A BIOLOGICAL SURVEY OF THE MURRAY MALLEE SOUTH AUSTRALIA

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2000

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Cover Photograph:
Golden Pennants (*Glischrocaryon behrii*) under Narrow-leafed Red Mallee (*Eucalyptus leptophylla*) in Scorpion Springs Conservation Park.

Photo: A. Robinson.

ABSTRACT

A vegetation survey was carried out in the Murray Mallee in 1990 which sampled 678 quadrats. This was followed by a vertebrate survey in October-November 1991 that sampled a sub-set of 173 quadrats. These sites aimed to sample representative areas of all the remaining natural vegetation in the area in proportion to the broad habitat variability of the total area. In addition, at least one sampling site was located in all of the 17 reserves under the National Parks and Wildlife Act in the study area. The total number of records contributed to the Biological Survey Database as a result of this survey were: 20974 plants, 25 amphibians, 1551 reptiles, 5406 birds and 796 mammals.

A combined analysis of the plant quadrat data with Victorian plant data resulted in the description of 60 PATN floristic groups of which 35 occurred in South Australia. Using this analysis as a basis, a vegetation map of the Murray Mallee was produced comprising 37 regional plant communities based on the dominant upper-storey plant. Within these 37 regional communities, 129 detailed communities have been identified and mapped.

Because of the low number of mammal species remaining in the Murray Mallee, PATN analyses were not undertaken. PATN analyses on reptile and bird tended to show clear patterning, however some groups were poorly defined. The reptile analysis resulted in the recognition of five communities with definite habitat preferences for species defined. Similarly, five bird communities were recognised, some of which appeared to have more ecological integrity than others.

Of seventy-nine reptile species known from the area, fifty five species were recorded during the Murray Mallee Survey. Populations of the Carpet Python, Common Bandy-bandy and Bardick are significant for the overall conservation of these species. There were four species of amphibians recorded during the survey.

One hundred and sixty eight of the two hundred and fifty-seven species of birds were recorded from the study area during the survey. Eight exotic species were recorded from quadrats during the survey. Bird species of conservation significance include: Malleefowl, Regent Parrot, Mallee Emu-wren and Bush Stone Curlew.

The Murray Mallee Survey recorded 31 extant mammal species of the 66 recorded from the area. Nine of the 31 species were exotic. Native terrestrial mammal captures and observations were low, even of species perceived as common. This raises some serious concerns for the long-term survival of small mammal communities in the Murray Mallee.

The striking blue flowers of the Rough Halgania (*Halgania cyanea*) are a feature of many parts of the Murray Mallee in spring. **Photo. D. Krahenbuehl.**

Accumulated bark around the base of a long unburnt mallee tree in Ferries McDonald Conservation Park.
Photo. A. Robinson.

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ACKNOWLEDGEMENTS

Funding to conduct the survey of the vegetation and vertebrate fauna of the Murray Mallee region was provided by the National Estate Grants Program. We are indebted to the more than one hundred land owners and managers who gave access to their properties, and in many cases showed a great deal of interest in our work, and provided much useful local and anecdotal information. Invaluable assistance in community liaison was provided by two tireless "mallee farmers" in Geoff Nicholls of Jabuk and Keith Payne of Loxton during both the vegetation and faunal surveys.

The distance required to be travelled between the many sample sites during the survey made catered accommodation most desirable wherever possible. Therefore our thanks go to the Angels of Pinnaroo, the Boundys of Meningie, the Burns of "Lindisfarne" Murray Bridge, the Kuehenes of "Bayree Farm" Coonalpyn, the Nicholls of Jabuk, and Paynes of Loxton and the staff of Yookamurra Sanctuary.

A number of survey participants were supported by their employers. For this assistance we are grateful to the Royal Zoological Society of South Australia; Adelaide Zoological Gardens; the Department of Road Transport South Australia; Landscape Design Section; the Zoological Board of Victoria, Healesville Sanctuary.

The survey organisers would also like to gratefully acknowledge the many volunteers, whose names appear amongst those listed in the "people involved" section of this report, who gave freely of their time and expertise to enable the survey to be successfully completed. Tony Robinson, Mark Hutchinson, Cath Kemper, David Armstrong, Sandy Carruthers, Felicity Smith, Lee Heard, and Graham Carpenter provided valuable comments on sections of the report.

PEOPLE INVOLVED

Most aspects of this survey surpassed all those previously carried out in this series of regional surveys. This is particularly notable in the number of people required to accomplish the fieldwork. Considering the great distances it was necessary to travel between the many sites, all are to be commended for completing their allotted sampling tasks with proficiency and dedication.

Fieldwork

(a) Vegetation Survey (July 1990)
: Murray Mallee (July 1990)

Participants were: K. Bellette, P. Canty, D. Donato, D. Fotheringham, T. Freeth, J. Gillen, M. Good, D. Goodwins, J. Goodwins, L. Hitch, S. Kinnear, P. Lang, I. Malcolm, L. Mitchell, L. Muirhead, D. Murphett, K. Nicholson, T. Noyce, A. Robinson, A. Sparrow, M. Steiner, R.Taplin, B. Luxton.

(b) Vertebrate Survey (October/November 1991)

Nine field groups were formed, each consisting of three biologists, one responsible for each of the taxonomic groups: **birds (B), mammals (M) and reptiles (R)**. They were: J. Arlidge (M), D. Armstrong (R), J. Ayre (M), R. Brandle (M), P. Canty (R), G. Carpenter (B), K. Casperson (B), B. Cohen (B), P. Copley (B), J. Davis (M), S. Doyle (R), A. Flaherty (R), J. Gates (B), R. Hill (M), D. Hopton (B), P. Horton (B), M. Hutchinson (R), E. Jackson (M), J. Mathew (B), L. Muirhead (M), R. Noyce (R), D. Peacock (M), A. Robinson (R), B. St John (B), K. Steven (M), R. Storr (B), S .Winter (M).

Two independent bat-trapping groups collected data opportunistically during the survey period. The members of these groups were: J. Davis, C. Kemper, B. Luxton, L. Queale, S. Holder and A. Sideris.

In addition a number of other individuals assisted in the field, primarily when help was most appreciated, in the establishing of traplines. They were: M. Armstrong, G. Kuehne, G. Pascoe, R. Wallace and E.Yeatman.

(c) Western Murray Flats Vegetation Survey (1992)

G. Adams, G. Burgess, S. Carruthers, B. Crew, N. Cundell, P. Farmer, D. Fotheringham, L. Heard, S. Hill, S. Kinnear, P. Lang, E. Lock, I. Malcolm, L. Mitchell, D. Murphett, N. Neagle, K. Nicholson, T. Noyce, R. Taplin, R. Tuckwell and L Webb.

SPECIMEN IDENTIFICATION

Birds:	P. Horton (SA Museum) and people nominated above
Mammals:	D. Armstrong (DEH), C. Kemper, L. Queale (SA Museum)
Reptiles:	D. Armstrong (DEH), A. Edwards, M. Hutchinson (SA Museum)
Vegetation:	P. Lang (DEH).

COMPUTING

Oracle Data Base Management:	Data Support Unit, Planning SA
Vegetation Analysis and Mapping:	
Murray Mallee:	J. Gillen, S. Kinnear, S. Carruthers, F. Smith
Western Murray Flats	S. Kenny, E. Lock, L. Heard, D. Goodwins
Digital Vegetation Map Capture:	J. Philips, G. Wilkins
Vegetation Map Production:	G. Wise, J. Philips
Vertebrate Analyses:	J. Foulkes
Vertebrate Mapping	H. Owens, J. Foulkes.

INTRODUCTION

By J. Foulkes[1] and J. Gillen[2]

BACKGROUND AND AIMS

In South Australia a program of systematic surveys across the state, to provide a broad baseline inventory of the state's flora and fauna, 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 Co-ordinating Committee. 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. In terms of responsibilities for the vegetation and vertebrate survey activities across the state the Department for Environment and Heritage (DEH) and Planning SA share these. Planning SA is responsible for vegetation survey and mapping in the Agricultural Zone while DEH is responsible for the vertebrate surveys in the Agricultural Zone and the vegetation and vertebrate surveys in the Pastoral Zone. 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 by Planning SA 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). Planning SA has also completed the vegetation survey component of the Biological Survey (both vegetation and vertebrate) for the South East and Murray Mallee (including the Western Murray Flats) regions, and the vegetation analysis and mapping components for Kangaroo Island. Biological Surveys completed by DEH in the Agricultural Zone include, the Offshore Islands (1971-1982), South East Coast (1982-1983), and Kangaroo Island (1989-1990). In addition, the same survey methodology has been used for specific surveys concentrating on specialist habitats such as grassy ecosystems (eg. Upper South East Box and Buloke Grassy Woodland Survey) and numerous smaller-scale surveys of parks and reserves conducted by various government and non-government organisations. Generally, the boundaries of these surveys have been based on mapsheet boundaries according to the standard 1:50 000, 1: 100 000 and 1: 250 000 map series.

In terms of the surveys carried out in the Pastoral Zone, twelve major regions had been studied by the DEH. These include 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).

These surveys have produced and are continuing to produce a comprehensive biological database with information now encompassing a large area of the state.

In 1990 the Biological Conservation Branch of the former Department of Environment and Planning received a grant from the National Estate Grants Program to undertake a vegetation and vertebrate fauna survey of the Murray Mallee region.

The Murray-Darling River Basin in South Australia comprises areas to the north, south and west of the River Murray. In 1990 the Murray Mallee vegetation (south and east of the river) was surveyed with support from the Save the Bush Program of the then Australian National Parks and Wildlife Service and the GIS Section of the Department for Environment and Planning (now part of Planning SA). The Western Murray Flats were subsequently surveyed in April 1992 on a Murray-Darling Basin NRMS grant (Lock and Goodwins 1993) by Planning SA (then the GIS Section of DEP), and the vertebrate fauna of the Murray Mallee was surveyed in 1991 by DEH under a National Estate Grant from the Australian Heritage Commission. In 1991-92 the vegetation and vertebrate fauna of the South Olary Plains were surveyed under a series of Murray Darling Basin NRMS grants (Forward and Robinson 1996). Thus, the vegetation and vertebrate fauna of the Murray-Darling Basin in South Australia have now been extensively sampled. More recently, Kahrimanis (1999) compiled a preliminary report toward the regional biodiversity plan for the Murray-Darling Basin in South Australia. This report discusses the conservation status of flora and fauna of the Murray Mallee and consequently this

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report does not duplicate the same material to any degree.

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 Murray Mallee biological survey were:

1. To observe, collect and identify the species of plants and vertebrate fauna present in the area during July- 1990 and October-November 1991, by sampling an array of fixed quadrats representing the geographical and biological diversity of the region.

2. To establish a comprehensive data base of the flora and associated vertebrate communities of the southern Murray-Darling Basin in South Australia that is amenable to analyses involving direct ecological comparisons, and compatible with similar data collected from adjacent areas in South Australia, Victoria and New South Wales.

3. To document and classify the patterns of species and communities across the region and their relationship with parameters of the physical environment.

4. To compile a floristic vegetation map of the area contiguous with maps of adjoining areas in South Australia and Victoria.

5. To evaluate the conservation status of species and communities typical of the Murray Mallee, as a basis for recommendations for natural resource management and conservation strategies, including additions to the existing South Australian reserve system.

6. To provide the State Herbarium and South Australian Museum with collections representative of the diversity of plants and vertebrates in the area in 1990-1991 and to provide material for taxonomic and other scientific studies related to wildlife protection.

7. To establish a long-term monitoring system and associated database to enable subsequent measurement of environmental change.

8. To provide baseline biological data for future research by government and non-government organisations.

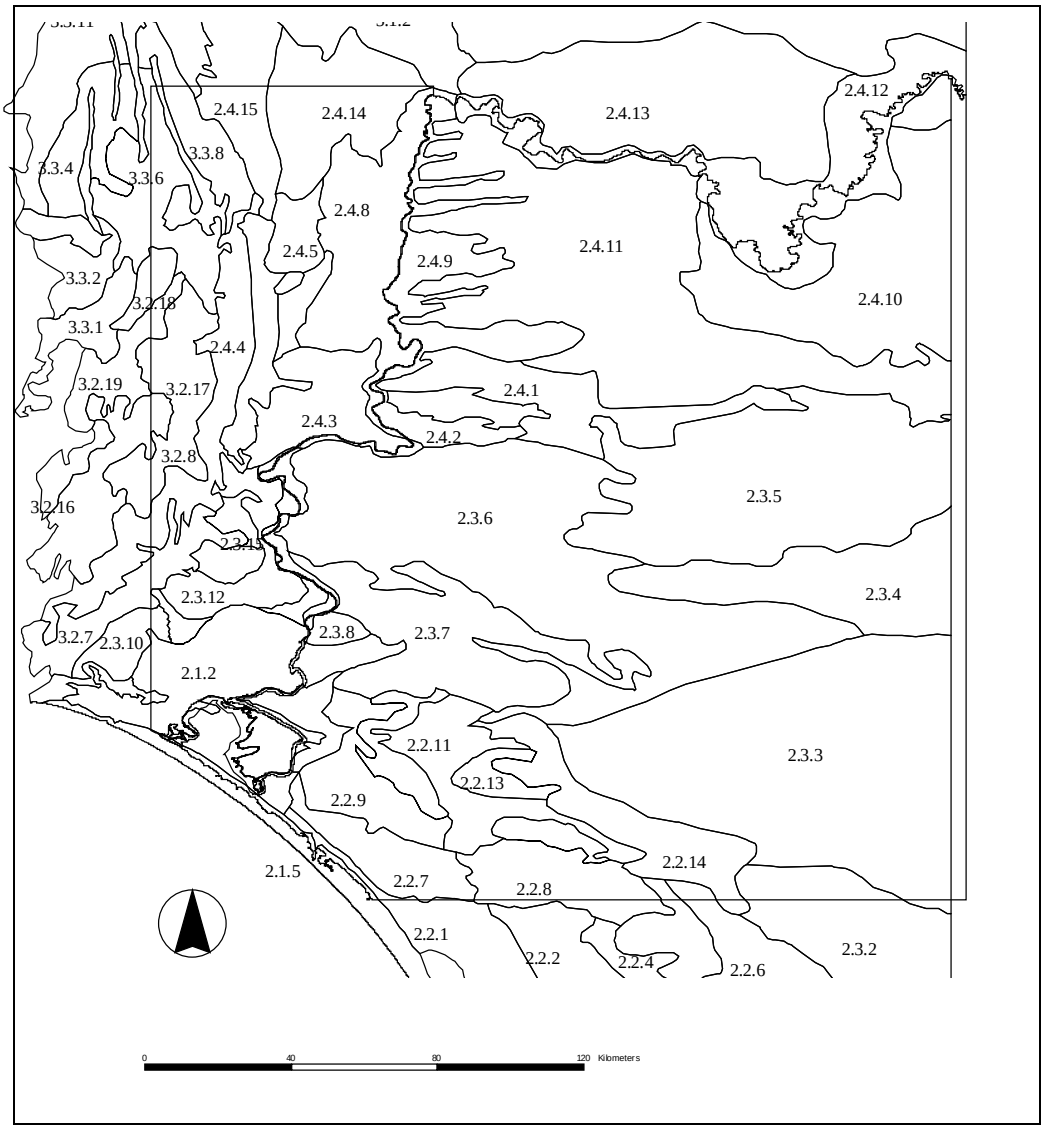
THE SURVEY AREA

The Murray Mallee survey area covers the southern Murray-Darling Basin in South Australia, from the edge of the Murray River flood-plain, south to 36°, west to the Mount Lofty Block and coast and east to the Victorian state border. The area includes the 1:250 000 map-sheet coverages of 'Renmark', 'Pinnaroo', and portions of ‘Adelaide’ and ‘Barker’. The survey area was delineated by the boundary of the Murray Mallee Environmental Region as described by Laut *et al.* (1977), but the outer limits were extended to the River Murray flood-plain in the north (Figure 1).

The Murray Mallee Province (number 2) is an area of 43,650 km^2 containing 4 environmental regions and eleven associations. Laut *et al.* (1977) described the region as comprising undulating calcrete plains with shallow soils supporting low woodlands or tall open shrublands with a mixed understorey, overlain in places by low dunes or sand sheets with degraded mallee (*Eucalyptus* spp.) over saltbush (*Atriplex* spp.) or porcupine grass (*Triodia irritans*).

Figures 2 -7 show the variation in environments of the area.

Most of the survey area is in the agricultural district where the vegetation is substantially modified and fragmented. A large section in the east is contained in an almost contiguous block comprising Ngarkat, Scorpion Springs, Mount Shaugh and Mount Rescue Conservation Parks.



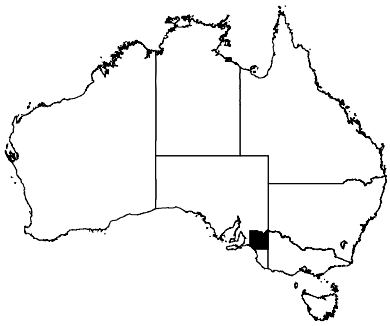


Figure 1.
Murray Mallee Biological Survey study area showing the Environmental Associations of South Australia (Laut *et al.* 1977).

PREVIOUS BIOLOGICAL STUDIES

This section provides an indication of the type of work conducted in the study region. More detailed descriptions of previous work conducted in the study area are presented in the relevant chapters. A listing of scientific research projects conducted in the region is provided in Appendix V.

Past Vertebrate Studies

In 1976 and 1977 Reid and Vincent (1979) coordinated a general ornithological survey of South Australian National, Conservation and Recreation Parks and Game Reserves. Paton (1982) and Close (1982) record birds of the Ninety Mile Desert area. White (1982) provides a brief list of reptiles found in the Ninety Mile Desert. David Paton and students from Adelaide University have been conducting research in Ngarkat CP in relation to pollination ecology, native birds and introduced honeybees.

Robinson (1982) and James (1982) present notes on the mammal fauna of locations within the Ninety Mile Desert area. Moore (1985a,b) compiled a summary of the distribution and conservation status of the terrestrial vertebrates and vascular plants of the South Australian Murray Mallee.

Basic flora and fauna species lists have been compiled for most of the parks in the area but none have been published. Management Plans have been published for all Conservation Parks in the region (Anon, 1993, 1994, 1995).

The Biodiversity Monitoring and Evaluation Section of the Department of Environment, Heritage and Aboriginal Affairs has made numerous assessments of native vegetation clearance applications on the western and southern edges of the present survey area and a plant species list and bird notes are available for each assessment.

The mammal, reptile and botany clubs of the South Australian Field Naturalists Association have conducted field trips to conservation parks and private properties in the survey area over the last 30 years and lists are available from these trips. Baverstock (1979) conducted a three year study of the mammals and lizards of Billiatt Conservation Park. Goonan and Mann (1989) studied the small vertebrate fauna of Brookfield Conservation Park. Students from the University of South Australia (Salisbury Campus) have been conducting a regular trapping program at Billiatt since the 1970's. The South Australian Ornithological Association also has many bird records from the area. Graham Carpenter, Tim Croft and Jamie Matthew have been undertaking a long-term examination of the effects of fire on bird communities in Billiatt CP.

Surveys in adjacent areas, which were a part of the Biological Survey of South Australia, are listed in the Introduction. Additional work has been carried out in adjacent areas of N.S.W. by Fox (1991), (vegetation mapping), Eldridge (1985) (land system/soils mapping) and Morecombe and The Murray Mallee Review (vegetation and fauna) has been completed in north-western Victoria (Land Conservation Council, 1987; Emisson and Bren 1989; Robertson *et al*. 1989; Yen *et al*. 1990).

Past Botanical Work

A number of early botanical studies in South Australia produced vegetation maps of the whole state (Prescott, 1929; Wood, 1937; Specht, 1972) but very little work was conducted on a regional basis. In the Murray Mallee, numerous small studies, mostly botanical, have been undertaken more recently on one or a few individual properties at a time, but very little comprehensive vegetation survey work has been conducted over the whole region.

Noy Meir (1971) systematically surveyed 240 000 square kilometres of the semi-arid winter rainfall zone of south-eastern Australia, conducting extensive floristic multivariate analyses. Twenty-six of these sites were in the southern part of the present survey area. Sparrow (1989, 1990) surveyed the mallee belt of South Australia to floristically analyse and classify the vegetation.

South Australia has a long history of plant ecological work (Specht 1972) and as mallee vegetation covered a broad belt of the State (between 225 mm - 450 mm annual rainfall) some of this work either directly or indirectly examined various aspects of this particular vegetation type. Sparrow (1991) provides an excellent overview of these vegetation studies including those conducted in the Murray Mallee area. The following summary draws heavily on Sparrow's work.

Studies relating to the Murray Mallee area have tended to be either broad and general in nature or conversely very localised, examining specific aspects of plant ecology. Few studies deal specifically with the Murray Mallee area in its entirety.

One early study of a broad general nature was that of Diels (1906) who described and mapped eight vegetation "Formations" over Australia. Five of these occurred in South Australia and among them were the "Formations" of Mallee Scrub and Sand Heath. This work later provided the base for Wood (1937) who retained Diel's five climatic vegetation Formations for his treatise on vegetation in South Australia. Wood had previously published (in 1929) an important paper in which he described the mallee of southern Australia as a zone of transition between the Eremean (arid) flora of the north and the savanna woodlands to the south (Noble and Bradstock 1989).

In 1972, Specht produced a revised edition of Wood's (1937) treatise integrating contemporary ecological theories and included a series of distribution maps of South Australian plant communities, (among them a

combined map of the vegetation of the Mount Lofty Ranges and the Murray Lands). The publication "Environments of South Australia (Laut *et al*. 1977) utilised Specht's maps and his classification system for the definition and description of Environmental Provinces, Associations and Units. However the works of Wood (1937) and Specht (1972) both suffered from a deficiency in survey data, particularly from the northern and western Eyre Peninsula and the Murray Mallee which meant that their proposed classifications of vegetation in these areas was tentative.

Conservation studies dealing specifically with the remnant vegetation of the Murray Mallee (Barritt and Mowling 1978, Moore 1985) overcame these deficiencies by making "improvised and unsubstantiated modifications where Specht's (1972) classification was found to be inadequate, particularly with respect to semi-arid mallee" (Sparrow 1991).

Other broad-scale studies which overlapped the Murray Mallee study area have been those of Noy-Meir (1971) surveying the vegetation of the Murray River Basin area, and the Victorian Department of Conservation, Forests and Lands (Land Conservation Council 1987) examining the mallee in north-west Victoria. These last two studies mark an important shift away from the descriptive nature of the earlier work by incorporating methods of multivariate numerical analysis in the interpretation of floristic survey data.

The most significant recent development in broad-scale phytosociological work in South Australia has been Sparrows' (1991) examination of the remnant natural vegetation of temperate South Australia. This major work has involved a floristic survey of the agricultural districts, an area which includes wholly or partially, eight of the State Herbarium of South Australia's 13 floristic regions (Jessop and Toelken 1986). The Murray Mallee study area falls within two of these floristic regions, namely the northern part of the South-East Region and the southern part of the Murray Lands region. The data Sparrow collected were subjected to multivariate numerical analysis to provide a detailed picture of mallee floristic patterns which proved to be more diverse and gradational in character than previously recognised.

Davies (1982) determined the conservation status of the major plant associations in South Australia by assessing all previously documented surveys in parks and reserves. This work was updated by Neagle (1995).

Other works that relate to specific portions of the study area are listed below.

<u>The Ninety-Mile Plain</u> - Alcock (1982); Barker (1982); Coaldrake (1951), Litchfield (1956); Rayson (1957); Specht (1957 a,b, 1963, 1966); Specht and Rayson (1957 a,b); Specht *et al.* (1982); Symon (1982 a,b). <u>Coonalpyn Downs</u> - Blackburn *et al.* (1953); Litchfield (1956); and <u>in the vicinity of Lakes Alexandrina and Albert</u> - Jessup (1946).

There is a dearth of research information for the northern, drier Mallee regions apart from the work of Potter, Wetherby and Chittleborough (1973) who studied the land-forms and soils of the Northern Mallee and included brief descriptions of the vegetation. These take the form of simple species lists typical of each of the twenty land units they defined for the region.

Figure 2.
For large portions of the Murray Mallee, much of the remnant vegetation is found in the roadside margins.
Photo P. Canty.

Figure 3.
Aerial view of fire patterns in mallee communities in Ngarkat CP. **Photo P. Canty.**

Figure 4.
Fragmented islands of native vegetation surrounded by agricultural land are a common feature of the landscape. **Photo P. Canty.**

Figure 5.
Flowering heath in Mt Rescue CP. **Photo A. Robinson.**

Figure 6.
Post -fire flowering of *Xanthorrhoea caespitosa* in Ngarkat CP. Photo A. Robinson.

Figure 7.
View from high sandy dune across dense low mallee in Mount Rescue CP. Photo J. Davis

CLIMATE

By J. Gillen[1]

The climate of the Murray Mallee region is warm to hot in summer and cool to cold in winter. The variation in diurnal and seasonal temperatures can be significant. Rainfall patterns show a distinct seasonality with most rain falling between May and September.

Annual rainfall within the area varies between 250 mm in the north, and 500 mm in the south of the region (Table 1). There is a predominance of rainfall in the winter months.

Temperatures tend to peak in January and February and then drop from May until September. Throughout the study area temperatures are generally warm, however continentality is reflected in high seasonal and diurnal ranges (Laut *et al.* 1977). Monthly trends in mean rainfall and mean daily maximum temperature from Waikerie, Lameroo and Keith are shown in Figure 8.

The cooler air temperatures in the winter month's result in higher relative humidity values than those recorded in the summer months. For example, at Waikerie, mean monthly relative humidity at 1500 hours range from 23% in January to 51% in June. These figures are higher at 0900 hours, with a figure of 41% in January to 81% in June. The same trend is apparent at locations at the southernmost margin of the study area. The wind speeds are generally less than 20 km/h (Laut *et al.* 1977). Instrumented wind data for Keith shows that during summer, winds are most frequently from the south-east, while during the winter months south-west to north-west winds predominate.

Mean annual rainfall at stations and centres throughout the Murray Mallee.
Source: SA Bureau of Meteorology

Locality	Mean rainfall per annum (mm)
Meningie	471
Loxton	274
Waikerie	250
Lameroo	388
Keith	471
Coonalpyn	453
Coomandook	418
Peebinga	300
Tintinara	468
Swan Reach	272
Blanchetown	263
Mannum	294

Table 1.

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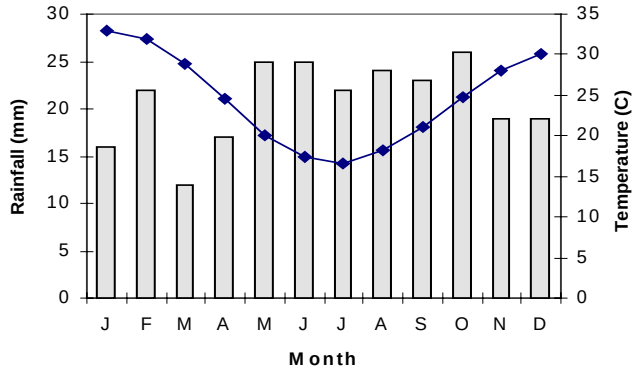

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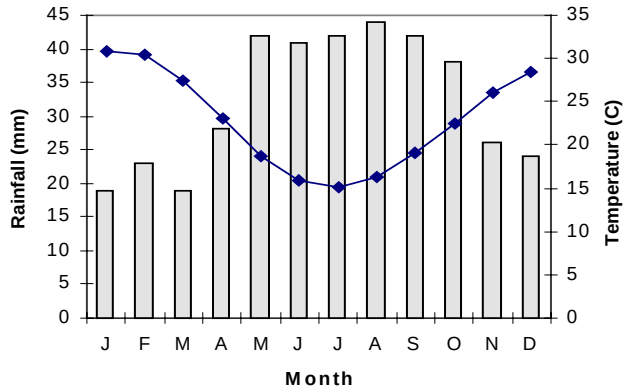

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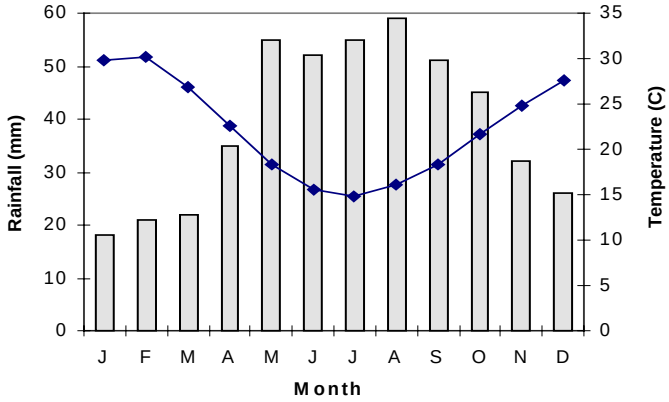

c)

Figure 8.
Mean monthly rainfall and mean daily maximum temperatures recorded at a) Waikerie, b) Lameroo and c) Keith.

GEOLOGY AND GEOMORPHOLOGY

by Paul Rogers[1]

STRUCTURE AND SETTING

The Murray Mallee region is situated in the central western part of the Tertiary Murray Basin, which covers an area of 300 000 km^2 in south-eastern South Australia, south-western New South Wales and north-western Victoria. The basin sediments are up to 600 m thick and comprise freshwater, marine, coastal and continental sediments of Palaeocene to Quaternary age, with the thickest part of the succession occurring between Renmark and north-western Victoria.

In South Australia, uplifted Neoproterozoic (Adelaidean) and Cambrian metasediments, and Cambro-Ordovician granites mark the western and northern basin margins. To the south-west, the basin is partly separated from the thicker succession in the Gambier Basin by the Padthaway Ridge, formed of outcropping and shallow Early Palaeozoic basement rocks. The Tertiary succession in South Australia rests unconformably on Neoproterozoic to Early Palaeozoic basement, Late Palaeozoic glacigene sediments of the Troubridge and Nadda Basins, and Early Cretaceous sediments of the Berri Basin (Figures 9 and 10).

TERTIARY

The Tertiary succession can be divided into three depositional associations: (1) Late Palaeocene to Early Oligocene non-marine and marginal-marine sediments, (2) Late Eocene to Middle Miocene transgressive marine sediments, and (3) latest Miocene to Late Pliocene marine, coastal and non-marine sediments.

LATE PALAEOCENE TO EARLY OLIGOCENE NON-MARINE SEQUENCE

The oldest sediments are the Renmark Group, comprising the Warina Sand and Olney Formation, together exceeding 330 m in thickness in the Renmark area. Warina Sand is restricted to the deeper parts of the Basin and consists of medium to coarse-grained quartz sand with minor thin, lenticular interbeds of locally carbonaceous silt and clay. The sandy facies is interpreted as a fluvial, braided-channel deposit and the finer-grained interbeds as lacustrine and floodplain deposits.

The overlying Olney Formation is more widespread than the Warina Sand, and extends into marginal areas of the basin where it rests on pre-Tertiary basement. Thinly bedded carbonaceous sand, silt, clay and lignite were deposited in fluvial, lacustrine and swamp environments.

The upper part of the Olney Formation is often marginal-marine in the western Murray Basin.

LATE EOCENE TO MIDDLE MIOCENE MARINE SEQUENCE

Deposition of the Buccleuch Formation began in the Late Eocene with a marine transgression into the southwestern Murray Basin. These marine sediments grade laterally into the marginal marine upper Olney Formation and include bryozoal limestone, glauconitic limestone and marl, bryozoal clayey sand, and black pyritic clay. Younger parts of Buccleuch Formation are Early Oligocene in age.

Transgressions in the Early and Late Oligocene led to the deposition of widespread thin conglomerate, ferruginised sandstone; sandy limestone and sandy clay referred to as Compton Conglomerate equivalents.

The Ettrick Formation, predominantly glauconitic and fossiliferous marl, calcareous clay and mudstone, with silt and fine quartz sand, represents a Late Oligocene transgressive phase found from the eastern margin of the Padthaway Ridge northwards.

Ettrick Formation is overlain by the Murray Group, predominantly shallow-marine fossiliferous limestone and sandstone with minor clay and silt, well exposed in the cliffs of the Murray River between Overland Corner and Tailem Bend. The limestones are incorporated into a single unit (Mannum Limestone), which ranges in age from Early to Middle Miocene and may extend back to the latest Oligocene. In the lower part it consists of echinoidal and bryozoal calcareous sandstone and sandy limestone. The middle part of the Limestone near Morgan comprises upper and lower bryozoal limestone, separated by the Cadell Marl Member. The youngest part of the Mannum Limestone occurring in the Loxton area comprises bryozoal limestone and marl with abundant worm tubes. Mannum Limestone also onlaps granite of the Padthaway Ridge west of Coonalpyn.

LATEST MIOCENE TO LATE PLIOCENE SEQUENCE

The unconformity at the top of the Murray Group resulted from both a marked fall in sea level and from mild tectonic activity and erosion in Middle to Late Miocene time. Reactivation of basement structures caused gentle but significant warping in the Murray Group and erosion of Mannum Limestone from areas west of Waikerie. High level upfaulted remnants of Miocene marine limestone indicate post Miocene uplift of the eastern Mt Lofty Ranges in the range of 60 to > 100 m with some of this movement occurring during the Pleistocene.

Deposition of the third major association in the Murray Basin commenced in the latest Miocene and continued through to the Late Pliocene. The lower part of this sequence is the Bookpurnong Formation, a shallow-water marine deposit comprising marl, silty clay and minor fine sand, all variably shelly, glauconitic and

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micaceous. Although widely distributed in the basin east of Loxton, it occurs largely in the sub-surface with only limited outcrop in the Loxton area.

The Early Pliocene Loxton Sand conformably overlies the Bookpurnong Formation. Loxton Sand comprises glauconitic, micaceous and shelly fine sand, overlain by planar and cross-bedded fine to coarse-grained sand and fine gravel, and planar-bedded, calcareous, micaceous, medium to coarse-grained sandstone with abundant shell debris. These are interpreted as an upward-coarsening regressive sequence of shallow water marine and estuarine sediments passing up into beach and coastal barrier deposits.

The upper part of Loxton Sand forms an extensive regressive strand plain composed of gently arcuate beach ridges. The latter extend from their southernmost limit, the Marmon Jabuk Range, northwards to the "Canopus" H.S. area, but have been eroded and reworked into Late Pliocene to early Pleistocene fluvial and lacustrine deposits in the Riverland area.

The Marmon Jabuk Range is the southernmost and most prominent of a group of calcrete-capped Loxton Sand coastal ridges in the Karoonda area. It contains a high proportion of calcareous shell fragments and extends south-eastwards beyond Mt Timothy. Further coastal ridges in the Mantung -Alawoona area can be seen on aerial photographs and satellite images. In the south-eastern corner of the project area, the quartz-rich Lawloit Range is an extension of the Victorian system of Pliocene coastal ridges that passes through Mt Shaugh. Eroded remnants of Pliocene offshore sandbars form low, flat-topped hills east of Meningie.

Loxton Sand is overlain by Late Pliocene Parilla Sand, composed of unfossiliferous, non-marine, fine to medium-grained clayey quartz sand with thin beds of sandy clay. The formation was derived mainly from Loxton Sand by aeolian and fluvial reworking, and may include large transgressive dune complexes (eg the extensive plain in the Lameroo - Pinnaroo area) as well as lacustrine and fluvial deposits laid down in depressions between stranded coastal ridges. Extensive erosion of the Marmon Jabuk Range and other coastal ridges occurred at this time. A duricrust rich in iron oxide and silica (the Karoonda Surface) is often found at the top of Parilla Sand. It was formed during a late Pliocene period of deep weathering and represents an old land surface.

Fossiliferous sandy limestone, calcareous sandstone and oyster beds comprising the Late Pliocene Norwest Bend Formation were deposited in a narrow estuarine zone extending northwards from Tailem Bend along the western margin of the Murray Basin, with an arm extending eastwards as far as Overland Corner.

QUATERNARY

The Murray Mallee region can be divided into two physiographic regions with markedly different Quaternary sequences. The higher country to the north of the Marmon Jabuk Range is characterised by continental lacustrine and fluvial sediments, playa lake deposits, and aeolian dune sands. This sequence was laid down during the Late Pliocene to Holocene period, and reflects a general trend of increasing aridity.

The Coastal Plain south of the Marmon Jabuk Range was affected by glacio-eustatic changes of sea level during the Quaternary and consequently displays a sequence of shallow marine deposits, coastal barrier deposits, and lagoonal - lacustrine sediments.

In addition, alluvial sediments of Late Pleistocene to Holocene age occupy the Murray River Valley.

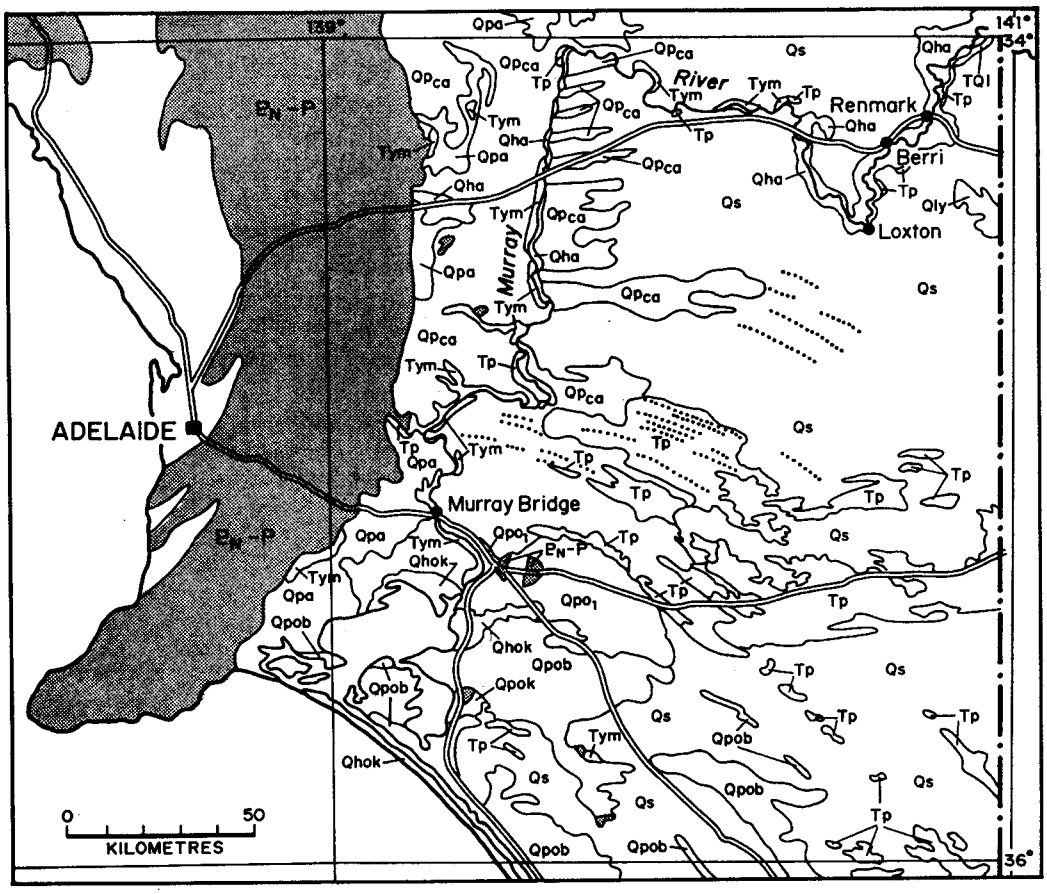
CONTINENTAL DEPOSITS

Late Pliocene-middle Pleistocene fluvial-lacustrine deposits, comprising Blanchetown Clay, Chowilla Sand, and Bungunnia Limestone disconformably overlie late Tertiary sediments in the central western Murray Basin.

Blanchetown Clay was deposited in a large body of fresh water known as Lake Bungunnia, which covered much of the western Murray Basin in the Late Pliocene - early Pleistocene period (Figure. 11). The sediment consists of greenish grey sandy clay with thin layers of limestone and quartz sand overlying red-brown and greenish grey mottled sandy clay. The unit is commonly gypsiferous at the top, and often contains calcareous septarian nodules. Thickness is variable, ranging up to 20m in South Australia.

A fluvial unit up to 10m thick, the Chowilla Sand, occurs at the base of Blanchetown Clay in some Murray River cliff sections upstream from Berri. Chowilla Sand is a lensing unit of fine to medium quartz sand reworked from the underlying Parilla Sand. It interfingers with and in places entirely replaces, Blanchetown Clay. Both units contain a fauna of ostracods, bivalves, tortoise and fish remains, and marsupial bones. Palaeomagnetic studies of a Blanchetown Clay section at Chowilla show that the formation includes sediments of both early Pleistocene and Late Pliocene age.

The filling of Lake Bungunnia may be related to a tectonic dam that formed in the area south of Swan Reach. However, filling of the lake was also influenced by the construction of large coastal barriers in the south-western Murray Basin in Pliocene and early Pleistocene time. Climatic fluctuations (wet and dry periods) caused large shoreline migrations in the shallow lake, resulting in interfingering of lacustrine Blanchetown Clay and fluvial Chowilla Sand near the lake margin.



HOLOCENE

- **Qha** — Alluvial sediments of Murray River Valley (COONAMBIGDAL FORMATION) and drainage from eastern Mt Lofty Ranges
- **Qly** — Gypsiferous playa lake deposits (YAMBA FORMATION)

PLEISTOCENE

- **Qs** — Aeolian dune sand (BUNYIP SAND, MOLINEAUX SAND, WOORINEN FORMATION)
- **Qpa** — Alluvial sediments along margin of eastern Mt Lofty Ranges (POORAKA FORMATION and HINDMARSH CLAY)
- **Qpca** — Calcrete
- **TQl** — Lacustrine and fluvial sediments (BLANCHETOWN CLAY, CHOWILLA SAND, BUNGUNNIA LIMESTONE)

PLIOCENE

- **Tp** — Shallow marine and non-marine sand (LOXTON SAND, PARILLA SAND)
- Pliocene coastal ridge

MIOCENE

- **Tym** — Marine shelly limestone (MANNUM LIMESTONE)
- **P_N-P** — Undifferentiated pre-Cainozoic rocks

- **Qhok** — Undifferentiated coastal deposits (ST KILDA FORMATION)
- **Qpob** — Calcarenite of stranded coastal barriers (BRIDGEWATER FORMATION)
- **Qpo_1** — Lagoonal dolomite

(after Cowley, W.M. and Freeman, P.J., in prep., Geological map of South Australia, 1 : 2 000 000. South Australia Department of Mines and Energy.)

Figure 9.
Geological map of the Murray Mallee region.

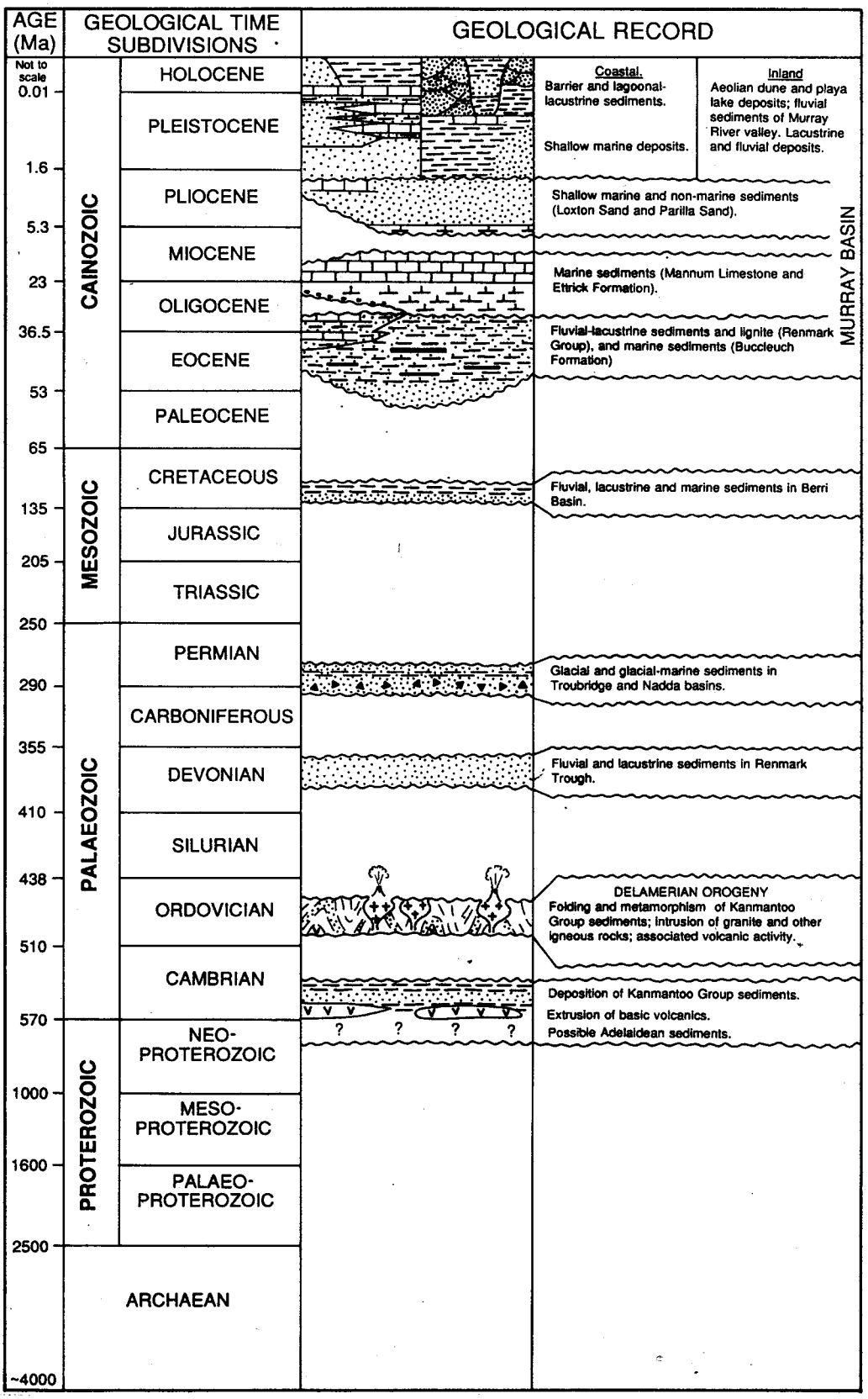


Figure 10.
Geological time-scale of the Murray Mallee Region.

Deposition of Blanchetown Clay ended at about 0.6 Ma when much of Lake Bungunnia was drained. This occurred during a period of low sea level, when fluvial erosion and downcutting breached the coastal barriers, allowing the release of the lake waters, and cut an irregular surface in the Blanchetown Clay.

As Lake Bungunnia drained, it fragmented into separate, smaller, clastic-starved basins in which Bungunnia Limestone was deposited. At other places, gypsum was precipitated at the top of Blanchetown Clay and Chowilla Sand as a result of lake drainage and increasing aridity. The Bungunnia Limestone is a thin (up to 3m); patchy, lacustrine carbonate unit of thinly bedded limestone and dolomite, and includes algal and oolitic varieties with ostracods and gastropods.

Low-lying areas in the bed of the former Lake Bungunnia have evolved into modern saline playas, fed partly by ground-water discharge. Deposits of those playas in South Australia are termed Yamba Formation and consist of lacustrine gypsiferous clay and gypsum - quartz sand mixtures, associated with dunes of seed and flour gypsum. The lacustrine component of Yamba Formation is equivalent to the Tyrrell Beds, a sequence 4-5m thick of inter-layered clay and silt, gypsum and dolomite described from Lake Tyrrell in Victoria. The Tyrrell Beds are a record, of wet and dry climatic cycles related to interglacial and glacial periods, which may extend back as far as 0.45 Ma.

Much of the surface of the Murray Basin in South Australia is composed of aeolian landforms dominated by linear and parabolic dunes of quartz sand. The dune sands are divided into Woorinen Formation, Molineaux Sand and Bunyip Sand.

The Woorinen Formation comprises the east-west linear dunes in the northern part of the basin. These are composed of pale reddish-brown silty and clayey quartz sand with layers of pedogenic carbonate. The type section near Swan Hill in Victoria is divided into five members separated by palaeosols: Piangil Member (youngest); Kyalite Member; Speewa Member; Bymue Member and Miralie Member (oldest).

Aeolian sands of east-west linear dunes and irregular parabolic dunes, covering a large area south of Loxton, are placed in the Molineaux Sand. This is a pale yellow, fine to medium grained quartz sand with some pedogenic carbonate in the lower part of the unit. Molineaux Sand can be regarded as equivalent to Lowan Sand of the Victorian dunefields.

The Bunyip Sand occurs mainly as large tongues of irregular linear and parabolic dunes trending in an ENE direction from the Murray Valley between Morgan and Swan Reach. The unit also includes source-bordering dunes within the Murray Valley (see below). Bunyip Sand is pale red-brown quartz sand with some pedogenic carbonate in the lower part of the unit.

Most of the radiocarbon and thermoluminescence dates obtained from aeolian deposits in the Murray Basin fall within the period from 15 000 yrs BP to 30 000 yrs BP. The present aeolian landforms and most of the aeolian sequences therefore formed during the last glacial period which reached its maximum at about 18 000 yrs BP. Younger dates indicate periods of reworking during the Holocene. Thermoluminescence dates of c. 130 000 yrs BP from the Speewa Member of Woorinen Formation suggest that this unit formed prior to or during the last interglacial. The Bymue and Miralie Members of Woorinen Formation represent older periods of dune building that may extend back to c. 0.4 Ma, comparable with the interpreted lower age limit for the evaporitic Tyrrell Beds.

DEPOSITS OF THE MURRAY RIVER VALLEY.

The Murray River Valley came into being during a period of low sea level at about 0.6 Ma when coastal barriers of Pliocene and early Pleistocene age were breached allowing drainage of Lake Bungunnia. The Murray River eroded a valley into underlying Murray Basin sediments during this period of downcutting. The Murray River valley has subsequently been infilled with fluvial sediments largely reworked from Pliocene sands. The present valley fill can be divided into two sequences: late Pleistocene upper terrace deposits and latest Pleistocene to Holocene Monoman and Coonambidgal Formations. Both these sequences were laid down during postglacial periods, and consist of coarse grained high-energy fluvial deposits passing up into finer grained low-energy floodplain deposits, a result of river gradient adjusting to rising sea level.

The upper terrace deposits are preserved mainly in the wide floodplain section of the Murray valley upstream from Renmark. They occur as broad eroded remnants of clayey fine sand, up to 7 m above the modern floodplain. A palaeosol characterised by reddening and pedogenic carbonate is developed at the top of the terrace remnants.

Small, eroded remnants of upper terrace deposits, elevated 2-4 m above the modern floodplain, occur in the gorge section of the Murray valley in the Blanchetown - Roonka area. These upper terrace deposits form an upward-fining sequence up to 16 m thick, consisting of a basal unit of medium to coarse sand, a lower fluvial unit of silt and very fine to medium sand, and a lagoonal/floodplain unit of silty and clayey very fine to fine sand and sandy clay. The lagoonal/floodplain unit is partly overlain and cut into by an upper fluvial unit of silty very fine to medium sand. Thermoluminescence dating of the upper terrace deposits at Roonka suggests that they can be correlated with a period of rising sea level between c. 65 000 and 59 000 yrs BP.

In South Australia, the younger fluvial sequence of latest Pleistocene to Holocene age that occupies most of the Murray River valley is divided into Monoman Formation and overlying Coonambidgal Formation. Combined thickness of Monoman and Coonambidgal Formations ranges from 16.5 m at Pelican Point (11

km south of Morgan) to 31 m at the Chowilla dam site, upstream from Renmark.

Downcutting by the Murray River during the sea level low stand of the last glacial maximum extended to 15 m below present sea level at Blanchetown (compared with - 8 m at the c. 65 000 yrs BP sea level low-stand), and to 65 m near Murray Bridge. Monoman Formation, consisting of medium to coarse sand with basal fine gravel, was laid down during the following postglacial transgression.

By about 7 000 yrs BP, sea level had reached its present level around the South Australian coast. As the sea approached its modern level, depositional surfaces in the Murray Valley became more stable and forests developed on these surfaces. At Chowilla, Monoman Formation is separated from overlying Coonambidgal Formation by a horizon of logs and stumps with represents one of these forests.

Deposition of Coonambidgal Formation commenced at about 7 000 yrs BP, and continues to the present day. The formation consists mainly of fine sand and sandy clay, with some medium to coarse sand and gravel, and includes modern point bar, lagoonal and floodplain deposits.

Aeolian dunes of Bunyip Sand at several locations in the Murray valley were formed by aeolian reworking of upper terrace deposits during the last glacial period. In post-glacial times, the Murray valley supported a large Aboriginal population. Aboriginal remains, including middens, fireplaces and skeletons are found at many locations, occurring mainly in Bunyip Sand. Radiocarbon dating of bone and charcoal from a lunette at Roonka has produced a series of dates extending from the last glacial maximum to the modern period.

DEPOSITS OF THE COASTAL PLAIN

Shallow marine sediments of Early Pleistocene age (Coomandook Formation) underlie most of the coastal plain, reaching a maximum thickness of 75 m west of the Padthaway Ridge. The formation was deposited during a major marine transgression that reached inland as far as the Marmon Jabuk Range, in which it cut an erosional coastline, the Marmon Jabuk Scarp (Figure 11). There was extensive reworking of Miocene and Pliocene sediments at this time. Shelly limestone float seen around granite outcrops east of Mt Boothby is probably a coastal facies of Coomandook Formation.

Coomandook Formation is overlain by a series of stranded coastal ridges composed of calcarenite deposited in shallow subtidal, beach and coastal dune environments (Bridgewater Formation). The coastal ridges were formed during interglacial periods of high sea level. Gradual uplift of the coastal plain in the Naracoorte - Kingston region has separated coastal deposits formed during individual high sea level stands, with ridges becoming progressively older away from the modern coast. Dating has indicated ages ranging from 100 000 to 870 000 years.

The Coonalpyn Range may include coastal deposits as old as latest Pliocene and representing coastal facies of Coomandook Formation. The Coonalpyn Range was built up along the shoreline of a wide bay that extended between granite headlands at Mt Boothby and Willalooka. Long offshore barriers (eg The Black Range) formed in the bay. A large coastal lagoon in which dolomite was deposited; existed between the Marmon Jabuk Scarp and the oldest Bridgewater Formation range that extends from Lake Alexandrina to Tauragat Hill.

The younger coastal ridges west of Naracoorte gradually coalesce towards the northwest, and form a single calcarenitic complex in the Meningie area where uplift during the Pleistocene was minimal. Lacustrine and lagoonal carbonates and fine-grained sediments of the Padthaway Formation were laid down between the ridges of Bridgewater Formation.

Holocene coastal deposits of the St Kilda Formation were laid down after the last glacial maximum, when sea level rose rapidly and reached its present level about 7000 years ago. The formation includes lagoonal and lacustrine sediments adjacent to Lakes Alexandrina and Albert and in the Murray Mouth area. Gypsiferous sediments with associated gypsum lunettes at Cooke Plains were laid down in a restricted evaporitic environment at the eastern limit of an embayment of a formerly enlarged Lake Alexandrina. These sediments were deposited during the early and middle part of the Holocene period. Subsequent uplift of the land has largely removed these areas from marine influence. Other components of St Kilda Formation include coastal barrier deposits of Younghusband Peninsula (Semaphore Sand Member), and bioclastic carbonate sediments of the Coorong lagoon.

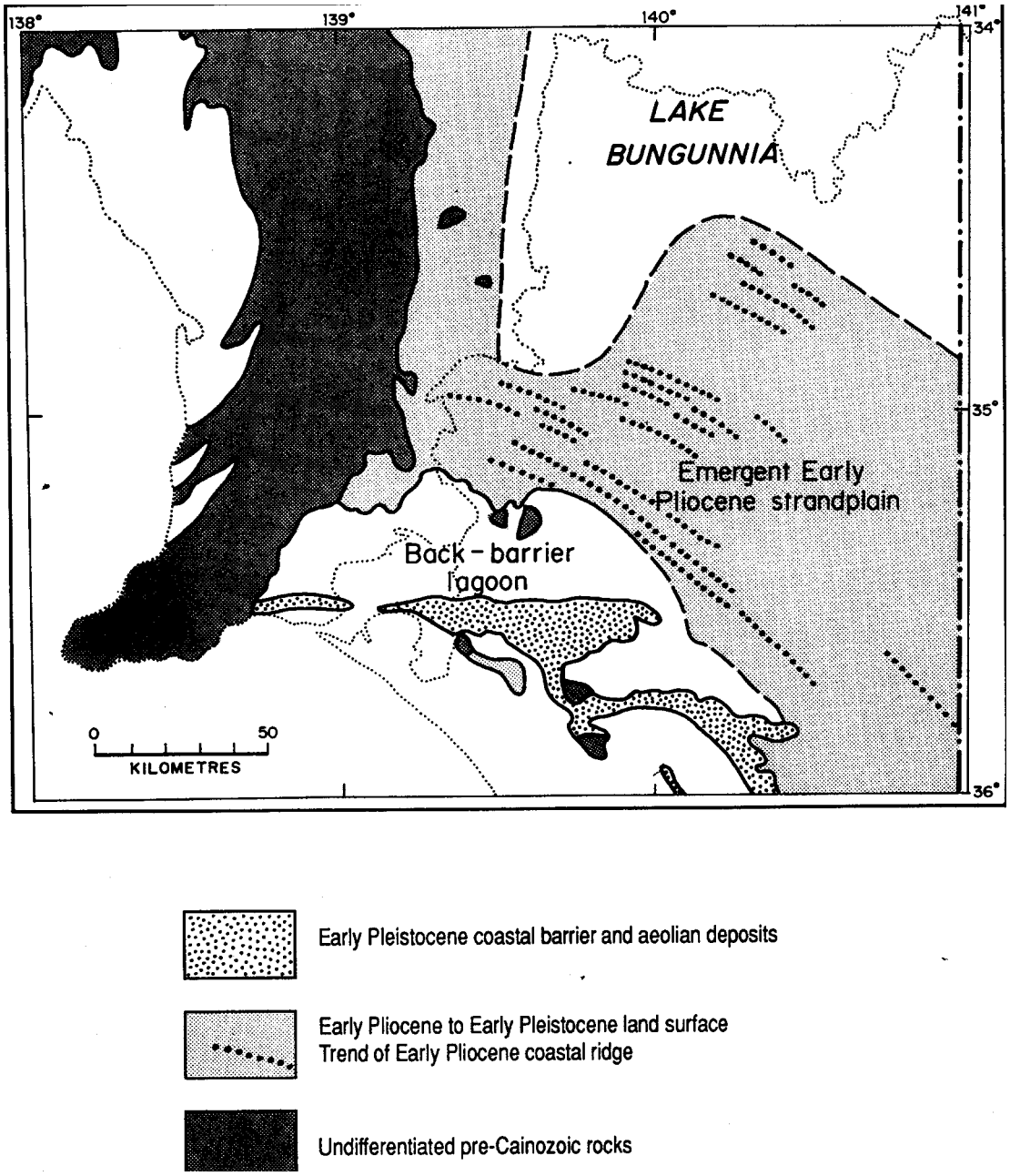


Figure 11.
Early Pleistocene palaeogeography of the Murray Mallee region. (After Belperio and Buck 1990).

LAND-USE HISTORY

By J. Foulkes[1] and D. Armstrong[1]

ABORIGINAL HISTORY

Aboriginal occupation of this part of Australia is believed to be in the order of 40-50,000 years (Harris 1989). Early European explorers found scant evidence of Aboriginal occupation in the mallee. They believed that the lack of surface waters prevented permanent occupation and that Aboriginals moved into the mallee following good seasons and an abundance of foods and water. There is now a body of evidence from a large number of occupation sites and ethnographic records that permanent occupation occurred. Water did restrict population size but occupation occurred at sites where soaks were present and in areas where a network/system of rock holes and solution cavities were maintained to collect considerable amounts of water. In some areas, neighbouring tribes allowed mallee people access to the river in times of drought.

When Europeans arrived there were 2 main tribal groups within the region and three smaller clans of the Ngarranjiri on the western side of the river. Shaw and Robinson (1996) describe the Aboriginal history and tribal groups from the northern margins of the Murray River. These groups were mapped by Tindale (1974). Recent archaeological and linguistic work disputes the validity of some of Tindale's groups (Harris 1990); we have used Tindale's nomenclature. These tribes utilised the area as described below.

European diseases such as smallpox and influenza spread down the River Murray and caused significant loss of Aboriginal lives, even before they actually had direct contact with Europeans. With the arrival of Europeans, the remaining Ngarkat people were in a distressed and debilitated state and disappeared rapidly. Today there are no known descendants of some of the original tribes (Department of Environment and Natural Resources, 1993).

Ngarkat:

This group occupied large areas (22,600 km^2) of the Murray Mallee, south as far as Tintinara and east of the Murray River to Tatura. They probably occupied the area on a permanent basis. They were reliant on water from soaks scattered throughout the region and they were also able to extract water from the roots of eucalypts. It has been reported that in times of severe drought, the Ngarkat were permitted by the Ngaiwang people to fall back to the waters of the River Murray (Harris 1982). It has been suggested that water limited

the population size of the Ngarkat people. For example, Kimber (in Harris 1982) concluded that the population for the Ninety Mile Desert Region of the Murray Mallee was no greater than ninety people. Their reliance on the soaks is represented by open areas immediately surrounding the soaks, presumably as a result of removing vegetation for firewood.

Eyre noted that in the eyes of Europeans, the region they occupied was "barren and worthless" but "to the native the most valuable and productive for here the wallabie, the opossum, the kangaroo rat, the bandicoot, the liepoa [mallee fowl], snakes lizards iguana and many other animals, reptiles, birds etc abound". This indicates that the standard of living must have been reasonably high.

Ngintait:

Little is known of this group with observations of their social organisation and folklore made during the late 1800's and early 1900's (Tindale 1974). The Ngintait predominantly inhabited an area of approximately 6,200 km^2 on the southern side of the Murray River from above Paringa to near Mildura and south to the southern extent of the mallee (Tindale 1974).

Three groups that at times have been considered to be Ngarrandjeri occupied the lower reaches of the Murray River and the margins of Lake Alexandrina. The Ngaralta were located on the Murray River from Wood Hill to Port Mannum, west to the eastern scarp of the Mount Lofty Ranges (Tindale 1974). The Portaulun were present on the western bank of the Murray River from Wood Hill to Wellington, occupying an area of less than 1000 km^2.

The Jarildekald occupied a small area of approximately 1,300 km^2 on the eastern side of Lake Alexandrina and the Murray River from Loveday Bay to Mobilong, the Narrung Peninsula and east to Meningie and Cookes Plains. This tribe consisted of more than 15 hordes. The social organisation and rituals of these three groups has been well documented in the literature (Tindale 1974).

EUROPEAN HISTORY

Early European history

The first European to have viewed the Murray Mallee was Charles Sturt while navigating the Murray River during his 1829-30 expedition. The impression he formed of the Mallee was unfavourable describing the country, "as barren and unproductive as the worst of the country we have passed through" (Sturt 1833 in Harris 1989). Unfortunately the Murray River acted as a conduit for European diseases such as smallpox and influenza which preceded European contact with Aboriginal tribes, decimating the local population leaving the remaining survivors in a diseased and debilitated state (NPWS 1984).

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Shortly after the establishment of the colony of South Australia in 1836, enterprising colonists began bringing stock overland from the eastern settlements. However, the nature of the waterless scrub took its toll upon some of these ventures. Edward John Eyre during May 1838 attempted to overland 300 head of cattle from the eastern settlements but upon encountering "country very thickly covered with scrub" (South Australian Gazette in Harris 1989) found it impossible to proceed, ultimately failing in this enterprise. Learning from Eyre's experience, subsequent droving ventures avoided the mallee country by the establishment of safer routes along the Coorong and the Murray River (Harris 1982).

Due to bloody clashes between the Murray River Aboriginals and Europeans overlanding stock, a settlement was established at Moorundie, 40 kilometres south of the North-West bend of the river. Edward John Eyre was appointed Special Magistrate and Protector of Aboriginals in 1841 and operated from this settlement to maintain peace between European settlers and Aboriginals. Moorundie was occupied until 1856 when it was abandoned in favour of the new government town of Blanchetown, approximately 5 km to the North. This new settlement was deemed to be a more suitable location for a port to service the growing river trade.

During the 1840's much of the land of the Western Murray Flats, close to the reliable waters of the Murray River was taken up under annual occupational licences. These were cancelled in 1851 and subsequent land ownership was either freehold or pastoral lease. From about 1860, land shortages in the more fertile districts led to the resumption of many pastoral leases in the Western Murray Flats and the subsequent progressive declaration of Hundreds. East of the Murray River the first use of suitable areas was pastoral and remained so until 1870 when Hundreds were proclaimed throughout the area (Potter *et al* 1973). Most of the pastoral activity was confined to the more open calcrete plains extending east from the Murray River which allowed greater accessibility than the more impenetrable mallee vegetation beyond.

Following the proclamation of Hundreds in conjunction with legislation that liberalised conditions of tenure, and new methods and inventions that facilitated clearance and cultivation, the Murray Mallee east and west of the River became the focus of agricultural development (Williams 1974). However this development was limited in the rate of its expansion due to transport costs. Previously this inaccessibility, distance from markets and lack of surface water had precluded agricultural activity. The advent of railways changed all this. An area of approximately 461 978 acres were cleared in the Pinnaroo area in the south east of the Murray Mallee in the eight years after the construction of the Adelaide to Melbourne line in 1906. Further railway extensions to Paringa in the north-east in 1913 and three branch lines, one to Peebinga and two towards the Murray River terminating at Waikerie and Loxton in 1914 meant the Northern Murray Mallee was now accessible to agriculture with the associated clearance of vast areas of vegetation. An indication of the scale and pace of vegetation clearance is provided by Table 3 revealing the two major peaks of activity recorded west and south of the Murray River.

The extensive clearance created a secondary source of income for farmers as the use of "mallee roots" for firewood became popular. Another source of income generated from clearance was the production of charcoal from mallee Eucalypt species. The vegetation of the Western Murray Flats being closer to potential markets suffered most from this activity, particularly during the second World War when widespread petrol shortages resulted in the utilisation of charcoal to generate producer gas to power motor vehicles (NPWS 1984).

The combined effect of these activities was the clearance of vast areas of agriculturally marginal land particularly in the northern areas of the Murray Mallee. This excessive clearance in conjunction with inappropriate farming practices and a succession of years of low rainfall marked a period of extensive wind erosion during the Depression years of the 1930's. The Marginal Lands Act 1940, was instituted to address this chronic condition implementing rural reconstruction schemes helping non-viable farmers to leave the land, encouraging the consolidation of smaller properties into larger more stable concerns. Following the second World War, the introduction of suitable crop rotations, livestock management in conjunction with pasture crops and methods of dune stabilisation to counter loss of soil fertility and erosion all contributed to reduce further land degradation the Northern Mallee (Williams 1974, Moore 1985). However, this post war period also saw clearance activities increase in the South. Government funding and encouragement as part of the soldier settlement scheme in conjunction with the discovery and alleviation of trace element deficiencies and the development of heavy machinery lead to the clearance of large areas of the Ninety Mile Desert.

Table 2.

Area estimates of Remnant Vegetation for the Murray Mallee Survey Area. It should be noted that a proportion of the area of remnant vegetation within Ngarkat Conservation Park is not within a hundred. This area is listed at the end. The hundreds cover the area on the east of the Murray River but also encompasses hundreds on the west of the river within the Western Murray Flats survey area. Vegetation mapping was mapped from 1:40,000 aerial photographs dating from 1985, 1987, 1989, 1991 for the Western Murray Flats and Murray Mallee regions (Planning SA).

Hundred	County	Area of hundred (ha)	Remnant Vegetation (ha)	Remnant Vegetation (%)
Allen	Alfred	46,194	9,482	21.0
Allenby	Chandos	31,091	4,178	13.0
Angas	Sturt	34,956	2,727	8.0
Anna	Eyre	28,005	8,858	32.0
Archibald	Buckingham	39,627	29,223	74.0
Auld	Chandos	42,589	31,899	75.0
Bagot	Eyre	26,137	7,281	28.0
Bakara	Albert	67,751	27,115	40.0
Bandon	Albert	53,861	7,440	14.0
Belvidere	Light	22,182	4	<1.0
Bews	Chandos	56,262	2,118	4.0
Billiatt	Chandos	42,683	35,035	82.0
Bonney	Russell	45,936	4,611	10.0
Bookpurnong	Alfred	78,686	3,194	4.0
Bowhill	Buccleuch	29,424	3,563	12.0
Brinkley	Sturt	60,221	3,499	6.0
Brownlow	Eyre	34,245	10,610	31.0
Burdett	Russell	31,032	4,629	15.0
Cadell	Albert	22,485	5,939	26.0
Carcuma	Buccleuch	35,488	9,594	27.0
Chesson	Albert	26,553	1,560	6.0
Colebatch	Cardwell	34,241	5,851	17.0
Coneybeer	Buccleuch	35,383	4,638	13.0
Coolinong	Russell	24,873	2,472	10.0
Coombe	Cardwell	45,232	2,241	5.0
Cotton	Chandos	56,180	4,715	8.0
Day	Chandos	27,038	8,871	33.0
Dutton	Eyre	20,424	1,845	9.0
Ettrick	Russell	33,968	6,195	18.0
Field	Cardwell	24,834	375	2.0
Finniss	Sturt	33,752	2,302	7.0
Fisher	Eyre	23,223	13,418	58.0
Fisk	Chandos	26,445	24,464	93.0
Forster	Albert	33,416	6,084	18.0
Freeling	Sturt	38,790	3,532	9.0
Glyde	Cardwell	40,148	3,543	9.0
Gordon	Alfred	47,869	2,252	5.0
Hay	Eyre	33,041	24,280	73.0
Holder	Albert	57,002	10,233	18.0
Hooper	Buccleuch	38,935	1,949	5.0
Jeffries	Russell	24,703	3,683	15.0
Jellicoe	Eyre	32,903	1,983	6.0
Julia Creek	Light	23,414	32	<1.0
Jutland	Sturt	26,468	347	1.0
Kekwick	Alfred	47,747	7,871	16.0
Kingsford	Chandos	42,432	20,350	48.0
Kirkpatrick	Buccleuch	25,589	2,421	9.0
Lewis	Buccleuch	42,743	12,015	28.0
Livingston	Buccleuch	34,211	4,116	12.0

Hundred	County	Area of hundred (ha)	Remnant Vegetation (ha)	Remnant Vegetation (%)
Makin	Buckingham	34,859	20,679	59.0
Malcolm	Russell	52,848	2,409	5.0
Mantung	Albert	67,454	12,944	19.0
Marmon Jabuk	Buccleuch	39,270	1,970	5.0
Mccallum	Buckingham	35,843	19,046	53.0
Mcgorrery	Alfred	46,686	5,985	13.0
Mcpherson	Buccleuch	34,354	7,509	22.0
Mindarie	Albert	27,425	2,954	11.0
Mobilong	Sturt	31,529	1,881	6.0
Molineux	Buccleuch	38,364	2,337	6.0
Monarto	Sturt	27,563	2,320	8.0
Moorook	Albert	56,680	5,803	10.0
Moorooroo	Light	31,633	47	<1.0
Murbko	Albert	28,861	16,549	57.0
Murtho	Alfred	32,063	5,255	16.0
Neales	Eyre	25,968	1,642	6.0
Nildottie	Albert	32,892	12,942	39.0
Paisley	Albert	32,303	18,225	56.0
Parilla	Chandos	56,103	2,680	5.0
Paringa	Alfred	41,851	3,844	9.0
Peake	Buccleuch	36,556	805	2.0
Peebinga	Chandos	43,086	12,332	29.0
Pinnaroo	Chandos	56,707	2,004	4.0
Price	Buccleuch	41,364	1,067	3.0
Pyap	Alfred	47,931	1,362	3.0
Quirke	Chandos	24,976	20,640	83.0
Richards	Cardwell	38,864	951	2.0
Ridley	Sturt	45,717	9,985	22.0
Roby	Buccleuch	37,072	488	1.0
Seymour	Russell	43,383	4,441	10.0
Shaugh	Buckingham	48,128	13,198	27.0
Sherlock	Buccleuch	38,220	2,063	5.0
Skurray	Eyre	28,558	17,924	63.0
Strawbridge	Buccleuch	26,711	6,607	25.0
Tungkillo	Sturt	31,394	1,741	6.0
Vincent	Buccleuch	37,217	2,707	7.0
Waikerie	Albert	64,992	16,520	25.0
Wilson	Buccleuch	32,426	1,133	3.0
Younghusband	Russell	28,276	1,746	6.0
“Ngarkat CP”		168,645	160,843	95.0

Table 3.
Land cleared on the Murray Mallee during two peak periods of clearing.

	Southern Half	Northern Half	TOTAL
Date	Area (ha)	Area (ha)	Area (ha)
1907-14	201,610	113,631	315,241
1925-29	152,382	178,734	331,116

(Source: SA Stat. Reg. 1907-1929 in:Williams 1974).

Contemporary land use throughout the Murray Mallee is predominantly dry-land farming with cereal crops in rotation with pastoral activities such as beef cattle and sheep for wool and fat lambs.

The extended period of clearance has dramatically fragmented the original continuous cover of native vegetation. Most of the remnants are to be found on those soil types least suitable for agriculture. Obviously those plant communities that previously occupied the more arable soils are now generally the smallest remnants of vegetation in the landscape.

In an effort to encourage the retention and conservation of native vegetation on private land the South Australian Government amended the Heritage Act 1980, to introduce the Heritage Agreement Scheme. This scheme provided incentives such as reimbursement for fencing costs, remission of local government rates and management assistance to encourage the voluntary retention of vegetation for conservation purposes (Dendy and Robertson, 1987). To some extent, this scheme had the opposite effect and seemed to provide a stimulus to accelerate clearance on private lands. In order to counter this rash of clearance it was obvious that the incentives required strengthening by regulation. Today, broad-acre clearance of native vegetation in South Australia has effectively ceased under the *Native Vegetation Act 1991* (S.A). Table 2 shows the extent of native vegetation clearance within the Murray Mallee Survey Area by Hundreds.

In May 1983, clearance controls were introduced by regulation under the Planning Act 1980, with the South Australian Planning Commission deciding the outcome of clearance applications. However, problems with legislative and administrative arrangements required the formulation of a new Native Vegetation Management Act which came into operation late 1985. This Act provided for;

- the establishment of the Native Vegetation Authority to make decisions on clearance applications
- the payment of financial assistance to landowners who are refused an application to clear and who enter into a Heritage Agreement.

A subsequent review of the Act after a 12 month period resulted in further administration and legislative refinement in December 1986. Among the refinements were increased financial assistance, appointment of conciliators to advise land-holders and the acquisition of properties made non-viable by a decision of the Authority.

Brief description of development of conservation in the study area follows. Under the National Parks and Wildlife Act 1972-74 approximately 8% of the remaining native vegetation in the study area is conserved in a system of conservation parks (Table 4) and as shown in the figures in the vegetation section (Table 11, page 146). These include the largest remaining remnants in the Region.

CONSERVATION

Seventeen conservation parks are located in the Murray Mallee, ranging in area from 94 hectares (Marne Valley Conservation Park) to over 205, 000 hectares (Ngarkat Conservation Park) (Table 4). Most of these parks are quite small and only five are greater than 5,000 hectares. A summary of the location and history of each of the parks is provided below. More detail on the history and biological value of these parks can be found in their respective management plans.

Peebinga Conservation Park is located 35 km north of Pinnaroo is in the Billiat Environmental Association of Laut *et al.* (1977). The area was set aside in 1940 as a flora and fauna reserve as the area had proven unsuitable for farming and was notorious for sand drift. Additions and adjustments to the boundary were made between 1962 and 1965.

Bakara Conservation Park approximately 25 km south of Waikerie, was compulsorily acquired in 1983. The park is a *Eucalyptus socialis* open mallee, which had been identified as one of a number of plant communities absent or poorly represented in the nations reserve system. It is considered to be of high floristic diversity and contains a significant population of Malleefowl. It occurs in the Holder environmental association of Laut *et al.* (1974)

Billiatt Conservation Park in the Billiat environmental association is located approximately 37 km north of Lameroo. The bulk of the current area of the park was declared a flora and fauna reserve in 1940 following a recommendation from the Land Board due to it being 'liable to soil erosion and have very little value economically'. Further sections have been added to the park since 1965.

Carcuma Conservation Park is located approximately 18 km northeast of Coonalpyn. It was formerly part of a grazing property and was dedicated a park when the lease expired as the Department of Lands considered it to be "50 % suitable for development but suitable for the National Parks Commission purposes". It is located in the Big Desert environmental association (Laut *et al.* 1974).

Ferries-McDonald Conservation Park is located approximately 20 km south west of Murray Bridge. It was dedicated in two stages. The first took place in 1938 when the area was gazetted as a Closed Area for Birds and Animals, creating the first reserve specifically for mallee fauna. The area was named after Robert McDonald, the donor of much of the land. An

addition to the park was made in 1953 with monies from a bequest from James Ferries, creating the Ferries-McDonald Reserve. The park is in the Wood Hill environmental association (Laut *et al.*1974).

Karte Conservation Park is 30 km north-west of Pinnaroo in the Billiat environmental association (Laut *et al.* 1974) and is located in the centre of the Murray Mallee. The whole area was considered to have little agricultural value and the park was dedicated in 1969 with additions made in 1971 and 1976. None of the park area has ever been cleared and it is believed that no grazing took place within the park.

Lowan Conservation Park, approximately 20 km north west of Karoonda, was purchased on the Land Board and National Parks Council recommendation from its private owners who were anxious to see scrub remain on the block. The park is in the Karoonda environmental association (Laut *et al.*1974)

Marne Valley Conservation Park is located approximately 10 km east of Cambrai, in the Blanchetown Environmental Association. This small park is part of a former travelling stock route on the Marne River.

Monarto Conservation Park 15 km south west of Murray Bridge was declared following the abandonment of the proposed satellite-city of Monarto. Much of the land acquired for the development was subsequently re-sold. The portion previously known as Braendlers Scrub was proclaimed as Monarto Conservation Park. It had been "rolled" at some stage but has regenerated well and is known for its prolific flowering plants.

Mt. Boothby Conservation Park dedicated in 1967, lies 14 km west of Culburra in the Cantana environmental association. Prior to being proclaimed a park, it was previously crown land withheld from settlement due to lack of underground water.

