTACEAE	Rare	

LANDFORM	Frequency
Hill footslope	5
Hill Slope	16
Stream Bank	1

SOIL TYPE	Frequency
Medium clay	1
Clay loam	14
Sandy-clay-loam	5
Sandy-loam	2

SITE SLOPE	Frequency
$0 - 5^0$	54
$6^0 - 10^0$	7
$11 - 15^0$	14
$16\text{-}20^0$	9
$20^0\text{-}25^0$	2
$26\text{-}30^0$	7
$>30^0$	7

STRUCTURE	Frequency
Low open forest	6
Low woodland	2
Low open woodland	1
Open woodland	1
Open forest	4
Tall open woodland	2
Woodland	5
Open shrubland	1

ASPECT

Northerly Aspect = 74%

Southerly Aspect = 26%

GROUP 23 (6 sites): 1 = *EUCALYPTUS LEUCOXYLON*, +/- *E. CAMALDULENSIS*, +/- *E. VIMINALIS* SPP. *CYGNETENSIS* SAVANNAH WOODLAND.
2 = *EUCALYPTUS POROSA*, +/- *ALLOCASUARINA VERTICILLATA* LOW WOODLAND.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
**Asclepias rotundifolia*	83	5	45	**28.6**
**Olea europaea* spp. *europaea*	83	5	78	**16.0**
**Plantago lanceolata* var. *lanceolata*	83	5	70	**17.9**
Allocasuarina verticillata	67	4	101	9.6
Eucalyptus leucoxylon spp.	67	4	121	7.8
Olearia ramulosa	67	4	373	1.9
Acacia pycnantha	50	3	538	0.5
Convolvulus remotus	50	3	12	**65.8**
Dianella revoluta var. *revoluta*	50	3	111	6.2
Oxalis perennans	50	3	125	5.4
Themeda triandra	50	3	90	7.8

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Aristida behriana	33	2	2	266
**Crataegus azarolus*	33	2	2	266
**Tragopogon porrifolius*	33	2	2	266
**Cynara cardunculus*	33	2	3	181
Austrostipa multispiculis	33	2	4	143
Vittadinia cuneata var. *cuneata* forma *cuneata*	33	2	6	85
**Scabiosa atropurpurea*	17	1	4	74
Enchylaena tomentosa var. *tomentosa*	17	1	4	67
Pleurosorus rutifolius	17	1	4	67
Eucalyptus porosa	33	2	8	66
Pultenaea scabra	17	1	4	62
Pittosporum phylliraeoides var. *microcarpa*	17	1	5	53
Sonchus hydrophilus	17	1	5	51
Dodonaea viscosa spp. *cuneata*	17	1	6	45
Myoporum viscosum	17	1	6	43
Exocarpos sparteus	17	1	7	38
Santalum acuminatum	17	1	8	34
**Lycium ferocissimum*	17	1	9	29
**Asclepias rotundifolia*	17	1	45	29
Danthonia racemosa var. *racemosa*	17	1	10	27
Elymus scabrus var. *scabrus*	17	1	11	24
Stackhousia monogyna	17	1	12	22
Eucalyptus viminalis spp. *cygnetensis*	17	1	14	19
Lomandra nana	17	1	14	18
Danthonia caespitosa	33	2	34	15
Carex breviculmis	17	1	18	14
Arthropodium fimbriatum	17	1	19	13
Lysiana exocarpi spp. *exocarpi*	17	1	19	13
**Rosa canina*	33	2	38	13
Geranium retrorsum	17	1	27	9
Hypericum perforatum	33	2	53	9
Lomandra densiflora	33	2	60	8
Eucalyptus camaldulensis var. *camaldulensis*	17	1	33	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Austrostipa multispiculis	GRAMINEAE	Rare	
Pultenaea scabra	LEGUMINOSAE	Rare	

LANDFORM	Frequency
Hill footslope	1
Hill Slope	3
Ridge	1

SOIL TYPE	Frequency
Clay Loam	3
Sandy loam	1
Silty-clay-loam	1

SITE SLOPE	Frequency
$0^0 - 5^0$	nil
$6^0 - 10^0$	1
$11^0 - 15^0$	1
$16\text{-}20^0$	1
$21^0\text{-}25^0$	2
$26\text{-}30^0$	1

STRUCTURE	Frequency
Low woodland	1
Open woodland	**1**
Very low woodland	1
Woodland	2

ASPECT
Northerly Aspect = 50%
Southerly Aspect = 50%

GROUP 24 (32 sites): *EUCALYPTUS FASCIULOSA*, +/- *CALLITRIS GRACILIS* +/- *ALLOCASUARINA VERTICILLATA* LOW WOODLAND OVER *CALYTRIX TETRAGONA.*

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Calytrix tetragona	88	28	224	3.6
Astroloma conostephioides	84	27	300	2.3
Eucalyptus fasciculosa	84	27	493	1.0
Acacia pycnantha	78	25	538	0.7
Amyema miquelii	75	24	155	4.7
Gonocarpus elatus	72	23	102	**7.3**
Callitris gracilis	69	22	41	**18.9**
Dodonaea viscosa spp. *spatulata*	69	22	103	**6.9**
Lomandra multiflora spp. *dura*	59	19	305	1.3
Thysanotus patersonii	59	19	350	1.0
Arthropodium strictum	56	18	388	0.7
**Chrysanthemoides monilifera*	56	18	96	5.8
Allocasuarina muelleriana spp. *muelleriana*	47	15	164	2.4
Hybanthus floribundus spp. *floribundus*	47	15	78	**6.1**
Hakea rostrata	44	14	498	0.0
Hibbertia sericea var. *sericea*	44	14	326	0.6
Dillwynia hispida	41	13	212	1.3

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Baeckea behrii	25	8	8	36
Enneapogon nigricans	6	2	2	36
Leucopogon cordifolius	9	3	4	26
Ptilotus erubescens	9	3	5	21
Acacia calamifolia	16	5	9	19
Correa glabra var. *leucoclada*	3	1	2	18
Anthocercis angustifolia	3	1	2	17
Lepidosperma canescens	6	2	5	14
Ozothamnus retusus	6	2	5	13
Pimelea stricta	13	4	12	12
Ophioglossum lusitanicum	3	1	3	12
Prostanthera chlorantha	13	4	14	10
Callistemon rugulosus var. *rugulosus*	6	2	7	9
**Carthamus lanatus*	3	1	4	8
Santalum acuminatum	6	2	8	8
Halgania cyanea	3	1	4	8
Spyridium spathulatum	9	3	13	7
Acacia continua	16	5	24	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Ptilotus erubescens	AMARANTHACEAE	Rare	
Prostanthera chlorantha	LABIATAE	Rare	
Acacia iteaphylla	LEGUMINOSAE	Rare	
Spyridium spathulatum	RHAMNACEAE	Rare	
Correa eburnea	RUTACEAE	Vulnerable	
Anthocercis angustifolia	SOLANACEAE	Rare	

LANDFORM	Frequency
hill crest	1
hill slope	4
plain	2
ridge	1
sandy plain	3

SOIL TYPE	Frequency
clay loam	2
clayey sand	1
loamy sand	2
sand	1
sandy clay loam	1
sandy loam	4

SITE SLOPE	Frequency
0^0 - 5^0	17
6^0 – 10^0	7
11^0 - 15^0	5
16^0- 20^0	2
21^0 25^0	nil
26^0 – 30^0	1
>30^0	nil

STRUCTURE	Frequency
Low open forest	1
Low woodland	7
Low open woodland	1
Open mallee	1
Very low woodland	2
Woodland	2

ASPECT

Northerly Aspect = 56%

Southerly Aspect = 44%

GROUP 25 (21 sites): *EUCALYPTUS FASCICULOSA*, *ALLOCASUARINA VERTICILLATA* +/-*E. GONIOCALYX* LOW WOODLAND AND LOW OPEN WOODLAND.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Acacia pycnantha	100	21	538	0.8
**Pentaschistis pallida*	90	19	63	**13.0**
Scaevola albida	81	17	248	2.2
Astroloma humifusum	76	16	479	0.6
Eucalyptus fasciculosa	76	16	493	0.5
Exocarpos cupressiformis	76	16	256	1.9
Lomandra multiflora spp. *dura*	76	16	305	1.4
Olearia ramulosa	76	16	373	1.0
Allocasuarina verticillata	71	15	101	**5.9**
Astroloma conostephioides	71	15	300	1.3
Cheilanthes austrotenuifolia	71	15	229	2.0
Gonocarpus elatus	67	14	102	**5.4**
Acacia paradoxa	62	13	224	1.7
Arthropodium strictum	57	12	388	0.4
Lepidosperma carphoides	57	12	269	1.1
Neurachne alopecuroidea	57	12	169	2.3
Pultenaea largiflorens	57	12	188	2.0
Acrotriche serrulata	52	11	460	0.1
Dillwynia hispida	52	11	212	1.4
Lomandra micrantha spp.	52	11	372	0.4
Danthonia setacea var. *setacea*	48	10	89	**4.3**
Hibbertia riparia (*glabriuscula*)	48	10	195	1.4
Kennedia prostrata	48	10	147	2.2
Themeda triandra	48	10	90	4.2
Calytrix tetragona	43	9	224	0.9
Gonocarpus tetragynus	43	9	688	-0.4
Grevillea lavandulacea	43	9	197	1.1
Hibbertia sericea var. *sericea*	43	9	326	0.3
Wahlenbergia stricta spp. *stricta*	43	9	128	2.3
Xanthorrhoea semiplana spp.	43	9	715	-0.4

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
**Polygala myrtifolia*	5	1	2	23
Lotus australis	5	1	2	22
Dodonaea viscosa spp. *cuneata*	10	2	6	15
Stackhousia monogyna	19	4	12	15
Myoporum viscosum	10	2	6	15
Xanthorrhoea quadrangulata	24	5	16	14
Acacia dodonaeifolia	5	1	4	12
Leucopogon cordifolius	5	1	4	11
Pultenaea tenuifolia	5	1	4	11
Austrostipa hemipogon	19	4	17	10
**Rhamnus alaternus*	5	1	6	7
Austrostipa scabra spp. *falcata*	5	1	6	7
Convolvulus erubescens	24	5	30	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Acacia dodonaeifolia	LEGUMINOSAE	Rare	
Prasophyllum pallidum	ORCHIDACEAE	Vulnerable	Vulnerable

LANDFORM	Frequency	SOIL TYPE	Frequency	SITE SLOPE	Frequency
hill crest	1	loam	1	0^0 - 5^0	3
hill slope	3	loamy sand	1	6^0 –10^0	3
		silty loam	2	11^0 - 15^0	5
				16^0- 20^0	3
				21^0 - 25^0	5
				26^0 – 30^0	2

STRUCTURE	Frequency
Low open forest	1
Low woodland	4
Low open woodland	3
Open mallee	1
Woodland	2

ASPECT

Northerly Aspect = 67%

Southerly Aspect = 33%

GROUP 26 (20 sites): *EUCALYPTUS FASCICULOSA* VERY LOW WOODLAND AND VERY LOW OPEN WOODLAND OVER *ACACIA PYCNANTHA.*

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Eucalyptus fasciculosa	90	18	493	1.5
Acacia pycnantha	85	17	538	1.2
Astroloma conostephioides	85	17	300	**2.9**
Astroloma humifusum	70	14	479	1.0
Cassytha pubescens	70	14	230	**3.2**
Xanthorrhoea semiplana spp.	70	14	715	0.3
Leptospermum myrsinoides	65	13	506	0.8
Amyema miquelii	55	11	155	**3.9**
Lepidosperma carphoides	55	11	269	1.8
Calytrix tetragona	50	10	224	**2.1**
Gonocarpus tetragynus	50	10	688	0.0
Grevillea lavandulacea	45	9	197	**2.1**

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Prostanthera behriana	25	5	8	42
Haloragis heterophylla	5	1	2	35
Pimelea flava spp. *dichotoma*	5	1	2	34
Beyeria lechenaultii	5	1	2	33
Kunzea pomifera	35	7	16	29
**Ammophila arenaria*	10	2	5	26
Dodonaea viscosa spp. *cuneata*	10	2	6	22
Carprobrotus rossii	20	4	12	22
Leucopogon rufus	35	7	25	18
Thomasia petalocalyx	20	4	15	17
Acacia rupicola	15	3	12	16
Austrostipa breviglumis	5	1	4	16
Olearia axillaris	40	8	32	16
Pultenaea tenuifolia	5	1	4	16
Rhagodia candolleana spp. *candolleana*	20	4	18	14
Zieria veronicea	10	2	11	11
**Ehrharta calycina*	30	6	38	10
Hibbertia virgata	35	7	48	9
Leucopogon parviflorus	10	2	14	9
Pimelea glauca	10	2	14	9
Leucopogon lanceolatus	5	1	7	8
Adenanthos terminalis	30	6	45	8
Muehlenbeckia gunnii	10	2	15	8
Santalum acuminatum	5	1	8	8
Eucalyptus porosa	5	1	8	8
Billardiera versicolor	5	1	8	8
Acacia longifolia var. *longifolia*	5	1	9	7
**Lycium ferocissimum*	5	1	9	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Austrostipa breviglumis	GRAMINEAE	Rare	
Grevillea muricata	PROTEACEAE	Vulnerable	
Correa eburnea	RUTACEAE	Vulnerable	
Zieria veronicea	RUTACEAE	Rare	

LANDFORM	Frequency	SOIL TYPE	Frequency	SITE SLOPE	Frequency
Dune	1	loamy sand	1	0^0 - 5^0	13
				6^0 - 10^0	5
				11^0 - 15^0	1
				16^0- 20^0	nil
				21^0 25^0	nil
				26^0 – 30^0	nil
				>30^0	nil

STRUCTURE	Frequency	ASPECT
Low woodland	1	Northerly Aspect = 42%
Very low open forest	**1**	**Southerly Aspect = 58%**
Very low open woodland	3	
Very low woodland	4	

GROUP 27 (21 sites): *EUCALYPTUS COSMOPHYLLA*, +/- *E. FASCICULOSA* +/- *E. LEPTOPHYLLA* +/- *E. INCRASSATA* VERY LOW WOODLAND AND VERY LOW OPEN WOODLAND.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Schoenus breviculmis	95	20	224	**3.5**
Astroloma humifusum	81	17	479	0.8
Calytrix tetragona	81	17	224	2.9
Isopogon ceratophyllus	81	17	385	1.2
Gonocarpus mezianus	76	16	202	3.0
Hakea rostrata	76	16	498	0.6
Lepidosperma carphoides	76	16	269	2.0
Allocasuarina muelleriana spp. *muelleriana*	67	14	164	3.4
Eucalyptus cosmophylla	67	14	261	1.7
Goodenia blackiana	67	14	379	0.9
Neurachne alopecuroidea	67	14	169	3.2
Xanthorrhoea semiplana spp.	67	14	715	0.0
Eucalyptus fasciculosa	62	13	493	0.3
Lepidosperma viscidum	62	13	90	**6.3**
Olearia ramulosa	62	13	373	0.8
Laxmania orientalis	57	12	124	**3.9**
Xanthosia pusilla	57	12	180	2.4
Burchardia umbellata	52	11	313	0.8
Platylobium obtusangulum	52	11	512	0.1
Dillwynia hispida	48	10	212	1.4
Gonocarpus tetragynus	48	10	688	-0.3
Grevillea lavandulacea	48	10	197	1.6
Pultenaea canaliculata var.	48	10	63	**7.1**
Thysanotus patersonii	48	10	350	0.5
Acacia paradoxa	43	9	224	1.0
Hakea carinata	43	9	250	0.8
Lepidosperma semiteres	43	9	595	-0.2
Leptospermum myrsinoides	43	9	506	-0.1
Lomandra micrantha spp.	43	9	371	0.2
Lomandra multiflora spp. *dura*	43	9	305	0.5
Spyridium thymifolium	43	9	159	1.9

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Spyridium spathulatum	33	7	13	27
Correa calycina	5	1	2	24
Styphelia exarrhena	38	8	21	18
Dampiera lanceolata var.	5	1	3	16
Eucalyptus cneorifolia	5	1	3	16
Boronia coerulescens spp. *coerulescens*	29	6	21	13
Cassinia uncata	19	4	14	13
Dodonaea baueri	5	1	4	12
Spyridium eriocephalum var. *eriocephalum*	5	1	4	12
Melaleuca uncinata	14	3	13	11
Eucalyptus incrassata	14	3	13	11
Phyllanthus australis	10	2	10	10
Eucalyptus leptophylla	14	3	14	10
Chrysocephalum baxteri	19	4	20	9
Baeckea ramosissima spp. *ramosissima*	38	8	45	8
Gahnia ancistrophylla	14	3	17	8
Cryptandra tomentosa	24	5	32	7
Pimelea phylicoides	19	4	26	7
Pseudanthus micranthus	5	1	7	7
Eriostemon angustifolius spp. *angustifolia*	5	1	7	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Pseudanthus micranthus	EUPHORBIACEAE	Rare	
Prostanthera chlorantha	LABIATAE	Rare	
Grevillea muricata	PROTEACEAE	Vulnerable	
Spyridium spathulatum	RHAMNACEAE	Rare	
Correa calycina	RUTACEAE	Not rated	Vulnerable
Correa eburnea	RUTACEAE	Vulnerable	

LANDFORM	Frequency	SOIL TYPE	Frequency	SITE SLOPE	Frequency
Hill slope	1	medium clay	1	$0 - 5^0$	5
				$6^0 –10^0$	7
				$11^0 - 15^0$	3
				$16^0 - 20^0$	1
				$21^0 25^0$	4
				$26^0 – 30^0$	1
				$>30^0$	nil

STRUCTURE	Frequency	ASPECT
Shrubland	1	Northerly Aspect = 33%
Open heathland	**2**	**Southerly Aspect = 67%**
Very low open forest	1	
Very low woodland	4	
Very low open woodland	3	

GROUP 28 (69 sites): 1 = EUCALYPTUS FASCICULOSA, +/- E. COSMOPHYLLA, +/- ACACIA PYCNANTHA LOW WOODLAND.
2 = *EUCALYPTUS FASCICULOSA*, *E. BAXTERI*, +/- *ACACIA PYCNANTHA* LOW WOODLAND.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Xanthorrhoea semiplana spp.	88	61	715	0.3
Eucalyptus fasciculosa	87	60	493	0.9
Olearia ramulosa	77	53	373	1.2
Astroloma humifusum	75	52	479	0.7
Acacia pycnantha	74	51	538	0.5
Arthropodium strictum	68	47	388	0.9
Gonocarpus tetragynus	62	43	688	0.0
Isopogon ceratophyllus	61	42	385	0.7
Lepidosperma semiteres	59	41	595	0.1
Platylobium obtusangulum	57	39	512	0.2
Gonocarpus mezianus	55	38	202	**1.9**
Burchardia umbellata	51	35	313	0.7
Hibbertia riparia (*glabriuscula*)	51	35	195	**1.8**
Cheilanthes austrotenuifolia	49	34	229	**1.3**
Goodenia blackiana	48	33	379	0.3
Acrotriche serrulata	46	32	460	0.1
Acacia paradoxa	45	31	224	1.1
Billardiera cymosa	45	31	152	**2.1**
Lomandra multiflora spp. *dura*	45	31	305	0.6
Eucalyptus cosmophylla	43	30	261	0.8
Hakea rostrata	43	30	498	-0.1
Thysanotus patersonii	43	30	350	0.3
Leptospermum myrsinoides	41	28	506	-0.1

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
**Myrsiphyllum declinatum*	7	5	6	12
Danthonia eriantha	3	2	4	8
Pleurosorus rutifolius	3	2	4	7
Senecio squarrorus	3	2	4	7
Phyllanthus australis	7	5	10	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Leucopogon hirsutus	EPACRIDACEAE	Rare	
Pentapogon quadrifidus var. *quadrifidus*	GRAMINEAE	Rare	
Pultenaea scabra	LEGUMINOSAE	Rare	
Phyllangium distylis	LOGANIACEAE	Rare	
Eucalyptus viminalis spp. *viminalis*	MYRTACEAE	Rare	
Grevillea muricata	PROTEACEAE	Vulnerable	
Spyridium coactilifolium	RHAMNACEAE	Vulnerable	Vulnerable
Spyridium spathulatum	RHAMNACEAE	Rare	
Correa eburnea	RUTACEAE	Vulnerable	

LANDFORM	Frequency
Hill crest	1
Hill footslope	3
Hill slope	14
Plain	1

SOIL TYPE	Frequency
clayey sand	1
light clay	1
light medium clay	1
loam	3
loamy sand	2
sand	2
sandy clay loam	2
sandy loam	1

SITE SLOPE	Frequency
0^0 - 5^0	19
6^0 –10^0	11
11^0 - 15^0	10
16^0- 20^0	7
21^0 - 25^0	9
26^0 – 30^0	4
>30^0	5

STRUCTURE	Frequency
Low open forest	6
Low woodland	9
Open forest	3
Open mallee	1
Very low open woodland	3
Very low woodland	3
Very low closed forest	1
Very low open forest	2
Woodland	4

ASPECT

Northerly Aspect = 48%

Southerly Aspect = 52%

GROUP 29 (30 sites): 1 = *EUCALYPTUS FASCICULOSA*, +/- *E. LEUCOXYLON* WOODLAND.
2 = *E. FASCICULOSA*, +/- *ALLOCASUARINA VERTICILLATA* +/- *E. COSMOPHYLLA* LOW WOODLAND.
3 = *EUCALYPTUS ODORATA*, +/- *E. FASCICULOSA*, +/- *E. PHENAX*, +/- *E. COSMOPHYLLA* VERY LOW WOODLAND ALL OVER *ACACIA PARADOXA* OR *ALLOCASUARINA VERTICILLATA*.

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Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Xanthorrhoea semiplana spp.	90	27	715	0.7
Olearia ramulosa	83	25	373	2.0
Eucalyptus fasciculosa	77	23	493	1.1
Acacia paradoxa	73	22	224	**3.3**
Acacia pycnantha	73	22	538	0.8
Cheilanthes austrotenuifolia	73	22	229	**3.2**
Astroloma humifusum	70	21	479	0.9
Gonocarpus mezianus	63	19	202	3.1
Arthropodium strictum	53	16	388	0.8
Thysanotus patersonii	53	16	350	1.0
Dichondra repens	50	15	176	2.8
Hibbertia exutiacies	50	15	364	0.8
Oxalis perennans	50	15	125	**4.3**
Caesia calliantha	47	14	111	**4.6**

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Austrostipa breviglumis	7	2	4	23
Goodenia amplexans	13	4	8	21
**Cynodon dactylon*	3	1	2	20
Agrostis billardieri var.	3	1	2	20
Cyrtostylis robusta	3	1	2	19
Pimelea micrantha	3	1	2	19
Galium migrans	10	3	7	19
Dichelachne inaequiglumis	7	2	5	18
Cymbonotus preissianus	7	2	6	14
Juncus flavidus	3	1	3	13
Melaleuca acuminata	3	1	3	13
Ajuga australis form *B*	3	1	3	12
Eucalyptus odorata	17	5	18	12
Goodenia medicaginae	3	1	4	9
Eucalyptus phenax	7	2	9	9
**Rosa rubiginosa*	3	1	4	9
Senecio picridioides	17	5	23	9
Danthonia racemosa var. *racemosa*	7	2	10	9
Amyema pendulum spp. *pendulum*	3	1	4	8
Austrostipa flavescens	3	1	5	7
Geranium solanderi var. *solanderi*	17	5	28	7
Acacia rupicola	7	2	12	7
Luzula meridionalis	7	2	12	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Crassula peduncularis	CRASSULACEAE	Rare	
Agrostis billardieri var. *filifolia*	GRAMINEAE	Rare	
Austrostipa breviglumis	GRAMINEAE	Rare	
Scutellaria humilis	LABIATAE	Rare	
Pterostylis foliata	ORCHIDACEAE	Rare	

LANDFORM	Frequency
Hill footslope	2
Hill slope	9

SOIL TYPE	Frequency
clay loam	3
loam	1
loamy sand	2
sandy clay loam	2
sandy loam	3

SITE SLOPE	Frequency
$0^0 – 5^0$	5
$6^0 – 10^0$	8
$11^0 – 15^0$	8
16^0- 20^0	4
$21^0 – 25^0$	4
$26^0 – 30^0$	1
$>30^0$	nil

STRUCTURE	Frequency	ASPECT
Low open woodland	1	Northerly Aspect = 53%
Low woodland	4	Southerly Aspect = 47%
Mallee	1	
Shrubland	1	
Very low open woodland	2	
Very low woodland	4	
Woodland	4	

GROUP 30 (16 sites): *EUCALYPTUS FASCICULOSA*, +/-– *E. LEPTOPHYLLA*, +/- *E. PHENAX*, +/- *E. INCRASSATA*, +/- *E. ODORATA* MALLEE.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Lomandra multiflora spp. *dura*	81	13	305	1.9
Eucalyptus fasciculosa	75	12	493	0.6
Astroloma humifusum	75	12	479	0.7
Amyema miquelii	75	12	155	4.2
Acacia pycnantha	69	11	538	0.4
Thysanotus patersonii	69	11	350	1.1
Arthropodium strictum	69	11	388	0.9
Hibbertia riparia (*glabriuscula*)	63	10	195	2.5
**Myrsiphyllum asparagoides*	63	10	80	**7.5**
Clematis microphylla	63	10	41	**15.5**
Schoenus breviculmis	56	9	224	1.7
Neurachne alopecuroidea	56	9	169	2.6
Lepidosperma carphoides	56	9	269	1.2
Xanthorrhoea semiplana spp.	50	8	715	-0.2
Olearia ramulosa	50	8	373	0.4
Acacia paradoxa	50	8	224	1.4
Acacia spinescens	50	8	72	6.4
Melaleuca uncinata	50	8	13	**41.2**
Lepidosperma viscidum	44	7	90	4.2
Correa reflexa	44	7	61	**6.7**

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Daviesia genistifolia	19	3	3	66
**Lepidium africanum*	13	2	2	66
Olearia pannosa spp. *pannosa*	13	2	2	66
Dampiera rosmarinifolia	25	4	5	55
Halgania cyanea	19	3	4	50
Dodonaea baueri	19	3	4	49
Spyridium eriocephalum var. *eriocephalum*	19	3	4	49
Exocarpos sparteus	31	5	7	46
Hakea muelleriana	13	2	3	45
Lasiopetalum baueri	19	3	5	41
Choretrum glomeratum var. *chrysanthum*	6	1	2	38
Eriostemon angustifolius spp. *angustifolia*	25	4	7	37
Grevillea ilicifolia var. *ilicifolia*	38	6	11	36
Billardiera versicolor	25	4	8	33
Acrotriche cordata	13	2	4	33
Crassula sieberiana spp.	31	5	13	24
Carprobrotus modestus	6	1	3	23
Prostanthera chlorantha	31	5	14	23
Scaevola linearis spp. *confertifolia*	19	3	8	23
Eucalyptus leptophylla	31	5	14	23
Lomandra juncea	31	5	14	22
Logania linifolia	6	1	3	22
Helichrysum leucopsideum	13	2	6	22
Vittadinia cuneata var. *cuneata* forma *cuneata*	13	2	6	22
Eucalyptus phenax	19	3	9	22
Melaleuca acuminata	6	1	3	22
Eucalyptus incrassata	25	4	13	20
Callistemon rugulosus var. *rugulosus*	13	2	7	19
Elymus scabrus var. *scabrus*	19	3	11	18
Santalum acuminatum	13	2	8	17
Eutaxia microphylla var. *microphylla*	38	6	23	17
Acacia dodonaeifolia	6	1	4	16
Acrotriche affinis	13	2	8	16
Einadia nutans	6	1	4	15
Enchylaena tomentosa var. *tomentosa*	6	1	4	15
Acacia calamifolia	13	2	9	14
Pimelea glauca	19	3	14	14
Choretrum glomeratum var. *glomeratum*	6	1	5	13
Leptocarpus brownii	6	1	5	12
Lomandra effusa	6	1	5	12
**Dittrichia graveolens*	6	1	5	12
**Plantagp coronopus* spp. *coronopus*	6	1	5	11

Glischrocaryon behrii	13	2	12	11
Amyema gracilis	6	1	6	10
Chorizandra enodis	6	1	6	10
Cassytha melantha	38	6	46	8

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Crassula peduncularis	CRASSULACEAE	Rare	
Prostanthera chlorantha	LABIATAE	Rare	
Acacia dodonaeifolia	LEGUMINOSAE	Rare	
Acacia pinguifolia	LEGUMINOSAE	Endangered	Endangered
Eremophila gibbifolia	MYOPORACEAE	Rare	
Olearia pannosa spp. *pannosa*	COMPOSITAE	Vulnerable	Vulnerable
Correa eburnea	RUTACEAE	Vulnerable	
Choretrum glomeratum var. *chrysanthum*	SANTALACEAE	Rare	

STRUCTURE	**Frequency**
Low open woodland	1
Very low open woodland	1
Woodland	2

LANDFORM: No landform information recorded in electronic form
SOIL TYPE: No soil information recorded in electronic form
SITE SLOPE: Slope recorded in electronic form for 6 sites only – all between 0^0 - 5^0
ASPECT: Recorded in electronic form for 6 sites only. Northerly Aspect = 50% Southerly Aspect = 50%

GROUP 31 (3 sites): *EUCALYPTUS DIVERSIFOLIA*, +/- *E. COSMOPHYLLA*- MALLEE.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Cassytha glabella forma *dispar*	100	3	335	2.0
Correa pulchella	100	3	4	**248.6**
Eucalyptus diversifolia	100	3	21	46.3
Hibbertia riparia (*glabriuscula*)	100	3	195	4.2
Olearia axillaris	100	3	32	31.0
Spyridium coactilifolium	100	3	19	52.5
Acacia myrtifolia	67	2	450	0.5
Acacia pycnantha	67	2	538	0.3
Astroloma humifusum	67	2	479	0.4
Brachyloma ericoides spp. *ericoides*	67	2	77	7.8
Clematis microphylla	67	2	41	15.5
Dampiera lanceolata var.	67	2	3	**220.3**
Eucalyptus cosmophylla	67	2	261	1.6
Eutaxia microphylla var. *microphylla*	67	2	23	28.2
Gonocarpus mezianus	67	2	202	2.4
Grevillea ilicifolia var. *ilicifolia*	67	2	11	**60.7**
Grevillea lavandulacea	67	2	197	2.4
Hakea rugosa	67	2	50	12.6
Lepidosperma congestum	67	2	18	36.1
Leucopogon rufus	67	2	25	26.5
Melaleuca decussata	67	2	97	6.0
Melaleuca lanceolata	67	2	9	**75.0**
Pultenaea canaliculata var.	67	2	63	9.8
Schoenus breviculmis	67	2	224	2.0

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Eriostemon pungens	33	1	2	181
Beyeria lechenaultii	33	1	2	167
Senecio odoratus var. *obtusifolius*	33	1	2	163
Hakea muelleriana	33	1	3	108
Gahnia deusta	33	1	4	90
Acrotriche cordata	33	1	4	80
Lasiopetalum baueri	33	1	5	67
Goodenia amplexans	33	1	8	41
Eucalyptus phenax	33	1	9	36
Phyllanthus australis	33	1	10	33
Baeckea crassifolia	33	1	10	31
Carprobrotus rossii	33	1	12	27
Eucalyptus incrassata	33	1	13	25
Leucopogon parviflorus	33	1	14	23
Cassinia uncata	33	1	14	23
Eucalyptus leptophylla	33	1	14	23
Thomasia petalocalyx	33	1	15	21
Styphelia exarrhena	33	1	21	15
Senecio picridioides	33	1	23	14
Cyrtostylis reniformis	33	1	24	13

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Senecio odoratus var. *obtusifolius*	COMPOSITAE	Vulnerable	
Daviesia pectinata	LEGUMINOSAE	Rare	
Spyridium coactilifolium	RHAMNACEAE	Vulnerable	Vulnerable

STRUCTURE: No structural information recorded in electronic form
LANDFORM: No landform information recorded in electronic form
SOIL TYPE: No soil information recorded in electronic form
SITE SLOPE: Slope recorded in electronic form for only 2 sites –0^0 and 13^0
ASPECT: Recorded in electronic form for 2 sites only – 0^0 and 180^0

Floristic Group 32 (4 sites): 1 = *EUCALYPTUS LEUCOXYLON*, +/- *E. VIMINALIS* SPP., +/- *E. OVATA*, +/- *E. FASCICULOSA*.
2 = *EUCALYPTUS FASCICULOSA*, +/- *E.DIVERSIFOLIA*, +/- *E. COSMOPHYLLA*, +/- *E. ODORATA*.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Acacia paradoxa	100	4	224	5.8
**Hypochaeris radicata*	100	4	198	6.7
Eucalyptus fasciculosa	75	3	493	1.3
Xanthorrhoea semiplana spp.	50	2	715	0.1
Lepidosperma semiteres	50	2	595	0.3
Danthonia geniculata	50	2	45	**15.9**
**Asclepias rotundifolia*	50	2	45	**16.0**
Hibbertia virgata	50	2	48	14.9
Hibbertia riparia (*glabriuscula*)	50	2	195	2.9
**Ehrharta calycina*	50	2	38	**19.1**
Eucalyptus leucoxylon spp.	50	2	121	5.3
Juncus pallidus	50	2	58	12.1
Hypolaena fastigiata	50	2	98	6.8
Gratiola peruviana	50	2	53	13.3
Juncus planifolius	50	2	48	**14.8**

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Solanum laciniatum	25	1	2	193
**Melianthus comosus*	25	1	4	93
Lepidosperma canescens	25	1	5	82
Leptocarpus brownii	25	1	5	77
Pelargonium littorale	25	1	6	63
Chorizandra enodis	25	1	6	62
Callistemon rugulosus var. *rugulosus*	25	1	7	54
Calytrix glaberrima	25	1	8	48
Thomasia petalocalyx	25	1	15	24
Eucalyptus odorata	25	1	18	21
Juncus subsecundus	25	1	18	21
Eucalyptus diversifolia	25	1	21	17
Leucopogon hirsutus	25	1	25	14
Hydrocotyle hirta	25	1	27	13
Eucalyptus ovata	25	1	29	12
Lepidosperma laterale	25	1	34	10
Lobelia alata	25	1	40	8
Euchiton gymnocephalus	25	1	40	8
Dillwynia sericea	25	1	41	8
Baumea juncea	25	1	43	8
Cassytha melantha	25	1	46	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Leucopogon hirsutus	EPACRIDACEAE	Rare	

LANDFORM: No landform □nformation recorded in electronic form
SOIL TYPE: No soil information recorded in electronic form
SITE SLOPE: Slope recorded in electronic form for only 3 sites –$5^{0,}$ 18^0 and 80^0
STRUCTURE: No structural information recorded in electronic form
ASPECT: Recorded in electronic form for 3 sites only – 4^0, 20^0 and 130^0

GROUP 33 (1 site): *MELALEUCA LANCEOLATA* TALL SHRUBLAND.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
**Asclepias rotundifolia*	100	1	45	99.6
**Carthamus lanatus*	100	1	4	1,162.3
Dodonaea viscosa spp. *spatulata*	100	1	103	42.9
Euchiton involucratus	100	1	58	76.4
Melaleuca lanceolata	100	1	9	505.6
Pultenaea daphnoides	100	1	356	11.7
Xanthorrhoea quadrangulata	100	1	16	288.3

STRUCTURE: 1 site only = Tall Shrubland
LANDFORM: No landform information recorded in electonic form
SOIL TYPE: No soil information recorded in electonic form
SITE SLOPE: 1 site = $33^{0,}$
ASPECT: 1 site = 310^{0}

GROUP 34 (2 sites): 1 = *EUCALYPTUS ODORATA*, *E. POROSA*, *E. PHENAX* – MALLEE.
2 = *EUCALYPTUS OLEOSA*, *E. LEPTOPHYLLA*, *E. FASCICULOSA* MALLEE.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Lepidosperma viscidum	100	2	90	28.2
Lomandra effusa	100	2	5	**524.6**
Melaleuca lanceolata	100	2	9	294.5
Eucalyptus fasciculosa	50	1	493	1.7
Thysanotus patersonii	50	1	350	2.8
Cassytha glabella forma *dispar*	50	1	335	2.9
Callitris gracilis	50	1	41	31.4
**Myrsiphyllum asparagoides*	50	1	80	15.6
Helichrysum leucopsideum	50	1	6	218.1
Eucalyptus leptophylla	50	1	14	92.1
Cassytha melantha	50	1	46	27.4
Eucalyptus porosa	50	1	8	166.9
Eucalyptus odorata	50	1	18	74.1
Austrostipa elegantissima	50	1	11	121.5
Einadia nutans	50	1	4	**329.8**
**Lycium ferocissimum*	50	1	9	144.2
Gahnia lanigera	50	1	4	316.2
Gahnia deusta	50	1	4	**357.7**
Eucalyptus phenax	50	1	9	145.0
Enchylaena omentose var. *tomentosa*	50	1	4	**329.8**
Melaleuca acuminata	50	1	3	**459.3**