Ridley Conservation Park is on the western side of the Mannum-Swan Reach Road, about 10 km south of Swan Reach in the Punthari environmental association. It is a long, narrow park, which was formerly part of a stock route.

Scorpion Springs Conservation Park, Mt. Shaugh Conservation Park, Ngarkat Conservation Park, Mt. *Rescue Conservation Park.* The four parks which make up the block are predominantly within the Big Desert Environmental Association, with part of Mt. Rescue also in the Cannwigara environmental association (Laut *et al.* 1977) and comprise the largest single natural vegetation remnant in the agricultural regions of South Australia. The area covered by these parks has a history of limited grazing and was systematically burnt in order to promote better feed. As with much of the region it was considered unsuitable for agriculture and remained as largely unused Crown land until its progressive integration into the parks system beginning in 1962 with Mount Rescue and ending in 1979 with the inclusion of Ngarkat.

Swan Reach Conservation Park is about 10 km west of the town of Swan Reach. It is in the Blanchetown Environmental Association. The Park was primarily proclaimed to protect the Southern Hairy-nosed Wombat (*Lasiorhinus latifrons*).

Brookfield Conservation Park is located to the north of the Sturt Highway, approximately 11 km west of Blanchetown and falls within the Blanchetown Environmental Association. The Park was primarily proclaimed to protect the Southern Hairy-nosed Wombat (*Lasiorhinus latifrons*) and its habitat. The original property, Glen Leslie Station, was purchased by the Chicago Zoological Society in 1971 and renamed Brookfield Zoo Wombat Park. Increased running costs of the zoo led to the reserve being offered to the state Government in 1977, with official proclamation taking place in 1978.

All areas described above are designated as conservation parks, defined under the *National Parks and Wildlife Act 1972.*

A further 136,804 ha of native vegetation is protected under 319 Heritage Agreements (to 1986). The area of these agreements ranges from 2 to 3,948 hectares with the average area being 429 ha and a median of 258 ha.

Table 4.
Area estimates of National Parks and Wildlife Reserves within the Murray Mallee Survey Area, NPWS Reserve boundaries current to December 1998.

Reserve	Reserve code	Area (ha)
Bakara Conservation Park	CP184	1,027
Billiatt Conservation Park	CP012	59,273
Brookfield Conservation Park	CP163	5,591
Carcuma Conservation Park	CP042	2,939
Ferries-Macdonald Conservation Park	CP002	851
Karte Conservation Park	CP043	3,614
Lowan Conservation Park	CP074	675
Marne Valley Conservation Park	CP148	94
Monarto Conservation Park	CP173	241
Morgan Conservation Park	CP155	395
Mount Boothby Conservation Park	CP032	4,087
Mount Rescue Conservation Park	CP011	28,339
Mount Shaugh Conservation Park	CP078	3,474
Ngarkat Conservation Park	CP168	205,158
Peebinga Conservation Park	CP008	3,381
Ridley Conservation Park	CP034	417
Scorpion Springs Conservation Park	CP054	30,422
Swan Reach Conservation Park	CP051	2,032

METHODS

by J. Foulkes[1] & D. Armstrong[1]

SITE SELECTION AND NOMENCLATURE

As for the previous regional surveys in South Australia, sample sites were selected to represent the biological and geographical diversity of the study area. In addition, the location of sites where biological data had already been collected were taken into consideration to avoid duplicating sampling effort.

Using the environmental association and land unit information in Laut *et al.* (1977) and 1:50,000 and 1:100,00 black and white aerial photo mosaics, sites were selected to represent the range of geographical formations and vegetation patterns visible on aerial photography throughout the area. A relatively even distribution of sites across mapsheets, environmental associations and rainfall gradients was sought.

At each site a series of quadrats were selected to reflect the representative land-forms and observed vegetation types present within an area of about one square kilometre. The number of quadrats at each site varied from one to five depending on the heterogeneity of the site, with each quadrat being placed in a homogeneous patch of vegetation.

Sites and quadrats were systematically named and coded in a hierarchical manner as follows. Groups of sites, called *site-areas*, were named after a local geographic feature or property, using a two letter code (the site-area code) e.g.BT site-area. Within each site-area, individual *sites* were sequentially numbered and given a four digit code (the site code) comprising the site-area code and sequence number e.g. BT01, BT02 are Billiatt site-area, sites number 1 & 2. At each site the *quadrats* were then sequentially numbered e.g. BT0101, BT0102, BT0201, BT0202 etc.

Additional factors affecting site location included landowner permission and accessibility, especially during wet weather. The final location of each quadrat was determined in the field by the survey workers.

Data collection methods were designed to be compatible with those used on adjacent surveys in South Australia, Victoria and N.S.W.

VEGETATION SURVEY

The Murray Mallee vegetation survey was conducted in late winter /early spring 1990. In that period, 678 of 749 selected sites were surveyed using the following methodology. The distribution of these quadrats is shown in Figure 19. More detailed information on the location, physical environment and final classified vegetation type of each quadrat are shown in Appendix I.

At each quadrat detailed descriptions of the location (using topographic maps, aerial photographs and hand drawn 'mud' maps), physical environment (landform elements and patterns, surface soil texture (both according to Speight (1990) disturbance and vegetation within a 30 x 30 metre area were recorded using standard data sheets. All vascular plant species present were recorded and evaluated using a measure of cover/abundance adapted from Braun-Blanquet (1964, in Gullan *et al*. 1976) and the structural classification of lifeform/height class and percent 'canopy' cover adapted from Muir (1977) (see below). These adapted Muir and Braun-Blanquet classifications are tabulated in Appendix III & IV. A general vegetation association description, structural summary and overstorey measurements were also recorded for each quadrat.

When using Muir's (1977) classification in this survey, percent cover was defined as the area of ground covered by a solid vertical projection of the species' or lifeform's total crown area (i.e. to the periphery of the crown) as a percentage of the total ground area of the quadrat, which is correctly termed the *crown* cover (Walker and Hopkins 1990). This was considered easier to estimate in the field by a variety of workers than Muir's definition of *canopy* cover which takes into account only the area of individual foliage clumps within one tree/shrub's crown and therefore not including the open spaces for example within a mallee's widely spaced foliage clumps. Similarly, *projective foliage* cover (Specht *et al.* 1974, in Walker and Hopkins 1990) (which includes projected cover of leaves and branches but not spaces in between open foliage) was also considered too time consuming and subjective.

The Braun-Blanquet (1964, in Gullan *et al*. 1976) cover/abundance classification was also used as it incorporates an abundance element and has more classes at the lower end of the scale (as opposed to Muir's (1977) four broad cover classes) and thus were considered more appropriate for mallee and semi-arid vegetation types. Muir's four classes were used for the structural summary of the whole community strata.

Herbarium specimens of every plant species encountered in each major area sampled were collected for later verification and incorporation into the State Herbarium collection. An expert taxonomist was available each week of the survey to assist with field determinations.

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Any interesting species observed outside the specified quadrats were recorded as 'opportunistic' on separate data sheets with location details only.

FAUNA SURVEY

A sub-set of 173 vegetation survey sites were sampled for vertebrate fauna over a period of six weeks from 21st October to 30th November 1991 using three teams of three to four workers each week. Each team included a mammalogist, an ornithologist and a herpetologist.

Of the 173 sites, 135 were a sub-set of sites from the Murray Mallee floristic survey, 25 were a sub-set of the Western Murray Flats floristic survey (Lock and Goodwins 1993) and the remaining 13 comprised a sub-set of sites established in the Northern Murray Mallee area during a study proposing management objectives for native vegetation remnants in the Murray Mallee (Barrett *et al.* 1991). Only 163 of these sites had both floristic and fauna data.

Single quadrats were selected from the vegetation sites to proportionately represent the vegetation group centroids detected in a preliminary analysis of the vegetation data, ensuring an even distribution of quadrats across the area and that the geographical distribution of each vegetation group was sampled.

At any one vegetation survey site the quadrat used for fauna sampling was generally in the dominant vegetation type, although at some sites more minor vegetation types were sampled. In this way all significant representative habitat types in each geographical area were sampled.

The distribution of the fauna survey quadrats is shown in Figure 12 and individual quadrats are listed in Appendix I**.**

At each quadrat reptiles and small mammals were sampled 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 15 Elliott traps and two cage traps was run in association with each pitline, about 20m away. Where rock prevented digging of some or all pits, a reduced depth pit was used or extra Elliott traps were set and additional effort put into physical searching and spotlighting. Each quadrat was sampled for four days and four nights. Trapping effort was not consistent at all sites as sheet limestone prevented pit lines being established at some quadrats. At a number of sites, holes for pits were created using explosives (Figure 13) and jackhammers (Figure 14), however a total of 39 quadrats had no pits installed and a further 9 quadrats had less than the full complement (between 2 and 5 pits). Damage to Elliott traps meant that at some quadrats (10), a full compliment of traps could not be set. Eight sites had no Elliot or pit traps set.

Mammals and reptiles were also recorded by active searching for individuals or signs such as burrows and scats. This was carried out for one to two hours at each quadrat. Spotlight searches were made at night where time and habitat permitted. Birds were observed and recorded for one to two hours during early morning or late afternoon at each quadrat.

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 of each area, including species' use of smaller or more heterogeneous habitat types not sampled by the quadrats.

Bats were sampled on an independent survey conducted by Cath Kemper, Lynette Queale (SA Museum) and John Davis. They sampled 42 sites during October and November 1991 (Figure 12). Attempts were made to sample bats on or near designated survey quadrats. Specific habitat required for trapping bats were sought to increase the likelihood of success. Suitable sites consisted of closed woodland of sufficient age for tree hollows to exist, old farm buildings and sheds, or tanks and dams adjacent suitable habitat. Mist nets (Figure 15) were erected and monitored for a few hours in the evenings, in suitable weather conditions, and harp traps were left up all night. The locations were trapped for bats for a total of 50 harp trap nights and 357 hours of mist-netting.

Generally one specimen of each small reptile and mammal species from each campsite was preserved as a museum specimen depending on the abundance or rarity of the species and the advice of museum curators. Standard collection, killing and preservation methods were employed with approval from the Department Animal Ethics Committee. Samples of liver tissue were taken from all specimens collected and stored in liquid nitrogen for the South Australian Museum (Evolutionary Biology Unit). Specimens and samples are permanently stored at the museum for future taxonomic studies.

A line of micro-pitfall plastic vials (2cm diameter, 10cm deep, filled with 70% alcohol) was laid parallel to each macro-pitfall line to collect invertebrates for the S.A. Museum. Invertebrates found in the macro-pitfalls were preserved in alcohol for later identification. Invertebrate data did not however form part of the data analysed. Identifications of these samples are not yet available. A summary of the trapping effort is shown in Table 3 and the daily minimum and maximum air temperatures recorded at each campsite are tabulated in

Appendix II. Figures 13 - 18 illustrate the range of activities undertaken during the field work.

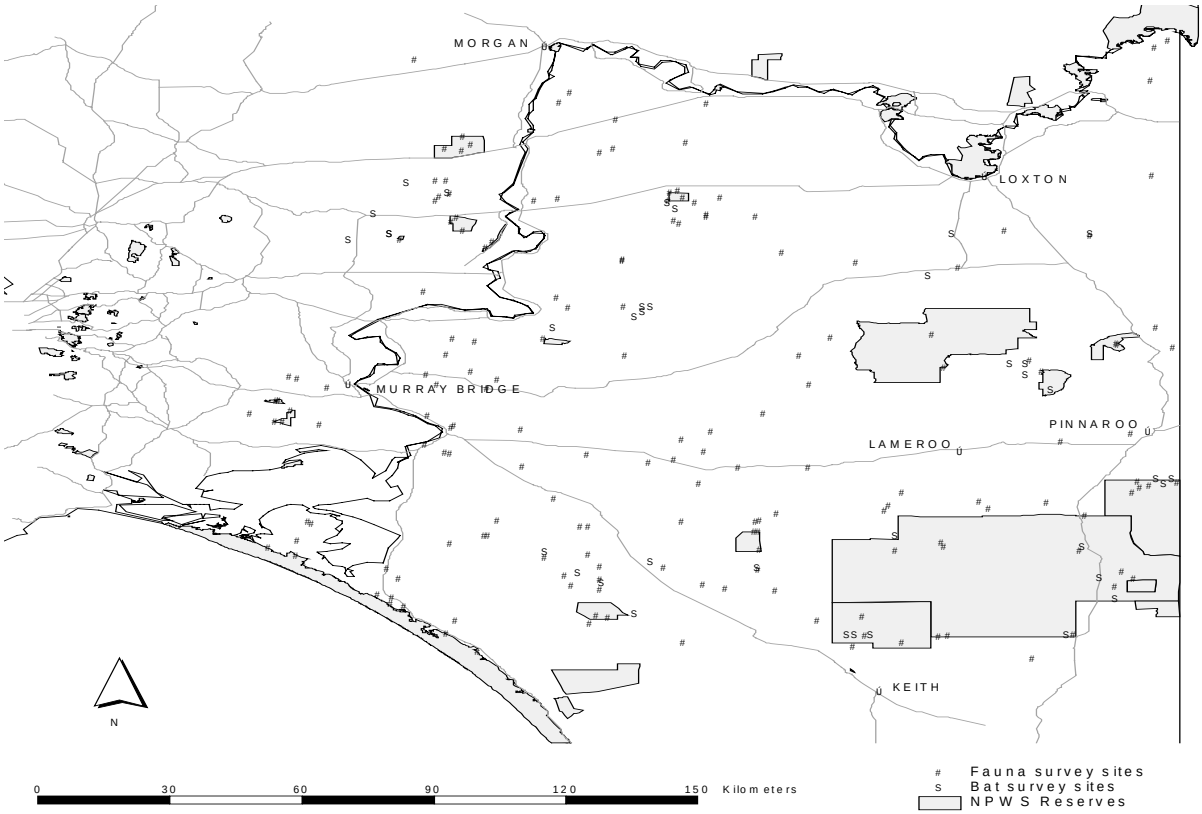

Figure 12.
Location of standard fauna survey sites (black circles) and opportune bat survey sites (open circles) surveyed during the Murray Mallee Survey.

Table 3.
Trapping effort for terrestrial mammals and reptiles during the Murray Mallee Vertebrate Fauna Survey, October- November 1991.

Week	Group	Base Camp	Pit trap nights	Elliot trap nights	Cage trap nights
1	1	Loxton	192	600	80
	2	Yookamurra	192	600	76
	3	Yookamurra	240	600	80
2	1	Purnong	48	600	80
	2	Murray Bridge	164	600	76
	3	Jabuk	174	630	74
3	4	Pinnaroo	168	600	80
	5	Pinnaroo	240	600	80
	6	Meningie	264	625	76
4	4	Jabuk	116	600	80
	5	Tintinara	236	600	80
	6	Jabuk	252	590	80
5	7	Coonalpyn	240	600	80
	8	Coonalpyn	200	570	76
	9	Coonalpyn	174	495	66
6	7	Yookamurra	144	360	48
	8	Yookamurra	108	570	76
	9	Murray Bridge	216	568	96
Total			**3 368**	**10 408**	**1 384**

PHOTOGRAPHIC MONITORING POINTS
At each fauna survey quadrat a permanent photographic monitoring point was established according to the South Australian Biological Survey protocol as described by Forward (1996).

Details of the physical environment, vegetation type and locations of all vegetation survey quadrats are shown by 1:100,000 map-sheets in Appendix I, with fauna survey and photo-point quadrats indicated.

DATA MANAGEMENT AND TAXONOMY
Survey data are stored in a relational data base *Interbase* (Borland) on a Hewlett-Packard mainframe computer, accessed via *Oracle* and *Paradox* software. Data were extensively cross-checked and edited in an Excel spreadsheet prior to importing to PATN.

All taxonomy was thoroughly checked although taxonomy is regularly updated through the data base. Dubious records were attributed to 'Genus sp.' if the observer or observation was not considered reliable, and hence excluded from the analysis.

Fauna
A similar system of voucher number usage to that used for plants enabled later verification or correction of collected fauna specimens' identifications. Vertebrate fauna taxonomy is according to Watts (1990) and updates by the relevant Museum Curators. No subspecific designations were used in the analysis and reporting as consistent differentiation of certain sub-species is not possible with a range of observers with varying skills.

DATA ANALYSIS
The vegetation and fauna quadrat data were analysed by classification and ordination techniques using PATN exploratory data analysis software (Belbin 1987) to detect trends and patterns in the data. Vegetation, mammal, bird and reptile data were separately extracted from the survey database as listings of sites and species, on which the discussed taxonomic standardisation's were performed. These data were then formatted into quadrat by species matrices for input into PATN using a specially written FORTRAN program PATNMAT.

Amphibian species were recorded too inconsistently to warrant any analysis. Similarly, opportunistic data, being non site-specific, also could not be analysed, but are still discussed in the results.

Fauna
Presence/absence data were used in the fauna analyses as abundance data were not recorded in a systematic manner. The same PATN analysis pathways as described in detail by Forward and Robinson (1996) were used to analyse vertebrate data, with the exception of mammals for which there was insufficient data to undertake numerical analysis. The PATNMAT module was not used for fauna input as the data was imported to PATN via free format (comma delimited).

The in-house post-processors, GROUPSTAT and GLIST, described in Forward and Robinson (1996) were no longer available so chi-square using a Yates Correction for continuity (Zar 1984) and proportional occurrence were calculated in Microsoft Excel .

Mammals

Insufficient data were collected for meaningful analysis to be conducted, so the occurrence of individual species has been described and discussed.

Reptiles

The initial reptile matrix contained 93 quadrats and 59 species (676 records). Several species were masked out: large snakes and goannas, legless lizards, blind snakes, 'Genus sp.' records and species with a frequency of one. Quadrats with only one species after this mask were also omitted. Thus, the final matrix contained 133 quadrats and 31 species.

Birds

The complete bird matrix contained 3168 records;102 species and 173 quadrats. All 'Genus sp.' records were masked out, as were any species that are very mobile, waterbirds and night-birds. The final matrix contained 61 species and 173 quadrats.

VEGETATION MAPPING

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The Murray Mallee vegetation was mapped using 1985 to 1989 1: 40 000 colour stereo-pair aerial photography. Areas of 1 hectare or larger were mapped. The mapping was based on the statistical analysis of site based vegetation survey data. The plant communities were defined using the statistical analysis groups as a base with further sub-divisions to represent plant communities identified from aerial photograph interpretation and field checking. Plant communities were mapped using dominant overstorey species (to represent the particular suite of species likely to be found within that community), along with overstorey species height and projective foliage cover to indicate structure.

Significant reliance was placed on aerial photograph interpretation. Such interpretation is never completely accurate and variations from the descriptions may occur in local areas. Considerable areas of roadside vegetation is not included in the mapping due to the difficulty in delineating it from aerial photography at 1: 40 000 scale.

Vegetation mapping was drafted from the aerial photographs onto 1: 40 000 scale mylar film that displayed the available 1: 10 000 and 1: 50 000 digital data of roads, cadastre, drainage and topography. The mapping was digitised from the mylar into ESRI's Arc/Info GIS software. This vegetation data is stored and maintained as part of the Environmental Database of South Australia by Planning SA.

Figure 13.
Explosives were also used to fracture sheet limestone to enable pitfall traps to be put in. **Photo D. Armstrong**.

Figure 14.
Jackhammers were used at a number of sites to install pitfall traps in sheet limestone. **Photo D. Armstrong.**

Figure 15.
Cath Kemper erecting a mist-net for batting over a waterhole. **Photo J. Davis.**

Figure 16.
Preparing reptile specimens at the Bayree Farm camp. **Photo K. Stevens.**

Figure 17.
Taking a photo-point photograph at a vegetation quadrat. **Photo K. Stevens.**

Figure 18.
Examining a road kill Western Grey Kangaroo opportune specimen. **Photo J. Davis.**

RESULTS

VEGETATION

by S. Kinnear[1], J. Gillen[2], F. Smith[1], S. Carruthers[1] and J. Foulkes[3]

INTRODUCTION

This survey was the first to provide a comprehensive list of plant species, a floristic vegetation association classification and detailed floristic vegetation map for the South Australian Murray Mallee region. The survey collected vegetation data, including 626 species from 678 Murray Mallee sites, as illustrated in Figure 19.

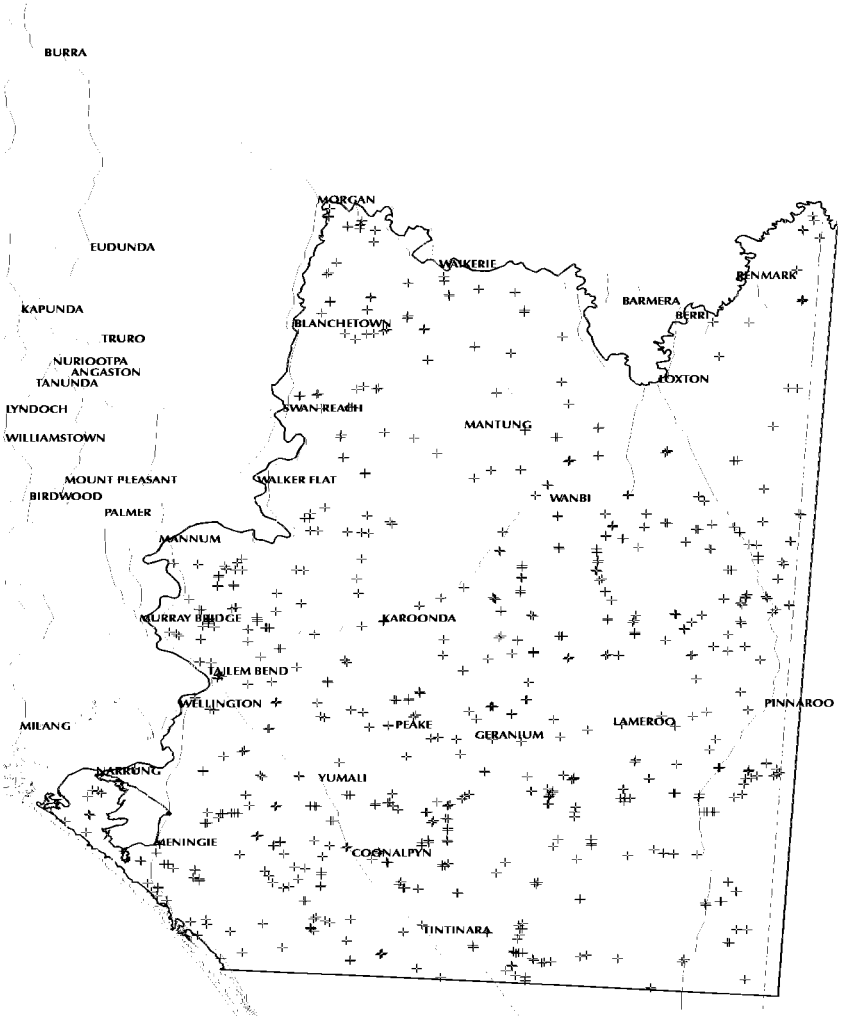

Figure 19.
Vegetation Sites from the Murray Mallee Biological Survey 1986.

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[2] Environment Australia, PO Box 119, YULARA NT 0872.
[3] Biological Survey and Research, Heritage and Biodiversity Division, Department for Environment and Heritage, GPO Box 1047, ADELAIDE SA 5001.

Figure 20.
***Calytrix tetragona* or common fringe myrtle was recorded widely during the survey. Photo A. Robinson.**

Figure 21.
Ridge-fruited mallee (*Eucalyptus incrassata*) was the most commonly recorded eucalypt during the survey.
Photo A. Robinson

Figure 22.
Flowering Holly-leaf Grevillea, (*Grevillea ilicifolia*). Photo A. Robinson.

Figure 23 .
A Fringe Lily*Thysanotus* sp. Photo A. Robinson.

A complete list of all plant taxa recorded from the Murray Mallee Region from the current survey and previous surveys is detailed in Appendix VI. Plant species and frequency of occurrence are shown in Appendix VII. The taxa that are identified as non-current (nc) are listed in Appendix VII with their appropriate taxonomic changes. A selection of flowering plants recorded during the survey are shown in Figures 20-23.

SIGNIFICANT SPECIES

There are 15 threatened and significant plant species recorded from the study area (Table 6). Brief descriptions of these are drawn from Briggs and Leigh (1995), Davies (1995), Lang & Kraehenbuehl (1998) and Kahrimanis (1999). More detailed descriptions of these species and aspects of their ecology along with other species from the Murray-Darling Basin in SA are provided in Kahrimanis (1999) and Kahrimanis and Carruthers (in prep.).

Coloured Spider-orchid (*Caladenia colorata*) (Figure 24)

The Coloured Spider-orchid is considered endemic to South Australia where it is found in the Murray region and along the eastern margins of the southern Mount Lofty Ranges, also in the South East. It has been recorded from Mount Boothby CP and Monarto CP in the study area, and has been collected from the Hartley, Milang and Monarto areas. It occurs in woodland dominated by *Eucalyptus leucoxylon*, *E. fasciculosa*, *Allocasuarina verticillata* and *Callitris pressii*, growing in sand over loam soils in the western edge of the study area.

Dodonaea subglandulifera

Dodonaea subglandulifera is considered Endangered in the Murray Mallee in South Australia and also Endangered nationally. No populations are known to occur in conservation reserves. It occurs in native vegetation associated with rock outcrops including Mallee Box (*Eucalyptus porosa*), Southern Cyprus Pine (*Callitris pressii*) Low woodland and a Tall shrubland community dominated by species of *Acacia*, *Dodonaea*, *Eremophila* and *Senna*.

Monarto mintbush (*Prostanthera eurybioides*)

The Monarto mintbush is endemic to South Australia, and clearance and intense grazing have greatly reduced the size and extent of populations. It is conserved in two small disjunct populations at Mount Monster CP in the upper South East and Monarto CP and at least two Heritage Agreement areas. There are at least 19 known unreserved populations occurring in the hundreds of Mobilong and Monarto.. It occurs on shallow sandy loams associated with outcrops of granite or schist. It is often found in Mallee Box (*Eucalyptus porosa*) Open woodland or a White Mallee (*E. dumosa*) Mallee communities. The Monarto mintbush has also been recorded associated with heath or shrubland of broombush *(Melaleuca uncinata*), Dagger-leaved Wattle (*Acacia rhigiophylla* or Wallowa (*A. calamifolia*).

Hale greenhood (*Pterostylis* aff. *nana* "Hale") (Figure 25)

This species was previously known as *Pterostylis* sp.10 or *P. nana*. A small population is conserved in a Heritage Agreement on the northern side of the Billiatt CP in the Murray Mallee, however little is known of its ecology.

Stiff Groundsel (*Senecio behrianus*)

This species was known from three collections made in the middle of the last century and is considered extinct in South Australia. It occured on sandy and loamy banks of the Murray River near Morundie, on sandy-clay banks of the Murray River near Woods Point Station near Wellington and from "Murray Flats". It was thought extinct in Australia until 1991, when a population was discovered near Stanhope in Victoria. Several hundred individuals exist along a roadside and adjacent irrigation channel. It occurs along the edges of closed-shrubland/herbland dominated by *Muehlenbeckia cunninghamii*, *Typha orientalis* or *Eragrostis infecunda* with emergent *Eucalyptus camaldulensis*.

Metallic sun-orchid (*Thelymitra epipactoides*)

Populations of *T. epipactoides* in the study area occur in Monarto CP, Mt Boothby CP, a nature reserve near Tintinara and several Heritage Agreements. It is also known from Gum Lagoon CP, Coorong NP and a State Flora Reserve near Tailem Bend. It occurs mainly in fertile loams in scrubby heath, often near swampy depressions. It is associated with *Melaleuca* and *Callitris* species in the Murray Mallee. Disturbance, especially by fire has been found to encourage its germination and growth. Threats to the species include weed invasion, grazing and trampling by introduced herbivores and firebreak and road construction.

Menzel's wattle (*Acacia menzelii*)

Menzel's wattle is endemic to South Australia where it is confined to localised regions of the Murray Mallee, Lofty Ranges and Flinders Ranges. It is considered Vulnerable across its range. Currently it is conserved in a number of Heritage Agreements in the Hundred of Mobilong, north of Monarto, and it is found in a few road reserves in the Murray Mallee. It has been found to occur in *Eucalyptus socialis* Low open woodland, *E. dumosa* Very open mallee, *E. porosa* Low woodland, *E. odorata* low woodland and *Callitris pressii* Open woodland in the Monarto area.

Resin Wattle (*Acacia rhetinocarpa*)

The Resin Wattle is endemic to South Australia and is considered as Vulnerable. Populations are present in

Table 6.
Threatened and Significant Plant species in the South Australian Murray Mallee.

Species	Common name	AUS*	SA#	Regional$
Caladenia colorata	coloured spider-orchid	E	E	MU,SL
Dodonaea subglandulifera	-	E	E	MU : E
Prostanthera eurybioides	Monarto mintbush	E -	E	MU & SE : E
Pterostylis aff. nana "Hale"	Hale greenhood	E	E	SL : E
Thelymitra epipactoides	metallic sun-orchid	E	E	MU: E
Acacia glandulicarpa	Hairy pod wattle	V	-	MU : E
Acacia menzelii	Menzel's wattle	V	V	MU : V
Acacia rhetinocarpa	resin wattle	V	V	MU : V
Phebalium lowanense	spreading cress or lowan phebalium	V	T	SE : T
Pterostylis xerophila	Desert greenhood	V	V	MU : E
Senecio macrocarpus	large-fruit groundsel	V	V	MU: X
Senecio megaglossus	superb groundsel	V	V	MU : E
Stipa nullanulla	club spear-grass	V	-	MU : K
Swainsona pyrophila	yellow swainson-pea	V	-	MU : E
Senecio behrianus	stiff groundsel	E	X	MU : X

AUS*refers to Environment Australia (1998) Endangered Species Protection Act Schedules, National conservation status

SA# refers to National Parks and Wildlife SA (1999) Draft Schedule, state conservation status

Regional$ refers to State Herbarium regions (MU-Murray, SE South-eastern, SL-Southern Lofty) and regional conservation status (Lang and Kraehenbuehl 1998).

Status explanation (X-Extinct, E-Endangered, V-vulnerable, T-Threatened, K-Insufficiently Known). Refer to relevant Schedules for definitions of status definitions.

Ferries-McDonald and Monarto Conservation Parks. Other populations currently occur unreserved on uncleared blocks or railway reserves mainly in the west of the study area. It has been found associated with *Eucalyptus porosa* Low woodlands, *E. socialis* Open mallee and *E. leptophylla* and *E. incrassata* Open mallee in the Mt Lofty Ranges. Competition from weeds on seedlings is considered a potential threat to recruitment to populations.

Mallee Phebalium (*Phebalium lowanense*)
Little is known of the ecology or threats to this perennial shrub that is considered Threatened in South Australia. Currently it is conserved in the Mount Shaugh Conservation Park in South Australia and the Big Desert Wilderness Park in Victoria.

Large-fruit Groundsel (*Senecio macrocarpus*)
The Large-fruit groundsel was once conserved in reserves across southern Australia and Tasmania, however this species is now presumed extinct in Tasmania and close to extinction in Victoria. In South Australia a very small population (<5 plants) is known from a Heritage Agreement on the Yulkiri Station in the hundred of Baker. There are records of this species collected from the Wellington and Goolwa areas as well as from Yorke Peninsula. The largest population occurs in Messent CP in the South-East where it is commonly associated with Sedgeland or Closed-sedgeland communities.

Figure 24.
The endangered *Caladenia colorata* (Coloured Spider Orchid) has been recorded from Monarto and Mt Boothby Conservation Parks. **Photo A. Robinson**

Figure 25.
***Pterostylis* aff. *nana* "Hale" has been recorded from near Billiatt CP . Photo R. Bates.**

FLORISTIC ANALYSIS

The floristic analysis considered a total of 1906 sites from 678 South Australian sites and 1228 Victorian sites. Quadrats that had less than 4 species were removed before the analysis. In the final analysis 1813 sites from 649 South Australian sites and 1164 Victorian sites were used. The removal of species poor quadrats from the final analysis was found necessary as visual inspection of the raw data following classification showed that impoverished quadrats had no floristic similarity but clustered together as artificial groups.

The PATN analysis included 1060 species, from South Australian and Victorian Mallee survey sites, see Appendix VIII. Taxa not identified to species were masked out of the analysis except *Danthonia* sp., *Stipa* sp. and *Halosarcia* sp.; although they could not be identified to species they were considered significant taxa. Species that only occurred once were removed from the analysis and are indicated in Appendix VII. All annual species were excluded; an annual species was defined as being not visible at all times of the year. This definition is broader than a definition of strictly annual species reproducing from seed stock as it excludes from analysis perennial species that die back to an over-summer bulb or rootstock such as *Thysanotus pattersonii*. The Flora of Australia, South Australian Flora and Plants of Western New South Wales were consulted to determine the "annual" status of all species in the data matrix. Finally, introduced perennial species were retained in the analysis on the basis that generally they would be in equilibrium with their environment and may prove to be useful indicators should this be the case. Such species have been shown in other surveys to be useful group indicators eg. Mt Lofty Ranges (D. Goodwins pers. comm.).

Differences between taxonomic names of the two States required a similar lumping of species together to perform the analysis. Some common situations were the differences in recognition of sub-specific taxa between the states. These were caused by small levels of inaccurate identification in the data sets and differing ability to identify taxa related to the seasons in which the data was collected. Examples on these are shown in Table 7. The complete list is in Appendix VIII).

Table 7.
Examples of taxonomic issues that arose between the South Australian and Victorian surveys.

SA	VIC	Analysis name used
Eucalyptus leucoxylon ssp. *pruinosa*	*Eucalyptus leucoxylon*	*Eucalyptus leucoxylon* ssp.
Xanthorrhoea caespitosa	*Xanthorrhoea semiplana*	*Xanthorrhoea caespitosa/semiplana*
Stipa mollis group	*Stipa mollis*	*Stipa mollis* group

The dendrogram was inspected and cut to produce 60 groups for which species composition was derived from the standard PATN group statistics for quantitative data output. The cut off point on the dendrogram was determined by looking for groups that were uniquely South Australian. For example *Eucalyptus diversifolia* was not recorded in the Victorian dataset but in South Australia is represented by the Group 46 comprising 66 members. Similarly, the Victorian data does not contain *Eucalyptus porosa*, which is a prominent member of both Group 11 and Group 32 comprising 6 members and 1 member, respectively.

The dendrogram is too long to be included. Table 8 lists the vegetation 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 members (quadrats). Only the 35 groups with SA sites represented are listed. The 25 Victorian PATN groups have been excluded from this table as the information of the group is general with characteristic species and no structural information.

Table 8.
South Australian Floristic vegetation groups resulting from the PATN analysis.

Woodlands

6. *Casuarina pauper* Low woodland (34 quadrats)
48. *Eucalyptus arenacea* Low woodland (2 quadrats)
49. *Eucalyptus leucoxylon* ssp. Low woodland (9 quadrats)
50. *Eucalyptus leucoxylon* ssp. Low open woodland (9 quadrats)
51. *Allocasuarina verticillata, Eucalyptus leucoxylon* ssp. Low open woodland (3 quadrats)
1. *Callitris preissii* Low open woodland (53 quadrats)
11. *Eucalyptus porosa* Low open woodland (6 quadrats)

Mallee

34. *Eucalyptus dumosa, +/- E.leptophylla* Mallee (76 quadrats)
46. *Eucalyptus diversifolia* Open mallee (66 quadrats)
36. *Eucalyptus cyanophylla, +/- E.socialis* Open mallee (12 quadrats)
33. *Eucalyptus leptophylla, E.socialis* Open mallee (246 quadrats)
35. *Eucalyptus leptophylla, +/- Melaleuca lanceolata* Open mallee (22 quadrats)
55. *Eucalyptus rugosa +/- Eucalyptus leptophylla* Open mallee (3 quadrats)
47. *Eucalyptus diversifolia, Olearia axillaris* Very open mallee (3 quadrats)
37. *Eucalyptus calycogona E. dumosa* Very open mallee (86 quadrats)
29. *Eucalyptus gracilis, E.oleosa* Very open mallee (204 quadrats)
40. *Eucalyptus incrassata, Leptospermum coriaceum* Very open mallee (272 quadrats)
38. *Eucalyptus brachycalyx* Open low mallee (1 quadrat)
30. *Eucalyptus oleosa, Melaleuca lanceolata, Acacia halliana/microcarpa, Dodonaea hexandra* Very open low mallee (1 quadrat)

Shrublands

43. *Allocasuarina pusilla, Leptospermum coriaceum, +/- Banksia ornata* Tall open shrubland (231 quadrats)
45. *Callitris verrucosa* Tall open shrubland (27 quadrats)
31. *Melaleuca acuminata, M. lanceolata, +/- Eucalyptus socialis, +/- E. leptophylla* Tall open shrubland (55 quadrats)
44. *Xanthorrhoea caespitosa/semiplana, +/- Banksia marginata* Tall open shrubland (9 quadrats)
32. *Callitris canescens, Eucalyptus dumosa, Eucalyptus porosa* Tall very open shrubland (1 quadrat)
8. *Alectryon oleifolius* ssp. *canescens* Tall very open shrubland (9 quadrats)
19. *Acacia nyssophylla* Tall very open shrubland (2 quadrats)

Chenopod shrublands

4. *Enchylaena tomentosa* var. *tomentosa* Open shrubland (12 quadrats)
21. *Maireana sedifolia* Open shrubland (4 quadrats)
10. *Maireana pyramidata* Low very open shrubland (14 quadrats)

Shrublands of wet areas

56. *Melaleuca halmaturorum* Tall open shrubland (2 quadrats)
57. *Melaleuca brevifolia* Tall open shrubland (4 quadrats)
52. *Halosarcia* sp. Low very open shrubland (13 quadrats)

Grasslands

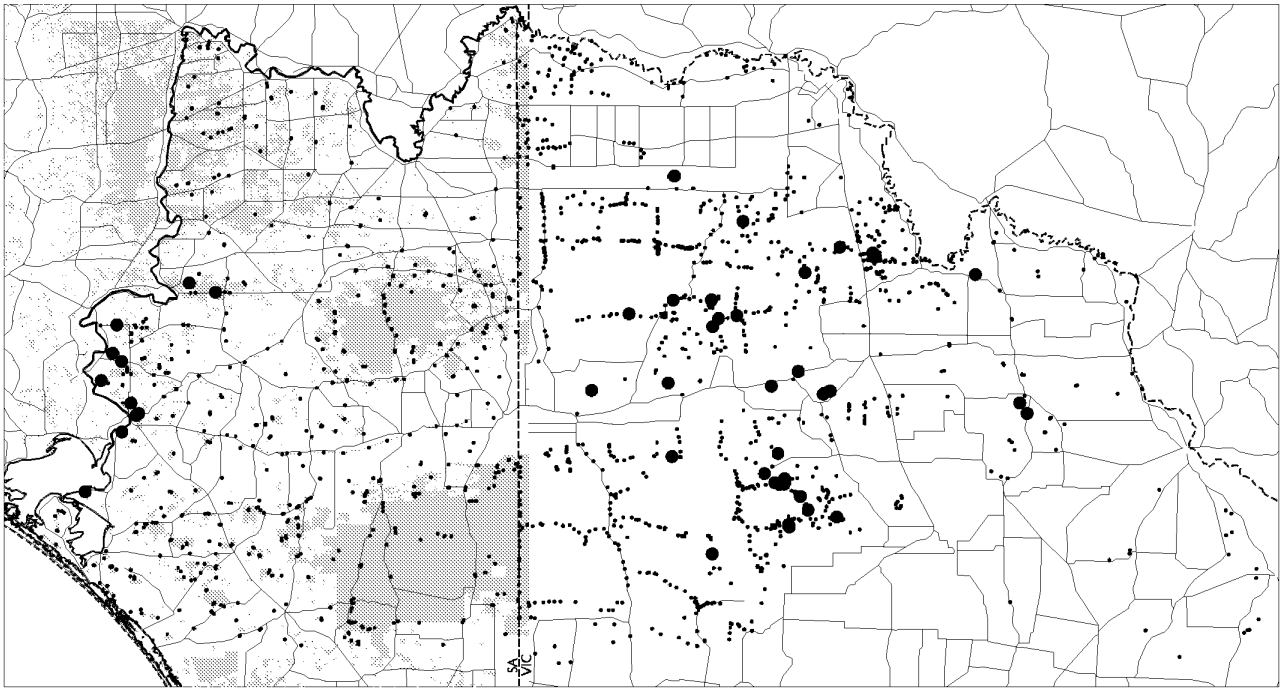
2. *Stipa* sp. Open (tussock) grassland (70 quadrats)
3. *Stipa* sp. Open (tussock) grassland (25 quadrats)
20. *Lepidosperma congestum/laterale/viscidum, Lomandra effusa, Lepidosperma carphoides, Stipa* sp. Open (tussock) grassland (2 quadrats)

The full details of the floristic groups defined using PATN are presented in the following format.

- Group number (as they appeared on the dendrogram); title which includes the dominant overstorey species and the vegetation structural classification for SA groups and the characteristic species for Victorian groups.
- The number of quadrats (members) in the group and the breakdown of South Australian and Victorian quadrats.
- The map shows the extent of the quadrats included in the analysis (small dots) and the quadrats that represent this floristic group as large dots. No data was available for the extent of native vegetation coverage in Victoria but the current extent of the native vegetation in South Australia is shown. Also included are roads, the Murray River and the defining line of the extent of the Murray Mallee vegetation survey region.
- The floristic vegetation mapping codes (as detailed in the vegetation mapping chapter: Table 11) that represents this PATN group. This refers to the mapping groups that described floristic group quadrats as listed under "Vegetation mapping groups". Vegetation mapping groups with descriptions that do not match the PATN group details but have representative quadrats within its mapped boundary are listed under "Hidden within mapping groups".
- The dominant overstorey species defined by the methodology criteria.
- The dominant understorey species defined by the methodology criteria.
- The "siteid" codes of the quadrats described by this group.
- Summary of the physical parameters recorded at the representative sites; "n/a" represents no data was available
- Structural data presented as an average for the sites where available; "n/a" represents no data was available
- The group species list shows the frequency of cover/abundance categories recorded for each species at the quadrats within the group (categories includes T,1,2,3,4,5). All species listed in the table occurred in at least 40% of the sites in the group. The species list shows the proportion of occurrence ordered with most common first. The proportion of occurrence is the proportion of quadrats in the group at which the species was recorded. The higher the value the more important the presence of that species was in defining the group. The State in which the species was recorded is also included.
- Photograph of a South Australian representative of that group if available.

Floristic Group 1. ***Callitris preissii* Low open woodland**

53 members SA/VIC (11/42)



Vegetation mapping details:
Vegetation mapping groups: 8.01, 18.09
Hidden within mapping groups: 9.01

Dominant Overstorey Species:
Callitris preissii

Dominant Understorey Species:
Stipa sp.
Enchylaena tomentosa
Danthonia sp.

Structural Data:
Typical canopy cover: sparse to very sparse
Av. height (metres): 6.1

Environmental Parameters:
Typical landforms: plains, hill slopes and hill crests
Calcrete type: generally broken -range none to sheet
Range of soils: loam -range clay loam to sand
Average rainfall (mm): 348 (11 members)

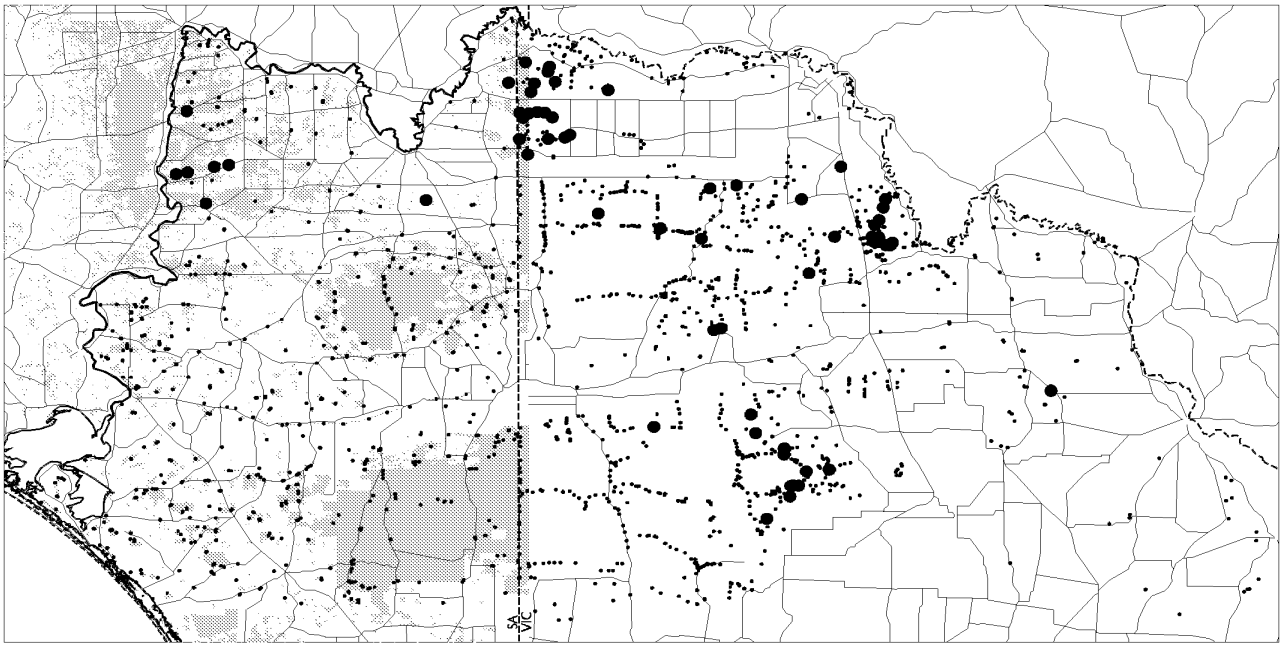
Quadrat(s):
MB02401, TB02301, MG01001, A03004, A03006, A03019, A03043, A03045, A03108, A03111, A04001, A04002, A04003, A04007, A04008, A12047, A12090, A12091, A12092, A12266, A12302, A15028, A15029, A15034, A15035, A15065, A16114, A16135, A16247, A16258, A16300, A16308, A16310, A16321, A16332, A16360, A16576, A16627, A16630, A16709, A16711, A16713, A16720, A16724, A16731, BA00401, MB00301, MB03301, CP00101, TB00501, TB01301, TB01401, MB03601,

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Stipa sp.	18	18	14	3	0	0	1.00	SA/VIC
Callitris preissii	2	5	25	14	3	0	0.92	SA/VIC
Enchylaena tomentosa var. *tomentosa*	27	5	1	1	0	0	0.64	SA/VIC
Senecio lautus	25	1	2	0	0	0	0.53	SA/VIC
Vittadinia dissecta var. *hirta*	22	5	0	0	0	0	0.51	SA/VIC
Danthonia sp.	12	11	2	0	0	0	0.47	SA/VIC
Allocasuarina luehmannii	2	4	15	1	0	0	0.42	SA/VIC
Einadia nutans ssp.	20	1	0	0	0	0	0.40	SA/VIC
Sclerolaena diacantha/uniflora	4	13	2	0	0	0	0.36	SA/VIC
Dodonaea viscosa ssp. *angustissima*	7	8	2	0	0	0	0.32	SA/VIC
Stipa elegantissima	12	1	0	0	0	0	0.25	SA/VIC
Senna artemisioides ssp.	6	5	0	0	0	0	0.21	SA/VIC

Figure 26.
***Callitris preissii* Low open woodland at quadrat CP00101.**

Floristic Group 2. ***Stipa* sp. Open (tussock) grassland**

70 members SA/VIC (8/62)



Vegetation mapping details:
Vegetation mapping groups: 18.01, 35.01
Hidden within mapping groups: none

Dominant Overstorey Species:
Stipa sp.

Dominant Understorey Species:
Sclerolaena diacantha/uniflora
Enchylaena tomentosa var. *tomentosa*
Sclerolaena obliquicuspis

Structural Data:
Typical canopy cover: sparse
Av. height (metres): n/a

Environmental Parameters:
Typical landforms: plains, hill slopes
Calcrete type: none or broken
Range of soils: sandy loams to clay loams
Average rainfall (mm): 268 (7 members)

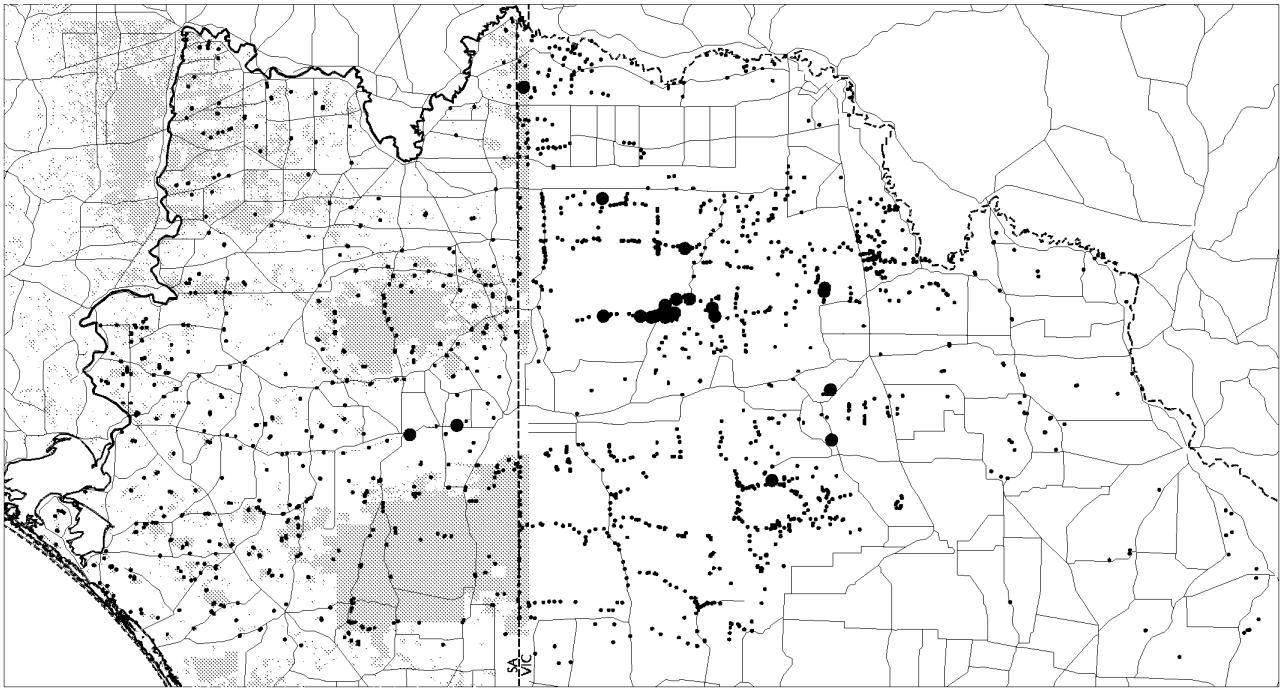
Quadrat(s):
BL01801, A03001, A03008, A03044, A03053, A03112, A03113, A04006, A04009, A04011, A06045, A12083, A12085, A12087, A12232, A15001, A15024, A15025, A15055, A15064, A15078, A15090, A15098, A15099, A15102, A15103, A15104, A15105, A15112, A15122, A15123, A15124, A15129, A16046, A16058, A16086, A16087, A16091, A16097, A16098, A16099, A16102, A16105, A16107, A16108, A16112, A16139, A16199, A16228, A16240, A16257, A16272, A16356, A16365, A16503, A16510, A16512, A16517, A16518, A16533, A16551, A16631, A16732, SR01601, SR01801, AL00101, SR00401, SR00201, SR00701, RE01001

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Stipa sp.	7	27	24	11	0	1	1.00	SA/VIC
Sclerolaena diacantha/uniflora	19	6	0	0	0	0	0.36	SA/VIC
Enchylaena tomentosa var. *tomentosa*	22	2	0	0	0	0	0.34	SA/VIC
Sclerolaena obliquicuspis	8	6	7	2	0	0	0.33	SA/VIC
Vittadinia dissecta var. *hirta*	9	7	3	0	0	0	0.27	SA/VIC
Danthonia sp.	5	11	1	1	0	0	0.26	SA/VIC
Dodonaea viscosa ssp. *angustissima*	14	3	1	0	0	0	0.26	SA/VIC
Zygophyllum ammophilum	14	1	0	0	0	0	0.21	SA/VIC
Atriplex pumilio	14	0	0	0	0	0	0.20	SA/VIC
Callitris preissii	10	2	2	0	0	0	0.20	SA/VIC

Figure 27.
***Stipa* sp. Open (tussock) grassland at quadrat AL00101.**

Floristic Group 3. *Stipa* sp. Open (tussock) grassland

25 members SA/VIC (2/23)



Vegetation mapping details:
Vegetation mapping groups: 35.06
Hidden within mapping groups: 18.01

Dominant Overstorey Species:
Stipa sp.

Dominant Understorey Species:
Hyalosperma semisterile
Sclerolaena diacantha/uniflora
Danthonia sp.

Structural Data:
Typical canopy cover: sparse to very sparse
Av. height (metres): n/a

Environmental Parameters:

Typical landforms: undulating plains
Calcrete type: none
Range of soils: sandy loam
Average rainfall (mm): 367 (2 members)

Quadrat(s):
A06039, A12061, A12093, A15030, A15031, A16033, A16192, A16194, A16293, A16294, A16295, A16296, A16299, A16301, A16322, A16324, A16328, A16329, A16330, A16335, A16513, A16823, A16825, KU04101, PI00201

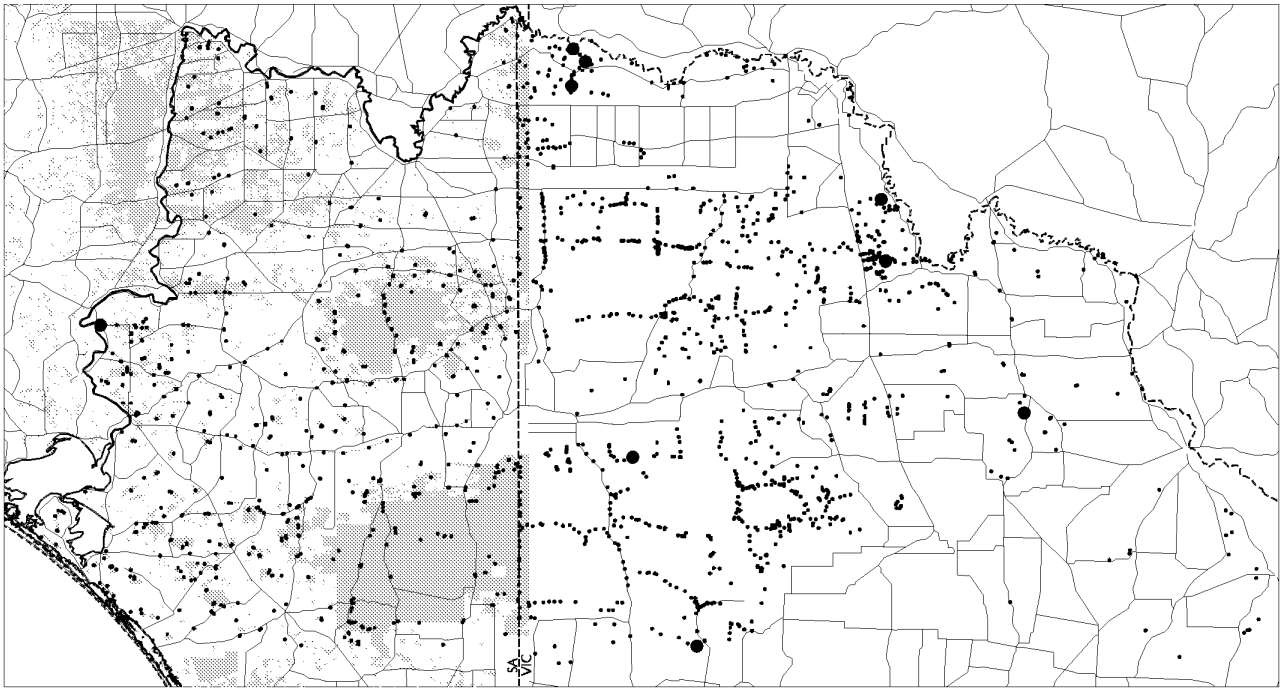
Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Stipa sp.	7	9	7	2	0	0	1.00	SA/VIC
Hyalosperma semisterile	1	8	10	4	0	0	0.92	SA/VIC
Sclerolaena diacantha/uniflora	8	11	2	0	0	0	0.84	SA/VIC
Danthonia sp.	7	4	0	0	0	0	0.44	SA/VIC
Eriochiton sclerolaenoides	6	4	0	0	0	0	0.40	SA/VIC
Eucalyptus dumosa	3	5	2	0	0	0	0.40	SA/VIC
Vittadinia condyloides	5	2	3	0	0	0	0.40	SA/VIC
Zygophyllum aurantiacum/eremaeum	7	0	3	0	0	0	0.40	SA/VIC
Vittadinia dissecta var. *hirta*	7	2	0	0	0	0	0.36	SA/VIC
Vittadinia gracilis	7	2	0	0	0	0	0.36	SA/VIC
Atriplex vesicaria ssp.	2	5	0	0	0	0	0.28	SA/VIC
Einadia nutans ssp.	5	2	0	0	0	0	0.28	SA/VIC
Eucalyptus calycogona	0	2	5	0	0	0	0.28	SA/VIC
Minuria leptophylla	3	3	1	0	0	0	0.28	SA/VIC

Olearia pimeleoides ssp. *pimeleoides*	7	0	0	0	0	0	0.28	SA/VIC
Sclerolaena obliquicuspis	5	2	0	0	0	0	0.28	SA/VIC
Chenopodium desertorum ssp.	6	0	0	0	0	0	0.24	SA/VIC
Enchylaena tomentosa var. *tomentosa*	4	2	0	0	0	0	0.24	SA/VIC
Senecio lautus	5	1	0	0	0	0	0.24	SA/VIC
**Gynandriris setifolia*	0	1	4	0	0	0	0.20	SA/VIC
Lomandra effusa	5	0	0	0	0	0	0.20	SA/VIC
Maireana erioclada	5	0	0	0	0	0	0.20	SA/VIC
Stipa elegantissima	4	1	0	0	0	0	0.20	SA/VIC
Zygophyllum apiculatum	5	0	0	0	0	0	0.20	SA/VIC

Figure 28.
***Stipa* sp. Open (tussock) grassland at quadrat PI00201.**

Floristic Group 4. *Enchylaena tomentosa* var. *tomentosa* Open shrubland.

12 members SA/VIC (1/11)



Vegetation mapping details:
Vegetation mapping groups: 27.01
Hidden within mapping groups: none

Dominant Overstorey Species:
Enchylaena tomentosa var. *tomentosa*

Dominant Understorey Species:
Stipa sp.

Structural Data:
Typical canopy cover: sparse

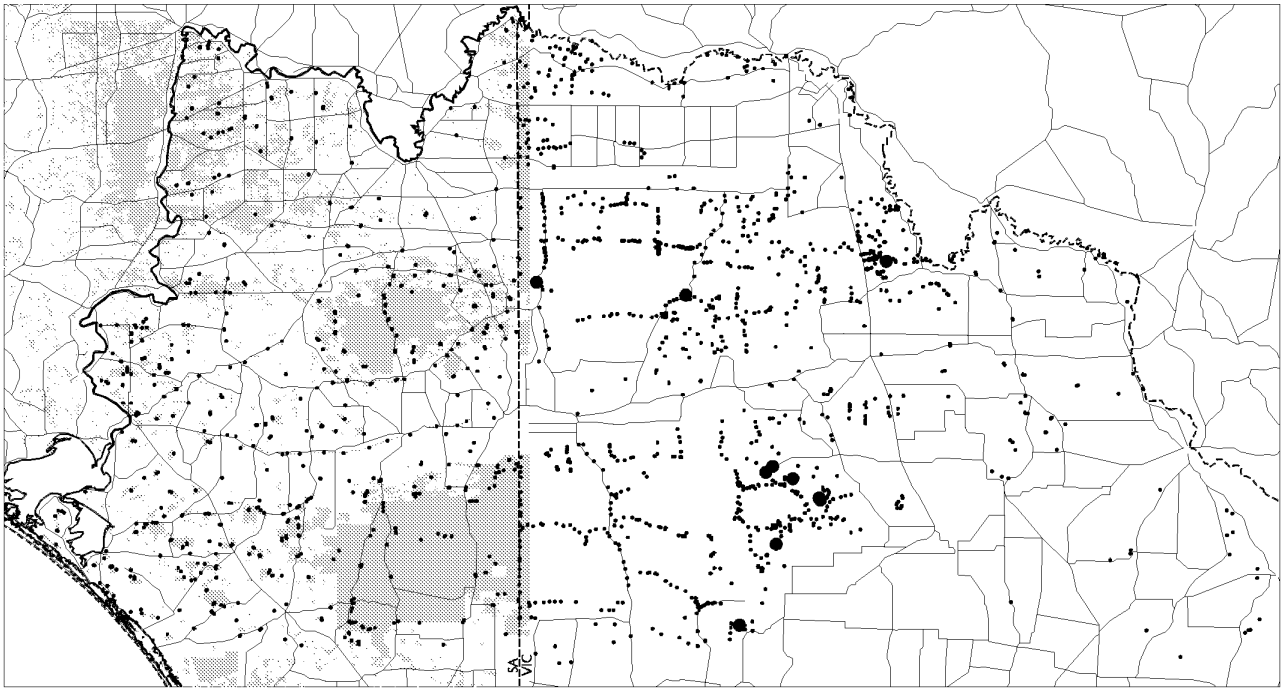
Environmental Parameters:
Typical landforms: plain
Calcrete type: broken
Range of soils: clay loam
Average rainfall (mm): 296 (1 member)

Quadrat(s):
A12025, A12229, A15128, A15130, A15131, A15137, A16163, A16522, A16526, A16628, A16902, MB03701

Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Enchylaena tomentosa var. *tomentosa*	0	6	6	0	0	0	1.00	SA/VIC
Stipa sp.	3	6	0	1	0	0	0.83	SA/VIC
Danthonia sp.	2	3	0	0	0	0	0.42	SA/VIC
Atriplex pumilio	3	1	0	0	0	0	0.33	SA/VIC
Einadia nutans ssp.	4	0	0	0	0	0	0.33	SA/VIC
Rhagodia spinescens	1	1	1	1	0	0	0.33	SA/VIC
Alectryon oleifolius ssp. *canescens*	1	0	1	1	0	0	0.25	SA/VIC
Chenopodium desertorum ssp.	2	1	0	0	0	0	0.25	SA/VIC
Dodonaea viscosa ssp. *angustissima*	3	0	0	0	0	0	0.25	SA/VIC
Maireana brevifolia	2	1	0	0	0	0	0.25	SA/VIC
Maireana rohrlachii	3	0	0	0	0	0	0.25	SA/VIC
Pittosporum phylliraeoides var. *microcarpa*	3	0	0	0	0	0	0.25	SA/VIC
Sclerolaena diacantha/uniflora	2	0	1	0	0	0	0.25	SA/VIC
Zygophyllum ammophilum	3	0	0	0	0	0	0.25	SA/VIC

Floristic Group 5. Characteristic species: *Danthonia* sp., *Stipa* sp.

10 members, VIC ONLY



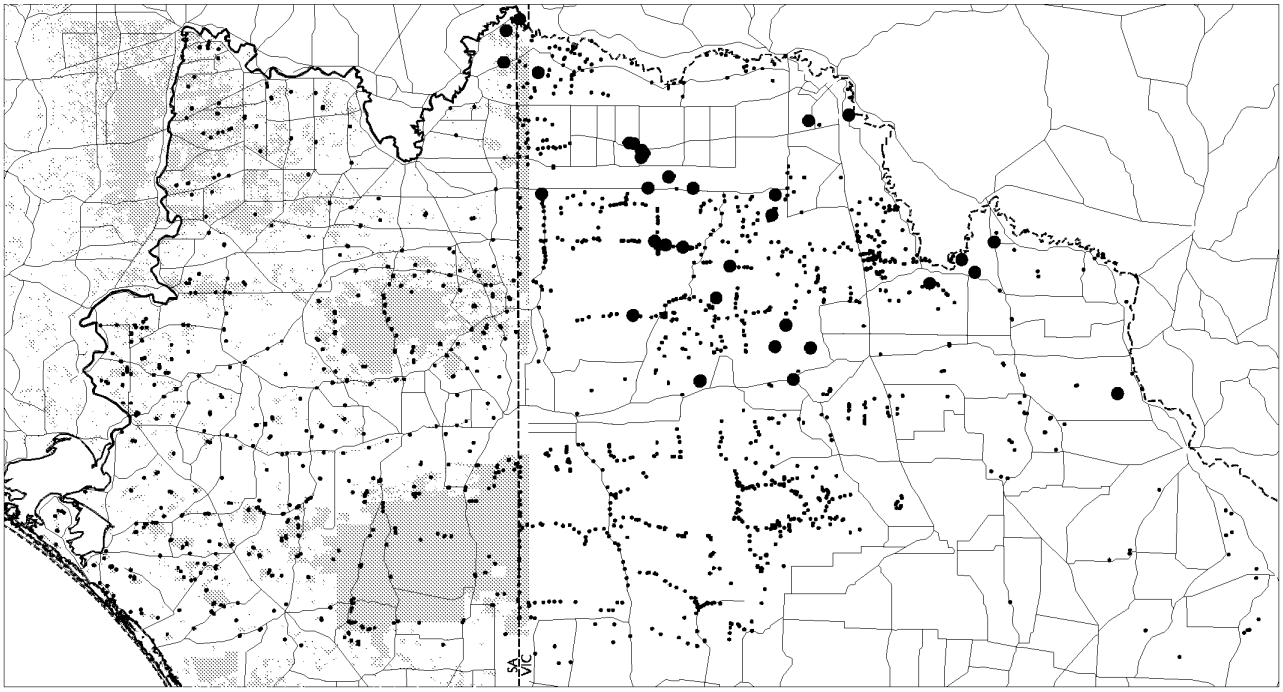
Characteristic Species:
Danthonia sp.
Stipa sp.

Quadrat(s):
A03024, A03025, A12010, A12038, A12041, A12084, A15033, A15127, A16370, A16830

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Danthonia sp.	0	8	1	0	0	0	0.90	SA/VIC
Stipa sp.	5	4	0	0	0	0	0.90	SA/VIC
Senecio lautus	0	3	1	0	0	0	0.40	SA/VIC
Vittadinia dissecta var. *hirta*	4	0	0	0	0	0	0.40	SA/VIC
Convolvulus erubescens	1	2	0	0	0	0	0.30	SA/VIC
Sclerolaena diacantha/uniflora	2	1	0	0	0	0	0.30	SA/VIC
Allocasuarina luehmannii	2	0	0	0	0	0	0.20	SA/VIC
Callitris preissii	2	0	0	0	0	0	0.20	SA/VIC
Enchylaena tomentosa var. *tomentosa*	1	1	0	0	0	0	0.20	SA/VIC
Maireana enchylaenoides	2	0	0	0	0	0	0.20	SA/VIC
Maireana pentatropis	2	0	0	0	0	0	0.20	SA/VIC
Pittosporum phylliraeoides var. *microcarpa*	1	1	0	0	0	0	0.20	SA/VIC
Vittadinia cuneata var.	1	1	0	0	0	0	0.20	SA/VIC

Floristic Group 6. *Casuarina pauper* Low woodland.

34 members SA/VIC (2/32)



Vegetation mapping details:
Vegetation mapping groups: 2.01, 2.02
Hidden within mapping groups: none

Dominant Overstorey Species:
Casuarina pauper

Dominant Understorey Species:
Sclerolaena diacantha/uniflora
Enchylaena tomentosa var. *tomentosa*
Stipa sp.
Senna artemisioides ssp.
Einadia nutans ssp.
Alectryon oleifolius ssp. *canescens*
Stipa elegantissima

Structural Data:
Typical canopy cover: sparse
Av. height (metres): 8.5

Environmental Parameters:
Typical landforms: plains, hill crests
Calcrete type: none
Range of soils: sand
Average rainfall (mm): no data

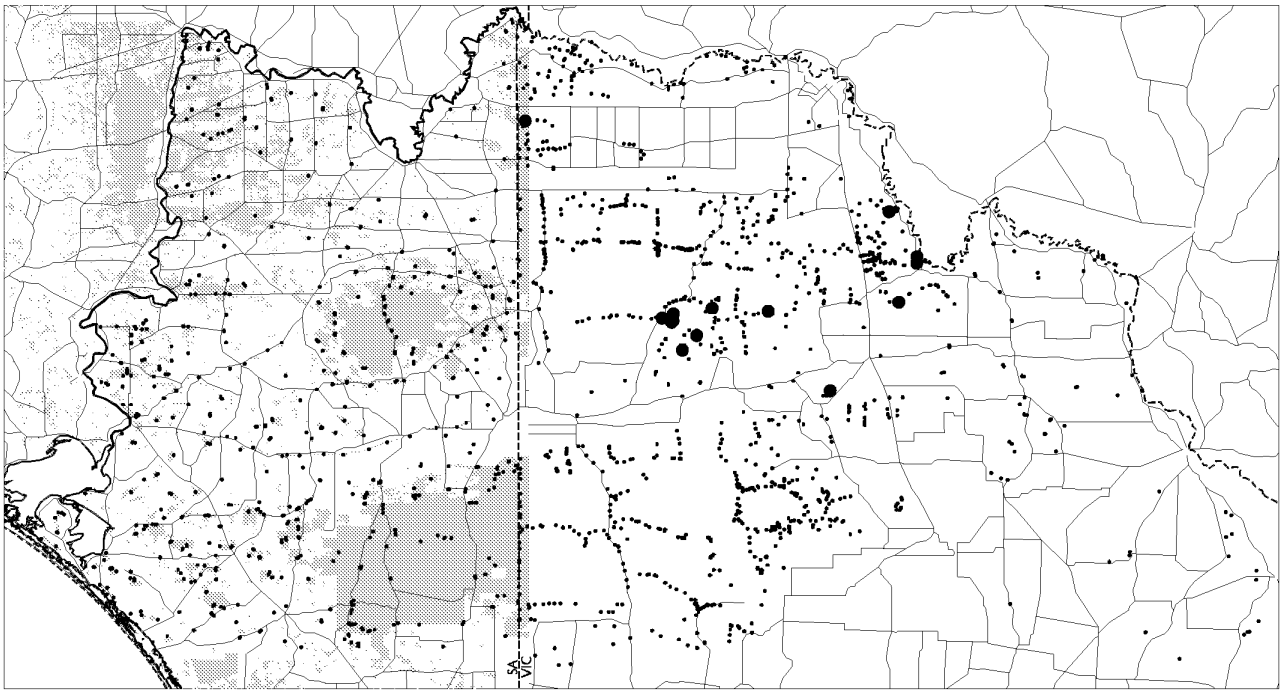
Quadrat(s):
A16001, A16004, A16005, A16017, A16047, A16061, A16063, A16064, A16115, A16130, A16171, A16224, A16232, A16264, A16267, A16284, A16318, A16320, A16331, A16344, A16508, A16516, A16564, A16571, A16573, A16577, A16580, A16611, A16710, A16718, A16719, A16721, RE00501, RE00201

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Stipa sp.	13	16	3	0	0	0	0.94	SA/VIC
Sclerolaena diacantha/uniflora	3	20	8	0	0	0	0.91	SA/VIC
Casuarina pauper	1	1	21	6	0	0	0.85	SA/VIC
Enchylaena tomentosa var. *tomentosa*	13	13	1	0	0	0	0.79	SA/VIC
Senna artemisioides ssp.	18	7	2	0	0	0	0.79	SA/VIC
Einadia nutans ssp.	22	2	0	0	0	0	0.71	SA/VIC
Alectryon oleifolius ssp. *canescens*	11	10	1	0	0	0	0.65	SA/VIC
Stipa elegantissima	20	2	0	0	0	0	0.65	SA/VIC
Zygophyllum apiculatum	7	7	5	0	0	0	0.56	SA/VIC
Chenopodium curvispicatum	10	7	0	0	0	0	0.50	SA/VIC
Chenopodium desertorum ssp.	13	4	0	0	0	0	0.50	SA/VIC

Exocarpos aphyllus	12	4	1	0	0	0	0.50	SA/VIC
Olearia pimeleoides ssp. *pimeleoides*	9	7	1	0	0	0	0.50	SA/VIC
Olearia muelleri	7	5	3	1	0	0	0.47	SA/VIC
Zygophyllum aurantiacum/eremaeum	14	2	0	0	0	0	0.47	SA/VIC
Eremophila glabra	14	1	0	0	0	0	0.44	SA/VIC
Scaevola spinescens	8	4	3	0	0	0	0.44	SA/VIC
Dodonaea viscosa ssp. *angustissima*	12	1	1	0	0	0	0.41	SA/VIC
Maireana pentatropis	9	4	1	0	0	0	0.41	SA/VIC
Rhagodia spinescens	9	4	1	0	0	0	0.41	SA/VIC
Acacia oswaldii	13	0	0	0	0	0	0.38	SA/VIC
Pittosporum phylliraeoides var. *microcarpa*	11	2	0	0	0	0	0.38	SA/VIC
Senecio lautus	12	0	0	0	0	0	0.35	SA/VIC
Vittadinia dissecta var. *hirta*	9	2	0	0	0	0	0.32	SA/VIC

Floristic Group 7. Characteristic species: *Sclerolaena diacantha/uniflora, Stipa* sp., *Enchylaena tomentosa* var. *tomentosa, Hyalosperma glutinosum* ssp. *glutinosum*.

14 members VIC ONLY



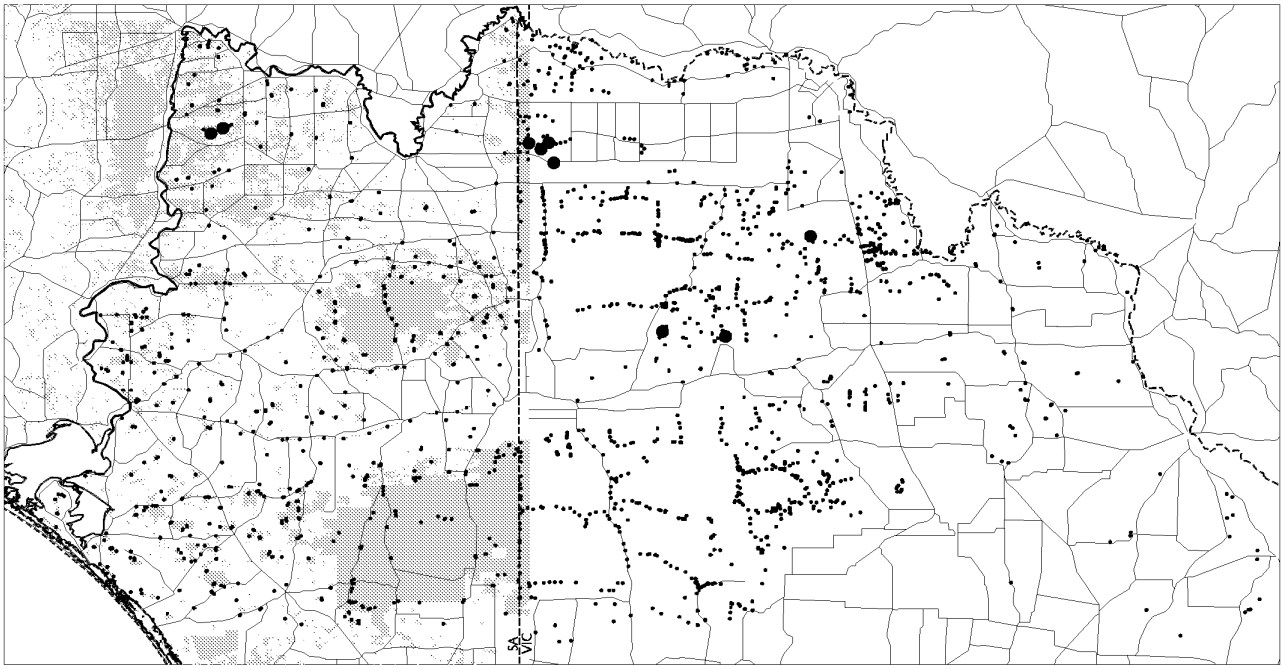
Characteristic Species:
Sclerolaena diacantha/uniflora
Stipa sp.
Enchylaena tomentosa var. *tomentosa*
Hyalosperma glutinosum ssp. *glutinosum*

Quadrat(s):
A15056, A15063, A15086, A16106, A16213, A16341, A16363, A16723, A16811, A16813, A16814, A16815, A16819, A1682

Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Sclerolaena diacantha/uniflora	1	6	6	1	0	0	1.00	SA/VIC
Stipa sp.	7	4	1	0	0	0	0.86	SA/VIC
Enchylaena tomentosa var. *tomentosa*	7	1	0	0	0	0	0.57	SA/VIC
Hyalosperma glutinosum ssp. *glutinosum*	1	4	1	1	0	0	0.50	VIC
Dodonaea viscosa ssp. *angustissima*	3	3	0	0	0	0	0.43	SA/VIC
Sclerolaena obliquicuspis	2	1	2	0	0	0	0.36	SA/VIC
Vittadinia condyloides	4	1	0	0	0	0	0.36	SA/VIC
Zygophyllum apiculatum	5	0	0	0	0	0	0.36	SA/VIC
Callitris preissii	4	0	0	0	0	0	0.29	SA/VIC
**Gynandriris setifolia*	0	3	1	0	0	0	0.29	SA/VIC
Allocasuarina luehmannii	2	1	0	0	0	0	0.21	SA/VIC
Atriplex vesicaria ssp.	1	1	1	0	0	0	0.21	SA/VIC
Danthonia sp.	2	1	0	0	0	0	0.21	SA/VIC
Eriochiton sclerolaenoides	3	0	0	0	0	0	0.21	SA/VIC
Senecio lautus	3	0	0	0	0	0	0.21	SA/VIC

Floristic Group 8. ***Alectryon oleifolius* ssp. *canescens* Tall very open shrubland.**

9 members SA/VIC (2/7)



Vegetation mapping details:
Vegetation mapping groups: 35.04
Hidden within mapping groups: none

Dominant Overstorey Species:
Alectryon oleifolius ssp. *canescens*

Dominant Understorey Species:
Enchylaena tomentosa var. *tomentosa*
Stipa sp.
Sclerolaena obliquicuspis

Structural Data:
Typical canopy cover: very sparse
Av. height (metres): 2.8

Environmental Parameters:
Typical landforms: plains
Calcrete type: broken
Range of soils: clay loam to loam
Average rainfall (mm): 268 (2 members)

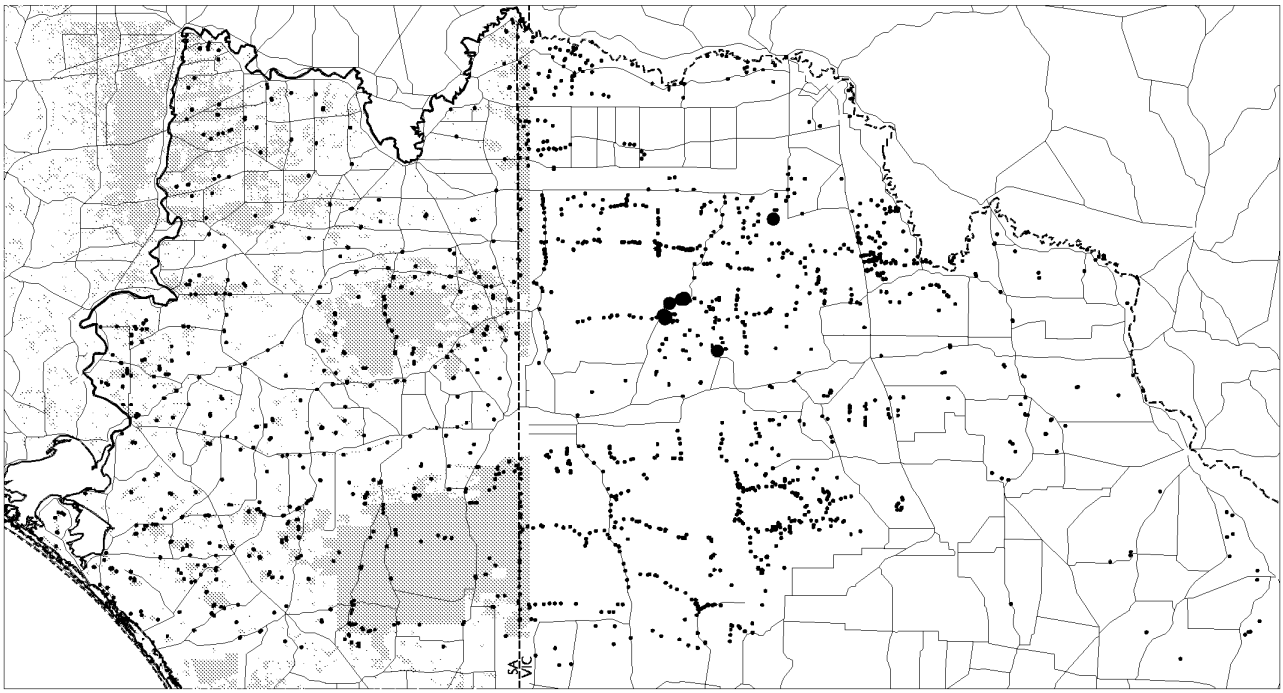
Quadrat(s):
BL01701, BL00501, A16084, A16092, A16100, A16104, A16253, A16347, A16357

Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Alectryon oleifolius ssp. *canescens*	0	3	6	0	0	0	1.00	SA/VIC
Enchylaena tomentosa var. *tomentosa*	6	0	0	0	0	0	0.67	SA/VIC
Stipa sp.	3	3	0	0	0	0	0.67	SA/VIC
Sclerolaena obliquicuspis	4	1	0	0	0	0	0.56	SA/VIC
Zygophyllum ammophilum	2	3	0	0	0	0	0.56	SA/VIC
Senna artemisioides ssp.	3	0	1	0	0	0	0.44	SA/VIC
Myoporum platycarpum	3	0	0	0	0	0	0.33	SA/VIC
Zygophyllum crenatum	1	2	0	0	0	0	0.33	VIC
Acacia nyssophylla	2	0	0	0	0	0	0.22	SA/VIC
Atriplex pumilio	2	0	0	0	0	0	0.22	SA/VIC
Atriplex vesicaria ssp.	2	0	0	0	0	0	0.22	SA/VIC
Chenopodium curvispicatum	2	0	0	0	0	0	0.22	SA/VIC
Eriochiton sclerolaenoides	2	0	0	0	0	0	0.22	SA/VIC
Geijera linearifolia	2	0	0	0	0	0	0.22	SA
Rhagodia spinescens	2	0	0	0	0	0	0.22	SA/VIC
Sclerolaena diacantha/uniflora	1	1	0	0	0	0	0.22	SA/VIC

Figure 29.
***Alectryon oleifolius* ssp. *canescens* Tall very open shrubland at quadrat BL00501.**

Floristic Group 9. Characteristic species: *Stipa* sp., *Eriochiton sclerolaenoides, Sclerolaena diacantha/uniflora, Vittadinia gracilis, Zygophyllum aurantiacum/eremaeum*.

9 members VIC ONLY



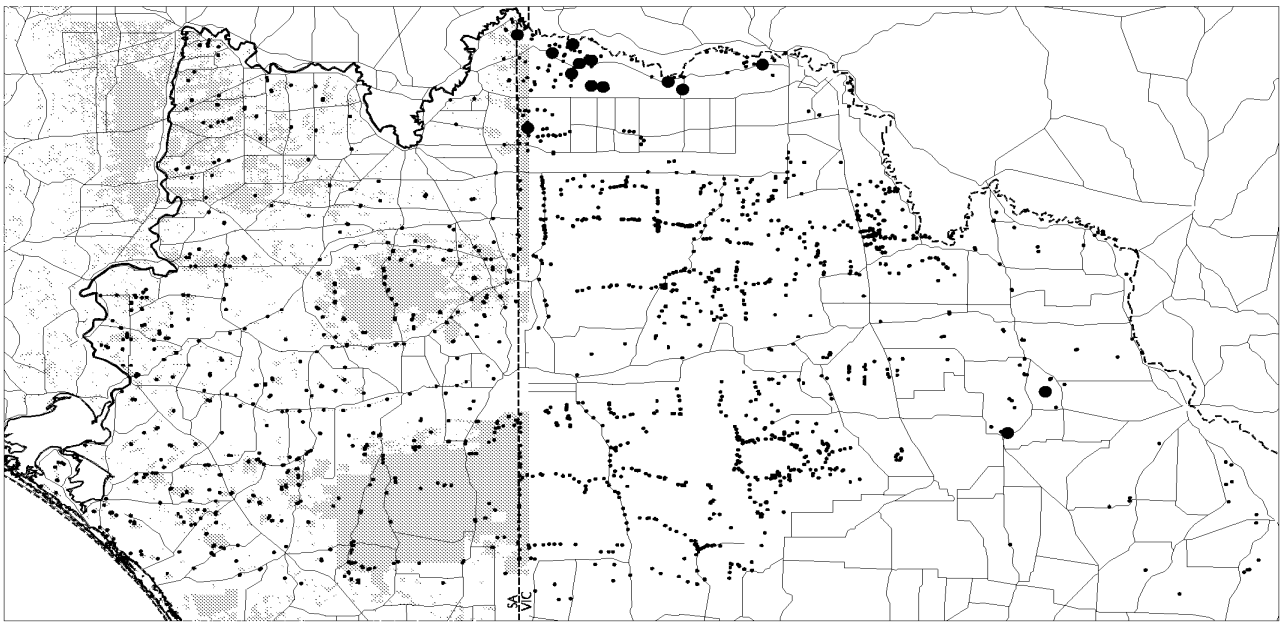
Characteristic Species:
Stipa sp.
Eriochiton sclerolaenoides
Sclerolaena diacantha/uniflora
Vittadinia gracilis
Zygophyllum aurantiacum/eremaeum

Quadrat(s):
A16234, A16355, A16812, A16816, A16817, A16824, A16827, A16828, A16829

Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Stipa sp.	5	4	0	0	0	0	1.00	SA/VIC
Eriochiton sclerolaenoides	7	0	0	0	0	0	0.78	SA/VIC
Sclerolaena diacantha/uniflora	7	0	0	0	0	0	0.78	SA/VIC
Vittadinia condyloides	7	0	0	0	0	0	0.78	SA/VIC
Vittadinia gracilis	6	0	0	0	0	0	0.67	SA/VIC
Zygophyllum aurantiacum/eremaeum	1	2	2	1	0	0	0.67	SA/VIC
**Gynandriris setifolia*	1	3	0	0	0	0	0.44	SA/VIC
Minuria leptophylla	4	0	0	0	0	0	0.44	SA/VIC
Zygophyllum crenatum	4	0	0	0	0	0	0.44	VIC
Atriplex vesicaria ssp.	3	0	0	0	0	0	0.33	SA/VIC
Disphyma crassifolium ssp. *clavellatum*	2	1	0	0	0	0	0.33	SA/VIC
Enchylaena tomentosa var. *tomentosa*	3	0	0	0	0	0	0.33	SA/VIC
Halosarcia sp.	1	2	0	0	0	0	0.33	SA/VIC
Senecio lautus	3	0	0	0	0	0	0.33	SA/VIC
Frankenia sessilis	0	2	0	0	0	0	0.22	SA/VIC
Kippistia suaedifolia	1	1	0	0	0	0	0.22	VIC
Lawrencia squamata	0	0	2	0	0	0	0.22	SA/VIC
Lomandra effusa	2	0	0	0	0	0	0.22	SA/VIC
Maireana oppositifolia	1	0	1	0	0	0	0.22	SA/VIC

Floristic Group 10. ***Maireana pyramidata*** **Low very open shrubland.**

14 members SA/VIC (1/13)



Vegetation mapping details:
Vegetation mapping groups: 28.01
Hidden within mapping groups: none

Dominant Overstorey Species:
Maireana pyramidata

Dominant Understorey Species:
Stipa sp.
Enchylaena tomentosa var. *tomentosa*
Rhagodia spinescens

Structural Data:
Typical canopy cover: very sparse
Av. height (metres): 1

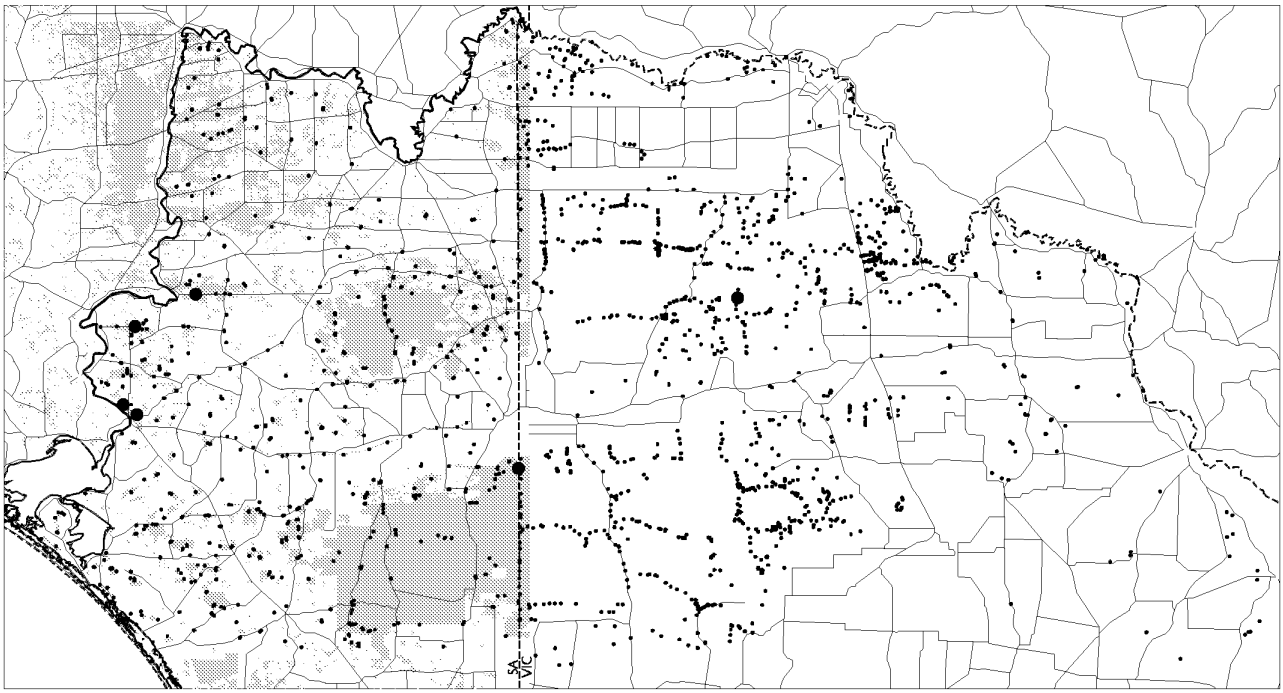
Environmental Parameters:
Typical landforms: plain
Calcrete type: broken
Range of soils: clay loam
Average rainfall (mm): no data

Quadrat(s):
A16110, A16500, A16520, A16523, A16527, A16532, A16540, A16543, A16549, A16550, A16559, A16622, A16633, RE00601

Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Maireana pyramidata	0	1	12	1	0	0	1.00	SA/VIC
Stipa sp.	2	6	1	0	0	0	0.64	SA/VIC
Sclerolaena brachyptera	6	1	0	0	0	0	0.50	VIC
Enchylaena tomentosa var. *tomentosa*	6	0	0	0	0	0	0.43	SA/VIC
Rhagodia spinescens	4	1	1	0	0	0	0.43	SA/VIC
Nitraria billardierei	2	3	0	0	0	0	0.36	VIC
Osteocarpum acropterum var.	4	1	0	0	0	0	0.36	SA/VIC
Sclerolaena diacantha/uniflora	2	3	0	0	0	0	0.36	SA/VIC
Danthonia sp.	3	1	0	0	0	0	0.29	SA/VIC
Maireana appressa	2	2	0	0	0	0	0.29	SA/VIC
Sclerolaena divaricata	4	0	0	0	0	0	0.29	VIC
Atriplex pumilio	3	0	0	0	0	0	0.21	SA/VIC
Disphyma crassifolium ssp. *clavellatum*	3	0	0	0	0	0	0.21	SA/VIC
Dissocarpus biflorus var. *biflorus*	3	0	0	0	0	0	0.21	VIC
Malacocera tricornis	1	2	0	0	0	0	0.21	VIC
Osteocarpum salsuginosum	1	2	0	0	0	0	0.21	VIC
Pachycornia triandra	3	0	0	0	0	0	0.21	VIC

Floristic Group 11. *Eucalyptus porosa* Low very open woodland.

6 members SA/VIC (5/1)



Vegetation mapping details:
Vegetation mapping groups: 9.01, 18.07
Hidden within mapping groups: 19.15

Dominant Overstorey Species:
Eucalyptus porosa

Dominant Understorey Species:
Stipa sp.
Lomandra effusa
Helichrysum leucopsideum
Senecio lautus

Structural Data:
Typical canopy cover: very sparse
Av. height (metres): 7

Environmental Parameters:
Typical landforms: low lying areas and undulating plains
Calcrete type: Typically none (broken and sheet were also recorded)
Range of soils: sand to loam
Average rainfall (mm): 343 (4 members)

Quadrat(s):
TB00101, A16305, CP00201, MB00101, SS00501, TB01201

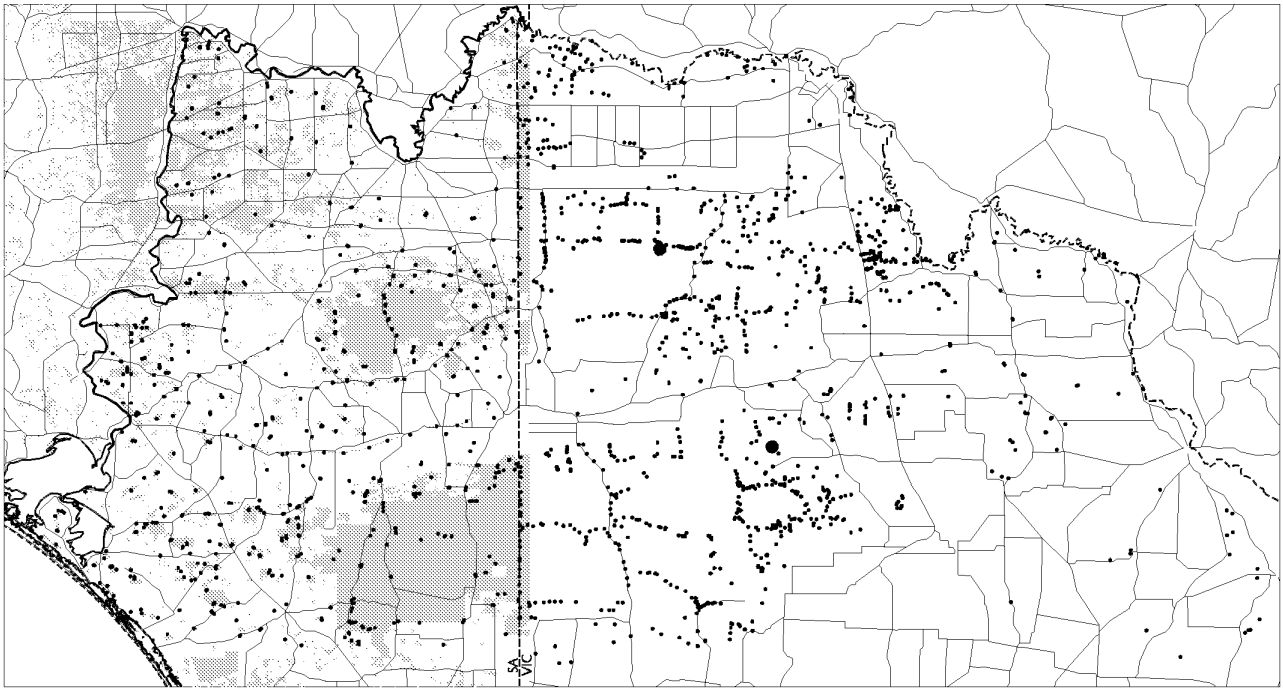
Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Eucalyptus porosa	0	0	1	5	0	0	1.00	SA/VIC
Stipa sp.	3	1	2	0	0	0	1.00	SA/VIC
Helichrysum leucopsideum	2	2	0	0	0	0	0.67	SA/VIC
Lomandra effusa	3	1	0	0	0	0	0.67	SA/VIC
Senecio lautus	2	2	0	0	0	0	0.67	SA/VIC
Clematis microphylla	3	0	0	0	0	0	0.50	SA/VIC
Danthonia sp.	2	0	1	0	0	0	0.50	SA/VIC
Enchylaena tomentosa var. *tomentosa*	3	0	0	0	0	0	0.50	SA/VIC
Vittadinia dissecta var. *hirta*	2	1	0	0	0	0	0.50	SA/VIC
Einadia nutans ssp.	2	0	0	0	0	0	0.33	SA/VIC
Eucalyptus leptophylla	0	2	0	0	0	0	0.33	SA/VIC
Gahnia lanigera	0	0	2	0	0	0	0.33	SA/VIC

Hibbertia riparia	2	0	0	0	0	0	0.33	SA/VIC
**Hypochoeris radicata*	1	0	1	0	0	0	0.33	SA
**Lycium ferocissimum*	2	0	0	0	0	0	0.33	SA/VIC
**Marrubium vulgare*	2	0	0	0	0	0	0.33	SA/VIC
Melaleuca lanceolata	2	0	0	0	0	0	0.33	SA/VIC
Pittosporum phylliraeoides var. *microcarpa*	1	1	0	0	0	0	0.33	SA/VIC
Sclerolaena diacantha/uniflora	2	0	0	0	0	0	0.33	SA/VIC
Stipa elegantissima	2	0	0	0	0	0	0.33	SA/VIC
Stipa mollis group	2	0	0	0	0	0	0.33	SA/VIC
Triodia irritans var.	0	1	0	1	0	0	0.33	SA/VIC
Vittadinia megacephala	2	0	0	0	0	0	0.33	SA/VIC

Figure 30.
***Eucalyptus porosa* Low very open woodland at quadrat CP00201.**

Floristic Group 12. Characteristic species: ***Acacia ligulata, Eucalyptus incrassata, Stipa* sp.**

2 members VIC ONLY



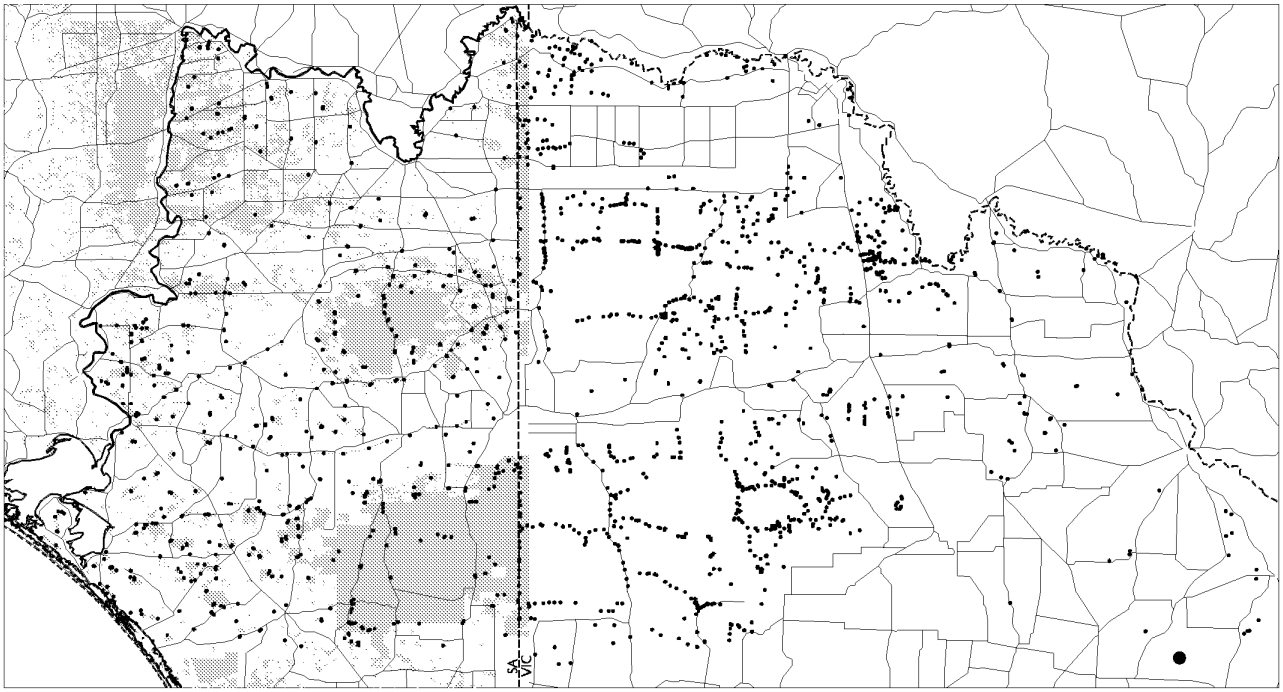
Characteristic Species:
Acacia ligulata
Eucalyptus incrassata
Stipa sp.

Quadrat(s):
A06015 A12089

Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Acacia ligulata	0	0	0	2	0	0	1.00	SA/VIC
Eucalyptus incrassata	1	1	0	0	0	0	1.00	SA/VIC
Stipa sp.	1	1	0	0	0	0	1.00	SA/VIC
Amyema linophyllum ssp. *orientale*	1	0	0	0	0	0	0.50	VIC
Callitris preissii	1	0	0	0	0	0	0.50	SA/VIC
Clematis microphylla	1	0	0	0	0	0	0.50	SA/VIC
Eucalyptus leptophylla	1	0	0	0	0	0	0.50	SA/VIC
Haloragis acutangula forma/*odontocarpa* forma	1	0	0	0	0	0	0.50	SA/VIC
Helichrysum apiculatum	1	0	0	0	0	0	0.50	SA/VIC
Helichrysum leucopsideum	1	0	0	0	0	0	0.50	SA/VIC
Lomandra leucocephala ssp. *robusta*	1	0	0	0	0	0	0.50	SA/VIC
Opercularia turpis	1	0	0	0	0	0	0.50	SA/VIC
Pittosporum phylliraeoides var. *microcarpa*	0	1	0	0	0	0	0.50	SA/VIC
Senecio lautus	1	0	0	0	0	0	0.50	SA/VIC
Senecio quadridentatus	1	0	0	0	0	0	0.50	SA/VIC
Zygophyllum apiculatum	0	1	0	0	0	0	0.50	SA/VIC
Zygophyllum aurantiacum/eremaeum	1	0	0	0	0	0	0.50	SA/VIC

Floristic Group 13. Characteristic species: ***Acacia acinacea, Acacia pycnantha, Allocasuarina luehmannii, Bursaria spinosa, Chenopodium desertorum*** **ssp.**, ***Danthonia*** **sp.**, ***Helichrysum semipapposum, Enchylaena tomentosa*** **var.** ***tomentosa.***

1 member VIC ONLY



Characteristic Species:
Acacia acinacea
Acacia pycnantha
Allocasuarina luehmannii
Bursaria spinosa
Chenopodium desertorum ssp.
Danthonia sp.
Helichrysum semipapposum
Enchylaena tomentosa var. *tomentosa*

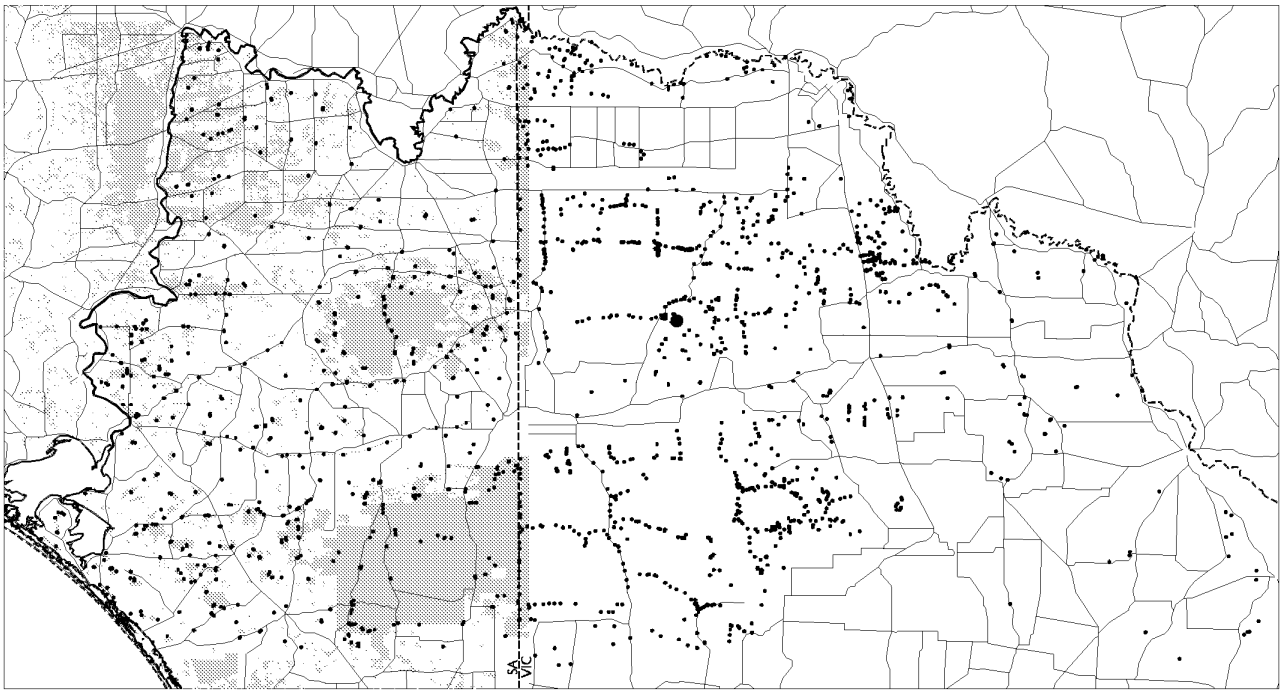
Quadrat(s):
A16605

Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Acacia acinacea	1	0	0	0	0	0	1.00	VIC
Acacia pycnantha	1	0	0	0	0	0	1.00	SA/VIC
Allocasuarina luehmannii	1	0	0	0	0	0	1.00	SA/VIC
Bursaria spinosa	1	0	0	0	0	0	1.00	SA/VIC
Chenopodium desertorum ssp.	0	1	0	0	0	0	1.00	SA/VIC
Danthonia sp.	0	0	1	0	0	0	1.00	SA/VIC
Dodonaea viscosa ssp. *cuneata*	0	1	0	0	0	0	1.00	VIC
Einadia nutans ssp.	1	0	0	0	0	0	1.00	SA/VIC
Enchylaena tomentosa var. *tomentosa*	0	1	0	0	0	0	1.00	SA/VIC
Eremophila deserti	1	0	0	0	0	0	1.00	SA/VIC
Eucalyptus dumosa	1	0	0	0	0	0	1.00	SA/VIC
Eucalyptus largiflorens	1	0	0	0	0	0	1.00	SA/VIC
Eucalyptus leucoxylon ssp.	0	1	0	0	0	0	1.00	SA/VIC
Helichrysum semipapposum	0	0	1	0	0	0	1.00	SA/VIC
Hyalosperma semisterile	0	1	0	0	0	0	1.00	SA/VIC
Lomandra effusa	1	0	0	0	0	0	1.00	SA/VIC
Minuria leptophylla	0	1	0	0	0	0	1.00	SA/VIC
Pittosporum phylliraeoides var. *microcarpa*	1	0	0	0	0	0	1.00	SA/VIC

Sclerolaena diacantha/uniflora	1	0	0	0	0	0	1.00	SA/VIC
Senna artemisioides ssp.	1	0	0	0	0	0	1.00	SA/VIC
Sida corrugata var.	1	0	0	0	0	0	1.00	VIC
Stipa elegantissima	1	0	0	0	0	0	1.00	SA/VIC
Vittadinia gracilis	0	1	0	0	0	0	1.00	SA/VIC
Stipa sp.	1	0	0	0	0	0	1.00	SA/VIC

Floristic Group 14. Characteristic species: *Vittadinia gracilis, V. condyloides, Danthonia* sp., *Dodonaea viscosa* ssp. *angustissima.*

1 members VIC ONLY



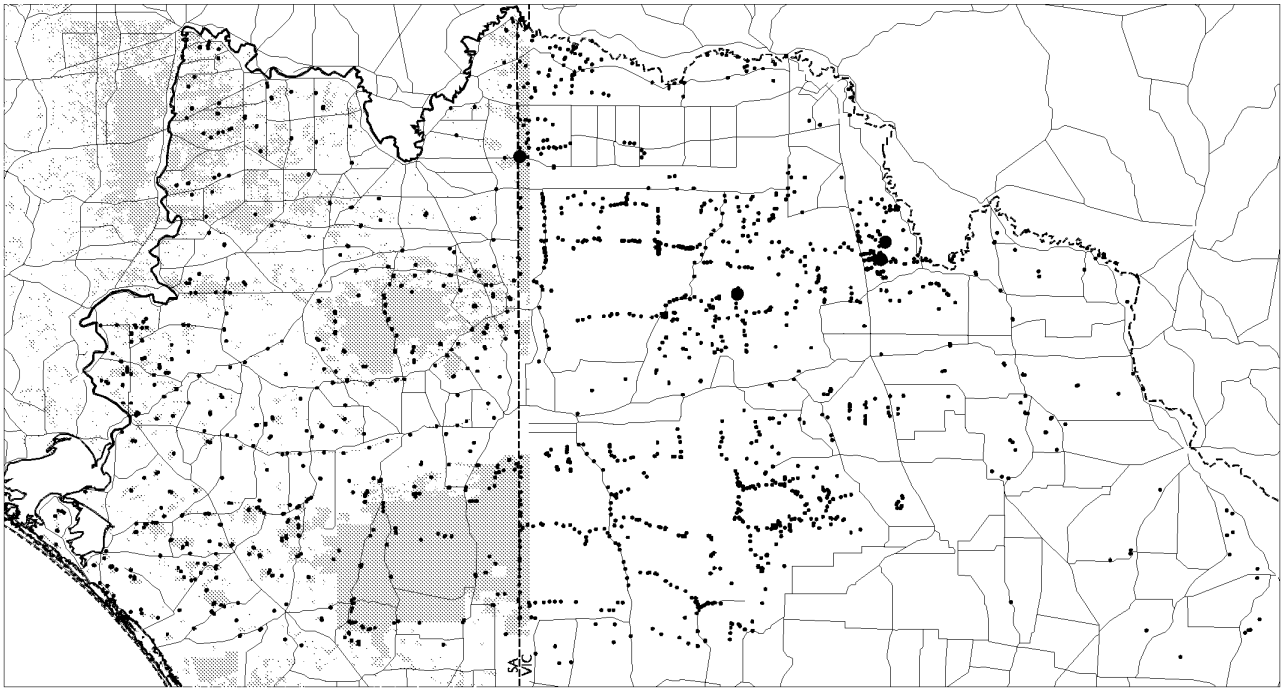
Characteristic Species:
Vittadinia gracilis
V. condyloides
Danthonia sp.
Dodonaea viscosa ssp. *angustissima*

Quadrat(s):
A16826

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Danthonia sp.	1	0	0	0	0	0	1.00	SA/VIC
Dodonaea viscosa ssp. *angustissima*	1	0	0	0	0	0	1.00	SA/VIC
**Gynandriris setifolia*	1	0	0	0	0	0	1.00	SA/VIC
Hyalosperma semisterile	1	0	0	0	0	0	1.00	SA/VIC
Sclerolaena diacantha/uniflora	1	0	0	0	0	0	1.00	SA/VIC
Sclerolaena obliquicuspis	1	0	0	0	0	0	1.00	SA/VIC
Senecio lautus	1	0	0	0	0	0	1.00	SA/VIC
Vittadinia condyloides	0	1	0	0	0	0	1.00	SA/VIC
Vittadinia gracilis	0	0	1	0	0	0	1.00	SA/VIC
Vittadinia megacephala	1	0	0	0	0	0	1.00	SA/VIC
Zygophyllum crenatum	1	0	0	0	0	0	1.00	VIC
Stipa sp.	1	0	0	0	0	0	1.00	SA/VIC

Floristic Group 15. Characteristic species: *Atriplex pumilio, Sclerolaena brachyptera*.

4 members VIC ONLY



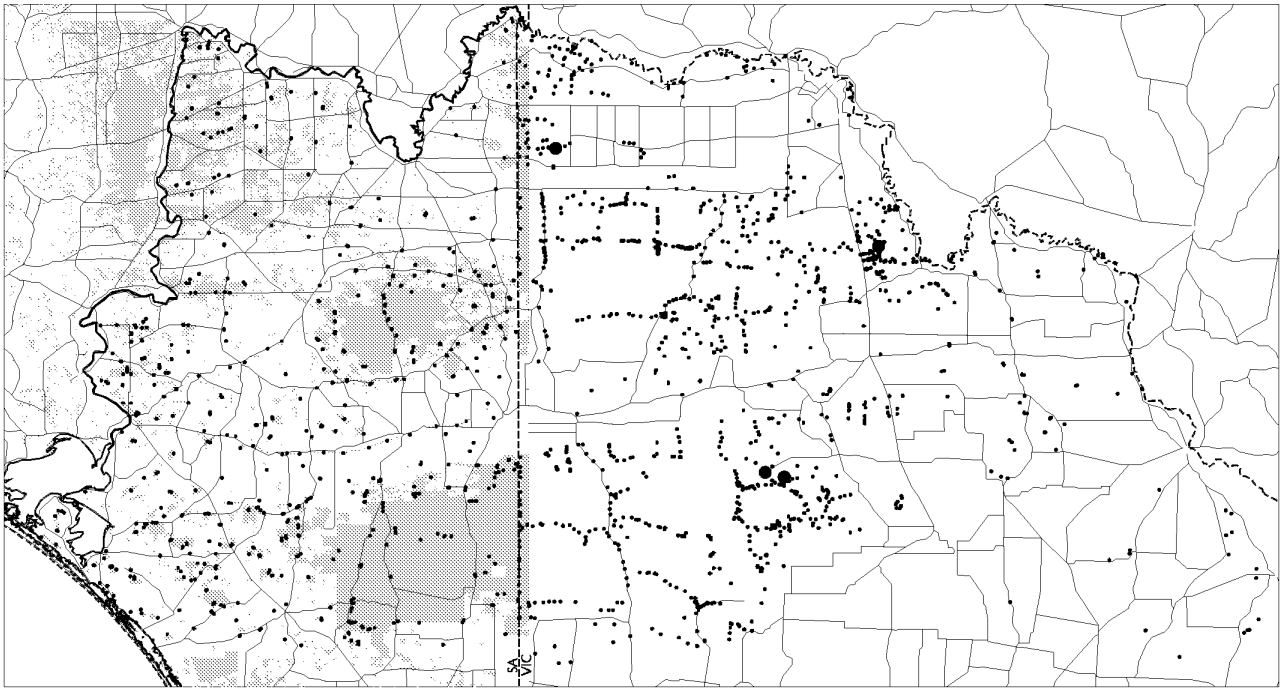
Characteristic Species:
Atriplex pumilio
Sclerolaena brachyptera

Quadrat(s):
A04048, A15074, A16113, A16303

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Atriplex pumilio	0	4	0	0	0	0	1.00	SA/VIC
Sclerolaena brachyptera	3	0	0	0	0	0	0.75	VIC
Osteocarpum acropterum var.	2	0	0	0	0	0	0.50	SA/VIC
Sclerolaena obliquicuspis	2	0	0	0	0	0	0.50	SA/VIC
Senecio lautus	2	0	0	0	0	0	0.50	SA/VIC
Stipa sp.	1	1	0	0	0	0	0.50	SA/VIC
Brachycome basaltica var. *gracilis*	0	1	0	0	0	0	0.25	VIC
Chloris truncata	0	0	1	0	0	0	0.25	VIC
Disphyma crassifolium ssp. *clavellatum*	1	0	0	0	0	0	0.25	SA/VIC
Enchylaena tomentosa var. *tomentosa*	1	0	0	0	0	0	0.25	SA/VIC
Frankenia foliosa	0	1	0	0	0	0	0.25	SA/VIC
Halosarcia sp.	1	0	0	0	0	0	0.25	SA/VIC
Maireana brevifolia	1	0	0	0	0	0	0.25	SA/VIC
Maireana turbinata	1	0	0	0	0	0	0.25	VIC
Osteocarpum salsuginosum	0	0	1	0	0	0	0.25	VIC
Sclerolaena diacantha/uniflora	0	1	0	0	0	0	0.25	SA/VIC
Sclerolaena muricata var. *muricata*	1	0	0	0	0	0	0.25	VIC
Solanum esuriale	1	0	0	0	0	0	0.25	SA/VIC
Vittadinia dissecta var. *hirta*	1	0	0	0	0	0	0.25	SA/VIC
Vittadinia gracilis	1	0	0	0	0	0	0.25	SA/VIC

Floristic Group 16. Characteristic species: *Stipa* sp., **Chondrilla juncea* and *Senecio lautus.*

5 members VIC ONLY



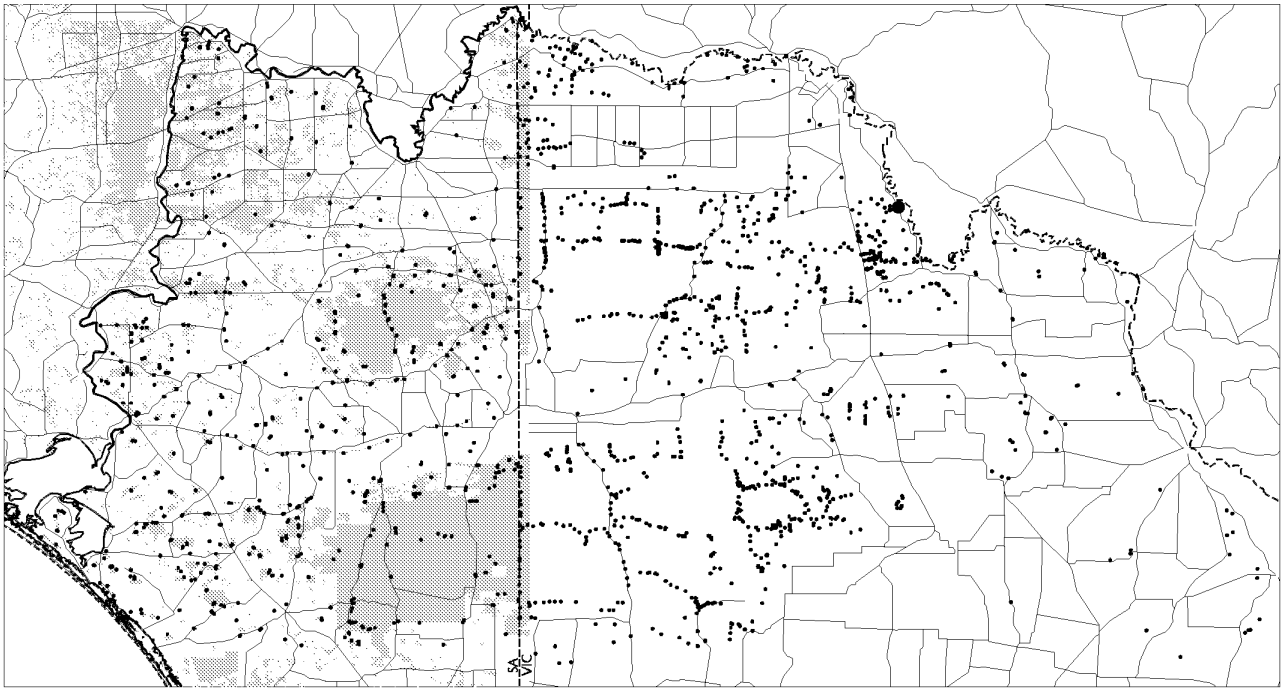
Characteristic Species:
Stipa sp.
**Chondrilla juncea*
Senecio lautus

Quadrat(s):
A15026, A15027, A15032, A15094, A16089

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Stipa sp.	5	0	0	0	0	0	1.00	SA/VIC
**Chondrilla juncea*	3	0	0	0	0	0	0.60	SA/VIC
Senecio lautus	3	0	0	0	0	0	0.60	SA/VIC
Callitris preissii	2	0	0	0	0	0	0.40	SA/VIC
Pelargonium australe	2	0	0	0	0	0	0.40	SA/VIC
Vittadinia condyloides	2	0	0	0	0	0	0.40	SA/VIC
Vittadinia dissecta var. *hirta*	2	0	0	0	0	0	0.40	SA/VIC
Alectryon oleifolius ssp. *canescens*	1	0	0	0	0	0	0.20	SA/VIC
Allocasuarina luehmannii	1	0	0	0	0	0	0.20	SA/VIC
Callistemon brachyandrus	1	0	0	0	0	0	0.20	VIC ONLY
Convolvulus erubescens	1	0	0	0	0	0	0.20	SA/VIC
Eucalyptus camaldulensis var. *camaldulensis*	1	0	0	0	0	0	0.20	SA/VIC
Maireana enchylaenoides	1	0	0	0	0	0	0.20	SA/VIC
** Marrubium vulgare*	1	0	0	0	0	0	0.20	SA/VIC
Myoporum platycarpum	1	0	0	0	0	0	0.20	SA/VIC
Senecio quadridentatus	1	0	0	0	0	0	0.20	SA/VIC
**Veronica catenata* ssp. *catenata*	1	0	0	0	0	0	0.20	VIC ONLY
Zygophyllum ammophilum	1	0	0	0	0	0	0.20	SA/VIC

Floristic Group 17. **Characteristic species:** ***Eucalyptus camaldulensis* var. *camaldulensis, Acacia stenophylla.***

1 members VIC ONLY



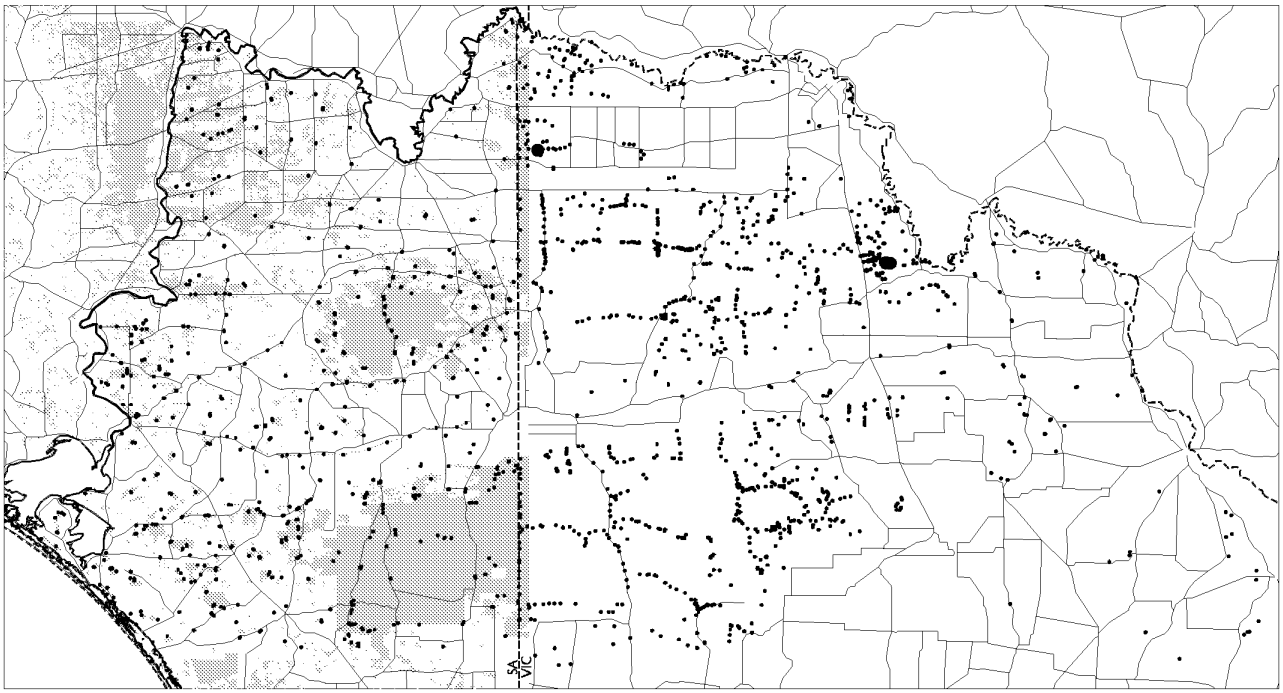
Characteristic Species:
Eucalyptus camaldulensis var. *camaldulensis*
Acacia stenophylla

Quadrat(s):
A15088

Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Acacia stenophylla	1	0	0	0	0	0	1.00	SA/VIC
Asperula conferta	1	0	0	0	0	0	1.00	VIC ONLY
Atriplex pumilio	1	0	0	0	0	0	1.00	SA/VIC
Chenopodium desertorum ssp.	1	0	0	0	0	0	1.00	SA/VIC
Enchylaena tomentosa var. *tomentosa*	1	0	0	0	0	0	1.00	SA/VIC
Eucalyptus camaldulensis var. *camaldulensis*	1	0	0	0	0	0	1.00	SA/VIC
Maireana pentagona	1	0	0	0	0	0	1.00	VIC ONLY
Paspalidium jubiflorum	1	0	0	0	0	0	1.00	SA/VIC
Sclerolaena brachyptera	1	0	0	0	0	0	1.00	VIC ONLY
Sclerolaena muricata var. *muricata*	1	0	0	0	0	0	1.00	VIC ONLY
Senecio quadridentatus	1	0	0	0	0	0	1.00	SA/VIC
Sida corrugata var.	1	0	0	0	0	0	1.00	VIC ONLY
Solanum esuriale	1	0	0	0	0	0	1.00	SA/VIC

Floristic Group 18. Characteristic species: *Sclerolaena diacantha/uniflora, Stipa* sp., *Atriplex pumilio, Enchylaena tomentosa* var. *tomentosa.*

3 members VIC ONLY



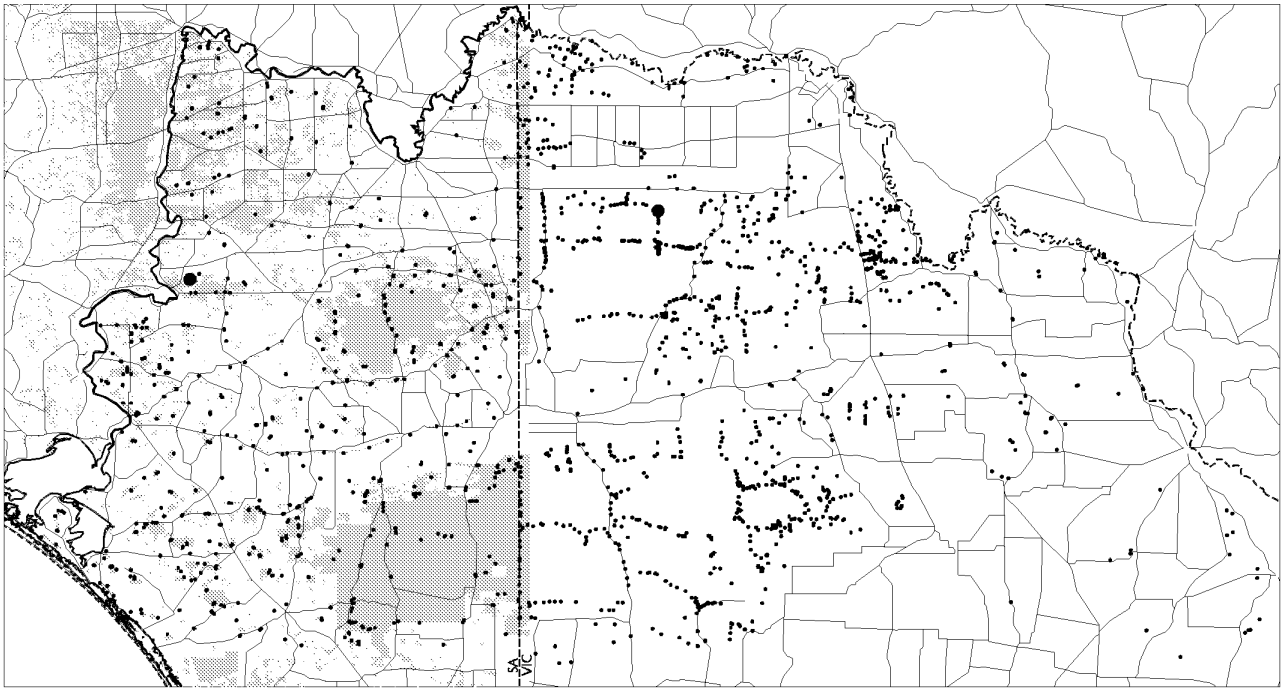
Characteristic Species:
Sclerolaena diacantha/uniflora
Stipa sp.
Atriplex pumilio
Enchylaena tomentosa var. *tomentosa*

Quadrat(s):
A15119, A15125, A16094

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Sclerolaena diacantha/uniflora	3	0	0	0	0	0	1.00	SA/VIC
Stipa sp.	3	0	0	0	0	0	1.00	SA/VIC
Atriplex pumilio	2	0	0	0	0	0	0.67	SA/VIC
Enchylaena tomentosa var. *tomentosa*	2	0	0	0	0	0	0.67	SA/VIC
Atriplex vesicaria ssp.	1	0	0	0	0	0	0.33	SA/VIC
Chenopodium desertorum ssp.	0	1	0	0	0	0	0.33	SA/VIC
Dodonaea viscosa ssp. *angustissima*	1	0	0	0	0	0	0.33	SA/VIC
Einadia nutans ssp.	1	0	0	0	0	0	0.33	SA/VIC
Sclerolaena obliquicuspis	1	0	0	0	0	0	0.33	SA/VIC
Sida ammophila	1	0	0	0	0	0	0.33	VIC ONLY
Solanum esuriale	1	0	0	0	0	0	0.33	SA/VIC

Floristic Group 19. ***Acacia nyssophylla, Acacia ligulata*** **Tall very open shrubland.**

2 members SA/VIC (1/1)



Vegetation mapping details:
Vegetation mapping groups: 24.01
Hidden within mapping groups: none

Dominant Overstorey Species:
Acacia nyssophylla
Acacia ligulata

Dominant Understorey Species:
Enchylaena tomentosa var. tomentosa

Structural Data:
Typical canopy cover: very sparse
Av. height (metres): 3

Environmental Parameters:
Typical landforms: plain
Calcrete type: broken
Range of soils: loam
Average rainfall (mm): 307 (1 member)

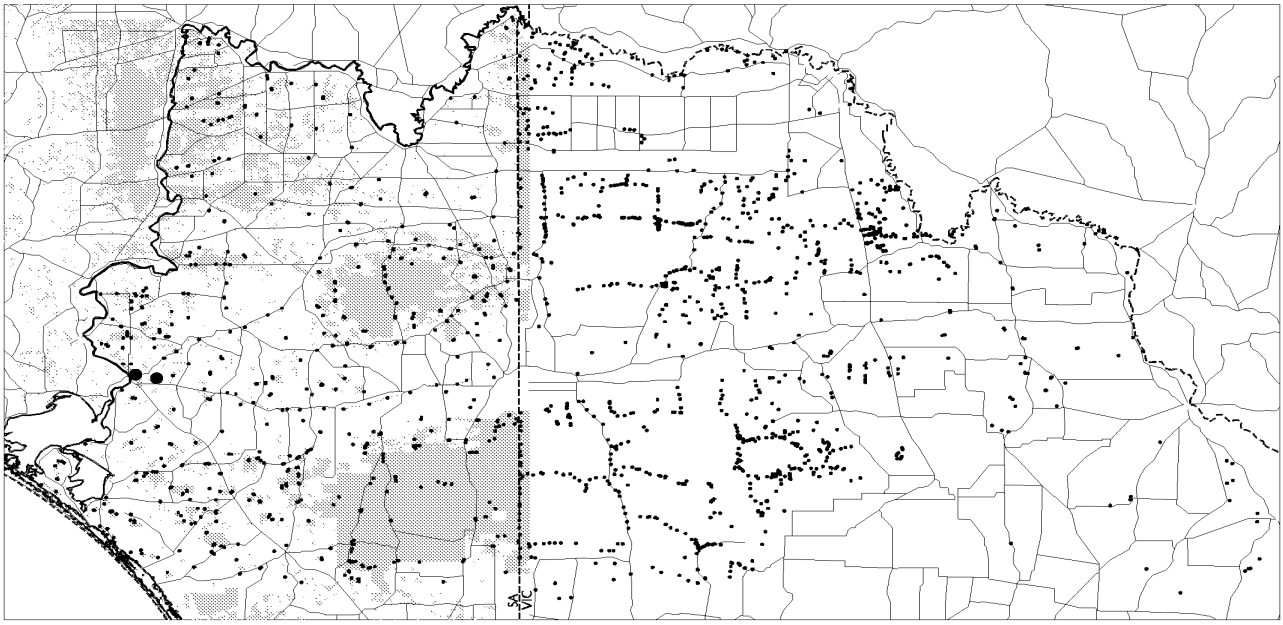
Quadrat(s):
BA00501, A16011

Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Acacia nyssophylla	0	0	2	0	0	0	1.00	SA/VIC
Amyema preissii	1	1	0	0	0	0	1.00	SA/VIC
Enchylaena tomentosa var. *tomentosa*	2	0	0	0	0	0	1.00	SA/VIC
Acacia ligulata	0	1	0	0	0	0	0.50	SA/VIC
Chenopodium curvispicatum	1	0	0	0	0	0	0.50	SA/VIC
Chenopodium desertorum ssp.	1	0	0	0	0	0	0.50	SA/VIC
Einadia nutans ssp.	1	0	0	0	0	0	0.50	SA/VIC
Eremophila longifolia	0	0	1	0	0	0	0.50	SA/VIC
Eucalyptus dumosa	1	0	0	0	0	0	0.50	SA/VIC
Eucalyptus socialis	1	0	0	0	0	0	0.50	SA/VIC
Exocarpos aphyllus	1	0	0	0	0	0	0.50	SA/VIC
Helichrysum leucopsideum	1	0	0	0	0	0	0.50	SA/VIC
Lomandra effusa	0	0	1	0	0	0	0.50	SA/VIC
Maireana rohrlachii	1	0	0	0	0	0	0.50	SA/VIC
**Psilocaulon tenue*	1	0	0	0	0	0	0.50	SA/VIC
Rhagodia parabolica	1	0	0	0	0	0	0.50	SA ONLY

Rhagodia spinescens	1	0	0	0	0	0	0.50	SA/VIC
Sclerolaena diacantha/uniflora	0	1	0	0	0	0	0.50	SA/VIC
Senecio hispidulus	1	0	0	0	0	0	0.50	VIC ONLY
Senna artemisioides ssp.	1	0	0	0	0	0	0.50	SA/VIC
Stipa elegantissima	1	0	0	0	0	0	0.50	SA/VIC
Stipa sp.	1	0	0	0	0	0	0.50	SA/VIC
Zygophyllum ovatum	1	0	0	0	0	0	0.50	SA/VIC

Floristic Group 20. ***Lepidosperma congestum/laterale/viscidum, Lomandra effusa, Lepidosperma carphoides, Stipa* sp. Very open (tussock) grassland.**

2 members SA ONLY



Vegetation mapping details:
Vegetation mapping groups: 37.01
Hidden within mapping groups: 9.01

Dominant Overstorey Species:
Lepidosperma congestum/laterale/viscidum
Lomandra effusa
Lepidosperma carphoides
Stipa sp.

Dominant Understorey Species:
n/a

Structural Data:
Typical canopy cover: sparse
Av. height (metres): 5 (where *E. porosa* is present)

Environmental Parameters:
Typical landforms: plain
Calcrete type: broken
Range of soils: clay loam - loam
Average rainfall (mm): 378

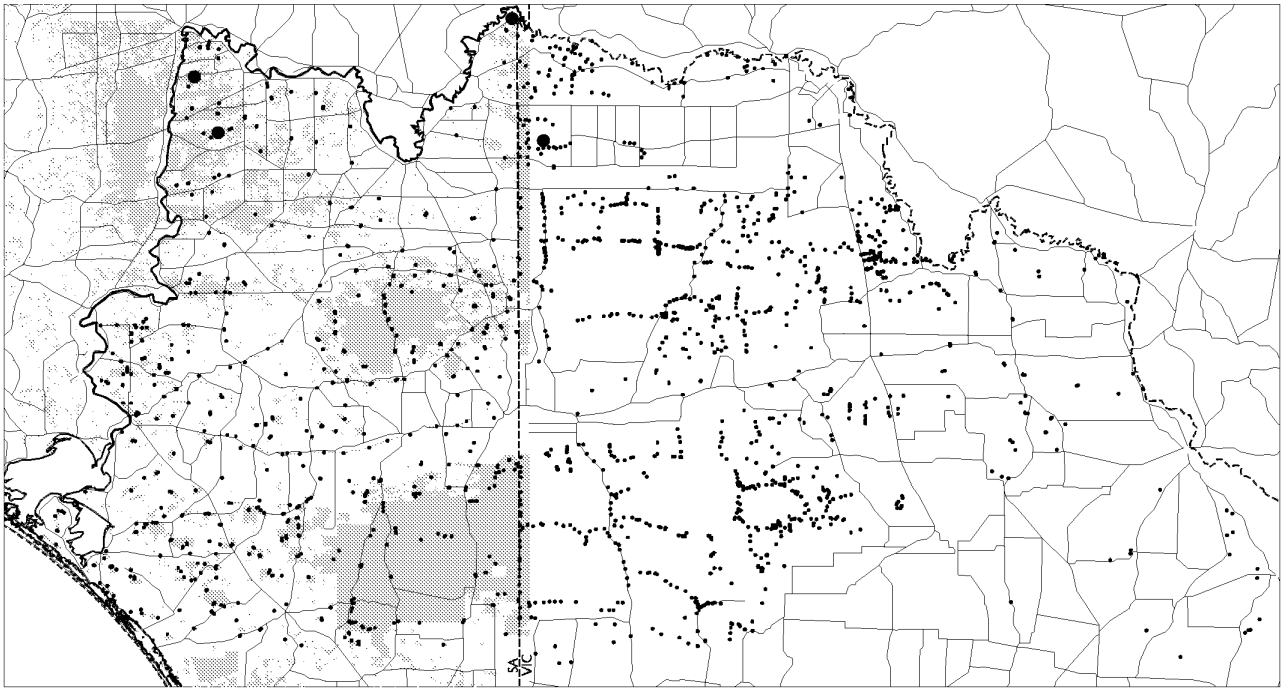
Quadrat(s):
TB01101, TB00201

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Lepidosperma congestum/laterale/viscidum	1	1	0	0	0	0	1.00	SA/VIC
Lomandra effusa	0	0	1	1	0	0	1.00	SA/VIC
**Asphodelus fistulosus*	0	1	0	0	0	0	0.50	SA/VIC
Cryptandra amara var.	1	0	0	0	0	0	0.50	SA/VIC
Einadia nutans ssp.	1	0	0	0	0	0	0.50	SA/VIC
Eucalyptus porosa	1	0	0	0	0	0	0.50	SA/VIC
Helichrysum leucopsideum	1	0	0	0	0	0	0.50	SA/VIC
**Hypochoeris radicata*	0	1	0	0	0	0	0.50	SA ONLY
Lepidosperma carphoides	0	0	1	0	0	0	0.50	SA/VIC
**Lycium ferocissimum*	1	0	0	0	0	0	0.50	SA/VIC
**Marrubium vulgare*	1	0	0	0	0	0	0.50	SA/VIC
Melaleuca lanceolata	1	0	0	0	0	0	0.50	SA/VIC
Stipa acrociliata group	1	0	0	0	0	0	0.50	SA/VIC
Stipa sp.	0	1	0	0	0	0	0.50	SA/VIC
Vittadinia australasica var.	1	0	0	0	0	0	0.50	SA/VIC

Figure 31.
***Lepidosperma congestum/laterale/viscidum, Lomandra effusa, Lepidosperma carphoides, Stipa* sp. Very open (tussock) grassland at quadrat TB00201.**

Floristic Group 21. ***Maireana sedifolia* Open shrubland**.

4 members SA/VIC (3/1)



Vegetation mapping details:
Vegetation mapping groups: 28.02, 35.04
Hidden within mapping groups: none

Dominant Overstorey Species:
Maireana sedifolia

Dominant Understorey Species:
n/a

Structural Data:
Av. height (metres): 1.8
Typical canopy cover: very sparse to sparse

Environmental Parameters:
Typical landforms: plain, undulating plain
Calcrete type: none to broken
Range of soils: sandy loam, loam and clay loam
Average rainfall (mm): 254 (2 members)

Quadrat(s):
BL00401, RE00701, A16095, BL00101

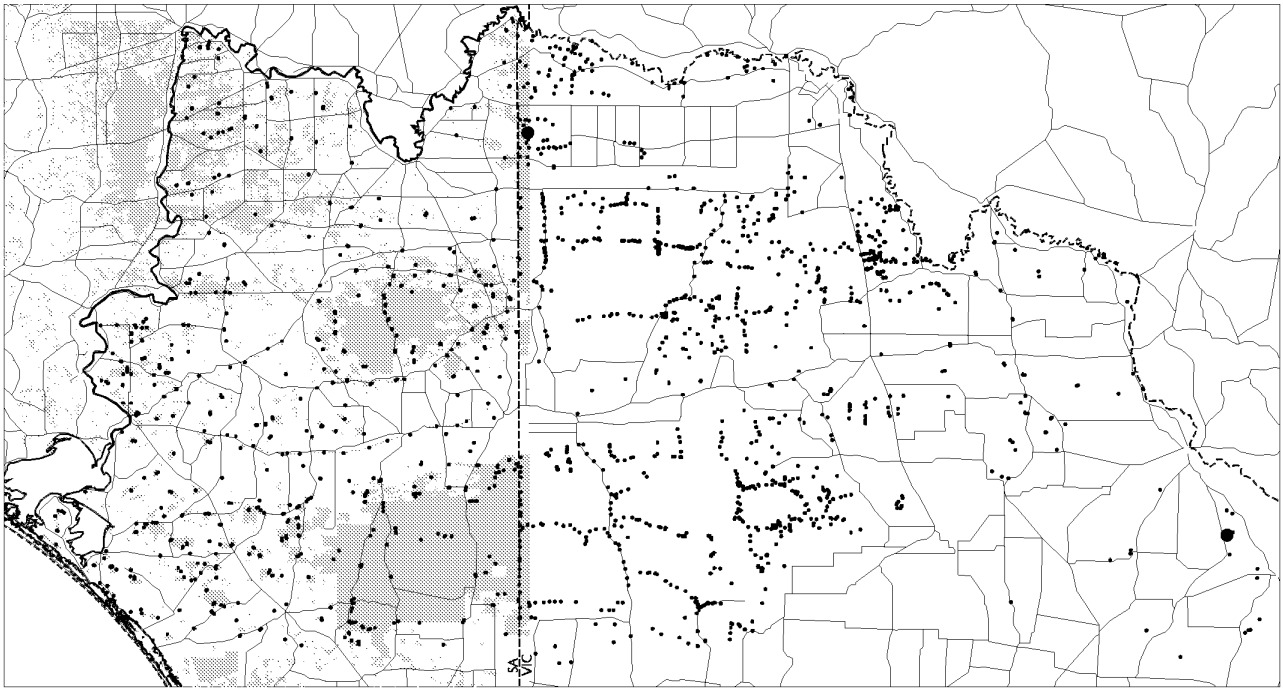
Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Maireana sedifolia	0	1	2	1	0	0	1.00	SA/VIC
Enchylaena tomentosa var. *tomentosa*	2	0	0	0	0	0	0.50	SA/VIC
Eriochiton sclerolaenoides	2	0	0	0	0	0	0.50	SA/VIC
Rhagodia spinescens	2	0	0	0	0	0	0.50	SA/VIC
Sclerolaena obliquicuspis	2	0	0	0	0	0	0.50	SA/VIC
Sclerolaena patenticuspis	2	0	0	0	0	0	0.50	SA ONLY
Acacia nyssophylla	1	0	0	0	0	0	0.25	SA/VIC
Alectryon oleifolius ssp. *canescens*	1	0	0	0	0	0	0.25	SA/VIC
Atriplex stipitata	1	0	0	0	0	0	0.25	SA/VIC
Atriplex vesicaria ssp.	1	0	0	0	0	0	0.25	SA/VIC
Dissocarpus paradoxus var. *paradoxus*	1	0	0	0	0	0	0.25	SA/VIC
Hyalosperma glutinosum ssp. *glutinosum*	0	1	0	0	0	0	0.25	VIC ONLY
Hyalosperma semisterile	0	0	1	0	0	0	0.25	SA/VIC
Ixiolaena leptolepis	1	0	0	0	0	0	0.25	VIC ONLY
Lawrencia squamata	1	0	0	0	0	0	0.25	SA/VIC
Lycium australe	1	0	0	0	0	0	0.25	SA/VIC

Maireana pyramidata	1	0	0	0	0	0	0.25	SA/VIC
Maireana turbinata	0	1	0	0	0	0	0.25	VIC ONLY
Myoporum platycarpum	1	0	0	0	0	0	0.25	SA/VIC
Rhagodia ulicina	1	0	0	0	0	0	0.25	SA ONLY
Sclerolaena diacantha/uniflora	1	0	0	0	0	0	0.25	SA/VIC
Stipa sp.	0	1	0	0	0	0	0.25	SA/VIC
Zygophyllum ammophilum	1	0	0	0	0	0	0.25	SA/VIC
Zygophyllum aurantiacum/eremaeum	1	0	0	0	0	0	0.25	SA/VIC
Zygophyllum billardierei	1	0	0	0	0	0	0.25	VIC ONLY
Zygophyllum crenatum	1	0	0	0	0	0	0.25	VIC ONLY

Figure 32.
***Maireana sedifolia* Open shrubland at quadrat BL00401.**

Floristic Group 22. Characteristic species: *Atriplex eardleyae, Danthonia* sp., *Einadia nutans* ssp.

2 members VIC ONLY



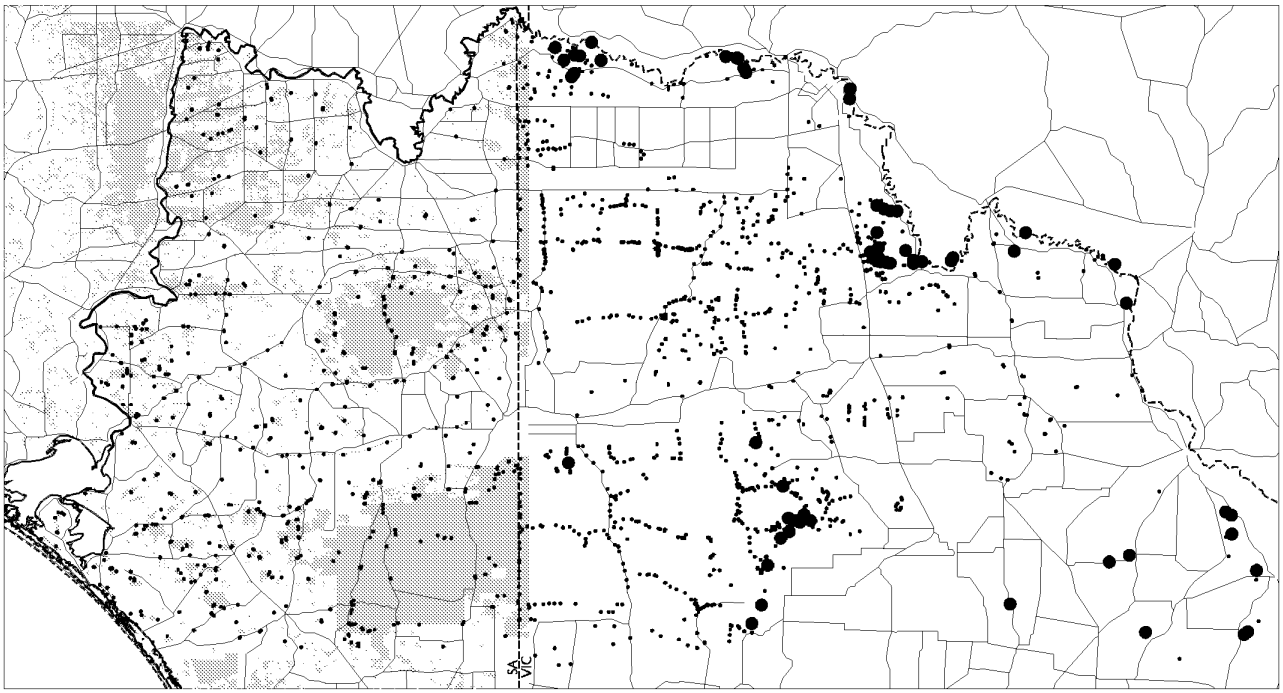
Characteristic Species:
Atriplex eardleyae
Danthonia sp.
Einadia nutans ssp.

Quadrat(s):
A16109, A16607

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Atriplex eardleyae	1	1	0	0	0	0	1.00	SA/VIC
Danthonia sp.	2	0	0	0	0	0	1.00	SA/VIC
Einadia nutans ssp.	0	2	0	0	0	0	1.00	SA/VIC
Dianella longifolia var.	1	0	0	0	0	0	0.50	VIC ONLY
Enchylaena tomentosa var. *tomentosa*	1	0	0	0	0	0	0.50	SA/VIC
Eragrostis falcata	1	0	0	0	0	0	0.50	VIC ONLY
Eriochiton sclerolaenoides	1	0	0	0	0	0	0.50	SA/VIC
Goodenia heteromera	1	0	0	0	0	0	0.50	SA/VIC
Homopholis proluta	0	1	0	0	0	0	0.50	SA/VIC
Ixiolaena leptolepis	1	0	0	0	0	0	0.50	VIC ONLY
Lawrencia squamata	1	0	0	0	0	0	0.50	SA/VIC
**Lolium* sp.	1	0	0	0	0	0	0.50	VIC ONLY
Lycium australe	0	0	1	0	0	0	0.50	SA/VIC
Maireana sedifolia	1	0	0	0	0	0	0.50	SA/VIC
Maireana turbinata	0	1	0	0	0	0	0.50	VIC ONLY
Osteocarpum acropterum var.	1	0	0	0	0	0	0.50	SA/VIC
Rhagodia spinescens	1	0	0	0	0	0	0.50	SA/VIC
Sclerolaena diacantha/uniflora	1	0	0	0	0	0	0.50	SA/VIC
Sclerolaena muricata var. *muricata*	1	0	0	0	0	0	0.50	VIC ONLY
Sclerolaena obliquicuspis	1	0	0	0	0	0	0.50	SA/VIC
Stipa elegantissima	1	0	0	0	0	0	0.50	SA/VIC
Stipa sp.	1	0	0	0	0	0	0.50	SA/VIC
Zygophyllum crenatum	0	1	0	0	0	0	0.50	VIC ONLY
Zygophyllum ovatum	1	0	0	0	0	0	0.50	SA/VIC

Floristic Group 23. Characteristic species: *Eucalyptus largiflorens, Stipa* sp., *Einadia nutans* ssp., *Enchylaena tomentosa* var. *tomentosa*.

71 members VIC ONLY



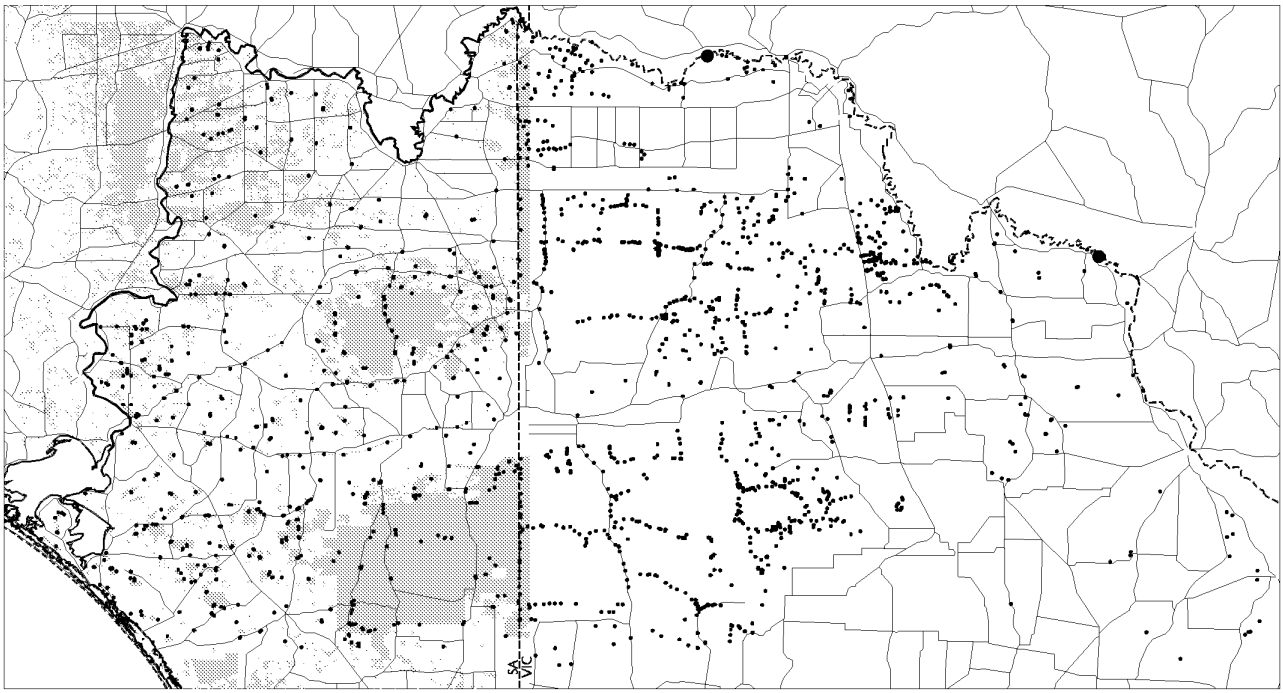
Characteristic Species:
Eucalyptus largiflorens
Stipa sp.
Einadia nutans ssp.
Enchylaena tomentosa var. *tomentosa*

Quadrat(s):
A03002, A03010, A03049, A03052, A03054, A03110, A04032, A04033, A04046, A12007, A12008, A12024, A12039, A12049, A12088, A12201, A15058, A15059, A15069, A15070, A15081, A15083, A15087, A15089, A15095, A15100, A15101, A15108, A15109, A15111, A15115, A15118, A15132, A15133, A15134, A15135 A15136, A16146, A16157, A16180, A16528, A16530, A16537, A16548, A16552, A16553, A16555, A16567, A16570, A16574, A16575, A16582, A16594, A16596 A16599, A16600, A16602, A16603, A16608, A16614, A16615, A16617, A16618, A16619, A16901, A16903, A16904, A16906, A16909, A16910, A16913,

Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Eucalyptus largiflorens	3	14	37	12	5	0	0.99	SA/VIC
Einadia nutans ssp.	21	14	1	0	0	0	0.50	SA/VIC
Enchylaena tomentosa var. *tomentosa*	20	10	5	1	0	0	0.50	SA/VIC
Stipa sp.	16	12	7	1	0	0	0.50	SA/VIC
Danthonia sp.	8	10	8	0	0	0	0.36	SA/VIC
Muehlenbeckia cunninghamii	3	8	10	3	0	0	0.33	SA/VIC
Sclerolaena brachyptera	9	5	2	0	0	0	0.22	VIC ONLY
Atriplex pumilio	12	3	0	0	0	0	0.21	SA/VIC
Sclerolaena diacantha/uniflora	9	5	1	0	0	0	0.21	SA/VIC

Floristic Group 24. Characteristic species: *Sclerolaena muricata* var. *muricata, S. stelligera, Chenopodium nitrariaceum, S. muricata* var. *muricata, Eucalyptus largiflorens* and *Pratia concolor.*

2 members VIC ONLY



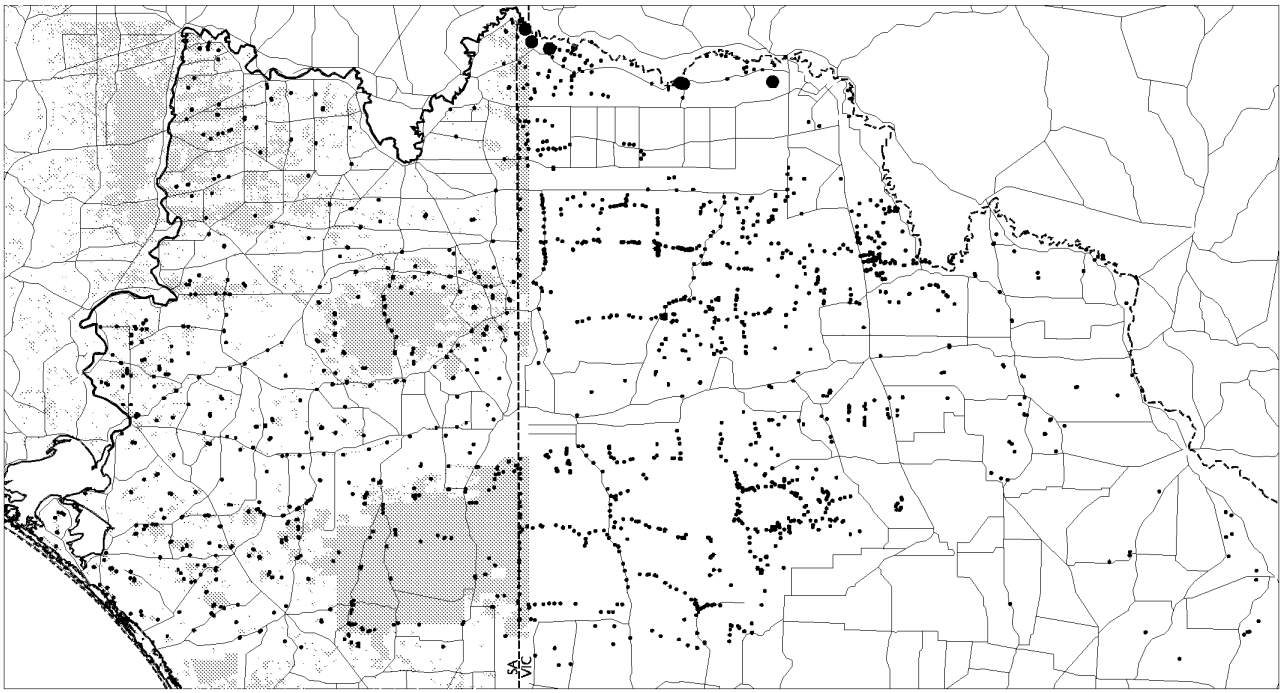
Characteristic Species:
Sclerolaena muricata var. *muricata*
S. stelligera
Chenopodium nitrariaceum
S. muricata var. *muricata*
Eucalyptus largiflorens
Pratia concolor

Quadrat(s):
A16591, A16908

Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Sclerolaena muricata var. *muricata*	1	1	0	0	0	0	1.00	VIC ONLY
Sclerolaena stelligera	0	2	0	0	0	0	1.00	SA/VIC
Chenopodium nitrariaceum	0	0	1	0	0	0	0.50	VIC ONLY
Disphyma crassifolium ssp. *clavellatum*	1	0	0	0	0	0	0.50	SA/VIC
Eucalyptus camaldulensis var. *camaldulensis*	1	0	0	0	0	0	0.50	SA/VIC
Eucalyptus largiflorens	0	1	0	0	0	0	0.50	SA/VIC
Muehlenbeckia cunninghamii	1	0	0	0	0	0	0.50	SA/VIC
**Phyla nodiflora*	1	0	0	0	0	0	0.50	VIC ONLY
Pratia concolor	0	1	0	0	0	0	0.50	VIC ONLY
Sclerolaena brachyptera	1	0	0	0	0	0	0.50	VIC ONLY
Sclerolaena tricuspis	1	0	0	0	0	0	0.50	VIC ONLY
Stipa sp.	1	0	0	0	0	0	0.50	SA/VIC
Vittadinia dissecta var. *hirta*	1	0	0	0	0	0	0.50	SA/VIC

PATN Floristic Group 25. Characteristic species: *Sclerolaena brachyptera, Disphyma crassifolium* ssp. *clavellatum, S. tricuspis, Einadia nutans* ssp.