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)
Only 2 sites therefore no species with a frequency <40%

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating = Nil

STRUCTURE: No structural information recorded in electronic form
LANDFORM: No landform information recorded in electronic form
SOIL TYPE: No soil information recorded in electronic form
SITE SLOPE: 1 site recorded in electronic form = $0^{0,}$
ASPECT: 1 site recorded in electronic form = 0^{0}

GROUP 35 (2 SITES) ***ALLOCASUARINA VERTICILLATA***, +/- ***EUCALYPTUS ODORATA***, +/- ***E. LEUCOXYLON*** **LOW WOODLAND OVER** ***ACACIA PYCNANTHA.***

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Acacia pycnantha	100	2	538	2.0
Allocasuarina verticillata	100	2	101	15.0
Caesia calliantha	100	2	111	13.6
Lomandra densiflora	100	2	60	26.1
Lomandra micrantha spp.	100	2	371	3.4
Lysiana exocarpi spp. *exocarpi*	100	2	19	82.5
Oxalis perennans	100	2	125	11.9
Pimelea glauca	100	2	14	115.1
Pittosporum phylliraeoides var. *microcarpa*	100	2	5	**321.8**
Austrostipa elegantissima	100	2	11	149.7
Themeda triandra	100	2	90	16.9
Acaena echinata var.	50	1	125	5.5
Bursaria spinosa	50	1	164	3.9
Callitris gracilis	50	1	41	18.9
Choretrum glomeratum var. *glomeratum*	50	1	5	179.0
Einadia nutans	50	1	4	**202.6**
Enchylaena tomentosa var. *tomentosa*	50	1	4	**202.6**
Eucalyptus leucoxylon spp.	50	1	121	5.7
Eucalyptus odorata	50	1	18	45.2
Gahnia lanigera	50	1	4	194.2
**Geranium dissectum*	50	1	2	**412.3**
Hardenbergia violacea	50	1	38	20.4
Lepidosperma concavum	50	1	18	44.4
Lomandra effusa	50	1	5	160.7
**Myrsiphyllum asparagoides*	50	1	80	9.2
Pomaderris paniculosa spp. *paniculosa*	50	1	4	**205.1**
Scaevola albida	50	1	248	2.3
Stackhousia monogyna	50	1	12	68.9

STRUCTURE: No structural information recorded in electronic form
LANDFORM: No landform information recorded in electronic form
SOIL TYPE: No soil information recorded in electronic form
SITE SLOPE: Slope recorded in electronic form for only 1 site = 4^0
ASPECT: Recorded in electronic form for 1site only = 330^0

GROUP 36 (15 sites): *OLEARIA AXILLARIS*, *RHAGODIA CANDOLLEANA*, *ACACIA LONGIFOLIA* VAR. *SOPHORAE*+/- *LEUCOPOGON PARVIFLORUS*, +/- E. *DIVERSIFOLIA* SHRUBLAND.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Rhagodia candolleana spp. *candolleana*	87	13	18	**100.8**
Isolepis nodosa	80	12	25	66.1
Olearia axillaris	80	12	32	52.0
Tetratheca implexicoma	73	11	12	**126.9**
Muehlenbeckia gunnii	67	10	15	92.0
Acacia longifolia var. *sophorae*	60	9	11	**116.6**
Lepidosperma gladiatum	47	7	7	**138.6**
**Myrsiphyllum asparagoides*	47	7	80	11.4

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
**Cakile maritima* spp. *maritima*	20	3	3	139
**Euphorbia paralias*	20	3	3	139
Leucophyta brownii	20	3	3	139
**Oenothera stricta* spp. *stricta*	27	4	4	139
Poa poiformis	20	3	3	139
Swainsona lessertiifolia	27	4	4	139
Threlkeldia diffusa	33	5	5	139
Adriana klotzschii	13	2	2	139
Myoporum insulare	13	2	2	139
Scaevola crassifolia	13	2	2	139
Spinifex sericeus	13	2	2	139
Pimelea serpyllifolia spp. *serpyllifolia*	40	6	7	117
Pelargonium australe	20	3	4	103
Senecio lautus	33	5	7	100
Austrostipa curticoma	13	2	3	88
**Pennisetum clandestinum*	7	1	2	83
**Ammophila arenaria*	20	3	5	83
Acacia retinodes var. *uncifolia*	27	4	7	75
Dianella brevicaulis	13	2	4	74
Senecio odoratus var. *obtusifolius*	7	1	2	71
Lotus australis	7	1	2	69
Pomaderris paniculosa spp. *paniculosa*	13	2	4	68
**Melianthus comosus*	13	2	4	66
**Lycium ferocissimum*	27	4	9	61
Leucopogon parviflorus	33	5	14	50
Samolus repens	7	1	3	46
Carprobrotus rossii	27	4	12	46
Melaleuca lanceolata	20	3	9	46
**Verbascum virgatum*	13	2	6	45
**Rhamnus alaternus*	13	2	6	45
Muehlenbeckia adpressa	7	1	3	42
Correa pulchella	7	1	4	35
Pultenaea tenuifolia	7	1	4	35
Kunzea pomifera	27	4	16	35
Acrotriche cordata	7	1	4	35
Gahnia lanigera	7	1	4	34
Senecio odoratus var. *odoratus*	20	3	14	29
Lomandra effusa	7	1	5	28
**Plantago coronopus* spp. *coronopus*	7	1	5	26
Juncus kraussii	7	1	7	19
Eucalyptus diversifolia	20	3	21	19
Santalum acuminatum	7	1	8	18
Goodenia amplexans	7	1	8	18
Clematis microphylla	33	5	41	16
Cassinia uncata	7	1	14	9
Lepidosperma concavum	7	1	18	7
Dichelachne crinita	7	1	18	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Senecio odoratus var. *obtusifolius*	COMPOSITAE	Vulnerable	
Scaevola calendulacea	GOODENIACEAE	Vulnerable	

LANDFORM	Frequency	SOIL TYPE	Frequency	SITE SLOPE	Frequency
Dune slope	1	sand	1	0^0 - 5^0	9
				6^0 –10^0	nil
				11^0 - 15^0	3
				16^0- 20^0	1
				21^0 25^0	nil
				26^0 – 30^0	nil
				$>30^0$	nil

STRUCTURE	Frequency	ASPECT
Shrubland	1	Northerly Aspect = 54%
		Southerly Aspect = 46%

GROUP 37 (18 sites): 1 = *EUCALYPTUS VIMINALIS* SPP. *VIMINALIS* OPEN FOREST
2 = *EUCALYPTUS OVATA*, +/- *E. OBLIQUA.*
3 = *EUCALYPTUS COSMOPHYLLA*, +/- *E. BAXTERI*, OVER WET HEATHS/ SEDGELANDS.
4 = *PHRAGMITES AUSTRALIS*, *LEPTOSPERMUM LANIGERUM.*

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Goodenia ovata	78	14	126	7.3
Blechnum minus	72	13	64	14.2
Gahnia sieberiana	72	13	81	11.0
Leptospermum continentale	72	13	188	4.2
Leptospermum lanigerum	72	13	66	13.7
Pteridium esculentum	72	13	271	2.6
Carex appressa	61	11	30	**26.6**
Gratiola peruviana	61	11	53	14.5
Phragmites australis	61	11	31	**25.9**
Epilobium pallidiflorum	56	10	33	21.7
**Rubus sp.*	56	10	128	4.9
Persicaria decipiens	50	9	16	**41.3**
Baumea tetragona	44	8	64	8.3
Isolepis inundata	44	8	46	11.8
Juncus pauciflorus	44	8	21	**27.2**
Lepidosperma longitudinale	44	8	69	7.6

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Baumea articulata	17	3	3	74
Blechnum nudum	33	6	7	61
**Rorippa nasturium-aquaticum*	17	3	4	56
**Cotula coronopifolia*	11	2	3	49
Danthonia semiannularis	11	2	3	45
Oxylobium lanceolatum	6	1	2	42
Pratia pedunculata	6	1	2	41
**Festuca arundinacea*	6	1	2	38
**Zantedeschia aethiopica*	6	1	2	38
Isachne globosa	17	3	6	38
Hypolepis rugosula	28	5	10	36
Baumea arthrophylla	6	1	2	34
Lycopus australis	17	3	7	33
Carex fascicularis	33	6	17	25
Haloragis brownii	6	1	3	25
**Rumex crispus*	6	1	3	25
Epilobium billardierianum spp. *billardierianum*	17	3	9	23
Juncus effusus	11	2	6	23
Triglochin procerum	17	3	13	16
**Dittrichia graveolens*	6	1	5	15
Juncus sarophorus	39	7	34	15
Glyceria australis	6	1	5	14
**Stellaria palustris* var.	17	3	16	13
Baumea acuta	11	2	10	13
Amyema gracilis	6	1	6	13
Epilobium hirtigerum	6	1	6	12
Gahnia trifida	17	3	18	11
**Juncus articulatus*	33	6	36	11
Gahnia sieberiana	72	13	81	11
Hydrocotyle hirta	22	4	27	10
Leucopogon lanceolatus	6	1	7	10
Hypericum japonicum	6	1	8	9
Senecio glomeratus	17	3	23	9
Villarsia umbricola var *umbricola*	22	4	31	9
Lobelia alata	28	5	40	8
Juncus caespiticius	11	2	16	8
Juncus pallidus	39	7	58	8
Gleichenia microphylla	22	4	34	8
Correa aemula	17	3	3	7
Danthonia carphoides var. *carphoides*	6	1	10	7
Eucalyptus ovata	17	3	29	7
**Solanum nigrum*	6	1	11	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Blechnum nudum	BLECHNACEAE	Rare	
Blechnum wattsii	BLECHNACEAE	Rare	
Crassula sieberiana spp. *sieberiana*	CRASSULACEAE	Endangered	
Baumea acuta	CYPERACEAE	Rare	
Hypolepis rugosula	DENNSTAEDTIACEAE	Rare	
Gleichenia microphylla	GLEICHENIACEAE	Rare	
Danthonia carphoides var. *carphoides*	GRAMINEAE	Rare	
Deyeuxia densa	GRAMINEAE	Rare	
Hypericum japonicum	GUTTIFERAE	Rare	
Haloragis brownii	HALORAGACEAE	Rare	
Myriophyllum amphibium	HALORAGACEAE	Rare	
Viminaria juncea	LEGUMINOSAE	Rare	
Eucalyptus dalrympleana spp. *dalrympleana*	MYRTACEAE	Rare	
Eucalyptus viminalis spp. *viminalis*	MYRTACEAE	Rare	

LANDFORM	Frequency
Gully	1
Stream channel	13
Swamp	3

SOIL TYPE	Frequency
loam	1
sand	2
sandy loam	1
silty clay loam	13

SITE SLOPE	Frequency
$0 - 5^0$	16
$6 – 10^0$	nil
$11 - 15^0$	1
$16^0 - 20^0$	1
21^0 25^0	nil
$26^0 – 30^0$	nil
$>30^0$	nil

STRUCTURE	Frequency
Closed sedgeland	2
Tall shrubland	4
Open forest	2
Open woodland	1

ASPECT

Northerly Aspect = 31%

Southerly Aspect = 69%

GROUP 38 (10 sites): *EUCALYPTUS OVATA* OPEN FOREST OVER WET HEATH.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Baumea juncea	90	9	43	**36.4**
Goodenia ovata	80	8	126	10.4
Eucalyptus ovata	70	7	29	**42.2**
Gahnia trifida	70	7	18	**67.6**
Leptospermum lanigerum	70	7	66	**18.2**
Leptospermum continentale	60	6	188	4.7
Melaleuca decussata	50	5	97	8.3
Pteridium esculentum	50	5	271	2.3

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Triglochin striatum	30	3	5	106
Juncus kraussii	40	4	7	98
Apium prostratum spp. *prostratum* var.	10	1	2	91
Ranunculus pachycarpus	10	1	2	88
Eleocharis acuta	20	2	5	68
Carex tereticaulis	20	2	6	59
Linum marginale	10	1	3	59
Haloragis brownii	10	1	3	57
Ranunculus amphitrichus	10	1	3	54
Isolepis platycarpa	10	1	4	45
Epilobium billardierianum spp. *billardierianum*	20	2	9	37
Leptocarpus brownii	10	1	5	36
Isolepis fluitans	10	1	5	36
Sonchus hydrophilus	10	1	5	33
Juncus pauciflorus	40	4	21	33
Carex gaudichaudiana	10	1	5	33
Plantago coronopus spp. *coronopus*	10	1	5	33
Isachne globosa	10	1	6	29
Baumea laxa	10	1	6	29
**Leontodon taraxacoides* spp. *taraxacoides*	20	2	13	27
Leucopogon lanceolatus	10	1	7	24
Centella cordifolia	30	3	27	19
**Juncus articulatus*	40	4	36	19
Carex appressa	30	3	30	17
Villarsia umbricola var *umbricola*	30	3	31	17
Eleocharis gracilis	40	4	44	15
Leucopogon hirsutus	20	2	25	14
Isolepis nodosa	20	2	25	13
Lythrum hyssopifolia	10	1	13	13
Gratiola peruviana	40	4	53	13
Triglochin procerum	10	1	13	13
Leucopogon parviflorus	10	1	14	12
Juncus bufonius	10	1	15	11
Juncus caespiticius	10	1	16	10
Olearia teretifolia	20	2	34	10
Carex fascicularis	10	1	17	10
Acaena novae-zelandiae	40	4	70	9
Juncus pallidus	30	3	58	8
Pultenaea laxiflora	10	1	20	8
Schoenus maschalinus	10	1	21	8
**Lotus uliginosus*	20	2	45	7
Patersonia fragilis	10	1	23	7
Senecio picridioides	10	1	23	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Baumea laxa	CYPERACEAE	Rare	
Leucopogon hirsutus	EPACRIDACEAE	Rare	
Haloragis brownii	HALORAGACEAE	Rare	
Myriophyllum amphibium	HALORAGACEAE	Rare	
Viminaria juncea	LEGUMINOSAE	Rare	
Melaleuca squamea	MYRTACEAE	Rare	
Eryngium vesiculosum (*A*)	UMBELLIFERAE	Rare	

LANDFORM	Frequency	SOIL TYPE	Frequency	SITE SLOPE	Frequency
Plain	2	loam	2	$0 - 5^0$	7
				$6 – 10^0$	1
				$11 - 15^0$	nil
				$16^0 - 20^0$	nil
				$21^0 25^0$	nil
				$26^0 – 30^0$	nil
				$>30^0$	nil

STRUCTURE	Frequency	ASPECT
Low shrubland	1	Northerly Aspect = 62%
Tall shrubland	2	Southerly Aspect = 38%
Low open forest	1	
Open forest	1	

GROUP 39 (6 sites): *CAREX APPRESSA*, *JUNCUS PALLIDUS* CLOSED SEDGELAND (SWAMPS).

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Eleocharis gracilis	100	6	44	33.6
Isolepis inundata	100	6	46	31.8
Carex appressa	83	5	30	**41.5**
Juncus pallidus	83	5	58	20.8
Juncus sarophorus	83	5	34	36.5
**Lotus uliginosus*	83	5	45	27.2
**Anthoxanthum odoratum*	67	4	51	18.9
Gratiola peruviana	67	4	53	18.2
**Juncus articulatus*	67	4	36	27.2
Juncus planifolius	67	4	48	20.2
Lobelia alata	67	4	40	24.3
Carex fascicularis	50	3	17	**43.8**
Epilobium pallidiflorum	50	3	33	21.9
Glyceria australis	50	3	5	**141.7**
**Hypochaeris radicata*	50	3	198	2.8
Juncus effusus	50	3	6	**121.1**
Juncus pauciflorus	50	3	21	35.2

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Agrostis billardieri var.	17	1	2	134
Isolepis platycarpa	33	2	4	127
Eleocharis sphacelata	17	1	2	113
Olearia glandulosa	17	1	2	113
Eleocharis acuta	33	2	5	95
Carex gaudichaudiana	33	2	5	94
Hydrocotyle pterocarpa	17	1	3	88
Haloragis brownii	17	1	3	83
Ranunculus amphitrichus	17	1	3	78
Typha domingensis	17	1	4	66
Pelargonium australe	17	1	4	63
**Paspalum dilatatum*	17	1	4	61
**Aster subulatus*	17	1	4	60
Juncus holoschoenus	33	2	9	58
**Rumex conglomeratus*	17	1	6	42
**Leontodon taraxacoides* spp. *taraxacoides*	33	2	13	38
Lythrum hyssopifolia	33	2	13	38
**Lotus suaveolens*	17	1	7	34
Juncus bufonius	33	2	15	33
Persicaria decipiens	33	2	16	31
Epilobium billardierianum spp. *billardierianum*	17	1	9	27
**Solanum nigrum*	17	1	11	24
Schoenus maschalinus	33	2	21	23
Triglochin procerum	17	1	13	18
Centella cordifolia	33	2	27	18
Juncus caespiticius	17	1	16	15
**Cirsium vulgare*	33	2	32	15
Gonocarpus micranthus spp. *micranthus*	33	2	32	15
Isolepis nodosa	17	1	25	9
Hydrocotyle hirta	17	1	27	9
Geranium retrorsum	17	1	27	9
Myriophyllum amphibium	17	1	28	8
Phragmites australis	17	1	10	7
Villarsia umbricola var. *umbricola*	17	1	31	7
Melaleuca squamea	17	1	32	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Olearia glandulosa	COMPOSITAE	Vulnerable	
Gonocarpus micranthus spp. *micranthus*	HALORAGACEAE	Rare	
Haloragis brownii	HALORAGACEAE	Rare	
Myriophyllum amphibium	HALORAGACEAE	Rare	
Hydrilla verticillata	HYDROCHARITACEAE	Rare	
Melaleuca squamea	MYRTACEAE	Rare	

LANDFORM	Frequency
Plain	1
Stream channel	1
Swamp	1

SOIL TYPE	Frequency
clay loam	1
loam	2

SITE SLOPE	Frequency
$0 - 5^0$	4
$6 – 10^0$	1
$11 - 15^0$	nil
$16^0 - 20^0$	nil
$21^0\ 25^0$	nil
$26^0 – 30^0$	nil
$>30^0$	nil

STRUCTURE	Frequency
Closed sedgeland	2
Sedgeland	1

ASPECT

Northerly Aspect = 40%

Southerly Aspect = 60%

GROUP 40 (63 SITES): *LEPTOSPERMUM CONTINENTALE*, *LEPTOSPERMUM LANIGERUM*, +/- *PHRAGMITES AUSTRALIS* SHRUBLAND +/- EMERGENT *EUCALYPTUS OVATA*.

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Leptospermum continentale	95	60	188	5.5
Baumea tetragona	84	53	64	16.0
Empodisma minus	84	53	63	16.1
Gahnia sieberiana	83	52	81	12.2
Lepidosperma longitudinale	78	49	69	13.6
Blechnum minus	71	45	64	13.4
Baumea rubiginosa	67	42	51	15.9
Viminaria juncea	63	40	46	16.8
Juncus planifolius	59	37	48	14.8
Leptocarpus tenax	52	33	37	**17.3**
**Lotus uliginosus*	52	33	45	14.0
Eleocharis gracilis	51	32	44	13.9
Isolepis inundata	49	31	46	12.6
Gonocarpus micranthus spp. *micranthus*	48	30	32	**18.2**
Gratiola peruviana	48	30	53	10.7
Melaleuca squamea	48	30	32	**18.2**
Sprengelia incarnata	48	30	34	17.0
Xyris operculata	48	30	31	**18.8**
Gleichenia microphylla	46	29	34	16.5
Leptospermum lanigerum	44	28	66	7.6
Patersonia occidentalis	41	26	56	8.4

Species with a frequency of < 40% but with a high significance to group (partial chi-square > 7)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Baumea gunnii	21	13	13	19
Lycopodiella lateralis	6	4	5	19
Pultenaea dentata	14	9	9	19
Schizaea bifida	10	6	6	19
Spiranthes sinensis spp. *australis*	16	10	10	19
Juncus continuus	3	2	2	19
Juncus prismatocarpus	3	2	2	19
Schizaea fistulosa	3	2	2	19
Utricularia dichotoma	40	25	26	19
Schoenus lepidosperma spp. *lepidosperma*	24	15	16	18
Schoenus carsei	29	18	21	17
Hypericum japonicum	11	7	8	17
**Lotus suaveolens*	10	6	7	17
Myriophyllum amphibium	38	24	28	17
Baumea laxa	8	5	6	16
Schoenus maschalinus	27	17	21	16
Centella cordifolia	33	21	27	15
Prunella vulgaris	5	3	4	15
**Paspalum dilatatum*	5	3	4	14
Villarsia umbricola var *umbricola*	33	21	31	13
Juncus caespiticius	17	11	16	12
Hydrocotyle pterocarpa	3	2	3	12
Leucopogon hirsutus	2	1	25	12
Baumea acuta	10	6	10	11
Epilobium pallidiflorum	32	20	33	11
Allocasuarina mackliniana spp. *mckliniana*	2	1	2	11
Lobelia alata	37	23	40	11
Juncus sarophorus	30	19	34	10
Juncus articulatus	32	20	36	10
Lycopus australis	6	4	7	10
Eleocharis sphacelata	2	1	2	10
Olearia glandulosa	2	1	2	10
Leontodon taraxacoides spp. *taraxacoides*	11	7	13	10
Lythrum hyssopifolia	11	7	13	10
Baumea arthrophylla	11	7	2	10
Lindsaea linearis	29	18	35	10
Hypolepis rugosula	8	5	10	9
Boronia parviflora	3	2	4	9
Typha domingensis	3	2	4	9
Triglochin procerum	10	6	13	9
Acacia retinodes var. *retinodes* (swamp form)	16	10	22	9

Anthoxanthum odoratum	33	21	51	7
Schoenus laevigatus	2	1	3	7
Danthonia semiannularis	2	1	3	7
Isolepis fluitans	3	2	5	7
Ranunculus amphitrichus	2	1	3	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Blechnum nudum	BLECHNACEAE	Rare	
Olearia glandulosa	COMPOSITAE	Vulnerable	
Baumea acuta	CYPERACEAE	Rare	
Baumea gunnii	CYPERACEAE	Rare	
Baumea laxa	CYPERACEAE	Rare	
Schoenus laevigatus	CYPERACEAE	Rare	
Schoenus lepidosperma spp. *lepidosperma*	CYPERACEAE	Rare	
Hypolepis rugosula	DENNSTAEDTIACEAE	Rare	
Drosera binata	DROSERACEAE	Rare	
Leucopogon hirsutus	EPACRIDACEAE	Rare	
Sprengelia incarnata	EPACRIDACEAE	Rare	
Gleichenia microphylla	GLEICHENIACEAE	Rare	
Deyeuxia densa	GRAMINEAE	Rare	
Poa umbricola	GRAMINEAE	Rare	
Hypericum japonicum	GUTTIFERAE	Rare	
Gonocarpus micranthus spp. *micranthus*	HALORAGACEAE	Rare	
Myriophyllum amphibium	HALORAGACEAE	Rare	
Juncus prismatocarpus	JUNCACEAE	Endangered	
Pultenaea dentata	LEGUMINOSAE	Rare	
Viminaria juncea	LEGUMINOSAE	Rare	
Lycopodiella lateralis	LYCOPODIACEAE	Rare	
Lycopodiella serpentina	LYCOPODIACEAE	Endangered	
Lythrum salicaria	LYTHRACEAE	Rare	
Melaleuca squamea	MYRTACEAE	Rare	
Cryptostylis subulata	ORCHIDACEAE	Vulnerable	
Microtis atrata	ORCHIDACEAE	Rare	
Microtis rara	ORCHIDACEAE	Rare	
Prasophyllum australe	ORCHIDACEAE	Rare	
Prasophyllum frenchii	ORCHIDACEAE	Endangered	Endangered
Spiranthes sinensis spp. *australis*	ORCHIDACEAE	Rare	
Thelymitra holmesii	ORCHIDACEAE	Vulnerable	
Thelymitra mucida	ORCHIDACEAE	Rare	
Boronia parviflora	RUTACEAE	Rare	
Schizaea bifida	SCHIZAEACEAE	Vulnerable	
Schizaea fistulosa	SCHIZAEACEAE	Vulnerable	
Xyris operculata	XYRIDACEAE	Rare	

LANDFORM	Frequency
Hill footslope	1
Perched swamp	15
Swamp	22

SOIL TYPE	Frequency
clay loam	7
loam	24
peat	1
sandy loam	6

SITE SLOPE	Frequency
0^0 - 5^0	38
6^0 –10^0	5
11^0 - 15^0	3
16^0- 20^0	2
21^0 25^0	nil
26^0 – 30^0	nil
>30^0	nil

STRUCTURE	Frequency
Low open woodland	1
Low shrubland	2
Low very open shrubland	1
Open shrubland	5
Sedgeland	3
Shrubland	11
Tall closed shrubland	1
Tall open shrubland	4
Tall shrubland	6
Very low open woodland	2

ASPECT

Northerly Aspect = 23%

Southerly Aspect = 77%

GROUP 41 (15 sites): 1 = *EUCALYPTUS OBLIQUA*, *E. OVATA*, +/- *E. COSMOPHYLLA* OPEN FOREST OVER WET HEATHS (GULLIES).
2 = *EUCALYPTUS COSMOPHYLLA*, *E. BAXTERI* OVER WET HEATHS.
3 = *LEPTOSPERMUM CONTINENTALE*, *MELALEUCCA DECUSSATA* -CLOSED SHRUBLAND OVER *LEPIDOSPERMA LONGITUDINALE.*

Species	% Frequency of Species >40% within group	Frequency within group	Frequency All groups	Significance to group
Acacia verticillata	100	15	160	6.0
Gonocarpus tetragynus	100	15	688	0.6
Melaleuca decussata	100	15	97	10.6
Patersonia occidentalis	87	13	56	**16.5**
Baumea juncea	73	11	43	**17.9**
Cassytha glabella forma *dispar*	73	11	335	1.4
Leptospermum continentale	73	11	188	3.4
Billardiera bignoniacea	60	9	94	6.2
Lepidosperma longitudinale	60	9	69	8.8
Empodisma minus	53	8	63	8.4
Hakea rostrata	53	8	498	0.2
Patersonia fragilis	53	8	23	**25.3**
Platylobium obtusangulum	53	8	512	0.2
Burchardia umbellata	47	7	313	0.7
Epacris impressa	47	7	277	0.9
Eucalyptus ovata	47	7	29	**17.1**
Olearia ramulosa	47	7	373	0.4

Species with a frequency of < 40% but with a high significance to group (chi-square > 9)

Species	% Frequency of Species Within Group	Frequency Within Group	Frequency All groups	Significance to group
Chorizandra enodis	27	4	6	50
Schoenus laevigatus	13	2	3	45
Boronia parviflora	13	2	4	37
Hibbertia eupetrifolia spp. *radians*	20	3	13	16
Gahnia trifida	27	4	18	15
Leptocarpus brownii	7	1	5	15
Leucopogon hirsutus	33	5	25	14
Callistemon rugulosus var. *rugulosus*	7	1	7	10
Xanthosia tasmanica	33	5	8	9
Sprengelia incarnata	27	4	34	8
Lindsaea linearis	27	4	36	8
Baumea acuta	7	1	10	7

Species with a State (listed in NPW Act, 1972) and/or Australian conservation rating

Species	Family	NPW Act Rating	Australian Rating
Baumea acuta	CYPERACEAE	Rare	
Schoenus discifer	CYPERACEAE	Rare	
Schoenus laevigatus	CYPERACEAE	Rare	
Schoenus lepidosperma spp.	CYPERACEAE	Rare	
Drosera binata	DROSERACEAE	Rare	
Leucopogon hirsutus	EPACRIDACEAE	Rare	
Sprengelia incarnata	EPACRIDACEAE	Rare	
Viminaria juncea	LEGUMINOSAE	Rare	
Cryptostylis subulata	ORCHIDACEAE	Vulnerable	
Diuris brevifolia	ORCHIDACEAE	Rare	
Microtis atrata	ORCHIDACEAE	Rare	
Prasophyllum frenchii	ORCHIDACEAE	Endangered	Endangered
Boronia parviflora	RUTACEAE	Rare	
Zieria veronicea	RUTACEAE	Rare	
Xanthosia tasmanica	UMBELLIFERAE	Rare	
Xyris operculata	XYRIDACEAE	Rare	

LANDFORM	Frequency	SOIL TYPE	Frequency	SITE SLOPE	Frequency
Perched swamp	1	loam	3	$0 - 5^0$	11
Plain	1	sandy loam	1	$6 – 10^0$	1
Stream Channel	1			$11 - 15^0$	nil
Swamp	1			$16^0 - 20^0$	nil
				$21^0\ 25^0$	nil
				$26^0 – 30^0$	nil
				$>30^0$	nil

STRUCTURE	Frequency	ASPECT
Low woodland	1	Northerly Aspect = 73%
Closed shrubland	1	Southerly Aspect = 27%
Very low woodland	1	
Woodland	2	
Shrubland	1	
Tall closed shrubland	1	

APPENDIX XI

FREQUENCY OF ALL MAMMALS (EXCLUDING BATS) RECORDED AT SURVEY QUADRATS.

(refer Appendix II for vegetation and physical parameter details of each site)

Site Number (Survey number)	*Antechinus flavipes* (Yellow-footed Antechinus)	*Capra hircus* * (Goat)	*Cercartetus concinnus* (Western Pygmy Possum)	*Cervus dama* * (Deer)	*Felis catus* * (Feral Cat)	*Isoodon obesulus* (Southern Brown Bandicoot)	*Lepus capensis* * (Brown Hare)	*Macropus fuliginosus* (Western Grey Kangaroo)	*Mus musculus* * (House Mouse)	*Oryctolagus cuniculus* * (Rabbit)	*Phascolarctos cinereus* (Koala)	*Pseudocheirus peregrinus* (Common Ringtail Possum)	*Rattus fuscipes* (Bush Rat)	*Rattus lutreolus* (Swamp Rat)	*Rattus rattus* * (Black Rat)	*Tachyglossus aculeatus* (Echidna)	*Trichosurus vulpecula* (Common Brushtail Possum)	*Vulpes vulpes* * (Fox)	Total records per site	Species/Quadrat
ADE00701(117)								1				3	2			1		1	8	5
ADE00801(117)										1	1	2				1		1	6	5
ADE00901(117)	4											5				1		1	11	4
ADE01001(117)						1		1		3	5	6	1			1		1	19	8
ADE01101(117)	2										3	8	9			1			23	5
ADE01201(117)	5					4						21	4		4				38	5
ADE01301(117)	1												4			1			6	3
ADE01401(117)								4	7							1			12	3
ADE01501(117)									3						1	1	2		7	4
ADE01601(117)								1	4							1			6	3
ADE01701(117)								3	2		2	1				1			9	5
ADE01801(117)		1						1	1							2			5	4
ADE01901(117)								11	3			6				1		1	22	5
ADE02001(117)					1			1		2	4	4						1	13	6
ADE02101(117)	1					2				1		11	8		1			1	25	7
ANG00101(117)								1								1			2	2
BAR00601(117)								1	2										3	2
BAR00701(117)				1				2		1						1			5	4
BAR01401(117)									1						3				4	2
BAR01501(117)	2											3			2		4		11	4
BAR01601(117)									2							1	1		4	3
BAR01701(117)		2													1				3	2
BAR01801(117)								3							1				4	2
BAR01901(117)								2	2							1			5	3
BAR02001(117)								3	1	2						1	1	2	10	6
BAR02101(117)							2	3	2	3						1		1	12	6
BAR02201(117)								2		3								1	6	3
BAR02301(117)								2								1			3	2
BAR02401(117)								1	2	1						1		2	7	5
BAR02501(117)								3		3					1				7	3
BAR02601(117)								14				2					2		18	3
BAR02701(117)								2				2			2	1	3		10	5
BAR02801(117)								1							1	1	1	2	6	5
BAR02901(117)								1				8			1	1	8		19	5
BAR03001(117)								5				1				2	5		13	4
BAR03101(117)								1	1							2			4	3

Site Number (Survey number)	*Antechinus flavipes* (Yellow-footed Antechinus)	*Capra hircus* * (Goat)	*Cercartetus concinnus* (Western Pygmy Possum)	*Cervus dama* * (Deer)	*Felis catus* * (Feral Cat)	*Isoodon obesulus* (Southern Brown Bandicoot)	*Lepus capensis* * (Brown Hare)	*Macropus fuliginosus* (Western Grey Kangaroo)	*Mus musculus* * (House Mouse)	*Oryctolagus cuniculus* * (Rabbit)	*Phascolarctos cinereus* (Koala)	*Pseudocheirus peregrinus* (Common Ringtail Possum)	*Rattus fuscipes* (Bush Rat)	*Rattus lutreolus* (Swamp Rat)	*Rattus rattus* * (Black Rat)	*Tachyglossus aculeatus* (Echidna)	*Trichosurus vulpecula* (Common Brushtail Possum)	*Vulpes vulpes* * (Fox)	Total records per site	Species/Quadrat
BAR03201(117)								2			1				5	1			9	4
ECH00101(117)								4	2			7			1	1			15	5
ECH00301(117)							2					4	8						14	3
ECH00401(117)												1					4		5	2
ENC00101(97)															1	1			2	2
ENC00201(97)															2				2	1
ENC00301(97)								2							1		1		4	3
ENC00401(117)								6	14	2						2		3	27	5
ENC00401(97)															1	1	1		3	3
ENC00501(117)								4	7	4			1			1		2	19	6
ENC00501(97)									1	2					1			1	5	4
JER00101(97)									6										6	1
JER00201(97)	10												10						20	2
JER00301(97)	1								4				5						10	3
JER00401(97)	3												13						16	2
JER00501(97)	1																		1	1
JER00701(117)	1							2	2			10	22						37	5
JER00801(117)	1							1	2				1					1	6	5
JER00901(117)	3							6					42	1		1			53	5
JER01001(117)	3							3	1			2	23			1			33	6
JER01101(117)	2							1	2	1			18						24	5
MIL00101(117)								1	3	1			3			1		1	10	6
MIL00201(117)								1	10				1					1	13	4
MIL00202(52)									12					14					26	2
MIL00203(52)								1	5					29					35	3
NOA00701(117)								2			1	13						1	17	4
NOA00801(117)						2				1	3	8					4		18	5
NOA00901(117)	1						1	2			2	2				1	4		13	7
NOA01001(117)						3		5	1		2	2	2		4				19	7
NOA01002(117)									6								1		7	2
NOA01101(117)						4		2			7	2	14			3		3	35	7
NOA01201(117)																		1	1	1
NOA01301(117)	1							2			1								4	3
NOA01401(117)	1			3				1					5			1		1	12	6
NOA01501(117)								1		1			1						3	3
NOA01601(117)	13					1		1				8						1	24	5
NOA01701(117)	1								5		2		1						9	4
NOA01801(117)								1					7			1			9	3
NOA01901(117)								1			1								2	2
NOA02001(117)	5							1		1	1	7	12			1	1		29	8
NOA02101(117)								1		1	1				1	1		1	6	6
NOA02201(117)								4	10			7			2		1	1	25	6
NOA02301(117)								2									1	1	4	3
NOA02401(117)								1	1			6	5						13	4