6 members VIC ONLY



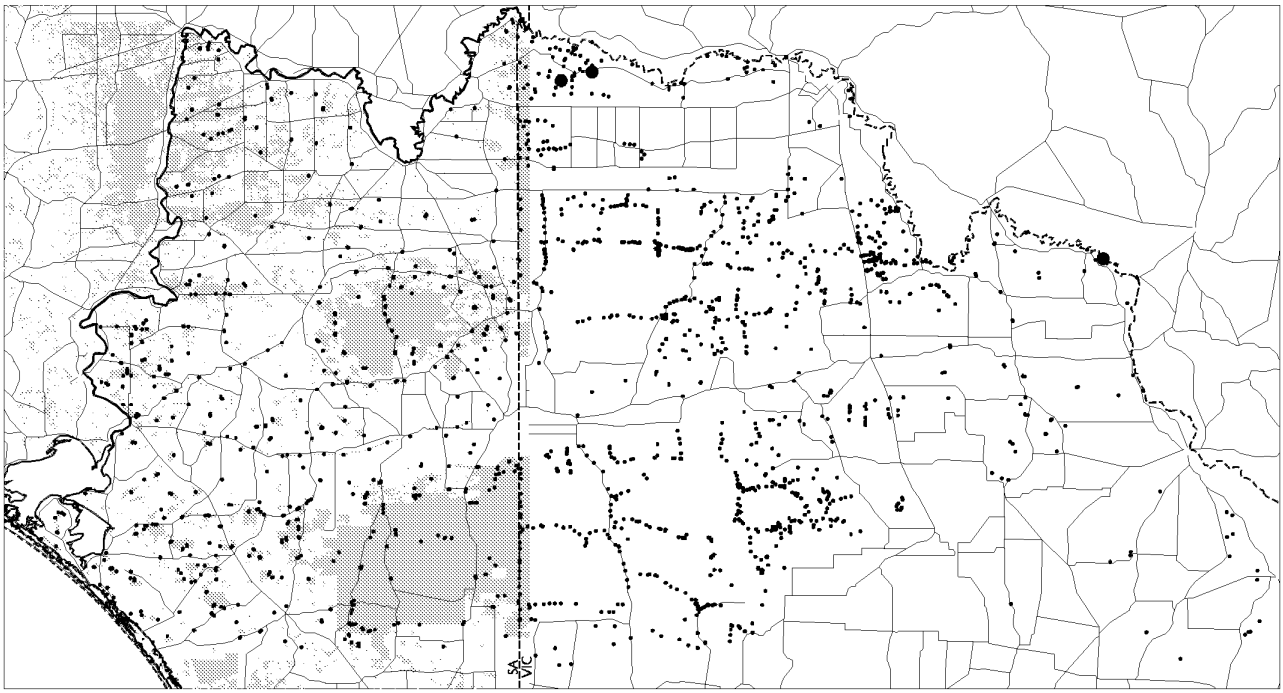
Characteristic Species:
Sclerolaena brachyptera
Disphyma crassifolium ssp. *clavellatum*
S. tricuspis
Einadia nutans ssp.

Quadrat(s):
A16501, A16502, A16504, A16506, A16536, A16557

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Sclerolaena brachyptera	0	2	4	0	0	0	1.00	VIC ONLY
Disphyma crassifolium ssp. *clavellatum*	2	3	0	0	0	0	0.83	SA/VIC
Sclerolaena tricuspis	2	3	0	0	0	0	0.83	VIC ONLY
Einadia nutans ssp.	2	1	1	0	0	0	0.67	SA/VIC
Malacocera tricornis	4	0	0	0	0	0	0.67	VIC ONLY
Atriplex nummularia ssp. *nummularia*	0	1	1	1	0	0	0.50	VIC ONLY
Cressa cretica	2	1	0	0	0	0	0.50	SA/VIC
Eucalyptus largiflorens	1	2	0	0	0	0	0.50	SA/VIC
Maireana ciliata	1	2	0	0	0	0	0.50	VIC ONLY
Sclerolaena stelligera	2	0	1	0	0	0	0.50	SA/VIC
Chenopodium nitrariaceum	1	0	0	1	0	0	0.33	VIC ONLY
Danthonia sp.	2	0	0	0	0	0	0.33	SA/VIC
Dissocarpus biflorus var. *biflorus*	1	0	1	0	0	0	0.33	VIC ONLY
Enchylaena tomentosa var. *tomentosa*	2	0	0	0	0	0	0.33	SA/VIC
Muehlenbeckia cunninghamii	1	1	0	0	0	0	0.33	SA/VIC
Sclerolaena diacantha/uniflora	2	0	0	0	0	0	0.33	SA/VIC

Floristic Group 26. Characteristic species: ***Nitraria billardierei, Sclerolaena brachyptera, Einadia nutans*** **ssp.,** ***Osteocarpum acropterum*** **var.,** ***Rhagodia spinescens, Sclerolaena tricuspis***.

3 members VIC ONLY



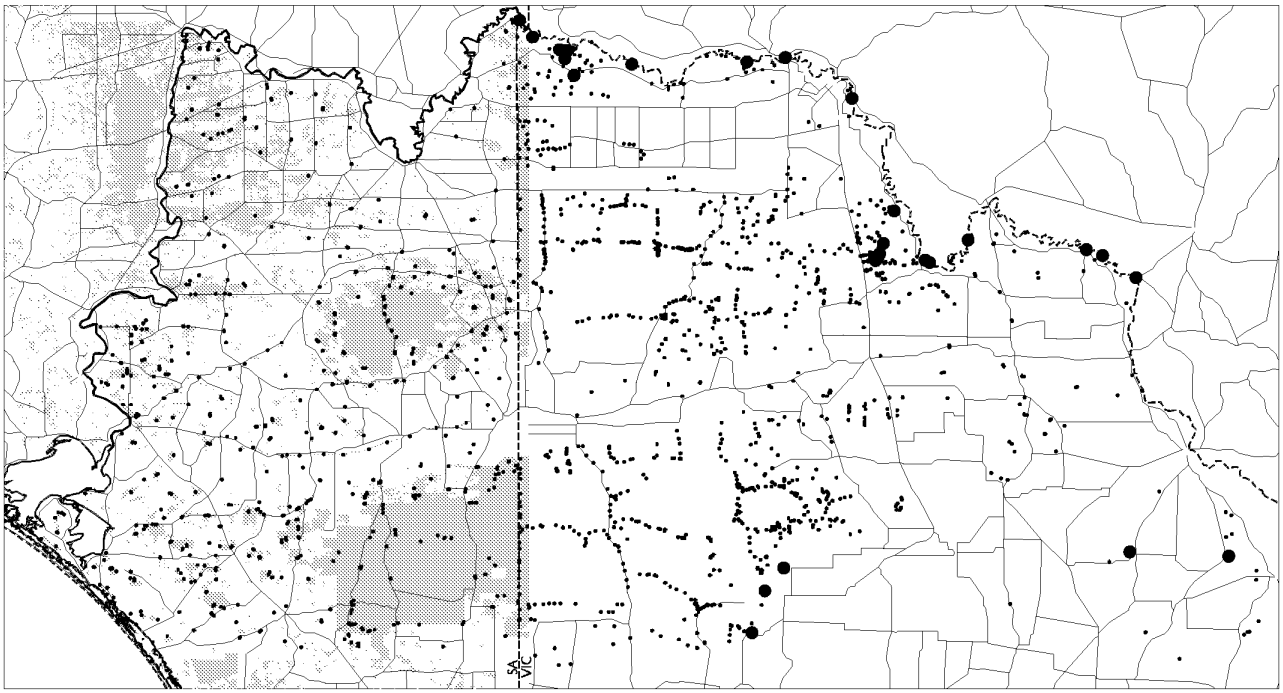
Characteristic Species:
Nitraria billardierei
Sclerolaena brachyptera
Einadia nutans ssp.
Osteocarpum acropterum var.
Rhagodia spinescens
Sclerolaena tricuspis

Quadrat(s):
A16524, A16534, A16593

Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Nitraria billardierei	0	0	3	0	0	0	1.00	VIC ONLY
Sclerolaena brachyptera	1	2	0	0	0	0	1.00	VIC ONLY
Einadia nutans ssp.	2	0	0	0	0	0	0.67	SA/VIC
Osteocarpum acropterum var.	1	1	0	0	0	0	0.67	SA/VIC
Rhagodia spinescens	1	1	0	0	0	0	0.67	SA/VIC
Sclerolaena tricuspis	1	1	0	0	0	0	0.67	VIC ONLY
Stipa sp.	1	1	0	0	0	0	0.67	SA/VIC
Atriplex eardleyae	0	1	0	0	0	0	0.33	SA/VIC
Danthonia sp.	0	1	0	0	0	0	0.33	SA/VIC
Dissocarpus biflorus var. *biflorus*	0	1	0	0	0	0	0.33	VIC ONLY
Eragrostis australasica	1	0	0	0	0	0	0.33	VIC ONLY
Maireana appressa	1	0	0	0	0	0	0.33	SA/VIC
Maireana pyramidata	1	0	0	0	0	0	0.33	SA/VIC
Osteocarpum salsuginosum	0	1	0	0	0	0	0.33	VIC ONLY
Sclerolaena diacantha/uniflora	1	0	0	0	0	0	0.33	SA/VIC
Sclerolaena divaricata	0	1	0	0	0	0	0.33	VIC ONLY
Sclerolaena muricata var. *muricata*	1	0	0	0	0	0	0.33	VIC ONLY
Sclerolaena obliquicuspis	1	0	0	0	0	0	0.33	SA/VIC
Sclerolaena stelligera	0	1	0	0	0	0	0.33	SA/VIC
Vittadinia dissecta var. *hirta*	1	0	0	0	0	0	0.33	SA/VIC
Zygophyllum crenatum.	0	1	0	0	0	0	0.33	VIC ONLY

Floristic Group 27. Characteristic species: *Eucalyptus camaldulensis* var. *camaldulensis, Morgania glabra, Paspalidium jubiflorum.*

27 members VIC ONLY



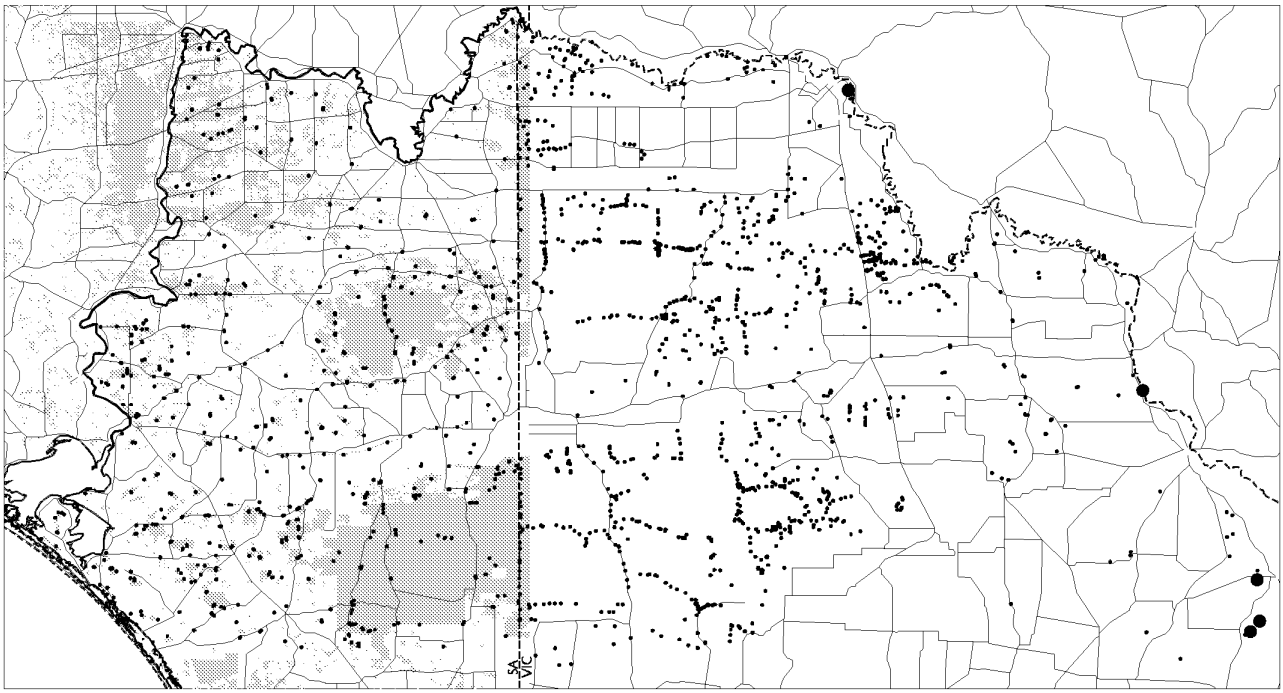
Characteristic Species:
Eucalyptus camaldulensis var. *camaldulensis*
Morgania glabra
Paspalidium jubiflorum

Quadrat(s):
A04010, A12006, A12023, A12030, A15067, A15068, A15071, A15075, A15080, A16177, A16181, A16505, A16507, A16529, A16538, A16539, A16546, A16561 A16566, A16578, A16589, A16592, A16595, A16606, A16616, A16905, A16911

Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Eucalyptus camaldulensis var. *camaldulensis*	0	0	19	9	0	0	1.00	SA/VIC
Morgania glabra	7	5	2	0	0	0	0.50	SA/VIC
Paspalidium jubiflorum	3	4	5	2	0	0	0.50	SA/VIC
Acacia stenophylla	6	2	3	0	0	0	0.39	SA/VIC
Enchylaena tomentosa var. *tomentosa*	8	2	1	0	0	0	0.39	SA/VIC
Rumex brownii	6	3	1	0	0	0	0.36	VIC ONLY
Vittadinia dissecta var. *hirta*	8	2	0	0	0	0	0.36	SA/VIC
Centipeda cunninghamii	5	3	1	0	0	0	0.32	SA/VIC
**Cynodon dactylon*	1	4	3	1	0	0	0.32	VIC ONLY
Einadia nutans ssp.	7	2	0	0	0	0	0.32	SA/VIC
Cyperus gymnocaulos	4	1	1	1	1	0	0.29	SA/VIC
Muehlenbeckia cunninghamii	3	3	2	0	0	0	0.29	SA/VIC
Senecio quadridentatus	4	3	1	0	0	0	0.29	SA/VIC
Eucalyptus largiflorens	2	0	4	0	0	0	0.21	SA/VIC
Pratia concolor	5	1	0	0	0	0	0.21	VIC ONLY
Stipa sp.	6	0	0	0	0	0	0.21	SA/VIC

Floristic Group 28. Characteristic species: ***Eleocharis acuta, Brachycome basaltica* var. *gracilis, Eucalyptus largiflorens, Juncus flavidus, Paspalum distichum*.**

5 members VIC ONLY



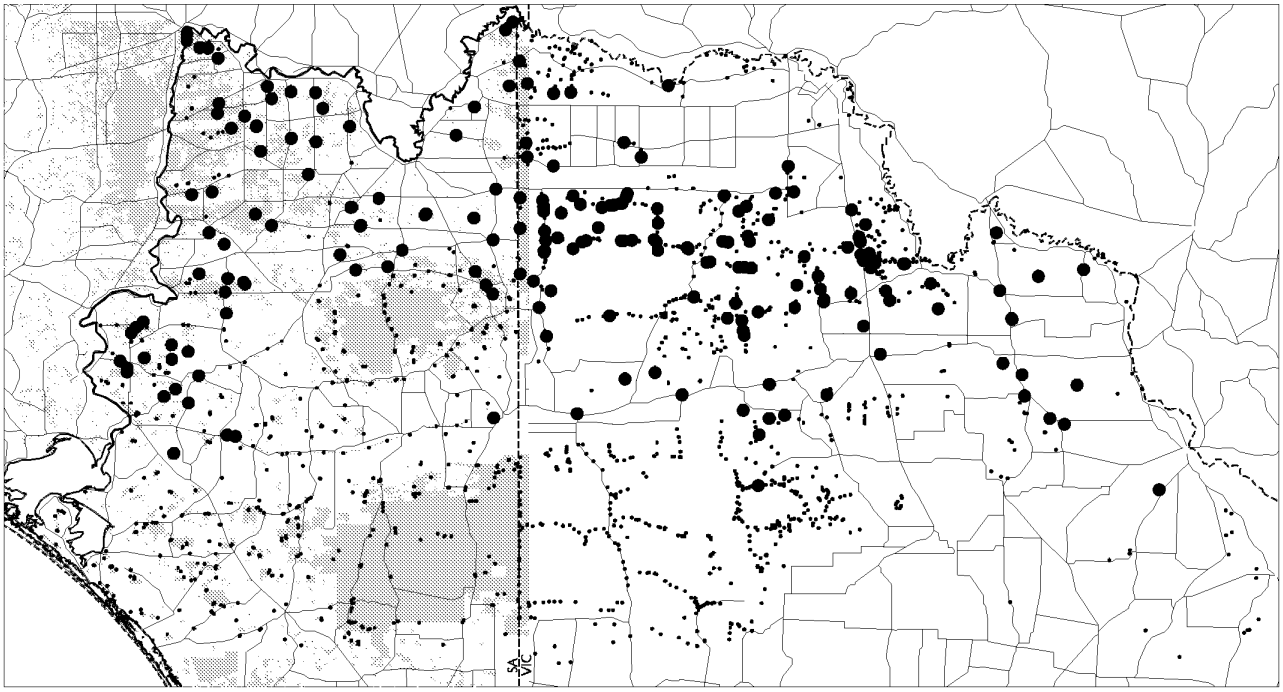
Characteristic Species:
Eleocharis acuta
Brachycome basaltica var. *gracilis*
Eucalyptus camaldulensis var. *camaldulensis*
Morgania glabra
Paspalidium jubiflorum

Quadrat(s):
A16569, A16597, A16598, A16604, A16609

Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Eleocharis acuta	0	0	5	0	0	0	1.00	SA/VIC
Brachycome basaltica var. *gracilis*	2	1	0	0	0	0	0.60	VIC ONLY
Eucalyptus largiflorens	1	2	0	0	0	0	0.60	SA/VIC
Juncus flavidus	3	0	0	0	0	0	0.60	SA/VIC
**Paspalum distichum*	0	2	0	0	1	0	0.60	SA/VIC
Danthonia sp.	1	1	0	0	0	0	0.40	SA/VIC
Eragrostis australasica	1	1	0	0	0	0	0.40	VIC ONLY
Eucalyptus camaldulensis var. *camaldulensis*	1	0	1	0	0	0	0.40	SA/VIC
Muehlenbeckia cunninghamii	2	0	0	0	0	0	0.40	SA/VIC
**Phyla nodiflora*	0	1	0	1	0	0	0.40	VIC ONLY
Pratia concolor	0	0	2	0	0	0	0.40	VIC ONLY
Rumex brownii	1	0	1	0	0	0	0.40	VIC ONLY
**Rumex crispus*	1	1	0	0	0	0	0.40	VIC ONLY
Triglochin procerum var. *procerum*	1	1	0	0	0	0	0.40	VIC ONLY

Floristic Group 29. *Eucalyptus gracilis, E.oleosa* Very open mallee.

204 members SA/VIC (77/127)



Vegetation mapping details:
Vegetation mapping groups: 2.02, 18.01, 18.06, 18.07, 18.08, 18.12, 18.15
Hidden within mapping groups: 12.01, 12.03, 14.01

Dominant Overstorey Species:
Eucalyptus gracilis
E.oleosa

Dominant Understorey Species:
Stipa sp.
Maireana pentatropis
Zygophyllum apiculatum

Structural Data:
Typical canopy cover: very sparse
Av. height (metres): 5.7

Environmental Parameters:
Typical landforms: undulating plain/plain - with a wide range of topographic features
Calcrete type: generally broken -range none to sheet
Range of soils: sandy loam to clay
Average rainfall (mm): 295 (74 members)

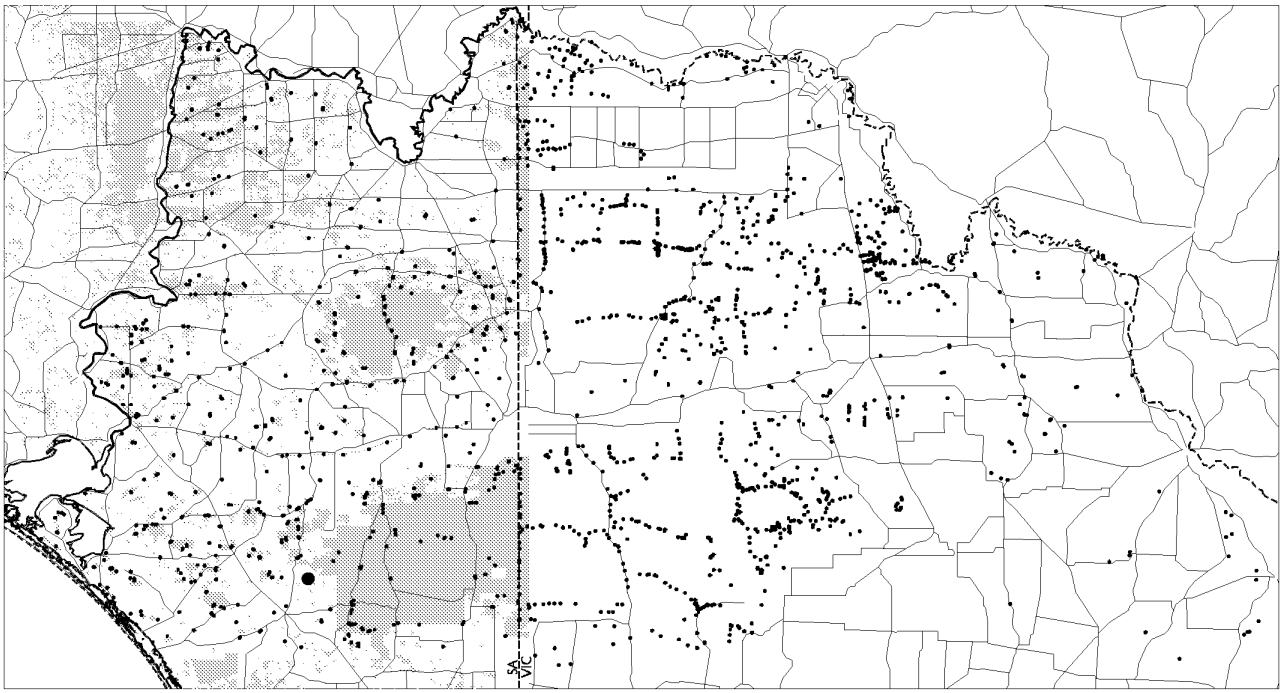
Quadrat(s):
TB02401, A03105, A04017, A04025, A04031, A04040, A04041, A04042, A06009, A06036, A06037, A06038, A06056, A06057, A06058, A12109, A12113, A12116, A15061, A15062, A16002, A16003, A16006, A16009, A16014, A16016, A16018, A16024, A16027, A16028, A16030, A16031, A16032, A16034, A16052, A16054, A16056, A16069, A16070, A16071, A16075, A16078, A16079, A16081, A16085, A16103, A16111, A16116, A16118, A16119, A16122, A16124, A16127, A16128, A16133, A16137, A16141, A16147, A16151, A16158, A16161, A16165, A16168, A16172, A16189, A16190, A16193, A16198, A16200, A16202, A16212, A16218, A16221, A16223, A16225, A16244, A16260, A16274, A16275, A16280, A16281, A16285, A16286, A16287, A16290, A16291, A16302, A16309, A16313, A16327, A16339, A16349, A16351, A16352, A16368, A16371, A16373, A16509, A16514, A16519, A16535, A16544, A16562, A16579, A16584, A16585, A16587, A16588, A16612, A16629, A16632, A16637, A16638, A16639, A16642, A16704, A16706, A16708, A16712, A16714, A16715, A16722, A16725, A16726, A16730, A16802, A16804, A16805, AL00601, AL01101, MM01101, SR01901, SR02001, SR02201, MM01301 AL01501, AL01601, AL01801, AL01901, LO00301, BA00101, CP00301, CP00401, CP00501, CP00601, BT02101, MB02501, MB02601, MB02701, MB00601, BL00801, BL00901, BL01201, BL01301, BL01501, MB01001, MB01401, MB01501, MB02101, CP00501, RE00901, MI00401, MI00501, MI00701, MM00101, MM00201, WK00301, WK00501, WK00601, MM00301, WA00401, WA00601, WA00701, WA00801, WA01401, WA01501, WA01601, WA01801, MM00501, MM00701, RE00101, RE00301, BL00801, BL00901, AL03301, AL03801, AL04201, SR00301, RE01201, RE01301, PB01601, PI00101, AL04601, CO00101, SH00401, SH00501, MI00401, WK00301, WK00601, WK00201, WK00801, WK00901, WK00101, MB03401

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Eucalyptus gracilis	11	21	90	31	2	0	0.76	SA/VIC
Sclerolaena diacantha/uniflora	72	64	19	0	0	0	0.76	SA/VIC
Stipa sp.	84	58	7	1	0	0	0.73	SA/VIC
Eucalyptus oleosa	12	20	88	24	3	0	0.72	SA/VIC
Maireana pentatropis	53	36	20	2	0	0	0.54	SA/VIC
Zygophyllum apiculatum	50	45	11	0	0	0	0.52	SA/VIC
Zygophyllum aurantiacum/eremaeum	42	17	25	2	0	0	0.42	SA/VIC
Chenopodium desertorum ssp.	67	17	0	0	0	0	0.41	SA/VIC
Eucalyptus dumosa	34	28	19	1	0	0	0.40	SA/VIC
Enchylaena tomentosa var. *tomentosa*	59	17	2	0	0	0	0.38	SA/VIC
Stipa elegantissima	60	9	0	0	0	0	0.34	SA/VIC
Westringia rigida	47	18	2	0	0	0	0.33	SA/VIC
Beyeria opaca	42	13	7	0	0	0	0.30	SA/VIC

Figure 33.
***Eucalyptus gracilis, E.oleosa* Very open mallee at quadrat BA00101.**

Floristic Group 30. ***Eucalyptus oleosa, Melaleuca lanceolata, Acacia halliana/microcarpa, Dodonaea hexandra*** **Very open low mallee.**

1 member SA ONLY



Vegetation mapping details:
Vegetation mapping groups: 18.01
Hidden within mapping groups: none

Dominant Overstorey Species:
Eucalyptus oleosa
Melaleuca lanceolata
Acacia halliana/microcarpa
Dodonaea hexandra

Dominant Understorey Species: n/a

Structural Data:
Typical canopy cover: very sparse
Av. height (metres): 2.5

Environmental Parameters:
Typical landform: undulating plain
Calcrete type: broken
Range of soils: loam
Average rainfall (mm): 447

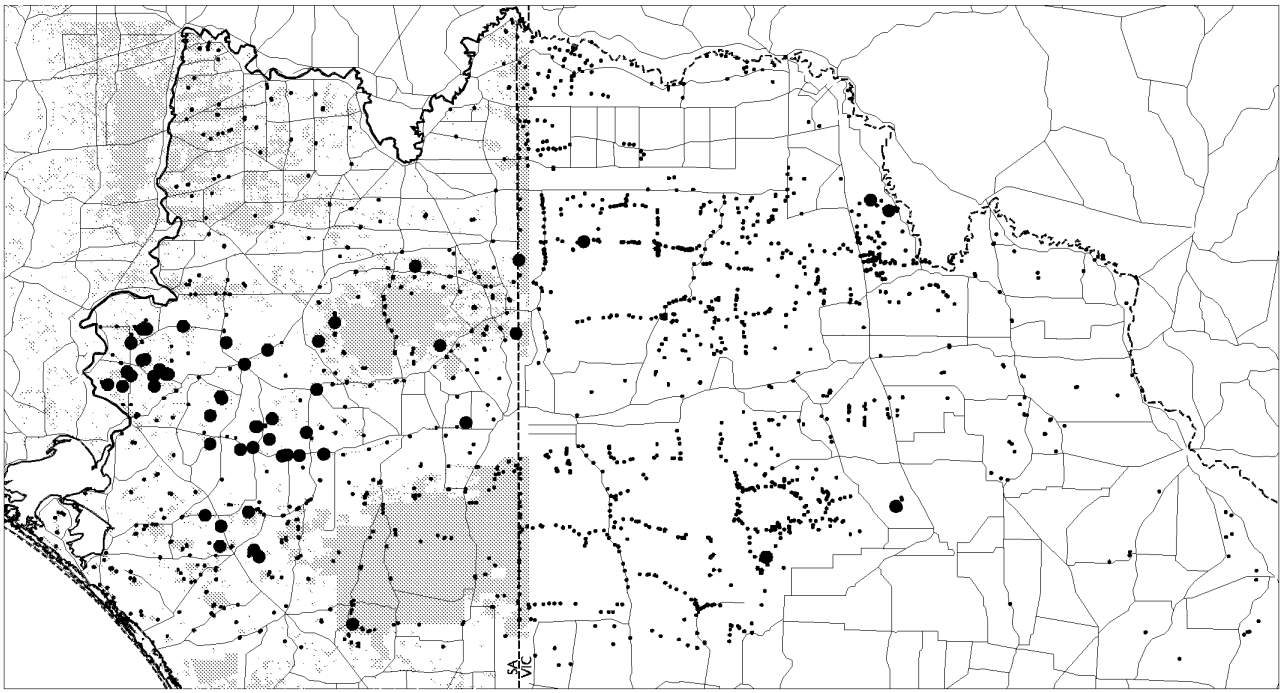
Quadrat(s):
TT00301

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Acacia halliana/microcarpa	0	0	0	1	0	0	1.00	SA/VIC
Dodonaea hexandra	0	0	1	0	0	0	1.00	SA/VIC
Eucalyptus oleosa	0	0	0	0	1	0	1.00	SA/VIC
Melaleuca lanceolata	0	0	1	0	0	0	1.00	SA/VIC

Figure 34.
Eucalyptus oleosa, Melaleuca lanceolata, Acacia halliana/microcarpa, Dodonaea hexandra **Very open low mallee at quadrat TT00301.**

Floristic Group 31. ***Melaleuca acuminata, M. lanceolata, +/- Eucalyptus socialis, +/- E. leptophylla*** **Tall open shrubland**

55 members SA/VIC (49/6)



Vegetation mapping details:
Vegetation mapping groups: 19.01, 19.08, 19.19, 23.01, 23.02, 23.05
Hidden within mapping groups: 10.01, 11.01, 18.07, 19.15

Dominant Overstorey Species:
Melaleuca acuminata
M. lanceolata
Eucalyptus socialis
E. leptophylla

Dominant Understorey Species:
Stipa sp.
Danthonia sp

Structural Data:
Typical canopy cover: very sparse to sparse
Av. height (metres): 4.8

Environmental Parameters:
Typical landforms: undulating plain -range dune crest/slope/swale
Calcrete type: none to broken
Range of soils: sandy loam to loam (sand to clay loam also recorded)
Average rainfall (mm): 370 (31 members)

Quadrat(s):
MB02501, PE00401, TB02501, A12059, A15002, A15003, A15085, A16053, A16162, MR01301, LO00101, MB02301, MB02401, MB02801, MB02901, MB03101, CN01301, CN01601, MB00901, MB01301, MB00401, MB01701, MB01801, MB02001, MB02201, MB00801, MI00201, MI00301, KA00201, AL03101, CN00201, CA02701, CA02901, PE00101, PE01401, PE00201, PE01701, KU00101, KU00201, KU01901, AL03701, PB00401, JA00301, JA00201, JA01301, JA01401, PE00301, JA00101, PI01101, PE00601, CN02101, SH00301, SH00701, MI00101 MI01001

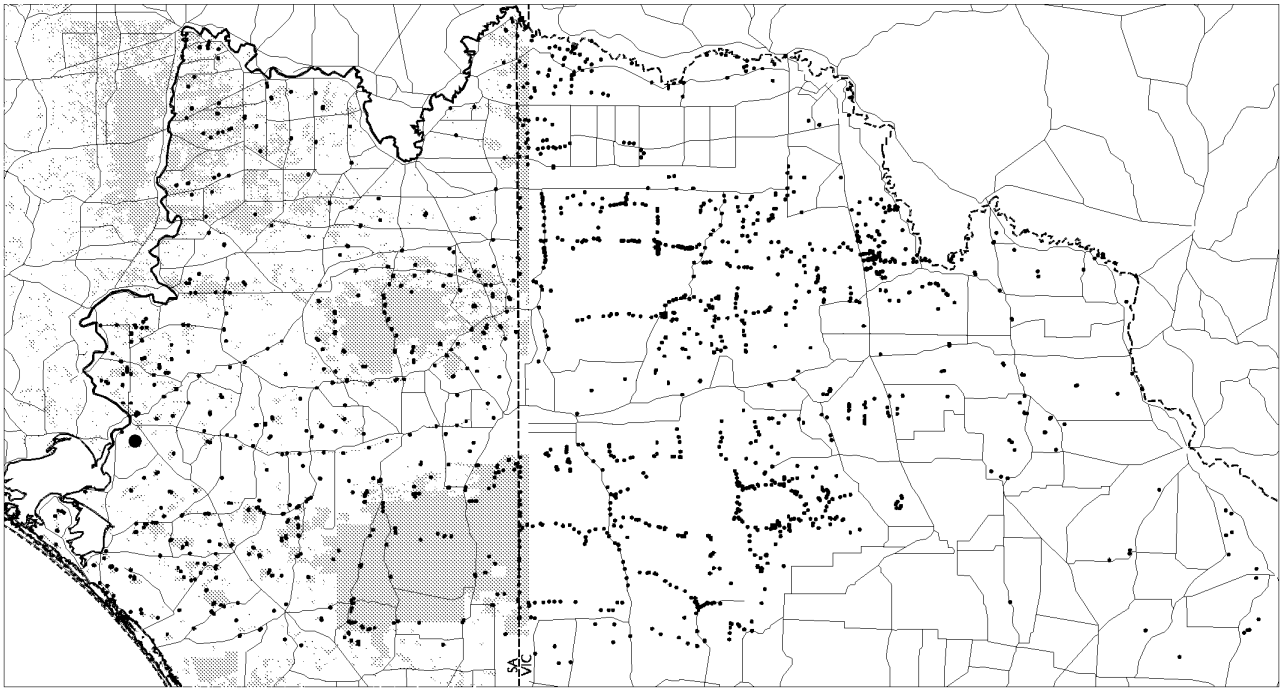
Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Melaleuca lanceolata	6	8	24	10	0	0	0.8	SA/VIC
Melaleuca acuminata	5	9	21	10	1	0	0.82	SA/VIC
Eucalyptus socialis	3	4	17	9	0	0	0.59	SA/VIC
Eucalyptus leptophylla	9	7	14	1	0	0	0.55	SA/VIC
Stipa sp.	21	6	0	0	0	0	0.48	SA/VIC
Danthonia sp.	18	3	1	0	0	0	0.39	SA/VIC

Eucalyptus dumosa	3	8	8	3	0	0	0.39	SA/VIC
Eucalyptus "anceps"	0	4	10	6	1	0	0.38	SA ONLY
Lepidosperma congestum/laterale/viscidum	17	2	2	0	0	0	0.38	SA/VIC
Dianella revoluta var.	17	2	1	0	0	0	0.36	SA/VIC
Hibbertia riparia	16	3	1	0	0	0	0.36	SA/VIC
Eucalyptus incrassata	7	3	6	3	0	0	0.34	SA/VIC
Senecio lautus	15	4	0	0	0	0	0.34	SA/VIC
Clematis microphylla	14	2	1	1	0	0	0.32	SA/VIC
Eucalyptus gracilis	2	0	9	6	0	0	0.30	SA/VIC
Gahnia deusta	6	1	8	2	0	0	0.30	SA ONLY
Helichrysum leucopsideum	12	4	1	0	0	0	0.30	SA/VIC

Figure 35.
***Melaleuca acuminata, M. lanceolata, +/- Eucalyptus socialis, +/- E. leptophylla* Tall open shrubland at quadrat PE00401.**

Floristic Group 32. ***Callitris canescens, Eucalyptus dumosa, Eucalyptus porosa*** **Tall very open shrubland**.

1 member SA ONLY



Vegetation mapping details:
Vegetation mapping groups: 25.01
Hidden within mapping groups: none

Dominant Overstorey Species:
Callitris canescens
Eucalyptus dumosa
Eucalyptus porosa

Dominant Understorey Species:
Acacia rigens
Acacia spinescens
Hibbertia sericea var.

Structural Data:
Typical canopy cover: very sparse
Av. height (metres): 6.0

Environmental Parameters:
Typical landforms: undulating plain
Calcrete type: broken
Range of soils: clay loam
Average rainfall (mm): 358

Quadrat(s):
TB00701

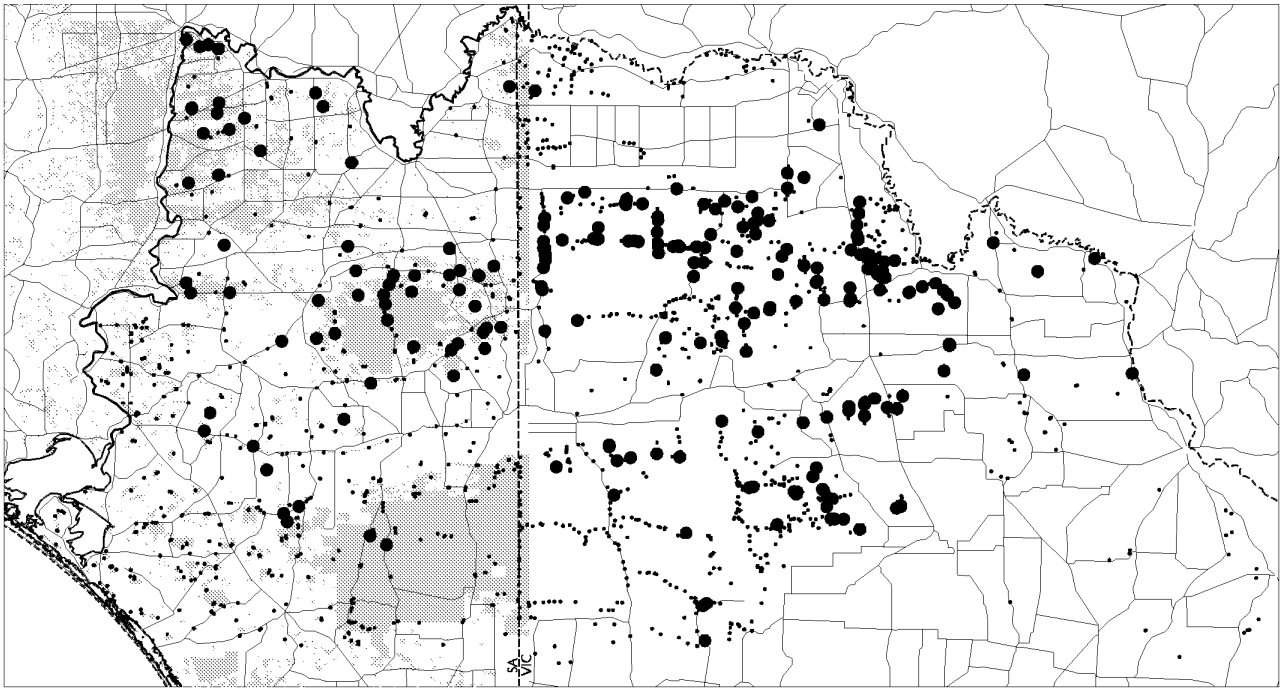
Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Acacia brachybotrya	1	0	0	0	0	0	1.00	SA/VIC
Acacia rigens	1	0	0	0	0	0	1.00	SA/VIC
Acacia spinescens	1	0	0	0	0	0	1.00	SA/VIC
Astroloma humifusum	1	0	0	0	0	0	1.00	SA/VIC
Brachyloma ericoides ssp. *ericoides*	1	0	0	0	0	0	1.00	SA/VIC
Callitris canescens	0	0	0	1	0	0	1.00	SA ONLY
Eucalyptus dumosa	0	1	0	0	0	0	1.00	SA/VIC
Eucalyptus porosa	0	1	0	0	0	0	1.00	SA/VIC
Eucalyptus socialis	1	0	0	0	0	0	1.00	SA/VIC
Eutaxia microphylla var. *microphylla*	1	0	0	0	0	0	1.00	SA/VIC
Helichrysum apiculatum	1	0	0	0	0	0	1.00	SA/VIC
Helichrysum leucopsideum	0	1	0	0	0	0	1.00	SA/VIC
Hibbertia riparia	1	0	0	0	0	0	1.00	SA/VIC
Hibbertia sericea var.	0	1	0	0	0	0	1.00	SA/VIC
Lepidosperma carphoides	0	1	0	0	0	0	1.00	SA/VIC

Lepidosperma congestum/laterale/viscidum	1	0	0	0	0	0	1.00	SA/VIC
Melaleuca lanceolata	0	1	0	0	0	0	1.00	SA/VIC
Rhagodia crassifolia	1	0	0	0	0	0	1.00	SA/VIC
Senecio lautus	1	0	0	0	0	0	1.00	SA/VIC

Figure 36.
Callitris canescens, Eucalyptus dumosa, Eucalyptus porosa **Tall very open shrubland at quadrat TB00701.**

Floristic Group 33. ***Eucalyptus leptophylla, E.socialis*** **Open mallee**.

246 members SA/VIC (65/181)



Vegetation mapping details:
Vegetation mapping groups: 14.03, 14.05, 14.09, 18.08, 18.09, 19.06, 19.08, 19.09, 19.18, 19.19

Hidden within mapping groups: 18.01

Dominant Overstorey Species:
Eucalyptus leptophylla
E.socialis

Dominant Understorey Species:
Triodia irritans var.
Stipa sp.

Structural Data:
Typical canopy cover: sparse to very sparse
Av. height (metres): 4.7

Environmental Parameters:
Typical landforms: dune crests, swales and undulating plains
Calcrete type: none or broken
Range of soils: sand to sandy loam
Average rainfall (mm): 315 (64 members)

Quadrat(s):
BL01601, CA03701, A03014, A03016, A03020, A03022, A03027, A03031, A03033, A03039, A03040, A03042, A03061, A03097, A03099, A04004, A04016, A04018, A04019, A04022, A04023, A04024, A04026, A04028, A04029, A04034, A04035, A04039, A04043, A04044, A04045, A06004, A06023, A06027, A06042, A06043, A06048, A06055, A06059, A12004, A12019, A12043, A12045, A12054, A12055, A12056, A12058, A12063, A12067, A12068, A12069, A12070, A12072, A12082, A12095, A12096, A12108, A12110, A12122, A12125, A12126, A12128, A12174, A12219, A12220, A12221, A12226, A12228, A12236, A12242, A12272, A12299, A12304, A15106, A15107, A16007, A16008, A16010, A16013, A16015, A16020, A16021, A16025, A16035, A16036, A16040, A16041, A16048, A16050, A16055, A16059, A16060, A16062, A16066, A16067, A16068, A16072, A16073, A16074, A16076, A16077, A16121, A16123, A16125, A16131, A16138, A16140, A16142, A16144, A16148, A16150, A16159, A16160, A16164, A16166, A16167, A16169, A16170, A16173, A16176, A16182, A16183, A16184, A16185, A16186, A16188, A16191, A16195, A16196, A16201, A16205, A16206, A16210, A16211, A16214, A16215, A16217, A16219, A16222, A16226, A16227, A16246, A16249, A16261, A16265, A16266, A16269, A16271, A16273, A16277, A16278, A16279, A16282, A16292, A16304, A16307, A16312, A16315, A16316, A16338, A16348, A16350, A16358, A16359, A16364, A16367, A16369, A16372, A16511, A16563, A16565, A16581, A16583, A16590, A16610, A16701, A16702, A16703, A16705, A16717, A16728, A16801, A16806, KU03401, AL00701, AL00801, AL01001, AL01201, SR01701, CP00401, BA00201, BT00301, BT00501, BT00901, BT01401, BT02201, CA01201, CA00201, BL00601, BL01101, BL01401, KU02201, KU03001, CP00401, WK00701, KA00301, KA00401, AL02001, AL02101, AL02201, AL02401, AL03001, WA00101, WA00501, MM00401, MM00601, KU00501, KU01101, KU01401, BL00701, BL00301, BL01001, BL01101, AL04001, AL04101, AL04401, SR00101, NG02501, NG00401, RE01101, PB00701, PB00301, PB01201,

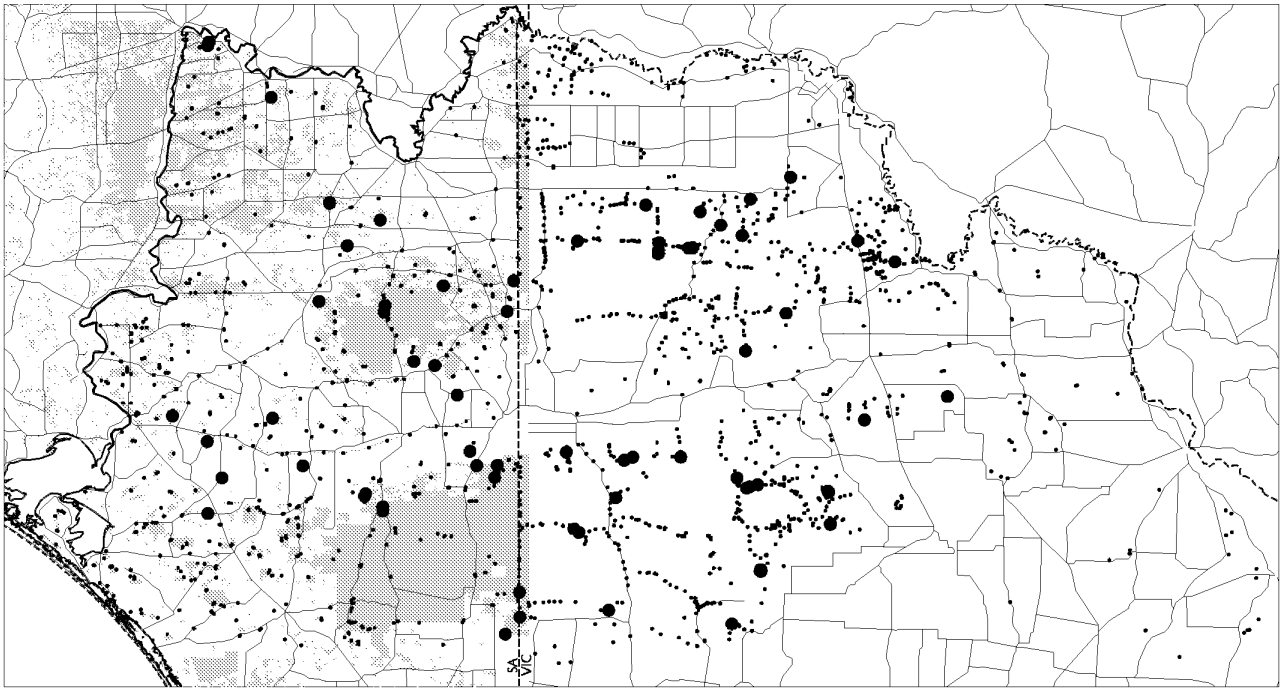
PB01801, PB02401, PE00801, PE00501, PI01801, AL04801, SH00201, SH00601, MI00201, WK00401, WK00501, WK01001, MI00901

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Triodia irritans var.	17	33	113	44	4	0	0.86	SA/VIC
Eucalyptus leptophylla	34	47	79	12	1	0	0.70	SA/VIC
Stipa sp.	65	77	11	1	0	0	0.63	SA/VIC
Eucalyptus socialis	22	32	80	17	1	1	0.62	SA/VIC
Helichrysum leucopsideum	82	43	3	0	0	0	0.52	SA/VIC
Eucalyptus incrassata	26	23	53	16	0	0	0.48	SA/VIC
Eucalyptus dumosa	25	30	55	4	0	0	0.46	SA/VIC
Stipa mollis group	62	42	0	0	0	0	0.42	SA/VIC
Lepidosperma congestum/laterale/viscidum	53	37	8	0	0	0	0.40	SA/VIC
Danthonia sp.	60	34	0	0	0	0	0.38	SA/VIC
Chenopodium desertorum ssp.	65	21	1	0	0	0	0.35	SA/VIC
Vittadinia dissecta var. *hirta*	68	18	0	0	0	0	0.35	SA/VIC
Lomandra leucocephala ssp. *robusta*	65	19	0	0	0	0	0.34	SA/VIC
Goodenia willisiana	38	38	5	0	0	0	0.33	SA/VIC
Callitris verrucosa	42	24	10	0	0	0	0.31	SA/VIC
Melaleuca lanceolata	45	23	6	1	0	0	0.30	SA/VIC
Sclerolaena parviflora	68	7	0	0	0	0	0.30	SA/VIC
Halgania cyanea	44	29	1	0	0	0	0.30	SA/VIC

Figure 37.
***Eucalyptus leptophylla, E.socialis* Open mallee at quadrat CA00201.**

Floristic Group 34. *Eucalyptus dumosa, +/- E.leptophylla* Mallee

76 members SA/VIC (31/45)



Vegetation mapping details:
Vegetation mapping groups:11.01, 11.02, 14.01, 14.04, 17.01, 18.12, 19.06, 19.09, 19.12, 19.19, 23.01, 23.05

Hidden within mapping groups:19.01, 19.15

Dominant Overstorey Species:
Eucalyptus dumosa
E.leptophylla

Dominant Understorey Species:
Stipa sp.
Danthonia sp.

Structural Data:
Typical canopy cover: mid dense
Av. height (metres): 4.5

Environmental Parameters:
Typical landforms: all dune system components and undulating plains
Calcrete type: none
Range of soils: sand to sandy loam
Average rainfall (mm): 346 (28 members)

Quadrat(s):
A03015 A03029 A03030 A03096 A03098 A03103 A04030 A06001 A06002 A06006 A06013 A06030 A06031 A06035 A06046 A12013 A12073 A12099 A12131 A12135 A12157 A12199 A12227 A12230 A12247 A12248 A12295 A12305 A15012 A15013 A15015 A15016 A15017 A15060 A16012 A16038 A16044 A16051 A16132 A16220 A16263 A16276 A16317 A16716 A16727 AL00401 BV00201 BV01201 BV01601 BV01701 BT00601 BT00701 BT01601 BL00701 BL01001 WK00401 KA00701 AL02701 CN01001 WA00301 WA00901 WA01001 PE00901 KU00601 AL03501 PB00101 JA01001 PI01201 PI01901 SS00601 SS01001 SS00201 YU00601 MR02201 SH00101 TB00401

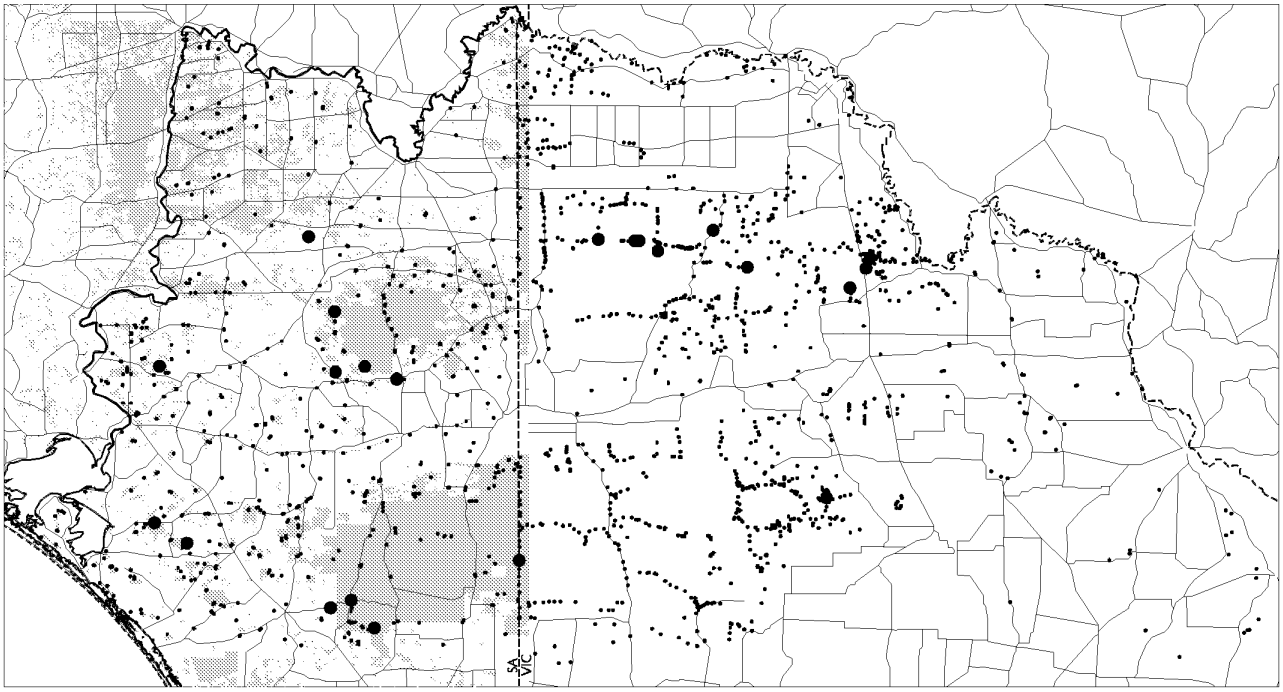
Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Eucalyptus dumosa	0	4	43	22	5	1	0.99	SA/VIC
Stipa sp.	20	20	2	0	0	0	0.55	SA/VIC
Danthonia sp.	27	12	1	0	0	0	0.53	SA/VIC
Eucalyptus leptophylla	14	3	17	2	0	0	0.47	SA/VIC

Lepidosperma congestum/laterale/viscidum	17	12	4	1	0	0	0.45	SA/VIC
Triodia irritans var.	12	9	7	1	1	0	0.39	SA/VIC
Dodonaea bursariifolia	12	11	6	0	0	0	0.38	SA/VIC
Stipa mollis group	20	9	0	0	0	0	0.38	SA/VIC
Eucalyptus socialis	8	2	16	0	1	0	0.36	SA/VIC
Melaleuca uncinata	6	4	8	6	2	0	0.34	SA/VIC
Chenopodium desertorum ssp.	21	4	0	0	0	0	0.33	SA/VIC
Melaleuca lanceolata	15	7	2	1	0	0	0.33	SA/VIC
Senecio lautus	16	6	1	0	0	0	0.30	SA/VIC
Helichrysum leucopsideum	19	2	0	0	0	0	0.28	SA/VIC
Dianella revoluta var.	19	1	0	0	0	0	0.26	SA/VIC
Eucalyptus incrassata	9	2	9	0	0	0	0.26	SA/VIC
Sclerolaena diacantha/uniflora	17	3	0	0	0	0	0.26	SA/VIC
Callitris verrucosa	10	6	3	0	0	0	0.25	SA/VIC
Halgania cyanea	9	10	0	0	0	0	0.25	SA/VIC
Vittadinia dissecta var. *hirta*	15	4	0	0	0	0	0.25	SA/VIC
Eutaxia microphylla var. *microphylla*	13	3	2	0	0	0	0.24	SA/VIC
Lomandra effusa	13	3	0	0	0	0	0.21	SA/VIC
Melaleuca acuminata	12	2	2	0	0	0	0.21	SA/VIC
Westringia rigida	7	1	6	1	0	0	0.20	SA/VIC

Figure 38
***Eucalyptus dumosa, +/- E.leptophylla* Mallee at quadrat BV00201.**

Floristic Group 35. *Eucalyptus leptophylla, +/- Melaleuca lanceolata* Open mallee.

22 members SA/VIC (11/11)



Vegetation mapping details:
Vegetation mapping groups: 15.01, 19.13, 19.19
Hidden within mapping groups: 10.01, 19.15

Dominant Overstorey Species:
Eucalyptus leptophylla
Melaleuca lanceolata

Dominant Understorey Species:
Stipa sp.
Lepidosperma congestum/laterale/viscidum

Structural Data:
Typical canopy cover: very sparse to sparse
Av. height (metres): 4.5

Environmental Parameters:
Typical landforms: depression areas within undulating plains and dune systems
Calcrete type: none
Range of soils: sand to sandy loam
Average rainfall (mm): 400 (11 members)

Quadrat(s):
A03026, A04012, A04037, A06008, A06049, A06051, A06054, A12139, A16039, A16156, A16289, KU03801, MR00501, MR00301, KU04701, TT00901, KU02801, MB00501, YU00301, WA00201, KU00901, CN02401.

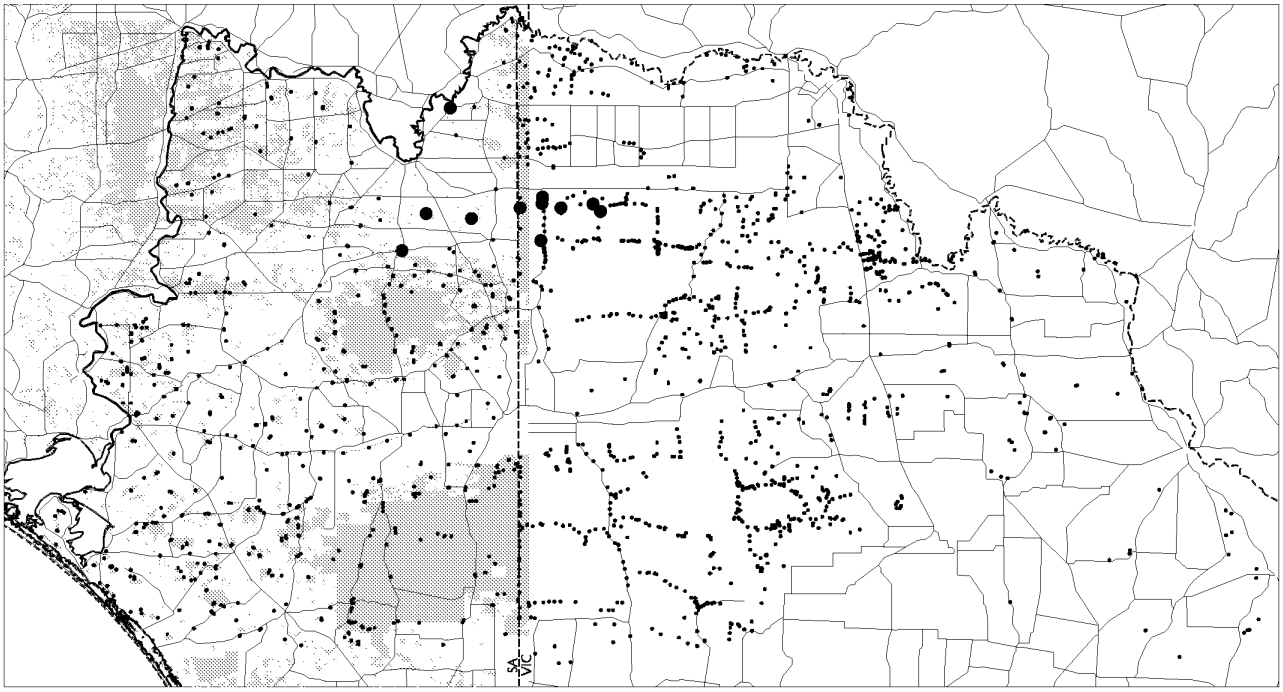
Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Eucalyptus leptophylla	0	2	15	5	0	0	1.00	SA/VIC
Stipa sp.	5	5	2	0	0	0	0.55	SA/VIC
Melaleuca lanceolata	1	6	4	0	0	0	0.50	SA/VIC
Lepidosperma congestum/laterale/viscidum	5	3	2	0	0	0	0.45	SA/VIC
Danthonia sp.	8	0	0	0	0	0	0.36	SA/VIC
Halgania cyanea	5	3	0	0	0	0	0.36	SA/VIC
Helichrysum leucopsideum	6	2	0	0	0	0	0.36	SA/VIC
Hibbertia riparia	4	3	1	0	0	0	0.36	SA/VIC
Baeckea crassifolia	5	1	0	0	0	0	0.27	SA/VIC
Calytrix tetragona	4	2	0	0	0	0	0.27	SA/VIC
Dianella revoluta var.	6	0	0	0	0	0	0.27	SA/VIC
Eucalyptus dumosa	1	1	2	2	0	0	0.27	SA/VIC
Eucalyptus incrassata	6	0	0	0	0	0	0.27	SA/VIC

Hibbertia virgata	5	1	0	0	0	0	0.27	SA/VIC
Lepidosperma carphoides	1	3	2	0	0	0	0.27	SA/VIC
Lomandra leucocephala ssp. *robusta*	5	1	0	0	0	0	0.27	SA/VIC
Senecio quadridentatus	5	1	0	0	0	0	0.27	SA/VIC
Triodia scariosa	0	0	0	5	1	0	0.27	VIC ONLY
Westringia rigida	3	2	1	0	0	0	0.27	SA/VIC
Acacia spinescens	4	1	0	0	0	0	0.23	SA/VIC
Callitris verrucosa	4	0	1	0	0	0	0.23	SA/VIC
Cryptandra leucophracta	5	0	0	0	0	0	0.23	SA/VIC
Cryptandra propinqua/tomentosa	4	1	0	0	0	0	0.23	SA/VIC
Eucalyptus socialis	2	0	2	0	1	0	0.23	SA/VIC
Glischrocaryon behrii	5	0	0	0	0	0	0.23	SA/VIC
Stipa mollis group	5	0	0	0	0	0	0.23	SA/VIC

Figure 39.
***Eucalyptus leptophylla, +/- Melaleuca lanceolata* Open mallee at quadrat MR00301.**

Floristic Group 36. *Eucalyptus cyanophylla, +/- E.socialis* Open mallee.

12 members SA/VIC (4/8)



Vegetation mapping details:
Vegetation mapping groups: 12.01
Hidden within mapping groups: 18.01

Dominant Overstorey Species:
Eucalyptus cyanophylla
E.socialis

Dominant Understorey Species:
Sclerolaena diacantha/uniflora
Triodia irritans var.

Av. height (metres): 4.1
Typical canopy cover: sparse

Structural Data:
Environmental Parameters:
Typical landforms: dune crests and slopes
Calcrete type: none
Range of soils: sand
Average rainfall (mm): 270 (4 members)

Quadrat(s):
A16049, A16080, A16082, A16083, A16117, A16120, A16126, A16129, AL00301, AL00201, AL01701, RE01401

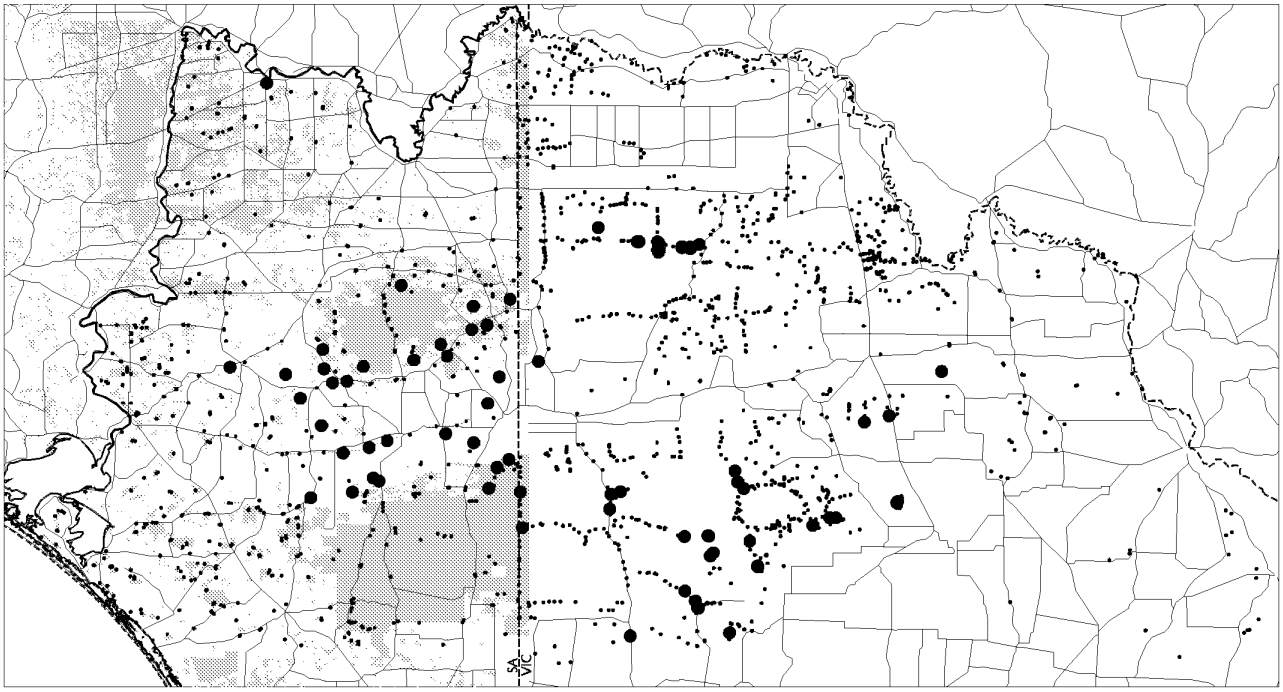
Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Eucalyptus cyanophylla	0	0	5	7	0	0	1.00	SA/VIC
Chenopodium desertorum ssp.	9	0	0	0	0	0	0.75	SA/VIC
Eucalyptus socialis	3	5	1	0	0	0	0.75	SA/VIC
Helichrysum leucopsideum	5	4	0	0	0	0	0.75	SA/VIC
Sclerolaena diacantha/uniflora	7	1	1	0	0	0	0.75	SA/VIC
Triodia irritans var.	2	1	3	3	0	0	0.75	SA/VIC
Maireana pentatropis	7	0	1	0	0	0	0.67	SA/VIC
Beyeria opaca	3	2	2	0	0	0	0.58	SA/VIC
Stipa sp.	6	1	0	0	0	0	0.58	SA/VIC
Sclerolaena parviflora	6	0	0	0	0	0	0.50	SA/VIC
Westringia rigida	5	1	0	0	0	0	0.50	SA/VIC
Zygophyllum ammophilum	5	0	0	0	0	0	0.42	SA/VIC
Dodonaea bursariifolia	3	1	0	0	0	0	0.33	SA/VIC
Stipa elegantissima	4	0	0	0	0	0	0.33	SA/VIC
Vittadinia dissecta var. *hirta*	4	0	0	0	0	0	0.33	SA/VIC

Acacia wilhelmiana	2	1	0	0	0	0	0.25	SA/VIC
Cassytha melantha	3	0	0	0	0	0	0.25	SA/VIC
Einadia nutans ssp.	3	0	0	0	0	0	0.25	SA/VIC
Eucalyptus incrassata	3	0	0	0	0	0	0.25	SA/VIC
Melaleuca lanceolata	3	0	0	0	0	0	0.25	SA/VIC
Senecio lautus	3	0	0	0	0	0	0.25	SA/VIC

Figure 40.
***Eucalyptus cyanophylla, +/- E.socialis* Open mallee at quadrat AL00301.**

Floristic Group 37. *Eucalyptus calycogona, E. dumosa* Very open mallee.

86 members SA/VIC (32/54)



Vegetation mapping details:
Vegetation mapping groups: 17.01, 17.03
Hidden within mapping groups: 19.01, 19.06, 19.15

Dominant Overstorey Species:
Eucalyptus calycogona
E. dumosa

Dominant Understorey Species:
Stipa sp.
Danthonia sp.

Structural Data:
Typical canopy cover: very sparse
Av. height (metres): 5.0

Environmental Parameters:
Typical landforms: depression areas in dune systems and undulating plains
Average rainfall (mm): 350 (30 members)
Calcrete type: none
Range of soils: sandy loam to clay loam

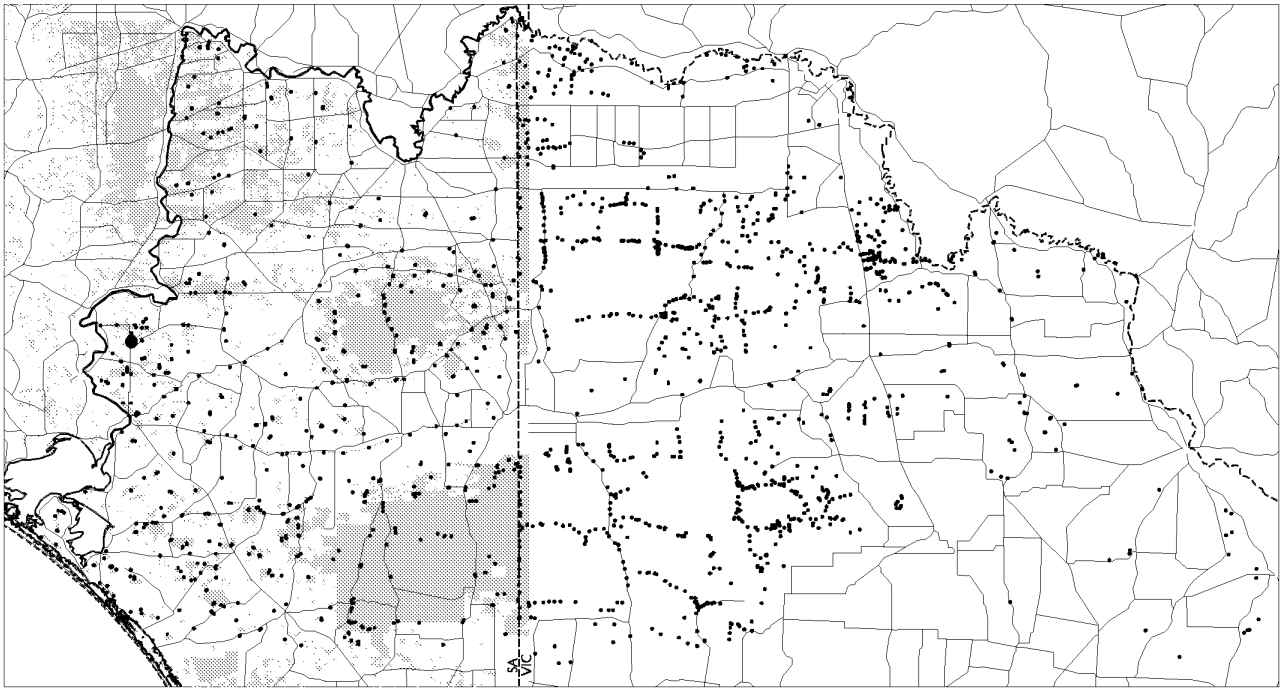
Quadrat(s):
A03013, A03018, A03087, A03095, A06005, A06010 A06011, A06012, A06016, A06017, A06020, A06021 A06024, A06025, A06028, A06029, A06032, A06033 A06034 ,A06040, A06041, A06052, A06053, A12001 A12015, A12020, A12033, A12051, A12060, A12074, A12076, A12101, A12118, A12123, A12179, A12185, A12186, A12194, A12210, A12257, A12267, A12270, A12271, A12273, A12294, A12297, A12301, A15006, A15007, A16057, A16268, A16270, A16707, A16729, KU03701, AL01301, BV00701, BV00101, BV01001, KU04801, BT01701, KU02601, KU03201, KU03301, MI00101, KA00501, KA00901, PE01101, KU01601, KU00301, KU01801, KU02001, PB00801, PB01001, PB01301, PB01401, JA00701, CA00101, PI00501, PI00601, PI00701, PI00901, PI01601, SS01101, SS01301, WK01101

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Eucalyptus calycogona	1	8	28	33	13	2	0.99	SA/VIC
Stipa sp.	25	30	5	1	0	0	0.71	SA/VIC
Eucalyptus dumosa	9	11	22	9	0	0	0.59	SA/VIC
Danthonia sp.	21	23	5	0	0	0	0.57	SA/VIC
Chenopodium desertorum ssp.	27	11	0	0	0	0	0.44	SA/VIC
Eucalyptus socialis	3	9	12	7	0	0	0.36	SA/VIC

Sclerolaena diacantha/uniflora	21	6	1	0	0	0	0.33	SA/VIC
Dodonaea bursariifolia	10	14	3	0	0	0	0.31	SA/VIC
Westringia rigida	7	14	3	0	0	0	0.28	SA/VIC
Beyeria opaca	4	6	10	2	0	0	0.26	SA/VIC
Eucalyptus oleosa	1	6	14	1	0	0	0.26	SA/VIC
Melaleuca uncinata	10	5	5	0	1	0	0.24	SA/VIC
Dianella revoluta var.	20	0	0	0	0	0	0.23	SA/VIC
Melaleuca lanceolata	13	6	1	0	0	0	0.23	SA/VIC
Vittadinia dissecta var. *hirta*	15	4	1	0	0	0	0.23	SA/VIC
Melaleuca acuminata	8	8	3	0	0	0	0.22	SA/VIC
Senecio lautus	13	5	0	0	0	0	0.21	SA/VIC
Einadia nutans ssp.	12	5	0	0	0	0	0.20	SA/VIC

Floristic Group 38. *Eucalyptus brachycalyx* Open low mallee.