Site Number (Survey number)	*Antechinus flavipes* (Yellow-footed Antechinus)	*Capra hircus* * (Goat)	*Cercartetus concinnus* (Western Pygmy Possum)	*Cervus dama* * (Deer)	*Felis catus* * (Feral Cat)	*Isoodon obesulus* (Southern Brown Bandicoot)	*Lepus capensis* * (Brown Hare)	*Macropus fuliginosus* (Western Grey Kangaroo)	*Mus musculus* * (House Mouse)	*Oryctolagus cuniculus* * (Rabbit)	*Phascolarctos cinereus* (Koala)	*Pseudocheirus peregrinus* (Common Ringtail Possum)	*Rattus fuscipes* (Bush Rat)	*Rattus lutreolus* (Swamp Rat)	*Rattus rattus* * (Black Rat)	*Tachyglossus aculeatus* (Echidna)	*Trichosurus vulpecula* (Common Brushtail Possum)	*Vulpes vulpes* * (Fox)	Total records per site	Species/Quadrat
NOA02501(117)								6		1	1					3			11	4
ONK01101(117)								2		1		4							7	3
ONK01201(117)								1							1	1		1	4	4
ONK01301(117)							1	3	1							2			7	4
ONK01401(117)	3							1	1						3	1	1		10	6
ONK01501(117)								5	1	1	1					1			9	5
ONK01601(117)								1	3							2			6	3
ONK01701(117)	3							1			1				2	1	1	1	10	7
ONK01801(117)							1	11				1			1	3		1	18	6
ONK01901(117)											2					1			3	2
ONK02001(117)								2				5				2			9	3
ONK02101(117)								3			2					1	1		7	4
ONK02201(117)								5								2			7	2
ONK02301(117)								2				6			1	1			10	4
ONK02401(117)															2			2	4	2
ONK02501(117)								3			2					1		3	9	4
ONK02601(117)							1	8				2				2	3		16	5
ONK02701(117)	1							3			3	2	12			1			22	6
ONK02801(117)								1				2				1			4	3
ONK02901(117)								4			2	1	7			3			17	5
TOR00101(97)	10				1			1	3				56	6	2		1		80	8
TOR00201(97)	1												20		1				22	3
TOR00301(97)	56												79	1					136	3
TOR00401(97)	2												18						20	2
TOR00402(52)	5													1		1			7	3
TOR00501(97)	2														1				3	2
TOR00502(52)	3							2					15	9					29	4
TOR00601(97)	2												2						4	2
TOR00701(97)									5										5	1
TOR00801(97)													1						1	1
TOR00901(97)	3								2				6						11	3
TOR00903(52)								4					4	1					9	3
TOR01001(52)								4						11					15	2
TOR01001(97)	20							1					17						38	3
TOR01101(52)									2										2	1
TOR01101(97)								1											1	1
TOR01301(117)	3							1	4			4	10			1		1	24	7
TOR01401(117)	2							1					17			1			21	4
TOR01501(117)	6							3	1				5			1		1	17	6
TOR01601(117)	4							1	1			15	15			1			37	6
TOR01701(117)								10	9							4		3	26	4
TOR01801(117)								8	12	1			5			2		1	29	6
WIL00101(97)	1												3						4	2
WIL00201(97)	3												5						8	2

Site Number (Survey number)	*Antechinus flavipes* (Yellow-footed Antechinus)	*Capra hircus* * (Goat)	*Cercartetus concinnus* (Western Pygmy Possum)	*Cervus dama* * (Deer)	*Felis catus* * (Feral Cat)	*Isoodon obesulus* (Southern Brown Bandicoot)	*Lepus capensis* * (Brown Hare)	*Macropus fuliginosus* (Western Grey Kangaroo)	*Mus musculus* * (House Mouse)	*Oryctolagus cuniculus* * (Rabbit)	*Phascolarctos cinereus* (Koala)	*Pseudocheirus peregrinus* (Common Ringtail Possum)	*Rattus fuscipes* (Bush Rat)	*Rattus lutreolus* (Swamp Rat)	*Rattus rattus* * (Black Rat)	*Tachyglossus aculeatus* (Echidna)	*Trichosurus vulpecula* (Common Brushtail Possum)	*Vulpes vulpes* * (Fox)	Total records per site	Species/Quadrat
WIL00301(97)													9						9	1
WIL00401(97)													9						9	1
WIL00501(97)									4										4	1
WIL00601(97)									7										7	1
WIL00701(97)									9										9	1
WIL00801(97)									2							1			3	2
WIL00802(52)									5					10	1				16	3
WIL00901(97)													7						7	1
WIL00902(52)									17					2	4				23	3
WIL01202(52)								4	5	1				12					22	4
WIL01701(117)									2	1			7					1	11	4
WIL01801(117)	3							1					4			2			10	4
WIL01901(117)	1							1	1				10					1	14	5
WIL01901(52)									4					1				3	8	3
WIL02001(117)	7							1	3				6					1	18	5
WIL02001(52)									1					4				1	6	3
WIL02101(117)								1	5			1	1			1		1	10	6
WIL02201(117)	1		1			4		1	9				20					1	37	7
WIL02301(117)						1		1	13				10			1			26	5
WIL02401(117)								3	2	2						1		1	9	5
WIL02501(117)			1					1	1	3						1		1	8	6
WIL02601(117)	2							1				5	1			1			10	5
WIL02701(117)	1		2			2		3	4	7			23			1		1	44	9
WIL02801(117)	1							5	2	2		3	12		1	1	1	1	29	10
WIL02901(117)	2						1	1	2			3	3			1			13	7
YAN00101(97)									2				8						10	2
YAN00201(97)			2										8						10	2
YAN00301(97)	1		1						1				5						8	4
YAN00901(117)								2	2							1		1	6	4
YAN01001(117)			2					1	6	1		1	1		4	1			17	8
YAN01101(117)						1		2					17					1	21	4
YAN01201(117)			1					1	1				11			1		1	16	6
Total records for each species	**211**	**3**	**10**	**4**	**2**	**25**	**9**	**260**	**282**	**55**	**51**	**217**	**691**	**102**	**61**	**100**	**53**	**64**	**2200**	**18**
# of sites each species recorded	**49**	**2**	**7**	**2**	**2**	**11**	**7**	**100**	**71**	**30**	**24**	**44**	**65**	**14**	**34**	**78**	**24**	**49**	**156**	**18**
Averages (Mean)																			**14.1**	**3.9**

APPENDIX XII

BIRD SPECIES RECORDED IN THE SOUTHERN MOUNT LOFTY RANGES AND ADJACENT SEAS.

Birds are arranged in family order as per Horton (2000). Horton has followed Christidis and Boles (1994) and Schodde and Mason (1999) for taxonomic order. This groups species in taxonomic order, according to evolutionary development from most primitive to most advance. Within families, species are arranged alphabetically by common name.

Current Satus

AUS = Australian Status = Environment Protection and Biodiversity Conservation Act, 1999
SA = SA NPWS Act 1972, Updated Schedule 2000
REG = regional status (Carpenter and Reid 1997)
E = Endangered, V = Vulnerable, R = Rare, U = Uncommon, I = Introduced, K = Unknown/Indeterminate
X = Extinct
Source: Biological Surveys (refer Chapter 2, Methods), Opportune and Reserves database (Department for Environment and Heritage); SA Museum
*** Denotes species foreign to Australia**

SPECIES DESCRIPTION		STATUS									SOURCE						
Species	Common Name	Resident	Migratory Breeders	Migratory Non-breeders	Nomadic	Vagrant	Oceanic	AUS	SA	REG	Surveys 52	Surveys 97	Surveys 117	Opportune	Reserves	S.A. Museum	Comments
CASUARIIDAE – Cassowaries and Emus																	
Emu	*Dromaius novaehollandiae*	✔								X/I			✔	✔	✔	✔	
PHASIANIDAE – Pheasants, quails and allies																	
Brown (or Swamp) Quail	*Coturnix ypsiliphora*				✔				V	V							
Indian Peafowl	*Pavo cristatus**	✔											✔	✔			Probably no feral populations in region.
King Quail	*Coturnix chinensis*	✔							E	X						✔	4 SAM records, 2 (1905), 1920 & last 1930
Stubble Quail	*Coturnix pectoralis*	✔										✔	✔	✔	✔	✔	
ANATIDAE – Geese, swans and ducks																	
Australian Shelduck (Mountain Duck)	*Tadorna tadornoides*				✔										✔	✔	
Australasian Shoveler	*Anas rhynchotis*				✔				R	R				✔	✔	✔	
Australian Wood Duck (Maned Duck)	*Chenonetta jubata*	✔									✔		✔	✔	✔	✔	
Black Swan	*Cygnus atratus*				✔									✔	✔	✔	
Blue-billed Duck	*Oxyura australis*				✔				R	R					✔	✔	
Cape Barren Goose	*Cereopsis novaehollandiae*			✔					R	R					✔	✔	
Chestnut Teal	*Anas castanea*				✔					U			✔	✔	✔	✔	
Freckled Duck	*Stictonetta naevosa*				✔				V	V						✔	
Grey Teal	*Anas gracilis*	✔											✔	✔	✔	✔	
Hardhead	*Aythya australis*				✔					U				✔	✔	✔	
Mallard	*Anas platyrhynchos**	✔								I				✔	✔	✔	
Musk Duck	*Biziura lobata*				✔				R	U				✔	✔	✔	
Pacific Black Duck (Black Duck)	*Anas superciliosa*	✔									✔		✔	✔	✔	✔	

SPECIES DESCRIPTION		STATUS									SOURCE						
Species	Common Name	Resident	Migratory Breeders	Migratory Non-breeders	Nomadic	Vagrant	Oceanic	AUS	SA	REG	Surveys			Opportune	Reserves	S.A. Museum	Comments
											52	97	117				
Pacific Black Duck/Mallard Hybrid	*Anas superciliosa x Anas platyrhynchos*	✔								I				✔		✔	
Pink-eared Duck	*Malacorhynchus membranaceus*				✔										✔	✔	
PODICIPEDIDAE - Grebes																	
Australasian (or Little) Grebe	*Tachybaptus novaehollandiae*	✔												✔	✔	✔	
Great Crested Grebe	*Podiceps cristatus*				✔				R	R				✔	✔	✔	
Hoary-headed Grebe	*Poliocephalus poliocephalus*				✔									✔	✔	✔	
SPHENISCIDAE - Penguins																	
Fiordland Penguin	*Eudyptes pachyrhynchus*					✔									✔	✔	Oceanic. 2 SAM records, 1991 & 1990
Little (or Fairy) Penguin	*Eudyptula minor*	✔													✔	✔	
Macaroni (or Royal) Penguin	*Eudyptes chrysolophus*					✔										✔	Oceanic. 1 SAM record, 1933
PROCELLARIIDAE – Shearwaters, petrels and diving-petrels																	
Antarctic (Dove) Prion	*Pachyptila desolata*						✔								✔	✔	Oceanic.
Broad-billed Prion	*Pachyptila vittata*						✔									✔	Oceanic. 2 SAM records, 1983 & 1982
Antarctic Petrel	*Thalassoica antarctica*						✔									✔	Oceanic. 1 SAM record, 1978
Blue Petrel	*Halobaena caerulea*						✔	V	V							✔	Oceanic.
Cape Petrel	*Daption capense*						✔								✔	✔	
Common Diving-Petrel	*Pelecanoides urinatrix*						✔								✔	✔	Oceanic.
Fairy Prion	*Pachyptila turtur*						✔								✔	✔	Oceanic.
Fleshy-footed Shearwater	*Puffinus carneipes*						✔		R						✔	✔	Oceanic.
Fluttering Shearwater	*Puffinus gavia*						✔								✔	✔	Oceanic & coastal.
Great-winged Petrel	*Pterodroma macroptera macroptera*						✔									✔	Oceanic.
Grey Petrel	*Procellaria cinerea*						✔									✔	Oceanic. 1 SAM record, 1977
Hutton's Shearwater	*Puffinus huttoni*						✔									✔	Prefers coasts – also oceanic.
Kerguelen Petrel	*Lugensa brevirostris*						✔								✔	✔	Oceanic.
Medium-billed (Salvin's) Prion	*Pachyptila salvini*						✔								✔	✔	Oceanic.
Northern Giant Petrel	*Macronectes halli*						✔									✔	Oceanic.
Short-tailed Shearwater (Mutton Bird)	*Puffinus tenuirostris*						✔								✔	✔	Oceanic & Coastal
Soft-plumaged Petrel	*Pterodroma mollis*						✔	V	V						✔	✔	Oceanic. 1 SAM record 1981
Sooty Shearwater	*Puffinus griseus*						✔								✔	✔	Oceanic.
Slender-billed Prion	*Pachyptila belcheri*						✔									✔	Oceanic.
Southern Fulmar	*Fulmarus glacialoides*						✔								✔	✔	Oceanic.
Southern Giant Petrel	*Macronectes giganteus*						✔								✔	✔	Oceanic.
White-headed Petrel	*Pterodroma lessonii*						✔								✔	✔	Oceanic.
DIOMEDEIDAE - Albatrosses																	
Black-browed Albatross	*Diomedea melanophrys*						✔								✔	✔	Oceanic.

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											52	97	117				
Grey-headed Albatross	*Diomedea chrysostoma*						✔	V	V							✔	Oceanic.
Light-mantled Sooty Albatross	*Diomedea palpebrata*						✔									✔	Oceanic
Shy Albatross	*Diomedea cauta*						✔		V						✔	✔	Oceanic.
Sooty Albatross	*Diomedea fusca*						✔	V	V							✔	Oceanic.
Yellow-nosed Albatross	*Diomedea chlororhynchos*						✔								✔	✔	Oceanic.
HYDROBATIDAE –Storm-petrels																	
White-faced Storm-Petrel	*Pelagodroma marina*						✔									✔	Oceanic.
Wilson's Storm-Petrel	*Oceanites oceanicus*						✔									✔	Oceanic.
SULIDAE – Gannets and boobies																	
Australasian Gannet	*Morus serrator*						✔								✔	✔	
ANHINGIDAE - Darters																	
Darter	*Anhinga melanogaster*				✔					R					✔		Belair NP 1989
PHALACROCORACIDAE - Cormorants																	
Black-faced Cormorant (or Black-faced Shag)	*Phalacrocorax fuscescens*	✔													✔	✔	
Great Cormorant (or Black Cormorant)	*Phalacrocorax carbo*				✔									✔	✔	✔	
Little Black Cormorant	*Phalacrocorax sulcirostris*				✔									✔	✔	✔	
Little Pied Cormorant	*Phalacrocorax melanoleucos*	✔									✔		✔	✔	✔	✔	
Pied Cormorant	*Phalacrocorax varius*				✔									✔	✔	✔	
PELECANIDAE - Pelicans																	
Australian Pelican	*Pelecanus conspicillatus*				✔									✔	✔	✔	
ARDEIDAE – Herons and bitterns																	
Australasian (Brown) Bittern	*Botaurus poiciloptilus*				✔				V	V					✔	✔	
Cattle Egret	*Ardea ibis (Bubulcus ibis)*			✔						U				✔	✔	✔	
Eastern Reef Egret Reef Heron)	*Egretta sacra*	✔							R	R					✔		
Great (or White) Egret	*Ardea alba*				✔									✔	✔	✔	
Little Egret	*Egretta garzatta*				✔				R	U					✔	✔	
Nankeen (or Rugous) Night Heron	*Nycticorax caledonicus*	✔								U				✔	✔	✔	
White-faced Heron	*Egretta novaehollandiae*	✔											✔	✔	✔	✔	
White-necked Heron	*Ardea pacifica*				✔												
THRESKIORNITHIDAE – Ibises and spoonbills																	
Glossy Ibis	*Plegadis falcinellus*				✔				R	R					✔	✔	
Royal Spoonbill	*Platalea regia*				✔					U					✔	✔	
Sacred (or Australian White) Ibis	*Threskiornis molucca*				✔						✔		✔	✔	✔	✔	
Straw-necked Ibis	*Threskiornis spinicollis*				✔						✔		✔	✔	✔	✔	
Yellow-billed Spoonbill	*Platalea flavipes*				✔										✔	✔	
ACCIPITRIDAE – Osprey, hawks, eagles and allies																	
Brown Goshawk	*Accipiter fasciatus*	✔										✔	✔	✔	✔	✔	
Black Kite	*Milvus migrans*				✔					U					✔	✔	1 SAM record, 1953
Black-shouldered Kite	*Elanus axillaris*	✔									✔			✔	✔	✔	

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											52	97	117				
Collared Sparrowhawk	*Accipiter cirrhocephalus*	✔								U			✔	✔	✔	✔	
Little Eagle	*Hieraaetus morphnoides*	✔											✔		✔	✔	
Osprey	*Pandion haliaetus*				✔				R	R					✔		
Spotted Harrier	*Circus assimilis*				✔									✔	✔	✔	
Square-tailed Kite	*Lophoictinia isura*					✔			V	V				✔		✔	1 SAM record, 1919
Swamp (Marsh) Harrier	*Circus approximans*				✔						✔			✔	✔	✔	
Wedge-tailed Eagle	*Aquila audax*	✔									✔	✔	✔	✔	✔	✔	
Whistling Kite	*Haliastur sphenurus*	✔								U					✔	✔	
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	✔							V	V					✔	✔	2 SAM records possibly captive, 1925 & 1927
FALCONIDAE - Falcons																	
Australian Hobby (Little Falcon)	*Falco longipennis*	✔								U			✔	✔	✔	✔	
Black Falcon	*Falco subniger*				✔					U					✔	✔	
Brown Falcon	*Falco berigora*	✔											✔	✔	✔	✔	
Nankeen (or Australian) Kestrel	*Falco cenchroides*	✔									✔		✔	✔	✔	✔	
Peregrine Falcon	*Falco peregrinus*	✔							R	R	✔	✔	✔	✔	✔	✔	
RALLIDAE – Rails, crakes and allies																	
Australian Spotted Crake	*Porzana fluminea*				✔										✔	✔	
Baillon's (Marsh) Crake	*Porzana pusilla*				✔				R	R					✔	✔	
Black-tailed Native-hen	*Gallinula ventralis*			✔											✔	✔	
Buff-banded Rail (Banded Landrail)	*Gallirallus philippensis*	✔								U			✔	✔	✔	✔	
Dusky Moorhen	*Gallinula tenebrosa*	✔											✔	✔	✔	✔	
Eurasian Coot	*Fulica atra*	✔												✔	✔	✔	
Lewin's Rail	*Rallus pectoralis*	✔							V	V	✔					✔	
Purple Swamphen	*Porphyrio porphyrio*				✔									✔	✔	✔	
Spotless Crake	*Porzana tabuensis*				✔					U					✔	✔	
OTIDIDAE - Bustards																	
Australian Bustard	*Ardeotis australis*	✔							V	X							
TURNICIDAE – Button-quails																	
Little Button-quail	*Turnix velox*		✔										✔	✔	✔	✔	
Painted Button-quail	*Turnix varia*	✔							V	V			✔	✔	✔	✔	
SCOLOPACIDAE – Sandpipers and allies																	
Bar-tailed Godwit	*Limosa lapponica*			✔													
Black-tailed Godwit	*Limosa limosa*			✔													
(Common) Greenshank	*Tringa nebularia*			✔											✔	✔	
Common Sandpiper	*Actitis hypoleucos*			✔											✔	✔	
Curlew Sandpiper	*Calidris ferruginea*			✔											✔	✔	
Eastern Curlew	*Numenius madagascariensis*			✔					V	V					✔	✔	
Grey-tailed Tattler	*Heteroscelus brevipes*			✔												✔	1 SAM record, Aldinga 1976.
Latham's (Japanese) Snipe	*Gallinago hardwickii*			✔					V	V					✔	✔	3 SAM records. Last record 1995 from Nangkita. Yankalilla, 1933, Goolwa, 1923
Little Curlew	*Numenius minutus*					✔										✔	

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											52	97	117				
Red-necked Stint	*Calidris ruficollis*			✔											✔	✔	
Ruddy Turnstone	*Arenaria interpres*			✔											✔		
Sharp-tailed Sandpiper	*Calidris acuminata*			✔											✔	✔	
Wood Sandpiper	*Tringa glareola*			✔												✔	
ROSTRATULIDAE – Painted Snipe																	
Painted Snipe	*Rostratula benghalensis*				✔				R	V					✔		
BURHINIDAE – Stone-curlews																	
Bush Stone-curlew (Southern Stone-curlew, Bush Thick-knee)	*Burhinus grallarius*	✔							V	E					✔	✔	2 SAM records, 1896 & 1903
HAEMATOPODIDAE - Oystercatchers																	
Pied Oystercatcher	*Haematopus longirostris*				✔					U					✔	✔	
Sooty Oystercatcher	*Haematopus fuliginosus*	✔													✔	✔	
RECURVIROSTRIDAE – Avocets and stilts																	
Banded Stilt	*Cladorhynchus leucocephalus*				✔										✔	✔	
Black-winged (or White-headed) Stilt	*Himantopus himantopus*				✔									✔	✔	✔	
Red-necked Avocet	*Recurvirostra novaehollandiae*				✔										✔	✔	
CHARADRIIDAE – Plovers and dotterels																	
Banded Lapwing	*Vanellus tricolor*	✔													✔	✔	
Black-fronted Dotterel	*Elseyornis melanops*	✔												✔	✔	✔	
Double-banded Plover	*Charadrius bicinctus*			✔											✔	✔	
Grey Plover	*Pluvialis squatarola*			✔											✔	✔	
Hooded Plover	*Thinornis rubricollis*	✔						V	V	V					✔	✔	
Pacific Golden Plover	*Pluvialis fulva*			✔											✔	✔	
Red-capped Plover	*Charadrius ruficapillus*	✔													✔	✔	
Red-kneed Dotterel	*Erythogonys cinctus*				✔										✔		
Spur-winged Plover	*Vanellus miles novaehollandiae*	✔									✔			✔	✔	✔	
GLAREOLIDAE – Pratincoles and coursers																	
Australian Pratincole	*Stiltia isabella*				✔										✔	✔	
LARIDAE – Gulls, skuas and allies																	
Arctic Tern	*Sterna paradisaea*						✔									✔	Oceanic. 1 SAM record, 1971
Caspian Tern	*Sterna caspia*						✔								✔	✔	
Common Tern	*Sterna hirundo*				✔				R	R						✔	
Crested Tern	*Sterna bergii*						✔							✔	✔	✔	
Fairy Tern	*Sterna nereis*				✔				V						✔	✔	
Great (Sub-antarctic, Brown) Skua	*Catharacta skua* spp. *antarctica*						✔								✔	✔	Oceanic. 1 SAM record, 1994.
Kelp (Dominican) Gull	*Larus dominicanus*				✔												
Pacific Gull	*Larus pacificus*	✔								U					✔		
Silver Gull	*Larus novaehollandiae*	✔												✔	✔	✔	
White-fronted Tern	*Sterna striata*						✔								✔	✔	Oceanic.
Whiskered (Marsh) Tern	*Chlidonias hybridus*				✔										✔	✔	
COLUMBIDAE – Pigeons and Doves																	
Brush Bronzewing	*Phaps elegans*	✔								U		✔	✔	✔	✔	✔	

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											52	97	117				
Common Bronzewing	*Phaps chalcoptera*	✔									✔	✔	✔	✔	✔	✔	
Crested Pigeon	*Ocyphaps lophotes*	✔									✔		✔	✔	✔	✔	
Peaceful Dove	*Geopelia placida*	✔								V			✔	✔	✔	✔	
Rock Dove	*Columba livia**	✔											✔	✔	✔		
Spotted Turtle-dove	*Streptopelia chinensis**	✔									✔		✔	✔	✔	✔	
CACATUIDAE –Cockatoos and Cockatiel																	
Cockatiel	*Nymphicus hollandicus*		✔											✔	✔	✔	
Galah	*Cacatua roseicapilla*	✔									✔	✔	✔	✔	✔	✔	
Glossy Black-Cockatoo	*Calyptorhynchus lathami halmaturinus*				✔			E	E	X							In published accounts.
Little Corella	*Cacatua sanguinea*	✔									✔		✔	✔	✔	✔	
Long-billed Corella	*Cacatua tenuirostris*	✔													✔	✔	Introduced
Sulphur-crested Cockatoo	*Cacatua galerita*	✔								U	✔	✔	✔	✔	✔	✔	
Yellow-tailed Black-Cockatoo	*Calyptorhynchus funereus*	✔							V	V	✔	✔	✔	✔	✔	✔	
PSITTACIDAE - Parrots																	
Australian Ringneck	*Barnadius zonarius*	✔								V					✔	✔	
Blue Bonnet	*Northiella haematogaster*				✔				V	R							
Blue-winged Parrot	*Neophema chrysostoma*			✔					V	V			✔	✔	✔	✔	1 SAM record, 1929
Budgerigah	*Melopsittacus undulatus*		✔										✔		✔	✔	
Crimson (Adelaide) Rosella	*Platycercus elegans*	✔									✔	✔	✔	✔	✔	✔	
Eastern Rosella	*Platycercus eximius*	✔										✔	✔	✔	✔	✔	
Elegant Parrot	*Neophema elegans*	✔								K	✔	✔	✔	✔	✔	✔	
Ground Parrot	*Pezoporus wallicus*	✔							E	X							
Little Lorikeet	*Glossopsitta pusilla*			✔					V	V						✔	6 SAM records, last 1918.
Musk Lorikeet	*Glossopsitta concinna*	✔											✔	✔	✔	✔	
Purple-crowned Lorikeet	*Glossopsitta porphyrocephala*	✔										✔	✔	✔	✔	✔	
Rainbow Lorikeet	*Trichoglossus haematodus*	✔									✔	✔	✔	✔	✔	✔	
Red-rumped Parrot	*Psephotus haematonotus*	✔									✔		✔	✔	✔	✔	
Rock Parrot	*Neophema petrophila*			✔					R	R					✔	✔	1 SAM record, 1918
Swift Parrot	*Lathamus discolor*			✔				E	V	V					✔	✔	10 SAM records. 8 from Blackwood. Last record from 1938.
CUCULIDAE - Cuckoos																	
Black-eared Cuckoo	*Chrysococcyx osculans*		✔							R					✔		
Fan-tailed Cuckoo	*Cacomantis flabelliformis*		✔									✔	✔	✔	✔	✔	
Horsfield's Bronze Cuckoo	*Chrysococcyx basalis*		✔								✔		✔	✔	✔	✔	
Pallid Cuckoo	*Cuculus pallidus*		✔										✔		✔	✔	
Shining Bronze Cuckoo	*Chrysococcyx lucidus*		✔						R	R			✔		✔	✔	

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											52	97	117				
STRIGIDAE – Typical Owls																	
Southern Boobook	*Ninox novaeseelandiae*	✔											✔	✔	✔	✔	
TYTONIDAE – Barn Owls																	
Barn Owl	*Tyto alba delicatula*	✔												✔	✔	✔	
Masked Owl	*Tyto novaehollandiae novaehollandiae*					✔			E							✔	1 SAM record, Aldinga Scrub 1975.
PODARGIDAE - Frogmouths																	
Tawny Frogmouth	*Podargus strigoides*	✔											✔	✔	✔	✔	
CAPRIMULGIDAE - Nightjars																	
Australian Owlet-nightjar	*Aegotheles cristatus*	✔								U			✔	✔	✔	✔	
Spotted Nightjar	*Eurostopodus argus*				✔					V					✔	✔	
APODIDAE - Swifts																	
Fork-tailed Swift	*Apus pacificus*			✔											✔	✔	
White-throated Needletail (Spine-tailed Swift)	*Hirundapus caudacutus*			✔											✔	✔	
ALCEDINIDAE - Kingfishers																	
Azure Kingfisher	*Alcedo azurea*	✔							E	X						✔	6 SAM records, last record 1954. From Willunga Creek, Snake Valley, Mt Compass, Para River & Lower Hermitage
Laughing Kookaburra	*Dacelo novaeguineae*	✔									✔	✔	✔	✔	✔	✔	
Red-backed Kingfisher	*Todiramphus pyrrhopygia*					✔								✔	✔		
Sacred Kingfisher	*Todiramphus sancta*	✔											✔	✔	✔	✔	
MEROPIDAE – Bee-eaters																	
Rainbow Bee-eater (Rainbow Bird)	*Merops ornatus*		✔								✔		✔	✔	✔		
CORACIIDAE - Rollers																	
Dollarbird	*Eurystomus orientalis*					✔										✔	Migrant. 1 SAM record 1918
CLIMACTERIDAE – Australopapuan treecreepers																	
Brown Treecreeper	*Climacteris picumnus*	✔								U			✔	✔	✔	✔	
White-throated Treecreeper	*Cormobates leucophaeus*	✔								U	✔	✔	✔	✔	✔	✔	
MALURIDAE – Fairy-wrens, emu-wrens and grasswrens																	
Southern Emu-wren	*Stipiturus malachurus intermedius*	✔						E	E	E	✔				✔	✔	
Superb Fairy-wren	*Malurus cyaneus*	✔									✔	✔	✔	✔	✔	✔	
Variegated Fairy-wren	*Malurus lamberti*	✔								V			✔		✔		
PARDALOTIDAE - Pardalotes																	
Spotted Pardalote	*Pardalotus punctatus*	✔								U			✔	✔	✔	✔	
Striated Pardalote	*Pardalotus striatus*	✔									✔	✔	✔	✔	✔	✔	
ACANTHIZIDAE – Bristlebirds, thornbills, scrubwrens and allies																	
Brown Thornbill	*Acanthiza pusilla*	✔									✔	✔	✔	✔	✔	✔	
Buff-rumped Thornbill	*Acanthiza reguloides*	✔											✔	✔	✔	✔	

SPECIES DESCRIPTION		STATUS									SOURCE						
Species	Common Name	Resident	Migratory Breeders	Migratory Non-breeders	Nomadic	Vagrant	Oceanic	AUS	SA	REG	Surveys			Opportune	Reserves	S.A. Museum	Comments
											52	97	117				
Chestnut-rumped Heathwren (Chestnut-rumped Hylacola)	*Calamanthus pyrrhopygia*	✔							V	V			✔	✔	✔	✔	
Chestnut-rumped Thornbill	*Acanthiza uropygialis*	✔								V					✔		
Rufous (Western) Fieldwren	*Calamanthus campestris (campestris)*	✔								X						✔	8 SAM records last 1938
Southern Whiteface	*Aphelocephala leucopsis*	✔								V					✔	✔	
Striated Thornbill	*Acanthiza lineata*	✔									✔	✔	✔	✔	✔	✔	
Weebill (Brown, yellow)	*Smicrornis brevirostris*	✔									✔		✔		✔	✔	
Western Gerygone (Western Warbler)	*Gerygone fusca*				✔				R	K							
White-browed Scrub-wren	*Sericornis frontalis*	✔								U	✔	✔	✔	✔	✔	✔	
White-throated Gerygone (White-throated Warbler)	*Gerygone olivacea*		✔						R	R					✔	✔	
Yellow (Little) Thornbill	*Acanthiza nana*	✔								U		✔	✔		✔	✔	
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	✔									✔	✔	✔	✔	✔	✔	
MELIPHAGIDAE – Honeyeaters and Australian chats																	
Black Honeyeater	*Certhionyx niger*					✔				U					✔	✔	
Black-chinned Honeyeater	*Melithreptus gularis*	✔							V	V				✔	✔	✔	
Brown-headed Honeyeater	*Melithreptus brevirostris*	✔									✔	✔	✔	✔	✔	✔	
Crescent Honeyeater	*Phylidonyris pyrrhoptera*	✔									✔	✔	✔	✔	✔	✔	
Crimson Chat	*Epthianura tricolor*					✔									✔	✔	
Eastern Spinebill	*Acanthorhynchus tenuirostris*	✔									✔	✔	✔	✔	✔	✔	
Little Wattlebird	*Anthochaera chrysoptera*	✔								U			✔	✔	✔	✔	
New Holland Honeyeater	*Phylidonyris novaehollandiae*	✔									✔	✔	✔	✔	✔	✔	
Noisy Miner	*Manorina melanocephala*	✔											✔	✔	✔	✔	
Red Wattlebird	*Anthochaera carunculata*	✔									✔	✔	✔	✔	✔	✔	
Regent Honeyeater	*Xanthomyza phrygia*				✔			E	E	E					✔	✔	
Singing Honeyeater	*Lichenostomus virescens*	✔											✔	✔	✔	✔	
Spiny-cheeked Honeyeater	*Acanthagenys rufogularis*				✔					U			✔		✔	✔	
Tawny-crowned Honeyeater	*Gliciphila melanops*	✔								U					✔	✔	
White-eared Honeyeater	*Lichenostomus leucotis*					✔						✔			✔		
White-fronted Chat	*Epthianura albifrons*	✔									✔		✔	✔	✔	✔	
White-fronted Honeyeater	*Phylidonyris albifrons*				✔					U					✔	✔	1 SAM record, 1919
White-naped Honeyeater	*Melithreptus lunatus*	✔										✔	✔	✔	✔	✔	
White-plumed Honeyeater	*Lichenostomus penicillatus*	✔											✔	✔	✔	✔	
Yellow-faced Honeyeater	*Lichenostomus chrysops*	✔									✔	✔	✔	✔	✔	✔	

SPECIES DESCRIPTION		STATUS									SOURCE						
Species	Common Name	Resident	Migratory Breeders	Migratory Non-breeders	Nomadic	Vagrant	Oceanic	AUS	SA	REG	Surveys			Opportune	Reserves	S.A. Museum	Comments
											52	97	117				
Yellow-plumed Honeyeater	*Lichenostomus ornatus*				✔					U				✔	✔	✔	
PETROICIDAE – Australopapuan robins and allies																	
Flame Robin	*Petroica phoenicea*			✔					R	U			✔		✔	✔	
Hooded Robin	*Melanodryas cucullata*	✔								U			✔	✔	✔	✔	
Jacky Winter	*Microeca fascinans*	✔								V					✔		
Pink Robin	*Petroica rodinogaster*			✔						R							
Red-capped Robin	*Petroica goodenovii*	✔								U				✔	✔	✔	
Rose Robin	*Petroica rosea*			✔						R					✔	✔	
Scarlet Robin	*Petroica multicolor*	✔									✔	✔	✔	✔	✔	✔	
POMATOSTOMIDAE – Australopapuan Babblers																	
White-browed Babbler	*Pomatostomus superciliosus*	✔								U			✔	✔	✔	✔	
EUPETIDAE - Whipbirds, quail-thrushes and allies																	
Spotted Quailthrush	*Cinclosoma punctatum anachoreta*	✔							E	E					✔	✔	
NEOSITTIDAE - Sittellas																	
Varied Sitella	*Daphoenositta chrysoptera*	✔									✔	✔	✔	✔	✔	✔	
PACHYCEPHALIDAE – Whistlers, shrike-tits and allies																	
Crested Shriketit	*Falcunculus frontatus*	✔							V	V			✔	✔	✔	✔	
Golden Whistler	*Pachycephala pectoralis*	✔									✔	✔	✔	✔	✔	✔	
Grey Shrikethrush	*Colluricincla harmonica*	✔									✔	✔	✔	✔	✔	✔	
Rufous Whistler	*Pachycephala rufiventris*	✔											✔	✔	✔	✔	
DICRURIDAE – Monarchs, drongos, magpie-larks and allies																	
Black-faced Monarch	*Monarcha melanopsis*					✔											
Grey Fantail	*Rhipidura albiscarpa*	✔									✔	✔	✔	✔	✔	✔	
Leaden Flycatcher	*Myiagra rubecula*					✔											
Magpie-lark	*Grallina cyanoleuca*	✔									✔		✔	✔	✔	✔	
Restless Flycatcher	*Myiagra inquieta*	✔								V					✔	✔	
Willie Wagtail	*Rhipidura leucophrys*	✔									✔		✔	✔	✔	✔	
ARTAMIDAE – Woodswallows, butcherbirds and allies																	
Australian Magpie	*Gymnorhina tibicen*	✔									✔	✔	✔	✔	✔	✔	
Dusky Woodswallow	*Artamus cyanopterus*	✔									✔		✔	✔	✔	✔	
Grey Butcherbird	*Cracticus torquatus*				✔					U			✔		✔	✔	
Grey Currawong	*Strepera versicolor*	✔								U	✔	✔	✔	✔	✔	✔	
Masked Woodswallow	*Artamus personatus*		✔												✔	✔	
White-breasted Woodswallow	*Artamus leucorhynchus*					✔										✔	1 SAM record 1969
White-browed Woodswallow	*Artamus superciliosus*		✔												✔	✔	
CAMPEPHAGIDAE – Cuckoo-shrikes and allies																	
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	✔									✔	✔	✔	✔	✔	✔	

SPECIES DESCRIPTION		STATUS									SOURCE						
Species	Common Name	Resident	Migratory Breeders	Migratory Non-breeders	Nomadic	Vagrant	Oceanic	AUS	SA	REG	Surveys			Opportune	Reserves	S.A. Museum	Comments
											52	97	117				
Ground Cuckoo-shrike	*Pteropodocys maxima*					✔									y		
White-winged Triller	*Lalage tricolor*		✔										✔		✔	✔	
ORIOLIDAE - Orioles																	
Olive-backed Oriole	*Oriolus sagittatus*				✔				R	R				✔	✔	✔	Partly Migratory.
CORVIDAE - Crows																	
Australian Raven	*Corvus coronoides*					✔							✔		✔		Recorded at Bullock Hill during survey.
Little Raven	*Corvus mellori*	✔									✔	✔	✔	✔	✔	✔	
CORCORACIDAE – Chough and Apostlebird																	
White-winged Chough	*Corcorax melanorhamphos*	✔								V			✔	✔	✔	✔	
MUSCICAPIDAE – Thrushes and Old World flycatchers																	
Bassian (Ground, White's, Mountain) Thrush	*Zoothera lunulata*	✔							R	V			✔	✔	✔	✔	
Eurasian (Common) Blackbird	*Turdus merula**	✔									✔	✔	✔	✔	✔	✔	
STURNIDAE - Starlings																	
Common Starling	*Sturnus vulgaris**	✔									✔	✔	✔	✔	✔	✔	
SWALLOWS																	
Fairy Martin	*Petrochelidon ariel*		✔										✔		✔	✔	
Tree Martin	*Petrochelidon nigricans*	✔									✔	✔	✔	✔	✔	✔	
Welcome Swallow	*Hirundo neoxena*	✔									✔	✔	✔	✔	✔	✔	
White-backed Swallow	*Cheramoeca leucosternum*				✔					U					✔	✔	2 SAM records, 1928 & 1924
ZOSTEROPIDAE - White-eyes																	
Silvereye	*Zosterops lateralis*	✔									✔	✔	✔	✔	✔	✔	
SYLVIIDAE - Warblers																	
Australian (Clamorous) Reedwarbler	*Acrocephalus australis*			✔								✔		✔	✔	✔	
Brown Songlark	*Cincloramphus cruralis*		✔												✔	✔	
Little Grassbird	*Megalurus gramineus*	✔									✔			✔	✔	✔	
Rufous Songlark	*Cincloramphus mathewsi*		✔												✔	✔	
Golden-headed Cisticola	*Cisticola exilis*					✔				R	R	✔		✔	✔	✔	1 SAM record 1984
DICAEIDAE - Flowerpeckers																	
Mistletoebird	*Dicaeum hirundinaceum*	✔									✔	✔	✔	✔	✔	✔	
PASSERIDAE – Old World Sparrows																	
House Sparrow	*Passer domesticus**	✔									✔		✔	✔	✔	✔	
ESTRILDIDAE – Grass-finches (waxbills)																	
Beautiful Firetail	*Stagnopleura bella*	✔							R	E			✔	✔	✔	✔	
Diamond Firetail	*Stagnopleura guttata*	✔							V	V			✔	✔	✔	✔	
Red-browed Finch	*Neochima temporalis*	✔									✔	✔	✔	✔	✔	✔	
Zebra Finch	*Taeniopygia guttata*	✔								U				✔	✔	✔	
FRINGILLIDAE - Finches																	
European Goldfinch	*Carduelis carduelis**	✔									✔	✔	✔	✔	✔	✔	
European Greenfinch	*Carduelis chloris**	✔									✔	✔		✔	✔	✔	

APPENDIX XIII

TOTAL BIRD SPECIES RECORDS (OBTAINED FROM SURVEYS 52, 97 AND 117 = 157 SITES). SPECIES ARRANGED IN DESCENDING ORDER OF SURVEY SITE FREQUENCY.