1 members SA ONLY



Vegetation mapping details:
Vegetation mapping groups: none
Hidden within mapping groups: 23.01

Dominant Overstorey Species:
Eucalyptus brachycalyx

Dominant Understorey Species:
Dodonaea bursarifolia
Westringia rigida

Structural Data:
Typical canopy cover: sparse
Av. height (metres): 2.0

Environmental Parameters:
Typical landforms: depression areas in dune systems and undulating plains
Calcrete type: broken
Range of soils: loam
Average rainfall (mm): 320 (1 member)

Quadrat(s):
MB00201

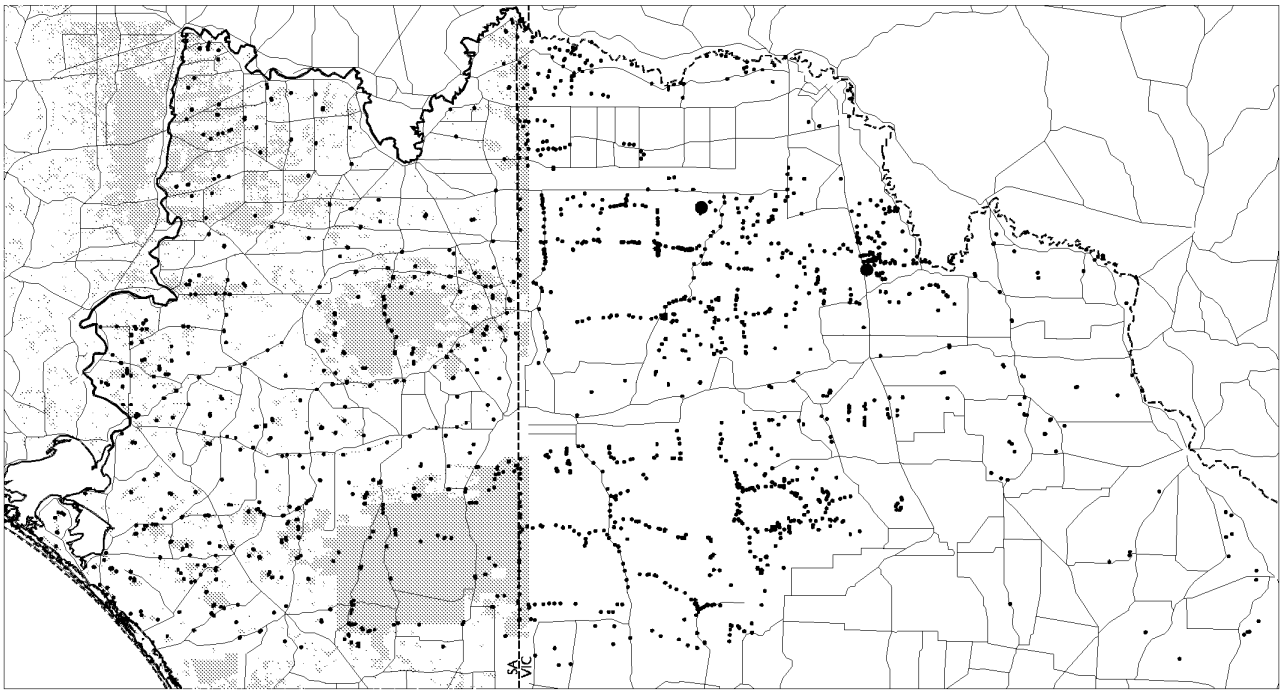
Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Billardiera cymosa	1	0	0	0	0	0	1.00	SA/VIC
Carpobrotus modestus/rossii	1	0	0	0	0	0	1.00	SA/VIC
Cassinia uncata	1	0	0	0	0	0	1.00	SA/VIC
Chenopodium desertorum ssp.	1	0	0	0	0	0	1.00	SA/VIC
Dodonaea bursariifolia	0	0	1	0	0	0	1.00	SA/VIC
Eucalyptus brachycalyx	0	0	0	1	0	0	1.00	SA ONLY
Eucalyptus socialis	0	1	0	0	0	0	1.00	SA/VIC
Exocarpos sparteus	1	0	0	0	0	0	1.00	SA/VIC
Gahnia deusta	1	0	0	0	0	0	1.00	SA ONLY
Goodenia varia	0	0	1	0	0	0	1.00	SA/VIC
Halgania andromedifolia	0	1	0	0	0	0	1.00	SA/VIC
Melaleuca lanceolata	1	0	0	0	0	0	1.00	SA/VIC
Olearia brachyphylla	1	0	0	0	0	0	1.00	SA/VIC
Olearia floribunda var. *floribunda*	1	0	0	0	0	0	1.00	SA ONLY
Olearia lepidophylla	1	0	0	0	0	0	1.00	SA/VIC

Pimelea serpyllifolia ssp. *serpyllifolia*	1	0	0	0	0	0	1.00	SA/VIC
Stipa elegantissima	1	0	0	0	0	0	1.00	SA/VIC
Stipa sp.	1	0	0	0	0	0	1.00	SA/VIC
Westringia rigida	0	0	0	1	0	0	1.00	SA/VIC

Figure 41.
***Eucalyptus brachycalyx* Open low mallee at quadrat MB00201.**

Floristic Group 39. Characteristic species: ***Eucalyptus socialis, Exocarpos sparteus, Myoporum platycarpum, Olearia teretifolia, Goodenia willisiana.***

2 members VIC ONLY



Characteristic Species:
Eucalyptus socialis
Exocarpos sparteus
Goodenia willisiana
Olearia teretifolia
Myoporum platycarpum

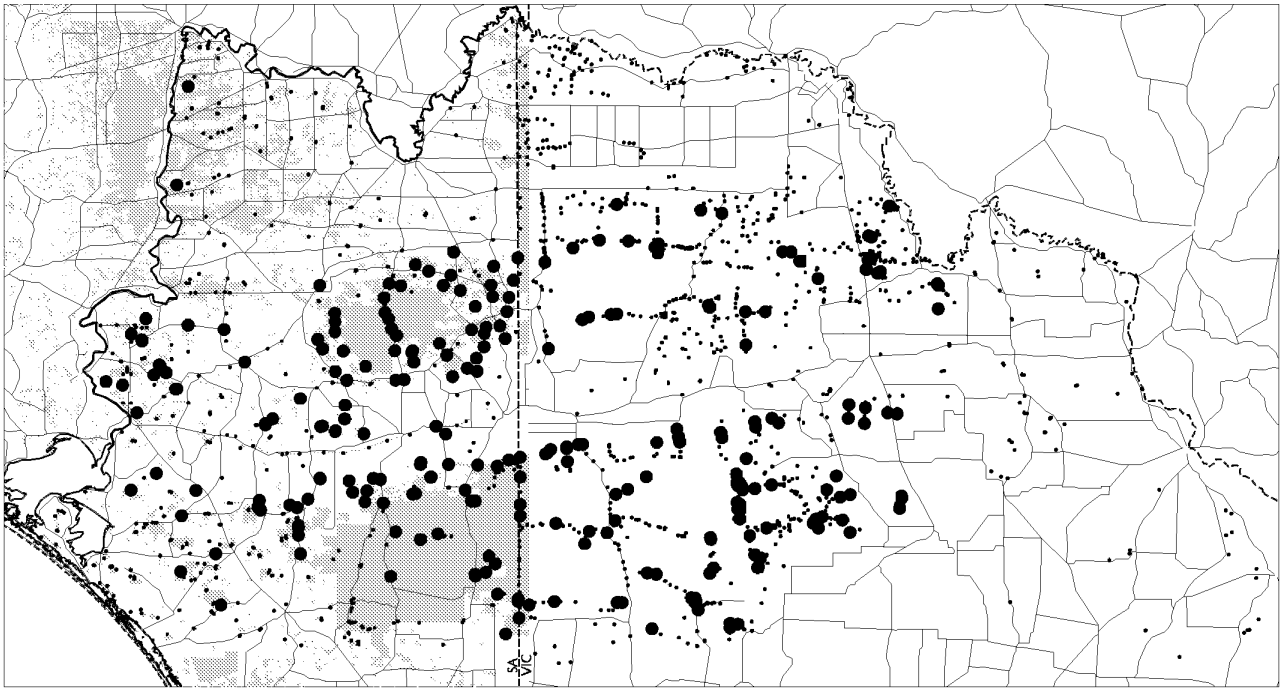
Quadrat(s):
A04013 A16043

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Chenopodium desertorum ssp.	1	1	0	0	0	0	1.00	SA/VIC
Cryptandra propinqua/tomentosa	2	0	0	0	0	0	1.00	SA/VIC
Cyphanthera myosotidea	1	1	0	0	0	0	1.00	SA/VIC
Eucalyptus socialis	0	1	1	0	0	0	1.00	SA/VIC
Exocarpos sparteus	1	1	0	0	0	0	1.00	SA/VIC
Goodenia varia	0	2	0	0	0	0	1.00	SA/VIC
Goodenia willisiana	1	0	1	0	0	0	1.00	SA/VIC
Halgania cyanea	0	0	2	0	0	0	1.00	SA/VIC
Haloragis acutangula forma / *odontocarpa* forma	1	1	0	0	0	0	1.00	SA/VIC
Myoporum platycarpum	1	0	1	0	0	0	1.00	SA/VIC
Olearia teretifolia	0	1	1	0	0	0	1.00	VIC ONLY
Senecio quadridentatus	2	0	0	0	0	0	1.00	SA/VIC
Vittadinia dissecta var. *hirta*	2	0	0	0	0	0	1.00	SA/VIC
Acacia brachybotrya	1	0	0	0	0	0	0.50	SA/VIC
Acacia wilhelmiana	1	0	0	0	0	0	0.50	SA/VIC
Amphipogon caricinus	1	0	0	0	0	0	0.50	SA/VIC
Callitris verrucosa	1	0	0	0	0	0	0.50	SA/VIC
Convolvulus erubescens	1	0	0	0	0	0	0.50	SA/VIC
Dampiera lanceolata var. *lanceolata*	1	0	0	0	0	0	0.50	SA/VIC
Eucalyptus leptophylla	0	1	0	0	0	0	0.50	SA/VIC
Gahnia lanigera	1	0	0	0	0	0	0.50	SA/VIC
Glischrocaryon behrii	1	0	0	0	0	0	0.50	SA/VIC

Grevillea huegelii	1	0	0	0	0	0	0.50	SA/VIC
Helichrysum apiculatum	1	0	0	0	0	0	0.50	SA/VIC
Helichrysum catadromum	1	0	0	0	0	0	0.50	SA/VIC
Hibbertia virgata	1	0	0	0	0	0	0.50	SA/VIC
Hybanthus floribundus ssp. *floribundus*	0	1	0	0	0	0	0.50	SA/VIC
Lepidosperma congestum/laterale/viscidum	1	0	0	0	0	0	0.50	SA/VIC
Lomandra collina	1	0	0	0	0	0	0.50	SA/VIC
Muehlenbeckia diclina	1	0	0	0	0	0	0.50	SA/VIC
Olearia rudis	0	1	0	0	0	0	0.50	SA/VIC
Opercularia turpis	1	0	0	0	0	0	0.50	SA/VIC
Pelargonium australe	1	0	0	0	0	0	0.50	SA/VIC
Prostanthera serpyllifolia ssp. *microphylla*	1	0	0	0	0	0	0.50	SA/VIC
Scaevola aemula	0	1	0	0	0	0	0.50	VIC ONLY
Sclerolaena parviflora	0	1	0	0	0	0	0.50	SA/VIC
Stipa mollis group	0	1	0	0	0	0	0.50	SA/VIC
Stipa sp.	1	0	0	0	0	0	0.50	SA/VIC
Triodia irritans var.	1	0	0	0	0	0	0.50	SA/VIC
Triodia scariosa	1	0	0	0	0	0	0.50	VIC ONLY
Westringia rigida	1	0	0	0	0	0	0.50	SA/VIC

Floristic Group 40. *Eucalyptus incrassata, Leptospermum coriaceum* Very open mallee

272 members SA/VIC (133/139)



Vegetation mapping details:
Vegetation mapping groups: 19.01, 19.06, 19.07, 19.08, 19.09, 19.12, 19.13, 19.15, 19.19, 19.20, 21.01, 21.02, 22.01, 23.01, 35.06
Hidden within mapping groups: 10.01, 10.02, 17.01, 18.06, 18.15

Dominant Overstorey Species:
Eucalyptus incrassata
Leptospermum coriaceum

Dominant Understorey Species:
Hibbertia riparia
Baeckea behrii
Callitris verrucosa
Glischrocaryon behrii
Melaleuca uncinata

Structural Data:
Typical canopy cover: sparse
Av. height (metres): 4.5

Environmental Parameters:
Typical landforms: depression areas in dune systems and undulating plains
Calcrete type: broken
Range of soils: loam
Average rainfall (mm): 320 (128 members)

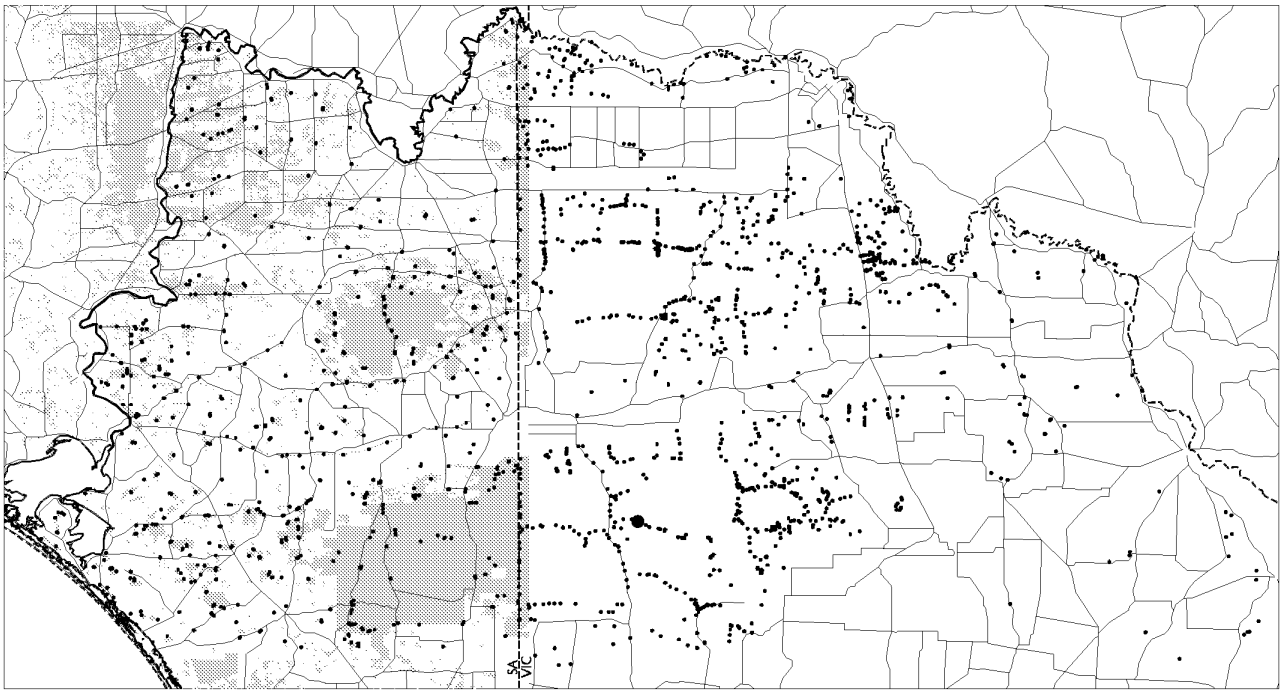
Quadrat(s):
MB02601, CA03501, NG03401, NG03701, AL04701, A03011, A03012, A03017, A03032, A03068, A03074, A03079, A03080, A03081, A03082, A03083, A03086, A03088, A03090, A03091, A03093, A03094, A03101, A03107, A04005, A04014, A04015, A04020, A04021, A04036, A04038, A06003, A06007, A06014, A06018, A06019, A06022, A06026, A06050, A12011, A12012, A12014, A12021, A12029, A12031, A12032, A12044, A12050, A12052, A12053, A12057, A12071, A12075, A12077, A12078, A12079, A12081, A12086, A12094, A12097, A12098, A12100, A12106, A12107, A12111, A12112, A12114, A12115, A12117, A12120, A12121, A12124, A12132, A12133, A12134, A12146, A12150, A12162, A12163, A12167, A12180, A12182, A12183, A12184, A12192, A12196, A12197, A12202, A12206, A12209, A12212, A12213, A12214, A12231, A12233, A12237, A12238, A12243, A12245, A12251, A12260, A12263, A12268, A12269, A12287, A12290, A12296, A12298, A12307, A12308, A12309, A15004, A15005, A15008, A15009, A15084, A16019, A16023, A16029, A16037, A16045, A16065, A16143, A16152, A16153, A16174, A16175, A16197, A16203, A16204, A16216, A16245, A16311, A16314, A16325, A16333, A16334, A16336, A16337, A16353, A16374, A16803, A16808, A16820, KU03601, KU03901, AL00901, AL01401, BV00401, BV00501, BV00801, BV00901, BV00301, BV01801, LO00201, KU04201, KU04301, KU04401, KU04501, KU04601, BT00401, BT00801, BT00101, BT01001, BT01101, BT01201, BT01301, BT01501, BT01801, BT01901, BT02001, MB03201, CA03301, CA00801, CA00901, CA01001, CA00301, YU00901, BB00501, BB00201, KU02301, KU02401, KU02501, KU02701, KU02901, KU03101, CN00601, QB00501, QB00601, QB00801, QB00901, MB00701, MB01101, MB01201, MB01601, MB01901, NG00801, NG03201, NG03301, MI00601, MI00601, KA00601, KA00101, KA00801, AL02301, AL02501, AL02801, AL02901, AL03201, CN01201, CA00701, CA03201, CA01701,

PE01001, PE01301, PE01501, PE01601, MM00901, KU00801, KU01001, KU01201, KU01301, KU01501, BL00201, KU00401, AL03401, AL03601, AL03901, AL04301, SR00501, NG01201, NG00301, NG01801, NG01901, NG02001, NG02101, NG02601, PB01501, PB00601, PB00201, PB00901, PB01101, PB01501, PB01701, PB01901, PB02101, PB02301, PB02501, JA00401, JA00501, JA00601, JA00801, JA01101, JA01201, CA00101, PI00301, PI01001, PI02001, PI01301, PI01401, PI01501,PI01701, SS00801, SS00101, SS01701, YU00101, CN03301, MR01701, MR02301, TB00301, MI00301, MB03501

Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Eucalyptus incrassata	22	49	135	49	6	1	0.96	SA/VIC
Leptospermum coriaceum	51	64	52	24	4	1	0.72	SA/VIC
Hibbertia riparia	110	68	7	3	0	0	0.69	SA/VIC
Baeckea behrii	52	46	48	17	0	0	0.60	SA/VIC
Callitris verrucosa	50	38	40	15	0	0	0.52	SA/VIC
Glischrocaryon behrii	74	53	11	2	0	0	0.51	SA/VIC
Melaleuca uncinata	15	14	64	39	3	2	0.50	SA/VIC
Danthonia sp.	71	53	4	0	0	0	0.47	SA/VIC
Stipa mollis group	78	49	1	0	0	0	0.47	SA/VIC
Lepidosperma congestum/laterale/viscidum	63	48	11	2	0	0	0.45	SA/VIC
Eucalyptus leptophylla	44	34	40	4	0	0	0.45	SA/VIC
Calytrix tetragona	49	51	7	1	0	0	0.40	SA/VIC
Helichrysum leucopsideum	60	42	1	0	0	0	0.38	SA/VIC
Baeckea crassifolia	52	42	3	0	0	0	0.36	SA/VIC
Stipa sp.	59	30	3	0	0	0	0.34	SA/VIC
Brachyloma ericoides ssp. *ericoides*	57	21	4	0	0	0	0.30	SA/VIC
Hibbertia virgata	67	13	2	0	0	0	0.30	SA/VIC

Floristic Group 41. Characteristic species: ***Eucalyptus incrassata, Melaleuca brevifolia, Clematis microphylla, Cyphanthera myosotidea, Senecio lautus***

1 members VIC ONLY



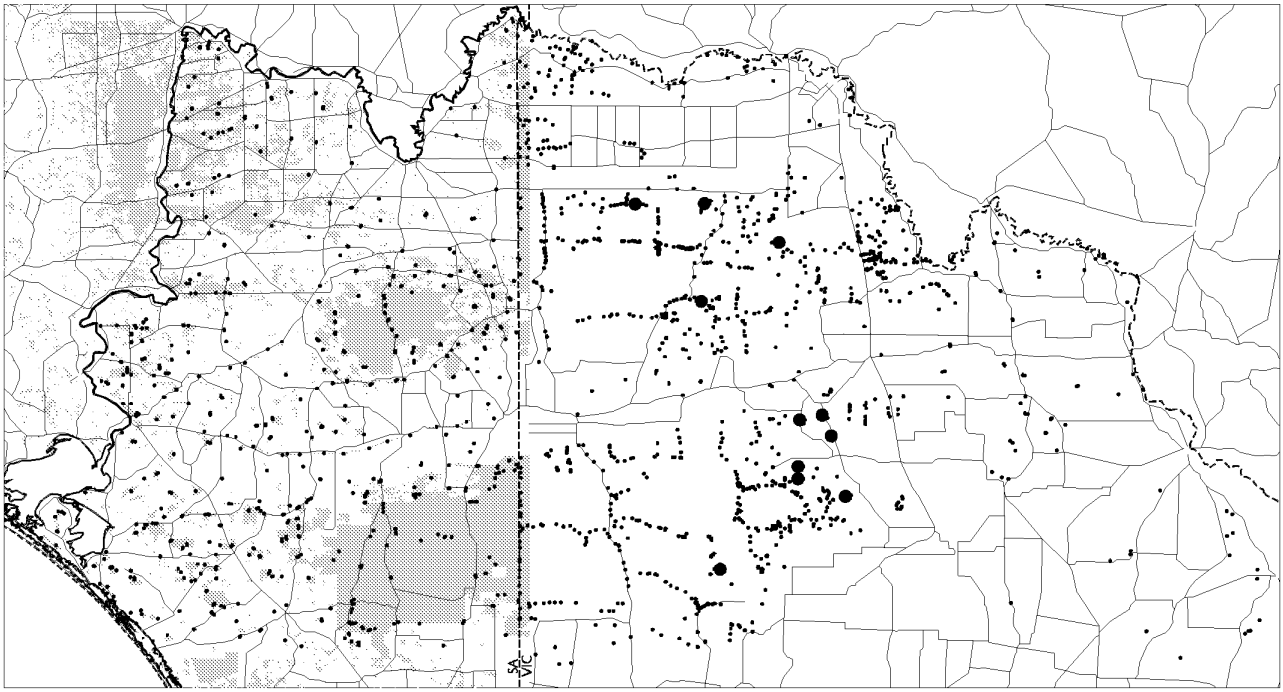
Characteristic Species:
Eucalyptus incrassata
Melaleuca brevifolia
Clematis microphylla
Cyphanthera myosotidea
Senecio lautus

Quadrat(s):
A12283

Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Acacia calamifolia	1	0	0	0	0	0	1.00	SA/VIC
Astroloma humifusum	1	0	0	0	0	0	1.00	SA/VIC
**Chondrilla juncea*	1	0	0	0	0	0	1.00	SA/VIC
Clematis microphylla	0	1	0	0	0	0	1.00	SA/VIC
Cyphanthera myosotidea	0	1	0	0	0	0	1.00	SA/VIC
Eucalyptus incrassata	0	0	1	0	0	0	1.00	SA/VIC
Kunzea pomifera	0	1	0	0	0	0	1.00	SA/VIC
Melaleuca brevifolia	0	0	1	0	0	0	1.00	SA/VIC
Senecio lautus	0	1	0	0	0	0	1.00	SA/VIC
Solanum laciniatum	1	0	0	0	0	0	1.00	VIC ONLY
Triodia irritans var.	1	0	0	0	0	0	1.00	SA/VIC

Floristic Group 42. Characteristic species: ***Eucalyptus leptophylla, Helichrysum leucopsideum, Stipa mollis*** **group,** ***Leptospermum coriaceum, Cyphanthera myosotidea, Eucalyptus incrassata, Pelargonium australe, Dampiera marifolia, Danthonia*** **sp.,** ***Muehlenbeckia diclina, Vittadinia dissecta*** **var.** ***hirta***

11 members VIC ONLY



Characteristic Species:
Eucalyptus leptophylla
Helichrysum leucopsideum
Stipa mollis group
Leptospermum coriaceum
Cyphanthera myosotidea
Eucalyptus incrassata
Pelargonium australe
Dampiera marifolia
Danthonia sp.
Muehlenbeckia diclina
Vittadinia dissecta var. *hirta*

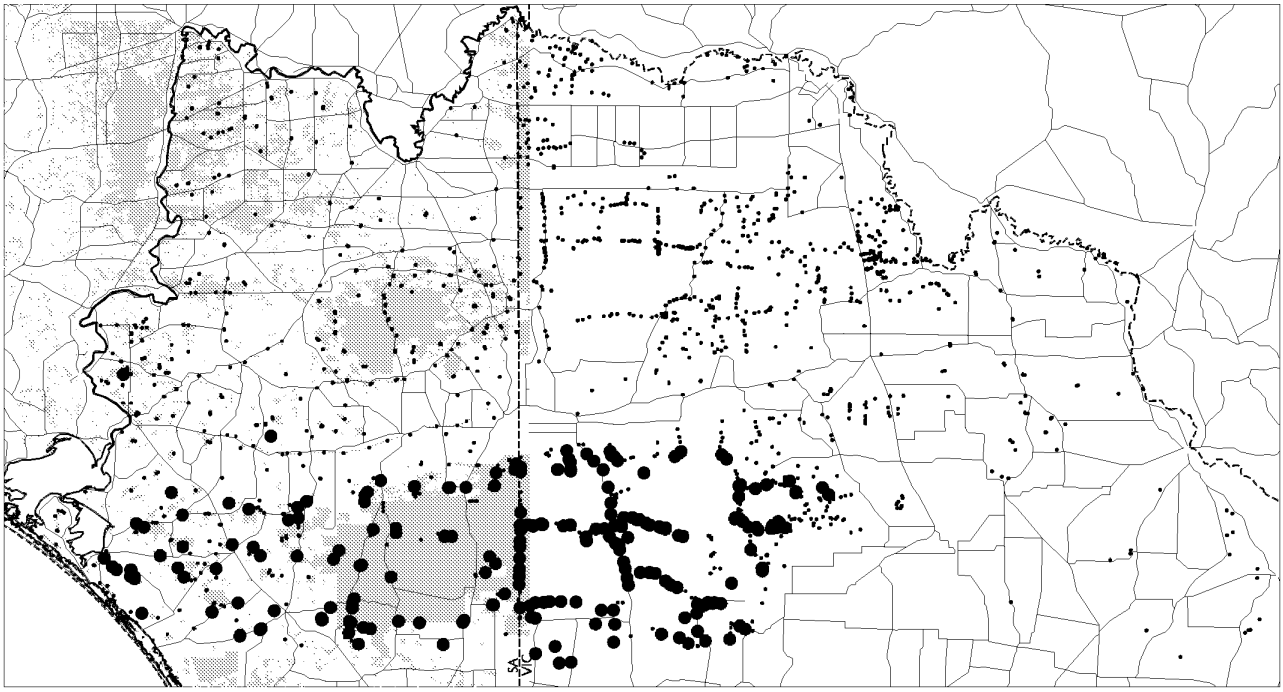
Quadrat(s):
A12034, A12042, A12046, A12062, A12064, A12066, A12080, A16026, A16042
A16207, A16326

Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Eucalyptus leptophylla	2	6	2	0	0	0	0.91	SA/VIC
Helichrysum leucopsideum	6	2	2	0	0	0	0.91	SA/VIC
Stipa mollis group	3	5	2	0	0	0	0.91	SA/VIC
Leptospermum coriaceum	4	3	2	0	0	0	0.82	SA/VIC
Cyphanthera myosotidea	2	6	0	0	0	0	0.73	SA/VIC
Eucalyptus incrassata	0	8	0	0	0	0	0.73	SA/VIC
Pelargonium australe	2	6	0	0	0	0	0.73	SA/VIC
Dampiera marifolia	5	2	0	0	0	0	0.64	SA/VIC
Danthonia sp.	3	4	0	0	0	0	0.64	SA/VIC
Muehlenbeckia diclina	4	3	0	0	0	0	0.64	SA/VIC
Vittadinia dissecta var. *hirta*	6	1	0	0	0	0	0.64	SA/VIC
Aotus subspinescens	1	4	1	0	0	0	0.55	SA/VIC
**Chondrilla juncea*	6	0	0	0	0	0	0.55	SA/VIC
Goodenia robusta	3	3	0	0	0	0	0.55	SA/VIC

Hibbertia riparia	5	1	0	0	0	0	0.55	SA/VIC
Lomandra leucocephala ssp. *robusta*	5	1	0	0	0	0	0.55	SA/VIC
Stipa sp.	1	5	0	0	0	0	0.55	SA/VIC
Glischrocaryon behrii	3	2	0	0	0	0	0.45	SA/VIC
Gyrostemon australasicus	1	4	0	0	0	0	0.45	SA/VIC
Scaevola aemula	3	2	0	0	0	0	0.45	VIC ONLY
Triodia irritans var.	4	1	0	0	0	0	0.45	SA/VIC
Billardiera cymosa	4	0	0	0	0	0	0.36	SA/VIC
Callitris verrucosa	3	1	0	0	0	0	0.36	SA/VIC
Clematis microphylla	3	1	0	0	0	0	0.36	SA/VIC
Eucalyptus socialis	1	3	0	0	0	0	0.36	SA/VIC
Halgania cyanea	1	3	0	0	0	0	0.36	SA/VIC
Haloragis acutangula forma/*odontocarpa* forma	4	0	0	0	0	0	0.36	SA/VIC
Hibbertia virgata	0	4	0	0	0	0	0.36	SA/VIC
Hyalosperma demissum	0	4	0	0	0	0	0.36	VIC ONLY

Floristic Group 43. ***Allocasuarina pusilla, Leptospermum coriaceum, +/- Banksia ornata*** **Tall open shrubland**

231 members SA/VIC (88/143)



Vegetation mapping details:
Vegetation mapping groups: 19.15, 21.01, 21.02, 21.03, 21.04,
Hidden within mapping groups: 3.01, 10.01, 19.20, 23.01, 27.01

Dominant Overstorey Species:
Allocasuarina pusilla
Leptospermum coriaceum
Banksia ornata

Dominant Understorey Species:
Hibbertia riparia
Lepidosperma congestum/laterale/viscidum
Lepidosperma carphoides
Calytrix tetragona
Lepidobolus drapetocoleus
Schoenus breviculmis
Hakea muelleriana
Cryptandra leucophracta
Astroloma conostephioides
Baeckea behrii

Structural Data:
Typical canopy cover: sparse to very sparse
Av. height (metres): 3.3

Environmental Parameters:
Typical landforms: undulating plains, dune slopes and crests
Calcrete type: none
Range of soils: sand
Average rainfall (mm): 456 (86 members)

Quadrat(s):
A03028, A03034, A03036, A03037, A03041, A03056, A03058, A03059, A03062, A03063, A03064, A03065, A03066, A03067, A03069, A03070, A03071, A03072 A03073, A03076, A03077, A03084, A03089, A03092, A03102, A03106, A03114, A12002, A12003, A12005, A12009, A12016, A12017, A12018, A12022, A12026 A12027, A12028, A12035, A12037, A12102, A12103, A12119, A12129, A12130, A12136, A12137, A12138, A12140, A12141, A12143, A12144, A12145, A12147 A12148, A12149, A12151, A12152, A12153, A12154, A12155, A12156, A12158, A12159, A12160, A12161, A12164, A12165, A12166, A12168, A12169, A12170 A12171, A12172, A12173, A12175, A12176, A12178, A12181, A12187, A12188, A12189, A12190, A12191, A12193, A12195, A12198, A12200, A12203, A12204 A12205, A12207, A12208, A12215, A12216, A12217, A12218, A12222, A12223, A12224, A12225, A12234, A12235, A12240, A12241, A12244, A12246, A12249 A12250, A12252, A12253, A12254, A12255, A12256, A12258, A12259, A12261, A12262, A12264, A12265, A12274, A12275, A12276, A12277, A12278, A12279 A12280, A12281, A12282, A12284, A12285, A12286, A12288, A12289, A12291, A12292, A12293, A12300, A12303, A12306, A15010, A15011, A15014, CB00301, CB00601, MR00401, MR00601, MR00701, MR01001, MR01101, MR01401, MR01501, MR01601 BV00601, BV01101, BV01301, BV01501, MB03001, MG01001, MG01401, MG01701, MG01801, MG01901, MG02001, MG02101, MG02201, MG02301, MG02401, CA00501, CA01301, CA01401 CB00401, CB00501, TT00401, YU01101, BB01001, BB01201, BB01301, CN01401, CN01701, CN01901, CN02001, QB00101, QB00401, QB00201, QB00701,

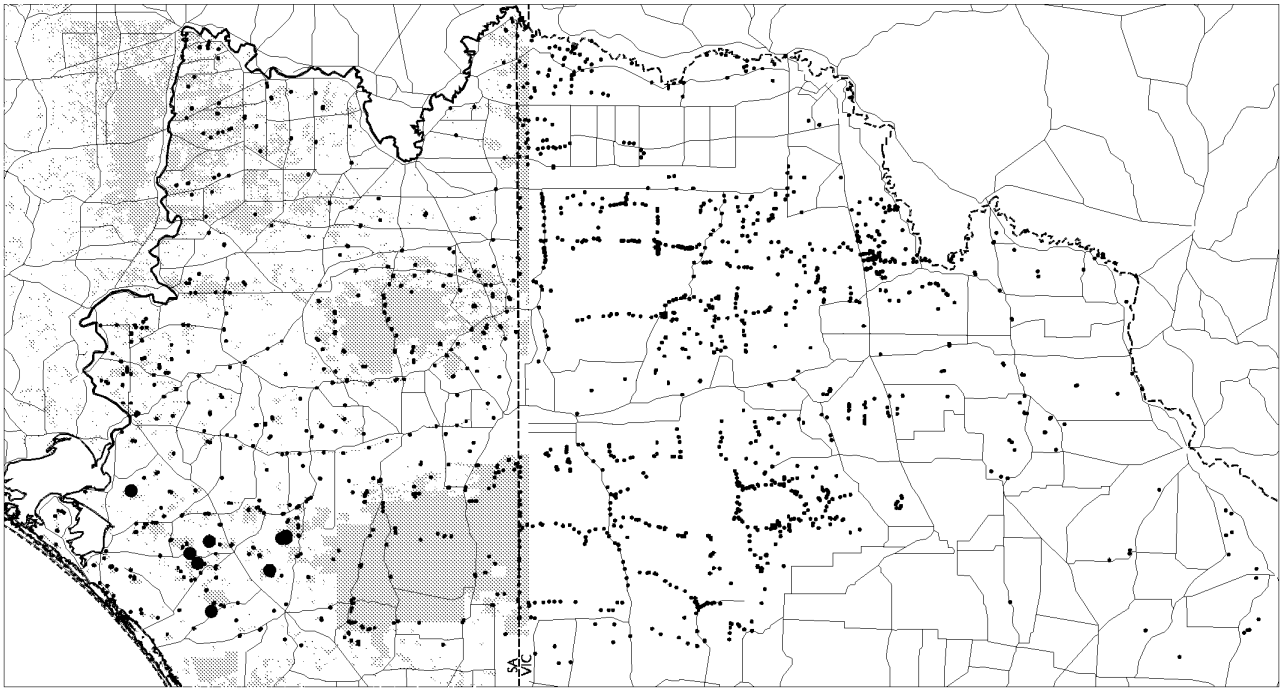
NG03101, MF00701, YU01301, CN01101, CA02401, CA02801, CA01601, CA01801, CA01901, NG01001, NG03401, SD00101, NG01301, NG01401, OH0301, NG00901, NG01601, NG01701, NG00701, NG00601, NG02201, OH00512, NG02301, NG02401, NG02701, NG02901, NG03001, CA00201, PE00701, PI00801, SS00901, SS01201, SS01401, SS01601, TT01001, TT01101, TT01201, TT01301, TT01401, CN03201, CN03401, CN02201, MR01801, MR02001, MR02101

Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Hibbertia riparia	50	138	30	7	0	0	0.97	SA/VIC
Lepidosperma congestum/laterale/viscidum	28	150	33	4	0	0	0.93	SA/VIC
Lepidosperma carphoides	51	133	19	3	0	0	0.89	SA/VIC
Calytrix tetragona	69	108	7	0	1	0	0.80	SA/VIC
Leptospermum coriaceum	33	49	56	28	4	3	0.75	SA/VIC
Lepidobolus drapetocoleus	30	126	13	3	0	0	0.74	SA/VIC
Schoenus breviculmis	80	70	2	0	0	0	0.66	SA/VIC
Hakea muelleriana	76	61	12	0	0	0	0.65	SA/VIC
Cryptandra leucophracta	93	54	0	0	0	0	0.64	SA/VIC
Astroloma conostephioides	122	23	1	0	0	0	0.63	SA/VIC
Baeckea behrii	39	51	34	12	4	0	0.61	SA/VIC
Allocasuarina pusilla	42	35	46	11	2	0	0.59	SA/VIC
Banksia ornata	31	22	52	28	3	0	0.59	SA/VIC
Cryptandra propinqua/tomentosa	81	51	2	0	0	0	0.58	SA/VIC
Leptospermum myrsinoides	37	51	32	12	1	0	0.58	SA/VIC
Hypolaena fastigiata	37	81	10	3	0	0	0.57	SA/VIC
Lomandra juncea	101	30	0	0	0	0	0.57	SA/VIC
Correa reflexa var. *reflexa*	104	23	2	0	0	0	0.56	SA/VIC
Triodia irritans var.	61	46	19	1	0	0	0.55	SA/VIC
Callitris verrucosa	28	37	37	21	1	0	0.54	SA/VIC
Eucalyptus incrassata	42	21	45	8	1	0	0.51	SA/VIC
Baeckea crassifolia	49	63	2	0	0	0	0.49	SA/VIC
Spyridium subochreatum var.	72	31	1	0	0	0	0.45	SA/VIC
Cassytha glabella forma *dispar*	59	43	1	0	0	0	0.45	SA/VIC
Boronia coerulescens ssp. *coerulescens*	73	27	1	0	0	0	0.44	SA/VIC
Stipa mollis group	70	28	1	0	0	0	0.43	SA/VIC
Lomandra collina	76	20	0	0	0	0	0.42	SA/VIC
Neurachne alopecuroidea	66	27	1	0	0	0	0.41	SA/VIC
Aotus subspinescens	36	45	9	0	0	0	0.39	SA/VIC
Dillwynia hispida	73	17	0	0	0	0	0.39	SA/VIC
Phyllota pleurandroides	50	29	9	1	0	0	0.39	SA/VIC
Leucopogon rufus	55	28	3	0	0	0	0.37	SA/VIC
Lomandra leucocephala ssp. *robusta*	69	14	0	0	0	0	0.36	SA/VIC
Allocasuarina muelleriana ssp. *muelleriana*	35	16	23	5	1	0	0.35	SA/VIC
Astroloma humifusum	71	4	1	0	0	0	0.33	SA/VIC
Goodenia geniculata	58	13	0	0	0	0	0.31	SA/VIC
Eucalyptus leptophylla	31	13	25	1	0	0	0.30	SA/VIC
Brachyloma ericoides ssp. *ericoides*	48	21	0	0	0	0	0.30	SA/VIC

Figure 42.
Allocasuarina pusilla, Leptospermum coriaceum, +/- Banksia ornata **Tall open shrubland at quadrat SD00101.**

Floristic Group 44. ***Xanthorrhoea caespitosa/semiplana, +/- Banksia marginata*** **Tall open shrubland**

9 members SA ONLY



Vegetation mapping details:
Vegetation mapping groups: 21.01, 26.01
Hidden within mapping groups: 10.01

Dominant Overstorey Species:
Xanthorrhoea caespitosa/semiplana
Banksia marginata

Dominant Understorey Species:
Astroloma humifusum
Kunzea pomifera
Hibbertia riparia
Lepidosperma congestum/laterale/viscidum
Calytrix tetragona
Lepidosperma carphoides

Structural Data:
Typical canopy cover: very sparse to sparse
Av. height (metres): 6.2

Environmental Parameters:
Typical landforms: depression areas and slopes
Calcrete type: none
Range of soils: sand
Average rainfall (mm): 457 (9 members)

Quadrat(s):
CA01101, BB00301, TT00101, CA02001, CA02201, MM01001, CN02501, CN00701, CN00401

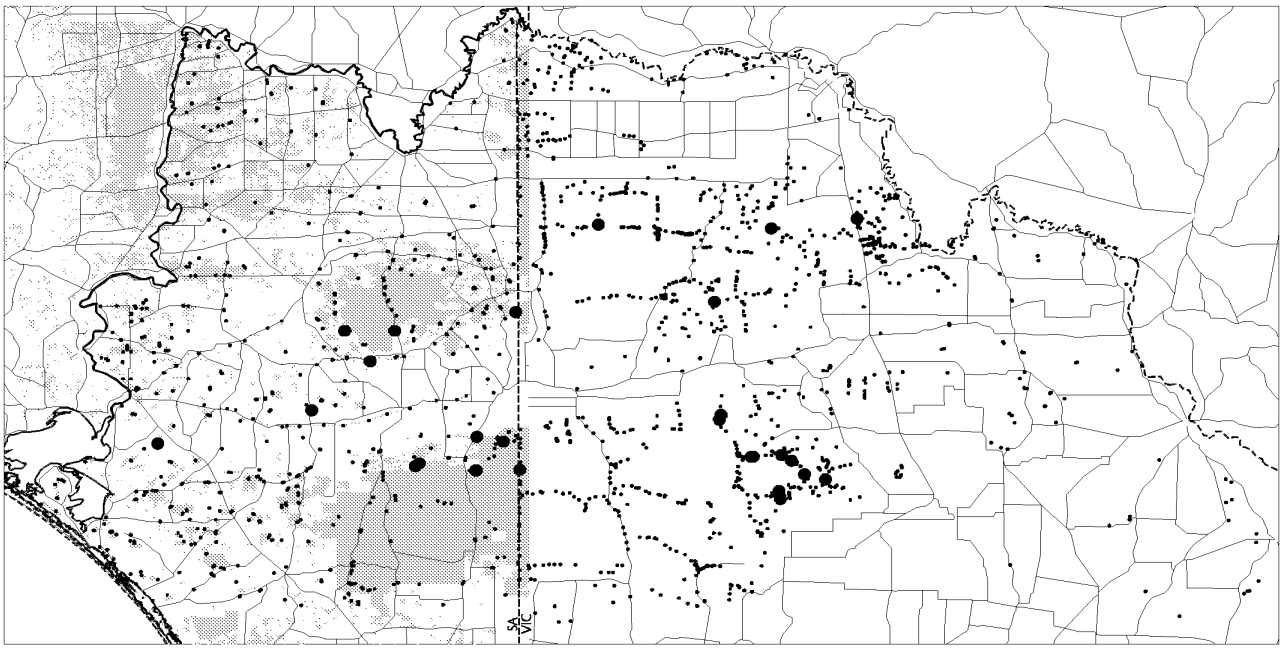
Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Astroloma humifusum	8	1	0	0	0	0	1.00	SA/VIC
Kunzea pomifera	0	0	1	5	3	0	1.00	SA/VIC
Xanthorrhoea caespitosa/semiplana	8	0	1	0	0	0	1.00	SA/VIC
Hibbertia riparia	5	0	2	0	1	0	0.89	SA/VIC
Lepidosperma congestum/laterale/viscidum	2	4	2	0	0	0	0.89	SA/VIC
Banksia marginata	5	0	2	0	0	0	0.78	SA/VIC
Calytrix tetragona	2	0	3	1	0	0	0.67	SA/VIC
Lepidosperma carphoides	3	3	0	0	0	0	0.67	SA/VIC
Acacia spinescens	4	0	1	0	0	0	0.56	SA/VIC
Baeckea behrii	2	0	1	2	0	0	0.56	SA/VIC
Banksia ornata	2	0	2	1	0	0	0.56	SA/VIC
Correa reflexa var. *reflexa*	4	1	0	0	0	0	0.56	SA/VIC
Helichrysum leucopsideum	5	0	0	0	0	0	0.56	SA/VIC

Hibbertia sericea var.	5	0	0	0	0	0	0.56	SA/VIC
Leptospermum coriaceum	1	0	2	0	2	0	0.56	SA/VIC
Thomasia petalocalyx	4	0	1	0	0	0	0.56	SA ONLY
Allocasuarina muelleriana ssp. *muelleriana*	4	0	0	0	0	0	0.44	SA/VIC
Astroloma conostephioides	4	0	0	0	0	0	0.44	SA/VIC
Brachyloma ericoides ssp. *ericoides*	4	0	0	0	0	0	0.44	SA/VIC
Cryptandra propinqua/tomentosa	4	0	0	0	0	0	0.44	SA/VIC
Leptospermum myrsinoides	3	0	1	0	0	0	0.44	SA/VIC
Lomandra leucocephala ssp. *robusta*	4	0	0	0	0	0	0.44	SA/VIC
Neurachne alopecuroidea	4	0	0	0	0	0	0.44	SA/VIC
Schoenus breviculmis	4	0	0	0	0	0	0.44	SA/VIC
Stipa sp.	4	0	0	0	0	0	0.44	SA/VIC
Acacia pycnantha	3	0	0	0	0	0	0.33	SA/VIC
Billardiera cymosa	3	0	0	0	0	0	0.33	SA/VIC
Clematis microphylla	3	0	0	0	0	0	0.33	SA/VIC
Danthonia sp.	2	1	0	0	0	0	0.33	SA/VIC
Dianella revoluta var.	3	0	0	0	0	0	0.33	SA/VIC
Eucalyptus diversifolia	2	0	1	0	0	0	0.33	SA ONLY
Eucalyptus leucoxylon ssp.	1	0	0	1	1	0	0.33	SA/VIC
Hakea muelleriana	3	0	0	0	0	0	0.33	SA/VIC
Hibbertia virgata	3	0	0	0	0	0	0.33	SA/VIC
Hypolaena fastigiata	2	1	0	0	0	0	0.33	SA/VIC
Stipa mollis group	3	0	0	0	0	0	0.33	SA/VIC
Triodia irritans var.	2	0	1	0	0	0	0.33	SA/VIC

Figure 43.
***Xanthorrhoea caespitosa/semiplana, +/- Banksia marginata* Tall open shrubland at quadrat BB00301.**

Floristic Group 45. *Callitris verrucosa* Tall open shrubland

27 members SA/VIC (12/15)



Vegetation mapping details:
Vegetation mapping groups: 19.17, 19.18, 19.19, 22.01
Hidden within mapping groups: 3.01, 19.15

Dominant Overstorey Species:
Callitris verrucosa

Dominant Understorey Species:
Leptospermum coriaceum
Hibbertia riparia

Structural Data:
Typical canopy cover: sparse
Av. height (metres): 3.6

Environmental Parameters:
Typical landforms: dune systems and sandy plains
Calcrete type: none
Range of soils: sand
Average rainfall (mm): 400 (11 members)

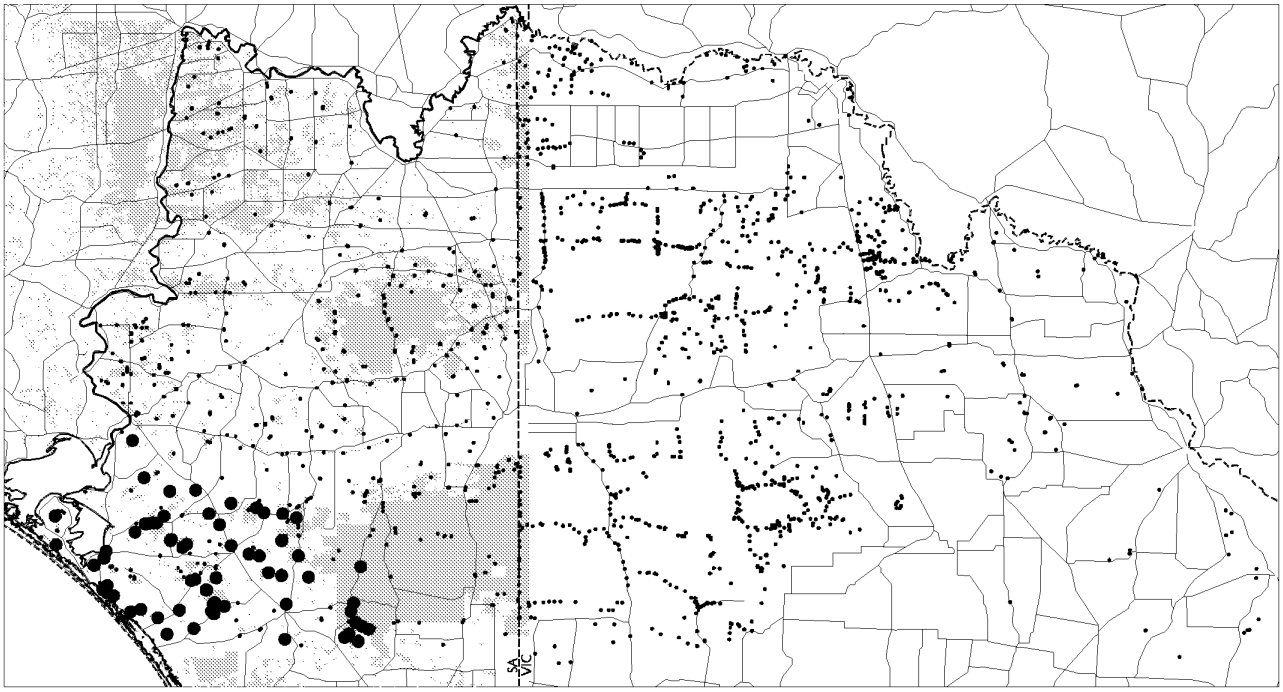
Quadrat(s):
NG03501, NG03601, A03021, A03023, A03038, A03057, A03100, A03104, A03109, A04027, A06047, A12040, A12104, A12105, A12211, A16208, A16323, KU04001, BT00201, YU01001, KU02101, QB00301, QB01001, PB02201, JA00901, SS00701, SS00401

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Callitris verrucosa	0	1	6	9	4	7	1.00	SA/VIC
Leptospermum coriaceum	10	3	2	0	0	0	0.56	SA/VIC
Hibbertia riparia	14	0	0	0	0	0	0.52	SA/VIC
Danthonia sp.	10	2	0	0	0	0	0.44	SA/VIC
Eucalyptus leptophylla	3	6	2	0	0	0	0.41	SA/VIC
Lepidosperma congestum/laterale/viscidum	9	2	0	0	0	0	0.41	SA/VIC
Stipa mollis group	11	0	0	0	0	0	0.41	SA/VIC
Brachyloma ericoides ssp. *ericoides*	9	1	0	0	0	0	0.37	SA/VIC
Stipa sp.	6	3	1	0	0	0	0.37	SA/VIC
Calytrix tetragona	7	2	0	0	0	0	0.33	SA/VIC
Eucalyptus incrassata	5	2	1	0	0	0	0.30	SA/VIC
Senecio quadridentatus	6	1	0	0	0	0	0.26	SA/VIC
Baeckea behrii	4	1	1	0	0	0	0.22	SA/VIC
Billardiera cymosa	6	0	0	0	0	0	0.22	SA/VIC

Figure 44.
***Callitris verrucosa* Tall open shrubland at quadrat BT00201.**

Floristic Group 46. *Eucalyptus diversifolia* Open mallee.

66 members SA ONLY



Vegetation mapping details:
Vegetation mapping groups: 10.01, 10.02, 10.05, 19.20
Hidden within mapping groups: 15.01, 18.01, 19.01, 19.15, 21.01, 23.01

Dominant Overstorey Species:
Eucalyptus diversifolia

Dominant Understorey Species:
Lepidosperma congestum/laterale/viscidum
Hibbertia riparia
Xanthorrhoea caespitosa/semiplana
Lepidosperma carphoides
Correa reflexa var. *reflexa*
Acacia spinescens
Astroloma humifusum

Structural Data:
Typical canopy cover: very sparse - ranging to mid dense
Av. height (metres): 4.4

Environmental Parameters:
Calcrete type: none to broken
Range of soils: sand - clay loam
Average rainfall (mm): 469 (66 members)

Quadrat(s):
YU01801, YU01901, CA03801, CB00201, CB00101, CB00501, MR00101, MR00801, MR00901,MR01201, MR00201, NA00701, NA00501, MG01101, MG01301, MG00101, MG01501, MG01601, MG00501, MG00701, MG00801, CA00401, CB00301, YU01201, BB00701, BB00801, BB00101, BB00901, BB01101, CN03101, CN00301, CN01501, CN01801, TT00601, CN03501, CN03601, MF00401, MF00501, MF00601, MF00101, MG00601, YU01401, YU01501, YU00401, YU01601, YU01701, CN00101, CA02501, CA02601, CA03001, CA03101, TT00201, TT00801, CA00601, CA02101, MM00801, NG02801, TT01501, YU00701, CN02301, CN00501, CN02701, CN02801,CN02901, CN03001, TB00601

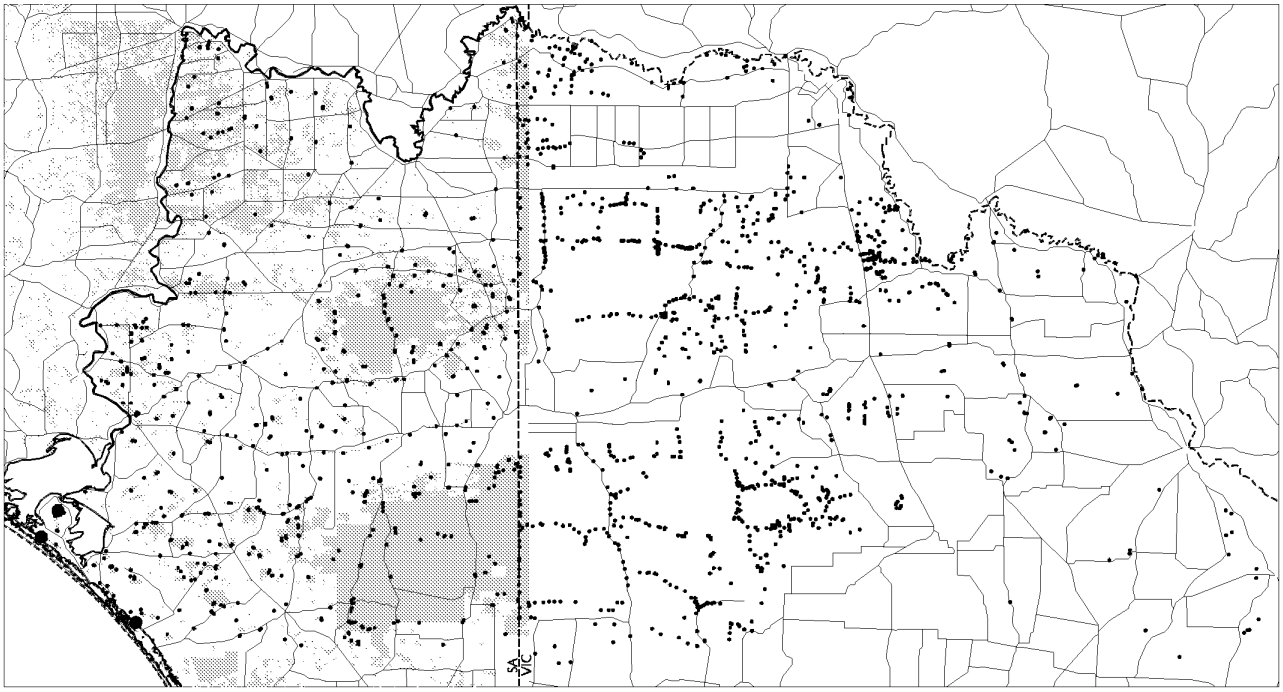
Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Eucalyptus diversifolia	1	4	19	23	17	1	0.98	SA ONLY
Lepidosperma congestum/laterale/viscidum	26	24	8	1	0	0	0.89	SA/VIC
Hibbertia riparia	23	13	15	5	0	0	0.85	SA/VIC
Xanthorrhoea caespitosa/semiplana	25	8	15	5	0	0	0.80	SA/VIC
Lepidosperma carphoides	20	19	11	1	0	0	0.77	SA/VIC
Correa reflexa var. *reflexa*	39	4	2	0	0	0	0.68	SA/VIC

Acacia spinescens	35	6	1	0	0	0	0.64	SA/VIC
Astroloma humifusum	33	4	3	0	0	0	0.61	SA/VIC
Allocasuarina muelleriana ssp. *muelleriana*	16	5	9	8	1	0	0.59	SA/VIC
Billardiera cymosa	36	3	0	0	0	0	0.59	SA/VIC
Dianella revoluta var.	27	2	6	0	0	0	0.53	SA/VIC
Hibbertia sericea var.	27	5	1	2	0	0	0.53	SA/VIC
Schoenus breviculmis	26	8	1	0	0	0	0.53	SA/VIC
Eucalyptus leptophylla	19	1	9	2	0	0	0.47	SA/VIC
Eucalyptus incrassata	16	3	7	3	1	0	0.45	SA/VIC
Hakea muelleriana	19	4	5	0	0	0	0.42	SA/VIC
Neurachne alopecuroidea	28	0	0	0	0	0	0.42	SA/VIC
Acrotriche cordata	18	2	4	3	0	0	0.41	SA ONLY
Lomandra collina	23	2	0	0	0	0	0.38	SA/VIC
Lomandra juncea	25	0	0	0	0	0	0.38	SA/VIC
Melaleuca lanceolata	14	7	2	1	1	0	0.38	SA/VIC
Cassytha glabella forma *dispar*	23	1	0	0	0	0	0.36	SA/VIC
Astroloma conostephioides	21	1	1	0	0	0	0.35	SA/VIC
Danthonia sp.	18	5	0	0	0	0	0.35	SA/VIC
Stipa mollis group	22	1	0	0	0	0	0.35	SA/VIC
Acrotriche affinis	20	1	1	0	0	0	0.33	SA/VIC
Helichrysum leucopsideum	18	3	1	0	0	0	0.33	SA/VIC
Kunzea pomifera	14	0	2	5	0	1	0.33	SA/VIC
Leptospermum coriaceum	6	1	7	6	2	0	0.33	SA/VIC
Brachyloma ericoides ssp. *ericoides*	17	3	1	0	0	0	0.32	SA/VIC
Clematis microphylla	18	3	0	0	0	0	0.32	SA/VIC
Dampiera rosmarinifolia	20	1	0	0	0	0	0.32	SA/VIC
Baeckea behrii	7	5	6	2	0	0	0.30	SA/VIC
Gahnia deusta	6	6	7	1	0	0	0.30	SA ONLY
Pultenaea tenuifolia	19	1	0	0	0	0	0.30	SA/VIC
Thomasia petalocalyx	12	4	4	0	0	0	0.30	SA ONLY

Figure 45.
***Eucalyptus diversifolia* Open mallee at quadrat CB00101.**

Floristic Group 47. *Eucalyptus diversifolia, Olearia axillaris* Very open mallee.

3 members SA ONLY



Vegetation mapping details:
Vegetation mapping groups: 10.05, 13.01
Hidden within mapping groups: none

Dominant Overstorey Species:
Eucalyptus diversifolia
Olearia axillaris

Dominant Understorey Species:
Dianella revoluta var.
Isolepis nodosa
Muehlenbeckia gunnii
Tetragonia implexicoma

Structural Data:
Typical canopy cover: very sparse- sparse
Av. height (metres): 7.7

Environmental Parameters:
Typical landforms: dune systems
Calcrete type: none
Range of soils: sand
Average rainfall (mm): 460 (3 members)

Quadrat(s):
NA00601, NA00401, MF00201

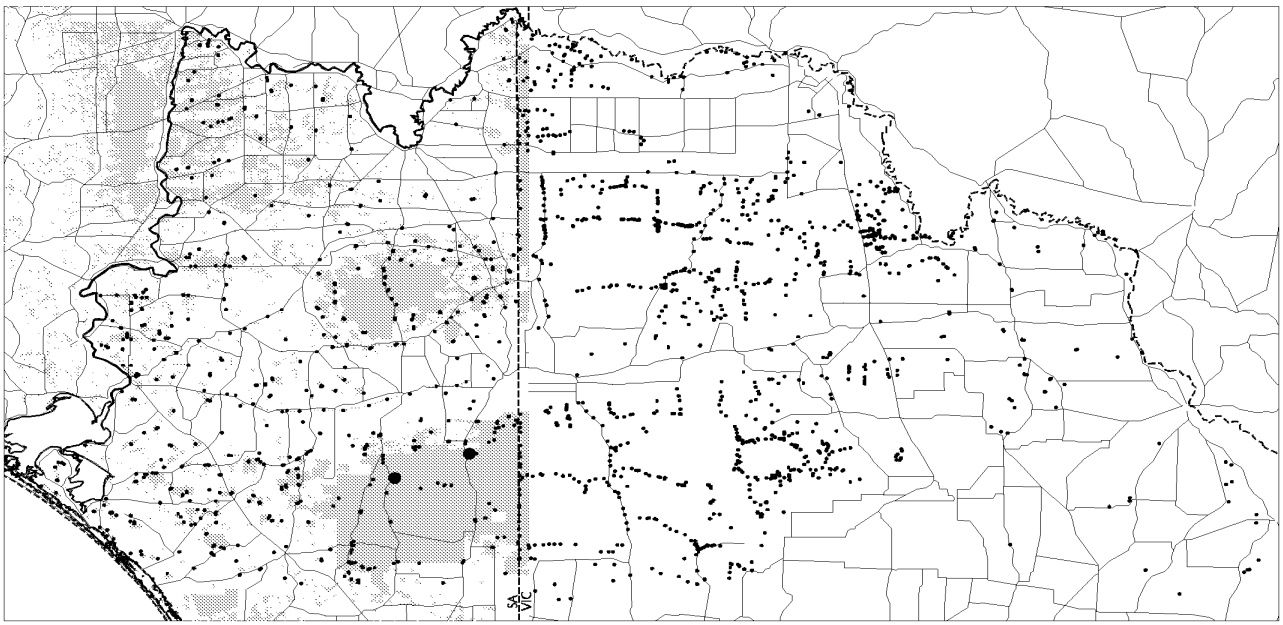
Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Acacia longifolia var. *sophorae*	0	0	0	3	0	0	1.00	SA/VIC
Dianella revoluta var.	2	1	0	0	0	0	1.00	SA/VIC
Eucalyptus diversifolia	0	0	1	0	2	0	1.00	SA ONLY
Isolepis nodosa	1	0	1	1	0	0	1.00	SA/VIC
Muehlenbeckia gunnii	1	0	2	0	0	0	1.00	SA ONLY
Olearia axillaris	0	1	1	1	0	0	1.00	SA ONLY
Tetragonia implexicoma	2	0	0	1	0	0	1.00	SA ONLY
**Asclepias rotundifolia*	2	0	0	0	0	0	0.67	SA ONLY
**Asphodelus fistulosus*	1	0	1	0	0	0	0.67	SA/VIC
Bursaria spinosa	1	0	1	0	0	0	0.67	SA/VIC
Clematis microphylla	1	0	1	0	0	0	0.67	SA/VIC
Dichondra repens	2	0	0	0	0	0	0.67	SA/VIC
Eucalyptus fasciculosa	0	0	0	2	0	0	0.67	SA ONLY
Rhagodia candolleana ssp. *candolleana*	0	0	1	1	0	0	0.67	SA ONLY
Xanthorrhoea caespitosa/semiplana	0	1	1	0	0	0	0.67	SA/VIC
Acacia pycnantha	0	0	1	0	0	0	0.33	SA/VIC

Acaena novae-zelandiae	1	0	0	0	0	0	0.33	SA ONLY
Allocasuarina verticillata	1	0	0	0	0	0	0.33	SA ONLY
Billardiera cymosa	1	0	0	0	0	0	0.33	SA/VIC
Carpobrotus modestus/rossii	0	0	0	1	0	0	0.33	SA/VIC
Enchylaena tomentosa var. *tomentosa*	0	1	0	0	0	0	0.33	SA/VIC
Eucalyptus incrassata	0	1	0	0	0	0	0.33	SA/VIC
**Euphorbia terracina*	0	0	1	0	0	0	0.33	SA/VIC
Gahnia lanigera	1	0	0	0	0	0	0.33	SA/VIC
Hakea muelleriana	1	0	0	0	0	0	0.33	SA/VIC
Helichrysum leucopsideum	0	0	1	0	0	0	0.33	SA/VIC
Kennedia prostrata	1	0	0	0	0	0	0.33	SA/VIC
Leucopogon parviflorus	0	1	0	0	0	0	0.33	SA ONLY
Lomandra effusa	0	0	1	0	0	0	0.33	SA/VIC
Lomandra juncea	0	0	1	0	0	0	0.33	SA/VIC
**Lycium ferocissimum*	1	0	0	0	0	0	0.33	SA/VIC
Melaleuca lanceolata	1	0	0	0	0	0	0.33	SA/VIC
Neurachne alopecuroidea	1	0	0	0	0	0	0.33	SA/VIC
Pelargonium rodneyanum	1	0	0	0	0	0	0.33	SA ONLY
**Rhamnus alaternus*	0	0	1	0	0	0	0.33	SA ONLY
Senecio lautus	0	0	0	1	0	0	0.33	SA/VIC
**Senecio pterophorus* var. *pterophorus*	0	1	0	0	0	0	0.33	SA ONLY
Stipa mollis group	1	0	0	0	0	0	0.33	SA/VIC
Vittadinia australasica var.	1	0	0	0	0	0	0.33	SA/VIC

Figure 46.
***Eucalyptus diversifolia, Olearia axillaris* Very open mallee at quadrat NA00401.**

Floristic Group 48. *Eucalyptus arenacea* Low woodland.

2 members SA ONLY



Vegetation mapping details:
Vegetation mapping groups: none
Hidden within mapping groups: 19.15, 21.01

Dominant Overstorey Species:
Eucalyptus arenacea

Dominant Understorey Species:
Baeckea behrii
Astroloma conostephioides
Astroloma humifusum
Baeckea crassifolia
Calytrix alpestris
Calytrix tetragona
Correa reflexa var. *reflexa*
Goodenia robusta
Hypolaena fastigiata
Lepidobolus drapetocoleus
Lepidosperma congestum/laterale/viscidum
Leptospermum coriaceum
Lomandra juncea

Structural Data:
Typical canopy cover: very sparse - sparse
Av. height (metres): 6.0

Environmental Parameters:
Typical landforms: dune crest
Calcrete type: none
Range of soils: sand
Average rainfall (mm): 420 (2 members)

Quadrat(s):
NG00101, NG00201

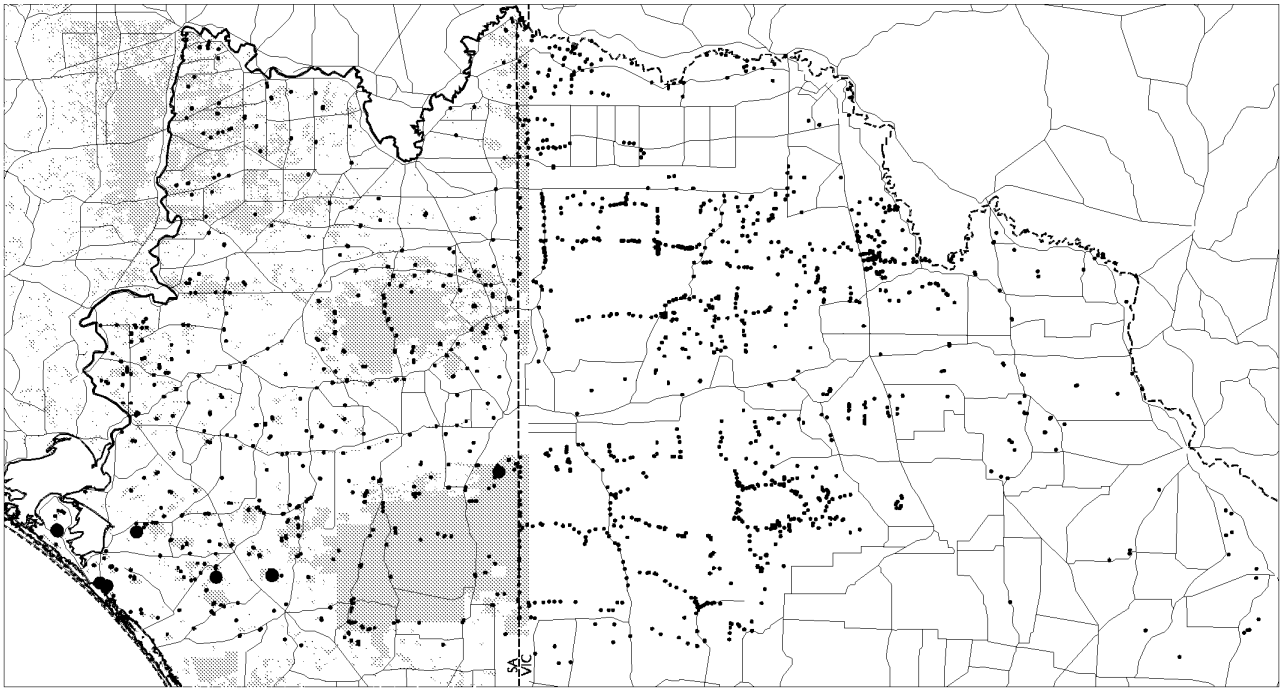
Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Astroloma conostephioides	2	0	0	0	0	0	1.00	SA/VIC
Astroloma humifusum	2	0	0	0	0	0	1.00	SA/VIC
Baeckea behrii	1	1	0	0	0	0	1.00	SA/VIC
Baeckea crassifolia	2	0	0	0	0	0	1.00	SA/VIC
Calytrix alpestris	2	0	0	0	0	0	1.00	SA/VIC
Calytrix tetragona	2	0	0	0	0	0	1.00	SA/VIC
Correa reflexa var. *reflexa*	2	0	0	0	0	0	1.00	SA/VIC
Eucalyptus arenacea	0	2	0	0	0	0	1.00	SA/VIC
Goodenia robusta	2	0	0	0	0	0	1.00	SA/VIC
Hypolaena fastigiata	2	0	0	0	0	0	1.00	SA/VIC
Lepidobolus drapetocoleus	2	0	0	0	0	0	1.00	SA/VIC
Lepidosperma congestum/laterale/viscidum	2	0	0	0	0	0	1.00	SA/VIC
Leptospermum coriaceum	2	0	0	0	0	0	1.00	SA/VIC
Lomandra juncea	2	0	0	0	0	0	1.00	SA/VIC

Phyllota pleurandroides	2	0	0	0	0	0	1.00	SA/VIC
Acacia myrtifolia	1	0	0	0	0	0	0.50	SA/VIC
Acrotriche affinis	1	0	0	0	0	0	0.50	SA/VIC
Adenanthos terminalis	1	0	0	0	0	0	0.50	SA/VIC
Allocasuarina muelleriana ssp. *muelleriana*	1	0	0	0	0	0	0.50	SA/VIC
Aotus subspinescens	1	0	0	0	0	0	0.50	SA/VIC
Banksia marginata	0	0	0	1	0	0	0.50	SA/VIC
Banksia ornata	1	0	0	0	0	0	0.50	SA/VIC
Boronia coerulescens ssp. *coerulescens*	1	0	0	0	0	0	0.50	SA/VIC
Brachyloma daphnoides	1	0	0	0	0	0	0.50	SA/VIC
Danthonia sp.	1	0	0	0	0	0	0.50	SA/VIC
Eucalyptus incrassata	1	0	0	0	0	0	0.50	SA/VIC
Eucalyptus leptophylla	0	1	0	0	0	0	0.50	SA/VIC
Hakea muelleriana	1	0	0	0	0	0	0.50	SA/VIC
Hibbertia riparia	1	0	0	0	0	0	0.50	SA/VIC
Hibbertia sericea var.	1	0	0	0	0	0	0.50	SA/VIC
Hybanthus floribundus ssp. *floribundus*	1	0	0	0	0	0	0.50	SA/VIC
Kunzea pomifera	1	0	0	0	0	0	0.50	SA/VIC
Lepidosperma semiteres	1	0	0	0	0	0	0.50	SA ONLY
Leucopogon cordifolius	1	0	0	0	0	0	0.50	SA/VIC
Leucopogon rufus	1	0	0	0	0	0	0.50	SA/VIC
Lomandra collina	1	0	0	0	0	0	0.50	SA/VIC
Lomandra leucocephala ssp. *robusta*	1	0	0	0	0	0	0.50	SA/VIC
Melaleuca uncinata	1	0	0	0	0	0	0.50	SA/VIC
Neurachne alopecuroidea	1	0	0	0	0	0	0.50	SA/VIC
Olearia ciliata var. *ciliata*	1	0	0	0	0	0	0.50	SA/VIC
Phyllota remota	1	0	0	0	0	0	0.50	SA/VIC
Pimelea octophylla	1	0	0	0	0	0	0.50	SA/VIC
Spyridium subochreatum var.	1	0	0	0	0	0	0.50	SA/VIC
Triodia irritans var.	1	0	0	0	0	0	0.50	SA/VIC
Xanthorrhoea caespitosa/semiplana	1	0	0	0	0	0	0.50	SA/VIC

Figure 47.
***Eucalyptus arenacea* Low woodland at quadrat NG00101.**

Floristic Group 49. *Eucalyptus leucoxylon* ssp. Low woodland

9 members SA ONLY



Vegetation mapping details:
Vegetation mapping groups: 7.01
Hidden within mapping groups: 10.01, 19.15

Dominant Overstorey Species:
Eucalyptus leucoxylon ssp.

Dominant Understorey Species:
Lepidosperma congestum/laterale/viscidum
Xanthorrhoea caespitosa/semiplana
Hibbertia riparia
Kunzea pomifera
Clematis microphylla
Hibbertia sericea var.
Melaleuca lanceolata

Structural Data:
Typical canopy cover: sparse
Av. height (metres): 8.6

Environmental Parameters:
Typical landforms: dune swales and undulating plains
Calcrete type: none
Range of soils: sand to sandy loam
Average rainfall (mm): 450 (9 members)

Quadrat(s):
CA03601, NA00801, NA00301, YU00501, MG00301, MG00901, CN00901, TT00701, SS00301

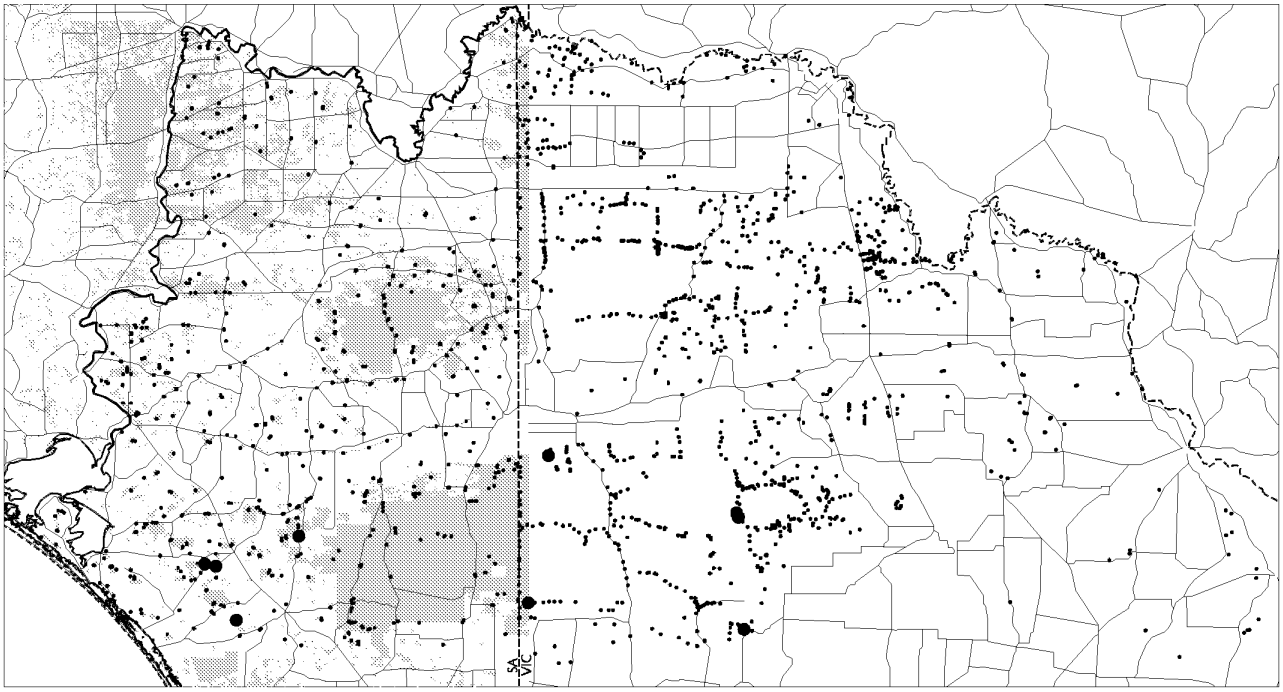
Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Dianella revoluta var.	4	2	3	0	0	0	1.00	SA/VIC
Lepidosperma congestum/laterale/viscidum	0	0	0	7	2	0	1.00	SA/VIC
Xanthorrhoea caespitosa/semiplana	3	0	2	3	0	0	0.89	SA/VIC
Hibbertia riparia	3	2	1	1	0	0	0.78	SA/VIC
Kunzea pomifera	2	2	1	2	0	0	0.78	SA/VIC
Clematis microphylla	5	0	1	0	0	0	0.67	SA/VIC
Eucalyptus leucoxylon ssp.	1	0	0	5	0	0	0.67	SA/VIC
Hibbertia sericea var.	4	0	2	0	0	0	0.67	SA/VIC
Melaleuca lanceolata	3	1	2	0	0	0	0.67	SA/VIC
Acacia pycnantha	0	1	4	0	0	0	0.56	SA/VIC
Acacia spinescens	3	1	0	1	0	0	0.56	SA/VIC
Astroloma humifusum	3	0	2	0	0	0	0.56	SA/VIC
Carpobrotus modestus/rossii	4	0	1	0	0	0	0.56	SA/VIC

Exocarpos sparteus	4	0	1	0	0	0	0.56	SA/VIC
Hakea muelleriana	2	0	3	0	0	0	0.56	SA/VIC
Helichrysum leucopsideum	4	1	0	0	0	0	0.56	SA/VIC
Lepidosperma carphoides	4	0	0	1	0	0	0.56	SA/VIC
Acrotriche affinis	2	1	1	0	0	0	0.44	SA/VIC
Brachyloma ericoides ssp. *ericoides*	2	0	2	0	0	0	0.44	SA/VIC
Bursaria spinosa	1	1	2	0	0	0	0.44	SA/VIC
Danthonia sp.	0	4	0	0	0	0	0.44	SA/VIC
Lomandra effusa	4	0	0	0	0	0	0.44	SA/VIC
Schoenus breviculmis	2	2	0	0	0	0	0.44	SA/VIC
Acacia ligulata	2	0	1	0	0	0	0.33	SA/VIC
Allocasuarina muelleriana ssp. *muelleriana*	2	0	1	0	0	0	0.33	SA/VIC
Baeckea behrii	1	1	1	0	0	0	0.33	SA/VIC
Billardiera cymosa	3	0	0	0	0	0	0.33	SA/VIC
Cassytha glabella forma *dispar*	3	0	0	0	0	0	0.33	SA/VIC
Gahnia lanigera	1	0	2	0	0	0	0.33	SA/VIC
Helichrysum scorpioides	3	0	0	0	0	0	0.33	SA ONLY
Leucopogon clelandii	3	0	0	0	0	0	0.33	SA/VIC
Stipa sp.	3	0	0	0	0	0	0.33	SA/VIC
Tetragonia implexicoma	1	0	2	0	0	0	0.33	SA ONLY

Figure 48.
***Eucalyptus leucoxylon* ssp. Low woodland at quadrat NA00301.**

Floristic Group 50. *Eucalyptus leucoxylon* ssp. Low open woodland.