Common Name	No. records at survey quadrats	No. survey quadrats	Opportune records	Total Records (Survey + Opportune)
Superb Fairy-wren	460	140	21	481
Crimson Rosella	414	136	30	444
Grey Fantail	338	120	23	361
Crescent Honeyeater	263	98	13	276
New Holland Honeyeater	225	74	21	246
Striated Pardalote	217	83	10	227
Striated Thornbill	217	88	13	230
Yellow-faced Honeyeater	217	83	12	229
Brown Thornbill	215	94	11	226
Grey Currawong	213	105	14	227
Grey Shrike-thrush	209	112	19	228
Red Wattlebird	196	91	9	205
Australian Magpie	184	105	24	208
White-browed Scrubwren	184	67	9	193
Golden Whistler	162	83	8	170
Silvereye	160	62	4	164
Rainbow Lorikeet	157	51	13	170
White-throated Treecreeper	157	68	12	169
Eurasian Blackbird	142	71	10	152
Yellow-tailed Black-cockatoo	141	68	40	181
Little Raven	133	83	9	142
Galah	124	75	14	138
Eastern Spinebill	119	64	8	127
Mistletoebird	110	44	6	116
White-naped Honeyeater	83	32	7	90
Scarlet Robin	80	50	12	92
Laughing Kookaburra	69	55	18	87
Tree Martin	66	39	6	72
Buff-rumped Thornbill	58	37	5	63
Red-browed Finch	57	41	17	74
Black-faced Cuckoo-shrike	55	45	11	66
Common Bronzewing	51	37	9	60
Rufous Whistler	50	28	2	52
European Goldfinch	44	23	15	59
Sulphur-crested Cockatoo	38	22	19	57
Musk Lorikeet	35	25	5	40
Spotted Pardalote	35	26	4	39
Common Starling	33	16	11	44
Welcome Swallow	33	21	4	37
Brush Bronzewing	29	20	4	33
Southern Boobook	29	22	10	39
Horsfield's Bronze-cuckoo	28	20	1	29
Brown-headed Honeyeater	27	23	4	31
Sacred Kingfisher	27	18	14	41
Red-rumped Parrot	26	17	11	37
Purple-crowned Lorikeet	24	17	3	27
White-plumed Honeyeater	24	16	10	34
Fan-tailed Cuckoo	23	15	1	24
White-winged Chough	23	12	24	47
Elegant Parrot	21	16	2	23

Common Name	No. records at survey quadrats	No. survey quadrats	Opportune records	Total Records (Survey + Opportune)
Wedge-tailed Eagle	20	20	32	52
Crested Pigeon	19	12	7	26
Australian Owlet-nightjar	18	15	4	22
Dusky Woodswallow	18	9	8	26
White-browed Babbler	18	12	10	28
Varied Sittella	16	14	4	20
Willie Wagtail	16	10	11	27
Magpie-lark	15	10	17	32
Weebill	15	9		15
Yellow-rumped Thornbill	15	14	5	20
House Sparrow	14	7	4	18
Emu	13	10	11	24
Australian Reed Warbler	12	5	3	15
Little Corella	12	9	5	17
Brown Goshawk	11	10	9	20
Tawny Frogmouth	11	9	18	29
Bassian Thrush	10	5	1	11
Australian Wood Duck, (Maned Duck)	9	8	39	48
Shining Bronze-Cuckoo	8	7		8
Singing Honeyeater	8	2		8
Golden-headed Cisticola	7	2	1	8
Little Grassbird	7	3	1	8
Peregrine Falcon	7	6	11	18
Spotted Turtle-dove	7	5	3	10
Eurasian Skylark	6	5		6
Painted Button-quail	6	5	2	8
Southern Emu-wren	6	3		6
Yellow Thornbill	6	4		6
Australian White Ibis	5	4	16	21
Little Pied Cormorant	5	4	10	15
Brown Falcon	4	4	6	10
Brown Treecreeper	4	2	8	12
Collared Sparrowhawk	4	4	2	6
Nankeen Kestrel	4	3	5	9
Pacific Black Duck	4	2	39	43
Peaceful Dove	4	4	2	6
Rainbow Bee-eater	4	3	4	8
Stubble Quail	4	4	1	5
White-fronted Chat	4	2		4
Eastern Rosella	3	3	9	12
European Greenfinch	3	3	1	4
Indian Peafowl	3	2	1	4
Little Button-quail	3	2	1	4
Little Wattlebird	3	3	2	5
Silver Gull	3	2		3
Variegated Fairy-wren	3	2		3
White-faced Heron	3	3	27	30
White-winged Triller	3	2		3
Beautiful Firetail	2	1	3	5
Chestnut-rumped Heathwren	2	1	1	3
Dusky Moorhen	2	1	13	15
Fairy Martin	2	2		2
Grey Teal	2	1	19	21
Hooded Robin	2	1	2	4
Little Eagle	2	2		2
Noisy Miner	2	1	6	8
Pallid Cuckoo	2	2		2

Common Name	No. records at survey quadrats	No. survey quadrats	Opportune records	Total Records (Survey + Opportune)
Spiny-cheeked Honeyeater	2	2		2
Straw-necked Ibis	2	2	6	8
Australian Hobby	1	1	1	2
Australian Raven	1	1		1
Black-shouldered Kite	1	1	12	13
Blue-winged Parrot	1	1	3	4
Budgerigar	1	1		1
Buff-banded Rail	1	1	1	2
Chestnut Teal	1	1	8	9
Crested Shrike-tit	1	1	2	3
Diamond Firetail	1	1	2	3
Flame Robin	1	1		1
Grey Butcherbird	1	1		1
Lewin's Rail	1	1		1
Masked Lapwing	1	1	14	15
Richard's Pipit	1	1	1	2
Rock Dove	1	1	3	4
Swamp Harrier	1	1	1	2
White-eared Honeyeater	1	1		1
Australasian Grebe, (Little Grebe)			18	18
Australasian Shoveler			3	3
Australian Pelican			3	3
Barn Owl			1	1
Black Swan			4	4
Black-chinned Honeyeater			6	6
Black-fronted Dotterel			1	1
Black-winged Stilt			1	1
Cattle Egret			1	1
Cockatiel			1	1
Eurasian Coot			26	26
Great Cormorant			6	6
Great Crested Grebe			2	2
Great Egret, (White Egret)			1	1
Hardhead (White-eyed Duck)			28	28
Hoary-headed Grebe			5	5
Little Black Cormorant			4	4
Mallard			1	1
Musk Duck			2	2
Nankeen Night Heron			2	2
Olive-backed Oriole			1	1
Pacific Black Duck/Mallard Hybrid			3	3
Pied Cormorant			1	1
Purple Swamphen			8	8
Red-backed Kingfisher			1	1
Red-capped Robin			1	1
Spotted Harrier			1	1
Square-tailed Kite			1	1
Yellow-plumed Honeyeater			1	1
Zebra Finch			1	1
# SPECIES		**127**	**136**	
TOTAL RECORDS ID TO SPECIES	**0**	**6487**	**973**	**7705**

APPENDIX XIV

DECLINING BIRDS OF THE MLR, MLR DECLINING BIRDS TASK FORCE (2000/01).

The species in each group are in no particular order. Two other species (Spotted Quail-thrush and Bush Stone-curlew) are likely to be on the extinct list, although this is not certain.
State Ratings are those appearing in *National Parks and Wildlife Act* (1972)

Locally Extinct	**State Rating**
King Quail (Australia)	Endangered
Glossy Black-Cockatoo (KI)	Endangered
Ground Parrot	Endangered
Azure Kingfisher (Eastern)	Endangered
Regent Honeyeater	Endangered
Rufous Fieldwren	
Nationally Critically Endangered	**State Rating**
Spotted Quail-thrush (MLR)	Endangered
Nationally Endangered	**State Rating**
Chestnut-rumped Heathwren (MLR)	Vulnerable
Southern Emu-wren (MLR)	Endangered
Nationally Vulnerable	**State Rating**
Malleefowl	Vulnerable
Australasian Bittern	Vulnerable
Painted Snipe (Aus)	Rare
Slender-billed Thornbill (St Vincent's Gulf)	Vulnerable
Nationally Near Threatened	**State Rating**
Bush Stone-curlew	Vulnerable
Black-chinned Honeyeater MLR	Vulnerable
Hooded Robin (South-eastern)	
Bassian Thrush (SA)	Rare
Diamond Firetail	Vulnerable
Declining (Alert List)	**State Rating**
Lewin's Rail	Vulnerable
Buff-banded Rail	
Spotless Crake	
Spotted Crake	
Baillons Crake	Rare
Painted Button-quail	Vulnerable
Whistling Kite	
Red-rumped Parrot	
Declining (Alert List)	**State Rating**
Yellow-tailed Black-cockatoo*	
Rainbow Bee-eater	
White-throated Treecreeper	
Brown Treecreeper	
Rufous Whistler	
Jacky Winter	
Restless Flycatcher	

Declining (Alert List)	**State Rating**
Scarlet Robin	
Flame Robin	Rare
Red-capped Robin	
Brown Thornbill	
Yellow Thornbill	
Yellow-rumped Thornbill	
Chestnut-rumped Thornbill	
Southern Whiteface	
Crested Shrike-tit	Vulnerable
Varied Sittella	
White-winged Chough	
White-browed Babbler	
Little Wattlebird	
White-naped Honeyeater	
Brown-headed Honeyeater	
Yellow-faced Honeyeater	
Tawny-crowned Honeyeater	
Eastern Spinebill	
Tree Martin	
Dusky Woodswallow	
Beautiful Firetail	
Red-browed Finch	
Zebra Finch	
Tawny Frogmouth	
Brush Bronzewing	
Common Bronzewing	

*This species added by Peter Cale, research officer Birds for Biodiversity – MLR.

APPENDIX XV

FULL LIST OF BIRDS OCCURRING IN EACH PATN GROUP, INCLUDING FREQUENCY OF OCCURRENCE AND SIGNIFICANCE TO GROUP.

Descriptions of the 3 bird groups are set out in the following format:
The following tables for each group present the following information:

- Number of sites each species was recorded
- The percentage frequency of the sites within a group at which a species was recorded
- A modified chi-square value = observed frequency (O) – expected frequency (E) divided by expected frequency. Figures are rounded to one decimal place.
- Chi-square value = [(observed frequency (O) – expected frequency (E)]^2 divided by expected frequency. Figures are rounded to one decimal place.
- The combined frequency of a species in all groups. This helps to assess the importance of a species to that group.
- Presents the number of groups in which a species was recorded. This provides an indication of how common a species was throughout the survey area.

PATN Group 1: Species of Stringybark Woodland and Open Forest over a heath understorey

Common Name	SPECIES	No. of quadrats	% of total quadrats	(O-E)/E	Chi-sq	Freq. all sites	Freq. in groups
Superb Fairy-wren	*Malurus cyaneus*	108	90	0.0	0.0	140	3
Adelaide (Crimson) Rosella	*Platycercus elegans*	106	88	0.0	0.0	136	3
Grey Shrikethrush	*Colluricincla harmonica*	96	80	0.1	1.3	112	3
Grey Fantail	*Rhipidura albiscapa*	96	80	0.1	0.2	120	3
Grey Currawong	*Strepera versicolor*	91	76	0.1	1.2	106	2
Crescent Honeyeater	*Phylidonyris pyrrhoptera*	88	73	0.2	1.7	100	3
Brown Thornbill	*Acanthiza pusilla*	82	68	0.2	1.9	92	3
Striated Thornbill	*Acanthiza lineata*	76	63	0.1	0.7	90	3
Golden Whistler	*Pachycephala pectoralis*	73	61	0.2	1.4	83	3
Australian Magpie	*Gymnorhina tibicen*	73	61	-0.1	0.7	105	3
Red Wattlebird	*Anthochaera carunculata*	71	59	0.0	0.0	92	3
Little Raven	*Corvus mellori*	70	58	0.1	0.4	85	3
White-throated Treecreeper	*Cormobates leucophaeus*	64	53	0.2	2.4	69	2
Galah	*Cacatua roseicapilla*	56	47	-0.0	0.1	76	3
New Holland Honeyeater	*Phylidonyris novaehollandiae*	55	46	-0.0	0.0	74	3
Eastern Spinebill	*Acanthorhynchus tenuirostris*	54	45	0.1	0.5	64	3
White-browed Scrubwren	*Sericornis frontalis*	53	44	0.0	0.0	68	3
Yellow-tailed Black-Cockatoo	*Calyptorhynchus funereus*	50	42	-0.0	0.1	68	3
Common Blackbird	*Turdus merula*	49	41	-0.1	0.5	71	3
Silvereye	*Zosterops lateralis*	49	41	0.0	0.0	63	3
Scarlet Robin	*Petroica multicolor*	44	37	0.2	0.9	50	3
Laughing Kookaburra	*Dacelo novaeguineae*	41	34	-0.0	0.0	55	3
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	35	29	-0.0	0.0	46	3
Red-browed Finch	*Neochima temporalis*	32	27	0.0	0.0	41	3
Common Bronzewing	*Phaps chalcoptera*	31	26	0.1	0.1	38	3
Buff-rumped Thornbill	*Acanthiza reguloides*	30	25	0.1	0.1	37	2

Common Name	SPECIES	No. of quadrats	% of total quadrats	(O-E)/E	Chi-sq	Freq. all sites	Freq. in groups
Mistletoebird	*Dicaeum hirundinaceum*	28	23	-0.2	1.5	46	3
White-naped Honeyeater	*Melithreptus lunatus*	28	23	0.1	0.3	33	2
Tree Martin	*Petrochelidon nigricans*	22	18	-0.3	2.5	40	3
Brown-headed Honeyeater	*Melithreptus brevirostris*	22	18	0.2	0.4	25	3
Spotted Pardalote	*Pardalotus punctatus*	22	18	0.0	0.0	28	3
Sulphur-crested Cockatoo	*Cacatua galerita*	20	17	0.1	0.4	23	2
Rufous Whistler	*Pachycephala rufiventris*	17	14	-0.2	1.2	29	3
Brush Bronzewing	*Phaps elegans*	16	13	0.0	0.0	20	3
European Goldfinch	*Carduelis carduelis*	14	12	-0.2	0.7	23	3
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	13	11	0.1	0.2	15	3
White-winged Chough	*Corcorax melanorhamphos*	11	9	0.2	0.4	12	2
Varied Sittella	*Daphoenositta chrysoptera*	11	9	0.0	0.0	14	3
Red-rumped Parrot	*Psephotus haematonotus*	10	8	-0.3	1.1	18	3
White-browed Babbler	*Pomatostomus superciliosus*	8	7	-0.1	0.1	12	3
White-plumed Honeyeater	*Lichenostomus penicillatus*	7	6	-0.4	2.2	16	3
Bassian Thrush	*Zoothera lunulata*	6	5	0.3	0.4	6	1
Dusky Woodswallow	*Artamus cyanopterus*	6	5	-0.2	0.4	10	3
Magpie-lark	*Grallina cyanoleuca*	6	5	-0.2	0.3	10	2
Weebill	*Smicrornis brevirostris*	5	4	-0.3	0.5	9	3
Common Starling	*Sturnus vulgaris*	4	3	-0.7	5.8	16	3
Willie Wagtail	*Rhipidura leucophrys*	4	3	-0.6	2.5	11	3
Little Corella	*Cacatua sanguinea*	4	3	-0.5	1.9	10	3
Little Thornbill	*Acanthiza nana*	4	3	-0.2	0.1	6	2
Eurasian Skylark	*Alauda arvensis*	2	2	-0.4	0.8	5	3
Spotted Turtle-dove	*Streptopelia chinensis*	2	2	-0.4	0.7	5	3
Painted Button-quail	*Turnix* varia	2	2	-0.4	0.7	5	3
Peaceful Dove	*Geopelia placida*	2	2	-0.3	0.3	4	2
Spiny-cheeked Honeyeater	*Acanthagenys rufogularis*	2	2	-0.3	0.3	4	3
Inland Thornbill	*Acanthiza apicalis*	2	2	0.3	0.2	2	1
Brown Treecreeper	*Climacteris picumnus*	2	2	0.3	0.2	2	1
Crested Pigeon	*Ocyphaps lophotes*	1	1	-0.9	7.1	12	3
House Sparrow	*Passer domesticus*	1	1	-0.8	3.3	7	3
Little Wattlebird	*Anthochaera chrysoptera*	1	1	-0.5	0.7	3	2
European Greenfinch	*Carduelis chloris*	1	1	-0.5	0.7	3	2
Southern Emu-wren	*Stipiturus malachurus intermedius*	1	1	-0.5	0.7	3	2
Eastern Rosella	*Platycercus eximius*	1	1	-0.5	0.6	3	2
White-eared Honeyeater	*Lichenostomus leucotis*	1	1	-0.3	0.1	2	2
Singing Honeyeater	*Lichenostomus virescens*	1	1	0.3	0.1	1	1

PATN Group 2: Birds of Savannah Woodland (25 quadrats)

Common Name	SPECIES	Number of quadrats	% of total quadrats	(O-E)/E	Chi-sq	Freq. all sites	Freq. in groups
Red Wattlebird	*Anthochaera carunculata*	20	80	0.5	2.8	92	3
Australian Magpie	*Gymnorhina tibicen*	20	80	0.3	1.1	105	3
Superb Fairy-wren	*Malurus cyaneus*	20	80	-0.1	0.1	140	3
Crimson (Adelaide) Rosella	*Platycercus elegans*	20	80	-0.0	0.0	136	3
Common Blackbird	*Turdus merula*	17	68	0.6	3.7	71	3
Mistletoebird	*Dicaeum hirundinaceum*	16	64	1.3	12.2	46	3
Grey Currawong	*Strepera versicolor*	15	60	-0.1	0.1	106	2
Grey Fantail	*Rhipidura albiscapa*	14	56	-0.2	0.9	120	3
Laughing Kookaburra	*Dacelo novaeguineae*	12	48	0.5	1.7	55	3
Yellow-tailed Black-Cockatoo	*Calyptorhynchus funereus*	12	48	0.2	0.3	70	3
Rufous Whistler	*Pachycephala rufiventris*	11	44	1.6	10.3	29	3
Silvereye	*Zosterops lateralis*	11	44	0.2	0.2	63	3
New Holland Honeyeater	*Phylidonyris novaehollandiae*	11	44	-0.0	0.0	74	3
Tree Martin	*Petrochelidon nigricans*	10	40	0.7	2.8	40	3
Galah	*Cacatua roseicapilla*	10	40	-0.1	0.2	76	3
Grey Shrikethrush	*Colluricincla harmonica*	9	36	-0.5	3.6	112	3
White-plumed Honeyeater	*Lichenostomus penicillatus*	8	32	2.3	12.8	16	3
Crescent Honeyeater	*Phylidonyris pyrrhoptera*	8	32	-0.5	3.2	100	3
Little Raven	*Corvus mellori*	8	32	-0.4	1.7	85	3
Eastern Spinebill	*Acanthorhynchus tenuirostris*	8	32	-0.2	0.3	64	3
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	8	32	0.2	0.2	46	3
Striated Thornbill	*Acanthiza lineata*	7	28	-0.5	3.1	90	3
Buff-rumped Thornbill	*Acanthiza reguloides*	7	28	0.3	0.4	37	2
Crested Pigeon	*Ocyphaps lophotes*	6	24	2.3	9.4	12	3
Common Bronzewing	*Phaps chalcoptera*	6	24	0.1	0.0	38	3
Brown Thornbill	*Acanthiza pusilla*	5	20	-0.6	5.6	92	3
Golden Whistler	*Pachycephala pectoralis*	5	20	-0.6	4.5	83	3
Common Starling	*Sturnus vulgaris*	5	20	1.1	3.0	16	3
White-throated Treecreeper	*Cormobates leucophaeus*	5	20	-0.5	2.7	69	2
White-browed Scrubwren	*Sericornis frontalis*	5	20	-0.5	2.6	68	3
Red-rumped Parrot	*Psephotus haematonotus*	5	20	0.9	2.1	18	3
Red-browed Finch	*Neochima temporalis*	5	20	-0.2	0.2	41	3
White-naped Honeyeater	*Melithreptus lunatus*	5	20	0.0	0.0	33	2
Spotted Pardalote	*Pardalotus punctatus*	4	16	-0.0	0.0	28	3
Scarlet Robin	*Petroica multicolor*	3	12	-0.6	2.8	50	3
Weebill	*Smicrornis brevirostris*	3	12	1.3	2.2	9	3
Little Corella	*Cacatua sanguinea*	3	12	1.1	1.7	10	3
Willie Wagtail	*Rhipidura leucophrys*	3	12	0.9	1.3	11	3
White-browed Babbler	*Pomatostomus superciliosus*	3	12	0.6	0.7	12	3
Sulphur-crested Cockatoo	*Cacatua galerita*	3	12	-0.2	0.1	23	2
Brush Bronzewing	*Phaps elegans*	3	12	0.0	0.0	20	3
Eastern Rosella	*Platycercus eximius*	2	8	3.2	4.8	3	2
Peaceful Dove	*Geopelia placida*	2	8	2.0	2.7	4	2
Little Thornbill	*Acanthiza nana*	2	8	1.4	1.6	6	2
House Sparrow	*Passer domesticus*	2	8	0.9	0.8	7	3

Common Name	SPECIES	Number of quadrats	% of total quadrats	(O-E)/E	Chi-sq	Freq. all sites	Freq. in groups
European Goldfinch	*Carduelis carduelis*	2	8	-0.4	0.7	23	3
Dusky Woodswallow	*Artamus cyanopterus*	2	8	0.3	0.2	10	3
Varied Sittella	*Daphoenositta chrysoptera*	2	8	-0.0	0.0	14	3
Rock Dove (Feral Pigeon)	*Columba livia*	1	4	5.7	4.8	1	1
Grey Butcherbird	*Cracticus torquatus*	1	4	5.7	4.8	1	1
Noisy Miner	*Manorina melanocephala*	1	4	5.7	4.8	1	1
Hooded Robin	*Melanodryas cucullata*	1	4	5.7	4.8	1	1
Beautiful Firetail	*Stagonopleura bella*	1	4	5.7	4.8	1	1
Diamond Firetail	*Stagonopleura guttata*	1	4	5.7	4.8	1	1
Brown-headed Honeyeater	*Melithreptus brevirostris*	1	4	-0.7	2.0	25	3
White-fronted Chat	*Epthianura albifrons*	1	4	2.4	1.7	2	2
Variegated Fairy-wren	*Malurus lamberti*	1	4	2.4	1.7	2	2
White-eared Honeyeater	*Lichenostomus leucotis*	1	4	2.0	1.4	2	2
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	1	4	-0.6	0.7	15	3
White-winged Chough	*Corcorax melanorhamphos*	1	4	-0.4	0.3	12	2
Spiny-cheeked Honeyeater	*Acanthagenys rufogularis*	1	4	0.5	0.2	4	3
Australian Reed-Warbler	*Acrocephalus australis*	1	4	0.3	0.1	5	2
Eurasian Skylark	*Alauda arvensis*	1	4	0.2	0.0	5	3
Spotted Turtle-dove	*Streptopelia chinensis*	1	4	0.2	0.0	5	3
Painted Button-quail	*Turnix* var*ia*	1	4	0.2	0.0	5	3

PATN Group 3: Birds of dense low vegetation, often swamps (12 quadrats)

Common Name	SPECIES	Number of quadrats	% of total quadrats	(O-E)/E	Chi-sq	Freq. all sites	Freq. in groups
Australian Magpie	*Gymnorhina tibicen*	12	100	0.3	1.0	105	3
Superb Blue Wren	*Malurus cyaneus*	12	100	0.0	0.0	140	3
White-browed Scrubwren	*Sericornis frontalis*	10	83	0.7	3.1	68	3
Galah	*Cacatua roseicapilla*	10	83	0.5	1.9	76	3
Adelaide (Crimson) Rosella	*Platycercus elegans*	10	83	-0.1	0.2	136	3
Grey Fantail	*Rhipidura albiscapa*	10	83	-0.0	0.0	120	3
Tree Martin	*Petrochelidon nigricans*	8	67	1.4	6.5	40	3
New Holland Honeyeater	*Phylidonyris novaehollandiae*	8	67	0.3	0.5	74	3
Common Starling	*Sturnus vulgaris*	7	58	4.3	24.0	16	3
European Goldfinch	*Carduelis carduelis*	7	58	2.5	12.5	23	3
Grey Shrikethrush	*Colluricincla harmonica*	7	58	-0.3	0.7	112	3
Striated Thornbill	*Acanthiza lineata*	7	58	-0.1	0.1	90	3
Little Raven	*Corvus mellori*	7	58	-0.0	0.0	85	3
Yellow-tailed Black-Cockatoo	*Calyptorhynchus funereus*	6	50	0.0	0.0	70	3
Crested Pigeon	*Ocyphaps lophotes*	5	42	3.8	15.4	12	3
Brown Thornbill	*Acanthiza pusilla*	5	42	-0.4	1.0	92	3
Golden Whistler	*Pachycephala pectoralis*	5	42	-0.3	0.6	83	3
Common Blackbird	*Turdus merula*	5	42	-0.2	0.2	71	3
Australian Reed-Warbler	*Acrocephalus australis*	4	33	8.4	29.7	5	2
House Sparrow	*Passer domesticus*	4	33	5.5	18.5	7	3
Magpie-lark	*Grallina cyanoleuca*	4	33	3.7	11.4	10	2

Common Name	SPECIES	Number of quadrats	% of total quadrats	(O-E)/E	Chi-sq	Freq. all sites	Freq. in groups
Willie Wagtail	*Rhipidura leucophrys*	4	33	3.4	10.4	11	3
Crescent Honeyeater	*Phylidonyris pyrrhoptera*	4	33	-0.5	2.4	100	3
Red-browed Finch	*Neochima temporalis*	4	33	0.1	0.1	41	3
Little Grassbird	*Megalurus gramineus*	3	25	10.8	29.5	3	1
Little Corella	*Cacatua sanguinea*	3	25	2.7	5.8	10	3
Red-rumped Parrot	*Psephotus haematonotus*	3	25	1.0	1.5	18	3
Silvereye	*Zosterops lateralis*	3	25	-0.4	1.1	63	3
Scarlet Robin	*Petroica multicolor*	3	25	-0.3	0.4	50	3
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	3	25	-0.2	0.2	46	3
Golden-headed Cisticola	*Cisticola exilis*	2	17	10.8	20.1	2	1
Little Wattlebird	*Anthochaera chrysoptera*	2	17	6.4	11.3	3	2
European Greenfinch	*Carduelis chloris*	2	17	6.4	11.3	3	2
Southern Emu-wren	*Stipiturus malachurus intermedius*	2	17	6.4	11.3	3	2
Eurasian Skylark	*Alauda arvensis*	2	17	3.4	5.4	5	3
Spotted Turtle-dove	*Streptopelia chinensis*	2	17	3.4	5.4	5	3
Painted Button-quail	*Turnix* var*ia*	2	17	3.4	5.4	5	3
Eastern Spinebill	*Acanthorhynchus tenuirostris*	2	17	-0.6	2.1	64	3
Dusky Woodswallow	*Artamus cyanopterus*	2	17	1.4	1.7	10	3
Laughing Kookaburra	*Dacelo novaeguineae*	2	17	-0.6	1.5	55	3
Mistletoebird	*Dicaeum hirundinaceum*	2	17	-0.5	0.9	46	3
Spotted Pardalote	*Pardalotus punctatus*	2	17	-0.1	0.0	28	3
Brown-headed Honeyeater	*Melithreptus brevirostris*	2	17	-0.0	0.0	25	3
Red Wattlebird	*Anthochaera carunculata*	1	8	-0.9	6.0	92	3
White-fronted Chat	*Epthianura albifrons*	1	8	4.8	3.8	2	2
Variegated Fairy-wren	*Malurus lamberti*	1	8	4.8	3.8	2	2
Common Bronzewing	*Phaps chalcoptera*	1	8	-0.7	1.6	38	3
Spiny-cheeked Honeyeater	*Acanthagenys rufogularis*	1	8	1.6	0.9	4	3
Rufous Whistler	*Pachycephala rufiventris*	1	8	-0.6	0.9	29	3
Brush Bronzewing	*Phaps elegans*	1	8	-0.4	0.3	20	3
White-plumed Honeyeater	*Lichenostomus penicillatus*	1	8	-0.3	0.1	16	3
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	1	8	-0.3	0.1	15	3
Weebill	*Smicrornis brevirostris*	1	8	0.3	0.1	9	3
Varied Sittella	*Daphoenositta chrysoptera*	1	8	-0.2	0.0	14	3
White-browed Babbler	*Pomatostomus superciliosus*	1	8	-0.1	0.0	12	3

APPENDIX XVI

VEGETATION DESCRIPTIONS OF BIRD SPECIES PATN GROUPS.

Group 1 -Vegetation Descriptions

Vegetation Groups
1 = Stringybark eucalyptus associations
2 = Smooth Barked eucalyptus associations
3 = Rough Barked eucalyptus associations
4 = Other woodland types (including eucalyptus codominant combinations)
5 = Shrubland
6 = Sedgeland

- refer to Appendix II for Braun-Blanquet codes
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# sites	Structural Formation	Dominant overstorey species and cover/abundance value*	Vegetation Group
1	Low Closed Forest	*Eucalyptus cosmophylla* (2), *Eucalyptus baxteri* (2)	1
2	Low Closed Forest	*Eucalyptus baxteri* (3)	1
1	Low Open Forest	*Eucalyptus baxteri* (2), *Eucalyptus cosmophylla* (2)	1
1	Low Open Forest	*Eucalyptus baxteri* (3), *Lepidosperma semiteres* (2), *Eucalyptus obliqua* (T)	1
1	Low Open Forest	*Eucalyptus obliqua* (2), *Eucalyptus fasciculosa* (2)	1
1	Low Open Forest	*Eucalyptus obliqua* (2), *Eucalyptus goniocalyx* (2)	1
2	Low Open Forest	*Eucalyptus baxteri* (2), *Eucalyptus obliqua* (2)	1
5	Low Open Forest	*Eucalyptus baxteri* (4) or *Eucalyptus baxteri* (3)	1
2	Low Open Forest	*Eucalyptus obliqua* (2), *Eucalyptus cosmophylla* (2)	1
9	Low Open Forest	*Eucalyptus obliqua* (3)	1
1	Low Open Woodland	*Eucalyptus baxteri* (2)	1
1	Low Woodland	*Eucalyptus obliqua* (3), *Eucalyptus fasciculosa* (3)	1
2	Low Woodland	*Eucalyptus baxteri* (2)	1
2	Low Woodland	*Eucalyptus obliqua* (2)	1
2	Low Woodland	*Eucalyptus baxteri* (3)	1
4	Mallee	*Eucalyptus obliqua* (3)	1
1	Open Forest	*Eucalyptus baxteri* (4)	1
1	Open Forest	*Eucalyptus obliqua* (3), *Eucalyptus leucoxylon* spp. *leucoxylon* (2)	1
6	Open Forest	*Eucalyptus baxteri* (2), *Eucalyptus obliqua* (2 or 3)	1
16	Open Forest	*Eucalyptus obliqua* (2 or 4)	1
1	Open Mallee	*Eucalyptus cosmophylla* (2), *Eucalyptus baxteri* (1), *Eucalyptus obliqua* (1)	1
2	Open Woodland	*Eucalyptus obliqua* (3)	1
1	Very Low Open Forest	*Eucalyptus baxteri* (4)	1
2	Very Low Open Forest	*Eucalyptus baxteri* (3), *Eucalyptus cosmophylla* (1)	1
1	Woodland	*Eucalyptus obliqua* (2)	1
1	Low Open Forest	*Eucalyptus viminalis* spp. *cygnetensis* (3), *Eucalyptus leucoxylon* spp. *leucoxylon* (3)	2
2	Low Open Forest	*Eucalyptus fasciculosa* (3)	2
2	Low Open Forest	*Eucalyptus leucoxylon* spp. *leucoxylon* (3)	2
1	Low Woodland	*Eucalyptus leucoxylon* spp. *pruinosa* (2)	2
3	Low Woodland	*Eucalyptus fasciculosa* (1), *Acacia pycnantha* (1)	2
1	Open Forest	*Eucalyptus camaldulensis* var. *camaldulensis* (3), *Eucalyptus goniocalyx* (2)	2
1	Open Forest	*Eucalyptus leucoxylon* spp. *leucoxylon* (2), *Eucalyptus fasciculosa* (2)	2
1	Open Forest	*Eucalyptus leucoxylon* spp. *leucoxylon* (3), *Eucalyptus obliqua* (2)	2

# sites	Structural Formation	Dominant overstorey species and cover/abundance value*	Vegetation Group
1	Open Forest	*Eucalyptus viminalis* spp. *viminalis* (2), *Eucalyptus leucoxylon* spp. *leucoxylon* (2)	2
4	Open Forest	*Eucalyptus leucoxylon* spp. (2)	2
1	Open Mallee	*Eucalyptus fasciculosa* (2)	2
1	Tall Open Woodland	*Eucalyptus leucoxylon* spp. *leucoxylon* (2)	2
2	Very Low Woodland	*Eucalyptus fasciculosa* (2)	2
1	Woodland	*Allocasuarina verticillata* (3), *Eucalyptus viminalis* spp. *cygnetensis* (2), *Eucalyptus leucoxylon* spp. *leucoxylon* (2)	2
1	Woodland	*Eucalyptus camaldulensis* var. *camaldulensis* (2), *Eucalyptus leucoxylon* spp. (2)	2
1	Woodland	*Eucalyptus camaldulensis* var. *camaldulensis* (3)	2
1	Woodland	*Eucalyptus leucoxylon* spp. (2)	2
1	Woodland	*Eucalyptus viminalis* spp. *viminalis* (2)	2
1	Low Open Forest	*Eucalyptus goniocalyx* (2)	3
1	Low Open Woodland	*Eucalyptus goniocalyx* (*N*), *Eucalyptus fasciculosa* (*N*)	3
1	Low Woodland	*Eucalyptus fasciculosa* (2), *Eucalyptus goniocalyx* (2)	3
1	Low Woodland	*Eucalyptus microcarpa* (3)	3
1	Mallee	*Eucalyptus goniocalyx* (3), *Eucalyptus fasciculosa* (2)	3
1	Mallee	*Eucalyptus goniocalyx* (3), *Eucalyptus fasciculosa* (*T*)	3
1	Open Forest	*Eucalyptus goniocalyx* (3)	3
1	Woodland	*Eucalyptus goniocalyx* (2)	3
1	Low Closed Forest	*Eucalyptus cosmophylla* (2), *Eucalyptus fasciculosa* (1), *Eucalyptus leptophylla* (1)	4
2	Low Mallee	*Eucalyptus diversifolia* (3), *Eucalyptus cosmophylla* (2)	4
1	Low Open Forest	*Eucalyptus fasciculosa* (2), *Eucalyptus cosmophylla* (2)	4
1	Low Woodland	*Callitris preissii* (2), *Acacia pycnantha* (1), *Eucalyptus fasciculosa* (*T*)	4
1	Low Woodland	*Eucalyptus fasciculosa* (2), *Eucalyptus obliqua* (2), *Eucalyptus goniocalyx* (2)	4
1	Very Low Closed Forest	*Eucalyptus cosmophylla* (1), *Eucalyptus diversifolia* (1)	4
1	Very Low Open Forest	*Eucalyptus cosmophylla* (2), *Eucalyptus fasciculosa* (2)	4
1	Very Low Woodland	*Eucalyptus cosmophylla* (2)	4
1	Woodland	*Eucalyptus fasciculosa* (2), *Allocasuarina verticillata* (2)	4
1	Closed Shrubland	*Melaleuca decussata* (3), *Leptospermum continentale* (3)	5
1	Shrubland	*Acacia paradoxa* (2), *Hakea rostrata* (2), *Allocasuarina muelleriana* spp. *muelleriana* (2)	5
1	Shrubland	*Leptospermum continentale* (3)	5
1	Tall Closed Shrubland	*Leptospermum continentale* (4)	5
1	Tall Shrubland	*Acacia retinodes* var. *retinodes* (*swamp* form) (3)	5
1	Tall Shrubland	*Leptospermum lanigerum* (3), *Acacia retinodes* var. *retinodes* (*swamp* form) (2), **Oxylobium lanceolatum* (2)	5
1	Tall Shrubland	*Leptospermum lanigerum* (3), *Leptospermum continentale* (2)	5
1	Closed Sedgeland	*Baumea rubiginosa* (4), *Baumea tetragona* (3)	6

Group 2 – Vegetation Descriptions

Vegetation Groups
1 = Stringybark eucalyptus associations
2 = Smooth Barked eucalyptus associations
3 = Rough Barked eucalyptus associations
4 = Other woodland types (including eucalyptus codominant combinations)
5 = Shrubland
6 = Sedgeland

# sites	Structural Formation	Dominant overstorey species and cover/abundance value	Vegetation Group
1	Low Open Forest	*Eucalyptus baxteri* (3), *Eucalyptus cosmophylla* (2)	1
1	Low Woodland	*Eucalyptus obliqua* (2), *Eucalyptus fasciculosa* (2)	1

# sites	Structural Formation	Dominant overstorey species and cover/abundance value	Vegetation Group
1	Mallee	*Eucalyptus baxteri* (3)	1
1	Open Forest	*Eucalyptus obliqua* (3), *Eucalyptus rubida* spp. *rubida* (2)	1
1	Woodland	*Eucalyptus obliqua* (1)	1
1	Low Open Forest	*Eucalyptus leucoxylon* spp. *pruinosa* (3), *Eucalyptus viminalis* spp. *cygnetensis (N)*	2
1	Low Woodland	*Eucalyptus fasciculosa* (2), *Eucalyptus leucoxylon* spp. *leucoxylon* (T), *Eucalyptus obliqua* (*T*)	2
1	Open Forest	*Eucalyptus camaldulensis* var. *camaldulensis* (3)	2
1	Open Forest	*Eucalyptus leucoxylon* spp. *leucoxylon* (2)	2
1	Open Forest	*Eucalyptus viminalis* spp. *cygnetensis* (3), *Eucalyptus leucoxylon* spp. *leucoxylon* (3)	2
1	Open Forest	*Eucalyptus viminalis* spp. *viminalis* (3), *Eucalyptus leucoxylon* spp. *leucoxylon* (3)	2
1	Woodland	*Eucalyptus camaldulensis* var. *camaldulensis* (2)	2
1	Woodland	*Eucalyptus leucoxylon* spp. *leucoxylon* (2), *Eucalyptus camaldulensis* var. *camaldulensis* (2)	2
1	Woodland	*Eucalyptus leucoxylon* spp. *leucoxylon* (2), *Eucalyptus microcarpa* (T)	2
1	Low Woodland	*Eucalyptus microcarpa* (2)	3
1	Open Mallee	*Eucalyptus goniocalyx* (2), *Eucalyptus fasciculosa* (2)	3
1	Open Mallee	*Eucalyptus porosa* (2), *Eucalyptus odorata* (2)	3
1	Woodland	*Eucalyptus goniocalyx* (3)	3
1	Low Open Forest	*Callitris preissii* (2), *Eucalyptus fasciculosa* (2)	4
2	Low Woodland	*Callitris preissii* (2), *Eucalyptus fasciculosa* (2)	4
1	Low Woodland	*Eucalyptus fasciculosa* (3), *Allocasuarina verticillata* (2)	4
1	Open Mallee	*Eucalyptus cosmophylla* (2), *Eucalyptus fasciculosa* (2), *Eucalyptus baxteri* (2)	4
1	Very Low Open Forest	*Eucalyptus cosmophylla* (2), *Exocarpos cupressiformis* (1)	4
1	Shrubland	*Acacia longifolia* var. *sophorae* (4), *Olearia axillaris* (4)	5

Group 3 – Vegetation Descriptions

Vegetation Groups
1 = Stringybark eucalyptus associations
2 = Smooth Barked eucalyptus associations
3 = Rough Barked eucalyptus associations
4 = Other woodland types (including eucalyptus codominant combinations)
5 = Shrubland
6 = Sedgeland

# sites	Structural Formation	Dominant overstorey species and cover/abundance value	Vegetation Group
1	Closed Sedgeland	**Juncus effusus* (3), *Juncus sarophorus* (2)	6
1	Shrubland	*Allocasuarina muelleriana* spp. *muelleriana* (2), *Eucalyptus cosmophylla* (1), *Acacia paradoxa* (1)	5
1	Open Mallee	*Eucalyptus arenacea* (2)	1
1	Mallee	*Eucalyptus baxteri* (4), *Eucalyptus obliqua* (*T*)	1
1	Open Forest	*Eucalyptus obliqua* (2), *Eucalyptus baxteri* (2), **Pinus radiata* (1)	1
1	Sedgeland	*Juncus sarophorus* (3)	6
1	Open Shrubland	*Leptospermum continentale* (2), *Gahnia sieberiana* (2)	5
1	Shrubland	*Leptospermum continentale* (3)	5
1	Sedgeland	*Leptospermum continentale* (3), *Gahnia sieberiana* (2)	5
1	Shrubland	*Leptospermum continentale* (3), *Melaleuca squamea* (2)	5
1	Closed Sedgeland	*Phragmites australis* (3)	6
1	Closed Sedgeland	*Phragmites australis* (5), *Leptospermum lanigerum* (3)	6

APPENDIX XVII

REPTILE SPECIES AND NUMBER RECORDED AT EACH SURVEY QUADRAT.

COUNT OF SPECIES																													
SITE ID	***Aprasia striolata***	***Austrelaps labialis***	***Bassiana duperreyi***	***Christinus marmoratus***	***Ctenophorus decresii***	***Ctenotus orientalis***	***Ctenotus robustus***	***Delma molleri***	***Diplodactylus vittatus***	***Egernia whitii***	***Eulamprus heatwolei***	***Eulamprus quoyii***	***Hemiergis decresiensis***	***Hemiergis peronii***	***Lampropholis guichenoti***	***Lerista bougainvillii***	***Lerista dorsalis***	***Menetia greyii***	***Morethia obscura***	***Pogona barbata***	***Pseudechis porphyriacus***	***Pseudemoia***	***Pseudonaja textilis***	***Pygopus lepidopodus***	***Suta flagellum***	***Tiliqua rugosa***	***Tiliqua scincoides***	**Total**	**Species/Site**
ADE00701(117)			3												1	1												5	3
ADE00801(117)				1									2		1			1					2					7	5
ADE01001(117)															7													7	1
ADE01101(117)			2										1		29													32	3
ADE01301(117)						1																						1	1
ADE01401(117)					1		4		2									6								1		14	5
ADE01501(117)	2			2	1		2						10		2	1		6										26	8
ADE01601(117)				2						4			2		5	4												17	5
ADE01701(117)							1	3					4		7	1		2										18	6
ADE01801(117)	2			1		10	3	5					2		21	14		2										60	9
ADE01901(117)			7					1					3		131													142	4
ADE02001(117)	1		1										6		24			1										33	5
ADE02101(117)													1		3													4	2
ANG00101(117)													9		4	4										1		18	4
BAR00601(117)				1									3		1			1	3							2		12	6
BAR00701(117)													3		1	1												5	3
BAR01401(117)				2									3		2									1		1		9	5
BAR01501(117)	2												3		4	4										1		14	5
BAR01601(117)													2		3	1										1		7	4
BAR01701(117)													19		6													25	2
BAR01801(117)													5			1										1		7	3
BAR01901(117)			2												5													7	2
BAR02001(117)													5		3	1		1										10	4
BAR02101(117)													10						5	1								16	3
BAR02201(117)				1									1			1			4									7	4
BAR02301(117)				2		1							3			3		1	1				1			1		13	8
BAR02401(117)													1		2											1		4	3
BAR02501(117)					1								5			7					1					1	1	16	6
BAR02601(117)				1									3		2	2		1								1		10	6
BAR02701(117)													2		5	3												10	3
BAR02801(117)															6											2		8	2
BAR02901(117)													2															2	1
BAR03001(117)				1									13		7	3										2		26	5
BAR03101(117)			3										4		7	3		1					1			1		20	7

COUNT OF SPECIES																													
SITE ID	***Aprasia striolata***	***Austrelaps labialis***	***Bassiana duperreyi***	***Christinus marmoratus***	***Ctenophorus decresii***	***Ctenotus orientalis***	***Ctenotus robustus***	***Delma molleri***	***Diplodactylus vittatus***	***Egernia whitii***	***Eulamprus heatwolei***	***Eulamprus quoyii***	***Hemiergis decresiensis***	***Hemiergis peronii***	***Lampropholis guichenoti***	***Lerista bougainvillii***	***Lerista dorsalis***	***Menetia greyii***	***Morethia obscura***	***Pogona barbata***	***Pseudechis porphyriacus***	***Pseudemoia***	***Pseudonaja textilis***	***Pygopus lepidopodus***	***Suta flagellum***	***Tiliqua rugosa***	***Tiliqua scincoides***	**Total**	**Species/Site**
BAR03201(117)			1							7			4		1	2												15	5
ECH00101(117)	2		3										5		8	3							1					22	6
ECH00301(117)			7										1		8	1										1		18	5
ECH00401(117)				4									2		2	2		1					1					12	6
ENC00101(97)			2												3													5	2
ENC00201(97)														1		1												2	2
ENC00301(97)														2	7													9	2
ENC00401(117)														2	3		1						1					7	4
ENC00401(97)															4			1										5	2
ENC00501(117)				2						6			4		2	6	2		1									23	7
ENC00501(97)			5																									5	1
JER00201(97)															1													1	1
JER00301(97)															2													2	1
JER00401(97)			2																									2	1
JER00701(117)													16		8											1		25	3
JER00801(117)													6		9													15	2
JER00901(117)	3		6							7			11		11													38	5
JER01001(117)										3			4		3													10	3
JER01101(117)	2		11	4	3					4			3		6	5												38	8
MIL00101(117)	1															2			4									7	3
MIL00201(117)	3		3										2			10			1									19	5
MIL00202(52)													1	2	5													8	3
MIL00203(52)															7													7	1
NOA00701(117)				3											9													12	2
NOA00801(117)													1		19	1												21	3
NOA00901(117)	1												1		15								1			2		20	5
NOA01001(117)			1										2		26													29	3
NOA01002(117)															13													13	1
NOA01101(117)	1		3										2		21											1		28	5
NOA01201(117)													1															1	1
NOA01301(117)													1		15													16	2
NOA01401(117)			4										1		30					1				2		1		39	6
NOA01501(117)			3	1		6							4		1	2							1			1		19	8
NOA01601(117)															1													1	1
NOA01701(117)															2											1		3	2
NOA01801(117)	1		6							1			3		3	2												16	6
NOA01901(117)			3										2		16	1				1						1		24	6
NOA02001(117)													1		20									2				23	3
NOA02101(117)				5											22	1		14					1					43	5
NOA02201(117)					1							9	1		14													25	4

COUNT OF SPECIES																													
SITE ID	***Aprasia striolata***	***Austrelaps labialis***	***Bassiana duperreyi***	***Christinus marmoratus***	***Ctenophorus decresii***	***Ctenotus orientalis***	***Ctenotus robustus***	***Delma molleri***	***Diplodactylus vittatus***	***Egernia whitii***	***Eulamprus heatwolei***	***Eulamprus quoyii***	***Hemiergis decresiensis***	***Hemiergis peronii***	***Lampropholis guichenoti***	***Lerista bougainvillii***	***Lerista dorsalis***	***Menetia greyii***	***Morethia obscura***	***Pogona barbata***	***Pseudechis porphyriacus***	***Pseudemoia***	***Pseudonaja textilis***	***Pygopus lepidopodus***	***Suta flagellum***	***Tiliqua rugosa***	***Tiliqua scincoides***	**Total**	**Species/Site**
NOA02301(117)	2			1									6			1	2		3									15	6
NOA02401(117)	3		5												15	3										1		27	5
NOA02501(117)			7	1						1			7		25													41	5
ONK01101(117)			1										3		7	2												13	4
ONK01201(117)			3							5					5													13	3
ONK01301(117)			1							3			1		5	1												11	5
ONK01401(117)			2										1		14					1			1					19	5
ONK01501(117)													1		2	1		1										5	4
ONK01601(117)			1										4		4						1							10	4
ONK01701(117)			5										3		6													14	3
ONK01801(117)				1	2								3													1		7	4
ONK01901(117)			1										3		1													5	3
ONK02001(117)			1												2													3	2
ONK02101(117)													4		5													9	2
ONK02201(117)													6		8													14	2
ONK02301(117)													3		3													6	2
ONK02401(117)			1	1	1			1					1		5	3		3							1			17	9
ONK02501(117)													2		12													14	2
ONK02601(117)			1	3									2		3													9	4
ONK02701(117)				1									4		11													16	3
ONK02801(117)													1		16											1		18	3
ONK02901(117)				2			1			1			2		27												1	34	6
TOR00101(97)										1			1		31											1		34	4
TOR00201(97)															1													1	1
TOR00301(97)										1					16													17	2
TOR00401(97)															5													5	1
TOR00402(52)													1		3													4	2
TOR00501(97)															7													7	1
TOR00502(52)													1													1		2	2
TOR00701(97)				1											3											1		5	3
TOR00801(97)													1		1													2	2
TOR00901(97)															2													2	1
TOR00903(52)			2										1		2													5	3
TOR01001(52)				1							1				1													3	3
TOR01101(97)															2													2	1
TOR01301(117)													1		4													5	2
TOR01401(117)										1			12		18													31	3
TOR01501(117)										2	2		4		8											3		19	5
TOR01601(117)				1						1			9		4													15	4
TOR01701(117)				3						2				2	1		3		5							1		18	7

COUNT OF SPECIES																													
SITE ID	***Aprasia striolata***	***Austrelaps labialis***	***Bassiana duperreyi***	***Christinus marmoratus***	***Ctenophorus decresii***	***Ctenotus orientalis***	***Ctenotus robustus***	***Delma molleri***	***Diplodactylus vittatus***	***Egernia whitii***	***Eulamprus heatwolei***	***Eulamprus quoyii***	***Hemiergis decresiensis***	***Hemiergis peronii***	***Lampropholis guichenoti***	***Lerista bougainvillii***	***Lerista dorsalis***	***Menetia greyii***	***Morethia obscura***	***Pogona barbata***	***Pseudechis porphyriacus***	***Pseudemoia***	***Pseudonaja textilis***	***Pygopus lepidopodus***	***Suta flagellum***	***Tiliqua rugosa***	***Tiliqua scincoides***	**Total**	**Species/Site**
TOR01801(117)				3						3				6			6		1	2						1		22	7
WIL00101(97)										1					5													6	2
WIL00201(97)																1												1	1
WIL00301(97)			2							1			3		1													7	4
WIL00401(97)			1							1					1													3	3
WIL00501(97)			1													1												2	2
WIL00601(97)			1																							2		3	2
WIL00701(97)			6													2												8	2
WIL00801(97)															4													4	1
WIL00802(52)													2															2	1
WIL00901(97)			1										1		10													12	3
WIL00902(52)			1																									1	1
WIL01001(97)													1		11													12	2
WIL01202(52)			1								1																	2	2
WIL01701(117)			3							2			1		8	6												20	5
WIL01801(117)			2												3													5	2
WIL01901(117)										1			4		4													9	3
WIL01901(52)																					1	1					1	3	3
WIL02001(117)										1					1	4										1		7	4
WIL02001(52)													3									1						4	2
WIL02101(117)													3		17													20	2
WIL02201(117)		1	2							4					1	1			2					1				12	7
WIL02301(117)						4				1									3									8	3
WIL02401(117)													1		6				6	1								14	4
WIL02501(117)	1						1										1		2									5	4
WIL02601(117)										1	1		1		6													9	4
WIL02701(117)	2		1	1						2			1		4	4												15	7
WIL02801(117)													11		1	4										1		17	4
WIL02901(117)			2								2		1		2													7	4
YAN00101(97)															5													5	1
YAN00201(97)															1	1												2	2
YAN00301(97)				1											4	1												6	3
YAN00901(117)	3			4									2	5					18				1	1		1		35	8
YAN01001(117)													2		3													5	2
YAN01101(117)	1												1		8	1												11	4
YAN01201(117)	1		2												6					1								10	4
Grand Total	**34**	**1**	**135**	**58**	**10**	**22**	**12**	**10**	**2**	**68**	**7**	**9**	**332**	**20**	**1003**	**131**	**15**	**43**	**59**	**8**	**3**	**2**	**12**	**7**	**1**	**42**	**3**	**2051**	**27**
Total Sites/Sp	**19**	**1**	**48**	**31**	**7**	**5**	**6**	**4**	**1**	**28**	**5**	**1**	**96**	**7**	**120**	**49**	**6**	**16**	**15**	**7**	**3**	**2**	**11**	**5**	**1**	**35**	**3**	**150**	**27**
Average																												**13.7**	**3.5**

APPENDIX XVIII

FROG SPECIES RECORDED AT EACH SURVEY QUADRAT. FROGS RECORDED FROM 66 OF 157 SURVEY QUADRATS.

Refer appendix II for vegetation and physical parameter details for survey quadrats.

SITEID	*Crinia signifera* (Brown Froglet)	*Limnodynastes dumerili* (Bull Frog)	*Limnodynastes tasmaniensis* (Marbled Frog)	*Litoria ewingi* (Brown Tree Frog)	*Neobatrachus pictus* (Painted Frog)	*Pseudophryne bibroni* (Brown Toadlet)	Total
ADE01001(117)			1				1
ADE02001(117)						1	1
ANG00101(117)						2	2
BAR00601(117)					2	1	3
BAR01501(117)					1		1
BAR01601(117)		1			2	1	4
BAR01701(117)	2						2
BAR01801(117)	1						1
BAR02201(117)		1					1
BAR02401(117)	1					1	2
BAR02501(117)	2						2
BAR02601(117)						1	1
BAR02701(117)	1	2					3
BAR02801(117)	1						1
BAR03201(117)						1	1
ECH00101(117)		2					2
ENC00201(97)					1		1
ENC00401(97)		1					1
ENC00501(117)		4			4		8
JER00101(97)	1						1
JER00701(117)		2		1			3
JER00801(117)	7	11	2				20
JER00901(117)	1						1
MIL00101(117)		1					1
MIL00202(52)	3						3
MIL00203(52)	2			3			5
NOA01002(117)			1				1
NOA01401(117)	1						1
NOA01601(117)				1			1
NOA02001(117)	2						2
NOA02201(117)	1						1
ONK01101(117)	1						1
ONK01501(117)	2	3					5
ONK01601(117)	1						1
ONK02001(117)	3						3
ONK02201(117)	3						3
ONK02301(117)	1						1
ONK02601(117)	1						1

SITEID	*Crinia signifera* (Brown Froglet)	*Limnodynastes dumerili* (Bull Frog)	*Limnodynastes tasmaniensis* (Marbled Frog)	*Litoria ewingi* (Brown Tree Frog)	*Neobatrachus pictus* (Painted Frog)	*Pseudophryne bibroni* (Brown Toadlet)	Total
ONK02701(117)	1						1
TOR00402(52)	2						2
TOR00502(52)	1						1
TOR00901(97)	1						1
TOR00903(52)	4					1	5
TOR01001(52)	1						1
TOR01101(52)			2				2
TOR01301(117)	1	2					3
TOR01401(117)	2	1					3
TOR01501(117)	1						1
TOR01601(117)	2						2
WIL00802(52)	2						2
WIL00902(52)	7						7
WIL01202(52)	3						3
WIL01801(117)	1						1
WIL01901(52)	4						4
WIL02001(117)						1	1
WIL02001(52)	1						1
WIL02101(117)		1					1
WIL02201(117)		3					3
WIL02301(117)					1		1
WIL02401(117)			1		1		2
WIL02501(117)	1	1					2
WIL02601(117)	1						1
WIL02701(117)	1	1					2
YAN01001(117)	2		3	1			6
YAN01101(117)			1				1
YAN01201(117)	1	1		2			4
Totals	**78**	**38**	**11**	**8**	**12**	**10**	**157**
Quadrat Totals	**42**	**17**	**7**	**5**	**7**	**9**	**66**

APPENDIX XIX

NUMBER OF INDIVIDUALS RECORDED FOR EACH INSECT FAMILY (OTHER THAN FLIES AND ANTS) FOR EACH SURVEY QUADRAT.

Part (i) Families Blattodea, Coleoptera, Collembola and Dermaptera

Order	BLATTODEA			COLEOPTERA													COLLEMBOLA			DERM-APTERA
Family / Site ID	Blaberidae	Blattellidae	Blattidae	Bostrichidae	Buprestidae	Carabidae	Cerambycidae	Chrysomelidae	Curculionidae	Dermestidae	Elateridae	Family not identified	Nitidulidae	Scarabaeidae	Staphylinidae	Tenebrionidae	Entomobryidae	Poduroidea	Sminthuridae	Forficulidae
ADE01401						6			1		3			1		1	2			
ADE01501		1												1	15		13			1
ADE01601	3					1			1								2	20	2	3
ADE01701						4			1							2	4			
ADE01801						4										10				
ADE01901	2					5			1							1				3
ADE02001	1					2			1					1	1	3	22	1		8
ADE02101																				
ANG00101				1		4									2	1	2		1	
BAR00701						1			1								17			1
BAR02001						1							1		4		5			
BAR02101															2	2				4
BAR02201	1					7								7		1	10			2
BAR02301						1									1		28		1	2
BAR02401						4			3					11			3			4
BAR02601	1					1		1	1					3			10		1	2
BAR02701		1				1			3						2		2			
BAR02801									2						7		2			2
BAR02901						1			1					2	1					
BAR03001			1			1									5		12		2	1
BAR03201						7			1			1		41	1					
ECH00101	1					1			5							4				
ECH00301				1										1		1				
ENC00401	2					5			2	3	3					6	9			11
ENC00501						1			1					2		1				5
JER00701									1					1						
JER00801						6			2		1					2				7
JER00901			1																	
JER01001		1				2			1		1									2
JER01101																	3			3
MIL00101		1				3								2		4				
MIL00201						8			1								3			3
ONK00701																				
ONK01301						3			1			1		1	1		2			1
ONK01401						1													1	2
ONK01501						2			1			1		3	1	1	12		1	2
ONK01601	1		1			1						3								2
ONK01701		1	1	1		4						1			4	1	7			3

Order	BLATTODEA			COLEOPTERA														COLLEMBOLA			DERM-APTERA
Family	Blaberidae	Blattellidae	Blattidae	Bostrichidae	Buprestidae	Carabidae	Cerambycidae	Chrysomelidae	Curculionidae	Dermestidae	Elateridae	Family not identified	Nitidulidae	Scarabaeidae	Staphylinidae	Tenebrionidae	Entomobryidae	Poduroidea	Sminthuridae	Forficulidae
Site ID																				
ONK01901	1																			
ONK02001						1			1			1		1		2	4			
ONK02101	3					2						1			1		4			6
ONK02201	1					5						2			2	4	3		1	7
ONK02301						3		1	3		1			1	2	1	5			1
ONK02401			2			3										1				6
ONK02501	3	1	1	1		1										11	6			
ONK02601	5	1				4								1	1		22			1
NOA01301	1															1				
NOA01401														3		3				
NOA01501					1	1			2							1	7			1
NOA01801																				
NOA01901						1										1	10			
NOA02001	1		1											1		1				
NOA02101						1											7			
NOA02301						1						1								
NOA02401	1			1		3			4					4		2				7
NOA02501																	5			
TOR01401	1	1				3			1						1	2				7
TOR01601		1				1			2								7			2
TOR01701						1										2	4			6
TOR01801														4		5				1
WIL01701						3								1		3				6
WIL01801	2					3			1					2			100			6
WIL01901						3		1		1					1	1				1
WIL02001						2											6			2
WIL02101	1					3	1		1					1	1		5			
WIL02201						1										7	6			6
WIL02301		3				1			2							3	21			1
WIL02401	2					2					1					1	70			9
WIL02501						6										4	12			2
WIL02601																				
WIL02701	2					4										1	17			5
WIL02801	1		1			2										1	8			2
YAN01001																	60			
YAN00901																				
TOTALS	**37**	**12**	**9**	**5**	**1**	**149**	**1**	**3**	**49**	**4**	**10**	**12**	**1**	**96**	**56**	**99**	**559**	**21**	**10**	**159**

Part (ii):Families Hemiptera and Hymenoptera

Order	HEMIPTERA (Bugs, Lerps, Aphids and Cicadas)											HYMENOPTERA (Sawflies, Wasps,Bees but excluding ants)						
Family / Site ID	Aradidae	Cicadidae	Coccidae	Cydnidae	Jassidae	Lygaeidae	Notonectidae	Pentatomidae	Psyllidae	Reduviidae	Scutelleridae	Apidae	Chrysididae	Family not identified	Mutillidae	Pergidae	Sphecidae	Thinnidae
ADE01401		1								1								
ADE01501					2					2								
ADE01601																		
ADE01701		1		1						1					1			
ADE01801				1											2			
ADE01901				2				1										
ADE02001					8													
ADE02101																		
ANG00101										1								
BAR00701																		
BAR02001																		
BAR02101								1										
BAR02201																		
BAR02301																		
BAR02401		1			1													
BAR02601					1					1								
BAR02701						1												
BAR02801									2									
BAR02901																		
BAR03001				1	1													
BAR03201												1						
ECH00101								2							2			
ECH00301								1										
ENC00401														2				
ENC00501																		
JER00701																		
JER00801					1										2			
JER00901					1													
JER01001															2			
JER01101						1												
MIL00101				5														
MIL00201				2		1					1					1		
ONK00701																		
ONK01301																		
ONK01401									1		1							
ONK01501											1	1						
ONK01601																		
ONK01701				1	2													
ONK01901																		
ONK02001																		
ONK02101																		
ONK02201					2													
ONK02301																		
ONK02401							1						1		1			
ONK02501			1															
ONK02601																		
NOA01301																		
NOA01401															1			
NOA01501																		
NOA01801																		

Order	HEMIPTERA (Bugs, Lerps, Aphids and Cicadas)											HYMENOPTERA (Sawflies, Wasps,Bees but excluding ants)						
Family / Site ID	Aradidae	Cicadidae	Coccidae	Cydnidae	Jassidae	Lygaeidae	Notonectidae	Pentatomidae	Psyllidae	Reduviidae	Scutelleridae	Apidae	Chrysididae	Family not identified	Mutillidae	Pergidae	Sphecidae	Thinnidae
NOA01901															2			
NOA02001												1		1				
NOA02101															1			
NOA02301															2			
NOA02401	1			5		1									2			
NOA02501					1													
TOR01401				1										1	3			
TOR01601						1												
TOR01701																		
TOR01801				10		1		1							1			
WIL01701											1			1	1		1	
WIL01801				1														
WIL01901					1	1									1			
WIL02001				2		1												
WIL02101					2						2			1				
WIL02201				2				1						1	4			
WIL02301								1							1			
WIL02401				1														
WIL02501																		
WIL02601																		
WIL02701					3													
WIL02801																1		2
YAN01001																		
YAN00901				2														
TOTALS	**1**	**3**	**1**	**37**	**26**	**8**	**1**	**8**	**3**	**0**	**6**	**3**	**1**	**7**	**29**	**2**	**1**	**2**

Part (iii): Families Isoptera, Lepidoptera, Mantodea, Orthoptera and Thysanura

Order	ISOPT-ERA (Ter-mites)	LEPIDOPTERA (Moths and Butterflies)				MANTO-DEA (Praying Mantids)	ORTHOPTERA (Grasshoppers and Crickets)							THYSAN-URA (Silver-fish)	Total (all Families)
Family / Site ID	Family not identified	Arctiidae	Family not identified	Hepialidae	Limacodidae	Mantidae	Acrididae	Gryllacrididae	Gryllidae	Myrmecophilidae	Pyrgomorphidae	Tetrigidae	Tettigoniidae	Lepismatidae	
ADE01401				1			1								18
ADE01501															38
ADE01601							1						1		34
ADE01701									1						16
ADE01801							2								19
ADE01901															15
ADE02001			2												50
ADE02101									1						1
ANG00101			2												16
BAR00701															24
BAR02001															15
BAR02101														1	10
BAR02201			1												29
BAR02301															33
BAR02401	6											1			34
BAR02601							4				1			1	28
BAR02701			1				1								29
BAR02801			1												16
BAR02901							2								7
BAR03001			1				3						1		29
BAR03201															63
ECH00101															15
ECH00301		3													7
ENC00401							1		1					1	46
ENC00501															10
JER00701															2
JER00801									1						22
JER00901															2
JER01001								1							10
JER01101									1						8
MIL00101															15
MIL00201									2	2				5	29
ONK00701															0
ONK01301							1								21
ONK01401															7
ONK01501			1												31
ONK01601															11
ONK01701															39
ONK01901															1
ONK02001															13
ONK02101	2		1												24
ONK02201															27
ONK02301		1													26
ONK02401														1	21
ONK02501			1						1						51
ONK02601			1									1			38
NOA01301															2

Order	ISOPT-ERA (Ter-mites)	LEPIDOPTERA (Moths and Butterflies)				MANTO-DEA (Praying Mantids)	ORTHOPTERA (Grasshoppers and Crickets)							THYSAN-URA (Silver-fish)	Total (all Families)
Family	Family not identified	Arctiidae	Family not identified	Hepialidae	Limacodidae	Mantidae	Acrididae	Gryllacrididae	Gryllidae	Myrmecophilidae	Pyrgomorphidae	Tetrigidae	Tettigoniidae	Lepismatidae	
Site ID															
NOA01401															8
NOA01501													1		15
NOA01801							1								1
NOA01901							2	2					1		19
NOA02001															6
NOA02101															9
NOA02301															4
NOA02401															31
NOA02501														2	8
TOR01401															21
TOR01601							1								15
TOR01701							1		1						15
TOR01801									2					1	28
WIL01701	1					2			6					1	27
WIL01801															115
WIL01901						1									13
WIL02001															13
WIL02101					1		1								20
WIL02201														1	29
WIL02301														1	35
WIL02401										1				1	88
WIL02501							1		1						26
WIL02601															0
WIL02701															33
WIL02801									1						19
YAN01001															60
YAN00901															2
	9	4	12	1	1	3	23	3	19	3	1	2	4	16	1662

APPENDIX XX

ANT GENERA RECORDED AT EACH SOUTHERN MT LOFTY SURVEY QUADRAT.