9 members SA/VIC (4/5)



Vegetation mapping details:
Vegetation mapping groups: 7.03
Hidden within mapping groups: 19.15, 21.01

Dominant Overstorey Species:
Eucalyptus leucoxylon ssp.

Dominant Understorey Species:
Stipa sp.
Danthonia sp.
Vittadinia dissecta var. *hirta*
Lepidosperma congestum/laterale/viscidum

Structural Data:
Typical canopy cover: very sparse - sparse
Av. height (metres): 9.3

Environmental Parameters:
Typical landforms: dune swales, undulating plains
Calcrete type: none
Range of soils: sand to sandy loam
Average rainfall (mm): 460 (9 members)

Quadrat(s):
A03075, A03078, A12036, A12142, A12239, CA00801, BB01401, CN01001, CN02601

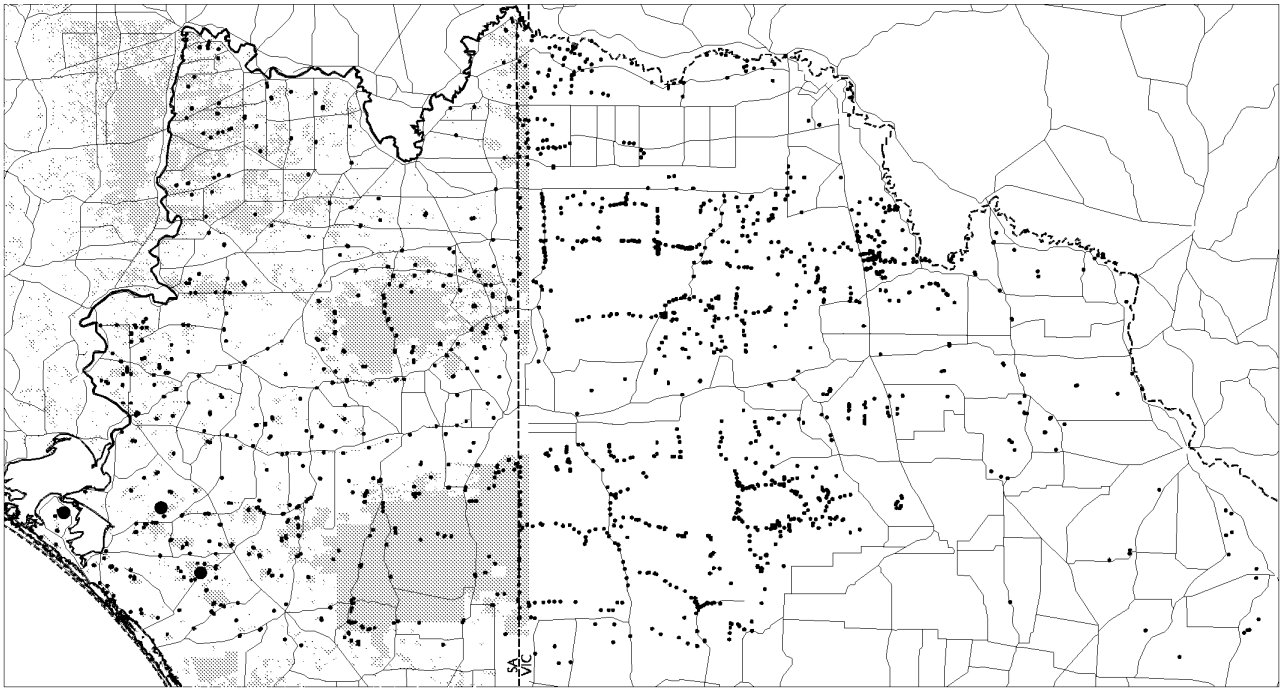
Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Eucalyptus leucoxylon ssp.	0	0	3	6	0	0	1.00	SA/VIC
Danthonia sp.	4	3	0	0	0	0	0.78	SA/VIC
Stipa sp.	3	3	0	0	0	0	0.67	SA/VIC
Vittadinia dissecta var. *hirta*	3	3	0	0	0	0	0.67	SA/VIC
Clematis microphylla	5	0	0	0	0	0	0.56	SA/VIC
Lepidosperma congestum/laterale/viscidum	3	1	1	0	0	0	0.56	SA/VIC
Hibbertia riparia	3	1	0	0	0	0	0.44	SA/VIC
Senecio lautus	2	2	0	0	0	0	0.44	SA/VIC
Senecio quadridentatus	3	0	1	0	0	0	0.44	SA/VIC
Stipa mollis group	4	0	0	0	0	0	0.44	SA/VIC
Triodia irritans var.	2	1	1	0	0	0	0.44	SA/VIC
Acacia calamifolia	2	0	1	0	0	0	0.33	SA/VIC
Baeckea behrii	2	1	0	0	0	0	0.33	SA/VIC
Callitris verrucosa	1	1	1	0	0	0	0.33	SA/VIC
Correa reflexa var. *reflexa*	3	0	0	0	0	0	0.33	SA/VIC

Galium gaudichaudii	2	1	0	0	0	0	0.33	SA/VIC
Kunzea pomifera	2	0	1	0	0	0	0.33	SA/VIC

Figure 49.
***Eucalyptus leucoxylon* ssp. Low open woodland at quadrat CN01001.**

Floristic Group 51. ***Allocasuarina verticillata, Eucalyptus leucoxylon*** **ssp. Low open woodland.**

3 members SA ONLY



Vegetation mapping details:
Vegetation mapping groups: 1.01
Hidden within mapping groups: none

Dominant Overstorey Species:
Allocasuarina verticillata
Eucalyptus leucoxylon ssp.

Dominant Understorey Species:
Thomasia petalocalyx
Hibbertia sericea var.
Acacia pycnantha
Dianella revoluta var.
Eucalyptus diversifolia
Hibbertia sericea var.
Lomandra densiflora
Lomandra effusa
Pomaderris paniculosa ssp.
Stipa sp.
Vittadinia gracilis

Structural Data:
Typical canopy cover: very sparse - sparse
Av. height (metres): 7.3

Environmental Parameters:
Typical landforms: undulating plains and slopes
Calcrete type: none, broken and sheet
Range of soils: sandy loam - loam
Average rainfall (mm): 466 (3 members)

Quadrat(s):
NA00201, YU00201, CN00801

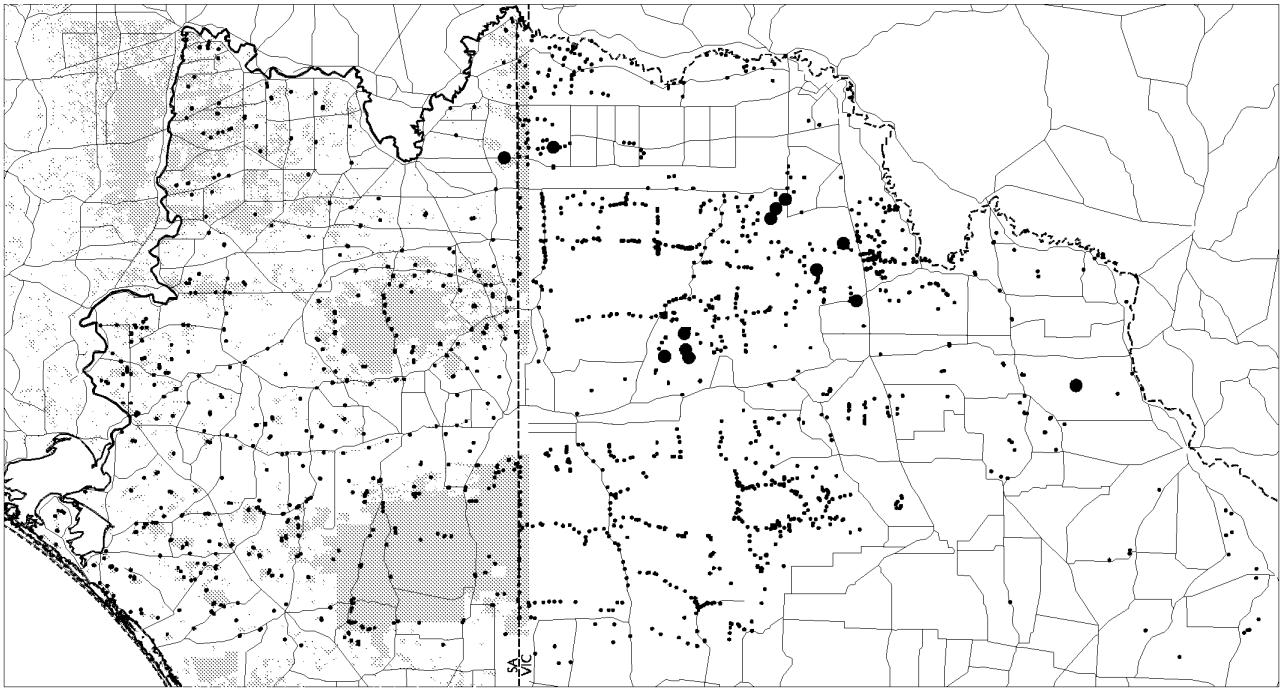
Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Allocasuarina verticillata	0	0	2	1	0	0	1.00	SA ONLY
Eucalyptus leucoxylon ssp.	1	0	1	1	0	0	1.00	SA/VIC
Helichrysum leucopsideum	3	0	0	0	0	0	1.00	SA/VIC
Stipa elegantissima	3	0	0	0	0	0	1.00	SA/VIC
Thomasia petalocalyx	2	1	0	0	0	0	1.00	SA ONLY
Acacia pycnantha	2	0	0	0	0	0	0.67	SA/VIC
Dianella revoluta var.	2	0	0	0	0	0	0.67	SA/VIC
Eucalyptus diversifolia	2	0	0	0	0	0	0.67	SA ONLY
Hibbertia sericea var.	1	1	0	0	0	0	0.67	SA/VIC
Lomandra densiflora	2	0	0	0	0	0	0.67	SA ONLY
Lomandra effusa	1	0	1	0	0	0	0.67	SA/VIC

Pomaderris paniculosa ssp.	0	0	2	0	0	0	0.67	SA ONLY
Stipa sp.	2	0	0	0	0	0	0.67	SA/VIC
Vittadinia gracilis	2	0	0	0	0	0	0.67	SA/VIC

Figure 50.
***Allocasuarina verticillata, Eucalyptus leucoxylon* ssp. Low open woodland at quadrat NA00201.**

Floristic Group 52. *Halosarcia* sp. Low very open shrubland.

13 members SA/VIC (1/12)



Vegetation mapping details:
Vegetation mapping groups: 33.01
Hidden within mapping groups: none

Dominant Overstorey Species:
Halosarcia sp.

Dominant Understorey Species:
Disphyma crassifolium ssp. *clavellatum*

Structural Data:
Typical canopy cover: very sparse
Av. height (metres): 0.4

Environmental Parameters:
Typical landforms: n/a
Calcrete type: n/a
Range of soils: n/a
Average rainfall (mm): n/a

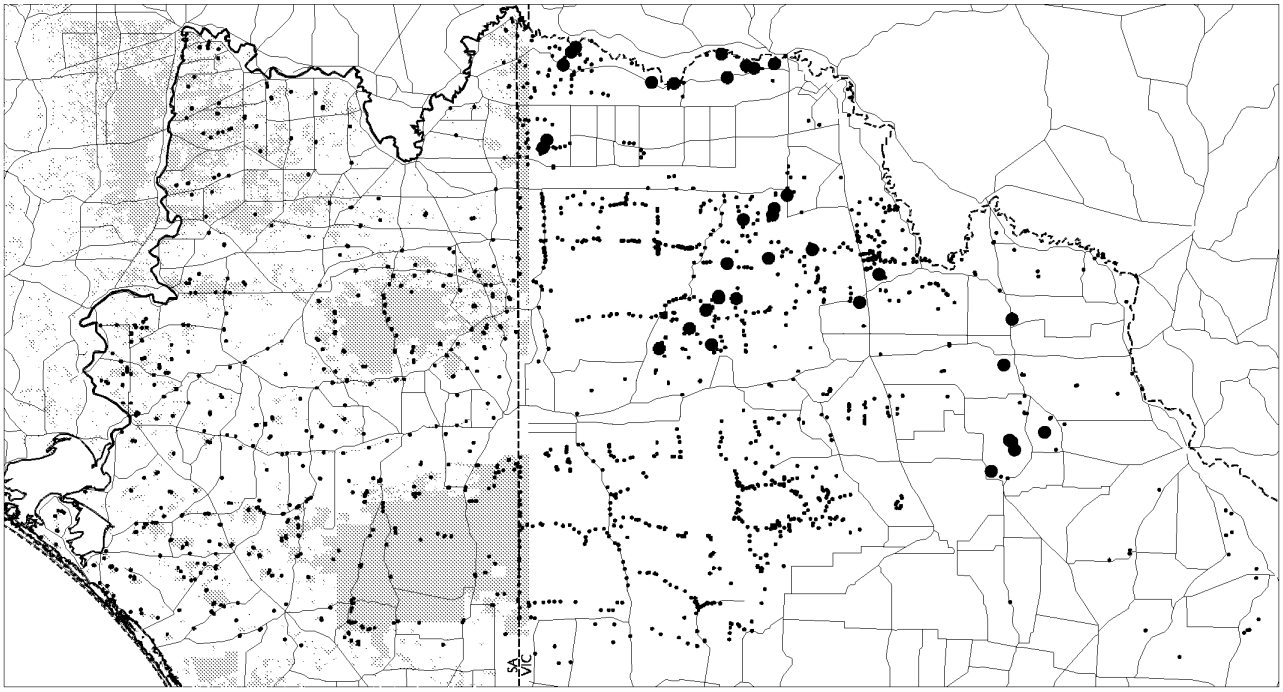
Quadrat(s):
RE00401, A16090, A16187, A16230, A16236, A16237, A16250, A16259, A16340 A16342, A16343, A16345, A16641

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Halosarcia sp.	1	3	8	1	0	0	1.00	SA/VIC
Disphyma crassifolium ssp. *clavellatum*	2	2	4	2	0	0	0.77	SA/VIC
Frankenia foliosa	0	2	3	0	0	0	0.38	SA/VIC
Frankenia sessilis	1	3	1	0	0	0	0.38	SA/VIC
Maireana oppositifolia	2	3	0	0	0	0	0.38	SA/VIC
Halosarcia pergranulata ssp.	3	1	0	0	0	0	0.31	SA/VIC
Sclerolaena diacantha/uniflora	3	1	0	0	0	0	0.31	SA/VIC
Atriplex vesicaria ssp.	3	0	0	0	0	0	0.23	SA/VIC
Sclerostegia moniliformis	1	0	2	0	0	0	0.23	VIC ONLY
Senecio lautus	3	0	0	0	0	0	0.23	SA/VIC
Stipa sp.	3	0	0	0	0	0	0.23	SA/VIC

Figure 51.
***Halosarcia* sp. Low very open shrubland at quadrat RE00401.**

Floristic Group 53. Characteristic species: *Disphyma crassifolium* ssp. *clavellatum*, *Atriplex vesicaria* ssp.

35 members VIC ONLY



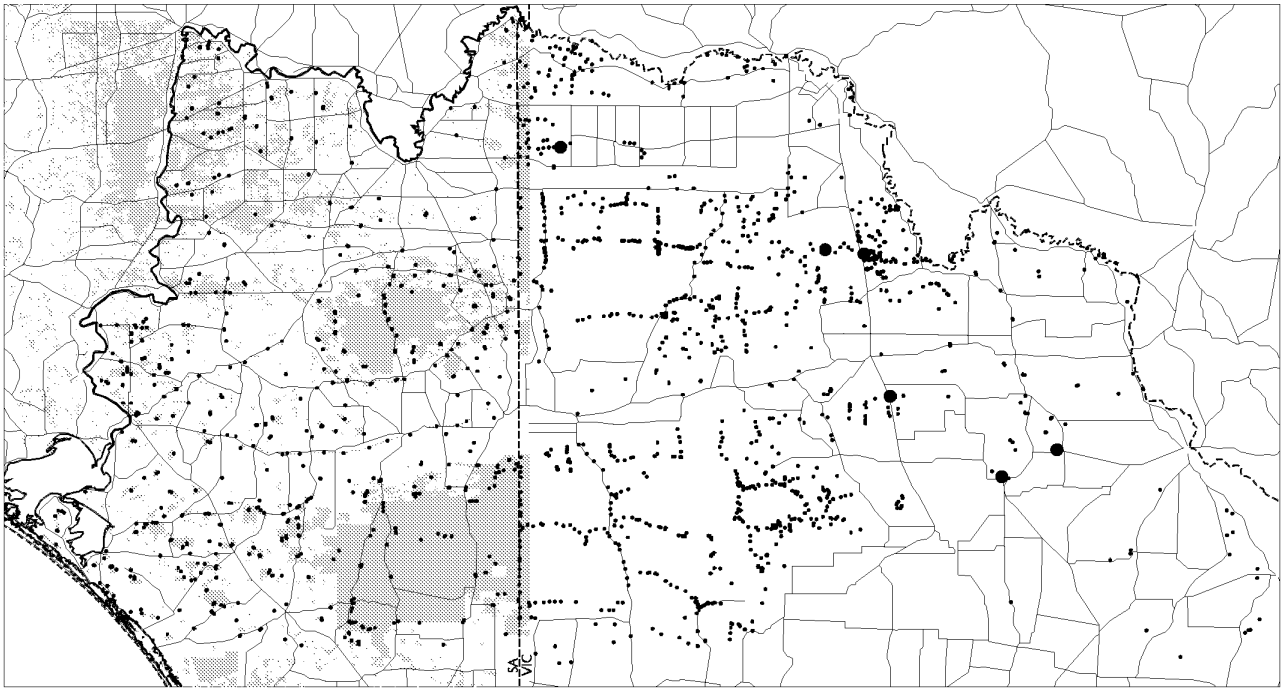
Characteristic Species:
Disphyma crassifolium ssp. *clavellatum*
Atriplex vesicaria ssp.

Quadrat(s):
A16093, A16096, A16134, A16145, A16209, A16229, A16233, A16256, A16262, A16283, A16288, A16306, A16319, A16346, A16362, A16366, A16531, A16541, A16542, A16545, A16554, A16556, A16558, A16560, A16572, A16586, A16620, A16623, A16624, A16625, A16634, A16636, A16810, A16822, A16907

Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Disphyma crassifolium ssp. *clavellatum*	2	5	16	7	0	0	0.86	SA/VIC
Atriplex vesicaria ssp.	6	3	13	7	0	0	0.83	SA/VIC
Sclerolaena diacantha/uniflora	13	7	0	0	0	0	0.57	SA/VIC
Halosarcia pergranulata ssp.	4	2	7	2	0	0	0.43	SA/VIC
Sclerolaena brachyptera	6	7	1	0	0	0	0.40	VIC ONLY
Danthonia sp.	10	0	0	0	0	0	0.29	SA/VIC
Dissocarpus biflorus var. *biflorus*	4	2	3	1	0	0	0.29	VIC ONLY
Pachycornia triandra	1	3	6	0	0	0	0.29	VIC ONLY
Enchylaena tomentosa var. *tomentosa*	8	1	0	0	0	0	0.26	SA/VIC
Senecio lautus	8	1	0	0	0	0	0.26	SA/VIC
Malacocera tricornis	5	3	0	0	0	0	0.23	VIC ONLY
Osteocarpum acropterum var.	6	2	0	0	0	0	0.23	SA/VIC
Halosarcia sp.	5	0	2	0	0	0	0.20	SA/VIC
Sclerolaena tricuspis	5	2	0	0	0	0	0.20	VIC ONLY
Sclerostegia tenuis	4	2	1	0	0	0	0.20	SA/VIC

Floristic Group 54. Characteristic species: *Halosarcia pergranulata* ssp., *Halosarcia* sp.

6 members VIC ONLY



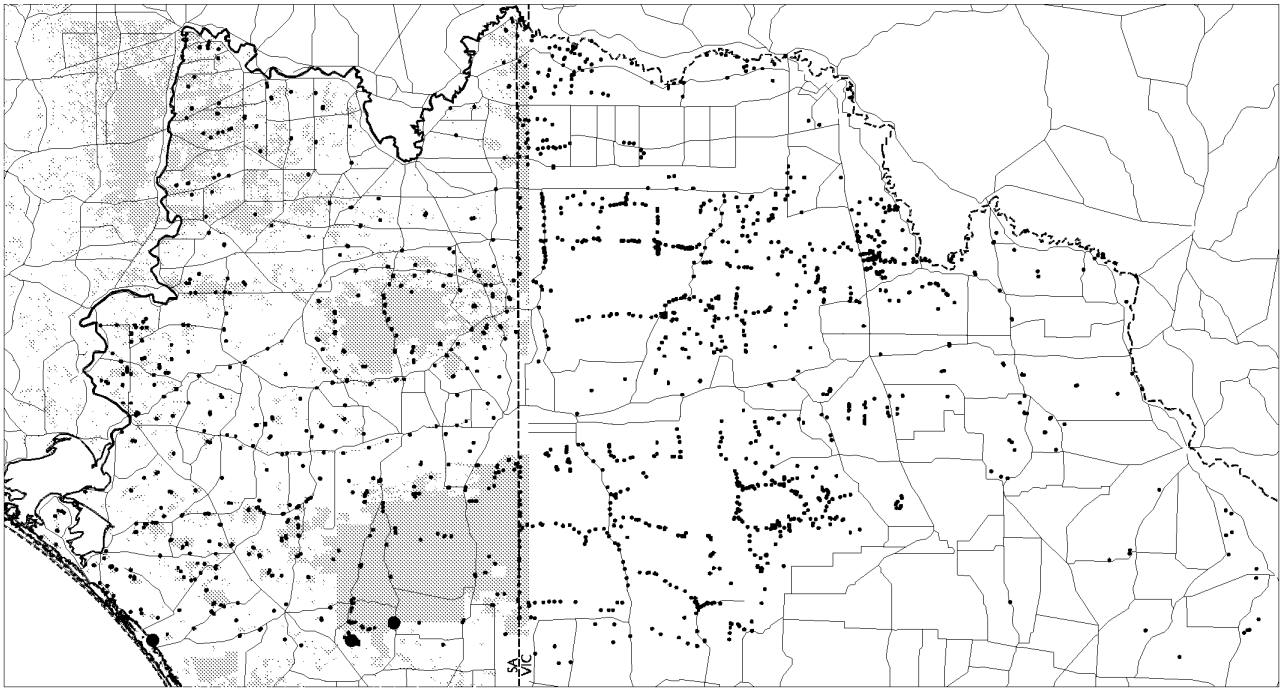
Characteristic Species:
Halosarcia pergranulata ssp.
Halosarcia sp.

Quadrat(s):
A12127, A16088, A16149, A16255, A16621, A16644

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Halosarcia pergranulata ssp.	0	2	1	3	0	0	1.00	SA/VIC
Halosarcia sp.	1	2	0	0	0	0	0.50	SA/VIC
Atriplex pumilio	0	1	1	0	0	0	0.33	SA/VIC
Osteocarpum acropterum var.	0	2	0	0	0	0	0.33	SA/VIC
Sarcocornia quinqueflora	1	1	0	0	0	0	0.33	SA/VIC

Floristic Group 55. ***Eucalyptus rugosa, +/- Eucalyptus leptophylla* Open mallee**

3 members SA ONLY



Vegetation mapping details:
Vegetation mapping groups: 16.01
Hidden within mapping groups: none

Dominant Overstorey Species:
Eucalyptus rugosa
Eucalyptus leptophylla

Dominant Understorey Species:
Dianella revoluta var.
Danthonia sp.
Lasiopetalum baueri
Melaleuca lanceolata
Stipa sp.

Structural Data:
Typical canopy cover: n/a
Av. height (metres): 5.2

Environmental Parameters:
Typical landforms: n/a
Calcrete type: n/a
Range of soils: n/a
Average rainfall (mm): n/a

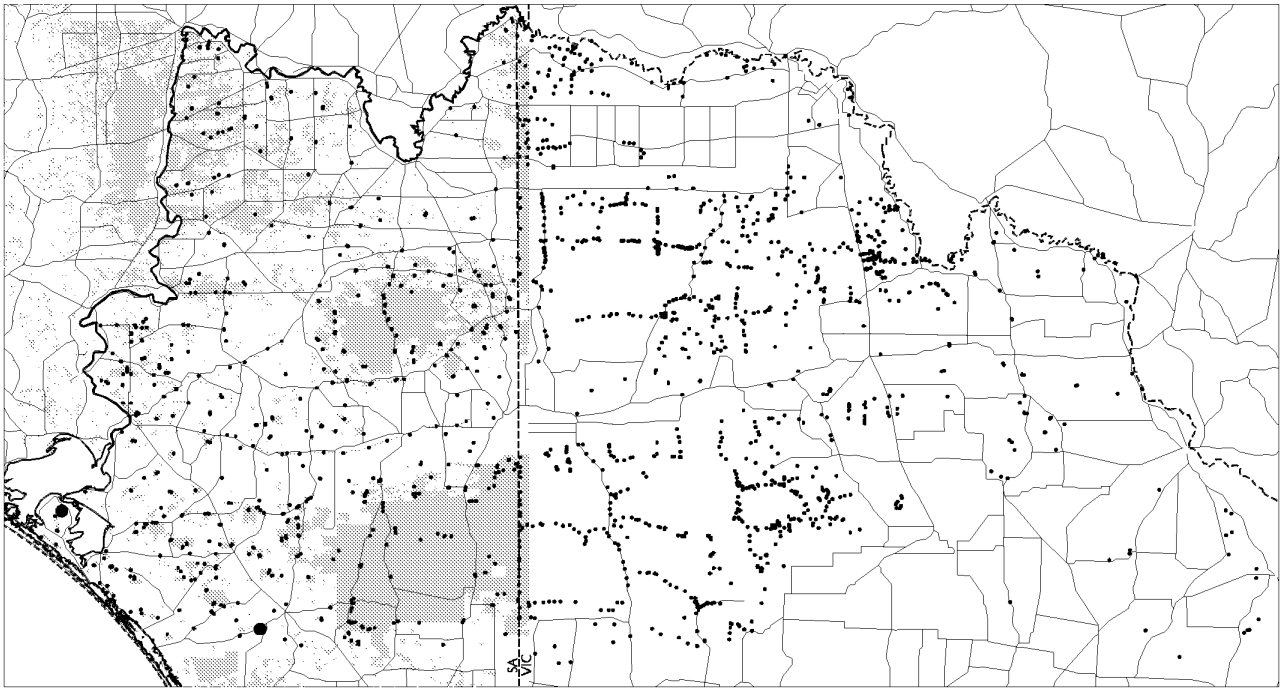
Quadrat(s):
CB00401, MF00301, NG01101

Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Dianella revoluta var.	3	0	0	0	0	0	1.00	SA/VIC
Eucalyptus rugosa	0	0	0	0	3	0	1.00	SA ONLY
Danthonia sp.	1	1	0	0	0	0	0.67	SA/VIC
Eucalyptus leptophylla	1	1	0	0	0	0	0.67	SA/VIC
Lasiopetalum baueri	1	1	0	0	0	0	0.67	SA/VIC
Melaleuca lanceolata	1	0	0	1	0	0	0.67	SA/VIC
Stipa sp.	2	0	0	0	0	0	0.67	SA/VIC

Figure 52.
***Eucalyptus rugosa, +/- Eucalyptus leptophylla* Open mallee at quadrat MF00301.**

Floristic Group 56. *Melaleuca halmaturorum* Tall open shrubland

2 members SA ONLY



Vegetation mapping details:
Vegetation mapping groups: 29.01
Hidden within mapping groups: 10.01

Dominant Overstorey Species:
Melaleuca halmaturorum

Dominant Understorey Species:
Sarcocornia quinqueflora
Frankenia pauciflora var.
Halosarcia pergranulata ssp.
Hemichroa pentandra
Tetragonia implexicoma

Structural Data:
Typical canopy cover: n/a
Av. height (metres): 4.5

Environmental Parameters:
Typical landforms: n/a
Calcrete type: n/a
Range of soils: n/a
Average rainfall (mm): n/a

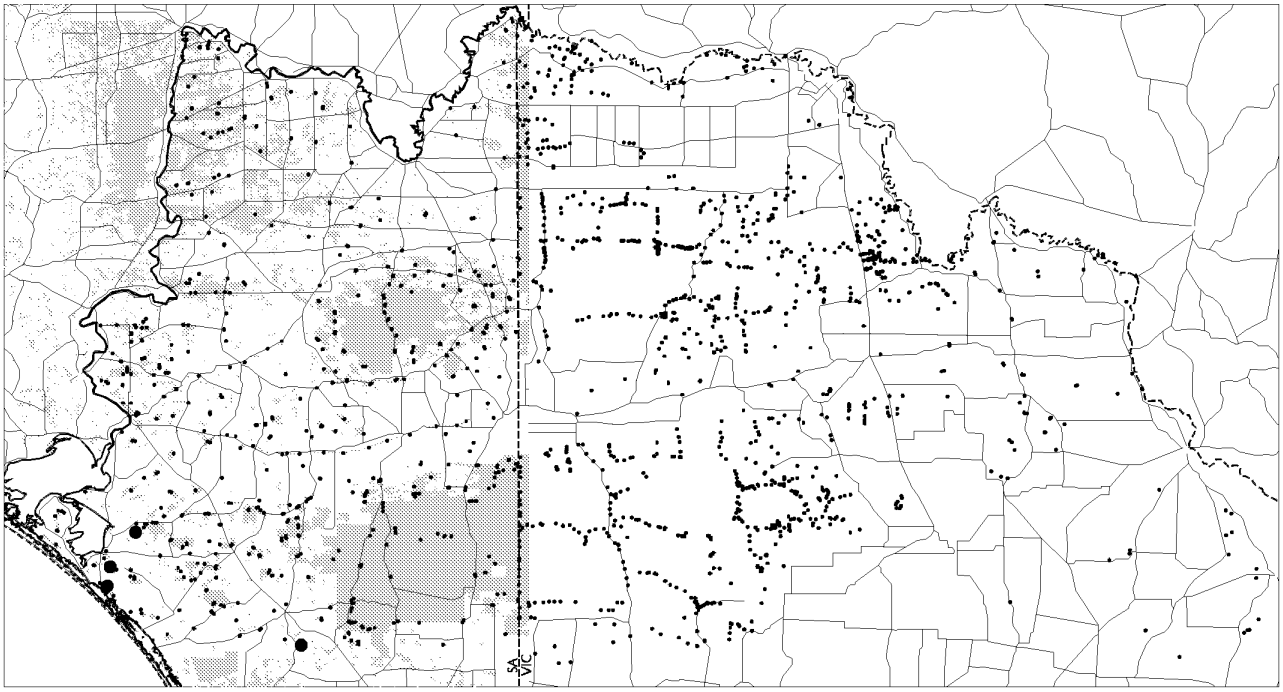
Quadrat(s):
NA00101, TT00501

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Melaleuca halmaturorum	0	0	0	1	1	0	1.00	SA/VIC
Sarcocornia quinqueflora	1	0	0	1	0	0	1.00	SA/VIC
Frankenia pauciflora var.	0	0	1	0	0	0	0.50	SA ONLY
Halosarcia pergranulata ssp.	0	0	1	0	0	0	0.50	SA/VIC
Hemichroa pentandra	0	0	1	0	0	0	0.50	SA ONLY
Leptocarpus brownii	1	0	0	0	0	0	0.50	SA ONLY
Maireana oppositifolia	0	1	0	0	0	0	0.50	SA/VIC
Samolus repens	1	0	0	0	0	0	0.50	SA ONLY
Tetragonia implexicoma	0	0	1	0	0	0	0.50	SA ONLY
Tetraria capillaris	0	1	0	0	0	0	0.50	SA ONLY
Threlkeldia diffusa	0	0	1	0	0	0	0.50	SA/VIC

Figure 53.
Melaleuca halmaturorum **Tall open shrubland at quadrat NA00101.**

Floristic Group 57. *Melaleuca brevifolia* Tall open shrubland.

4 members SA ONLY



Vegetation mapping details:
Vegetation mapping groups: 30.01
Hidden within mapping groups: 21.03

Dominant Overstorey Species:
Melaleuca brevifolia

Dominant Understorey Species:
Gahnia filum
Lawrencia squamata
Leptocarpus brownii
Samolus repens
Tetraria capillaris

Structural Data:
Typical canopy cover: n/a
Av. height (metres): 2.6

Environmental Parameters:
Typical landforms: n/a
Calcrete type: n/a
Range of soils: n/a
Average rainfall (mm): n/a

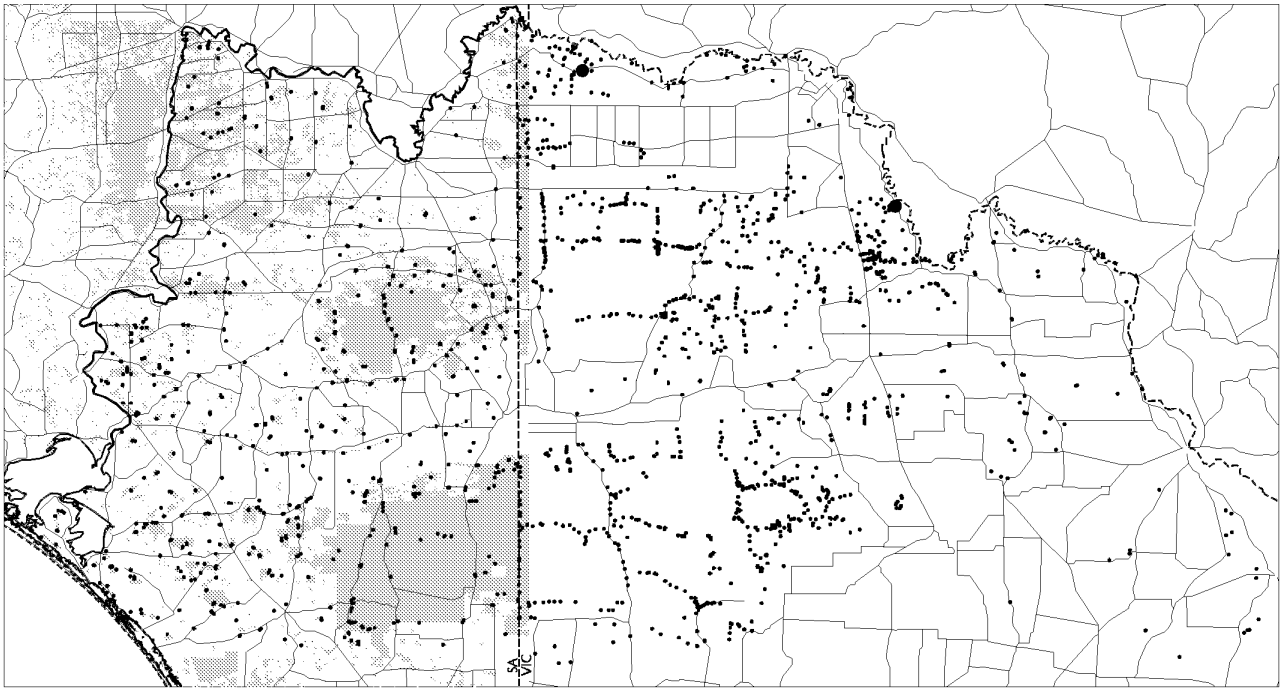
Quadrat(s):
MG01201, MG00401, MG00201, CB00601

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Melaleuca brevifolia	0	0	0	2	2	0	1.00	SA/VIC
Gahnia filum	0	0	1	2	0	0	0.75	SA ONLY
Lawrencia squamata	0	2	1	0	0	0	0.75	SA/VIC
Leptocarpus brownii	0	1	0	2	0	0	0.75	SA ONLY
Samolus repens	0	3	0	0	0	0	0.75	SA ONLY
Tetraria capillaris	1	0	1	1	0	0	0.75	SA ONLY
Lepidosperma congestum/laterale/viscidum	1	1	0	0	0	0	0.50	SA/VIC
Melaleuca lanceolata	0	1	0	1	0	0	0.50	SA/VIC
Sarcocornia quinqueflora	0	0	2	0	0	0	0.50	SA/VIC
Threlkeldia diffusa	1	0	1	0	0	0	0.50	SA/VIC

Figure 54.
***Melaleuca brevifolia* Tall open shrubland at quadrat MG00201.**

Floristic Group 58. Characteristic species: *Chenopodium nitrariaceum*.

2 members VIC ONLY



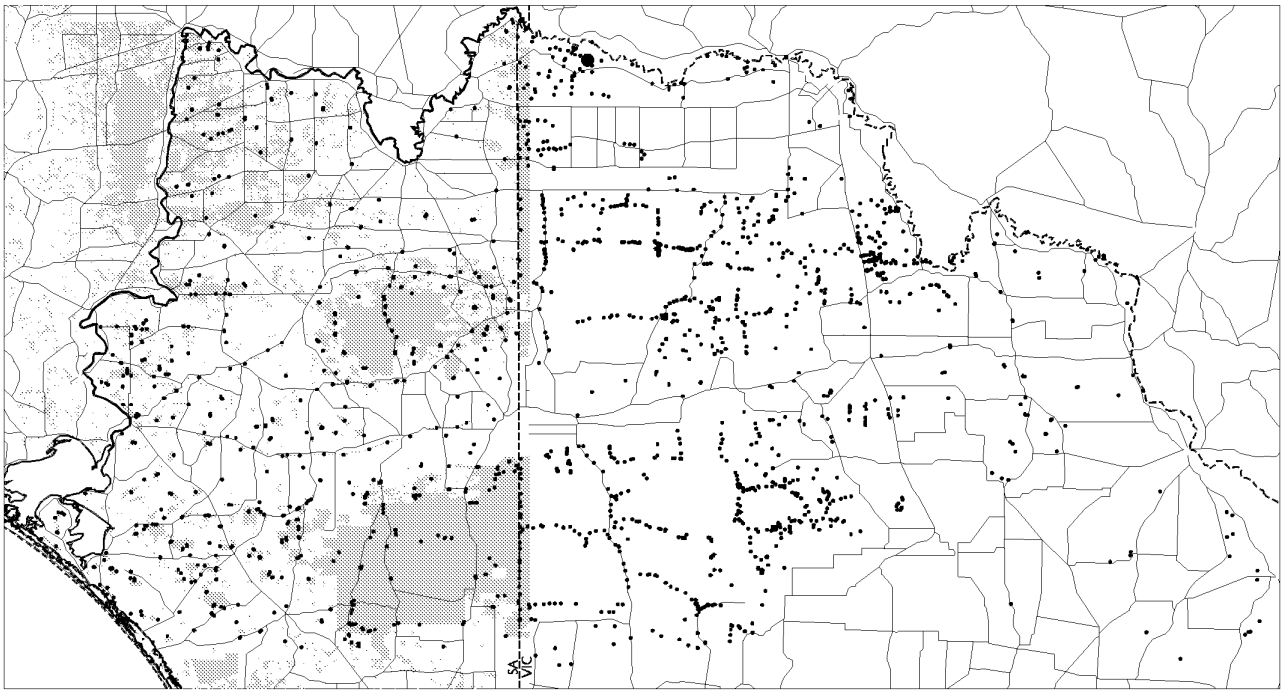
Characteristic Species:
Chenopodium nitrariaceum

Quadrat(s):
A15079, A16645

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
Chenopodium nitrariaceum	0	2	0	0	0	0	1.00	VIC ONLY
Amphibromus nervosus	1	0	0	0	0	0	0.50	VIC ONLY
Asperula gemella	0	1	0	0	0	0	0.50	VIC ONLY
Atriplex pumilio	1	0	0	0	0	0	0.50	SA/VIC
Centipeda cunninghamii	1	0	0	0	0	0	0.50	SA/VIC
**Cynodon dactylon*	1	0	0	0	0	0	0.50	VIC ONLY
Danthonia sp.	1	0	0	0	0	0	0.50	SA/VIC
Eleocharis pallens	0	1	0	0	0	0	0.50	VIC ONLY
Enchylaena tomentosa var. *tomentosa*	1	0	0	0	0	0	0.50	SA/VIC
Eragrostis australasica	0	0	0	0	1	0	0.50	VIC ONLY
Maireana pentagona	0	0	1	0	0	0	0.50	VIC ONLY
Marsilea hirsuta	1	0	0	0	0	0	0.50	VIC ONLY
Sclerolaena brachyptera	1	0	0	0	0	0	0.50	VIC ONLY

Floristic Group 59. Characteristicstic species: ***Atriplex limbata, Danthonia sp., Maireana pyramidata, Osteocarpum acropterum* var.*, Sclerolaena brachyptera, Sclerolaena decurrens, Sclerolaena divaricata*.**

1 members VIC ONLY



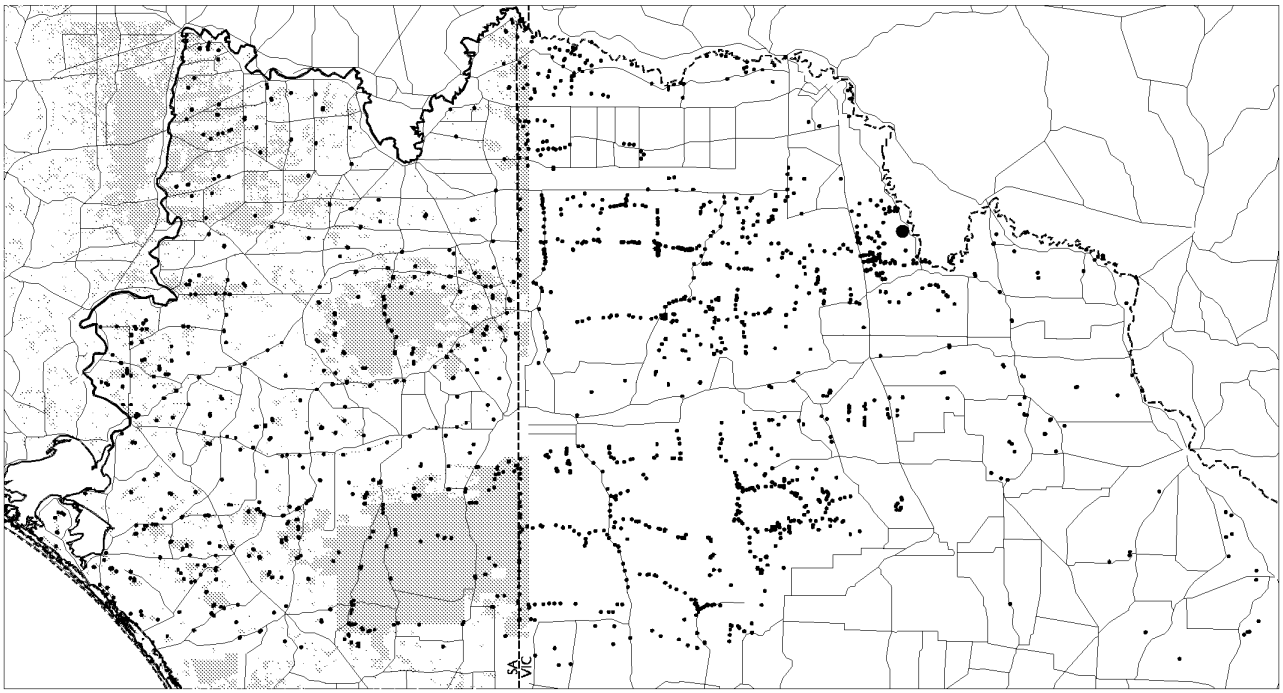
Characteristicistic Species:
Atriplex limbata
Danthonia sp.
Maireana pyramidata
Sclerolaena decurrens
Sclerolaena divaricata
Sclerolaena brachyptera
Osteocarpum acropterum var.

Quadrat(s):
A16521

Species	**Cover / Abundance**							
	T	**1**	**2**	**3**	**4**	**5**	**Prop. Occur.**	**State located**
Atriplex limbata	1	0	0	0	0	0	1.00	VIC ONLY
Danthonia sp.	1	0	0	0	0	0	1.00	SA/VIC
Maireana pyramidata	1	0	0	0	0	0	1.00	SA/VIC
Osteocarpum acropterum var.	1	0	0	0	0	0	1.00	SA/VIC
Sclerolaena brachyptera	1	0	0	0	0	0	1.00	VIC ONLY
Sclerolaena decurrens	0	1	0	0	0	0	1.00	VIC ONLY
Sclerolaena divaricata	1	0	0	0	0	0	1.00	VIC ONLY

Floristic Group 60. Characteristic species: **Alopecurus geniculatus, Eucalyptus camaldulensis* var. *camaldulensis, Olearia pimeleoides* ssp. *pimeleoides, Senecio quadridentatus, Vittadinia dissecta* var. *hirta*

1 members VIC ONLY



Characteristic Species:
**Alopecurus geniculatus*
Eucalyptus camaldulensis var. *camaldulensis*
Vittadinia dissecta var. *hirta*
Senecio quadridentatus
Olearia pimeleoides ssp. *pimeleoides*

Quadrat(s):
A16155

Species	Cover / Abundance							
	T	1	2	3	4	5	Prop. Occur.	State located
**Alopecurus geniculatus*	0	1	0	0	0	0	1.00	VIC ONLY
Eucalyptus camaldulensis var. *camaldulensis*	1	0	0	0	0	0	1.00	SA/VIC
Olearia pimeleoides ssp. *pimeleoides*	1	0	0	0	0	0	1.00	SA/VIC
Senecio quadridentatus	1	0	0	0	0	0	1.00	SA/VIC
Vittadinia dissecta var. *hirta*	1	0	0	0	0	0	1.00	SA/VIC

VEGETATION MAPPING

by S. Kinnear[1] J. Gillen[2], S. Carruthers[1] and F. Smith[1]

MAJOR MAPPING UNITS

The PATN analysis produced 35 unique floristic groups within South Australia. The 25 floristic groups identified as unique to the Victorian mallee have been described and mapped in full by Land Conservation Council (1987). The PATN analysis determined differences and similarities between the species compositions of different sites. This provided an objective basis for describing the vegetation floristically. Using these groups in conjunction with aerial photography interpretation and on ground surveying, 37 regional floristic plant communities were recognised. These are listed in Table 9 and shown on the regional floristic map in the back of this report. The comparison with the PATN groups is shown in Table 10.

Not every PATN group was defined as a mappable plant community. This was due to under representation of sites resulting in mis-classification of some groups in the region. The areas containing these sites were mapped within another more appropriate plant community. Additional plant communities were mapped that were not identified from the analysis. This was due to the lack of representative sites within the study region to cover all the communities known to be present.

It is worth noting that despite extensive sampling, it is possible that some rare community types have been missed. In addition to this, the vegetation rarely changes as sharply as the boundary lines suggest. The distinction between some floristic groups is often blurred by gradual transition from one community type to another.

Table 9.
South Australian Murray Mallee Regional Floristic Mapping Communities and Area Estimates

Gp	Regional Floristic Description	Total Area (ha)	Area Protected (ha)	% Gp Protected
	WOODLANDS			
1	*Allocasuarina verticillata, Eucalyptus leucoxylon* ssp. Low woodland	107	0	0.0
2	*Casuarina pauper* Low woodland	1,287	63	4.9
3	*Eucalyptus arenacea* Low woodland	3,081	852	27.7
4	*Eucalyptus fasciculosa, E. leucoxylon* Low woodland	32	10	31.2
5	*Eucalyptus fasciculosa, Xanthorrhoea caespitosa* Low woodland	7	0	0.0
6	*Eucalyptus largiflorens* Low woodland	18	0	0.0
7	*Eucalyptus leucoxylon* ssp. Low woodland	1,250	412	33.0
8	*Callitris preissii* Low open woodland	1,208	68	5.6
9	*Eucalyptus porosa* Low open woodland	2,028	82	4.0
	MALLEE			
10	*Eucalyptus diversifolia* Mallee	42,113	25,952	61.6
11	*Eucalyptus dumosa, +/- E. leptophylla* Mallee	1,816	580	31.9
12	*Eucalyptus cyanophylla, +/- E. socialis* Open mallee	318	72	22.6
13	*Eucalyptus diversifolia, Olearia axillaris* Open mallee	470	388	82.6
14	Euca*lyptus leptophylla, E. socialis* Open mallee	19,798	8,280	41.8
15	*Eucalyptus leptophylla, Melaleuca lanceolata* Open mallee	651	361	55.5
16	*Eucalyptus rugosa* Open mallee	174	71	40.8
17	*Eucalyptus calycogona, E. dumosa* Very open mallee	11,874	9,595	80.8
18	*Eucalyptus gracilis, E. oleosa* Very open mallee	92,481	26,172	28.3
19	*Eucalyptus incrassata* Open low mallee	306,937	247,421	80.6
	SHRUBLANDS			
20	*Leucopogon parviflorus, Acacia longifolia var. sophorae, +/- Olearia axillaris, +/- Myoporum insulare* Tall shrubland	3,693	3,634	99.9
21	*+/-Banksia ornata, +/- Allocasuarina pusilla , Leptospermum coriaceum* Tall open shrubland	133,693	127,683	95.5
22	*Callitris verrucosa* Tall open shrubland	670	395	59.0
23	*Melaleuca acuminata, M. lanceolata, +/- Eucalyptus socialis, +/- E. leptophylla* Tall open shrubland	10,170	3,971	39.0
24	*Acacia nyssophylla* Tall very open shrubland	2,400	169	7.0
25	*Callitris canescens*, Eucalyptus dumosa, E. porosa Tall very open shrubland	419	0	0.0
26	*Xanthorrhoea caespitosa/semiplana, +/- Banksia marginata* Tall very open shrubland	728	458	62.9

[1] Geographic Analysis and Research Unit, Planning SA, Department for Transport, Urban Planning and the Arts, GPO Box 1815, ADELAIDE SA 5001
[2] Environment Australia, PO Box 119 YULARA NT 0872.

Gp	Regional Floristic Description	Total Area (ha)	Area Protected (ha)	% Gp Protected
	CHENOPOD SHRUBLANDS			
27	*Enchylaena tomentosa* var. *tomentosa* Low open shrubland	271	3	1.1
28	*Maireana sedifolia* or *M. pyramidata* Very open shrubland	10,114	0	0.0
	SHRUBLANDS OF WET AREAS			
29	*Melaleuca halmaturorum* Tall open shrubland	57	2	3.5
30	*Melaleuca brevifolia* Tall open shrubland	2,991	25	0.8
31	*Muehlenbeckia florulenta* Shrubland	242	15	6.2
32	*Sarcocornia quinqueflora*, +/- Suaeda australis, +/- *Halosarcia* sp. Low shrubland	798	112	14.0
33	*Halosarcia* sp. Low very open shrubland	4,455	0	0.0
	GRASSLANDS			
34	*Spinifex sericeus, Ozothamnus turbinatus, Isolepis nodosa* Tussock grassland	921	921	100.0
35	*Stipa* sp. Open tussock grassland	49,893	1,079	2.2
	SEDGELANDS			
36	*Gahnia filum, Samolus repens* Sedgeland	182	176	96.7
37	*Lomandra effusa* Open sedgeland	1,616	0	0.0

Note: Protected areas include NPWSA Reserves (December 1998) and Heritage Agreements (January 1998).

Source: Murray Mallee Floristic Vegetation Mapping (GIS), Environmental Database of SA , (Planning SA). Refer to Murray Mallee Floristic Vegetation Map for mapping details.

Table 10.
Comparison of floristic plant community mapping groups with PATN derived groups.

Vegetation Mapping Groups ***()'s indcate mapping group number***	***PATN group*** ***()'s indcate PATN group number***
Allocasuarina verticillata, Eucalyptus leucoxylon ssp. Low woodland (1)	*Allocasuarina verticillata, Eucalyptus leucoxylon* ssp. Low open woodland (51)
Casuarina pauper Low woodland (2)	*Casuarina pauper* Low woodland (6)
Eucalyptus arenacea Low woodland (3)	*Eucalyptus arenacea* Low woodland (48)
Eucalyptus fasciculosa, E. leucoxylon Low woodland (4)	No equivalent
Eucalyptus fasciculosa, Xanthorrhoea caespitosa Low woodland (5)	No equivalent
Eucalyptus largiflorens Low woodland (6)	No equivalent
Eucalyptus leucoxylon ssp. Low woodland (7)	*Eucalyptus leucoxylon* ssp. Low woodland (49) *Eucalyptus leucoxylon* ssp. Low open woodland (50)
Callitris preissii Low open woodland (8)	*Callitris preissii* Low open woodland (1)
Eucalyptus porosa Low open woodland (9)	*Eucalyptus porosa* Low open woodland (11)
Eucalyptus diversifolia Mallee (10)	*Eucalyptus diversifolia* Open mallee (46)
Eucalyptus dumosa, +/- E. leptophylla Mallee (11)	*Eucalyptus dumosa, +/- E.leptophylla* Mallee (34)
Eucalyptus cyanophylla, +/- E. socialis Open mallee (12)	*Eucalyptus cyanophylla, +/- E.socialis* Open mallee (36)
Eucalyptus diversifolia, Olearia axillaris Open mallee (13)	*Eucalyptus diversifolia, Olearia axillaris* Very open mallee (47)
Eucalyptus leptophylla, E. socialis Open mallee (14)	*Eucalyptus leptophylla, E.socialis* Open mallee (33)
Eucalyptus leptophylla, Melaleuca lanceolata Open mallee (15)	*Eucalyptus leptophylla, +/- Melaleuca lanceolata* Open mallee (35)
Eucalyptus rugosa Open mallee (16)	*Eucalyptus rugosa, +/- Eucalyptus leptophylla* Open mallee (55)
Eucalyptus calycogona, E. dumosa Very open mallee (17)	*Eucalyptus calycogona E. dumosa* Very open mallee (37)
Eucalyptus gracilis, E. oleosa Very open mallee (18)	*Eucalyptus gracilis, E.oleosa* Very open mallee (29) *Eucalyptus oleosa, Melaleuca lanceolata, Acacia halliana/microcarpa, Dodonaea hexandra* Very open low mallee (30)
Eucalyptus incrassata Open low mallee (19)	*Eucalyptus incrassata, Leptospermum coriaceum* Very open mallee (40)

Vegetation Mapping Groups ***()'s indcate mapping group number***	***PATN group*** ***()'s indcate PATN group number***
Leucopogon parviflorus, Acacia longifolia var. *sophorae*, +/- *Olearia axillaris*, +/- *Myoporum insulare* Tall shrubland (20)	No equivalent
+/- *Banksia ornata*, +/- *Allocasuarina pusilla Leptospermum coriaceum* Tall open shrubland (21)	*Allocasuarina pusilla, Leptospermum coriaceum*, +/- *Banksia ornata* Tall open shrubland(43)
Callitris verrucosa Tall open shrubland (22)	*Callitris verrucosa* Tall open shrubland (45)
Melaleuca acuminata, M. lanceolata, +/- *Eucalyptus socialis*, +/- *E.leptophylla* Tall open shrubland (23)	*Melaleuca acuminata, M. lanceolata* +/- *Eucalyptus socialis* +/- *E. leptophylla* Tall open shrubland (31)
Acacia nyssophylla Tall very open shrubland (24) *Callitris canescens, Eucalyptus dumosa, E. porosa* Tall very open shrubland (25)	*Acacia nyssophylla* Tall very open shrubland (19) *Callitris canescens, Eucalyptus dumosa, Eucalyptus porosa* Tall very open shrubland (32)
Xanthorrhoea caespitosa ssp. *semiplana*, +/- *Banksia marginata* Tall very open shrubland (26)	*Xanthorrhoea caespitosa/semiplana*,+/- *Banksia marginata* Tall open shrubland (44)
Enchylaena tomentosa var. *tomentosa* Low open shrubland (27)	*Enchylaena tomentosa* var. *tomentosa* Open shrubland (4)
Maireana sedifolia or *M.pyramidata* Very open shrubland (28)	*Maireana sedifolia* Open shrubland (21) *Maireana pyramidata* Low very open shrubland (10)
Melaleuca halmaturorum Tall open shrubland (29)	*Melaleuca halmaturorum* Tall open shrubland (56)
Melaleuca brevifolia Tall open shrubland (30)	*Melaleuca brevifolia* Tall open shrubland (57)
Muehlenbeckia florulenta Shrubland (31)	No equivalent
Sarcocornia quinqueflora, +/- *Suaeda australis*, +/- *Halosarcia* sp. Low shrubland (32)	No equivalent
Halosarcia sp. Low very open shrubland (33)	*Halosarcia* sp. Low very open shrubland (52)
Spinifex sericeus, Ozothamnus turbinatus, Isolepis nodosa Tussock grassland (34)	No equivalent
Stipa sp. Open tussock grassland (35)	*Stipa* sp. Open (tussock) grassland (2) *Stipa* sp. Open (tussock) grassland (3)
Gahnia filum, Samolus repens Sedgeland (36)	No equivalent
Lomandra effusa Open sedgeland (37)	*Lepidosperma congestum/laterale/viscidum, Lomandra effusa, Lepidosperma carphoides, Stipa* sp. Open (tussock) grassland (20)
No equivalent	*Alectryon oleifolius* ssp. *canescens* Tall very open shrubland (8)
No equivalent	*Eucalyptus arenacea* Low woodland (48)
No equivalent	*Eucalyptus brachycalyx* Open low mallee (38)

DETAILED FLORISTIC DESCRIPTIONS

The regional plant communities have been divided further by the presence of mosaic plant communities detected during the aerial photograph interpretation stage of the mapping.

As native vegetation does not occur as discrete discernible units that can be mapped, but may be intergrading or occur in complex mosaic patterns, several groups may occur in a delineated area or block. Where distinct communities can be recognised they have been delineated, however where the pattern is more complex, then several floristic groups, in order of dominance, may have been indicated in the original 1:40,000 scale mapping. Up to 5 categories may have been recognised in a mosaic within a given area, however, at any given location some of these may or may not be present.

The areas where the broader plant communities described also contain mosaic plant communities have been identified in the mapping and the detailed list is provided in Table 11. For each of the 37 regional floristic mapping groups identified there will be one or more sub-groups which indicate the presence of understorey species and mosaic communities occurring within the broad community identified.

For example Group 2 *Casuarina pauper* Low woodland contains 3 sub groups within it that have been identified and mapped: These sub-groups can only be displayed clearly on small scale maps such as 1:50,000 scale. The regional maps are generally at a 1:250,000 scale and show the broad floristic groups but not the sub-groups within them.

Casuarina pauper **Low woodland**

2.01 *Casuarina pauper* Low woodland over *Stipa* sp., *Sclerolaena diacantha/uniflora, Enchylaena tomentosa* var. *tomentosa, Senna artemisioides* ssp.

2.02 *Casuarina pauper* Low woodland Mosaiced with *Eucalyptus gracilis, E. oleosa* Very open mallee

2.03 *Casuarina pauper* Low woodland Mosaiced with *Eucalyptus leptophylla, E. socialis* Open – Very open mallee

Floristic vegetation 1:50,000 GIS based maps for the Murray Mallee study area are available on request from Planning SA.

Table 11.
Detailed Floristic Mapping Groups for the Murray Mallee Region

Regional Floristic Description	Gp	Detailed Floristic Description	Total Area (ha)	Area Protected (ha)	% Gp Protected
WOODLANDS					
***Allocasuarina verticillata, Eucalyptus leucoxylon* ssp. Low woodland**	1.01	*Allocasuarina verticillata, Eucalyptus leucoxylon* ssp. Low woodland - Low open woodland over *Thomasia petalocalyx, Hibbertia sericea* var., *Acacia pycnantha, Dianella revoluta* var.	107	0	0.0
***Casuarina pauper* Low woodland**	2.01	*Casuarina pauper* Low woodland over *Stipa* sp., *Sclerolaena diacantha/uniflora, Enchylaena tomentosa* var. *tomentosa, Senna artemisioides* ssp.	678	57	8.4
	2.02	*Casuarina pauper* Low woodland Mosaiced with *Eucalyptus gracilis, E. oleosa* Very open mallee	578	0	0.0
	2.03	*Casuarina pauper* Low woodland mosaiced with *Eucalyptus leptophylla, E. socialis* Open – Very open mallee	31	6	19.4
***Eucalyptus arenacea* Low woodland**	3.01	*Eucalyptus arenacea* Low woodland - Low open woodland over *Baeckea behrii, Astroloma conostephioides, Astroloma humifusum, Baeckea crassifolia, Calytrix alpestris, C. tetragona*	1,994	600	30.1
	3.02	*Eucalyptus arenacea* Low woodland - Low open woodland mosaiced with *E. incrassata* Open low mallee	55	0	0.0
	3.03	*Eucalyptus arenacea* Low woodland - Low open woodland *E. incrassata* Open low mallee and *Eucalyptus leptophylla, E. socialis* Open – Very open mallee	573	253	44.2
	3.04	*Eucalyptus arenacea* Low woodland - Low open woodland mosaiced with *E. incrassata* open Low mallee and *Allocasuarina pusilla, Leptospermum coriaceum, +/-Banksia ornata* Tall open shrubland - Tall very open shrubland	459	0	0.0
***Eucalyptus fasciculosa, E. leucoxylon* Low woodland**	4.01	*Eucalyptus fasciculosa, E. leucoxylon* Low woodland over *Kunzea pomifera*	29	7	24.1
	4.02	*Eucalyptus fasciculosa, E. leucoxylon* Low woodland mosaiced with *E. diversifolia* Mallee - Very open mallee	3	3	100.0
***Eucalyptus fasciculosa, Xanthorrhoea caespitosa* Low woodland**	5.01	*Eucalyptus fasciculosa, Xanthorrhoea caespitosa* Low woodland	7	0	0.0
***Eucalyptus largiflorens* Low woodland**	6.01	*Eucalyptus largiflorens* Low - Low open woodland over *Stipa sp., Einadia nutans* ssp., *Enchylaena tomentosa* var	18	0	0.0
***Eucalyptus leucoxylon* ssp. Low woodland**	7.01	*Eucalyptus leucoxylon* ssp. Low woodland over *Lepidosperma congestum/laterale/viscidum, Xanthorrhoea caespitosa/semiplana, Hibbertia riparia, Kunzea pomifera*	1,018	342	33.6
	7.02	*Eucalyptus leucoxylon* ssp. Low woodland mosaiced with *Allocasuarina pusilla, Leptospermum coriaceum, +/-Banksia ornata* Tall open - Tall very open shrubland	15	0	0.0
	7.03	*Eucalyptus leucoxylon* ssp. Low woodland - Low open woodland over *Stipa* sp., *Danthonia* sp., *Vittadinia dissecta* var. *hirta, Lepidosperma congestum/laterale/viscidum*	217	70	32.3
***Callitris preissii* Low open woodland**	8.01	*Callitris preissii* Low open woodland Over *Stipa* sp., *Enchylaena tomentosa* var. *tomentosa*	1,208	68	5.6
***Eucalyptus porosa* Low open woodland**	9.01	*Eucalyptus porosa* Low open woodland over *Stipa* sp., *Lomandra effusa, Helichrysum leucopsideum, Senecio lautus, Clematis microphylla, Danthonia* sp.	1,858	82	4.4
	9.02	*Eucalyptus porosa* Low open woodland mosaiced with *Stipa sp., Enchylaena tomentosa* var. *tomentosa* Tussock grassland	170	0	0.0

Regional Floristic Description	Gp	Detailed Floristic Description	Total Area (ha)	Area Protected (ha)	% Gp Protected
MALLEE					
***Eucalyptus diversifolia* Mallee**	10.01	*Eucalyptus diversifolia* Mallee - Very open mallee over *Lepidosperma congestum/laterale/viscidum, Hibbertia riparia, Xanthorrhoea caespitosa/semiplana*	36,114	23,041	63.8
	10.02	*Eucalyptus diversifolia* Mallee - Very open mallee mosaiced with *E. incrassata* Open low mallee	5,111	2,648	51.8
	10.03	Eucalyptus diversifolia Mallee - Very open mallee mosaiced with *Allocasuarina pusilla, Leptospermum coriaceum, +/- Banksia ornata* Tall open - Very tall open shrubland	78	0	0.0
	10.04	*Eucalyptus diversifolia* Mallee - Very open mallee mosaiced with *Allocasuarina pusilla, Leptospermum coriaceum, +/- Banksia ornata* Tall open - Very tall open shrubland and *E. incrassata* Open low mallee	369	259	70.2
	10.05	*Eucalyptus diversifolia* Mallee - Very open mallee mosaiced with the coastal *E. diversifolia* community	418	4	1.0
	10.06	*Eucalyptus diversifolia* Mallee - Very open mallee mosaiced with *Allocasuarina verticillata, Eucalyptus leucoxylon* ssp. Low - Low open woodland	24	0	0.0
***Eucalyptus dumosa, +/- E.leptophylla* Mallee**	11.01	*Eucalyptus dumosa, +/- E.leptophylla* Mallee over *Stipa* sp., *Danthonia* sp., *Lepidosperma congestum/laterale/viscidum*	1,124	450	40.0
	11.02	*Eucalyptus dumosa, +/- E.leptophylla* Mallee with small areas of *E. gracilis, E. oleosa* Very open mallee	145	0	0.0
	11.03	*Eucalyptus dumosa, +/- E.leptophylla* Mallee mosaiced with *Melaleuca acuminata, M. lanceolata*, and/or *E. socialis, E. leptophylla* Tall open - Tall very open shrubland	196	0	0.0
	11.04	*Eucalyptus dumosa, +/- E.leptophylla* Mallee mosaiced with *E. leptophylla, E. socialis* Open - Very open mallee	108	3	2.8
	11.05	*Eucalyptus dumosa, +/- E.leptophylla* Mallee mosaiced with *E. calycogona, E. dumosa* Very open mallee and *E. gracilis, E. oleosa* Very open mallee	7	0	0.0
	11.06	*Eucalyptus dumosa, +/- E.leptophylla* Mallee mosaiced with *E. incrassata* Open low mallee	236	127	53.8
***Eucalyptus cyanophylla, +/- E. socialis* Open mallee**	12.01	*Eucalyptus cyanophylla, +/- E. socialis* Open mallee over *Sclerolaena diacantha/uniflora, Triodia irritans* var.	187	19	10.2
	12.02	*Eucalyptus cyanophylla, +/- E. socialis* Open mallee mosaiced with *E. gracilis, E. oleosa* Very open mallee	40	0	0.0
	12.03	*Eucalyptus cyanophylla, +/- E. socialis* Open mallee mosaiced with *E. leptophylla, E. socialis* Open - Very open mallee	65	54	83.1
	12.04	*Eucalyptus cyanophylla, +/- E. socialis* Open mallee mosaiced with *E. incrassata, Leptospermum coriaceum* Open low mallee	28	0	0.0
***Eucalyptus diversifolia, Olearia axillaris* Open mallee**	13.01	*Eucalyptus diversifolia, Olearia axillaris* Open mallee – Very open mallee over *Dianella revoluta* var., *Isolepis nodosa, Muehlenbeckia gunnii, Tetragona implexicoma*	470	388	82.6
*Euca***lyptus leptophylla, E. socialis* Open mallee**	14.01	*Eucalyptus leptophylla, E. socialis* Open mallee - Very open mallee over *Triodia irritans* var., *Stipa* sp.	16,110	7,632	47.4
	14.02	*Eucalyptus leptophylla, E. socialis* Open mallee - Very open mallee with small areas of *E. gracilis, E. oleosa* Very open mallee	481	0	0.0
	14.03	*Eucalyptus leptophylla, E. socialis* Open mallee - Very open mallee mosaiced with *Melaleuca acuminata, M. lanceolata*, and/or *E. socialis, E. leptophylla* Tall open - Tall very open shrubland	115	0	0.0
	14.04	*Eucalyptus leptophylla, E. socialis* Open mallee - Very open mallee interspersed with *Melaleuca acuminata, M. lanceolata* and/or *E. socialis, E. leptophylla* Tall open - Tall very open shrubland	173	0	0.0

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	14.05	*Eucalyptus leptophylla, E. socialis* Open mallee - Very open mallee mosaiced with *E. dumosa, +/- E. leptophylla* Mallee	1,559	0	0.0
	14.06	*Eucalyptus leptophylla, E. socialis* Open mallee - Very open mallee mosaiced with *E. dumosa, +/- E. leptophylla* Mallee and *E. incrassata* Open low mallee	177	138	78.0
	14.07	*Eucalyptus leptophylla, E. socialis* Open mallee - Very open mallee mosaiced with areas of *E. cyanophylla +/- E. socialis* Open mallee	529	221	41.8
	14.08	*Eucalyptus leptophylla, E. socialis* Open mallee - Very open mallee with areas of *E. calycogona, E. dumosa* Very open mallee	319	272	85.3
	14.09	*Eucalyptus leptophylla, E. socialis* Open mallee - Very open mallee mosaiced with *E. incrassata* Open low mallee	194	0	0.0
	14.10	*Eucalyptus leptophylla, E. socialis* Open mallee - Very open mallee mosaiced with a Tall open shrubland of *Allocasuarina pusilla, Leptospermum coriaceum, +/-Banksia ornata*	141	17	12.1
***Eucalyptus leptophylla, Melaleuca lanceolata* Open mallee**	15.01	*Eucalyptus leptophylla, Melaleuca lanceolata* Open mallee – Very open mallee over *Stipa* sp., *Lepidosperma congestum/laterale/viscidum*	651	361	55.5
***Eucalyptus rugosa* Open mallee**	16.01	*Eucalyptus rugosa* Open mallee over *Dianella revoluta* var., *Danthonia* sp., *E. leptophylla, Lasiopetalum baueri, Melaleuca lanceolata, Stipa* sp.	174	71	40.8
***Eucalyptus calycogona, E. dumosa* Very open mallee**	17.01	*Eucalyptus calycogona, E. dumosa* Very open mallee over *Stipa* sp., *Danthonia* sp.	11,456	9,507	83.0
	17.02	*Eucalyptus calycogona, E. dumosa* Very open mallee mosaiced with *E. gracilis, E. oleosa* Very open mallee	1	0	0.0
	17.03	*Eucalyptus calycogona, E. dumosa* Very open mallee mosaiced with *E. leptophylla, E. socialis* Open - Very open mallee	316	0	0.0
	17.04	*Eucalyptus calycogona, E. dumosa* Very open mallee mosaiced with *E. incrassata* Open low mallee	101	88	87.1
***Eucalyptus gracilis, E. oleosa* Very open mallee**	18.01	*Eucalyptus gracilis, E. oleosa* Very open mallee over *Sclerolaena diacantha/uniflora, Stipa* sp., *Maireana pentatropis, Zygophyllum apiculatum*	66,131	16,269	24.6
	18.02	*Eucalyptus gracilis, E. oleosa* Very open mallee mosaiced with *Callitris preissii* Low open woodland	47	0	0.0
	18.03	*Eucalyptus gracilis, E. oleosa* Very open mallee containing small open areas dominated by *Stipa* sp. Open tussock grassland	885	0	0.0
	18.04	*Eucalyptus gracilis, E. oleosa* Very open mallee mosaiced with *Casuarina pauper* Low woodland	73	0	0.0
	18.05	*Eucalyptus gracilis, E. oleosa* Very open mallee in which areas of *Maireana sedifolia* Very open shrubland occur sparsely	74	0	0.0
	18.06	*Eucalyptus gracilis, E. oleosa* Very open mallee mosaiced with a Tall open shrubland of *Melaleuca acuminata, M. lanceolata*, and/or *E. socialis, E. leptophylla* which occurs on small pockets of clay soil	879	247	28.1
	18.07	*Eucalyptus gracilis, E. oleosa* Very open mallee mosaiced with a Tall open shrubland of *Melaleuca acuminata, M. lanceolata* and/or *E. socialis, E. leptophylla* and areas of *E. porosa* Low open woodland	1,166	12	1.0
	18.08	*Eucalyptus gracilis, E. oleosa* Very open mallee forming a mosaic with an Open to Very open mallee community of *E. leptophylla, E. socialis* which occupies low sand rises separating extensive flats	12,432	4,488	36.1
	18.09	*Eucalyptus gracilis, E. oleosa* Very open mallee mosaiced with *E. leptophylla, E. socialis* Open to Very open mallee and *Callitris preissii* Low woodland	933	241	25.8

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	18.10	*Eucalyptus gracilis, E. oleosa* Very open mallee mosaiced with two Open mallee communities *E. leptophylla, E. socialis* and *E. cyanophylla, +/- E. socialis* which occur on dunal sands	479	390	81.4
	18.11	*Eucalyptus gracilis, E. oleosa* Very open mallee mosaiced with *E. leptophylla, E. socialis* Open mallee and *E. incrassata* Open low mallee occurring on dunal sands	113	36	31.9
	18.12	*Eucalyptus gracilis, E. oleosa* Very open mallee mosaiced with *E. dumosa, +/- E. leptophylla* Open Low mallee	8,910	4,489	50.4
	18.13	*Eucalyptus gracilis, E. oleosa* Very open mallee mosaiced with a number of mallee communities occurring on sandier soils dominated by the following species *E. dumosa, E. leptophylla* or *E. socialis*	7	0	0.0
	18.14	*Eucalyptus gracilis, E. oleosa* Very open mallee mosaiced with *E. cyanophylla, +/- E. socialis* Open mallee occurring on dunal sands	131	0	0.0
	18.15	*Eucalyptus gracilis, E. oleosa* Very open mallee with *E. incrassata* Open low mallee on sandy rises	222	0	0.0
***Eucalyptus incrassata* Open Low mallee**	19.01	*Eucalyptus incrassata, Leptospermum coriaceum* Open low mallee over *Hibbertia riparia, Baeckea behrii, Callitris verrucosa, Glischrocaryon behrii, Melaleuca uncinata*	27,227	11,811	43.4
	19.02	*Eucalyptus incrassata* Open low mallee mosaiced with *E. gracilis, E. oleosa* Very open mallee	20	0	0.0
	19.03	*Eucalyptus incrassata* Open low mallee mosaiced with *Melaleuca acuminata, M. lanceolata* and/or *E. socialis, E. leptophylla* Tall open - Tall very open shrubland	262	0	0.0
	19.04	*Eucalyptus incrassata* Open low mallee mosaiced with *Melaleuca acuminata, M. lanceolata* and/or *E. socialis, E. leptophylla* Tall open - Tall very open shrubland and *E. gracilis, E. oleosa* Very open mallee	3	0	0.0
	19.05	*Eucalyptus incrassata* Open low mallee mosaiced with *Melaleuca acuminata, M. lanceolata* and/or *E. socialis, E. leptophylla* and *E. dumosa, E. leptophylla* Mallee	9	0	0.0
	19.06	*Eucalyptus incrassata* Open low mallee mosaiced with *E. leptophylla, E. socialis* Open – Very open mallee	24,279	12,781	52.6
	19.07	*Eucalyptus incrassata* Open low mallee mosaiced with *E. leptophylla, E. socialis* Open to Very open mallee and *Melaleuca acuminata, M. lanceolata* and/or *E. socialis, E. leptophylla* Tall open shrubland - Tall very open shrubland	51	0	0.0
	19.08	*Eucalyptus incrassata* Open low mallee mosaiced with *Melaleuca acuminata, M. lanceolata* and/or *E. socialis, E. leptophylla* and *E. dumosa +/- E. leptophylla* Mallee	4,370	2,283	52.2
	19.09	*Eucalyptus incrassata* Open low mallee mosaiced with *E. leptophylla, E. socialis* Open - Very open mallee and *E. dumosa, +/- E. leptophylla* Mallee	14,969	8,370	55.9
	19.10	Billiatt mapping unit - extensive fire scars prevented photo-interpretation. Mallee communities dominated by *E. incrassata, E dumosa, E. socialis* and *E. leptophylla* are prominent on sandy soils	3	3	100.0
	19.11	*Eucalyptus incrassata* Open low mallee mosaiced with *E. leptophylla, E. socialis* Open - Very open mallee and *E. leptophylla, Melaleuca lanceolata* Open - Very open mallee	279	69	24.7
	19.12	*Eucalyptus incrassata* Open low mallee mosaiced with *Eucalyptus dumosa, +/- E. leptophylla* Mallee	853	0	0.0
	19.13	*Eucalyptus incrassata* Open low mallee mosaiced with *E. leptophylla, Melaleuca lanceolata* Open - Very open mallee	234	0	0.0

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	19.14	*Eucalyptus incrassata* Open low mallee mosaiced with *E. calycogona, E. dumosa* Very open mallee	101	0	0.0
	19.15	*Eucalyptus incrassata* Open low mallee mosaiced with *Allocasuarina pusilla, Leptospermum coriaceum, +/-Banksia ornata* Tall open shrubland to Tall very open shrubland	145,556	136,771	94.0
	19.16	*Eucalyptus incrassata* Open low mallee mosaiced with *Allocasuarina pusilla, Leptospermum coriaceum, +/-Banksia ornata* Tall open – Tall very open shrubland and *E. diversifolia* Mallee	747	0	0.0
	19.17	*Eucalyptus incrassata* Open low mallee mosaiced with *Callitris verrucosa* Tall open shrubland	40	0	0.0
	19.18	*Eucalyptus incrassata* Open low mallee mosaiced with *Callitris verrucosa* Tall open shrubland and *E. leptophylla, E. socialis* Open – Very open mallee	643	441	68.6
	19.19	*Eucalyptus incrassata* Open low mallee mosaiced with *Callitris verrucosa* Tall open shrubland and Mallee communities dominated by *E. leptophylla, E. socialis* and *E. dumosa*	81,400	71,265	87.5
	19.20	*Eucalyptus incrassata* Open low mallee mosaiced with *E. diversifolia* mallee - Very open mallee	5,864	3,627	61.9
	19.21	*Eucalyptus incrassata* Open low mallee mosaiced with *E. arenacea* Low – Low open woodland	27	0	0.0
SHRUBLANDS					
***Leucopogon parviflorus, Acacia longifolia var. sophorae, +/- Olearia axillaris, +/- Myoporum insulare* Tall shrubland**	20.01	*Leucopogon parviflorus, Acacia longifolia var. sophorae, Olearia axillaris +/- Myoporum insulare* Tall shrubland	3,785	3,780	99.9
	20.02	*Myoporum insulare, Acacia longifolia var. sophorae, Leucopogon parviflorus* Tall shrubland	323	323	100
***+/-Banksia ornata, +/- Allocasuarina pusilla , Leptospermum coriaceum* Tall open shrubland**	21.01	*Allocasuarina pusilla, Leptospermum coriaceum, +/-Banksia ornata* Tall open shrubland - Tall very open shrubland over *Hibbertia riparia, Lepidosperma congestum/laterale/viscidum*	129,472	125,219	96.7
	21.02	*Allocasuarina pusilla, Leptospermum coriaceum, +/-Banksia ornata* Tall open shrubland - Tall very open shrubland mosaiced with *Eucalyptus incrassata* Open low mallee	3,283	2,428	74.0
	21.03	*Allocasuarina pusilla, Leptospermum coriaceum, +/-Banksia ornata* Tall open shrubland - Tall very open shrubland mosaiced with *Eucalyptus diversifolia* Mallee - Very open mallee	907	36	4.0
	21.04	*Allocasuarina pusilla, Leptospermum coriaceum, +/-Banksia ornata* Tall open shrubland - Tall very open shrubland mosaiced with *Eucalyptus leucoxylon* ssp. Low - Low open woodland	31	0	0.0
***Callitris verrucosa* Tall open shrubland**	22.01	*Callitris verrucosa* Tall open shrubland over *Leptospermum coriaceum, Hibbertia riparia*	670	395	59.0
***Melaleuca acuminata, M. lanceolata, +/- Eucalyptus socialis, +/- E. leptophylla* Tall open shrubland**	23.01	*Melaleuca acuminata, M. lanceolata* and/or *Eucalyptus socialis, E. leptophylla* Tall open shrubland - Tall very open shrubland over *Stipa* sp., Danthonia sp.	8,109	2,943	36.3
	23.02	*Melaleuca acuminata, M. lanceolata* and/or *Eucalyptus socialis, E. leptophylla* Tall open shrubland - Tall very open shrubland mosaiced with *Eucalyptus gracilis, E. oleosa* Very open mallee	837	568	67.9
	23.03	*Melaleuca acuminata, M. lanceolata*, and/or *Eucalyptus socialis, E. leptophylla* Tall open shrubland - Tall very open shrubland mosaiced with *Eucalyptus leptophylla, E. socialis* Open mallee - Very open mallee	136	0	0.0

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	23.04	*Melaleuca acuminata, M. lanceolata, and/or Eucalyptus socialis, E. leptophylla* Tall open shrubland - Tall very open shrubland mosaiced with *E. leptophylla, E. socialis* Open - Very open mallee	10	0	0.0
	23.05	*Melaleuca acuminata, M. lanceolata* and/or *Eucalyptus socialis, E. leptophylla* Tall open shrubland - Tall very open shrubland mosaiced with *Eucalyptus dumosa +/- E. leptophylla* Mallee	551	274	49.7
	23.06	*Melaleuca acuminata, M. lanceolata* and/or *Eucalyptus socialis, E. leptophylla* Tall open shrubland - Tall very open shrubland mosaiced with *Eucalyptus dumosa, +/- E.leptophylla* Open low mallee	199	52	26.1
	23.07	*Melaleuca acuminata M. lanceolata* and/or *Eucalyptus socialis, E. leptophylla* Tall open shrubland - Tall very open shrubland mosaiced with Open low mallee	329	135	41.0
***Acacia nyssophylla* Tall very open shrubland**	24.01	*Acacia nyssophylla* Tall very open shrubland over *Enchylaena tomentosa* var. *tomentosa*	2,400	169	7.0
***Callitris canescens, Eucalyptus dumosa, E. porosa* Tall very open shrubland**	25.01	*Callitris canescens, Eucalyptus dumosa, E. porosa* Tall very open shrubland over *Acacia spinescens, A. rigens, Astroloma humifusum, Hibbertia sericea* var.	419	0	0.0
***Xanthorrhoea caespitosa/semiplana, +/- Banksia marginata* Tall very open shrubland**	26.01	*Xanthorrhoea caespitosa/semiplana, +/- Banksia marginata* Tall very open shrubland - Tall open shrubland over *Astroloma humifusum, Kunzea pomifera, Hibbertia riparia, Lepidosperma congestum/laterale/viscidum*	580	458	79.0
	26.02	*Xanthorrhoea caespitosa/semiplana, +/- Banksia marginata* Tall very open shrubland - Tall open shrubland mosaiced with *Eucalyptus diversifolia* Mallee-Very open mallee	148	0	0.0
CHENOPOD SHRUBLANDS					
***Enchylaena tomentosa* var. *tomentosa* Low open shrubland**	27.01	*Enchylaena tomentosa* var. *tomentosa* Low open shrubland over *Stipa* sp., *Danthonia* sp.	271	3	1.1
***Maireana sedifolia* or *M. pyramidata* Very open shrubland**	28.01	*Maireana pyramidata* Very open shrubland over *Stipa* sp., *Enchylaena tomentosa* var. *tomentosa, Rhagodia spinescens*	467	0	0.0
	28.02	*Maireana sedifolia* Very open shrubland over *Enchylaena tomentosa* var. *tomentosa, Eriochiton sclerolaenoides, Rhagodia spinescens, Sclerolaena obliquicuspis*	8,137	0	0.0
	28.03	*Maireana sedifolia* Very open shrubland mosaiced with *Stipa* sp. Open tussock grassland	828	0	0.0
	28.04	*Maireana sedifolia* Very open shrubland mosaiced with areas of *Eucalyptus gracilis, E. oleosa* Very open mallee	135	0	0.0
	28.05	*Maireana sedifolia* Very open shrubland mosaiced with small discrete areas of *Eucalyptus oleosa, E. gracilis* Very open mallee	548	0	0.0
SHRUBLANDS OF WET AREAS					
***Melaleuca halmaturorum* Tall open shrubland**	29.01	*Melaleuca halmaturorum* Tall open shrubland over *Sarcocornia quinqueflora, +/- Frankenia pauciflora* var., *Halosarcia pergranulata, Hemichroa pentandra, Tetragonia implexicoma*	57	2	3.5
***Melaleuca brevifolia* Tall open shrubland**	30.01	*Melaleuca brevifolia* Tall open shrubland - Tall very open shrubland over *Gahnia filum, Lawrencia squamata, Leptocarpus brownii, Samolus repens, Tetraria capillaris*	2,991	25	0.8
***Muehlenbeckia florulenta* Shrubland**	31.01	*Muehlenbeckia florulenta* Shrubland	242	15	6.2
***Sarcocornia quinqueflora, +/- Suaeda australis, +/- Halosarcia* sp. Low**	32.01	*Sarcocornia quinqueflora, Suaeda australis* Low shrubland	686	1	0.1

Regional Floristic Description	Gp	Detailed Floristic Description	Total Area (ha)	Area Protected (ha)	% Gp Protected
shrubland					
	32.02	*Sarcocornia* sp., *Halosarcia* sp. Low shrubland complexed with *Melaleuca halmaturorum* Tall shrubland	14	13	92.9
	32.03	*Sarcocornia* spp. *Halosarcia* spp. Low shrubland	98	98	100.0
***Halosarcia* sp.** **Low very open shrubland**	33.01	*Halosarcia* sp. Low very open shrubland over *Disphyma crassifolium* ssp. *clavellatum*	4,455	0	0.0
GRASSLANDS					
Spinifex sericeus, Ozothamnus turbinatus, Isolepis nodosa **Tussock grassland**	34.01	*Spinifex sericeus, Ozothamnus turbinatus, Isolepis nodosa* Tussock grassland	921	921	100.0
***Stipa* sp.** **Open tussock grassland**	35.01	*Stipa* sp. Open tussock grassland with sparse low shrubs occasionally present including *Sclerolaena diacantha/uniflora*	28,538	620	2.2
	35.02	*Stipa* sp. Open tussock grassland mosaiced with small areas of *Alectryon oleifolius* ssp. *canescens* Tall shrubland	125	6	4.8
	35.03	*Stipa* sp. Open tussock grassland mosaiced with areas of *Maireana sedifolia* Very open shrubland	28	0	0.0
	35.04	*Stipa* sp. Open tussock grassland mosaiced with areas of both *Maireana sedifolia* Very open shrubland and *Alectryon oleifolius* ssp. *canescens* Tall shrubland	19,347	452	2.3
	35.05	*Stipa* sp. Open tussock grassland mosaiced with pockets of *Eucalyptus gracilis, E. oleosa* Very open mallee	1,521	0	0.0
	35.06	*Stipa* sp. Open tussock grassland with *Hyalosperma semisterile, Sclerolaena diacantha/uniflora, Danthonia* spp. sparsely present	302	0	0.0
	35.07	*Stipa* sp. Tussock grassland primarily found in Victoria one area in SA mapped to match adjacent Victorian coding	31	0	0.0
SEDGELANDS					
Gahnia filum, Samolus repens **Sedgeland**	36.01	*Gahnia filum, Samolus repens* Sedgeland	182	176	96.7
Lomandra effusa **Open sedgeland**	37.01	*Lomandra effusa* Open sedgeland with *Lepidosperma congestum/laterale/viscidum, Asphodelus fistulosus, Cryptandra amara* var.	1,516	0	0.0
	37.02	*Lomandra effusa* Open sedgeland interleaving with *Eucalyptus porosa* Low open woodland	100	0	0.0

Note: Protected areas include NPWSA Reserves and Heritage Agreements (Jan. 1998).