Survey 117 Site id.	*Amblyopone*	*Anonychomyrma*	*Aphaenogaster*	*Calomyrmex*	*Camponotus*	*Ceraphachys*	*Colobstruma*	*Crematogaster*	*Discothyrea*	*Dolichoderus*	*Hereroponera*	*Iridomyrmex*	*Leptogenys*	*Melophorus*	*Meranoplus*	*Mesostruma*	*Monomorium*	*Myrmecia*	*Notoncus*	*Ochetellus*	*Paratrechina*	*Pachycondtla*	*Pheidole*	*Podomyrma*	*Polyrhachis*	*Prolasius*	*Rhytidoponera*	*Stigmacros*	*Tapinoma*	*Technomyrmex*	*Tetramorium*
ADE01401												x		x			x					x					x				
ADE01501		x											x					x						x				x		x		
ADE01601								x																								
ADE01701					x					x		x		x				x									x					
ADE01801					x			x										x						x								
ADE01901					x					x								x									x					
ADE02001					x							x						x					x				x					
ADE02101								x				x		x				x					x				x					
ANG00101					x					x				x				x									x					
BAR00601					x		x	x		x		x		x													x					
BAR00701					x							x						x					x									
BAR01401								x				x					x						x						x			
BAR01501					x			x		x	x	x					x						x									
BAR01601								x				x					x	x				x	x				x		x			
BAR01701								x				x					x			x			x				x					
BAR01801												x					x			x	x							x				
BAR01901		x						x															x				x					
BAR02001					x			x										x					x				x					
BAR02101					x			x						x	x			x					x				x					
BAR02201					x	x								x	x		x	x									x		x			
BAR02301					x			x		x									x				x				x		x			
BAR02401					x					x								x														
BAR02501																																
BAR02601					x							x					x						x				x	x				
BAR02701					x			x		x		x						x					x	x	x		x					
BAR02801																																
BAR02901					x	x		x				x						x									x					
BAR03001					x			x				x															x					
BAR03101					x					x		x											x	x								
BAR03201																																
ECH00101		x			x			x				x		x				x					x		x		x					
ECH00301					x			x				x						x					x	x	x	x		x				
ECH00401					x							x		x				x					x				x					
ENC00401	x													x									x				x					
ENC00501					x							x						x			x		x				x					
JER00701																											x					x
JER00801																		x					x				x					
JER00901		x																					x									
JER01001	x		x											x				x					x		x		x					
JER01101																		x									x					
MIL00101					x									x				x														
MIL00201		x			x									x			x						x	x			x					
NOA00701												x				x		x											x			

Survey 117 Site id.	*Amblyopone*	*Anonychomyrma*	*Aphaenogaster*	*Calomyrmex*	*Camponotus*	*Ceraphachys*	*Colobstruma*	*Crematogaster*	*Discothyrea*	*Dolichoderus*	*Hereroponera*	*Iridomyrmex*	*Leptogenys*	*Melophorus*	*Meranoplus*	*Mesostruma*	*Monomorium*	*Myrmecia*	*Notoncus*	*Ochetellus*	*Paratrechina*	*Pachycondtla*	*Pheidole*	*Podomyrma*	*Polyrhachis*	*Prolasius*	*Rhytidoponera*	*Stigmacros*	*Tapinoma*	*Technomyrmex*	*Tetramorium*
NOA00801					x									x				x									x				
NOA00901										x								x	x												
NOA01001					x													x									x			x	
NOA01101																		x													
NOA01201					x							x		x				x									x				
NOA01301								x										x					x				x		x		
NOA01401						x		x						x				x					x				x			x	
NOA01501					x									x				x					x					x		x	
NOA01601																															
NOA01701																															
NOA01801					x			x		x		x						x				x			x		x				
NOA01901										x								x					x				x				x
NOA02001		x			z	x						x					x	x			x					x		x			x
NOA02101					x			x				x						x													
NOA02201																															
NOA02301					x			x				x		x	x		x	x									x				x
NOA02401								x							x			x			x					x					
NOA02501								x							x								x								
ONK01101												x		x			x				x										
ONK01201																	x														
ONK01301								x										x									x				
ONK01401					x			x										x						x			x	x			
ONK01501		x						x										x									x				
ONK01601		x																x			x										x
ONK01701					x			x										x				x		x			x				
ONK01801																															
ONK01901																															
ONK02001								x										x					x				x				
ONK02101		x								x								x								x					
ONK02201		x			x				x									x								x	x				
ONK02301		x						x						x	x		x	x								x					
ONK02401					x			x						x				x							x		x				
ONK02501					x			x									x						x			x	x				
ONK02601					x			x										x									x				
ONK02701		x		x				x									x	x	x		x		x		x		x				
ONK02801					x													x													
ONK02901												x						x													
TOR01301	x			x			x				x		x				x					x				x	x		x		
TOR01401		x			x													x									x				
TOR01501																															
TOR01601																											x			x	
TOR01701		x			x			x				x		x	x		x									x	x				
TOR01801					x							x		x				x							x		x				
WIL01701					x			x				x		x	x		x	x					x				x				
WIL01801					x							x						x					x				x				
WIL01901					x							x						x	x				x				x				
WIL02001																		x					x				x				
WIL02101	x				x							x			x		x	x	x				x				x				
WIL02201		x			x									x	x			x					x				x				
WIL02301		x			x			x				x		x			x	x			x		x				x			x	
WIL02401		x			x							x		x				x						x			x				

Survey 117 Site id.	*Amblyopone*	*Anonychomyrma*	*Aphaenogaster*	*Calomyrmex*	*Camponotus*	*Ceraphachys*	*Colobstruma*	*Crematogaster*	*Discothyrea*	*Dolichoderus*	*Hereroponera*	*Iridomyrmex*	*Leptogenys*	*Melophorus*	*Meranoplus*	*Mesostruma*	*Monomorium*	*Myrmecia*	*Notoncus*	*Ochetellus*	*Paratrechina*	*Pachycondyla*	*Pheidole*	*Podomyrma*	*Polyrhachis*	*Prolasius*	*Rhytidoponera*	*Stigmacros*	*Tapinoma*	*Technomyrmex*	*Tetramorium*
WIL02501								x				x		x				x									x				
WIL02601																							x								
WIL02701		x			x													x									x				
WIL02801																		x					x			x	x	x			
WIL02901		x			x													x					x				x				
YAN00901												x		x	x			x									x				
YAN01001																		x					x				x				
YAN01101																															
YAN01201		x			x																		x				x				
Total	4	20	1	2	52	4	2	39	1	13	2	38	2	29	11	1	21	68	5	2	8	5	44	8	8	10	65	7	8	5	5

APPENDIX XXI

CAMPONOTUS SPECIES RECORDED AT EACH SOUTHERN MT LOFTY SURVEY QUADRAT (ONLY THOSE QUADRATS WHERE *CAMPONOTUS* SPECIES WERE RECORDED ARE INCLUDED IN THE TABLE BELOW).

Site ID (all from Survey 117)	*C. afflatus*	*C. ceriseipes*	*C. consobrinus*	*C. claripes*	*C. gasseri*	*C. gibbinotus*	*C. lownei*	*C. minimus*	*C. oetkeri*	*C. piliventris*	*C.* sp.(undescribed)	*C. terebrans*	*C. whitei*
ADE01601			x										
ADE01701			x		x	x				x		x	
ADE01801												x	
ANG00101			x					x					
BAR00701			x							x			
BAR02001			x										
BAR02101						x							
BAR02201							x		x				x
BAR02301	x		x								x	x	
BAR02401			x	x									
BAR02601			x								x		
BAR02901			x										
BAR03001			x										
BAR03101			x										
ECH00101										x			
ECH00301												x	
ECH004						x							
ENC00501		x											
MIL00201		x										x	
NOA008			x										
NOA010			x										
NOA012				x									
NOA015												x	
NOA019											x		
NOA020												x	
NOA023								x		x			
ONK013										x			
ONK014			x										
ONK017										x			
ONK022			x			x							
ONK024					x								
ONK025						x							
ONK026				x									
ONK027			x	x									
ONK028			x										

Site ID (all from Survey 117)	*C. afflatus*	*C. ceriseipes*	*C. consobrinus*	*C. claripes*	*C. gasseri*	*C. gibbinotus*	*C. lownei*	*C. minimus*	*C. oetkeri*	*C. piliventris*	*C.* sp.(undescribed)	*C. terebrans*	*C. whitei*
TOR01401			x										
TOR01701		x										x	
TOR01801						x						x	
WIL01701								x		x		x	
WIL01801			x										
WIL01901												x	
WIL02001						x						x	
WIL02101			x					x		x			
WIL02201								x				x	
WIL02301												x	
WIL02401										x		x	
WIL02701			x										
WIL02901			x										
YAN01201								x					
	1	3	22	4	2	7	1	6	1	9	3	15	1

APPENDIX XXII

NUMBER OF INDIVIDUALS FOR EACH FAMILY WITHIN DIPTERA (FLIES) RECORDED FOR EACH SURVEY QUADRAT.

	Family																								
Site ID	Anisopodidae	Anthomyiidae	Asilidae	Bibionidae	*Calliphora augur*	*Calliphora dubia*	Cecidomyiidae	Chloropidae	Dolichopodidae	Drosophilidae	Empididae	Ephydridae	Lauxaniidae	Muscidae	Mycetophilidae	Phoridae	Psychodidae	Pyrgotidae	Sciaridae	Sphaeroceridae	Tabanidae	Tachinidae	Tanyderidae	Tipulidae	TOTALS
ADE01401								1																	1
ADE01501							1									11	1		2	2					17
ADE01601							1		7					8		1			5	2					24
ADE01701																									0
ADE01801																									0
ADE01901																									0
ADE02001																1									1
ADE02101																									0
ANG00101						1	2							12		2				3			1		21
BAR00701							2									3									5
BAR02001							1	1						11		2				3		1			19
BAR02101														1											1
BAR02201																									0
BAR02301							2	2						1					1						6
BAR02401																1			1	2					4
BAR02601							1							1		3			2						7
BAR02701																2			1	1					4
BAR02801	1						1									6				1					9
BAR02901														1		3									4
BAR03001							3		2			1	1	1		3			8	1	1				21
BAR03201														1		1									2
ECH00101																		1							1
ECH00301																3			1						4
ENC00401			1					1																	2
ENC00501																									0
JER00701																				1					1
JER00801																									0
JER00901					1											3				3					13
JER01001																3									3
JER01101																				1	1				2
MIL00101								3																	6
MIL00201								2																	2
ONK00701											1														2
ONK01301							8				2					1			1	1					25
ONK01401	1						3												2	5					11
ONK01501		1					4		2					1		4				5					28
ONK01601																									0
ONK01701							5				1					9			2	9					38
ONK01901																				9					9

	Family																									
Site ID	**Anisopodidae**	**Anthomyiidae**	**Asilidae**	**Bibionidae**	***Calliphora augur***	***Calliphora dubia***	**Cecidomyiidae**	**Chloropidae**	**Dolichopodidae**	**Drosophilidae**	**Empididae**	**Ephydridae**	**Lauxaniidae**	**Muscidae**	**Mycetophilidae**	**Phoridae**	**Psychodidae**	**Pyrgotidae**	**Sciaridae**	**Sphaeroceridae**	**Tabanidae**	**Tachinidae**	**Tanyderidae**	**Tipulidae**	**TOTALS**
ONK02001							1									3			1	1					9
ONK02101								2				1				5			3	1				1	13
ONK02201	5						3		1					1		8	2			2					22
ONK02301											1	1			1	4				2					9
ONK02401							1				1									2					4
ONK02501	1						3		1					1		5			1	3					15
ONK02601							2	1	1			1		2		5				4					16
NOA01301																									0
NOA01401																									0
NOA01501																1									1
NOA01801																					1				1
NOA01901																									0
NOA02001																									0
NOA02101																									0
NOA02301									1							1									2
NOA02401																			2						2
NOA02501																			2						4
TOR01401					2	1			1																4
TOR01601				1				1	1											1					5
TOR01701								1																	1
TOR01801									1				1	5											7
WIL01701								1	1					1											3
WIL01801							1	1	3			1				2									14
WIL01901								1	3							2									10
WIL02001							2		5																4
WIL02101									2							5									7
WIL02201																									0
WIL02301						1				1							1								3
WIL02401								1	1																4
WIL02501									3							1				1					5
WIL02601																									0
WIL02701								1								1									2
WIL02801									5																5
YAN01001								3								4				1					8
YAN00901																									0
TOTALS	**8**	**1**	**1**	**1**	**3**	**3**	**45**	**28**	**45**	**1**	**6**	**5**	**2**	**48**	**1**	**112**	**4**	**1**	**40**	**85**	**3**	**1**	**1**	**1**	**473**

APPENDIX XXIII

NUMBER OF INDIVIDUALS FOR EACH BROAD TAXONOMIC GROUP WITHIN NON-INSECT ORDERS RECORDED FOR EACH SURVEY QUADRAT (EXCLUDING ARACHNIDS OTHER THAN MITES). ONLY QUADRATS AT WHICH NON-INSECTS WERE RECORDED ARE INCLUDED IN THE TABLE BELOW.

Site ID	Acarina		Crustacea		Myriapoda					Gastro-poda	Oligo-chaeta	Total
	mite	mite eryth-raeid	Amphi-pod	Slater	Centipede - not blue	Centipede - *Scutigera*	Centipede -blue	Millipede: *Ommatoiulus moreletii*	Millipede - native	snail: *Cupedora bednalli*	worm	
ADE01401								3				3
ADE01501				1			1	2				4
ADE01601	3	1						4	1	2		11
ADE01701								5				5
ADE02001						3	1	10	1			15
ADE02101			1						5			6
ANG00101								2	1			3
BAR00701				1				8				9
BAR02001		1						2				3
BAR02101								14				14
BAR02201								10				10
BAR02301								2	1			3
BAR02401									17	1		18
BAR02601		1		1				1				3
BAR02701								3				3
BAR02801								15				15
BAR02901				1				5				6
BAR03001		2		2					1	1		6
BAR03201								69	2			71
ECH00301								19	1			20
ONK01301					1							1
ONK01401											5	5
ONK01501	1							1			1	3
ONK01601								1			2	3
ONK01701				4			1	3	4			12
ONK01901										1		1
ONK02001								1				1
ONK02101				1	1		1	4	2			9
ONK02201			24	3				8				35
ONK02301		1	13					6			1	21
ONK02401			1				1	7	2	1		12
ONK02501		1	6			1		3		2	3	16
ONK02601							1	14		2	1	18
NOA01501								3				3
TOR01801		5							1			6
WIL01701							3					3
WIL01801				1	1		4		1			7
WIL02001								6				6
WIL02101							1					1
WIL02201								5				5
WIL02301								4				4
WIL02401							1	1				2
WIL02501					1		1	1				3
WIL02701								7				7
WIL02801								2				2
YAN01001							1					1
YAN00901								1				1
Totals	**4**	**12**	**45**	**15**	**4**	**4**	**17**	**252**	**40**	**10**	**13**	**416**

APPENDIX XXIV

NUMBER (AND IN SOME CASES, SEX) OF EACH ARACHNID SPECIES(EXCLUDING MITES) RECORDED AT SURVEY QUADRATS.

m=male, f=female, j=juvenile

Part (i) Quadrats ADE015 to JER009

Family	Species		ADE015	ADE017	ADE018	ADE019	ADE020	ADE021	BARO7	BARO20	BARO22	BARO23	BARO24	BARO26	BARO27	BARO30	ECHO01	ECHO03	ENCO04	ENCO05	JERO07	JERO08	JERO09
SPIDERS	MYGALOMORPHAE																						
Actinopodidae	*Missulena* sp.	mouse spider																					
Hexathelidae	*Hadronyche adelaidensis*	Adelaide funnelweb																					
Idiopidae	*Misgolas andrewsi*	mygalomorph (no trapdoor)																					
Idiopidae	*Misgolas* sp. 2	mygalomorph (no trapdoor)																			2m	23 m	
Nemesiidae	*Aname tepperi*	mygalomorph (no trapdoor)											m										
Nemesiidae	*Aname* sp.	mygalomorph (no trapdoor)			m, f		f		f			f	2m				m						
Nemesiidae	*Teyloides bakeri*	mygalomorph (no trapdoor)																					
	ARANEOMORPHAE																						
Oonopidae	?genus	six-eyed spiders																					
Pholcidae	*Wugigarra kaurna*	native daddy-long legs		m	f																		
Segestriidae	*Segestria*? Sp.					m																	
Desidae	*Toxopsoides* sp.																						
Desidae	sp. 2																						
Stiphidiidae	*Baiami loftyensis*						f										m						
Hahniidae	*Scotospilus* sp.																						
Zoridae	*Argoctenus* sp.																						
Zoridae	*Hestimodema* sp.		3f																				
Zoridae	sp. 3																			f			
Zoridae	sp. 4										2m 3j												
Miturgidae	*Miturga* sp. 1	lined spider																					
Miturgidae	*Miturga* sp. 2	lined spider																					
Miturgidae	*Uliodon tarantulinus*	lined spider				2m							m		m								
Miturgidae	?genus sp. 4	lined spider																					
Miturgidae	?genus sp. 5	lined spider																					
Sparassidae	*Isopeda woodwardi*	huntsman spider																					
Sparassidae	*Neosparassus* sp. N49	badge-huntsman spider			m																		
Thomisidae	*Stephanopis* sp.	crab spider	m																				
Corinnidae	*Battalus* sp.															m							
Corinnidae	*Supunna albomaculata?*		f	f																			
Corinnidae	*Supunna picta?*																						
Lamponidae	*Lampona cylindrata*	white-tailed spider																					
Lamponidae	*Lamponina loftia*	white-tailed spider																					
Lamponidae	*Asadipus kunderang*	ground spider											m										
Lamponidae	*Longepi woodman*	ground spider	m																				

Family	Species		ADEO15	ADEO17	ADEO18	ADEO19	ADEO20	ADEO21	BARO7	BARO20	BARO22	BARO23	BARO24	BARO26	BARO27	BARO30	ECHO01	ECHO03	ENCO04	ENCO05	JERO07	JERO08	JERO09
Lamponidae	*Prionosternum nitidiceps*	ground spider						m					m										
Prodidomidae	*Myandra* sp.	ground spider																					
Gnaphosidae	*Encoptarthria* sp. 1	ground spider		m		f												m					
Gnaphosidae	*Encoptarthria* sp. 2	ground spider																					
Gnaphosidae	*Encoptarthria* sp. 3	ground spider	4m																				
Gnaphosidae	*Hemicloea*	ground spider																					
Gnaphosidae	sp. 4	ground spider					3f			m			m				m, f						
Gnaphosidae	sp. 5	ground spider																					
Gnaphosidae	sp. 6	ground spider		3m	m						m						m						
Gnaphosidae	sp. 7	ground spider					m					m											
Gnaphosidae	sp. 8	ground spider									m												
Salticidae	*Jotus* sp.	jumping spider																					
Salticidae	*Lycidas* sp.	jumping spider		2m																			
Salticidae	*Maratus* sp.	jumping spider																					
Salticidae	*Opisthoncus* sp.	jumping spider																					
Salticidae	sp. 5	jumping spider																					
Zodariidae	*Habronestes* sp. 1	spotted ant spider			f																		
Zodariidae	*Habronestes* sp. 2	spotted ant spider																					
Zodariidae	*Neostorena* sp.	spotted ant spider																					
Zodariidae	*Storosa* sp.	spotted ant spider																					
Zodariidae	sp. 5	spotted ant spider																					
Zodariidae	sp. 6	spotted ant spider			f																	f	
Lycosidae	*Artoria flavimanus*	wolf spider	f																				
Lycosidae	*Artoria lineata*	wolf spider	f		f										m	f		f	4m fj			f	
Lycosidae	*Artoria* sp. 3	wolf spider						3m f												11 m 2f			
Lycosidae	*Artoria* sp. 4	wolf spider							m	m		m	3m f										
Lycosidae	*Artoria* sp. 5	wolf spider												m									
Lycosidae	*Artoria* sp. 6	wolf spider																					
Lycosidae	*Artoria* sp. 7	wolf spider																					
Lycosidae	*Lycosa gilberta*	wolf spider											2 juv										
Lycosidae	*Lycosa senilis*	wolf spider																					
Lycosidae	*Lycosa* sp. 3	wolf spider					m																
Lycosidae	*Lycosa* sp. 4	wolf spider																				m	
Lycosidae	*Lycosa* sp. 5	wolf spider																					
Lycosidae	*Lycosa* sp. 6	wolf spider																					
Lycosidae	*Venatrix pseudospeciosa*	wolf spider																					
Lycosidae	*Venatrix roo*	wolf spider																				3m	
Lycosidae	*Trochosa expolita*	wolf spider											juv										
Linyphiidae	*?Dunedinia* sp. 1	midget spider								3 juv													
Micropholcommatidae	*Micropholcomma*	midget spider								f													
Theridiidae	*Steatoda* sp. 1	cupboard spider'									m												
Theridiidae	*Achaearanea* sp.	tangle-web weaver																					
Theridiidae	*Dipoena* sp.																m						

Family	Species		ADEO15	ADEO17	ADEO18	ADEO19	ADEO20	ADEO21	BARO7	BARO20	BARO22	BARO23	BARO24	BARO26	BARO27	BARO30	ECHO01	ECHO03	ENCO04	ENCO05	JERO07	JERO08	JERO09
Araneidae	*Austracantha minax*	spiny or Christmas spider																					
Araneidae	*Eriophora pustulosa*	garden orb-weaver																					
SCORPIONS																							
Urodacidae	*Urodacus armatus*																		6	1			
Urodacidae	*Urodacus manicatus*	jade scorpion		1	4	1	2									1	3						
Buthidae	*Lychas* sp.	marbled scorpion		1																			
Bothriuridae	*Cercophonius squama*	wood scorpion						5														1	1
PSEUDOSCORPIONS																							
Olpiidae	sp.																						
OPILIONES																							
Triaenonychidae	*Callihamina adelaidia*	short-legged harvestmen																					
Triaenonychidae	*Yatala hirsti*	short-legged harvestmen																					

Part (ii) Quadrats JER0010 to NOA019

Family	Species		JERO10	JERO11	MILO01	MILO02	ONKO13	ONKO14	ONKO15	ONKO17	ONKO19	ONKO20	ONKO21	ONKO22	ONKO23	ONKO24	ONKO25	ONKO26	NOAO13	NOAO14	NOAO15	NOAO18	NOAO19
SPIDERS	MYGALOMORPHAE																						
Actinopodidae	*Missulena* sp.	mouse spider	f?																				
Hexathelidae	*Hadronyche adelaidensis*	Adelaide funnelweb																					
Idiopidae	*Misgolas andrewsi*	mygalomorph (no trapdoor)																					
Idiopidae	*Misgolas* sp. 2	mygalomorph (no trapdoor)	10 m																				
Nemesiidae	*Aname tepperi*	mygalomorph (no trapdoor)																					
Nemesiidae	*Aname* sp.	mygalomorph (no trapdoor)						m				4m		m			m		m				m
Nemesiidae	*Teyloides bakeri*	mygalomorph (no trapdoor)										m, f											
	ARANEOMORPHAE																						
Oonopidae	?genus	six-eyed spiders																			m		
Pholcidae	*Wugigarra kaurna*	native daddy-long legs																					
Segestriidae	*Segestria*? sp.							2m					f				m						
Desidae	*Toxopsoides* sp.							f		f			f	f			f						
Desidae	sp. 2												f			f							
Stiphidiidae	*Baiami loftyensis*							f				2f			m			f					
Hahniidae	*Scotospilus* sp.																						
Zoridae	*Argoctenus* sp.																						
Zoridae	*Hestimodema* sp.																						
Zoridae	sp. 3																						
Zoridae	sp. 4																						
Miturgidae	*Miturga* sp. 1	lined spider							m														
Miturgidae	*Miturga* sp. 2	lined spider																					
Miturgidae	*Uliodon tarantulinus*	lined spider					m		2m	2m							m			m			
Miturgidae	*?genus* sp. 4	lined spider																					
Miturgidae	*?genus* sp. 5	lined spider													m		2m						
Sparassidae	*Isopeda woodwardi*	huntsman spider																					
Sparassidae	*Neosparassus* sp. N49	badge-huntsman spider																					
Thomisidae	*Stephanopis* sp.	crab spider																					
Corinnidae	*Battalus* sp.																						
Corinnidae	*Supunna albomaculata?*																2 f						
Corinnidae	*Supunna picta?*																						
Lamponidae	*Lampona cylindrata*	white-tailed spider																					
Lamponidae	*Lamponina loftia*	white-tailed spider											f	2m									
Lamponidae	*Asadipus kunderang*	ground spider																					
Lamponidae	*Longepi woodman*	ground spider																					
Lamponidae	*Prionosternum nitidiceps*	ground spider											6m	3m				m					
Prodidomidae	*Myandra* sp.	ground spider																					
Gnaphosidae	*Encoptarthria* sp. 1	ground spider																				f, m	3m 3f
Gnaphosidae	*Encoptarthria* sp. 2	ground spider																				f	
Gnaphosidae	*Encoptarthria* sp. 3	ground spider																					
Gnaphosidae	*Hemicloea*	ground spider																					

Family	Species		JERO10	JERO11	MILO01	MILO02	ONKO13	ONKO14	ONKO15	ONKO17	ONKO19	ONKO20	ONKO21	ONKO22	ONKO23	ONKO24	ONKO25	ONKO26	NOAO13	NOAO14	NOAO15	NOAO18	NOAO19
Gnaphosidae	sp. 4	ground spider								m							m	m				m, 2f	f
Gnaphosidae	sp. 5	ground spider											2m f	M f									
Gnaphosidae	sp. 6	ground spider																				3m	
Gnaphosidae	sp. 7	ground spider								2m													
Gnaphosidae	sp. 8	ground spider																					
Salticidae	*Jotus* sp.	jumping spider															m						
Salticidae	*Lycidas* sp.	jumping spider																					
Salticidae	*Maratus* sp.	jumping spider																					
Salticidae	*Opisthoncus* sp.	jumping spider																					
Salticidae	sp. 5	jumping spider								m													
Zodariidae	*Habronestes* sp. 1	spotted ant spider																				m	
Zodariidae	*Habronestes* sp. 2	spotted ant spider																					
Zodariidae	*Neostorena* sp.	spotted ant spider													m								
Zodariidae	*Storosa* sp.	spotted ant spider																					
Zodariidae	sp. 5	spotted ant spider																					
Zodariidae	sp. 6	spotted ant spider																			f		
Lycosidae	*Artoria flavimanus*	wolf spider																					
Lycosidae	*Artoria lineata*	wolf spider										m	m	m	m		m						
Lycosidae	*Artoria* sp. 3	wolf spider																					
Lycosidae	*Artoria* sp. 4	wolf spider					2m		2m														
Lycosidae	*Artoria* sp. 5	wolf spider																					
Lycosidae	*Artoria* sp. 6	wolf spider				m																	
Lycosidae	*Artoria* sp. 7	wolf spider				f												f					
Lycosidae	*Lycosa gilberta*	wolf spider				2m f																	
Lycosidae	*Lycosa senilis*	wolf spider				f																	
Lycosidae	*Lycosa* sp. 3	wolf spider																					
Lycosidae	*Lycosa* sp. 4	wolf spider		m																			
Lycosidae	*Lycosa* sp. 5	wolf spider																					
Lycosidae	*Lycosa* sp. 6	wolf spider																					
Lycosidae	*Venatrix pseudospeciosa*	wolf spider				3f																	
Lycosidae	*Venatrix roo*	wolf spider										f	m						f				f
Lycosidae	*Trochosa expolita*	wolf spider																f					
Linyphiidae	*?Dunedinia* sp. 1	midget spider																					
Micropholcommatidae	*Micropholcomma*	midget spider																					
Theridiidae	*Steatoda* sp. 1	cupboard spider'																					
Theridiidae	*Achaearanea* sp.	tangle-web weaver													f								
Theridiidae	*Dipoena* sp.																f						
Araneidae	*Austracantha minax*	spiny or Christmas spider																					
Araneidae	*Eriophora pustulosa*	garden orb-weaver																					
SCORPIONS																							
Urodacidae	*Urodacus armatus*				4																		
Urodacidae	*Urodacus manicatus*	jade scorpion									1												
Buthidae	*Lychas* sp.	marbled scorpion							1														
Bothriuridae	*Cercophonius squama*	wood scorpion	1												3								

Family	Species		JERO10	JERO11	MILO01	MILO02	ONKO13	ONKO14	ONKO15	ONKO17	ONKO19	ONKO20	ONKO21	ONKO22	ONKO23	ONKO24	ONKO25	ONKO26	NOAO13	NOAO14	NOAO15	NOAO18	NOAO19
PSEUDOSCORPIONS																							
Olpiidae	sp.																						
OPILIONES																							
Triaenonychidae	*Callihamina adelaidia*	short-legged harvestmen																					1
Triaenonychidae	*Yatala hirsti*	short-legged harvestmen																1					

Part (iii) Quadrats NOA020 to YAN010

Family	Species		NOA020	NOA021	NOA024	NOA025	TORO14	TORO16	TORO17	TORO18	WILO17	WILO18	WILO19	WILO20	WILO21	WILO22	WILO24	WILO25	WILO26	WILO27	WILO28	YANO09	YANO10
SPIDERS	MYGALOMORPHAE																						
Actinopodidae	*Missulena* sp.	mouse spider																					
Hexathelidae	*Hadronyche adelaidensis*	Adelaide funnelweb																					
Idiopidae	*Misgolas andrewsi*	mygalomorph (no trapdoor)																2m					2m
Idiopidae	*Misgolas* sp. 2	mygalomorph (no trapdoor)					9m	14 m															2m
Nemesiidae	*Aname tepperi*	mygalomorph (no trapdoor)																					
Nemesiidae	*Aname* sp.	mygalomorph (no trapdoor)	3m	f													f						
Nemesiidae	*Teyloides bakeri*	mygalomorph (no trapdoor)																					
	ARANEOMORPHAE																						
Oonopidae	?genus	six-eyed spiders																					
Pholcidae	*Wugigarra kaurna*	native daddy-long legs																					
Segestriidae	*Segestria*? sp.																						
Desidae	*Toxopsoides* sp.																						
Desidae	sp. 2																						
Stiphidiidae	*Baiami loftyensis*		f																				
Hahniidae	*Scotospilus* sp.														m								
Zoridae	*Argoctenus* sp.										m												
Zoridae	*Hestimodema* sp.																						
Zoridae	sp. 3																						
Zoridae	sp. 4																f						
Miturgidae	*Miturga* sp. 1	lined spider		f		m																	
Miturgidae	*Miturga* sp. 2	lined spider								m													
Miturgidae	*Uliodon tarantulinus*	lined spider											m										
Miturgidae	?genus sp. 4	lined spider																	f				
Miturgidae	?genus sp. 5	lined spider																					
Sparassidae	*Isopeda woodwardi*	huntsman spider																	m				
Sparassidae	*Neosparassus* sp. N49	badge-huntsman spider																					
Thomisidae	*Stephanopis* sp.	crab spider																					f
Corinnidae	*Battalus* sp.																						
Corinnidae	*Supunna albomaculata?*																						
Corinnidae	*Supunna picta?*												f										
Lamponidae	*Lampona cylindrata*	white-tailed spider																					
Lamponidae	*Lamponina loftia*	white-tailed spider					m							f	2m								
Lamponidae	*Asadipus kunderang*	ground spider																					
Lamponidae	*Longepi woodman*	ground spider																					
Lamponidae	*Prionosternum nitidiceps*	ground spider																					
Prodidomidae	*Myandra* sp.	ground spider																					
Gnaphosidae	*Encoptarthria* sp. 1	ground spider	m																				
Gnaphosidae	*Encoptarthria* sp. 2	ground spider																					
Gnaphosidae	*Encoptarthria* sp. 3	ground spider								m													
Gnaphosidae	*Hemicloea*	ground spider																					m
Gnaphosidae	sp. 4	ground spider	2m	f	m, f								f										

Family	Species		NOAO20	NOAO21	NOAO24	NOAO25	TORO14	TORO16	TORO17	TORO18	WILO17	WILO18	WILO19	WILO20	WILO21	WILO22	WILO24	WILO25	WILO26	WILO27	WILO28	YANO09	YANO10
Gnaphosidae	sp. 5	ground spider																					
Gnaphosidae	sp. 6	ground spider			m																		
Gnaphosidae	sp. 7	ground spider																					
Gnaphosidae	sp. 8	ground spider																					
Salticidae	*Jotus* sp.	jumping spider																					
Salticidae	*Lycidas* sp.	jumping spider		m		f																	
Salticidae	*Maratus* sp.	jumping spider																					
Salticidae	*Opisthoncus* sp.	jumping spider																					
Salticidae	sp. 5	jumping spider																	f				
Zodariidae	*Habronestes* sp. 1	spotted ant spider									f												
Zodariidae	*Habronestes* sp. 2	spotted ant spider																m					
Zodariidae	*Neostorena* sp.	spotted ant spider																					
Zodariidae	*Storosa* sp.	spotted ant spider												f									
Zodariidae	sp. 5	spotted ant spider																m					
Zodariidae	sp. 6	spotted ant spider																					
Lycosidae	*Artoria flavimanus*	wolf spider																					
Lycosidae	*Artoria lineata*	wolf spider			f																		
Lycosidae	*Artoria* sp. 3	wolf spider																					
Lycosidae	*Artoria* sp. 4	wolf spider																					
Lycosidae	*Artoria* sp. 5	wolf spider																	f				
Lycosidae	*Artoria* sp. 6	wolf spider																					
Lycosidae	*Artoria* sp. 7	wolf spider												m, 2f									
Lycosidae	*Lycosa gilberta*	wolf spider																					
Lycosidae	*Lycosa senilis*	wolf spider																					
Lycosidae	*Lycosa* sp. 3	wolf spider																					
Lycosidae	*Lycosa* sp. 4	wolf spider																					
Lycosidae	*Lycosa* sp. 5	wolf spider									6m f												
Lycosidae	*Lycosa* sp. 6	wolf spider																		m	m		
Lycosidae	*Venatrix pseudospeciosa*	wolf spider												2m f									
Lycosidae	*Venatrix roo*	wolf spider		f,m			2m				2m	m	3m	2m	4m						2m		3m
Lycosidae	*Trochosa expolita*	wolf spider																					
Linyphiidae	*?Dunedinia* sp. 1	midget spider																					
Micropholcommatidae	*Micropholcomma*	midget spider																					
Theridiidae	*Steatoda* sp. 1	cupboard spider'																					
Theridiidae	*Achaearanea* sp.	tangle-web weaver																					
Theridiidae	*Dipoena* sp.																						
Araneidae	*Austracantha minax*	spiny or Christmas spider																					
Araneidae	*Eriophora pustulosa*	garden orb-weaver																					
SCORPIONS																							
Urodacidae	*Urodacus armatus*								4									4			1		
Urodacidae	*Urodacus manicatus*	jade scorpion									2	2					4						
Buthidae	*Lychas* sp.	marbled scorpion								6													
Bothriuridae	*Cercophonius squama*	wood scorpion					1	2	1				2										
PSEUDOSCORPIONS																							

Family	Species		NOAO20	NOAO21	NOAO24	NOAO25	TORO14	TORO16	TORO17	TORO18	WILO17	WILO18	WILO19	WILO20	WILO21	WILO22	WILO24	WILO25	WILO26	WILO27	WILO28	YANO09	YANO10
Olpiidae	sp.					2																	
OPILIONES																							
Triaenonychidae	*Callihamina adelaidia*	short-legged harvestmen																					
Triaenonychidae	*Yatala hirsti*	short-legged harvestmen				1	1			1													1

APPENDIX XXV

INSECTS (OTHER THAN FLIES AND ANTS) SORTED BY ORDER AND FAMILY AND THE FREQUENCY AT WHICH THEY WERE RECORDED WITHIN EACH (I) VEGETATION STRUCTURAL FORMATION; (II) SURFACE COVER STREW SIZE; (III) GROUND COVER STREW %, AND (IV) SOIL TYPE.