Source: Murray Mallee Floristic Vegetation Mapping (GIS), Environmental Database of SA (Planning SA).

STRUCTURAL VEGETATION GROUPS

The structural classification for each plant community was described from the site data by visual estimates of the projective foliage cover and overstorey height estimates. The descriptions are based on a table adapted from Specht, Rowe and Boughton (1974) and Muir (1977), now published in Heard and Channon (1997), refer to Appendix III & IV. A broad grouping of the floristic plant communities into main structurally descriptive groups is provided in Table 12. This provides an indication of the extent of Mallee mapped compared to structural groups such as grasslands and shrublands.

COMPARISON WITH OTHER VEGETATION MAPPING

Across South Australia regions are progressively being mapped to record the remnant vegetation. The regions adjacent to the Murray Mallee region have common environmental factors influencing the vegetation. Table 13 compares the floristic mapping groups of surrounding regions: South Olary plains (Forward and Robinson 1996), Western Murray Flats, South East and Victorian Mallee (Land Conservation Council 1987). The numbers/codes identified with each vegetation group definition is the map description number/code from the respective regional maps.

Table 12.
Area Estimates for Vegetation Groups based on structure in the Murray Mallee Study Area.

Structural Group	Total Area (ha)	% of total vegetation	Area Protected (ha)	% of total structural group protected
Woodlands	9,018	1.3%	1,487	16.5%
Mallee	476,632	67.2%	318,892	67%
Shrublands	151,773	21.4%	136,310	90%
Chenopod Shrublands	10,385	1.5%	3	0%
Shrublands of wet areas	8,543	1.2%	154	1.8%
Grasslands	50,814	7.2%	2,000	4%
Sedgelands	1,798	0.3%	176	9.8%
Total	708,963	100%	459,022	

Note: Protected areas include NPWSA Reserves and Heritage Agreements (January 1998).

Source: Murray Mallee Floristic Vegetation Mapping (GIS), Environmental Database of SA (Planning SA). Refer to Murray Mallee Floristic Vegetation Map for mapping details.

Table 13.
Comparison of the Murray Mallee Floristic Vegetation mapping groups with adjacent regions.

Murray Mallee Vegetation groups	South East	South Olary (Forward and Robinson 1996)	Western Murray Flats	Victorian Mallee (Land Conservation Council 1987)
1. *Allocasuarina verticillata, Eucalyptus leucoxylon* ssp. Low woodland	9. *Allocasuarina verticillata, Eucalyptus leucoxylon* ssp. Low woodland	R. *Allocasuarina verticillata* Low woodland	66. *Allocasuarina verticillata* Low woodland	
2. *Casuarina pauper* Low woodland		F. *Casuarina pauper* Low woodland G. *Casuarina pauper* Low open woodland	64. *Casuarina pauper* +/- *Maireana sedifolia* Low open woodland	Belah Woodland *Casuarina pauper*
3. *Eucalyptus arenacea* Low woodland	11. *Eucalyptus arenacea/baxteri, Baeckea behrii* Low woodland			
4. *Eucalyptus fasciculosa, E. leucoxylon* Low woodland	5. *Eucalyptus fasciculosa , E. leucoxylon* spp. Low woodland			
5. *Eucalyptus fasciculosa, Xanthorrhoea caespitosa* Low woodland	7. *Eucalyptus fasciculosa, Xanthorrhoea caespitosa* Low woodland		72. *Eucalyptus fasciculosa, Xanthorrhoea caespitosa* Low woodland	
6. *Eucalyptus largiflorens* Low woodland			81. *Eucalyptus largiflorens* +/- *Muehlenbeckia florulenta* Woodland	Black box – chenopod woodland *E. largiflorens*
7. *Eucalyptus leucoxylon* ssp. Low woodland			78. *Eucalyptus leucoxylon* ssp. +/- *Lomandra effusa* Open woodland	Yellow gum woodland *E. leucoxylon*
8. *Callitris preissii* Low open woodland			12. *Callitris preissii* Low woodland	Pine – buloke woodland *Callitris preissii, Casuarina luehmannii*
9. *Eucalyptus porosa* Low open woodland		O. *Eucalyptus porosa* Open mallee	11. *Eucalyptus porosa* +/- *Lomandra effusa* Low woodland	Big mallee *E. porosa, E. behriana* +/- *E. dumosa, E. calycogona*
10. *Eucalyptus diversifolia* Mallee	3. *Eucalyptus diversifolia* Open mallee			
11. *Eucalyptus dumosa*, +/- *E. leptophylla* Mallee			3. *Eucalyptus dumosa* +/- *E. gracilis* Open mallee	
12. *Eucalyptus cyanophylla*, +/- *E. socialis* Open mallee		C. *Eucalyptus dumosa , E. socialis* Open mallee		Loamy sand mallee *E. incrassata, E. leptophylla* +/- *E. socialis*
13. *Eucalyptus diversifolia, Olearia axillaris* Open mallee				

Murray Mallee Vegetation groups	South East	South Olary (Forward and Robinson 1996)	Western Murray Flats	Victorian Mallee (Land Conservation Council 1987)
14. *Eucalyptus leptophylla, E. socialis* Open mallee				
15. *Eucalyptus leptophylla, Melaleuca lanceolata* Open mallee				
16. *Eucalyptus rugosa* Open mallee				
17. *Eucalyptus calycogona, E. dumosa* Very open mallee			73. *Eucalyptus calycogona E. dumosa* Open mallee	Red – swale mallee *E. dumosa, E. calycogona*
18. *Eucalyptus gracilis, E. oleosa* Very open mallee		A. *Eucalyptus gracilis, E. oleosa, E. socialis* Open mallee	1. *Eucalyptus gracilis*, +/- *E. oleosa* Open mallee 65 *Eucalyptus gracilis, E. oleosa* over *Maireana sedifolia* Open mallee	Chenopod mallee *Eucalytpus oleosa, E. gracilis*, +/- *E. calycogona, or E. dumosa*
19. *Eucalyptus incrassata* Open Low mallee	1. *Eucalyptus incrassata, E. leptophylla*, +/- *Melaleuca uncinata* Open mallee		9. *Eucalyptus incrassata* Open mallee	Deep sand mallee *E. incrassata, Leptospermum coriaceum, Acacia bivenosa*
20. *Leucopogon parviflorus, Acacia longifolia* var. *sophorae*, +/- *Olearia axillaris*, +/- *Myoporum insulare* Tall shrubland	26. *Leucopogon parviflorus , Acacia longifolia var. sophorae , Olearia axillaris* Tall shrubland			
21. +/- *Banksia ornata*, +/- *Allocasuarina pusilla Leptospermum coriaceum* Tall open shrubland	4. *Banksia ornata* Shrubland			Sand – plain heath *Banksia ornata, Allocasuarina pusilla, Leptospermum coriaceum, L. myrsinoides.*
22. *Callitris verrucosa* Tall open shrubland	16. *Callitris verrucosa* Tall shrubland			Scrub – pine woodland *Callitris verrucosa*
23. *Melaleuca acuminata, M. lanceolata*, +/- *Eucalyptus socialis*, +/- *E.leptophylla* Tall open shrubland			2. *Melaleuca lanceolata*, +/- *M. acuminata* Shrubland	
24. *Acacia nyssophylla* Tall very open shrubland			83. *Acacia nyssophylla*, +/- *Myoporum monatnum*, +/- *Maireana sedifolia* Shrubland	
25. *Callitris canescens, Eucalyptus dumosa, E. porosa* Tall very open shrubland				
26. *Xanthorrhoea caespitosa* ssp. *semiplana*, +/- *Banksia marginata* Tall very open shrubland				
27. *Enchylaena tomentosa* var. *tomentosa* Low open shrubland			*6. Enchylaena tomentosa, Maireana brevifolia* Low shrubland	
28. *Maireana sedifolia* or *M.pyramidata* Very open shrubland		I. *Maireana sedifolia* Low open shrubland J. *Maireana pyramidata* Low open shrubland	8. *Maireana sedifolia*, +/- *Lycium australe* Shrubland	
29. *Melaleuca halmaturorum* Tall open shrubland			85. *Melaleuca halmaturorum* ssp. *halmaturorum* Tall open shrubland	
30. *Melaleuca brevifolia* Tall open shrubland	17. *Melaleuca brevifolia* Low shrubland			
31. *Muehlenbeckia florulenta* Shrubland			25. *Muehlenbeckia florulenta* Shrubland	
32. *Sarcocornia quinqueflora*, +/- *Suaeda australis*, +/- *Halosarcia* sp. Low shrubland	29. *Sarcocornia* sp., *Halosarcia sp*. Low shrubland	L. *Lycium* spp. *Sclerostegia* spp. *Disphyma* spp. *Nitraria* spp. Low open shrubland	26. *Sarcocornia quinqueflora*, +/- *Sclerostegia arbuscula* Low shrubland	
33. *Halosarcia* sp. Low very open shrubland		L. *Lycium* spp. *Sclerostegia* spp. *Disphyma* spp. *Nitraria* spp. Low open shrubland	84. *Halosarcia* sp., *Sclerostegia* sp. Low open shrubland	

Murray Mallee Vegetation groups	**South East**	**South Olary (Forward and Robinson 1996)**	**Western Murray Flats**	**Victorian Mallee (Land Conservation Council 1987)**
34. *Spinifex sericeus, Ozothamnus turbinatus, Isolepis nodosa* Tussock grassland	27. *Spinifex sericeus, Ozothamnus turbinatus, Isolepis nodosa* Tussock grassland			
35. *Stipa* sp. Open tussock grassland		M. Open grassland / Open herbland (Very) Low very open shrubland with emergent trees	69 *Stipa* sp. Open tussock grassland	
36. *Gahnia filum, Samolus repens* Sedgeland	21. *Gahnia filum, Samolus repens* Sedgeland			
37. *Lomandra effusa* Open sedgeland			13. *Lomandra effusa*, +/- *Helichrysum leucopsideum* Open (tussock) grassland	

MAMMALS

By J. Foulkes[1] and J. Gillen[2]

INTRODUCTION

To date, very little information has been published on the Murray Mallee mammals in South Australia. Wakefield (1966) described the findings of the Blandowski Expedition in 1856-57 to north-western Victoria, which collected 36 species however the actual location of many of the specimens was poorly documented. No structured recording or trapping of mammals was undertaken in the Murray Mallee, until the 1970's when the Field Naturalists Society of South Australia Mammal Club made a number of field trips to various parks in the area (Harris *et al.*1982, G. Medlin pers. comm. 1996). Simpson (1973) reported on the mammals in the region between Mildura and Renmark. Baverstock (1979) documented the findings from a three-year study at Billiatt Conservation Park. Robinson (1982) provided notes on the mammals of the Ninety Mile Desert and James (1982) described the mammals of Scorpion Springs Conservation Park. Goonan and Mann (1992) and Goonan *et al.* (1993) presented the results of a study at Brookfield Conservation Park.

South Australian Museum records from the Murray Mallee date back to 1863, but most of these (80%) are from the last thirty years (prior to 1991) and those from 1889-1899 were mainly from the Riverland area. The present survey area does not include the Murray River valley and floodplains.

Figure 55 shows the distribution of South Australian Museum mammal records from the Murray Mallee prior to the current survey. Records are concentrated around the edges of the area near towns, along main access routes and in conservation parks. Up to 1992, 46 extant species, 8 of which were introduced, were confirmed from the area, 5 locally extinct species were known from sub-fossil records and a number of others were thought to have occurred historically in the area.

TOTAL SPECIES

Many mammal species rapidly declined or disappeared soon after European settlement in Australia and there are very few or no confirmed location records for many species in some areas. However, the range of some of these species can be ascertained from the limited information in historical documents. As very little fieldwork has been previously conducted in some areas, and particularly because most small mammals are nocturnal and can usually only be recorded by trapping, some species may still occur in the study area. The complete list of all mammal species from the Murray Mallee, shown in Appendix IX therefore includes all those known as well as species which could have occurred there prior to European settlement.

A total of 66 species from 18 families is listed in Appendix IX, of which 31 still occur in the area (22 native and 9 introduced), 6 are thought to possibly/probably occur there, 21 are thought to have been there historically. Sub-fossil deposits from the area are scarce with one sample from Jimmy's Well in Ngarkat CP and 1 or 2 from the Coorong. The Ngarkat samples are believed to have come from an Aboriginal midden of unknown age and contained fragments of Broad Faced Potoroo *Potorous platyops, Bettongia penicillata, Macropus eugenii and M. giganteus* (G. Medlin, pers. comm). Therefore, of the 57 native species known or thought to have been recorded in the Murray Mallee since European occupation, 14 (28%) are now extinct in South Australia, four are endangered, two are vulnerable and five are rare (Appendix IX).

The Murray Mallee survey recorded 31 confirmed extant species representing 11 families. Twenty-five species were recorded on quadrats and an additional six by opportunistic observations. One species was a new record for the area and sub-fossil material was recorded for another 13 species that are now locally extinct.

In total, 93% of known extant mammal species in the Murray Mallee area were recorded on the survey plus the one new record added. The known species that were not recorded were *Macropus giganteus, Rattus lutreolus, Pseudocheirus peregrinus, Scotorepens balstoni, Myotis macropus* and the vagrant species, *Miniopterus schreibersii* and *Saccolaimus flaviventris.*

The total number of mammal species and records recorded by quadrat and opportunistic methods on the survey are summarised in Table 14.

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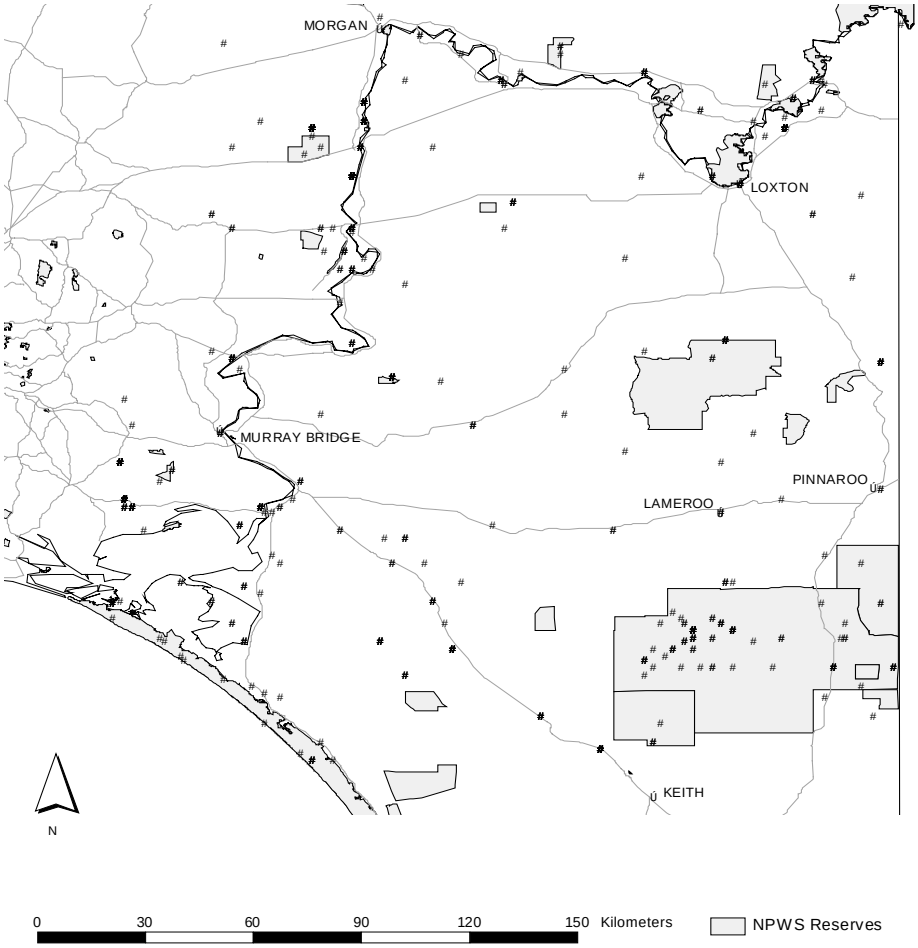

Figure 55.
Distribution of SA Museum mammal records prior to the survey.

Table 14.
Total number of mammal species and records from the Murray Mallee survey. Figures in brackets indicate species found *only* by opportunistic observations (which are included in the preceding figure).

	Indigenous	Introduced	Total
Number of species	16 (6)	9	31
Approx. no. of records of species	247(48)	205	452(48)

The frequency and abundance of all taxa recorded at survey quadrats are listed in Table 15. Common names can be determined from Appendix IX.

The additional three extant species recorded only from opportunistic observations were the Water Rat (*Hydromys chrysogaster)*, and four bat species (*Chalinolobus morio, Vespadelus baverstocki, V. regulus, V. vulturnus* and *Mormopterus planiceps*). Species recorded in the sub-fossil material are discussed later. As a number of species were predominantly recorded by opportunistic observations (eg. bats) the frequency of all species recorded by this method is shown in Table 16 (remembering that frequency in this case is the number of locations at which the species was recorded, *not* the number of individuals observed).

Table 15.
Mammal species frequencies and abundance recorded at quadrats on the Murray Mallee biological survey. The frequency is the number of quadrats at which the species was recorded. The total number of quadrats surveyed for fauna was 173.

Abundance figures represent the total number of individuals of the species recorded (at quadrats) on the survey (or signs of individuals eg. tracks, scats). [Note that species abundance was not consistently recorded at each quadrat. Therefore only species presence/absence (ie. frequency) data can be accurately compared between species.]

* Introduced species

Species	Frequency	Abundance
Macropus fuliginosus	105	191
**Oryctolagus cuniculus*	85	190
Tachyglossus aculeatus	68	80
**Mus musculus*	44	89
**Vulpes vulpes*	37	39
Pseudomys apodemoides	16	42
Lepus capensis	15	20
Cercartetus concinnus	11	16
Lasiorhinus latifrons	9	16
**Ovis aries*	9	11
Sminthopsis murina	8	20
Macropus sp.	8	10
Cercartetus lepidus	7	11
**Capra hircus*	4	7
**Bos taurus*	4	4
**Rattus rattus*	4	4
Sminthopsis crassicaudata	3	5
**Felis catus*	3	3
Chalinolobus gouldii	2	16
Notomys mitchellii	2	2
Nyctophilus geoffroyi	2	11
Ningaui yvoneae	1	2
Macropus rufus	1	2
Macropus robustus	1	1
Nyctinomus australis	1	1
Cercartetus sp.	1	1
Trichosurus vulpecula	1	1
Total number of records of species:	452	
Approx. number of individuals observed:		796

Table 16.
Mammal species recorded by opportunistic observations on the Murray Mallee survey.
Frequency is the number of locations at which the species was recorded, *not* the number of individuals observed.
(Sheep and cattle are not included).
* introduced species

Species	Frequency
Macropus fuliginosus	120
Chalinolobus gouldii	74
**Oryctolagus cuniculus*	70
**Vulpes vulpes*	38
Nyctophilus geoffroyi	36
* *Lepus capensis*	31
Chalinolobus morio	24
Lasiorhinus latifrons	13
Macropus rufus	13
Tachyglossus aculeatus	10
**Felis catus*	9
Vespadelus regulus	9
Vespadelus vulturnus	8
Mormopterus planiceps	5
**Rattus rattus*	3
Trichosurus vulpecula	3
Macropus robustus	2
Sminthopsis crassicaudata	2
**Capra hircus*	2
Nyctinomus australis	1
Notomys mitchellii	1
**Mus musculus*	1
Hydromys chrysogaster	1
Vespadelus baverstocki	1
Total	**477**

A total of 156 quadrats (90.1%) had sign of terrestrial mammals (both native and introduced) recorded at

them. Of these, 127 quadrats (73.4%) recorded at least one native species, with one quadrat having 5 native species. Only 36 quadrats (20.8%) had at least one small native mammal species, and of those, one had more than two native small mammals. From Table 11 it is evident that most species (20 of 25) occurred at relatively low frequencies ie. at less than 20% of quadrats (11). The five most frequently recorded species occurred in greater than 20% (35) of the quadrats, of which three are introduced species (rabbit, House Mouse and fox) and the others the Western Grey Kangaroo *Macropus fuliginosus* and Short Beaked Echinda *Tachyglossus aculeatus*. The rest of the species occurred at very low frequencies - 50% of them at less than 4% of the quadrats.

Western Grey Kangaroos were the most abundant and Rabbits and the Short Beaked Echinda appeared to be the next most abundant as these animals are easily observed. These figures cannot be compared accurately as abundance data was not collected in a systematic manner at each quadrat and some of the abundance data is only signs (ie. droppings, tracks and diggings).

Most bats were trapped at opportunistic locations as the specified survey sites were not always suitable for bat trapping. The location of bat sampling sites are shown on Figure 12 (Methods section). Up to five species were captured at a single location.

Species such as *C. gouldii* (Figure 56, 94 captures) and *N. geoffroyi* (42 captures) were the most widespread and common. Both these species are very adaptable which may be related to their ability to roost in a wide variety of places including buildings (especially *N. geoffroyi* cf other species). *Chalinolobus morio* (24 captures) was captured primarily close to the river because it dwells in caves or in hollows close to the river bank. The remaining bat species all recorded less than 10 captures eg *Vespadelus baverstocki* (Figure 57). The high flying species (*Nyctiomus* and *Mormopterus* sp) were captured the least but their distinctive calls were heard at two sites. The lack of calls suggests that they were uncommon in the survey area.

PATN ANALYSIS

With so few species, multi-variate analysis is generally inappropriate and unnecessary as there are not enough data to enable detection of true patterns and any trends between quadrats and species can be visually assessed from the data.

SPECIES OF PARTICULAR INTEREST

Species status was derived from (A.N.Z.E.C.C.) list of Threatened Vertebrate Fauna, April, 1991'] and updated from the action plans of Kennedy (1992) (marsupials), Lee (1995) (rodents) and Richards and Hall (1994) (bats). The South Australian status is from Kemper and Queale (1990). Australian current and historical distribution comments are from the action plans or Strahan (1983) and Watts and Aslin (1981) and South Australian distributions from Kemper and Queale (1990), Reardon and Flavel (1991) and S. A. Museum records. Ecological notes are from Reardon and Flavel (1991), Strahan (1998), Watts and Aslin (1981) and reasons for decline from the action plans. Species only thought to possibly occur, or have occurred, in the Murray Mallee are from C. Kemper (pers.comm.). Only extant species (or those possibly or recently extant) in the survey area are discussed in detail.

Species of national and state significance

In the following lists 'H' indicates species for which there are no museum records from the Murray Mallee but the species are thought to have occurred there historically [deduced from Watts and Aslin (1981), Watts (1990) and Wakefield, 1966 (Blandowski expedition to north-western Victoria, 1856-57)]. 'F' indicates species previously not known to have occurred in the area but sub-fossil material has recently been found (ie. species occurred there pre and possibly post-European occupation).

<u>Extinct in Australia</u>

White-footed Tree-rat *Conilurus albipes* (fossil only)
Eastern Hare-wallaby *Lagorchestes leporides* H
Pig-footed Bandicoot *Chaeropus ecaudatus* H (presumed extinct)
Gould's Mouse *Pseudomys gouldii* H, F
Toolache Wallaby *Macropus greyi* H (presumed extinct)

<u>Extinct in South Australia (and Australian classification as shown)</u>

Golden Bandicoot *Isoodon auratus* F (endangered)
Western-barred Bandicoot *Perameles bougainville* H, F (endangered)
Burrowing Bettong *Bettongia lesueur* H (endangered)
Numbat *Myrmecobius fasciatus* H (endangered)
Western Quoll *Dasyurus geoffroii* H? (endangered)
Bridled Nailtail Wallaby *Onychogalea fraenata* H? (endangered)
Brush-tailed Phascogale *Phascogale tapoatafa* H, F (endangered)
Spotted-tailed Quoll *Dasyurus maculatus* H (including specimens) (potentially vulnerable)
Eastern Quoll *Dasyurus viverrinus* H? (potentially vulnerable)

<u>Endangered in South Australia (locally extinct and classified in Australia)</u>

Brush-tailed Bettong *Bettongia penicillata* H (endangered)

Figure 56.
Gould's Wattled Bat (*Chalinolobus gouldii*) was the most commonly captured bat during the survey. Photo P. Bird

Figure 57.
Inland Forest Bat (*Vespadelus baverstocki*) was only recorded at a single opportunistic location during the survey. Photo T. Reardon.

Vulnerable in Australia
Plains Mouse *Pseudomys australis* H, F (locally extinct)
Common Brushtail Possum *Trichosurus vulpecula* H, F (potentially vulnerable)

The following descriptions refer to extant species of particular interest:

Eastern Grey Kangaroo (*Macropus giganteus*) (Figure 58)
This large kangaroo is widely distributed throughout eastern Australia, coming into South Australia only in the south-east and east, although there have been occasional reports in the Murray Mallee and Eastern Pastoral districts. Classified as vulnerable in South Australia, only two museum specimens, collected in 1992 from near Overland Corner and 1908 from near Coonalpyn are known from the Murray Mallee study area. It is difficult for an untrained observer to distinguish the two grey kangaroo species, the Western Grey Kangaroo (*M. fuliginosus*) is generally slightly smaller and more brown in colour particularly on the tail, whereas *M. giganteus* is predominantly grey).

Hairy-nosed Wombat (*Lasiorhinus latifrons*) (Figure 59)
This species is distributed across the Nullarbor Plain, in the Gawler Ranges, upper western Eyre Peninsula and the Murraylands. Several remnant populations also exist on Yorke Peninsula. It is thought to have been distributed throughout much of these areas historically and small colonies have re-established where wombats were re-introduced to Pooginook Conservation Park and Kia-ora Station in 1971 (St John and Saunders 1989). The latter two locations are just north of the Murray Mallee survey area. There is one recorded occurrence of wombats introduced to the “inside” of the Murray River in the Bow Hill area (D. Armstrong, pers. comm. 1999). The Hairy-nosed Wombat is classified as uncommon in South Australia but presumed stable on a national basis.

***Mormopterus* spp.**
In South Australia this free-tailed bat is divided into two species (*Mormopterus* sp. 3 and *Mormopterus sp.*4) but it is not possible to distinguish between females using external characters: males have different sized penises. Thus they are commonly referred to as 'big penis' and 'little penis' freetail bats.

The 'little penis' species is common in arid areas of South Australia, extending as far south as just below the River Murray. The 'big penis' species is abundant from Fleurieu Peninsula to the Flinders Ranges and less common on Eyre Peninsula and in the South East. Up until 1991, no confirmed specimens were known from the Murray Mallee, except some caught on the Chowilla floodplain immediately north of the survey area (Brandle and Bird 1990), but of course this only refers to males. There are numerous records of females from the area but these could be either species.

On the South Olary Plains survey a number of female and 'little penis' specimens were captured on Calperum, Chowilla, Pine Valley and Lilydale Stations and one 'big penis' specimen caught on Caroona Station (Forward 1996).

Common Dunnart (*Sminthopsis murina*) (Figure 60)
This small native marsupial is uncommon in woodland, open forest and heathlands in south-eastern Australia. On the Murray Mallee survey fewer than fifteen individuals were captured, the majority from Ngarkat and Brookfield Conservation Parks. In eastern NSW they reach maximum densities in early to mid seral stages following fire (Fox 1982), however there is little data on its response to fire in Murray Mallee habitats. *S. murina* feeds primarily on arthropods, apparently having a preference for beetles, cockroaches and moths (Menkhorst 1995).

Large-footed Myotis (*Myotis macropus)*
This species is primarily coastal, however they occur further inland along major rivers such as the Murray River. Only five South Australian specimens are represented in the SA Museum collection; all from Nildottie on the River Murray in 1987. They will live in most habitats that are near water as they forage mostly over streams and pools (Churchill 1998). This small, brown bat is usually a cave-dwelling species, but will roost in tree hollows, dense vegetation and man-made structures. Colonies are usually 60 pairs or less and are reliant on permanent fresh water bodies nearby. They reportedly fly in pairs and eat airborne and aquatic insects and occasionally small fish. Disturbance to colonies, particularly during colder months (Reardon and Flavel 1991) are considered major threats to this species.

Yellow-bellied Sheath-tailed Bat (*Saccolaimus flaviventris*)
Distributed widely throughout eastern and northern Australia, but abundant only in the tropics. The SA Museum has a number of specimens from the River Murray, Murray Mallee, Lake Albert and Coorong. All have been collected between late March and early June, suggesting the possibility of an autumn migration (Reardon and Flavel 1991). This species is usually solitary, but may form small groups of 2-6 individuals in late winter and spring (Churchill 1998).

Figure 58.
The distribution of the Eastern Grey Kangaroo (*Macropus giganteus*) extends into the Murray Mallee in South Australia. Photo A. Robinson.

Figure 59.
The Hairy-nosed Wombat (*Lasiorhinus latifrons)* occurs in a relatively small area to the west of the Murray River. Photo P. Canty.

It occurs over a wide range of habitats, but being a forest-dweller it prefers large hollow trees for roosting. Its diet consists of airborne insects, usually moths and beetles. Clearance of trees, particularly older individuals with hollows is a threat to their favoured habitats in the mallee.

Large forest bat (*Vespadelus darlingtoni*)
The Large forest bat is distributed along the eastern coast of Australia. In South Australia it was not captured on the survey but its distribution is suggested as occurring in the Murray Mallee. This bat utilises a wide variety of habitats including rainforests, wet and dry eucalypt forests, and woodlands. Colonies of up to 60 bats have been found in tree hollows. Its diet is believed to consist of small flying insects.

Little Pygmy-possum (*Cercartetus lepidus*)
The Little Pygmy-possum is found in the Murray Mallee straddling the SA/Vic border and in the Coorong region. It has been found in Mt Rescue CP at a number of sites across the south western corner of the survey area. This is the smallest of all possums weighing a maximum of only 6-9 grams. It occupies a wide range of habitats on dunes or sandplain from mallee to dry heath. The size of *C. lepidus* makes it difficult to find but nests have been disturbed in spilt logs or stumps. It is highly omnivorous and even eats small lizards. Habitat modification and predation by introduced predators are the likely major threats to this species. The long-term effects of extensive and frequent fires on this species are uncertain.

Western Pygmy-possum (*Cercartetus concinnus)* (Figure 61)
This species was found at predominantly mallee/ heathland sites across the southern boundary of the study area but has also been recorded at Brookfield CP (Goonan and Mann 1992). Typically the habitat has an understorey stratum that includes a range of myrtaceous and proteaceous shrubs (Menkhorst 1995). It is predominantly scansorial, consuming nectar, pollen and arthropods, however it also moves about on the ground in search of food. The threats to its survival are the same as those described for *C. lepidus.*

Common Brushtail Possum (*Trichosurus vulpecula*) (Figure 62)
The Common Brushtail Possum was found at only a few locations during the Murray Mallee survey. It is considered to be uncommon or absent from much of the mallee scrub in south-eastern Australia and its distribution throughout Australia (excluding islands) appears to be declining (Kemper & Foulkes 1997). Possums, when present, generally den in tree hollows, fallen logs, limestone sinkholes or farm out buildings. Their diet consists of leaves, flowers and fruits from a variety of plant species as well as arthropods. Habitat modification and destruction, and predation of dispersing sub-adults by foxes and feral cats are their major threats to survival.

Mitchell's Hopping Mouse (*Notomys mitchellii*) (Figure 63)
The largest of the extant Australian hopping-mice, *Notomys mitchellii* was captured only on three occasions during the Murray Mallee survey. All captures were in the Ngarkat complex of parks. Favoured habitats appear to be mallee habitats with a shrubby understorey, mallee heath and tall *Melaleuca* shrublands. This species is rarely captured in the region, presumably because of the reduction in suitable habitat. In the Murray Mallee region of Victoria it is uncommon and occurs primarily in the larger conservation reserves such as Big Desert Wilderness Park (Menkhorst 1995).

Silky Mouse (*Pseudomys apodemoides*) (Figure 64)
The Silky Mouse was the most commonly captured native mammal species during the survey. It was captured in mallee-heath habitats across the bottom third of the study area, in particular the Ngarkat complex of parks. It is a cryptic and nocturnal species that feeds mainly on seeds but is known to eat insects and nectar (Cockburn 1981). The Silky Mouse is a social mouse which lives in large complex burrow systems and its presence can be determined by spoil heaps under shrubs and tussocks (Aitken 1983).

Southern Ningaui (*Ningaui yvonneae*) (Figure 65)
One of the smallest marsupials (~10 g), the Southern Ningaui is known from only a small number of records from Billiatt CP and Ngarkat CP in the Murray Mallee. During the survey it was recorded at only one location in Ngarkat CP and is considered to be uncommon. Throughout the mallee in South Australia and Victoria, *N. yvonneae* is linked with mallee/*Triodia* associations on sandy soil (Menkhorst 1995). In western Victoria, it is considered widespread but uncommon in mallee/*Triodia habitats,* however the effects of wildfire on its habitat are poorly known and require investigation as do most aspects of it's ecology (Menkhorst 1995).

Species probably/possibly extant in the area:

The following species may occur in the Murray Mallee, given their past known or present distributions. Occurrences from Kinchega National Park (in N.S.W. 100km ENE of the current survey area) are from Ellis and Henle (1988) and records from north-western Victoria are from Robertson *et al.* (1989).

Chocolate Wattled Bat (*Chalinolobus morio*) (Figure 66)
The only museum record near the survey area prior to the survey was from Sutherlands (west of Morgan, just west of survey area). It is also known from north-western Victoria. Animals were caught at two locations

Figure 60.
The Common Dunnart (*Sminthopsis murina*) were recorded at 8 locations during the survey, all within the Ngarkat comlpex of parks and at Brookfield Conservation Park. Photo A. Robinson.

Figure 61.
The Western Pygmy-possum (*Cercartetus concinnus*) was the most commonly recorded pygmy-possum during the survey. Photo A. Robinson.

Figure 62.
The Common Brushtail Possum (*Trichosurus vulpecula*) is uncommon or absent from much of the Murray Mallee. **Photo P. Canty.**

Figure 63.
Mitchell's Hopping-mouse (*Notomys mitchellii*) was recorded at three locations on the Murray Mallee survey. **Photo A. Robinson.**

Figure 64.
The Silky Mouse (*Pseudomys apodemoides)* was the most commonly captured native small mammal on the survey. Photo A. Robinson.

Figure 65.
Southern Ningaui (*Ningaui yvonneae*) is a mallee/*Triodia* specialist and was recorded at only one location during the survey. Photo S. Doyle.

Figure 66.
The Chocolate Wattled Bat (*Chalinolobus morio*) is uncommon in the mallee. **Photo T. Reardon.**

in Marne Conservation Park and a single location near Cambrai. It is probable that they occupy hollows in the large River Red Gums but they probably also roost in buildings. Menkhorst (1995) suggests that its distribution is limited by rainfall and that much of the Murray Mallee is too dry (ie <300 mm/year) however the lack of suitable cave roosting sites is equally plausible (C. Kemper, pers. comm 1999).

Dingo (*Canis lupus dingo*)
The Dingo was not recorded on the survey and there are few recent confirmed records for the area due to the difficulty in distinguishing the Dingo from feral dogs and their hybrids. They probably occurred in low numbers throughout the Murray Mallee at the time of European settlement, but following settlement, they were trapped and shot to protect grazing stock. In the mallee of western Victoria adjacent to South Australia, the Dingo is not considered common and their status is considered uncertain (Menkhorst 1995).

Little Pied Bat (*Chalinolobus picatus*)
There are very few specimens collected in SA, these are confined to arid mallee region along the South Australian-New South Wales border, north of River Murray (34° to 30° latitude), however it is likely to occur in mallee to the south of the river. Restricted in distribution in SA and restricted outside the state, where it is locally abundant. They roost in trees, caves and abandoned mines and houses (Churchill 1998)

INTRODUCED SPECIES

As noted in the frequency tables, seven introduced species as well as cattle and sheep (as domesticated livestock) were recorded during the survey. The most numerous and widespread of these were European Rabbit, Brown Hare, House Mouse and European Fox. The highest number of introduced species that occurred in a single quadrat was six. A total of 128 quadrats of the 173 sampled (74%) recorded at least one introduced species.

The ubiquitous rabbit was the most abundant and also widespread, although only in low densities in some places such as the sandy areas of the south-eastern mallee.

House Mice were also widespread, but less so in the central areas, where patches of native vegetation may be relatively undisturbed such as the Ngarkat complex of parks, and more isolated from townships and main access routes. In many quadrats House Mice were the only small terrestrial mammals recorded. Most of these locations were in the west and north-east of the survey area, nearer main roads, settlements and agricultural activities.

European Foxes (Figure 67) were also widely observed in the Murray Mallee, but appeared to be more common in the eastern and south-western portions of the study area. Cats were observed in low numbers during the study. Given the cryptic and generally nocturnal habits of both these species and the limited

amount of spotlighting conducted on the survey, it is likely that their presence was more widespread than the results indicate.

DISCUSSION

The total number of native mammal species known to occur at the time of European settlement in the Murray Mallee is 53 species. Similarly, the 43 species known to have existed in the survey area since European occupation constitutes 70% of the known 60 species that occurred in the whole mallee region of south-eastern Australia in historical times (Bennett *et al.* 1989).

The number of extant mammal species of the Murray Mallee area (31) is also similar to that currently known in the north-eastern deserts (36 species) (Kemper 1990); north-western Victoria (40 species) (Robertson *et al* 1989) and species of the southern Australian mallee (37 species) (Bennett *et al.* 1989), indicating that many areas have suffered similar substantial declines in species in recent times.

Mammal species richness (introduced and native) recorded at quadrats on the South Olary Plains survey varied from zero to 7 species, averaging 4.3 species. In the Murray Mallee, species richness of small terrestrial mammal species was only an average of 0.6 per quadrat. This is low compared with other studies conducted in semi-arid and arid pastoral areas of South Australia. The Yellabinna survey found small terrestrial mammal species richness averaging about two to three but this areas is more remote from towns and agricultural practises (Copley and Kemper 1992). The Murray Mallee survey area, being agricultural with patchy remnants of native vegetation, had much lower mammal species richness. However, species richness and abundance in mallee vegetation is known to be generally low (Bennett *et al.* 1989) and may largely be attributed, in part, to the loss of species since European settlement (Menkhorst and Bennett 1990).

No mammalian family is particularly specialised to the mallee vegetation but prominent groups are the Dasyuridae (*Ningaui, Sminthopsis)*, Burramyidae (*Cercartetus*), vespertilionid bats and to a lesser extent Muridae (*Pseudomys, Notomys*). Prior to European settlement, bandicoots (Peramelidae) and bettongs (Potoroidae) were well represented in mallee mammal assemblages (Bennett *et al.* 1989).

The mallee specialists are all small mammals: a *Triodia* sheltering terrestrial insectivore/carnivore (*N. yvonneae*): a *Triodia* sheltering scansorial insectivore/carnivore (*C. lepidus*) and a burrowing omnivorous murid (*Notomys mitchellii*).

Figure 67.
The European Fox (*Vulpes vulpes*) is a significant predator of many small to medium-sized mammals and reptiles throughout the Murray Mallee and much of Australia. Photo S. Doyle.

The specialists that are frequently found in heaths having an emergent layer of mallee eucalyptus comprise the burrowing omnivorous rodent (*Pseudomys apodemoides*), scansorial insectivore/nectivores (*C. concinnus, C lepidus*). And the insectivorous dasyurid *Sminthopsis murina*.

Apart from the ant and termite-eating Short-beaked Echidna *Tachyglossus aculeatus*, no species are highly specialised in diet selection. Insectivory is the most common dietary niche, shared by the dasyurids, vespertilionids and mollosids, and one species of C*ercartetus*. All the murids are omnivorous, tending to be granivores, but also consuming fruit, flowers and arthropods when available.

There are four native terrestrial grazers, the three macropod species and the Hairy-nosed Wombat.
The low diversity of bat species appears to be related to structure and extent of the vegetation. The most extensive areas of native vegetation in the study area, Ngarkat and Billiatt Conservation Parks, had been burnt frequently in the 10 or so years preceding the survey and as a result the structure of the vegetation and availability of hollows has been reduced. *Vespadelus* species in particular appear to prefer habitats with a more complex structure and hence prefer patches that have not been burnt for some time.

The number of extant coexisting species of mammals in mallee vegetation, and their population densities are generally low (Bennett *et al.* 1989). Low diversity of mammals in mallee communities may be attributed in part to the loss of species since European settlement. Extinction of medium sized mammals in the critical weight range of 0.5 – 5.0 kg. has been documented in the arid zone and a decline has been documented from semi-arid south eastern Australia, however the reasons are mostly related to habitat destruction. The decline has been attributed to a combination of factors including the loss or degradation of habitat due to grazing by introduced stock and rabbits, predation by introduced carnivores and the affect of changed fire regimes (Burbidge and McKenzie 1987, Bennett *et al.* 1989)

Mallee occurs as a mosaic of vegetation communities rather than uniform areas over a large scale. The mosaic provides different resources. Consequently few taxa are highly specialised and adapted to mallee vegetation.

Biogeographic considerations
As discussed in previous chapters, the Murray Mallee survey area lies adjacent to three South Australian regions: the South East, the northern arid zone and the Mt Lofty-Flinders Ranges. On a national scale, the area represents an ecotone between the Bassian zoogeographic subregion, comprising temperate southern and eastern Australia, and the Eyrean subregion, encompassing the semi-arid and arid inland (Bennett *et al.* 1989). More of the survey area lies in the Eyrean zone. Thus the Murray Mallee contains mammal species with affinities to both these major biogeographic regions but predominantly Eyrean (Robertson *et al.* 1989). Eyrean mammal species are known to predominate in mallee mammal fauna (Menkhorst and Bennett 1990).

Some of the Eyrean species are:
- Southern Ningaui (*Ningaui yvonneae*)
- Euro (*Macropus robustus*)
- Red Kangaroo (*Macropus rufus*)
- Little Pied Bat (*Chalinolobus picatus*)
- Inland Eptesicus (*Vespadelus baverstocki*)
- Western Broad-nosed Bat (*Scotorepens balstoni*)

The few Bassian species are:
- Common Dunnart (*Sminthopsis murina*)
- Western Grey Kangaroo (*Macropus fuliginosus*)
- Eastern Grey Kangaroo (*Macropus giganteus*)
- Southern Forest Bat (*Vespadelus regulus*)
- Little Forrest Bat (*Vespadelus vulturnus*)

Widespread species include:
- Short-beaked Echidna (*Tachyglossus aculeatus*)
- White-striped Mastiff Bat (*Nyctinomus australis*)
- Gould's Wattled Bat (*Chalinolobus gouldii*)
- Fat-tailed Dunnart (*Sminthopsis crassicaudata*)
- Lesser Long-eared Bat (*Nyctophilus geoffroyi*)

Within the survey area, very few geographic trends of individual species distributions could be detected, probably due to the low overall abundances recorded and the presence of many known widespread species. The few that showed slight trends were *Sminthopsis murina*, occurring mostly in the southern half of the area, and *S. crassicaudata*, found only in the north, both of which were the anticipated distributions (from Strahan 1998). The occurrences of *Macropus giganteus* and *Lasiorhinus latifrons* were, as expected, only in the eastern and north-western areas respectively. Most other species were widely distributed eg Short-beaked Echidna, *Macropus* species, rodents, introduced species and many bats.

No native mammals were caught north of the Pinnaroo road in the Murray Mallee and only three *Sminthopsis* were caught on the Western Murray Flats. Approximately 50 % of the Murray Mallee survey sites are south of this road which accounts for about 1/3 of the total area, but contains the largest remaining areas of uncleared land. Those small mammals captured were predominantly from parks and the largest ones at that. The lack of captures could be explained by the effects of recent fires in Billiatt Conservation Park which is the largest area of native vegetation north of the Pinnaroo Road and the severe fragmentation of the remaining vegetation in the area.

The country either side of the Pinnaroo road is almost totally cleared for 10-20 km, thereby creating a broad

barrier between 20 and 40 km wide which prevents movement of mammals between remnants. The distribution of the remaining vegetation can be seen on the map in the back of this report.

Conservation considerations

At the time of European settlement, the mallee region of south-eastern Australia probably supported a rich and diverse mammal fauna, which was comparable to that of many other areas in Australia (Bennett *et al.*, 1989). A large number of species are now locally extinct in some areas, this diversity is now low (Bennett *et al.* 1989). Considering the relatively short time span over which this has occurred (ie. less than 200 years), there is cause for concern that many remaining species and populations are at considerable risk.

The prime causes of extinction and ongoing threat to remaining species are loss or degradation of habitat through clearing and overgrazing by domestic stock and rabbits; predation by introduced carnivores; competition for food and shelter with introduced species; indirect poisoning of animals and their food prey through agricultural practises, and altered fire regimes that have reduced habitat heterogeneity or changed plant communities (Menkhorst and Bennett 1990; Stephens 1992). Once species and populations are under pressure, competition between native species for the limited habitat and food resources leads to another pressure. These effects and threats are then magnified in times of drought.

The high rabbit numbers in the Murray Mallee and their suspected substantial impact on native vegetation is of great concern, as it is elsewhere in the state. The Cooperative Research Centre for Biological Control of Vertebrate Pest Populations (researching immunocontraception control methods) and CSIRO Division of Wildlife and Ecology (integrated control - poisoning, warren ripping and fumigation) are helping to address the problem.

Similarly, the effect of foxes and feral cats on the small native species populations is of great concern. The University of Adelaide has been conducting research into the effects of the domestic cat on small native mammal, bird and reptile species. Additionally, the Western Australian Department of Conservation and Land Management, the Agriculture Protection Board and DEH are testing and implementing intensive fox baiting programs and CSIRO is investigating methods of biological control of foxes. Once again this is an enormous problem that will involve long-term programs.

On more localised scales, some projects are being undertaken to eradicate introduced pests (by extensive poisoning and shooting) to enable populations of threatened native species to stabilise and expand or be reintroduced into areas: eg. Maggea/Mantung Malleefowl project (Barratt *et al.* 1991)

As discussed earlier, the Murray Mallee contains some mammal species that have significant conservation status on a national basis:

Little Pied Bat (rare)
Common Brushtail Possum (potentially vulnerable) - possibly in area

Others species rated on a South Australian basis:

Eastern Grey Kangaroo (vulnerable)

The Murray Mallee have a large number of nationally or locally extinct species (12) which are known to have occurred in the area but have disappeared since European occupation. Five other extinct species were possibly present historically and five were at least in existence prior to European occupation. Despite having already lost so many species, those that remain need protection, especially in light of the large numbers of thriving introduced species and ongoing agricultural and pastoral activities. The remaining areas of suitable natural habitat must be maintained to support these remaining populations. In the longer term it may be possible to re-introduce some species.

As discussed previously, the Murray Mallee contains mammal species of both Eyrean and Bassian origins, many of which are at the northern or southern limits respectively of their distributions. The survey area may be of particular importance to the survival of these populations if their status in the rest of their distributions is threatened. In the case of Bassian species, many or most of their preferred habitats have been cleared or severely damaged through agricultural practises, or in the case of Eyrean species, the added impacts of regular drought conditions and long term pastoralism may increase threats to these species.

REPTILES AND AMPHIBIANS

by J. Foulkes[1] and J. Gillen[2]

INTRODUCTION

Prior to the Murray Mallee survey, the only systematic searching or trapping of reptiles and amphibians conducted in the area was field trips by the Field Naturalists Society of S.A. Herpetology Club and visits by individuals (G. Armstrong, pers. comm). Baverstock (1979) undertook a three-year study of reptiles in Billiatt Conservation Park. Goonan and Mann (1992) and Goonan *et al.* (1993) report on a long-term study at Brookfield Conservation Park in the Western Murray Flats.

There are few studies of adjacent areas the main ones being, the South Olary Plains survey conducted in 1992 (Forward and Hutchinson 1996), South East (in prep.), a survey of north-western Victoria (Bennett *et al*. 1989) and a longer term study by Coventry (1996) from the Big Desert in Victoria.

Figure 68 shows the distribution of South Australian Museum reptile records from the Murray Mallee prior to 1992. In addition to specimens collected by the above studies, these records are mostly random collections, concentrated around the edges of the area near towns, along main access routes and in the larger conservation parks. Prior to 1992, 76 species were confirmed from the area (72 reptiles and 4 amphibians).

TOTAL SPECIES

A complete list of all reptile and amphibian taxa recorded from the Murray Mallee is shown in Appendix X. The total number of species recorded is 79 (75 reptiles and 4 amphibians) representing 14 families and sub-families.

The Murray Mallee survey recorded 59 species (55 reptiles and 4 amphibians) with 50 species being recorded on quadrats and an additional 6 by opportunistic observations. This survey added three new species for the area.

The breakdown of the species recorded into broad groups is outlined below:

Amphibians	(4 species)
Geckoes	(8 species)
Dragons	(6 species)
Goannas	(2 species)
Skinks	(27 species)
Legless lizards	(6 species)
Blind Snakes	(2 species)
Elapid Snakes	(4 species)
TOTAL	59 species

In total, 77% of known reptile and amphibian species in the Murray Mallee area were recorded on the survey plus the three confirmed new species for the area added. Records collected by opportunistic observations (ie. not on specified survey quadrats) numbered 56 species (including six species *not* recorded on any quadrats) confirming that this method is a valuable addition to site-based records.

The total number of reptile and amphibian species, records and individuals recorded by quadrat and opportunistic methods on the survey are summarised in Table 17.

Table 17
Total numbers of reptile and amphibian species and records from the Murray Mallee survey.

R = reptiles, A = amphibians

		Quadrats	Opportune	Total
Number of species	R	50	36	55
	A	2	4	4
				59
No. of records of species	R	676	366	1042
	A	16	8	24
				1066

The frequency and abundance of all taxa recorded at survey quadrats are listed in Table 18. Genus-only designations are shown in normal rather than italic typeface and species masked out of the analysis are indicated, as are species that were grouped for the analysis. The rest of the list shows all species included in the analysis except those with a frequency of one, (which were also masked out). A conversion list of scientific names to common names is in Appendix X.

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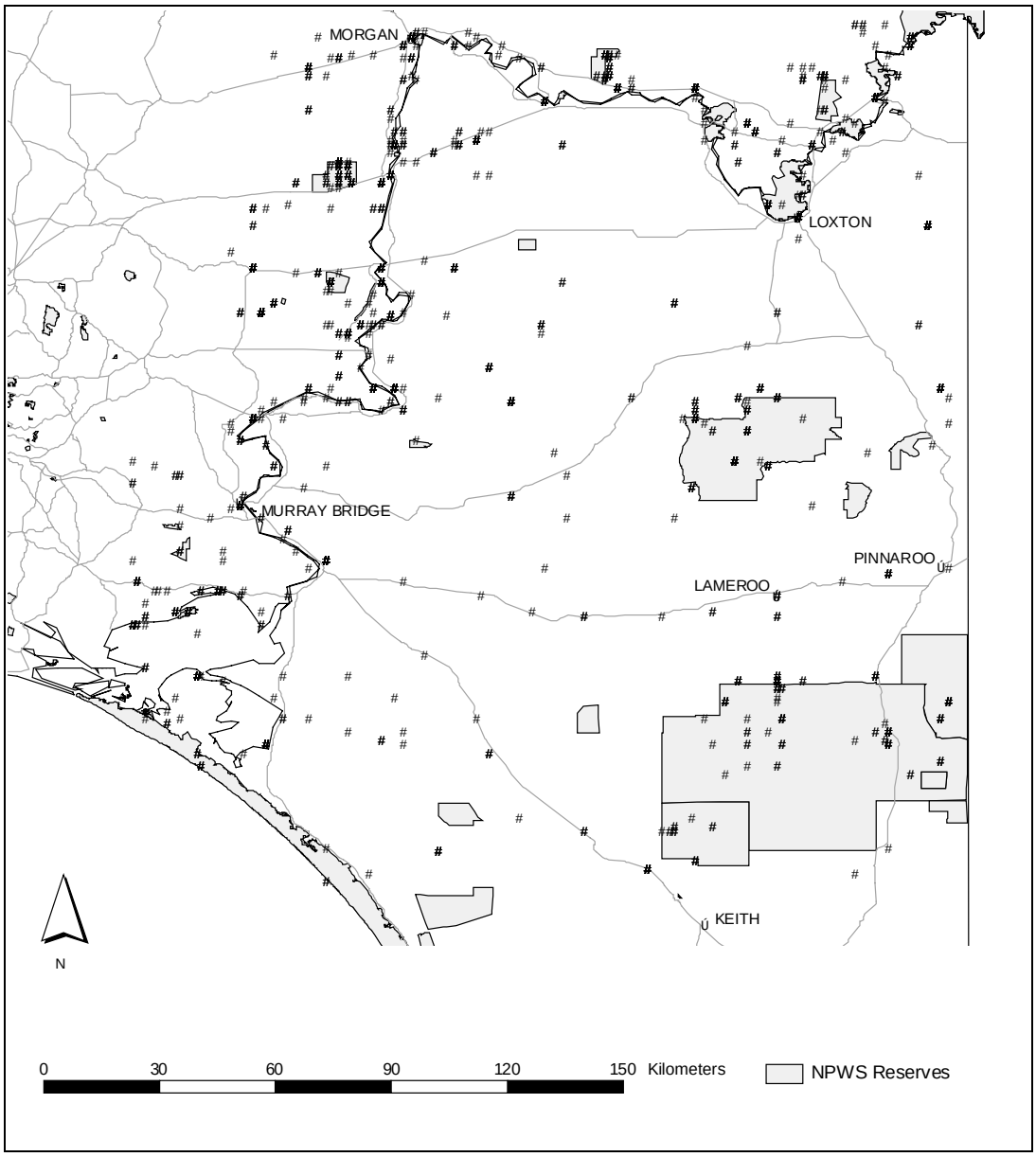


Figure 68.
Distribution of SA Museum reptile records prior to the survey.

The additional species recorded from opportunistic observations are listed in Table 19.

Table 18.
Reptile and amphibian species frequencies and numbers observed at quadrats on the Murray Mallee survey.

The frequency is the number of quadrats at which the species was recorded. The total number of quadrats surveyed for fauna was 173.

Abundance figures represent the total number of individuals of the species recorded (at quadrats) on the survey. [Note that species abundance was not consistently (systematically) recorded at each quadrat. Therefore only species presence/absence (ie. frequency) data can be accurately compared between species.]

+ Species excluded from the analysis (ie snakes, varanids, legless lizards and amphibians - see methods chapter)

Species	Freq.	Total Obs.
Tiliqua rugosa	106	178
Morethia obscura	70	123
Menetia greyii	50	70
Lerista bougainvillii	44	58
Ctenotus robustus	40	54
Ctenophorus fordi	38	112
Ctenotus orientalisr	35	48
Hemiergis peronii	34	49
+Varanus gouldii	28	32
Ctenophorus pictus	20	33
+Pseudonaja textilis	17	18
Diplodactylus vittatus	14	14
+Neobatrachus pictus	13	21
+Delma australis	13	16
Lerista dorsalis	12	14
Amphibolurus norrisi	11	12
Christinus marmoratus	10	11
Amphibolurus nobbi	9	17
Morethia boulengeri	9	12
Nephrurus milii	9	10
Pogona vitticeps	9	10
Heteronotia binoei	7	9
+Morethia sp.	7	7
Lampropholis delicata	6	8
Ctenotus brooksi	5	7
Diplodactylus damaeus	5	5
Hemiergis millewae	5	5
Lerista punctatovittata	5	9
+Ramphotyphlops bituberculatus	5	5
Cryptoblepharus plagiocephalus	4	6
Tiliqua occipitalis	4	4
+Limnodynastes dumerili	3	5
+Aprasia striolata	3	3
Ctenotus brachyonyx	3	5
Ctenotus regius	3	5
+Ctenotus sp.	3	3
Gehyra variegata	3	4
+Pygopus lepidopodus	3	4
+Ramphotyphlops australis	3	3
Bassiana duperreyi	2	2
+Drysdalia mastersii	2	2
+Pseudonaja sp.	2	2
Strophurus intermedius	2	2
Tiliqua scincoides	2	2
Ctenotus atlas	2	2
Ctenotus schomburgkii	1	1
Ctenotus strauchii	1	1
Delma butleri	1	1
Delma sp.	1	1
Diplodactylus stenodactylus	1	1
Egernia striolata	1	1
Eremiascincus richardsonii	1	2
Lialis burtonis	1	3
Morethia adelaidensis	1	2
Pogona barbata	1	1
Suta nigriceps	1	1
Tiliqua sp.	1	1
Varanus sp.	1	1

Table 19
Reptile and amphibian species frequencies for opportune records from the Murray Mallee survey.

Species	Frequency
Tiliqua rugosa	117
Pogona vitticeps	76
Varanus gouldii	32
Pseudonaja textilis	29
Ctenophorus fordi	8
Ctenophorus pictus	8
Lerista bougainvillii	7
Amphibolurus nobbi	6
Morethia boulengeri	6
Heteronotia binoei	5
Menetia greyii	5
Christinus marmoratus	5
Pogona sp.	5
Tiliqua scincoides	5
Hemiergis peronii	4
Morethia obscura	4
Pogona barbata	4
Limnodynastes dumerili	4
Cryptoblepharus plagiocephalus	3
Lerista punctatovittata	3
Nephrurus milii	2
Pseudonaja nuchalis	2
Pseudonaja sp.	2
Varanus sp.	2
Litoria peroni	2

Limnodynastes tasmaniensis	1
Neobatrachus pictus	1
Aprasia inaurita	1
Ctenotus brooksi	1
Ctenotus regius	1
Ctenotus robustus	1
Ctenotus orientalis	1
Delma australis	1
Delma molleri	1
Delma sp.	1

Egernia striolata	1
Eremiascincus richardsonii	1
Gehyra variegata	1
Hemiergis millewe	1
Lampropholis delicata	1
Lialis burtonis	1
Morelia spilota	1
Strophurus intermedius	1
Tiliqua occipitalis	1
Varanus varius	1

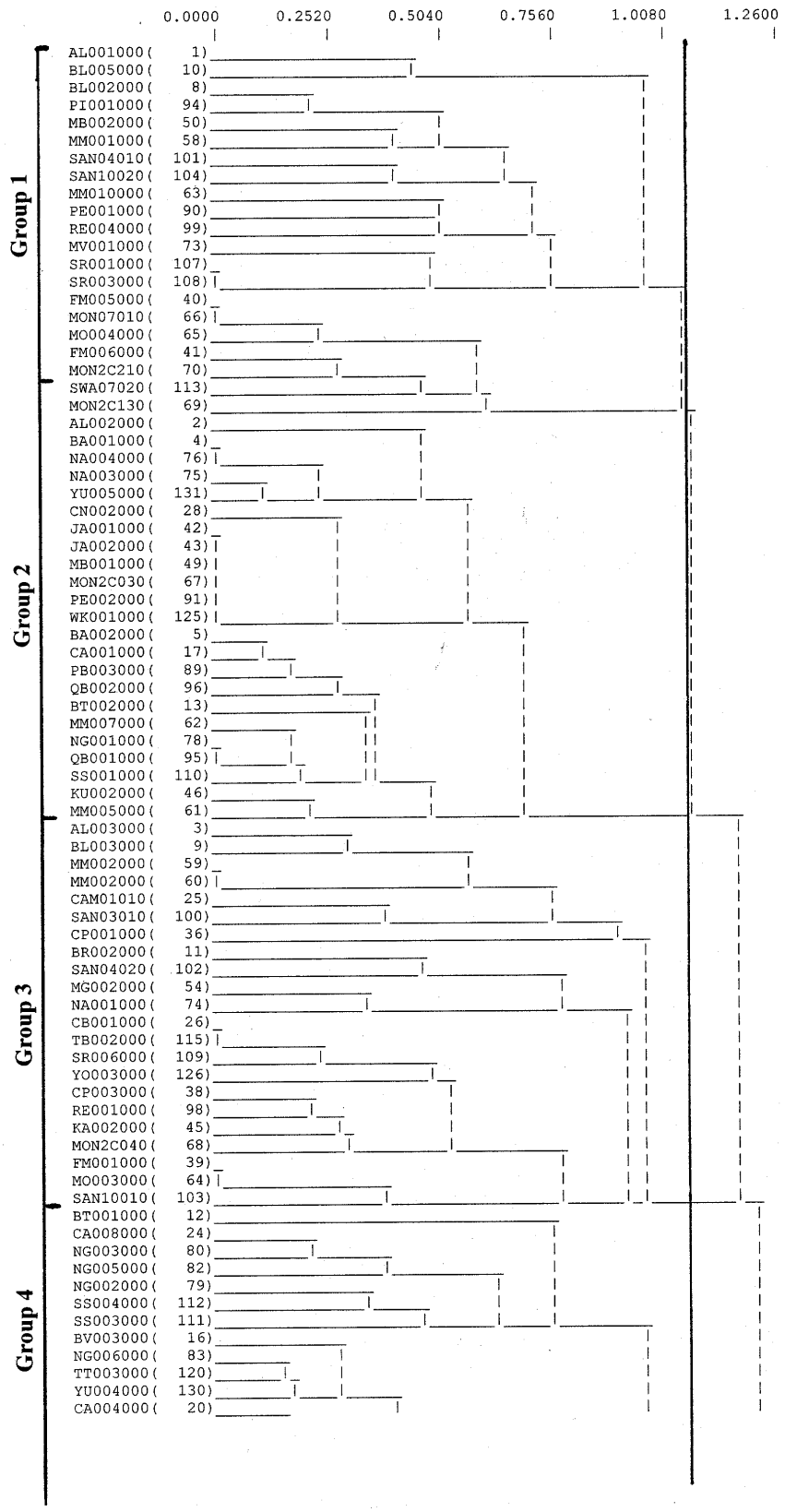
SPECIES PATTERNS

Of the 173 sites that were surveyed for reptiles, 133 sites and 31 species were included in the analysis, following the masking of single species records, snakes, pygopids and goannas. The resultant dendrogram (Figure 69) shows the relationships or dissimilarities between the sites in the analysis. The overall dissimilarity of 1.26 indicates a relatively low degree of difference in the composition of the groups.

The two-way table of species incidence by quadrat (Table 20) combines the results of the quadrat and species analyses into a more easily interpreted form. The species are represented down the left hand side as the first four letters of the genus and species (eg AMPHNOBB is *Amphibolurus nobbi*)

Descriptions of the groups identified are set out in the following order:

- Reptile assemblage group number
- Number of sites comprising the group;
- Number of species recorded in the group;
- Mean number of species recorded in the group;
- Range or minimum and maximum species richness within the group;
- A brief description of the group;
- A map showing the distribution of the sites represented in the group relative to sites from other groups
- A table showing species recorded in order of decreasing frequency, chi-square value, proportion of total individual species observations represented by each species in that group and the number of groups in which each species is found.
- A table listing the corresponding floristic PATN groups for sites where the reptile group was recorded.


0.0000
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0.5040
0.7560
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1.2600
Group 1
Group 2
Group 3
Group 4
AL001000(1)
BL005000(10)
BL002000(8)
PI001000(94)
MB002000(50)
MM001000(58)
SAN04010(101)
SAN10020(104)
MM010000(63)
PE001000(90)
RE004000(99)
MV001000(73)
SR001000(107)
SR003000(108)
FM005000(40)
MON07010(66)
MO004000(65)
FM006000(41)
MON2C210(70)
SWA07020(113)
MON2C130(69)
AL002000(2)
BA001000(4)
NA004000(76)
NA003000(75)
YU005000(131)
CN002000(28)
JA001000(42)
JA002000(43)
MB001000(49)
MON2C030(67)
PE002000(91)
WK001000(125)
BA002000(5)
CA001000(17)
PB003000(89)
QB002000(96)
BT002000(13)
MM007000(62)
NG001000(78)
QB001000(95)
SS001000(110)
KU002000(46)
MM005000(61)
AL003000(3)
BL003000(9)
MM002000(59)
MM002000(60)
CAM01010(25)
SAN03010(100)
CP001000(36)
BR002000(11)
SAN04020(102)
MG002000(54)
NA001000(74)
CB001000(26)
TB002000(115)
SR006000(109)
YO003000(126)
CP003000(38)
RE001000(98)
KA002000(45)
MON2C040(68)
FM001000(39)
MO003000(64)
SAN10010(103)
BT001000(12)
CA008000(24)
NG003000(80)
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TT003000(120)
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CA004000(20)

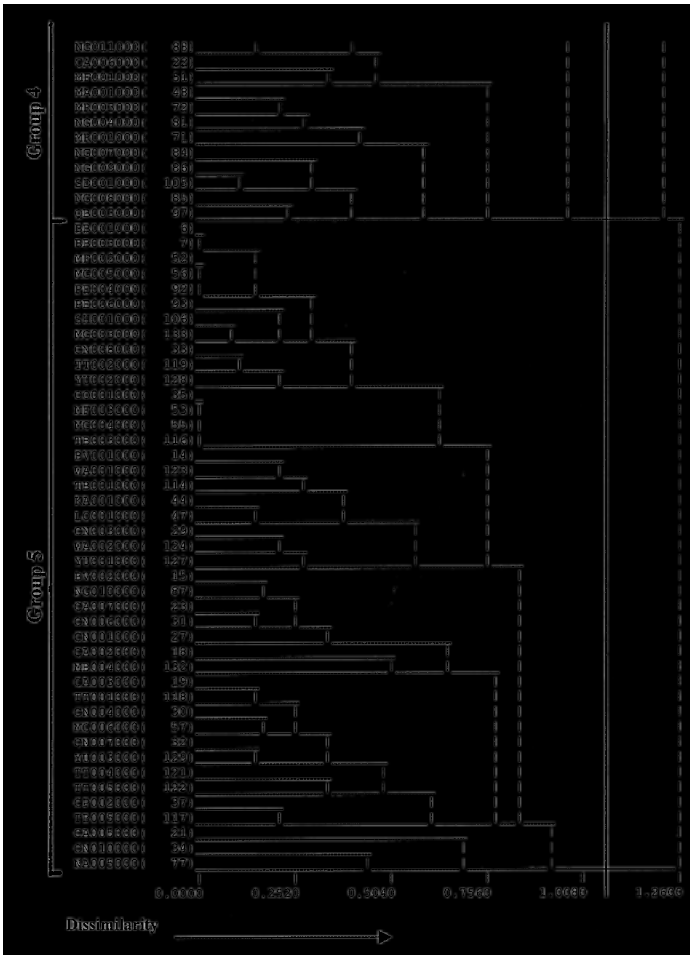

Figure 62.
Dendrogram from PATN analysis of reptile data showing quadrat groups.

Table 19.
Two-way table of reptile species analysis showing groups of quadrats by species.

```
          Group 1                 Group 2                 Group 3                 Group 4                 Group 5

          ABBPMMSSMPRMSSFMMFMSM|ABNNYCJJMMPWBCPQBMNQSKM|ABMMCSCBSMNCTSYCRKMFMS|BCNNNSSBNTYCNCMMMNMNNSNQ|BBMMPPSMCTYCMMTBWTKLCWYBNCCCCMCTCMCYTTCTCCN
          LLLIBMAAMEEVRRMOOMOWO|LAAAUNAABOEKAABBTMGBSUM|LLMMAAPRAGABBROPEAOMOA|TAGGGSSVGTUAGAFARGRGGDGB|BBFGEEHGNTUOFGBVABAONAUVGANNABATNGNUTTPBANA
          000000NN0000000N00NAN|000000000N0000000000000|0000MN00N000000000N00N|0000000000000000000000000|0000000000000000000000000000000000000000000
          0000000110000000000202|0000000000200000000000|0000000000000000002001|0000000000001000000000000|0000000000000000000000001000000000000000010
          1521214001411357 46C7C|214352121C2121322711125|3322131242112633 12C130|1835243363441611341791 83|1325461382213431111132120761243146734525505
          0000000000000000000201|0000000000000000000000|0000000000000000000000|0000000000000000000000000|0000000000000000000000000000000000000000000
          0000001200000000100123|0000000003000000000000|0000110020000000004001|0000000000000000000000000|0000000000000000000000000000000000000000000
          0000000000000000000000|0000000000000000000000|0000000000000000000000|0000000000000000000000000|0000000000000000000000000000000000000000000
                                |                      |                      |                      |
AMPHNOBB                        |                      | *******      **      |                      |
LERIDORS                *******|                      |    **             ***|                      |
POGOVITT                        |                 *    |     * *              |       *              |     *                       *
CRYPCARN        *               |                      |    ** *              |                      |
LERIPUNC      *                 |                      |*   **                |                      |
CTENBRAC                        |             *        |**                    |                      |
HEMIMILL                        |*                     |****                  |                      |
CTENREGI *          *           |                      | *                    |                      |
DIPLDAMA                        |                *    * |  **                  |*                     |
STROINTE                        |                      |       *              |*                     |
          ----------------------+----------------------+----------------------+----------------------+------------------------------------------
GEHYVARI *     **               |                      |                      |                      |
HETEBINO **    ***              |                      |       **             |                      |
MOREBOUL **   * *   ***         |                      |                      |                      |
NEPHMILI  ******                |                      |*     *               |                      |                                          *
          ----------------------+----------------------+----------------------+----------------------+------------------------------------------
AMPHNORR    *    *              |                      |                      |    ***  *    *   ****  |
CTENPICT      *     **    *     |              **      |                    * |*   *  ****        *****|                *                  *
CTENFORD                        |            ***********| *** *               |******* ***      *  ****|                      *** *      ***   *
CTENUBER      *           *     |               *      |    *      ****    ** |       *** **  *********|                      *****  **  **     *
DIPLVITT                 **     |                      |                  *   |                *  **|                      *******
CTENBROO                        |                      |                    * |*   **  *             *|
CTENROBU    *                   |            *         |  **                  |  ***  ********   *   * |********               *    * ***** * ** **
HEMIPERO                  * *   |   **                 |     *   *            |              *         |***************       *  ***   *****    ***
LERIBOUG *   **                 |    *                 |**                    |    *                   |***********    ********* *** ************
MENEGREY       *                |*****       ****      |**** * ****** ********| ** **          * *    *|     ***         *       *    ****** * *
MOREOBSC  *         **   ***    |********************  |**  ** * *            |    * ***** ********* **|**       *        * *******   ********
TILIRUGO  *****************     | **********************|*****      *** ****   |        ********        |******************** * ****  *****
LAMPDELI                        |                      |                      |             *          |     *                       *    **  *
PHYLMARM           *    *       |     *                |       **             |                      |        **                     *       **
BASSDUPE                        |                      |         **           |                      |
TILIOCCI                        |                   *  |                  *   |                      |                 **
TILISCIN                        |                      |                      |                      |       *                     *
```

GROUP NUMBER 1

Number of sites **21**
Number of species in group **19**
Mean number of species **4.2**
Range **2 – 9**

Group 1 comprises 21 members (Figure 70) and is characterised by *Morethia boulengeri, Lerista dorsalis, Nephrurus milii* (Figure 71), *Heteronotia binoei* and *Gehyra variegata* (Figure 72). The habitats for these species appear to be a range of eucalypt and non-Eucalypt woodland with harder soils and fallen timber, which are found in the north and north-western portion of the study area. *Morethia boulengeri* and *Gehyra variegata* are restricted to this group. *Tiliqua rugosa* is the most common species in this group.