Part (i): Insects sorted on Vegetation Structure

Order	Family	Highest taxonomic level at which taxa identified	Low Mallee	Low Open Forest	Low Woodland	Mallee	Open Forest	Open Mallee	Shrubland	Tall Shrubland	Very Low Open Forest	Very Low Woodland	Woodland	Totals
BLATTODEA	Blaberidae	*Calolampra* sp.	2	6	4		9				1		7	29
BLATTODEA	Blaberidae	*Laxta* sp.			1		5						1	7
BLATTODEA	Blaberidae	*Robshelfordia* sp.									1			1
BLATTODEA	Blattellidae	blattellid-blue stripe			1			3					2	6
BLATTODEA	Blattellidae	blattellid-ylw stripe		1	1		3						1	6
BLATTODEA	Blattidae	*Platyzosteria circumducta*			1		1							2
BLATTODEA	Blattidae	*Platyzosteria* sp.		2	1		3						1	7
COLEOPTERA	Family?	orange and green						1						1
COLEOPTERA	Family?	larva			2		7						2	11
COLEOPTERA	Bostrichidae	*Bostrychopsis jesuita*					1							1
COLEOPTERA	Bostrichidae	*Xylion* sp.				1	3							4
COLEOPTERA	Buprestidae	*Castiarina* sp.		1										1
COLEOPTERA	Carabidae	*Carenum* blue	1	11				1	7		6			26
COLEOPTERA	Carabidae	*Carenum* thin blue			1	1	1	4						7
COLEOPTERA	Carabidae	*Cerotalis* sp.							1		1			2
COLEOPTERA	Carabidae	*Gnathoxys* sp.		1										1
COLEOPTERA	Carabidae	*Hypapharax* sp.					2							2
COLEOPTERA	Carabidae	*Neocarenum* sp.		2							3			5
COLEOPTERA	Carabidae	*Notagonum* sp.	1		3	1	7						2	14
COLEOPTERA	Carabidae	*Philoscaphus* sp.			2									2
COLEOPTERA	Carabidae	*Secatophus australis*	4	7	16	2	25	12				1	10	77
COLEOPTERA	Carabidae	*Simodontus australis*		1	3	1	4				1			10
COLEOPTERA	Cerambycidae	Laminineae			1									1
COLEOPTERA	Chrysomelidae	*Augomela hypochalcea*			1									1
COLEOPTERA	Chrysomelidae	*?Aporocera*=gr/or		1			1							2
COLEOPTERA	Curculionidae	small	1	2			4						3	10
COLEOPTERA	Curculionidae	Cryptorhynchinae			1		1							2
COLEOPTERA	Curculionidae	*?Sclerorhinus*		4	3		14	5					3	29
COLEOPTERA	Curculionidae	*Prypnus* sp.												0
COLEOPTERA	Curculionidae	*Curculio impressipennis*	1					2	1					4
COLEOPTERA	Curculionidae	*Acantholophus* sp.			1		1							2
COLEOPTERA	Curculionidae	*Leptopius* sp.					1				1			2
COLEOPTERA	Elateridae	*?Agrypnus* sp..			1		2	3						6
COLEOPTERA	Elateridae	*Conoderus* sp. 4 mm		1										1
COLEOPTERA	Elateridae	*Conoderus* sp.near	3											3
COLEOPTERA	Nitidulidae	*Carpophilus* sp.		1										1
COLEOPTERA	Scarabaeidae	hairy and small						1						1
COLEOPTERA	Scarabaeidae	*Phyllotocus* sp						1						1
COLEOPTERA	Scarabaeidae	*Colpolchila* sp.					1							1
COLEOPTERA	Scarabaeidae	*Cryptodus* sp.		1										1
COLEOPTERA	Scarabaeidae	Gn sp.		1			3							4
COLEOPTERA	Scarabaeidae	*Heteronyx* sp.(near)		2	5		3	3	4		2		1	20
COLEOPTERA	Scarabaeidae	*Lepanus loftyensis* PT			41								1	42
COLEOPTERA	Scarabaeidae	*Liparetrus* sp.		1									1	2
COLEOPTERA	Scarabaeidae	*Onthophagus gazella*					1	11					2	14
COLEOPTERA	Scarabaeidae	*Phyllotocus rufipennis*		6			2							8
COLEOPTERA	Scarabaeidae	*Scitala* sp.		1	1									2

Order	Family	Highest taxonomic level at which taxa identified	Low Mallee	Low Open Forest	Low Woodland	Mallee	Open Forest	Open Mallee	Shrubland	Tall Shrubland	Very Low Open Forest	Very Low Woodland	Woodland	Totals
COLEOPTERA	Staphylinidae	Gn sp.		7	5	2	9	1					32	56
COLEOPTERA	Tenebrionidae	*Adelium brevicorne*			4		3	8			3			18
COLEOPTERA	Tenebrionidae	*Adelium* sp.	1	1	1		2		1					6
COLEOPTERA	Tenebrionidae	*Cardiothorax* sp.				1	1						4	6
COLEOPTERA	Tenebrionidae	*Celibe adewahni*					1		1					2
COLEOPTERA	Tenebrionidae	*Celibe australis*	7	3	4		7	5			3			29
COLEOPTERA	Tenebrionidae	*Ecnolagria rufescens*					1							1
COLEOPTERA	Tenebrionidae	*Helea* sp.			1				3					4
COLEOPTERA	Tenebrionidae	*Metistete omophloides*			4									4
COLEOPTERA	Tenebrionidae	*Saragus interrruptus*		4	3		16	2					3	28
COLEOPTERA	Carabidae	*Dyschirus* sp.			1								2	3
COLEOPTERA	Tenebrionidae	*Seirotrana* sp.near					1							1
COLEOPTERA	Dermestidae	juvenile	3	1										4
DERMAPTERA	Forficulidae	*Forficula* sp.	17	23	19	2	38	19	7		12		22	159
HEMIPTERA	Aradidae	Gn.sp.					1							1
HEMIPTERA	Cicadidae	Gn.sp.					1	2						3
HEMIPTERA	Coccidae	Gn.sp.					1							1
HEMIPTERA	Cydnidae	*Adrisa* sp		4	8		10	2	12				1	37
HEMIPTERA	Jassidae	Gn.sp.		2	4		3	1			3		13	26
HEMIPTERA	Lygaeidae	Gn.sp.		3			1		3				1	8
HEMIPTERA	Notonectidae	*Anisops* sp.near			1									1
HEMIPTERA	Pentatomidae	*Kapunda troughtoni*			1									1
HEMIPTERA	Pentatomidae	Gn sp					4	2	1					7
HEMIPTERA	Psyllidae	Gn.sp.				1							2	3
HEMIPTERA	Reduviidae	*Oncocephalus* sp.		2	5			3					2	12
HEMIPTERA	Reduviidae	*Ptilocnemus* sp.							1					1
HEMIPTERA	Reduviidae	*Agylla* sp.						1						1
HEMIPTERA	Reduviidae	*Ptilocnemus pallidus*							1					1
HEMIPTERA	Reduviidae	Gn.sp.					1	1			1			3
HEMIPTERA	Reduviidae	Emesiinae, Gn sp		1	1	1	1	1						5
HEMIPTERA	Scutelleridae	*Choerocoris paganus*			2	1		2	1					6
COLLEMBOLA	Entomobryidae	Gn.sp.	13	268	50	2	59	44	6		29	7	81	559
COLLEMBOLA	Poduroidea	Gn.sp.			20								1	21
COLLEMBOLA	Sminthuridae	Gn.sp.			4	2		1					3	10
HYMENOPTERA	Family?	Native bee	2		1		2	2						7
HYMENOPTERA	Apidae	*Apis mellifera*			1		1	1						3
HYMENOPTERA	Ichneumonidae	*Netelia* sp.												0
HYMENOPTERA	Mutillidae	Gn.sp.		2	7		12	6	1			1		29
HYMENOPTERA	Pergidae	Gn.sp.		1					1					2
HYMENOPTERA	Sphecidae	spotted wing						1						1
HYMENOPTERA	Thinnidae	Gn.sp.		2										2
HYMENOPTERA	Chrysididae	*Stilbum* sp.			1									1
ISOPTERA	Family?	Gn.sp.					2	7						9
LEPIDOPTERA	Family?	larva		2		2	2	1					5	12
LEPIDOPTERA	Limacodidae	*Doratifera quadriguttata*			1									1
LEPIDOPTERA	Hepialidae	*Trictena ?atripalpis*						1						1
LEPIDOPTERA	Arctiidae	*Spilosoma glatignyi*					4							4
MANTODEA	Mantidae	Gn.sp.						1						1
MANTODEA	Mantidae	*Paraoxylinae*		1				1						2
MANTODEA	Mantidae	*Orthodera ministralis*												0
ORTHOPTERA	Acrididae	*?Peakesia* sp.			3								2	5
ORTHOPTERA	Acrididae	Acrididae Gn.sp.	1	1	3			1					1	7
ORTHOPTERA	Acrididae	*Goniaea* sp.	1		2		3				1		4	11
ORTHOPTERA	Gryllacrididae	Gn.sp.					2							2
ORTHOPTERA	Gryllacrididae	*Paragryllacris* sp.			1									1
ORTHOPTERA	Gryllidae	*Eurygryllodes* sp.					1	4	2					7
ORTHOPTERA	Gryllidae	Gn.sp.	1	1			1	2	3		1			9
ORTHOPTERA	Gryllidae	*Lepidogryllus* sp.								1				1
ORTHOPTERA	Gryllidae	*Teleogryllus* sp.	1											1
ORTHOPTERA	Gryllidae	Trigoniinae, Gn sp					1							1
ORTHOPTERA	Myrmecophilidae	*Myrmecophilus* sp.		1					2					3

Order	Family	Highest taxonomic level at which taxa identified	Low Mallee	Low Open Forest	Low Woodland	Mallee	Open Forest	Open Mallee	Shrubland	Tall Shrubland	Very Low Open Forest	Very Low Woodland	Woodland	Totals
ORTHOPTERA	Pyrgomorphidae	Gn.sp.			1									1
ORTHOPTERA	Tetrigidae	Gn.sp.						1					1	2
ORTHOPTERA	Tettigoniidae	*Hemisaga* sp.		1	1		1							3
ORTHOPTERA	Tettigoniidae	Tettigoniidae Gn.sp.											1	1
THYSANURA	Lepismatidae	brown species		1	5			1	1					8
THYSANURA	Lepismatidae	*Ctenolepisma* sp	1					2	5					8
			61	406	267	23	365	174	65	1	69	9	222	1556

Part (ii): Insects sorted on strew size

Order	Family	Highest taxonomic level at which taxa identified	boulder (>t 250mm)	cobble (51-250mm)	none apparent	pebble (5-50mm)	TOTALS
BLATTODEA	Blaberidae	*Calolampra* sp.		15	11	3	29
BLATTODEA	Blaberidae	*Laxta* sp.		3	2	2	7
BLATTODEA	Blaberidae	*Robshelfordia* sp.		0	1	0	1
BLATTODEA	Blattellidae	blattellid-blue stripe		1	4	1	6
BLATTODEA	Blattellidae	blattellid-ylw stripe		3	1	2	6
BLATTODEA	Blattidae	*Platyzosteria circumducta*		2	0	0	2
BLATTODEA	Blattidae	*Platyzosteria* sp.	1	2	3	1	7
COLEOPTERA	Family?	orange and green		0	0	1	1
COLEOPTERA	Family?	larva		3	4	4	11
COLEOPTERA	Bostrichidae	*Bostrychopsis jesuita*		0	1	0	1
COLEOPTERA	Bostrichidae	*Xylion* sp.		2	1	1	4
COLEOPTERA	Buprestidae	*Castiariana* sp.		1	0	0	1
COLEOPTERA	Carabidae	*Carenum* blue		0	19	7	26
COLEOPTERA	Carabidae	*Carenum* thin blue		4	1	2	7
COLEOPTERA	Carabidae	*Cerotalis* sp.		0	1	1	2
COLEOPTERA	Carabidae	*Gnathoxys* sp.		0	1	0	1
COLEOPTERA	Carabidae	*Hypapharax* sp.		2	0	0	2
COLEOPTERA	Carabidae	*Neocarenum* sp.		0	5	0	5
COLEOPTERA	Carabidae	*Notagonum* sp.		7	4	3	14
COLEOPTERA	Carabidae	*Philoscaphus* sp.		0	2	0	2
COLEOPTERA	Carabidae	*Secatophus australis*	1	28	26	22	77
COLEOPTERA	Carabidae	*Simodontus australis*		3	2	5	10
COLEOPTERA	Cerambycidae	Laminine		1	0	0	1
COLEOPTERA	Chrysomelidae	*Augomela hypochalcea*		1	0	0	1
COLEOPTERA	Chrysomelidae	*?Aporocera*=gr/or		0	2	0	2
COLEOPTERA	Curculionidae	small		3	5	2	10
COLEOPTERA	Curculionidae	*Cryptorhynchinae*		1	0	1	2
COLEOPTERA	Curculionidae	*?Sclerorhinus*		7	8	14	29
COLEOPTERA	Curculionidae	*Prypnus* sp.		0	0	0	0
COLEOPTERA	Curculionidae	*Catasarcus impressipennis*		0	3	1	4
COLEOPTERA	Curculionidae	*Acantholophus* sp.		0	1	1	2
COLEOPTERA	Curculionidae	*Leptopius* sp.		0	2	0	2
COLEOPTERA	Elateridae	*?Agrypnus* sp.		3	1	2	6
COLEOPTERA	Elateridae	*Conoderus* sp. 40mm		0	1	0	1
COLEOPTERA	Elateridae	*Conoderus* sp.near		0	3	0	3
COLEOPTERA	Nitidulidae	*Carpophilus* sp.		0	1	0	1
COLEOPTERA	Scarabaeidae	hairy and small		0	0	1	1
COLEOPTERA	Scarabaeidae	*Phyllotocus* sp		0	0	1	1
COLEOPTERA	Scarabaeidae	*Colpolchila* sp.		0	1	0	1
COLEOPTERA	Scarabaeidae	*Cryptodus* sp.		1	0	0	1
COLEOPTERA	Scarabaeidae	Gn sp.		2	2	0	4
COLEOPTERA	Scarabaeidae	*Heteronyx* sp.(near)		5	13	2	20
COLEOPTERA	Scarabaeidae	*Lepanus loftyensis* PT		41	1	0	42
COLEOPTERA	Scarabaeidae	*Liparetrus* sp.		0	2	0	2
COLEOPTERA	Scarabaeidae	*Onthophagus gazella*		2	1	11	14
COLEOPTERA	Scarabaeidae	*Phyllotocus rufipennis*		0	8	0	8
COLEOPTERA	Scarabaeidae	*Scitala* sp.		1	1	0	2
COLEOPTERA	Staphylinidae	Gn sp.	5	23	21	7	56
COLEOPTERA	Tenebrionidae	*Adelium brevicorne*		2	16	0	18
COLEOPTERA	Tenebrionidae	*Adelium* sp.		2	4	0	6
COLEOPTERA	Tenebrionidae	*Cardiothorax* sp.		0	5	1	6
COLEOPTERA	Tenebrionidae	*Celibe adewahni*		0	1	1	2
COLEOPTERA	Tenebrionidae	*Celibe australis*		5	17	7	29
COLEOPTERA	Tenebrionidae	*Ecnolagria rufescens*		0	1	0	1
COLEOPTERA	Tenebrionidae	*Helea* sp.		0	4	0	4
COLEOPTERA	Tenebrionidae	*Metistete omophloides*		4	0	0	4
COLEOPTERA	Tenebrionidae	*Saragus interrruptus*		20	6	2	28
COLEOPTERA	Carabidae	*Dyschirus* sp.		1	2	0	3
COLEOPTERA	Tenebrionidae	*Seirotrana* sp.near		0	0	1	1
COLEOPTERA	Dermestidae	juvenile		0	4	0	4
DERMAPTERA	Forficulidae	*Forficula* sp.	1	31	88	39	159
HEMIPTERA	Aradidae	Gn.sp.		0	1	0	1
HEMIPTERA	Cicadidae	Gn.sp.		2	0	1	3

Order	Family	Highest taxonomic level at which taxa identified	boulder (>t 250mm)	cobble (51-250mm)	none apparent	pebble (5-50mm)	TOTALS
HEMIPTERA	Coccidae	Gn.sp.		1	0	0	1
HEMIPTERA	Cydnidae	*Adrisa* sp.	1	4	30	2	37
HEMIPTERA	Jassidae	Gn.sp.	1	15	8	2	26
HEMIPTERA	Lygaeidae	Gn.sp.		0	5	3	8
HEMIPTERA	Notonectidae	*Anisops* sp.near		1	0	0	1
HEMIPTERA	Pentatomidae	*Kapunda troughtoni*		0	1	0	1
HEMIPTERA	Pentatomidae	Gn sp.		0	5	2	7
HEMIPTERA	Psyllidae	Gn.sp.		0	2	1	3
HEMIPTERA	Reduviidae	*Oncocephalus* sp.		9	1	2	12
HEMIPTERA	Reduviidae	*Ptilocnemus* sp.		0	1	0	1
HEMIPTERA	Reduviidae	*Agylla* sp.		0	0	1	1
HEMIPTERA	Reduviidae	*Ptilocnemus pallidus*		0	1	0	1
HEMIPTERA	Reduviidae	Gn.sp.		1	2	0	3
HEMIPTERA	Reduviidae	Emesiinae, Gn sp		2	1	2	5
HEMIPTERA	Scutelleridae	*Choerocoris paganus*		2	0	4	6
COLLEMBOLA	Entomobryidae	Gn.sp.	12	264	188	95	559
COLLEMBOLA	Poduroidea	Gn.sp.		21	0	0	21
COLLEMBOLA	Sminthuridae	Gn.sp.	2	3	1	4	10
HYMENOPTERA	Family?	Native bee		1	5	1	7
HYMENOPTERA	Apidae	*Apis mellifera*		1	1	1	3
HYMENOPTERA	Ichneumonidae	*Netelia* sp.		0	0	0	0
HYMENOPTERA	Mutillidae	Gn.sp.		4	15	10	29
HYMENOPTERA	Pergidae	Gn.sp.		0	1	1	2
HYMENOPTERA	Sphecidae	spotted wing		0	0	1	1
HYMENOPTERA	Thinnidae	Gn.sp.		0	2	0	2
HYMENOPTERA	Chrysididae	*Stilbum* sp.		1	0	0	1
ISOPTERA	Family?	Gn.sp.		0	0	9	9
LEPIDOPTERA	Family?	larva	1	4	2	5	12
LEPIDOPTERA	Limacodidae	*Doratifera quadriguttata*		1	0	0	1
LEPIDOPTERA	Hepialidae	*Trictena ?atripalpis*		1	0	0	1
LEPIDOPTERA	Arctiidae	*Spilosoma glatignyi*		0	4	0	4
MANTODEA	Mantidae	Gn.sp.		0	0	1	1
MANTODEA	Mantidae	Paraoxylinae		0	1	1	2
MANTODEA	Mantidae	*Orthodera ministralis*		0	0	0	0
ORTHOPTERA	Acrididae	*?Peakesia* sp.	1	3	1	0	5
ORTHOPTERA	Acrididae	*Acrididae* Gn.sp.		4	1	2	7
ORTHOPTERA	Acrididae	*Goniaea* sp.	2	2	4	3	11
ORTHOPTERA	Gryllacrididae	Gn.sp.		0	0	2	2
ORTHOPTERA	Gryllacrididae	*Paragryllacris* sp.		0	0	1	1
ORTHOPTERA	Gryllidae	*Eurygryllodes* sp.		0	2	5	7
ORTHOPTERA	Gryllidae	Gn.sp.		1	4	4	9
ORTHOPTERA	Gryllidae	*Lepidogryllus* sp.		0	1	0	1
ORTHOPTERA	Gryllidae	*Teleogryllus* sp.		0	1	0	1
ORTHOPTERA	Gryllidae	Trigoniinae, Gn sp		1	0	0	1
ORTHOPTERA	Myrmecophilidae	*Myrmecophilus* sp.		0	1	2	3
ORTHOPTERA	Pyrgomorphidae	Gn.sp.		1	0	0	1
ORTHOPTERA	Tetrigidae	Gn.sp.		1	0	1	2
ORTHOPTERA	Tettigoniidae	*Hemisaga* sp.		2	0	1	3
ORTHOPTERA	Tettigoniidae	Tettigoniidae Gn.sp.	1	0	0	0	1
THYSANURA	Lepismatidae	brown species		2	6	0	8
THYSANURA	Lepismatidae	*Ctenolepisma* sp.		0	2	6	8
			29	641	636	356	1556

Part (iii): Insects sorted on ground cover strew %

Order	Family	Highest taxonomic level at which taxa identified	Nil	<10%	10-30%	TOTALS
BLATTODEA	Blaberidae	*Calolampra* sp.	11	15	3	29
BLATTODEA	Blaberidae	*Laxta* sp.	2	4	1	7
BLATTODEA	Blaberidae	*Robshelfordia* sp.	1	0	0	1
BLATTODEA	Blattellidae	blattellid-blue stripe	4	1	1	6
BLATTODEA	Blattellidae	blattellid-ylw stripe	1	5	0	6
BLATTODEA	Blattidae	*Platyzosteria circumducta*	0	2	0	2
BLATTODEA	Blattidae	*Platyzosteria* sp.	3	4	0	7
COLEOPTERA	Family?	orange and green	0	1	0	1
COLEOPTERA	Family?	larva	4	7	0	11
COLEOPTERA	Bostrichidae	*Bostrychopsis jesuita*	1	0	0	1
COLEOPTERA	Bostrichidae	*Xylion* sp.	1	3	0	4
COLEOPTERA	Buprestidae	*Castiariana* sp.	0	1	0	1
COLEOPTERA	Carabidae	*Carenum* blue	19	7	0	26
COLEOPTERA	Carabidae	*Carenum* thin blue	1	3	3	7
COLEOPTERA	Carabidae	*Cerotalis* sp.	1	1	0	2
COLEOPTERA	Carabidae	*Gnathoxys* sp.	1	0	0	1
COLEOPTERA	Carabidae	*Hypapharax* sp.	0	2	0	2
COLEOPTERA	Carabidae	*Neocarenum* sp.	5	0	0	5
COLEOPTERA	Carabidae	*Notagonum* sp.	4	10	0	14
COLEOPTERA	Carabidae	*Philoscaphus* sp.	2	0	0	2
COLEOPTERA	Carabidae	*Secatophus australis*	26	46	5	77
COLEOPTERA	Carabidae	*Simodontus australis*	2	6	2	10
COLEOPTERA	Cerambycidae	Laminine	0	0	1	1
COLEOPTERA	Chrysomelidae	*Augomela hypochalcea*	0	1	0	1
COLEOPTERA	Chrysomelidae	*?Aporocera*=gr/or	2	0	0	2
COLEOPTERA	Curculionidae	small	5	5	0	10
COLEOPTERA	Curculionidae	*Cryptorhynchinae*	0	1	1	2
COLEOPTERA	Curculionidae	*?Sclerorhinus*	8	19	2	29
COLEOPTERA	Curculionidae	*Prypnus* sp.	0	0	0	0
COLEOPTERA	Curculionidae	*Catasarcus impressipennis*	3	1	0	4
COLEOPTERA	Curculionidae	*Acantholophus* sp.	1	1	0	2
COLEOPTERA	Curculionidae	*Leptopius* sp.	2	0	0	2
COLEOPTERA	Elateridae	*?Agrypnus* sp.	1	2	3	6
COLEOPTERA	Elateridae	*Conoderus* sp. 40mm	1	0	0	1
COLEOPTERA	Elateridae	*Conoderus* sp.near	3	0	0	3
COLEOPTERA	Nitidulidae	*Carpophilus* sp.	1	0	0	1
COLEOPTERA	Scarabaeidae	hairy and small	0	1	0	1
COLEOPTERA	Scarabaeidae	*Phyllotocus* sp.	0	1	0	1
COLEOPTERA	Scarabaeidae	*Colpolchila* sp.	1	0	0	1
COLEOPTERA	Scarabaeidae	*Cryptodus* sp.	0	1	0	1
COLEOPTERA	Scarabaeidae	Gn sp.	2	2	0	4
COLEOPTERA	Scarabaeidae	*Heteronyx* sp.(near)	13	5	2	20
COLEOPTERA	Scarabaeidae	*Lepanus loftyensis* PT	1	41	0	42
COLEOPTERA	Scarabaeidae	*Liparetrus* sp.	2	0	0	2
COLEOPTERA	Scarabaeidae	*Onthophagus gazella*	1	12	1	14
COLEOPTERA	Scarabaeidae	*Phyllotocus rufipennis*	8	0	0	8
COLEOPTERA	Scarabaeidae	*Scitala* sp.	1	1	0	2
COLEOPTERA	Staphylinidae	Gn sp.	21	19	16	56
COLEOPTERA	Tenebrionidae	*Adelium brevicorne*	16	2	0	18
COLEOPTERA	Tenebrionidae	*Adelium* sp.	4	2	0	6
COLEOPTERA	Tenebrionidae	*Cardiothorax* sp.	5	1	0	6
COLEOPTERA	Tenebrionidae	*Celibe adewahni*	1	1	0	2
COLEOPTERA	Tenebrionidae	*Celibe australis*	17	12	0	29
COLEOPTERA	Tenebrionidae	*Ecnolagria rufescens*	1	0	0	1
COLEOPTERA	Tenebrionidae	*Helea* sp.	4	0	0	4
COLEOPTERA	Tenebrionidae	*Metistete omophloides*	0	4	0	4
COLEOPTERA	Tenebrionidae	*Saragus interrruptus*	6	21	1	28
COLEOPTERA	Carabidae	*Dyschirus* sp.	2	1	0	3
COLEOPTERA	Tenebrionidae	*Seirotrana* sp.near	0	1	0	1
COLEOPTERA	Dermestidae	juvenile	4	0	0	4
DERMAPTERA	Forficulidae	*Forficula* sp.	88	67	4	159
HEMIPTERA	Aradidae	Gn.sp.	1	0	0	1
HEMIPTERA	Cicadidae	Gn.sp.	0	2	1	3

Order	Family	Highest taxonomic level at which taxa identified	Nil	<10%	10-30%	TOTALS
HEMIPTERA	Coccidae	Gn.sp.	0	1	0	1
HEMIPTERA	Cydnidae	*Adrisa* sp	30	7	0	37
HEMIPTERA	Jassidae	Gn.sp.	8	14	4	26
HEMIPTERA	Lygaeidae	Gn.sp.	5	3	0	8
HEMIPTERA	Notonectidae	*Anisops* sp.near	0	1	0	1
HEMIPTERA	Pentatomidae	*Kapunda troughtoni*	1	0	0	1
HEMIPTERA	Pentatomidae	Gn sp	5	2	0	7
HEMIPTERA	Psyllidae	Gn.sp.	2	1	0	3
HEMIPTERA	Reduviidae	*Oncocephalus* sp.	1	8	3	12
HEMIPTERA	Reduviidae	*Ptilocnemus* sp.	1	0	0	1
HEMIPTERA	Reduviidae	*Agylla* sp.	0	1	0	1
HEMIPTERA	Reduviidae	*Ptilocnemus pallidus*	1	0	0	1
HEMIPTERA	Reduviidae	Gn.sp.	2	1	0	3
HEMIPTERA	Reduviidae	Emesiinae, Gn sp	1	4	0	5
HEMIPTERA	Scutelleridae	*Choerocoris paganus*	0	4	2	6
COLLEMBOLA	Entomobryidae	Gn.sp.	188	349	22	559
COLLEMBOLA	Poduroidea	Gn.sp.	0	1	20	21
COLLEMBOLA	Sminthuridae	Gn.sp.	1	7	2	10
HYMENOPTERA	Family?	Native bee	5	1	1	7
HYMENOPTERA	Apidae	*Apis mellifera*	1	2	0	3
HYMENOPTERA	Ichneumonidae	*Netelia* sp	0	0	0	0
HYMENOPTERA	Mutillidae	Gn.sp.	15	14	0	29
HYMENOPTERA	Pergidae	Gn.sp.	1	1	0	2
HYMENOPTERA	Sphecidae	spotted wing	0	1	0	1
HYMENOPTERA	Thinnidae	Gn.sp.	2	0	0	2
HYMENOPTERA	Chrysididae	*Stilbum* sp.	0	1	0	1
ISOPTERA	Family?	Gn.sp.	0	9	0	9
LEPIDOPTERA	Family?	larva	2	10	0	12
LEPIDOPTERA	Limacodidae	*Doratifera quadriguttata*	0	0	1	1
LEPIDOPTERA	Hepialidae	*Trictena ?atripalpis*	0	0	1	1
LEPIDOPTERA	Arctiidae	*Spilosoma glatignyi*	4	0	0	4
MANTODEA	Mantidae	Gn.sp.	0	1	0	1
MANTODEA	Mantidae	Paraoxylinae	1	1	0	2
MANTODEA	Mantidae	*Orthodera ministralis*	0	0	0	0
ORTHOPTERA	Acrididae	*?Peakesia* sp.	1	4	0	5
ORTHOPTERA	Acrididae	Acrididae Gn.sp.	1	5	1	7
ORTHOPTERA	Acrididae	*Goniaea* sp.	4	5	2	11
ORTHOPTERA	Gryllacrididae	Gn.sp.	0	2	0	2
ORTHOPTERA	Gryllacrididae	*Paragryllacris* sp.	0	1	0	1
ORTHOPTERA	Gryllidae	*Eurygryllodes* sp.	2	5	0	7
ORTHOPTERA	Gryllidae	Gn.sp.	4	5	0	9
ORTHOPTERA	Gryllidae	*Lepidogryllus* sp.	1	0	0	1
ORTHOPTERA	Gryllidae	*Teleogryllus*	1	0	0	1
ORTHOPTERA	Gryllidae	Trigoniinae, Gn sp	0	1	0	1
ORTHOPTERA	Myrmecophilidae	*Myrmecophilus* sp.	1	2	0	3
ORTHOPTERA	Pyrgomorphidae	Gn.sp.	0	1	0	1
ORTHOPTERA	Tetrigidae	Gn.sp.	0	2	0	2
ORTHOPTERA	Tettigoniidae	*Hemisaga* sp.	0	2	1	3
ORTHOPTERA	Tettigoniidae	*Tettigoniidae* Gn.sp.	0	1	0	1
THYSANURA	Lepismatidae	brown species	6	2	0	8
THYSANURA	Lepismatidae	*Ctenolepisma* sp.	2	6	0	8
			636	916	110	1556

Part (iv): Insects sorted on soil type

Order	Family	Highest taxonomic level at which taxa identified	clay loam	clay loam, sandy	clayey sand	light medium clay	loam	loamy sand	Med-ium clay	sand	sandy clay loam	sandy loam	TOT-ALS
BLATTODEA	Blaberidae	*Calolampra* sp.	3		1	3	2	4		3	5	8	29
BLATTODEA	Blaberidae	*Laxta* sp.	2			1	2	1				1	7
BLATTODEA	Blaberidae	*Robshelfordia* sp.								1			1
BLATTODEA	Blattellidae	blattellid-blue stripe	2							4			6
BLATTODEA	Blattellidae	blattellid-ylw stripe		1		1					2	2	6
BLATTODEA	Blattidae	*Platyzosteria circumducta*			1	1							2
BLATTODEA	Blattidae	*Platyzosteria* sp.	1	1	2	1					1	1	7
COLEOPTERA	Family?	orange and green			1								1
COLEOPTERA	Family?	larva	6	1			1				1	2	11
COLEOPTERA	Bostrichidae	*Bostrychopsis jesuita*	1										1
COLEOPTERA	Bostrichidae	*Xylion* sp.		1		1					1	1	4
COLEOPTERA	Buprestidae	*Castiariona* sp.						1					1
COLEOPTERA	Carabidae	*Carenum* blue			6			5		12		3	26
COLEOPTERA	Carabidae	*Carenum* thin blue	1		1			3			1	1	7
COLEOPTERA	Carabidae	*Cerotalis* sp.								2			2
COLEOPTERA	Carabidae	*Gnathoxys* sp.										1	1
COLEOPTERA	Carabidae	*Hypapharax* sp.										2	2
COLEOPTERA	Carabidae	*Neocarenum* sp.			1			3				1	5
COLEOPTERA	Carabidae	*Notagonum* sp.	3	1					3	1	1	5	14
COLEOPTERA	Carabidae	*Philoscaphus* sp.								2			2
COLEOPTERA	Carabidae	*Secatophus australis*	14	3	7	1	2	7	3	6	10	24	77
COLEOPTERA	Carabidae	*Simodontus australis*							3	1	6		10
COLEOPTERA	Cerambycidae	Laminine									1		1
COLEOPTERA	Chrysomelidae	*Augomela hypochalcea*									1		1
COLEOPTERA	Chrysomelidae	*?Aporocera*=gr/or							1			1	2
COLEOPTERA	Curculionidae	small	2					1		1		6	10
COLEOPTERA	Curculionidae	Cryptorhynchinae							1		1		2
COLEOPTERA	Curculionidae	*?Sclerorhinus*	11		1			3	4		4	6	29
COLEOPTERA	Curculionidae	*Prypnus* sp.											0
COLEOPTERA	Curculionidae	*Catasarcus impressipennis*								4			4
COLEOPTERA	Curculionidae	*Acantholophus* sp.							1		1		2
COLEOPTERA	Curculionidae	*Leptopius* sp.								1		1	2
COLEOPTERA	Elateridae	*?Agrypnus* sp.						3	2		1		6
COLEOPTERA	Elateridae	*Conoderus* sp. 4 mm						1					1
COLEOPTERA	Elateridae	*Conoderus* sp.near								3			3
COLEOPTERA	Nitidulidae	*Carpophilus* sp.	1										1
COLEOPTERA	Scarabaeidae	hairy and small			1								1
COLEOPTERA	Scarabaeidae	*Phyllotocus* sp.			1								1
COLEOPTERA	Scarabaeidae	*Colpolchila* sp.	1										1
COLEOPTERA	Scarabaeidae	*Cryptodus* sp.									1		1
COLEOPTERA	Scarabaeidae	Gn sp.	1						1		2		4
COLEOPTERA	Scarabaeidae	*Heteronyx* sp.(near)	1		2			1		8	3	5	20
COLEOPTERA	Scarabaeidae	*Lepanus loftyensis* PT										42	42
COLEOPTERA	Scarabaeidae	*Liparetrus* sp.			1							1	2
COLEOPTERA	Scarabaeidae	*Onthophagus gazella*	12						1			1	14
COLEOPTERA	Scarabaeidae	*Phyllotocus rufipennis*			6	1						1	8
COLEOPTERA	Scarabaeidae	*Scitala* sp.									1	1	2
COLEOPTERA	Staphylinidae	Gn sp.	23	4	1		1		2		9	16	56
COLEOPTERA	Tenebrionidae	*Adelium brevicorne*						3		11		4	18
COLEOPTERA	Tenebrionidae	*Adelium* sp.			1					2	1	2	6
COLEOPTERA	Tenebrionidae	*Cardiothorax* sp.	4						1		1		6
COLEOPTERA	Tenebrionidae	*Celibe adewahni*	1							1			2
COLEOPTERA	Tenebrionidae	*Celibe australis*	2		3		1	2	1	11	2	7	29
COLEOPTERA	Tenebrionidae	*Ecnolagria rufescens*	1										1
COLEOPTERA	Tenebrionidae	*Helea* sp.								4			4
COLEOPTERA	Tenebrionidae	*Metistete omophloides*										4	4
COLEOPTERA	Tenebrionidae	*Saragus interrruptus*	4	1	2	12		2			1	6	28
COLEOPTERA	Carabidae	*Dyschirus* sp.	2								1		3
COLEOPTERA	Tenebrionidae	*Seirotrana* sp.near							1				1

Order	Family	Highest taxonomic level at which taxa identified	clay loam	clay loam, sandy	clayey sand	light medium clay	loam	loamy sand	Med-ium clay	sand	sandy clay loam	sandy loam	TOT-ALS
COLEOPTERA	Dermestidae	juvenile								3		1	4
DERMAPTERA	Forficulidae	*Forficula* sp.	28	3	16		6	17	8	38	21	22	159
HEMIPTERA	Aradidae	Gn.sp.										1	1
HEMIPTERA	Cicadidae	Gn.sp.	1					1				1	3
HEMIPTERA	Coccidae	Gn.sp.				1							1
HEMIPTERA	Cydnidae	*Adrisa* sp.		1				5		19	3	9	37
HEMIPTERA	Jassidae	Gn.sp.	13	2	1				1	3	4	2	26
HEMIPTERA	Lygaeidae	Gn.sp.	1					1		2	1	3	8
HEMIPTERA	Notonectidae	*Anisops* sp.near			1								1
HEMIPTERA	Pentatomidae	*Kapunda troughtoni*										1	1
HEMIPTERA	Pentatomidae	Gn sp	3							3		1	7
HEMIPTERA	Psyllidae	Gn.sp.	1									2	3
HEMIPTERA	Reduviidae	*Oncocephalus* sp.	2		7			2				1	12
HEMIPTERA	Reduviidae	*Ptilocnemus* sp.								1			1
HEMIPTERA	Reduviidae	*Agylla* sp.			1								1
HEMIPTERA	Reduviidae	*Ptilocnemus pallidus*								1			1
HEMIPTERA	Reduviidae	Gn.sp.								2		1	3
HEMIPTERA	Reduviidae	Emesiinae, Gn sp.			1	1					2	1	5
HEMIPTERA	Scutelleridae	*Choerocoris paganus*	1		2					1	2		6
COLLEMBOLA	Entomobryidae	Gn.sp.	72	7	22	6	4	99	5	60	203	81	559
COLLEMBOLA	Poduroidea	Gn.sp.	1					20					21
COLLEMBOLA	Sminthuridae	Gn.sp.	2		1			2			4	1	10
HYMENOPTERA	Family?	Native bee			1	1				3	2		7
HYMENOPTERA	Apidae	*Apis mellifera*			1	1						1	3
HYMENOPTERA	Ichneumonidae	*Netelia* sp.											0
HYMENOPTERA	Mutillidae	Gn.sp.	2		2				2	6	6	11	29
HYMENOPTERA	Pergidae	Gn.sp.								1		1	2
HYMENOPTERA	Sphecidae	spotted wing			1								1
HYMENOPTERA	Thinnidae	Gn.sp.										2	2
HYMENOPTERA	Chrysididae	*Stilbum* sp.			1								1
ISOPTERA	Family?	Gn.sp.	6		1		2						9
LEPIDOPTERA	Family?	larva	2		2	1	1				3	3	12
LEPIDOPTERA	Limacodidae	*Doratifera quadriguttata*									1		1
LEPIDOPTERA	Hepialidae	*Trictena ?atripalpis*						1					1
LEPIDOPTERA	Arctiidae	*Spilosoma glatignyi*	3						1				4
MANTODEA	Mantidae	Gn.sp.			1								1
MANTODEA	Mantidae	Paraoxylinae			1							1	2
MANTODEA	Mantidae	*Orthodera ministralis*											0
ORTHOPTERA	Acrididae	*?Peakesia* sp.									4	1	5
ORTHOPTERA	Acrididae	Acrididae Gn.sp.			1			1		1	1	3	7
ORTHOPTERA	Acrididae	*Goniaea* sp.	2					2		1	3	3	11
ORTHOPTERA	Gryllacrididae	Gn.sp.										2	2
ORTHOPTERA	Gryllacrididae	*Paragryllacris* sp.									1		1
ORTHOPTERA	Gryllidae	*Eurygryllodes* sp.			4				1	2			7
ORTHOPTERA	Gryllidae	Gn.sp.			2			1		3	1	2	9
ORTHOPTERA	Gryllidae	*Lepidogryllus* sp.								1			1
ORTHOPTERA	Gryllidae	*Teleogryllus* sp.								1			1
ORTHOPTERA	Gryllidae	Trigoniinae, Gn. sp.				1							1
ORTHOPTERA	Myrmecophilidae	*Myrmecophilus* sp.						1		2			3
ORTHOPTERA	Pyrgomorphidae	Gn.sp.									1		1
ORTHOPTERA	Tetrigidae	Gn.sp.	1									1	2
ORTHOPTERA	Tettigoniidae	*Hemisaga* sp.						2				1	3
ORTHOPTERA	Tettigoniidae	Tettigoniidae Gn.sp.									1		1
THYSANURA	Lepismatidae	brown species			1			1		2	1	3	8
THYSANURA	Lepismatidae	*Ctenolepisma* sp.			1					7			8
			265	39	111	57	26	196	50	241	329	348	1556

APPENDIX XXVI

FLIES (ORDER DIPTERA) SORTED BY ORDER AND FAMILY AND THE FREQUENCY AT WHICH THEY WERE RECORDED WITHIN EACH (I) VEGETATION STRUCTURAL FORMATION AND (II) SOIL TYPE.

Part (i): Flies sorted on Vegetation Structural Formation

	Shrub-land	Low mallee	Mallee	Open mallee	Low open forest	Open forest	Very low open forest	Low wood-land	Wood-land	TOTALS
Anisopodidae			1		0	1		0	6	8
Anthomyiidae				1	0	0		0	0	1
Asilidae		1			0	0		0	0	1
Bibionidae					0	0		0	1	1
Calliphora augur					1	2		0	0	3
Calliphora dubia			1	1	0	1		0	0	3
Cecidomyiidae			5	4	6	20		5	10	37
Chloropidae	2	2		2	6	2	1	8	2	25
Dolichopodidae	1			1	12	2	3	10	5	34
Drosophilidae				1	0	0		0	0	1
Empididae					0	4		1	0	5
Ephydridae					1	0		0	0	1
Lauxaniidae	1				0	0		0	1	2
Muscidae	5		12	2	11	1		12	5	48
Mycetophilidae					0	1		0	0	1
Phoridae			2	5	10	31	2	11	37	98
Psychodidae				1	0	0		0	3	4
Pyrgotidae					0	1		0	0	1
Sciaridae			2	1	1	11		10	10	35
Sphaeroceridae	1		8	7	7	17	1	4	10	55
Tabanidae	1				0	0		0	2	3
Tachinidae					1	0		0	0	1
Tanyderidae			1		0	0		0	0	1
Tipulidae					0	1		0	0	1
TOTALS	**11**	**3**	**32**	**39**	**82**	**126**	**7**	**66**	**105**	**471**

Part (ii): Flies sorted on soil type

Family	clay loam	clay loam, sandy	clayey sand	light medium clay	loam	loamy sand	medium clay	sand	sandy clay loam	sandy loam	Totals
Anisopodidae	6			1						1	8
Anthomyiidae			1								1
Asilidae								1			1
Bibionidae	1										1
Calliphora augur			1						2		3
Calliphora dubia								1	2		3
Cecidomyidae	13	3	4	3		3			8	5	37
Chloropidae	2		1		2	2		7		4	18
Dolichopodidae	2		1	1		11		1	8	10	34
Drosophilidae								1			1
Empididae	2	1	1				1				5
Ephydridae					1		1		1	1	4
Lauxaniidae								1	1		2
Muscidae	12		2	1		8		5	14	6	48
Mycetophilidae							1				1
Phoridae	34	12	7	5	5	3	4	1	16	18	98
Psychodidae	3							1			4
Pyrgotidae	1										1
Sciaridae	7	2		1	3	5			11	6	35
Sphaeroceridae	15	9	12	3	1	3	3		5	6	46
Tabanidae			10						2		12
Tachinidae	1										1
Tanyderidae									1		1
Tipulidae					1						1
Totals	**123**	**38**	**49**	**15**	**13**	**39**	**10**	**23**	**96**	**65**	**471**

APPENDIX XXVII

NON-INSECTS SORTED BY FAMILY AND THE FREQUENCY AT WHICH THEY WERE RECORDED WITHIN EACH (I) VEGETATION STRUCTURAL FORMATION; (II) SURFACE COVER STREW SIZE; (III) SURFACE COVER STREW % AND (IV) SOIL TYPE. TABLE INCLUDES MITES BUT EXCLUDES OTHER ARACHNIDS.

Part (i): Non-insects sorted on structural formation

Family	Common Name	Low open forest	Low woodland	Mallee	Open forest	Open mallee	Shrub-land	Tall shrub-land	Very low open forest	Woodland	TOTALS
Acarina	mite		3			1					4
Acarina	mite erythraeid	1	2		2		5			2	12
Crustacea	amphipod		1		19			1		24	45
Crustacea	Slater	1	1		6					7	15
Myriapoda	Centipede - not blue	1			2				1		4
Myriapoda	Centipede - *Scutigera*				1					3	4
Myriapoda	Centipede - blue	6	2		2	3			1	3	17
Myriapoda	Millepede - *Ommatoiulus moreletii*	27	98	2	50	13			8	54	252
Myriapoda	Millipede - native	1	6	1	7	17	1	5		2	40
Gastropoda	Snail - *Cupedora bednalli*		3		2	1				4	10
Oligochaeta	worm			5	6	1				1	13
		37	**116**	**8**	**97**	**37**	**6**	**6**	**10**	**103**	**416**

Part (ii): Non-insects sorted on surface cover strew size

Family	Common Name	boulder (gt 250mm)	cobble (51-250mm)	none apparent	pebble (5-50mm)	TOTALS
Acarina	mite	0	3	0	1	4
Acarina	mite erythraeid	2	3	7	0	12
Crustacea	amphipod		7	38	0	45
Crustacea	Slater	2	7	4	2	15
Myriapoda	Centipede - not blue	0	1	2	1	4
Myriapoda	Centipede - *Scutigera*	0	4	0	0	4
Myriapoda	Centipede -blue	0	11	2	4	17
Myriapoda	Millipede - :*Ommatoiulus moreletii*	0	125	106	21	252
Myriapoda	Millipede - native	1	11	7	21	40
Gastropoda	Snail - *Cupedora bednalli*	1	8	0	1	10
Oligochaeta	worm		4	1	8	13
	TOTALS	**9**	**185**	**167**	**59**	**416**

Part (iii): Non-insects sorted on surface cover strew %

Family	Common Name	Nil	<10%	10-30%	<10%	Totals
Acarina	mite	0	0	3	1	4
Acarina	mite erythraeid	7	4	1	0	12
Crustacea	amphipod	38	7	0	0	45
Crustacea	Slater	4	8	1	2	15
Myriapoda	Centipede - not blue	2	1	0	1	4
Myriapoda	Centipede - *Scutigera*	0	4	0	0	4
Myriapoda	Centipede -blue	2	9	2	4	17
Myriapoda	Millipede - *Ommatoiulus moreletii*	106	116	9	21	252

Family	Common Name	Nil	<10%	10-30%	<10%	Totals
Myriapoda	Millipede - native	7	11	1	21	40
Gastropoda	Snail - *Cupedora bednalli*	0	7	2	1	10
Oligochaeta	worm	1	4	0	8	13
	Totals	**167**	**174**	**20**	**59**	**416**

Part (iv): Non-insects sorted on soil type

Family	Common Name	clay loam	clay loam, sandy	clayey sand	light med-ium clay	loam	loamy sand	Med-ium clay	sand	sandy clay loam	sandy loam	TOTALS
Acarina	mite			1			3					4
Acarina	mite erythraeid	1			1		1	1	5	3		12
Crustacea	amphipod	24		1	6			13	1			45
Crustacea	Slater	5	4			1				4	1	15
Myriapoda	Centipede - not blue	1				1	1			1		4
Myriapoda	Centipede - *Scutigera*	3			1							4
Myriapoda	Centipede - blue	2	1	4		1	2			6	1	17
Myriapoda	Millipede - *Ommatoiulus moreletii*	50	3	18	3	4	19	6	16	4	129	252
Myriapoda	Millipede - native	19	4	2		2	1		6	3	3	40
Gastropoda	Snail - *Cupedora bednalli*	2		1	2		2			1	2	10
Oligochaeta	worm	7		1	3			1			1	13
	Totals	**114**	**12**	**28**	**16**	**9**	**30**	**21**	**28**	**25**	**137**	**416**

APPENDIX XXVIII

LOCATION OF AQUATIC MACRO-INVERTEBRATE SITES AND HABITATS SAMPLED IN THE MT. LOFTY RANGES.

Habitats: R=Riffle, E=Edge, M=Macrophyte, P=Pool, NS= not sampled

LOCATION			HABITATS	DATE	DATE	DATE
1994/95	EASTING	NORTHING	AUT94	SPR94	AUT95	SPR95
Dog Trap Ck (The Deep Ck), Dog Trap Rd	246350	6056850	E, R, M	E, M	E, M	E, M
The Deep Ck at culvert on access track	249550	6054000	E, R	E, R	E, R	E, R
The Deep Ck at Waterfall on Heyson Trail	249050	6051900	E, R	E, R	E, R	E, R
Yankalilla Ck on Parawa Rd	263400	6065900	M	M	DRY	M
Yankalilla Ck on Hay Flat Rd	257950	6068900	E, M	E, M	E, R	E, R
Yankalilla Ck off Main South Rd	254750	6071150	E, R, M	E, R, M	E, M	E, R, M
Congeratinga Ck	249800	6065050	E, R	P	DRY	DRY
Coolawang Ck, Mt Scrub Rd	267450	6057200	E, R	E, R	E, R	E, R
Waitpinga Ck, Waitpinga Rd	272800	6055950	E, M	M	E, R	R, M
Inman R, Glacier Rock	274200	6069000	E, R	E, R	E, R	E, R, M
Inman R, Sawpit Rd	277000	6068300	E, M, P	E, M, P	E, M	E, M
Inman River D/S STW	283000	6063000	M	M	M	E, M
Hindmarsh River GS 501500	280900	6072300	E, R	E, R	E, R	E, R
Myponga River, Dodd Rd	276150	6086400	M	E, M	E, M	E, M
Myponga River GS 502502	270700	6081650	M	E, M	E, M	E, M
Cox Ck Uraidla GS 503526	293150	6127400	M	M	M	M
Aldgate Ck Aldgate GS 503509	292850	6122850	E, R	R	E, R	E, R
Lenswood Ck GS 503507	301050	6131900	E, R	E, R	E	E, R
Inverbrachie Ck-Woodside	306450	6128750	E	E	E	E, M
Onkaparinga R at Hahndorf (u/s Hahndorf Ck)	298300	6122350	E, R	E, R	E, R	E, R, M
Echunga Ck GS 503506	292800	6110250	E, PR	E, R	E, R	E
Scotts Ck, near Scotts Bottom GS 503502	287850	6113450	E, R	E, R	E, R	E, R
Onkaparinga R Noarlunga GS 503522	272750	6104200	E	E, M	E	E
Sturt R U/S Minno Ck Jcn GS 504518	283250	6120350	E, R	E, R	E, R	E, R
Minno Ck U/S Sturt R Jcn GS 504519	283150	6120400	DRY	E, R	E	E
Brownhill Ck	285850	6125850	E, R	E, R	E, R	E
Sturt R Sturt Rd	277350	6122100	E, M	E, M	E, M	E, M
Torrens R, d/s Mt Pleasant	317350	6147800	E, R	E, R, M	E, R, M	E, R
Torrens R, Poplar Grove	309850	6144200	R	E, R	E, R	E, R
Kersbrook Ck GS 504525	301900	6145800	DRY	E, R	P	E
First Ck, Waterfall Gully	288100	6127700	E, R	E, R	E, R	E, R
Sixth Ck Castambul GS 504523	294450	6138900	E, R	E, R	E, R	E, R
Torrens R Silkes Rd Ford	288150	6139150	E, R	E, R, M	E, R, M	E, R, M
Torrens R. Windsor Gve	285000	6137650	E, R	E, R	E, R, M	E, R, M
Torrens R South Rd	277300	6133800	E, R	E, R	E, R	E, R
Torrens R Tapleys Hill Rd	273200	6131550	E, R	E, R	E, R	E
Little Para R D/S dam	291000	6151550	M	E, M	E, M	M
North Para R, Penrice D/S GS 505517	320000	6184700	DRY	P	DRY	E, R
Jacob Ck, Rowland Flat	311000	6173150	P	E	E	E
North Para R Rowland Flat	309650	6172350	E, R	E, R, M	E, R, M	E, R, M
North Para R , Rosedale	302300	6174050	E, R	E, R	E, R, M	E, R, M
South Para R SE Gawler	293400	6168400	DRY	E, M	DRY	E, M
Gawler R Gawler Jcn GS 505505	292350	6168950	DRY	E	P	E, M
Meadows Ck, Tynan Rd	288575	6098700	E, R	E, R, M	E	E, R, M
Blackfellow Ck	288400	6090525	E, R	E, M	E	E
Finniss R. E of Yundi at ford	287950	6088650	E, R	E, R, M	E, R, M	E, M
Finniss R Braeside Rd	297850	6085625	E, R	E, R	E, R	E, R
Tookayerta Ck Cleland Gully Rd S5	286300	6082900	E, R, R	E, R	E, R	E, R

LOCATION			HABITATS	DATE	DATE	DATE
Nangkita Ck N7	291075	6083675	M	R	M	E, R
Tookayerta Ck S7	291050	6083525	M	R	M	E, R
Currency Ck Stuarts Bridge	292950	6075700	E, R	E	E	E
1997	**EASTING**	**NORTHING**	**AUT97**	**SPR97**		
Hindmarsh River GS 501500	280900	6072300	E,R	E,R		
Hindmarsh River, d/s Adventure Park at Footbridge	284500	6065400	E	E		
Myponga River GS 502502	270700	6081700	E	E,M		
Myponga River, d/s Myponga Reservoir	265300	6079400	E, R	E		
Scotts Ck, Scotts Bottom GS 503502	287900	6113200	E,R	E,R		
Baker Gully, GS 503503	281600	6108700	E, R	E,R		
Leslie Creek, Strathalbyn Rd, Mylor	295600	6120000	E	E		
Aldgate Creek, Strathalbyn Rd, Mylor	295650	6120100	E, R	E,R		
Onkaparinga River, Onkaparinga Valley Rd, Verdun	298600	6123700	E	E,R		
Onkaparinga River, d/s Onkaparinga-Murray Pipeline	298050	6121400	E	E		
Onkaparinga River, Houlgraves, GS 503504	292400	6115300	E, R	E,R		
Onkaparinga River, u/s Clarendon Oval	283800	6111700	E	E		
Onkaparinga River, u/s Brooks Rd Ford	281700	6108850	E	E,R		
Hahndorf Creek, d/s Hahndorf WWTP	299400	6122600	E	E		
Creek on Beaumonts Rd, N of Verdun	298300	6124600	E, R	E,R		
Cox Creek, in Engelbrecht Reserve	295850	6122150	E, R	E,R		
Cox Creek, Bridgewater Mill	295400	6123400	E, R	E,R		
Unnamed creek flows into Happy Valley Reservoir	279400	6116250	E	E		
Heathfield Creek, d/s Heathfield WWTP	289900	6121850	R	R		
Sturt River, Coromandel Parade, Coromandel Valley	282250	6118900	E, R	E,R		
Sturt River, u/s Flood Control Dam, GS 504530	280000	6119550	E, R	E,R		
Sturt River, end of Riverside Dv, Bedford Park	277600	6120750	E, R	E,R		
Chambers Creek, Coromandel Valley, GS 504521	282900	6118250	E, R	E,R		
Deep Creek, Knott's Hill Rd	296050	6132550	E, R	E,R		
First Creek, ds Botanic Gardens	281200	6133500	E	E,R		
Second Creek, Michael Perry Reserve	287500	6131100	E, R	E,R		
Fourth Creek, opp. Colonial Dve	292000	6134000	E	E		
Fifth Creek, George St, Paradise	288800	6138950	E, R	E		
Cudlee Creek, GS 504524	301500	6142200	E	E,R		
Torrens R, Carnell Boulevard	317300	6147800	DRY	E,R		
First Ck, Waterfall Gully	288100	6127700	E,R	E,R		
Torrens River, d/s Mt Pleasant (SAFGA rd)	319750	6149250	E, R	E,R		
Torrens River, Warren Rd, Birdwood	312100	6145600	E, R	E,R		
Torrens River, d/s Angas Creek	311450	6144500	E, R	E,R		
Torrens River, d/s Kangaroo Creek Reservoir	296000	6139400	E, R	E,R		
Torrens River, d/s Gorge Weir	291500	6140000	E, R	E		
Torrens River, u/s Lower North East Rd	287600	6138900	E, R	E,M		
Torrens River, Hackney Bridge	281750	6134300	E, R	E		
Torrens River, Torrens Lake nr University Footbridge	281000	6133450	E	E		
Torrens River, Hindmarsh Bridge	278550	6134300	E, R	E		
Millbrook Creek, d/s reservoir	299100	6142400	E	E		
Dry Creek, Oratanga Rd, Modbury Nth	289000	6144200	E	E,R		
Dry Creek, Conway Crescent	287150	6142050	E, R	E,R		
Dry Creek, u/s Walkley's Rd	284600	6141800	E, R	E,R		
Dry Creek, The Levels, opposite the end of First Avenue	282050	6144650	DRY	E		
Dry Creek, d/s Salisbury Highway	280750	6145900	E	E		
Little Para River, d/s Millbrook Pipeline	296450	6147900	E, R	E,R		
Little Para River, Carisbrooke Reserve, Salisbury Park	287300	6151600	E, R	E,R		
Little Para River, Gawler Street, Salisbury	284300	6151000	E	E		
Cobbler Creek, McEvoy Drive, Salisbury East	286000	6150150	E	DRY		
Gawler River, Virginia Park, GS 505510	274400	6164000	E	E		
Victoria Creek, Williamstown, GS 505522	306500	6160850	E, R	E,R		
Yettie Creek, d/s Whispering Wall	302400	6164400	E, R	E,R		
South Para River, d/s Warren Reservoir	309250	6156900	E, R	E,R		
South Para River, u/s ford & d/s Tenafeate Creek	297600	6162500	E, R	E,R		

LOCATION			HABITATS	DATE	DATE	DATE
Tenafeate Creek, u/s confluence with Sth Para R	297600	6161900	E, R	E,R		
South Para River, Heinrich St, Gawler South	294000	6167650	NS	E,R		
South Para River, Portuguese Bridge	315500	6159400	E	E,R		
Ducks Ponds Creek	322000	6185600	E, R	E,R		
North Para R, Penrice D/S GS 505517	319950	6184750	DRY	E,R		
North Para River, Gawler Park Rd, Angaston	323500	6180450	E	E		
North Para River, d/s Nuriootpa	314700	6182500	E	E		
North Para River, Bethany Rd, Tanunda	311600	6176800	E, R	E,R		
Jacob Creek, GS 505518	313100	6171300	E, R	E,R		
North Para River, Gomersal Rd	304850	6172000	E, R	E,R		
North Para River, Turretfield, GS 505504	295550	6173150	E, R	E,R		
Salt Creek, Turretfield Research Centre	300650	6174350	E, R	E,R		
North Para River, Gawler	293450	6169600	E, R	E,R		
Currency Creek, Currency Ck	296700	6074100	E	E		
Meadows Creek, Wicks Rd	290300	6102700	E	E,M		
Tookayerta Creek, d/s Currency Creek Winery	300500	6078000	M	E		
Tookayerta Creek	294700	6082300	E, R	E,R		
Nangkita Creek, Willowburn Dv off Nangkita Rd	287750	6086000	E, R	E,R		
Finniss R. E of Yundi at ford	288000	6088750	E,M	E		
Finniss River, Winery Rd	302500	6080750	E	E		
Bull Creek, near "The Cliff"	296400	6092750	E	E		
Giles Creek, Signal Flat Rd	300300	6085100	E, R, M	E		
1998	**EASTING**	**NORTHING**	**AUT98**	**SPR98**		
Hindmarsh River GS 501500	280900	6072300	E,R	E,R		
Inman River, Memory Grove	278750	6065250	E, R	E, R		
Duck Nest Creek	274500	6069250	DRY	E		
Myponga River GS 502502	270700	6081700	E,R	E		
Parananacoola Creek, Main Sth Rd, Second Valley	248500	6064800	DRY	DRY		
Yatagolinga Creek near mouth	245400	6064400	E, R	E, R		
Yatagolinga Creek, Main South Rd	247400	6061100	E, R	E, R		
No Where Else Creek	245400	6064100	E, R	E, R		
Blackfellows Creek, Tonto rd	256100	6068000	E, R	E		
Waterfall Creek, Hay Flat Rd	259300	6065000	E, R	E, R		
Myponga R, Rogers Rd	273150	6084200	E, R	E, R		
Panalatinga Ck, Panalatinga Rd bridge	276250	6113850	E	E		
Field River, Reserve near Main South Rd	276400	6115400	E, R	E		
Tributary of Christie Ck, Timothy Rd	274700	6110550	E	E		
Christie Creek, d/s Hardy's Winery, Main South Rd	274250	6110100	DRY	DRY		
Christie Creek, near Panalatinga Rd	276400	6110500	DRY	DRY		
Lenswood Creek, Recreation Park	301400	6133600	E	E		
Spoehr Ck, Old Balhannah mine (Marshall property)	299600	6126250	E, R	E, R		
Spoehr Creek, off Spoehr Rd	300200	6125150	E, R	E, R		
Lenswood Creek, Martins Rd	302450	6127800	E	E		
Wether Station Creek, Wicks Rd	301150	6126350	E	E		
Onkaparinga River, ford on Jungfer Rd	309050	6135350	E	E		
Onkaparinga trib., ford Jungfer and Onk. Valley Rd	309300	6135350	DRY	DRY		
Unnamed branch Onkaparinga River, Springhead	312400	6136550	DRY	DRY		
Inverbrackie Creek, Pfeiffer Rd near Craigbank, 3209)	309000	6130900	DRY	E		
Western Branch Onkaparinga River, Tiers Rd, Woodside	304100	6130550	E	E		
Western Branch Onkaparinga River, Lobethal STP	305500	6134500	E, R	E		
W. Branch Onkaparinga River, near Oakbank Racetrack	303100	6126900	DRY	E		
Onkaparinga River, ford on Oakwood Rd	302900	6126800	E	E		
Hahndorf Creek, Ambleside rd bridge	299500	6122600	E	E		
Onkaparinga R, track off Mt Bold Rd (d/s Mt Bold)	287800	6110600	E, R	E, R		
Cox Creek, W Branch from Piccadilly	292600	6126800	E, R	E, R		
Cox Creek, Mt Lofty Golf Course	293700	6125650	E, R	E, R		
Cox Creek, bridge on Arbury Park Rd Freeway Bridge	294800	6123900	E,R	E, R		
Stirling Park Creek, d/s Woorabinda Dam, Milan Rd	292300	6122600	E	E		
Aldgate Creek, Aldgate Valley Rd	294000	6121300	E, R	E, R		

LOCATION			HABITATS	DATE	DATE	DATE
Onkaparinga River, Hack Bridge, S Mylor	295500	6118850	E	E, R		
Biggs Flat Creek, bridge on Strathalbyn Rd	296100	6117600	E, R	E		
Onkaparinga River, Silver Lake Rd	295200	6116850	E, R	E, R		
Echunga Creek, Kavanagh Rd, SW Echunga	298000	6112650	E	E		
Echunga Ck, Gate 31, Mt Bold Res	294700	6113500	E	E		
Jupiter Ck u/s Echunga Ck	292900	6110200	E	E		
Scotts Ck, Scotts Bottom GS 503502	287900	6113200	E,R	E,R		
Scott Creek, Kurla Lane off Scott Rd	291100	6118800	E, R	E		
Scott Creek, Matthews Rd	288500	6114900	E, R	E, R		
Hadrian Ck above Scott Ck junction	288700	6116250	E, R	E, R		
Torrens R, Carnell Boulevard	317300	6147800	E,R	E,R		
First Ck, Waterfall Gully	288100	6127700	E,R	E,R		
Torrens River, Gumeracha Weir	303300	6144400	E	E		
Torrens River US Gumeracha Weir	305250	6144950	E	E, R		
Torrens River, upstream Kiosk	300300	6142350	E, R	E, R		
Kenton Creek, opp. Gumeracha Effluent Ponds	305990	6144750	E	E, R		
Forreston Creek, Checker Hill Rd	307300	6146750	E	E		
Howard Creek, cnr Adel.-Mannum Rd and Fox Rd	310250	6144400	DRY	E		
Fox Creek us bridge on Cudlee Ck Rd	302650	6140600	E	E, R		
First Creek, Hazelwood Park	285800	6131400	E, R	E, R		
Fourth Creek, Morialta Falls Rd	289900	6135300	E, R	E, R		
?Fourth Creek, Denis Morrissey Park, Hectorville	287250	6136650	E, R	E, R		
Brownhill Creek, northern branch	285500	6126500	E, R	E, R		
Brownhill Creek, middle branch, Elliott property	286500	6125500	E, R	E, R		
Brownhill Creek, below junction all tributaries	284500	6125500	E, R	E, R		
Helps Rd Drain, Pt Wakefield Road	279000	6153800	E	E		
Cobbler Creek, Golden Grove Rd	291450	6148900	DRY	NS		
Smith Creek, Main North Rd	289250	6158200	DRY	NS		
Little Para River, Burton Rd	282100	6150500	E	E		
Little Para River, Moss Rd	285800	6151250	E, R	E, R		
Little Para River, Snake Gully Bridge	294400	6150700	E, R	E, R		
Dry Ck us Wynn Vale dam, off Park Lane Drive	289550	6146750	DRY	E, R		
Dry Ck ds Wynn Vale dam, Grenfell Rd	289400	6146600	E	E		
Dry Ck opp Golf Course Grand Junction Rd	286400	6141500	E, R	E, R		
Dry Ck, reserve opp Royal Ave	282600	6142400	E, R	E, R		
Dry Ck tributary, Mulkarra St	289400	6144700	E	E, R		
South Para river, Humbug Scrub Rd	302600	6160100	DRY	DRY		
South Para River, Mount Rd us Warren Res	312900	6158400	E	E, R		
Malcolm Creek, Kersbrook Rd	305600	6155100	E, R	E, R		
Kangaroo Gully Ck, Willls Hill Rd	307250	6160000	DRY	DRY		
Tanunda Creek, Klinges pool	318600	6173000	E	E		
Tanunda Creek, Gravel Pit Road	318000	6175200	E	E, R		
Tanunda Creek, Bethany Reserve	314700	6175600	E	E, R		
Greenock Creek, Roenfeldt Rd	308980	6183750	E	E		
Walkers Creek, Nurse Rd	300550	6181000	E	E		
Salt Creek, S of Daveyston	301800	6179600	E	E		
North Para R, Penrice D/S GS 505517	319950	6184750	E	E,R		
Gawler R, Heaslip Rd	284100	6165200	DRY	DRY		
Tookayerta Creek, Adelaide Rd	284200	6083700	DRY	DRY		
Finniss R. E of Yundi at ford	288000	6088750	E	E		
Finniss River, Don Bolt's property	284500	6089500	E, R	E, R		
Finniss River, Coles Crossing	291600	6087800	E, R	E, R		
Meadows Creek, Burma Rd	285100	6090250	E	E		
Meadows Creek, 1.5km NE of dingabledinga	286250	6095000	E	E		
Currency Creek, Mosquito Hill Rd	289500	6076900	E, R	E, R		
Creek on Strathalbyn-Currency Ck Rd	304950	6191550	DRY	DRY		
1999	**EASTING**	**NORTHING**	**AUT99**	**SPR99**		
Yohoe Creek, Yohoe Rd	244600	6059400	E,R	E,R		
tributary of Yohoe Creek, Yohoe Rd	244550	6059400	E,R	NS		

LOCATION			HABITATS	DATE	DATE	DATE
Fishery Creek	238750	6053000	E	NS		
Aaron Creek at waterfall	244600	6051500	E,R	NS		
Blowhole Creek at mouth	242400	6050550	E,R	NS		
Deep Creek, Tappanappa Rd	250400	6056400	E	NS		
Myponga River GS 502502	270700	6081650	E	E		
Myponga River, southern branch Barclay Road	270700	6080750	E	E		
Hindmarsh River GS 501500	280900	6072300	E,R	E,R		
tributary of Hindmarsh River, above falls	280400	6075250	E,R	E,R		
Hindmarsh River at Hindmarsh Falls	280500	6075400	E,R	E,R		
Hall Creek, us Inman R	280450	6063700	E,R	E,R		
Scotts Ck, Scotts Bottom GS 503502	287900	6113200	E,R	E,R		
creek on Malpas Rd, W of main South Rd	276650	6096200	E	NS		
tributary of Onkaparinga River, Melsetter Rd	273900	6106700	E	NS		
Peter Creek, near "Brookside"	284600	6107850	E	E		
Bakers Gully, Chapel Hill Rd	283600	6108400	E,R	E,R		
Echunga Creek, McHenery Rd	295100	6112100	E,R	E,R		
Mitchell Creek, Oakbank-Woodside Rd	304650	6127800	E	E		
Torrens R, Carnell Boulevard	317300	6147800	E,R	E,R		
First Ck, Waterfall Gully	288100	6127700	E,R	E,R		
Torrens R, Holbrooks Rd	275900	6133600	E,R	NS		
Torrens River, us Gumeracha Effluent Ponds	306900	6145200	E,R	NS		
Angus Creek, Birdwood-Mt Torrens Rd	313450	6140050	E	NS		
Hannaford Creek, Warren Rd	312250	6146500	E	NS		
Sixth Creek, Valley Rd	295600	6137600	E,R	E,R		
Keswick Creek, Met Station 7	275500	6129750	E	NS		
Brownhill Creek, Mitcham Reserve	282800	6126300	E,R	NS		
Sturt River, Pole Rd	287800	6120900	E	NS		
Sturt River, Sturt Valley Rd	288950	6121600	E,R	NS		
Sturt River, Archibald's Place	283850	6120600	E,R	NS		
Creek at Hub Drive, Happy Valley	280950	6116450	DRY	NS		
Field River, Tripoli Rd	276600	6115600	E	NS		
tributary of Little Para River, Lower Hermitage Rd	295600	6146200	E,R	E,R		
Gould Creek, Goulds Ck Rd	294800	6153000	E	E,R		
tributary of Dry Creek, NE Rd, Tea Tree Gully	292600	6144240	E	E		
Victoria Creek, E of Williamstown (Old Glen Rd)	311000	6161050	E,R	E,R		
tributary of South Para River, "Corryton Park" gate	313900	6162000	E	E		
Malcolm Creek, us S Para Res	304300	6156000	E	E,R		
Yettie Creek, Allendale Rd	298250	6165450	E	E		
South Para River, Plum Quarry Rd (Humbug Scrub Rd)	302650	6160050	E	E		
tributary of S Para R, Warren Rd	312400	6155300	E	E		
tributary of S Para R, Tungali Rd	315600	6158000	E	E,R		
North Para R, Penrice D/S GS 505517	321500	6184600	E	E		
North Para River, Mt Mckenzie, GS 505533	323600	6172600	E	E,R		
N Para R, us Jacob Creek junction	309950	6173350	E,R	E,R		
North Para River, Light Pass Rd	318650	6184400	DRY	DRY		
Duck Ponds Creek, Shannon Rd	326400	6185250	E	E		
North branch of Jacob Creek near Pewsey Vale winery	315700	6166600	DRY	NS		
South branch of Jacob Creek near Pewsey Vale winery	315400	6166300	DRY	NS		
Jacob Creek, at N Para confluence	309950	6173250	E	E,R		
Lyndoch Creek, Barossa Hwy	306650	6169000	E	E		
Whitelaw Creek, Harris Rd	295000	6169850	E	E		
Finniss R. E of Yundi at ford	288000	6088750	E	E,R		
Bull Creek, McHarg Ck Rd	296050	6095300	E,R	E,R		
Bull Creek, Spring Gully Rd	296600	6097850	E,R	NS		
McHarg's Creek, Freshfield	294300	6094500	E,R	E,R		
Blackfellow Creek, Woodgate Hill Rd	290800	6093950	E	E		

APPENDIX XXIX

NUMBERS OF AQUATIC MACROINVERTEBRATE GENERA RECORDED FROM THE MT. LOFTY RANGES BETWEEN 1994-1999, ACCORDING TO MAJOR TAXONOMIC GROUPS.

Phyllum/Class	Order	Family	No. of Genera*
Desmospongiae	Haplosclerida	Spongillidae	*
Hydrozoa	Anthomedusae	Hydridae	*
		Clavidae	*
Turbellaria	Rhabdocoela	Temnocephalidae	*
Nemertea			*
Nematoda			*
Nematomorpha	Gordioida	Gordiidae	*
Bryozoa			*
Gastropoda	Neotaenioglossa	Hydrobiidae	3
		Thiaridae	1
		Pomatiopsidae	1
	Basommatophora	Lymnaeidae	2
		Ancylidae	1
		Planorbidae	5
		Physidae	1
Bivalvia	Veneroida	Corbiculidae	1
		Sphaeriidae	1
Hirudinea	Rhynchobdellida	Glossiphoniidae	*
	Arhynchobdellida	Richardsonianidae	*
Aphanoneura		Aeolosomatidae	*
Oligochaeta	Haplotaxida	Haplotaxidae	*
	Tubificida	Enchytraeidae	*
		Phreodrilidae	2
		Tubificidae	6
		Naididae	7
	Lumbriculida	Lumbriculidae	1
	Opisthopora		*
Hydracarina	Astigmata		*
	Oribatida		*
	Prostigmata	Hydrodromidae	1
		Hydryphantidae	4
		Eylaidae	1
		Limnocharidae	1
		Limnesiidae	1
		Oxidae	1
		Aturidae	2
		Hygrobatidae	5
		Pionidae	2
		Unionicolidae	2
		Arrenuridae	1
		Momoniidae	1
	Mesostigmata		*
Crustacea	Amphipoda	Talitridae	*
		Ceinidae	1
		Eusiridae	1
		Perthiidae	1
	Isopoda	Janiridae	1
		Oniscidae	1

Phyllum/Class	Order	Family	No. of Genera*
	Decapoda	Atyidae	1
		Parastacidae	1
		Hymenosomatidae	1
Collembola		Onychiuridae	*
		Hypogastruridae	*
		Isotomidae	*
		Entomobryidae	*
		Sminthuridae	*
Insecta	Coleoptera	Carabidae	*
		Haliplidae	1
		Dytiscidae	16
		Gyrinidae	2
		Hydrophilidae	8
		Hydraenidae	2
		Ptiliidae	*
		Staphylinidae	*
		Scirtidae	*
		Elmidae	3
		Psephenidae	1
		Curculionidae	*
	Diptera	Tipulidae	13[#]
		Dixidae	1
		Culicidae	3
		Ceratopogonidae	8
		Simuliidae	3
		Thaumaliidae	1
		Psychodidae	*
		Scatopsidae	*
		Cecidomyidae	*
		Tabanidae	*
		Stratiomyidae	*
		Empididae	*
		Dolichopodidae	*
		Syrphidae	*
		Sciomyzidae	*
		Ephydridae	*
		Muscidae	*
		Chironomidae	43
	Ephemeroptera	Baetidae	3
		Oniscigastridae	1
		Leptophlebiidae	3
		Caenidae	2
	Hemiptera	Mesoveliidae	1
		Hydrometridae	1
		Hydrometridae	1
		Veliidae	1
		Saldidae	1
		Nepidae	2
		Belostomatidae	1
		Ochteridae	1
		Corixidae	4
		Notonectidae	2
		Pleidae	1
	Mecoptera	Nannochoristidae	1
	Lepidoptera	Pyralidae	*
	Neuroptera	Neurorthidae	1
		Sisyridae	1
	Odonata	Coenagrionidae	4
		Lestidae	1

Phyllum/Class	Order	Family	No. of Genera*
		Aeshnidae	2
		Telephlebiidae	1
		Gomphidae	2
		Hemicorduliidae	1
		Synthemistidae	2
		Libellulidae	2
	Plecoptera	Gripopterygidae	5
	Trichoptera	Hydrobiosidae	5
		Hydroptilidae	6
		Hydropsychidae	1
		Ecnomidae	1
		Tasimiidae	1
		Conoesucidae	1
		Atriplectididae	1
		Calamoceratidae	1
		Leptoceridae	6

*These groups are present but are not identified to genus level.
[#] This is the number of morphospecies recognised; their organisation at the generic level cannot be readily resolved at present.