Species	Common Name	Frequency	Chi-Squ.	Prop. Occur	No. Groups
Tiliqua rugosa	Sleepy Lizard	17	0.6	0.19	5
Lerista dorsalis	Southern Four-toed Slider	7	**13.8**	0.58	2
Morethia boulengeri	Common Snake-eye	7	**31.4**	1.00	1
Morethia obscura	Mallee Snake-eye	6	2.2	0.19	5
Nephrurus milii	Thick-Tailed Gecko	6	**14.8**	0.67	3
Heteronotia binoei	Bynoe's Gecko	5	**13.7**	0.71	2
Ctenophorus pictus	Painted Dragon	4	0.2	0.20	5
Gehyra variegata	Tree Dtella	3	**13.5**	1.00	1
Lerista bougainvillii	Bougainville's Skink	3	2.0	0.17	5
Amphibolurus norrisi	Mallee Tree-Dragon	2	0.1	0.18	2
Ctenotus regius	Eastern Desert Ctenotus	2	4.9	0.67	2
Ctenotus orientalis	Eastern Spotted Ctenotus	2	2.1	0.16	5
Diplodactylus vittatus	Wood Gecko	2	0.1	0.15	4
Hemiergis peronii	Four Toed Earless Skink	2	2.1	0.16	5
Christinus marmoratus	Marbled Gecko	2	0.1	0.20	4
Cryptoblepharus plagiocephalus	Desert Wall Skink	1	0.2	0.25	2
Ctenotus robustus	Eastern Striped Skink	1	4.0	0.13	5
Lerista punctatovittata	Spotted Slider	1	0.2	0.25	2
Menetia greyii	Dwarf Skink	1	5.9	0.12	5

Floristic PATN Group	Frequency
Eucalyptus gracilis, E. oleosa Very open mallee	3
Eucalyptus incrassata Open mallee	3
Geijera linearifolia, Myoporum platycarpum Low open woodland	3
Alectryon oleifolius Tall very open shrubland	1
Atriplex stipitata, +/- M. tricoptera,+/- M. pentatropis,+/- Zygophyllum sp. Low open shrubland	1
Eucalyptus brachycalyx Open low mallee	1
Eucalyptus camaldulensis Woodland	1
Eucalyptus incrassata, Leptospermum coriaceum Very open mallee	1
Eucalyptus leptophylla, E. socialis Open mallee	1
Eucalyptus porosa+/- Lomandra effusa Low woodland	1
Halosarcia sp. Low very open shrubland	1
Melaeuca uncinata Closed shrubland	1
Melaleuca acuminata, M. lanceolata, +/- Eucalyptus socialis, +/- E. leptophylla Tall open shrubland	1
Melaleuca lanceolata +/- M. acuminata Shrubland	1
Stipa sp. Open tussock grassland	1
Xanthorrhoea caespitosa/semiplana, +/- Banksia marginata Tall open shrubland	1

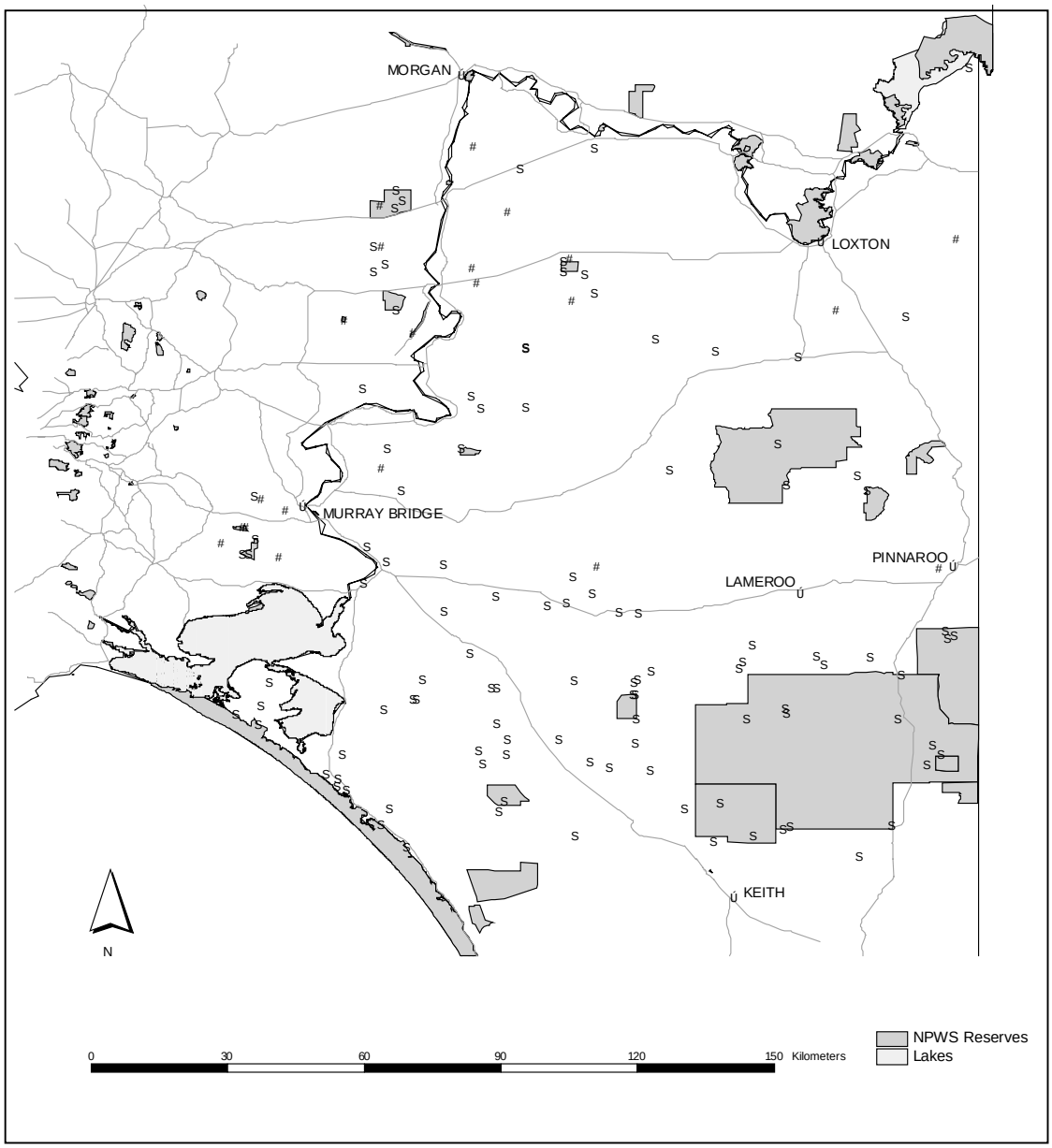

Figure 70.
Distribution of sites representing reptile PATN group 1 (closed circles) and other reptile groups (open circles).

Figure 71.
The Thick-tailed Gecko (*Nephrurus millii*) was a characteristic species of group 1. **Photo: A. Robinson**

Figure 72.
The Tree Dtella (*Gehyra variegata*) was restricted to PATN group 1. **Photo P. Canty**

GROUP NUMBER 2

Number of sites **23**
Number of species in group **15**
Mean number of species **3.4**
Range 2 - 6

Group 2 was poorly defined by the analysis and comprises 23 members (Figure 73) and is characterised by a range of species that can be considered generalists such as *Morethia obscura* (Figure 74) and *Lerista bougainvillii* (Figure 75). The habitats can be generalised as mallee woodland and *Triodia* with leaf litter, ranging from coastal heathlands to semi-arid scrub and woodland with no distinct distribution in the study area. Four species (particularly *Tiliqua rugosa* and *Morethia obscura*) dominate and the remaining 11 species were recorded with a frequency of 2 or less.

Species	Common Name	Frequency	Chi-Squ.	Prop. Occur	No. Groups
Tiliqua rugosa	Sleepy Lizard	22	2.8	0.25	5
Morethia obscura	Mallee Snake-eye	21	6.9	0.30	5
Ctenophorus fordi	Mallee Dragon	11	3.0	0.29	4
Menetia greyii	Dwarf Skink	9	0.1	0.18	5
Ctenophorus pictus	Painted Dragon	2	0.6	0.10	5
Diplodactylus damaeus	Beaded Gecko	2	1.5	0.40	3
Hemiergis peronii	Four Toed Earless Skink	2	2.6	0.16	5
Ctenotus brachyonyx	Brown Ctenotus	1	0.4	0.33	2
Ctenotus robustus	Eastern Stiped Skink	1	4.6	0.13	5
Ctenotus orientalis	Eastern Spotted Ctenotus	1	4.0	0.13	5
Hemiergis millewae	Rusty Earless Skink	1	0.1	0.20	2
Lerista bougainvillii	Bougainville's Skink	1	5.4	0.12	5
Christinus marmoratus	Marbled Gecko	1	0.3	0.10	4
Pogona vitticeps	Central Bearded Dragon	1	0.1	0.17	4
Tiliqua occipitalis	Western Bluetongue	1	0.1	0.25	3

Floristic PATN Group	Frequency
Melaleuca acuminata, M. lanceolata, +/- Eucalyptus socialis, +/-E. leptophylla Tall open shrubland	6
Eucalyptus gracilis, E. oleosa Very open mallee	4
Allocasuarina pusilla, Leptospermum coriaceum, +/- Banksia ornata Tall open shrubland	2
Eucalyptus leucoxylon ssp. Low woodland	2
Callitris verrucosa Tall open shrubland	1
Eucalyptus arenacea Low woodland	1
Eucalyptus calycogona, E. dumosa Very open mallee	1
Eucalyptus cyanophlla, +/- E. socialis Open mallee	1
Eucalyptus diversifolia, Olearia axillaris Very open mallee	1
Eucalyptus incrassata, Leptospermum coriaceum Very open mallee	1
Eucalyptus incrassata Open mallee	1
Eucalyptus leptophylla, E. socialis Open mallee	1
Eucalyptus porosa Low very open woodland	1

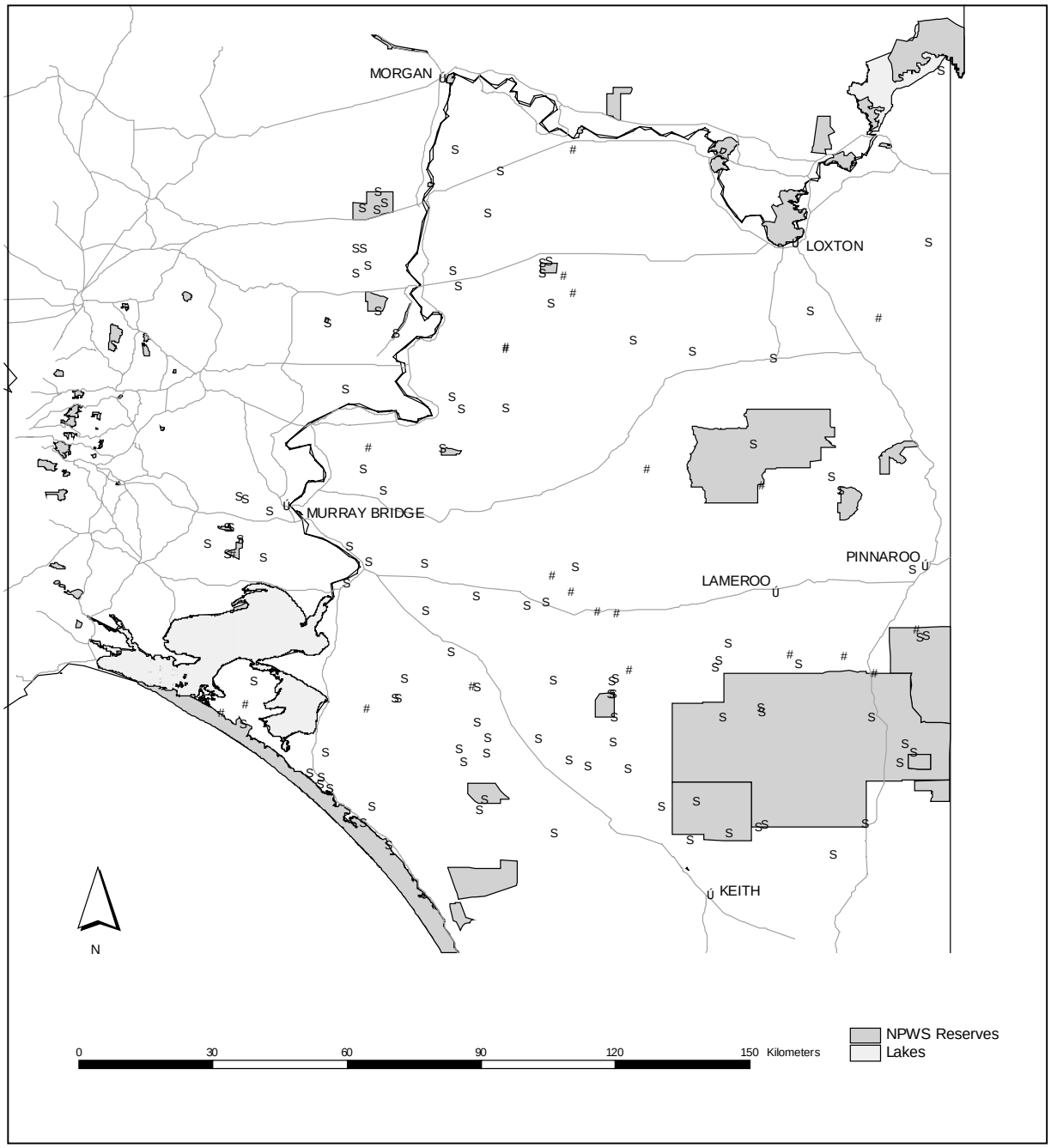

Figure 73.
Distribution of sites representing reptile PATN group 2 (closed circles) and other reptile groups (open circles).

Figure 74.
The Mallee Snake-eye (*Morethia obscura*) was found throughout the study area and was most strongly associated with quadrats with a dense litter layer in PATN group 2. Photo A. Robinson.

Figure 75.
The Mallee Dragon (*Ctenophorus fordi*) was found in a wide range of mallee dominated habitats. Photo A. Robinson.

GROUP NUMBER 3

Number of sites	**22**
Number of species in group	**25**
Mean number of species	**3.8**
Range	**2 - 8**

Group 3 comprises 22 members (Figure 76) and has the highest species richness of the groups (25 species). The group is the characterised by *Amphibolurus nobbi* (Figure 77), *Menetia greyii* and *Hemiergis millewae* (Figure 78). The occurrence of these species is characterised by unburnt mallee/*Triodia* associations, particularly *E.gracilis/E. oleosa* very open mallee. *Amphibolurus nobbi* is also restricted to this group. Nineteen species have frequency of occurrence of 4 or less.

Species	Common Name	Frequency	Chi-Squ.	Prop. Occur	No. Groups
Menetia greyii	Dwarf Skink	19	**14.6**	0.39	5
Tiliqua rugosa	Sleepy Lizard	12	0.5	0.13	5
Amphibolurus nobbi	Nobbi Dragon	9	**37.9**	1.00	1
Ctenotus orientalis	Eastern Spotted Ctenotus	7	0.3	0.21	5
Morethia obscura	Mallee Snake-eye	6	2.6	0.19	5
Lerista dorsalis	Southern Four-toed Slider	5	4.6	0.42	2
Ctenophorus fordi	Mallee Dragon	4	0.8	0.11	4
Hemiergis millewae	Rusty Earless Skink	4	**12.2**	0.80	2
Cryptoblepharus plagiocephalus	Desert Wall Skink	3	8.3	0.75	2
Lerista punctatovittata	Spotted Slider	3	8.3	0.75	2
Bassiana duperreyi	Eastern Three-lined Skink	2	8.4	1.00	2
Ctenotus brachyonyx	Brown Ctenotus	2	4.6	0.67	2
Ctenotus robustus	Eastern Striped Skink	2	2.8	0.15	5
Diplodactylus damaeus	Beaded Gecko	2	1.7	0.40	3
Hemiergis peronii	Four Toed Earless Skink	2	2.3	0.16	5
Heteronotia binoei	Bynoe's Gecko	2	0.6	0.29	2
Lerista bougainvillii	Bougainville's Skink	2	3.5	0.15	5
Nephrurus millii	Thick-tailed Gecko	2	0.2	0.22	3
Christinus marmoratus	Marbled Gecko	2	0.1	0.20	4
Pogona vitticeps	Central Bearded Dragon	2	1.0	0.33	4
Ctenophorus pictus	Painted Dragon	1	1.6	0.15	5
Ctenotus regius	Eastern Desert Ctenotus	1	0.5	0.33	2
Diplodactylus vittatus	Eastern Stone Gecko	1	0.6	0.18	4
Strophurus intermedius	Southern Spiny-tailed Gecko	1	1.4	0.50	2
Tiiqua occipitalis	Western Bluetongue	1	0.2	0.25	3

Floristic PATN Group	Frequency
Eucalyptus gracilis, E. oleosa Very open mallee	7
Eucalyptus leptophylla, E. socialis Open mallee	2
Geijera linearifolia, Myoporum platycarpum Low open woodland	2
Callitris preissii Low open woodland	1
Eucalyptus cyanophlla, +/- E. socialis Open mallee	1
Eucalyptus diversifolia Open mallee	1
Eucalyptus incrassata Open mallee	1
Eucalyptus porosa+/- Lomandra effusa Low woodland	1
*Lepidosperma congestum/laterale/viscidum, Lomandra effusa, Lepidosperma carphoides, Stip*a sp. Very open grassland	1
Maireana sedifolia, +/- Lycium australe Shrubland	1
Melaleuca acuminata, M. lanceolata, +/- Eucalyptus socialis, +/- E. leptophylla Tall open shrubland	1
Melaleuca brevifolia Tall open shrubland	1
Melaleuca halmaturorum Tall open shrubland	1

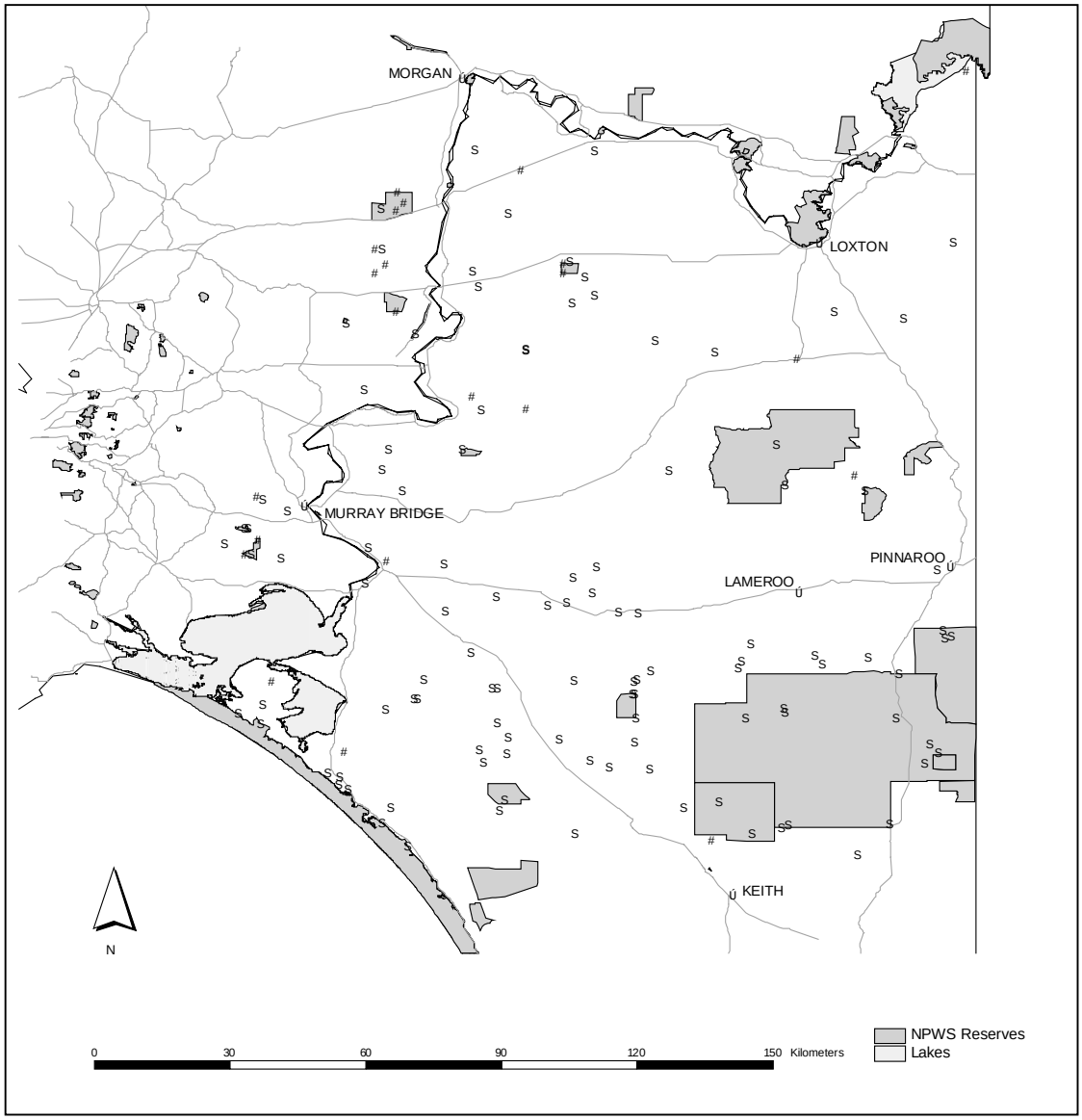

Figure 76.
Distribution of sites representing reptile PATN group 3 (closed circles) and other reptile groups (open circles).

Figure 77:
The Nobbi Dragon (*Ampibolurus nobbi*), a mallee/*Triodia* specialist was restricted to PATN group 3. **Photo A.Robinson**

Figure 78.
The Rusty Earless Skink (*Hemiergis millewae*) is commonly found in *Triodia* habitats. **Photo S. Doyle.**

GROUP NUMBER 4

Number of sites	**24**
Number of species in group	**16**
Mean number of species	**4.5**
Range	**2 - 8**

Group 4 comprises 24 members (Figure 79) and is characterised by *Amphibolurus norrisi* (Figure 80), *Ctenotus brooksi*, *C. orientalis* (Figure 81) and *Ctenophorus pictus.* The habitats are primarily open mallee woodland with a heath understorey on sand ridges that are found in the southern half of the study area, particularly in the Ngarkat complex of parks. *Ctenotus brooksi* is restricted to this group. This group had the highest mean number of species per quadrat (4.5 species).

Species	Common Name	Frequency	Chi-Squ.	Prop. Occur	No. Groups
Morethia obscura	Mallee Snake-eye	17	1.7	0.25	5
Ctenophorus fordi	Mallee Dragon	15	9.7	0.39	4
Ctenotus orientalis	Eastern Spotted Ctenotus	14	**10.1**	0.41	5
Ctenotus robustus	Eastern Striped Skink	13	6.0	0.35	5
Ctenophorus pictus	Painted Dragon	11	**15.1**	0.55	5
Amphibolurus norrisi	Mallee Tree-Dragon	9	**24.8**	0.82	2
Tiliqua rugosa	Sleepy Lizard	8	4.0	0.19	5
Menetia greyii	Dwarf Skink	7	0.4	0.14	5
Ctenotus brooksi	Sandhill Ctenotus	5	**18.6**	1.00	1
Diplodactylus vittatus	Eastern Stone Gecko	3	0.2	0.23	4
Diplodactylus damaeus	Beaded Gecko	1	0.1	0.20	3
Hemiergis peronii	Four Toed Earless Skink	1	4.3	0.13	5
Lampropholis delicata	Delicate Skink	1	0.1	0.17	2
Lerista bougainvillii	Bougainville's Skink	1	5.7	0.12	5
Pogona vitticeps	Central Bearded Dragon	1	0.1	0.17	4
Strophurus intermedius	Southern Spiny-tailed Gecko	1	1.1	0.50	2

Floristic PATN Group	Frequency
Eucalyptus diversifolia Open mallee	5
Eucalyptus incrassata , Leptospermum coriaceum Very open mallee	5
Allocasuarina pusilla, Leptospermum coriaceum, +/- Banksia ornata Tall open shrubland	4
Callitris verrucosa Tall open shrubland	2
Unclassified	2
Eucalyptus arenacea Low woodland	1
Eucalyptus leptophylla, +/- Melaleuca lanceolata Open mallee	1
Eucalyptus leptophylla, E. socialis Open mallee	1
Eucalyptus leucoxylon ssp. Low woodland	1
Eucalyptus oleosa, Melaleuca lanceolata, Acacia halliana/microcarpa, Dodonaea hexandra Very low open mallee	1
Eucalyptus rugosa, +/- E. leptophylla Open mallee	1

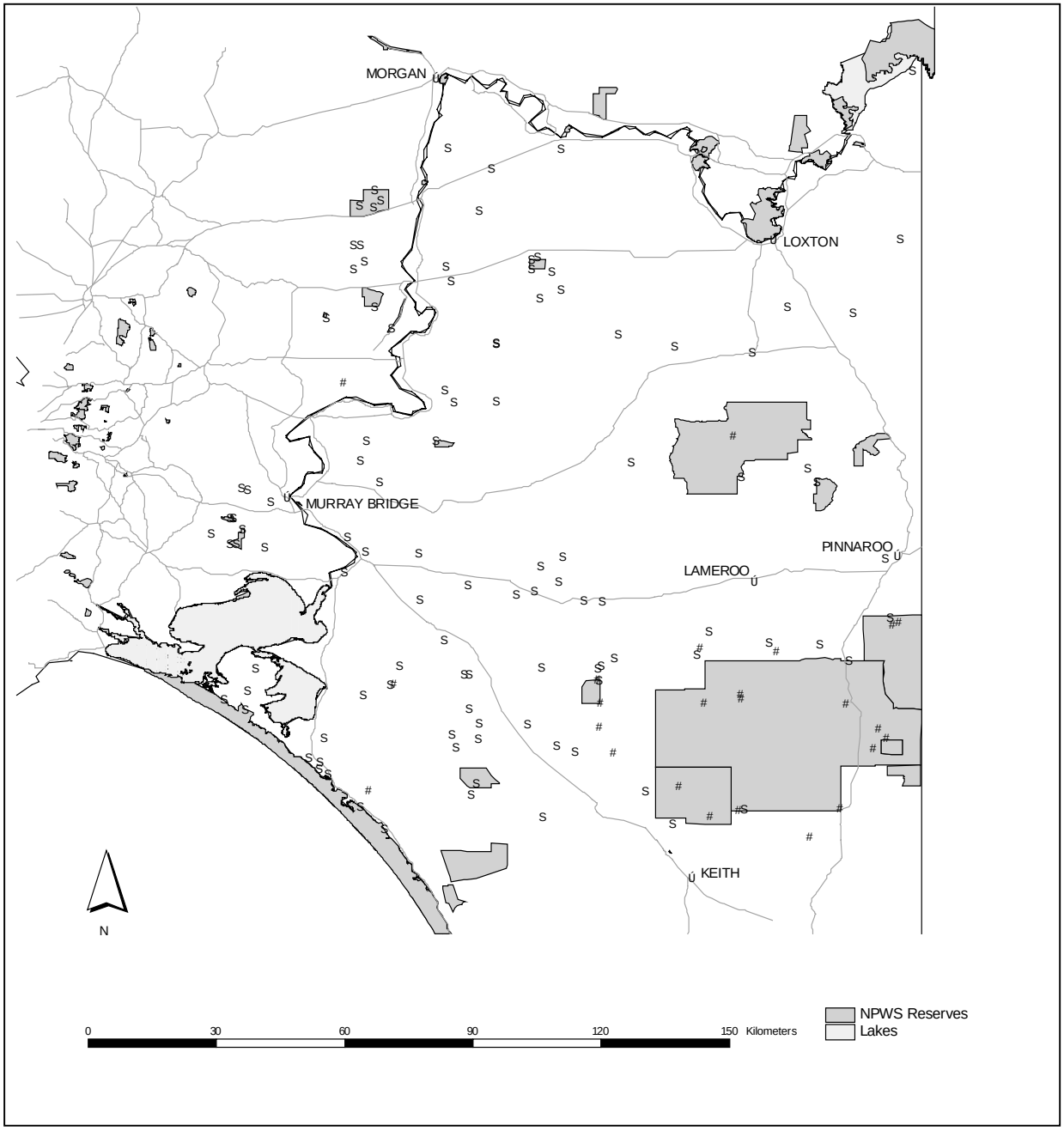

Figure 79.
Distribution of sites representing reptile PATN group 4 (closed circles) and other reptile groups (open circles).

Figure 80.
The Mallee Tree Dragon (*Amphibolurus norrisi*) is commonly found in mallee heath habitats in the southern half of the study area and is characteristic of PATN group 4. **Photo: A. Robinson.**

Figure 81.
The Spotted Ctenotus (*Ctenotus orientalis*) was found in a wide range of habitats throughout the study area. **Photo A. Robinson.**

GROUP NUMBER 5

Number of sites	**43**
Number of species in group	**16**
Mean number of species	**4.4**
Range	**2 – 8**

Group 5 comprises 43 members (Figure 82) and is characterised by *Lerista bougainvillii* (Figure 83) and *Hemiergis peronii* (Figure 84) and is represented by sites predominantly in the south-eastern corner of the study area in open mallee habitat. *Tiliqua scincoides* is present only in this group.

Species	Common Name	Frequency	Chi-Squ.	Prop. Occur	No. Groups
Lerista bougainvillii	Bougainville's Skink	35	**33.8**	0.83	5
Tiliqua rugosa	Sleepy Lizard	30	0.1	0.34	5
Hemiergis peronii	Four Toed Earless Skink	27	**23.3**	0.79	5
Ctenotus robustus	Eastern Striped Skink	20	5.4	0.54	5
Morethia obscura	Mallee Snake-eye	19	0.5	0.28	5
Menetia greyii	Dwarf Skink	13	0.5	0.27	5
Ctenotus orientalis	Eastern Spotted Ctenotus	10	0.1	0.29	5
Ctenophorus fordi	Mallee Dragon	8	1.5	0.21	4
Diplodactylus vittatus	Wood Gecko	7	1.9	0.54	4
Lampropholis delicata	Delicate Skink	5	4.8	0.83	2
Christinus marmoratus	Marbled Gecko	5	1.0	0.50	4
Ctenophorus pictus	Painted Dragon	2	3.1	0.10	5
Pogona vitticeps	Central Bearded Dragon	2	0.1	0.33	4
Tiiqua occipitalis	Western Blue-Tongue	2	0.4	0.50	3
Tiliqua scincoides	Eastern Blue-Tongue	2	2.8	1.00	1
Nephrurus millii	Thick-tailed Gecko	1	1.3	0.11	3

Floristic PATN Group	Frequency
Eucalyptus diversifolia Open mallee	7
Eucalyptus incrassata , *Leptospermum coriaceum* Very open mallee	5
Eucalyptus dumosa, +/- E. leptophylla Mallee	4
Melaleuca acuminata, M. lanceolata, +/- Eucalyptus socialis, +/- E. leptophylla Tall open shrubland	4
Xanthorrhoea caespitosa/semiplana, +/- Banksia marginata Tall open shrubland	4
Allocasuarina pusilla, Leptospermum coriaceum, +/- Banksia ornata Tall open shrubland	3
Allocasuarina verticillata, Eucalyptus leucoxylon ssp. Low woodland	2
Eucalyptus gracilis, E. oleosa Very open mallee	2
Eucalyptus leptophylla, +/- Melaleuca lanceolata Open mallee	2
Eucalyptus leptophylla, E. socialis Open mallee	2
Callitris preissii Low open woodland	1
Eucalyptus calycogona, E. dumosa Very open mallee	1
Eucalyptus diversifolia, Olearia axillaris Very open mallee	1
Eucalyptus leucoxylon ssp. Low woodland	1
Eucalyptus porosa Low very open woodland	1
Eucalyptus rugosa, +/- E. leptophylla Open mallee	1
Melaleuca brevifolia Tall open shrubland	1
Melaleuca halmaturorum Tall open shrubland	1

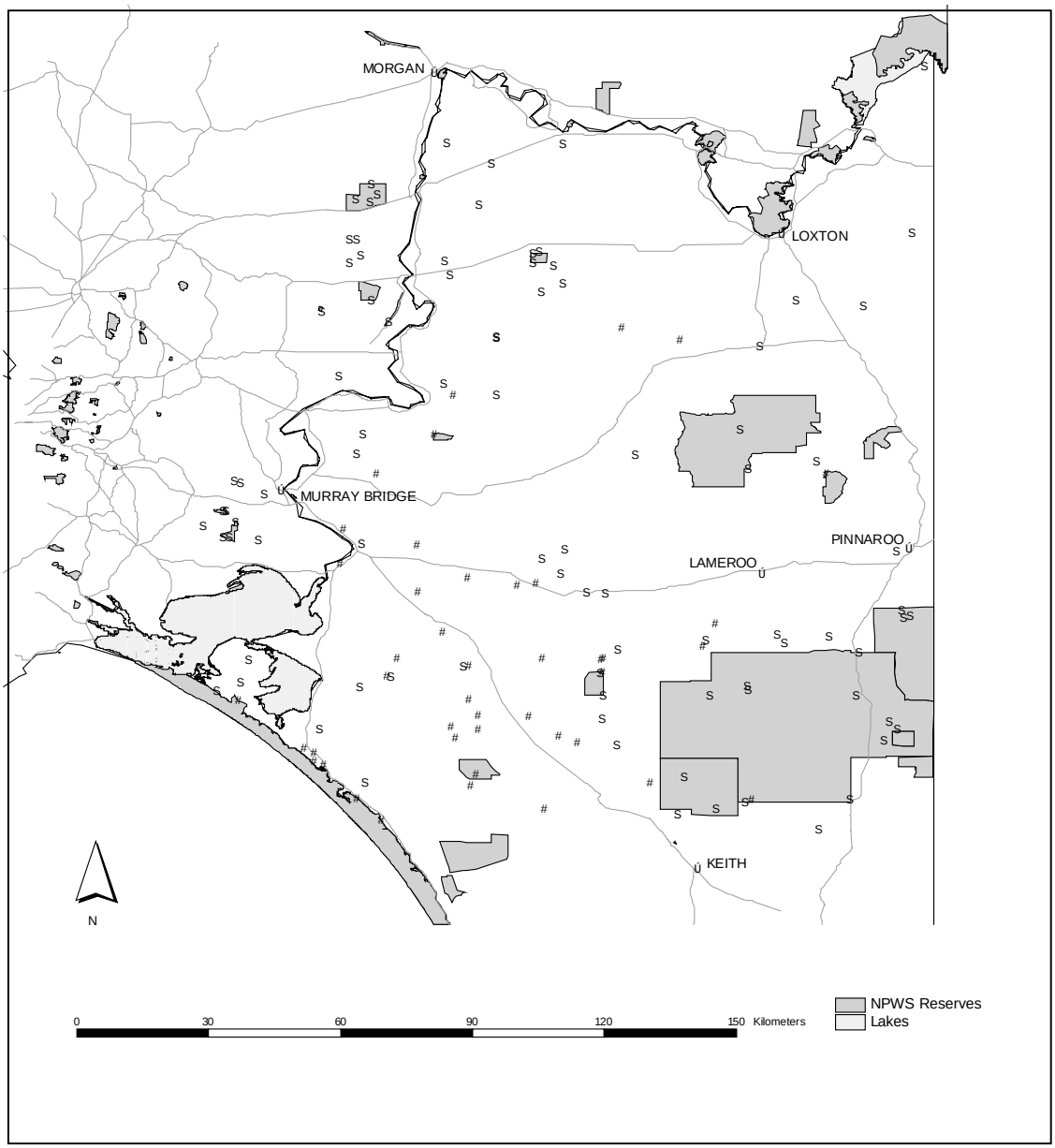

Figure 82.
Distribution of sites representing reptile PATN group 5 (closed circles) and other reptile groups (open circles).

Figure 83.
The Four-toed Earless Skink (*Hemiergis peronii*) is found in heath and scrub plant communities. Photo A. Robinson.

Figure 84.
Bougainville's Skink (*Lerista bougainvillii*) is found in a range of heath and woodland habitats under logs and leaf litter. Photo A. Robinson.

SPECIES OF PARTICULAR INTEREST

Significant Species

Simoselaps australis and the Common Bandy-bandy (*Vermicella annulata*) have both been collected from the Murray Mallee (40 and 3 Museum specimens respectively) but neither were caught on the survey. Both species are subterranean and possibly have been disadvantaged by clearing of large tracts of habitat and by the size of the remnants. Most of the specimens for these two species are pre 1970. *Vermicella annulata* is considered rare in South Australia.

In South Australia *V. annulata* is classified as rare as its distribution and abundance is uncertain but probably sparse. On a national basis it's status is regarded as indeterminate.

Also of interest is the dwarf race of *Pogona vitticeps* (Figure 85), encountered in the heathlands of the southern Murray Mallee/upper Southeast (D. Armstrong, pers. comm.). The dwarf race has also been documented in the Big Desert in western Victoria (Witten and Coventry 1990).

Figure 85.
The Central Bearded Dragon (*Pogona vitticeps*) was very common throughout the study area.
Photo: A. Robinson.

***Morelia spilota* (Carpet Python)**

A widespread python which occurs throughout continental Australia, except in southern Victoria and the arid centre and west. It exists in a variety of habitats but mostly occurs in rocky areas or along watercourses where crevices and tree hollows provide refuge (Hutchinson 1992).

In South Australia the species is classified as vulnerable as the populations have substantially reduced since European settlement, primarily due to vegetation clearance and intensive agriculture. A roadkill was collected during the survey just to the SE of Blanchetown. The S.A. Museum also has specimens from north of Morgan, Robertstown and along the River Murray.

It is mostly nocturnal and often sleeps in burrows of other animals. It feeds on a variety of terrestrial vertebrates (Cogger 1996). A combination of factors, including overgrazing by stock, clearance of habitat for agriculture and grazing, pasture improvement and crop production are thought to be responsible for its reduced distribution (Cogger 1996, Hutchinson 1992).

Figure 86.
The Eastern Banjo Frog (*Lymnodynastes dumerili*) was recorded from four locations during the survey. Photo: A. Robinson.

Figure 87.
The Painted Frog (*Neobatrachus pictus*) was the most commonly captured amphibian on the Murray Mallee Survey. Photo: A. Robinson.

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***Echiopsis curta* (Bardick)**

A medium-sized elapid snake which is widely distributed from south-western Western Australia through southern South Australia to western Victoria and south-western N.S.W. It inhabits heathlands, woodlands and mallee-*Triodia* associations on sandy to loamy soils. It occurs in the north-western section of the study area with records from Peebinga CP (G. Armstrong, pers. comm). A poorly known species usually found under logs and other debris on sandy or loamy soils. It is nocturnal and is known to eat lizards, frogs, birds, mammals and insects. Although venomous, this snake is generally regarded as harmless to humans.

In South Australia the Bardick is classified as rare as its distribution and abundance is uncertain but thought to be sparse due to the decline of habitat quality.

Eastern Bluetongue (*Tiliqua scincoides*)

A large, robust skink which is distributed throughout eastern and northern Australia, extending into south-eastern South Australia. It occurs in virtually all habitats in the study area, except at high altitudes and in humid environments, and shelters in hollow logs and under ground debris. It was recorded on seven occasions during the survey.

In South Australia this species is known from all major regions and specimens have been confirmed from the western margins of the Murray Mallee study area. During the survey, it was not recorded from within the central portion of study area in typical mallee habitats. The closest records are from locations further west and just to the south of the survey area in the upper South east.

Amphibians

Frogs are poorly represented in the mallee region with less than 19% of Australian taxa listed as occurring in mallee communities (Cogger 1989). No frogs are endemic to mallee communities. Two species were recorded from quadrats during the survey: Eastern banjo Frog *Lymnodynastes dumerili* (Figure 86) and *Neobatrachus pictus* (Figure 87). An additional 2 frog species (*Litoria peroni* and *Lymnodynastes tasmaniensis*) were recorded at opportune locations.

The following species is primarily from the riverine corridor, however it will be briefly described here:

Bibron's Toadlet (*Pseudophryne bibroni*)

This species occurs throughout the entire SA Murray-Darling Basin. Bibron's Toadlet is a brown to black frog of approximately 30mm. It is usually found under rocks, logs and litter in both wet and dry sclerophyll forest. Breeding congregations usually occur in inundated grassy areas besides gutters and small creek habitats Cogger (1996). An insufficiently known species that may be of some concern (Tyler 1997). Increasing salinity of breeding sites close to the river has been considered as a potential threat to their survival in the riverine corridor (Stephens 1992).

Of the species recorded from the survey area, three are classified as rare in South Australia (Common Bandy-bandy, Olive Snake-lizard and Bardick) and one is vulnerable in Australia (Carpet Python).

DISCUSSION

Comparison of the South Olary Plains Survey results (Forward & Hutchinson 1996) with that of the Murray Mallee survey reveals some similarities in the composition of the groups. It seems that the more northern Murray Mallee survey reptile PATN groups (1 and 3) are similar to the mallee species groups and the more arid woodland group from the Murray Mallee is similar to the two South Olary Plains woodland groups. Overall however the Murray Mallee reptile groups contained species typical of more mesic habitats.

These reflect a north-south xeric to mesic gradient and an east-west gradient related to changes in soil texture. Only the northern groups had any similarities to those of the Murray Mallee.

The total number of reptile species known from the Murray Mallee study area (76 species) is comparable to the 77 species found in north-western Victoria (Robertson *et al*., 1989) and that of the north-eastern deserts of South Australia (77 species) (Tyler *et al*., 1990), but substantially more than the 56 species recorded on the Murray Mallee Survey. However, in the study area, the remaining natural vegetation is much more degraded and large areas have been cleared for agriculture. Menkhorst and Bennett (1990) report 95 species are known from the southern Australian mallee, but this includes areas in Western Australia which have a very high reptile diversity and consequently high level of endemism relative to the eastern mallee (ie E of Eyre Peninsula). Reptiles are a particularly prominent component of mallee fauna (Menkhorst and Bennett 1990).

The abundance of amphibians is low in mallee environments (Menkhorst and Bennett, 1990) primarily because of the lack of natural permanent water bodies. In this study only 4 species were recorded, which is considerably fewer when compared to other studies; north-western Victoria - 10 species (Robertson *et al*. 1989), southern Australian mallee - 11 species (Menkhorst and Bennett 1989) and the South Olary Plains 10 species (Forward and Robinson 1996).

Reptile species richness at quadrats on the Murray Mallee survey varied from one to 9, averaging 4 per quadrat. In contrast, the South Olary Plains Survey recorded and average of 6.0 species per quadrat, with up to 16 species recorded from a single quadrat (Forward and Hutchinson 1996).

Biogeographic considerations

As discussed in previous chapters, the Murray Mallee is a transition zone between three South Australian regions: the South East, the northern arid zone and the Mt Lofty-Flinders Ranges. On a national scale, the area represents an ecotone between the Bassian zoogeographic subregion, comprising temperate southern and eastern Australia, and the Eyrean subregion, encompassing the semi-arid and arid inland (Bennett *et al.* 1989). However, more of the survey area lies in the Bassian zone. Thus the Murray Mallee contains reptile species with affinities to both these major regions but predominantly Bassian. In general, the mallee reptile fauna as a whole is more Bassian than Eyrean (Menkhorst and Bennett 1990).

The herpetofauna of the Murray Mallee in South Australia generally includes several genera which have speciated extensively in arid environments (e.g. *Ctenotus*, *Lerista*, *Ctenophorus*, *Diplodactylus*) (Menkhorst and Bennett 1989). The few typical Bassian species that occur on the Murray Mallee include the Four-toed Slider (*L. dorsalis*) and the Marbled Gecko (*P. marmoratus*).

Most of the reptile species found on the Murray Mallee survey were generally widespread e.g. Painted Dragon (*Ctenophorus pictus*), Dwarf Skink (*M. greyi*) and Sleepy Lizard (*T. rugosa*). A few species showed far western and/or southern distributions, being more mesic habitat dwellers: Southern Four-toed Slider (*L. dorsalis*), Mallee Snake-eye (*M. obscura*) and the frog *Neobatrachus pictus.*

There is known to be a low level of habitat specialisation amongst mallee reptilian fauna with most species utilising several habitat types (Menkhorst and Bennett, 1989). Seven reptile species have been described as endemic to mallee by Cogger (1989). Of these, three species occurred in the Murray Mallee study area: Barred Snake-lizard (*D. australis*), Mallee Dragon (*C. fordi*) and Sandplain Ctenotus (*C. schomburgkii*). The first two showed a significant association with the mallee areas but *C. schomburkgii* is commonly recorded in non-mallee habitats in the north of the state. However, Menkhorst and Bennett (1990) comment that only one or two reptile species are thought by some experts to be considered true mallee specialists.

On the Murray Mallee survey and more recently on the Flinders Ranges survey, other species also showed a preference for mallee habitats, particularly that with a *Triodia* understorey. These included the Nobbi Dragon (*A. nobbi),* Mallee Dragon (*C. fordi*), Dwarf Skink (*M. greyi*) and the Rusty Earless Skink (*H. millewae*).

Those that generally showed a preference for woodland habitats were particularly the arboreal species: Tree Dtella (*G. variegata*) and the Common Snake Eye (*M. boulengeri*).

Conservation considerations

Despite the enormous impact European settlement has had on the mammal species of Australia, it is remarkable that reptiles and amphibians have not quite suffered to the same extent and that no species are extinct, but many are still threatened, endangered or locally extinct.

Cogger (1989) states that the effects of mallee clearing have resulted in the permanent loss of 70-95% of the original mallee herpetofauna from some locations. Ehmann and Cogger (1985) also note that in the Murray Mallee region of South Australia and N.S.W. the clearing of mallee lands since the mid-1960s has resulted in the permanent removal of 26 species of reptiles from those areas. These figures are particularly relevant for the agricultural region where habitat clearance is the key threatening process. Cogger (1989) has recorded species diversity to be directly proportional to the structural complexity of the understorey vegetation. This vital stratum for reptiles has been substantially altered by overgrazing and changed fire regimes.

Other possible threats to reptile populations are predation by introduced carnivores, indirect poisoning from chemicals, harvesting of timber for firewood and aviary hollows and perhaps more subtle effects such as soil-compaction (Stephens 1992; Cogger 1989). Much more research is needed to accurately assess the status of many species and populations and ascertain key threats.

BIRDS

by J. Foulkes[1]

INTRODUCTION

The birds of the Murray Mallee in South Australia are well documented as have birds of mallee habitats throughout Australia (eg Emison and Bren 1989, Schodde 1990). There are extensive lists and accounts published in journals such as *South Australian Ornithologist* and *Emu*. These include notes on range extensions (eg. Eckert 1972 a,b; Rix 1940), birds of particular parks (eg. Carpenter and Matthew 1986, Attwood 1977) and breeding records (eg. Fraser 1983). Additionally, there are unpublished lists compiled by members of the South Australian Ornithologists Association during visits to parks and reserves throughout the Murray Mallee. A more extensive listing of references relevant to the bird fauna of the Murray Mallee (by no means authoritative) is provided in the bibliography.

A comprehensive examination of ornithological studies in the Murray Mallee is currently being prepared by Matthew and Croft (in prep) and a concise summary is presented here. One of the first studies of birds in mallee was conducted by John Gould in the area now known as the Western Murray Flats. The findings and species accounts from this and other excursions are described in Gould (1848) including accounts of the first collection of typical mallee birds: Southern Scrub-robin, Shy Hylacola and Inland Thornbill.

In the intervening years between Gould's trips and the early 1900's, there was little information on birds collected due to the dense vegetation preventing settlement of all but the River Murray margins.

The expansion of land clearance for agriculture and the establishment of a railway network enabled easier access for ornithologists to the "interior" of the Murray Mallee.

Some of the earlier accounts include Ashby's (1912) account of birds from near Schwetze's Landing and Bellchambers (1916) observations of nesting by Malleefowl. Edwin Ashby published a number of papers on aspects of ornithology in the region between 1912 and 1922. Other ornithologists including S.A. White and Professor Cleland (1936, 1937) made expeditions to Karoonda and Monarto respectively.

Observations of the Western Whipbird were made by McGilip and Parsons (1937, 1939) and Parsons, also collected the first Mallee Emu-wren from South Australia (Sutton 1922). General species lists were prepared by a number of ornithologists in the region, but Sutton (1929) published one of the first concise lists of birds from the southern Murray Mallee that included some habitat detail. Rix (1937) noted the impact of mallee clearance on mallee birds.

The birds of the Mt. Mary District in the north-western portion of the study area were documented by Erhard Boehm in series of papers between 1928 and 1981. He also conducted mist-netting and banding studies and published ecological accounts (Boehm 1974, 1976, 1981). Similarly, Mack (1961, 1970) documented the birds of the upper Murray and into the South Olary Plains. Regional compilations of birds include the birds of Billiatt CP (Carpenter and Matthew 1986), Ninety-Mile Desert (Close 1982, Paton 1982), Mt Rescue CP (Attwood 1977) and Comet Bore (Hatch 1977)

More detailed studies of the ecology of birds have been undertaken by a number of authors including a comprehensive reviews by Schodde (1990) and Emison and Bren (1989). David Paton has undertaken studies on the interactions between European Honeybee's and native birds, Williams (1994) studied the impact of pastoral grazing on bird communities, Possingham and Possingham (1997) have studied the relationships between bird abundance and diversity to habitat type. Woinarski (1989) studied the effects of Broombush harvesting on mallee birds. Species specific studies that have been conducted include Brandle (1991) and Cutten's (1998) studies on Malleefowl and Joseph's (1986) study on Black-eared Miners. Robinson and Traill's (1996) conservation describes the causes of decline in woodland birds (including the mallee habitats) and presents actions needed to prevent further declines.

Extensive collections of eggs of mallee birds were made by Gordon Ragless from the 1940's and collections of birds have been made by Dick Schodde, John Eckert, Leo Joseph and others from the 1960's to the present. A number of studies are also examining the long-term effects of fire on mallee bird communities (G. Carpenter, pers. comm.1998).

In summary, the mallee bird fauna is the best known of the vertebrate groups in the South Australian Murray Mallee.

TOTAL SPECIES

[1] Biological Survey and Research, Heritage and Biodiversity Division, Department for Environment and Heritage, GPO Box 1047 ADELAIDE 5001

A complete list of all bird taxa recorded from the Murray in the current survey and SA Museum records is shown in Appendix XI. The distribution of SA Museum bird records are shown in Figure 88. The total number of species recorded on the survey was 168 (142 species from quadrats) of which five are introduced to Australia. (An additional twelve taxa were only identified to genus.)

The most commonly recorded species on quadrats are shown in Table 21. The most abundant species observed were the White-browed Woodswallow, Galah and Common Bronzewing, whereas the species most widely observed were Grey Shrikethrush, Galah and Spiny cheeked Honeyeater. The most commonly recorded species opportunistically were the Australian Magpie and the White-browed Woodswallow (Table 22).

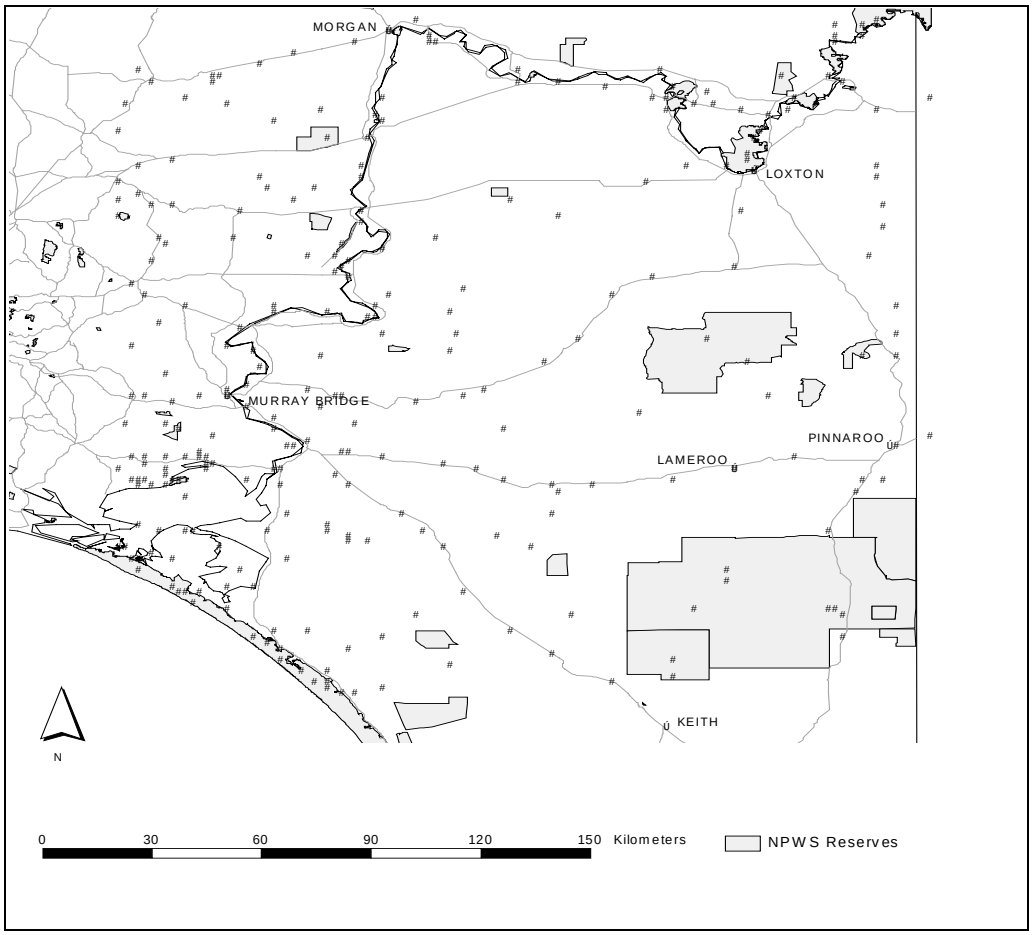


Figure 88.
Distribution of SA Museum bird records from the Murray Mallee region prior to the survey.

Table 21.
Common birds recorded in survey quadrats on the Murray Mallee Biological Survey. Species recorded at > 20% of quadrats are shown. Asterisk denotes introduced species and + indicates included in analysis.

Common Name	Scientific Name	No. of Quadrats	% of total quadrats	Observations (% of Total)
+Grey Shrikethrush	*Colluricincla harmonica*	115	66	1.9
Galah	*Cacatua roseicapillus*	103	60	9.5
Spiny-cheeked Honeyeater	*Acanthagenys rufogularis*	95	55	2.1
White-browed Woodswallow	*Artamus superciliosus*	93	54	11.8
+Australian Magpie	*Gymnorhina tibicen*	93	54	2.2
+Weebill	*Smicrornis brevirostris*	93	54	3.4
Red Wattlebird	*Anthochaera carunculata*	82	47	2.8
+White-browed Babbler	*Pomatostomus superciliosus*	80	46	2.7
+Willie Wagtail	*Rhipidura leucophrys*	73	42	1.1
+Common Bronzewing	*Phaps chalcoptera*	69	40	6.0
+Grey Currawong	*Strepera versicolor*	67	39	1.0
+Grey Butcherbird	*Cracticus torquatus*	65	38	0.8
Brown-headed Honeyeater	*Melithreptus brevirostris*	62	36	1.7
+Yellow-tailed Pardalote	*Pardalotus xanthopygus*	62	36	1.2
+Mallee Ringneck	*Barnardius zonarius*	61	35	1.7
+Variegated Wren	*Malurus lamberti*	59	34	1.8
+Little Raven	*Corvus mellori*	58	34	1.3
+Golden Whistler	*Pachycephala pectoralis*	56	32	0.8
+Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	51	29	1.8
+Superb Blue Wren	*Malurus cyaneus*	51	29	1.3
Silvereye	*Zosterops lateralis*	50	29	1.4
Inland Brown Thornbill	*Acanthiza apicalis*	49	28	1.6
+Striated Pardalote	*Pardalotus striatus*	49	28	1.0
+Singing Honeyeater	*Lichenostomus virescens*	48	28	1.1
Masked Woodswallow	*Artamus personatus*	46	27	3.4
+White-eared Honeyeater	*Lichenostomus leucotis*	46	27	0.7
+*Common Starling	*Sturnus vulgaris*	46	27	2.3
+Southern Scrub-robin	*Drymodes brunneopygia*	43	25	0.7
Black-faced Cuckooshrike	*Coracina novaehollandiae*	38	22	0.4
+Crested Bellbird	*Oreoica gutturalis*	38	22	0.4
+Yellow-plumed Honeyeater	*Lichenostomus ornatus*	37	21	1.0
+White-fronted Honeyeater	*Phylidonyris albifrons*	37	21	1.2
+New Holland Honeyeater	*Phylidonyris novaehollandiae*	37	21	2.1
Rainbow Bee-eater	*Merops ornatus*	35	20	0.6

Table 22.
Opportune bird records for the Murray Mallee Biological Survey. Species with greater than 10 records are shown.

Common Name	Scientific Name	Frequency
Australian Magpie	*Gymnorhina tibicen*	184
White-browed Woodswallow	*Artamus superciliosus*	83
Galah	*Cacatua roseicapilla*	56
Little Raven	*Corvus mellori*	52
Crested Pigeon	*Ocyphaps lophotes*	44
Brown Falcon	*Falco berigora*	38
Malleefowl	*Leipoa ocellata*	30
White-winged Chough	*Corcorax melanorhamphos*	28
Bluebonnet	*Northiella haematogaster*	24
Budgerigah	*Melopsittacus undulatus*	23
Emu	*Dromaius novaehollandiae*	22
Common Bronzewing	*Phaps chalcoptera*	20
Masked Woodswallow	*Artamus personatus*	18
Richard's Pipit	*Anthus novaeseelandiae*	16
Ring-necked Parrot	*Barnardius zonarius*	16
Grey Currawong	*Strepera versicolor*	16
Spiny-cheeked Honeyeater	*Acanthagenys rufogularis*	15
Brown Songlark	*Cincloramphus cruralis*	13
Welcome Swallow	*Hirundo neoxena*	13
Rainbow Bee-eater	*Merops ornatus*	13
Mulga Parrot	*Psephotus varius*	13
Straw-necked Ibis	*Threskiornis spinicollis*	13
Magpie-lark	*Grallina cyanoleuca*	12
Cockatiel	*Nymphicus hollandicus*	11
Red-rumped Parrot	*Psephotus haematonotus*	11
Grey Shrikethrush	*Colluricincla harmonica*	10
Black-tailed Native-hen	*Gallinula ventralis*	10

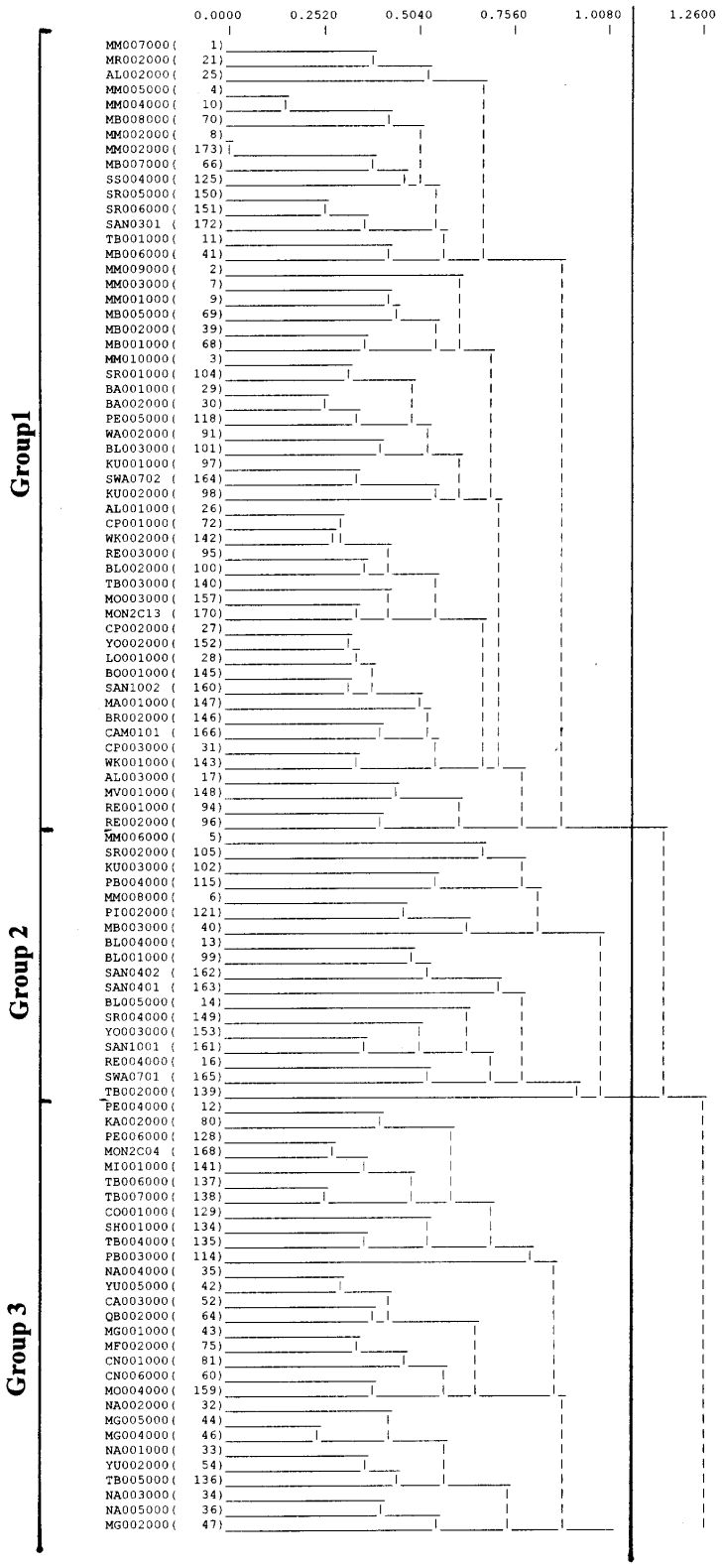
SPECIES PATTERNS

Of the 177 sites that were surveyed for birds, 173 sites and 61 species were included in the analysis, following the masking of single species records, water birds, raptors and migratory species. The resultant dendrogram (Figure 89) shows the relationships or dissimilarities between the sites in the analysis. The overall dissimilarity of 1.26 indicates a relatively low degree of difference in the composition of the groups.

The two-way table of species incidence by quadrat (Table 23) combines the results of the quadrat and species analyses into a more easily interpreted form. The species are represented down the left hand side as the first four letters of the genus and species (eg ACANCHRY is *Acanthiza chrysorrhoa*)

Descriptions of the groups identified are set out in the following order:

- Bird assemblage group number
- Number of sites comprising the group;
- Number of species recorded in the group;
- Mean number of species recorded in the group;
- Range or minimum and maximum species richness within the group;
- A brief description of the group;
- A map showing the distribution of the sites represented in the group relative to sites from other groups
- A table showing species recorded in order of decreasing frequency, chi-square value, proportion of total individual species observations represented by each species in that group; and the number of groups in which each species is found.
- A table indicating the floristic PATN Groups represented by the sites in each group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PE005000(118)
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BL003000(101)
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AL001000(26)
CP001000(72)
WK002000(142)
RE003000(95)
BL002000(100)
TB003000(140)
MO003000(157)
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CP002000(27)
YO002000(152)
LO001000(28)
BO001000(145)
SAN1002 (160)
MA001000(147)
BR002000(146)
CAM0101 (166)
CP003000(31)
WK001000(143)
AL003000(17)
MV001000(148)
RE001000(94)
RE002000(96)
MM006000(5)
SR002000(105)
KU003000(102)
PB004000(115)
MM008000(6)
PI002000(121)
MB003000(40)
BL004000(13)
BL001000(99)
SAN0402 (162)
SAN0401 (163)
BL005000(14)
SR004000(149)
YO003000(153)
SAN1001 (161)
RE004000(16)
SWA0701 (165)
TB002000(139)
PE004000(12)
KA002000(80)
PE006000(128)
MON2C04 (168)
MI001000(141)
TB006000(137)
TB007000(138)
CO001000(129)
SH001000(134)
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YU005000(42)
CA003000(52)
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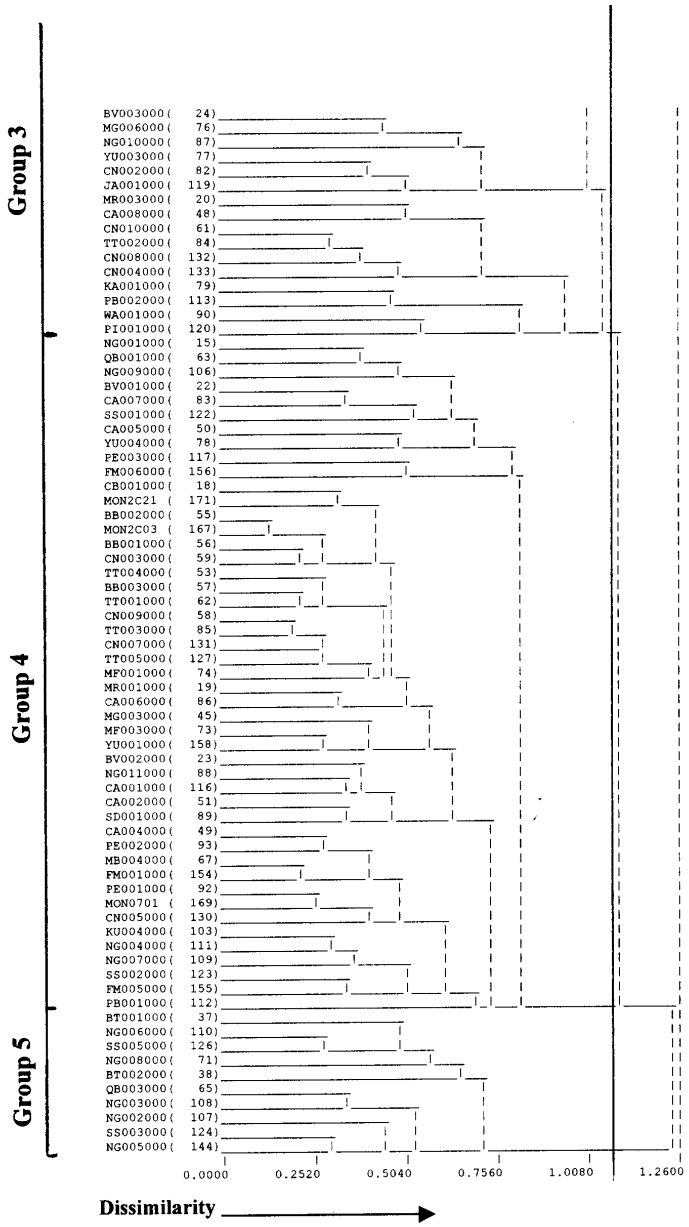
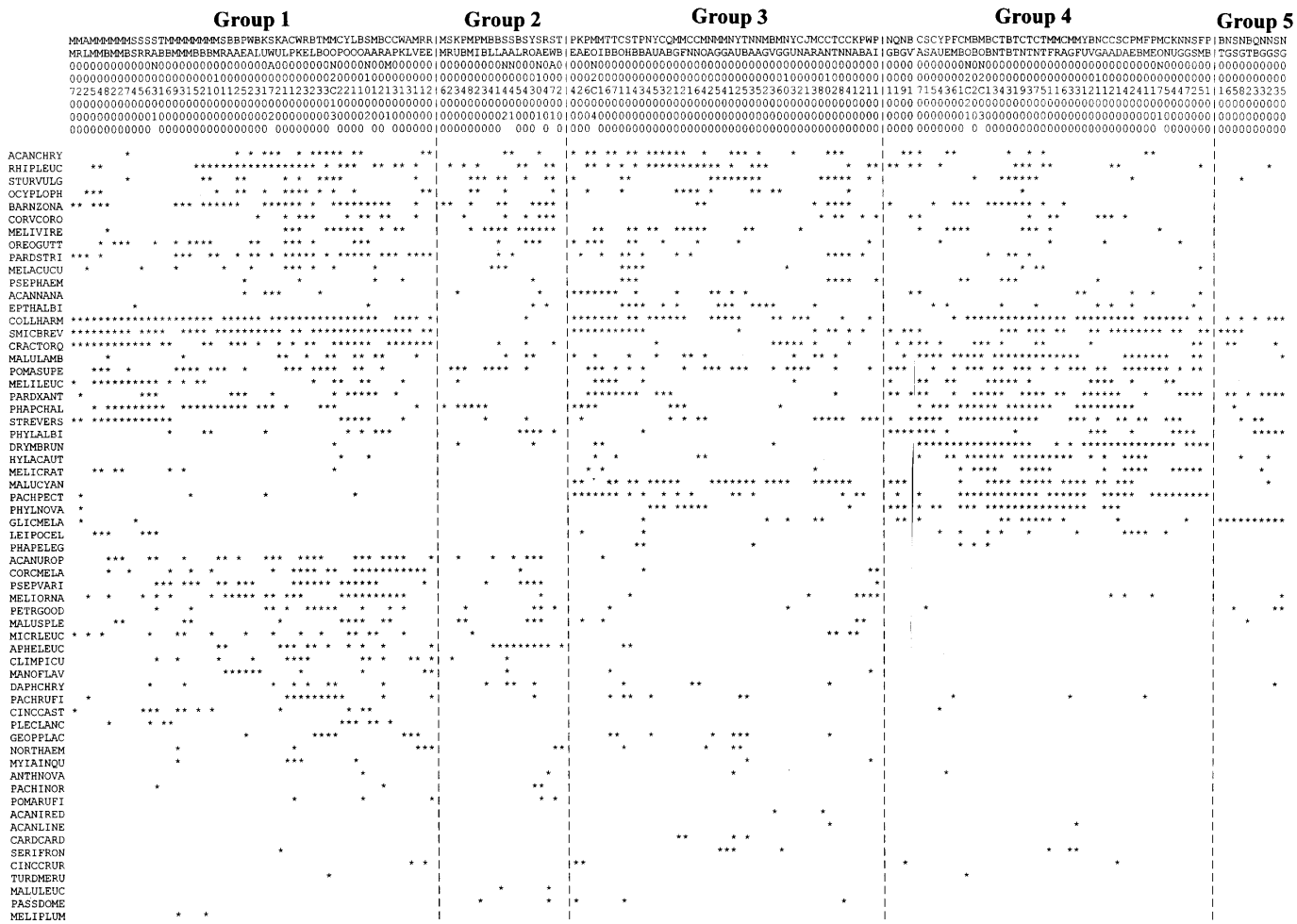


Figure 82.
Dendrogram from PATN analysis of bird data showing quadrat groups.

Table 22.
Two-way table of bird species analysis showing groups of quadrats by species.



GROUP NUMBER 1

Number of sites **53**
Number of species in group **55**
Mean number of species **21**
Range **11-40**

This group consists of 55 sites (Figure 90) which are primarily in the north and north-west of the study area. The birds characteristic of this group are the Striated Pardalote, Yellow-plumed Honeyeater, Chestnut-rumped Thornbill, Mulga Parrot (Figure 91) and the Brown Treecreeper. These species are typical of the drier taller open mallee associations which occur on the red brown loams on calcareous soils in the north and west of the Murray Mallee. Several species nest in hollows in mallee. Typical vegetation associations are *Eucalyptus oleosa-E. gracilis* Open mallee-Low open forest. The most frequently recorded species were Grey Shrike-thrush and Weebill. This group had the highest mean number of species of all the PATN groups (21 species) and the highest number of species recorded on a single quadrat (40 species).

Species	Common Name	Frequency	Chi -Squ	Prop./Freq	Groups
Colluricincla harmonica	Grey Shrikethrush	48	4.27	0.42	5
Smicrornis brevirostris	Weebill	46	10.15	0.49	4
Cracticus torquatus	Grey Butcherbird	37	13.82	0.57	5
Gymnorhina tibicen	Australian Magpie	33	0.56	0.35	5
Barnardius zonarius	Mallee Ringneck	31	7.47	0.51	4
Pardalotus striatus	Striated Pardalote	31	**15.98**	0.63	4
Rhipidura leucophrys	Willie Wagtail	29	1.68	0.40	5
Phaps chalcoptera	Common Bronzewing	28	1.91	0.41	5
Lichenostomus ornata	Yellow-plumed Honeyeater	26	**17.70**	0.70	5
Pardalotus punctatus	Yellow-rumped Pardalote	26	0.01	0.32	5
Acanthiza uropygialis	Chestnut-rumped Thornbill	24	**20.65**	0.77	3
Psephotus varius	Mulga Parrot	24	**22.28**	0.80	3
Corvus mellori	Little Raven	22	0.78	0.38	5
Pomatostomus superciliosus	White-browed Babbler	22	0.37	0.28	4
Lichenostomus leucotis	White-eared Honeyeater	21	2.91	0.46	4
Strepera versicolor	Grey Currawong	20	0.05	0.30	5
Oreoica gutturalis	Crested Bellbird	19	4.53	0.51	4
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	16	0.01	0.31	4
Microeca leucophaea	Jacky Winter	16	12.78	0.76	3
Ocyphaps lophotes	Crested Pigeon	16	2.87	0.48	4
Climacteris picumnus	Brown Treecreeper	14	**15.08**	0.88	2
Lichenostomus virescens	Singing Honeyeater	13	0.33	0.27	4
Petroica goodenovii	Red-capped Robin	13	4.22	0.57	5
Aphelocephala leucopsis	Southern Whiteface	12	2.34	0.50	3
Cinclosoma castanotum	Chestnut Quailthrush	12	0.06	0.92	2
Malurus lamberti	Variegated Wren	12	2.39	0.20	5
Pachycephala rufiventris	Rufous Whistler	12	3.36	0.55	4
Sturnus vulgaris	Common Starling	12	0.48	0.26	5
Corvus coronoides	Australian Raven	11	0.11	0.35	4
Malurus splendens	Splendid Fairy-wren	11	2.57	0.52	4
Melanodryas cucullata	Hooded Robin	11	1.69	0.48	4
Manorina flavigula	Yellow-throated Miner	10	7.64	0.77	3
Plectorhyncha lanceolata	Striped Honeyeater	10	13.52	1.00	1
Phylidonyris albifrons	White-fronted Honeyeater	9	0.71	0.24	5
Daphoenositta chrysoptera	Pallid Cuckoo	8	1.01	0.47	4
Geopelia placida	Peaceful Dove	8	1.38	0.50	2
Lichenostomus cratitia	Purple-gaped Honeyeater	7	0.95	0.23	4
Leipoa ocellata	Malleefowl	6	0.02	0.32	3
Acanthiza nana	Yellow Thornbill	5	1.72	0.19	4
Myiagra inquieta	Restless Flycatcher	5	2.59	0.71	2
Northiella haematogaster	Bluebonnet	5	0.38	0.45	3
Pachycephala pectoralis	Golden Whistler	4	10.87	0.07	3
Psephotus haematonotus	Red-rumped Parrot	4	0.93	0.21	4
Pomatostomus ruficeps	Chestnut-crowned Babbler	3	0.61	0.60	2

Cincloramphus cruralis	Brown Songlark	2	14.19	0.33	3
Epthianura albifrons	White Fronted Chat	2	5.25	0.08	4
Gliciphila melanops	Tawny-crowned Honeyeater	2	6.44	0.07	4
Hylacola cauta	Shy Heathwren	2	7.03	0.06	4
Lichenostomus plumula	Grey-fronted Honeyeater	2	1.28	1.00	1
Pachycephala inornata	Gilbert's Whistler	2	0.06	0.50	2
Anthus novaeseelandiae	Richard's Pipit	1	0.43	0.25	4
Drymodes brunneopygia	Southern Scrub-robin	1	12.19	0.02	4
Phylidonyris novaehollandiae	New Holland Honeyeater	1	10.36	0.03	3
Sericornis frontalis	White-browed Scrubwren	1	1.55	0.13	3
Turdus merula	Blackbird	1	0.02	0.50	2

Floristic PATN Group	**Frequency**
Eucalyptus gracilis, E. oleosa Very open mallee	18
Eucalyptus leptophylla, E. socialis Open mallee	5
Eucalyptus incrassata , Leptospermum coriaceum Very open mallee	4
Melaleuca acuminata, M. lanceolata+/- Eucalyptus socialis/E. leptophylla Tall open shrubland	4
Unclassified	3
Eucalyptus cyanophlla, +/- E. socialis Open mallee	2
Eucalyptus leptophylla, +/- Melaleuca lanceolata Open mallee	2
Eucalyptus porosa Low very open woodland	2
Geijera linearifolia, Myoporum platycarpum Low open woodland	2
Callitris preissii Low open woodland	1
Callitris verrucosa Tall open shrubland	1
Casuarina pauper Low woodland	1
Eucalyptus brachycalyx Open low mallee	1
Eucalyptus camaldulensis Woodland	1
Eucalyptus diversifolia Open mallee	1
Eucalyptus porosa+/- Lomandra effusa Low woodland	1
Maireana sedifolia , +/- Lycium australe Shrubland	1
Melaleuca lanceolata +/- M. acuminata Shrubland	1
Stipa sp Open tussock grassland	1
Xanthorrhoea caespitosa/semiplana, +/- Banksia marginata Tall open shrubland	1

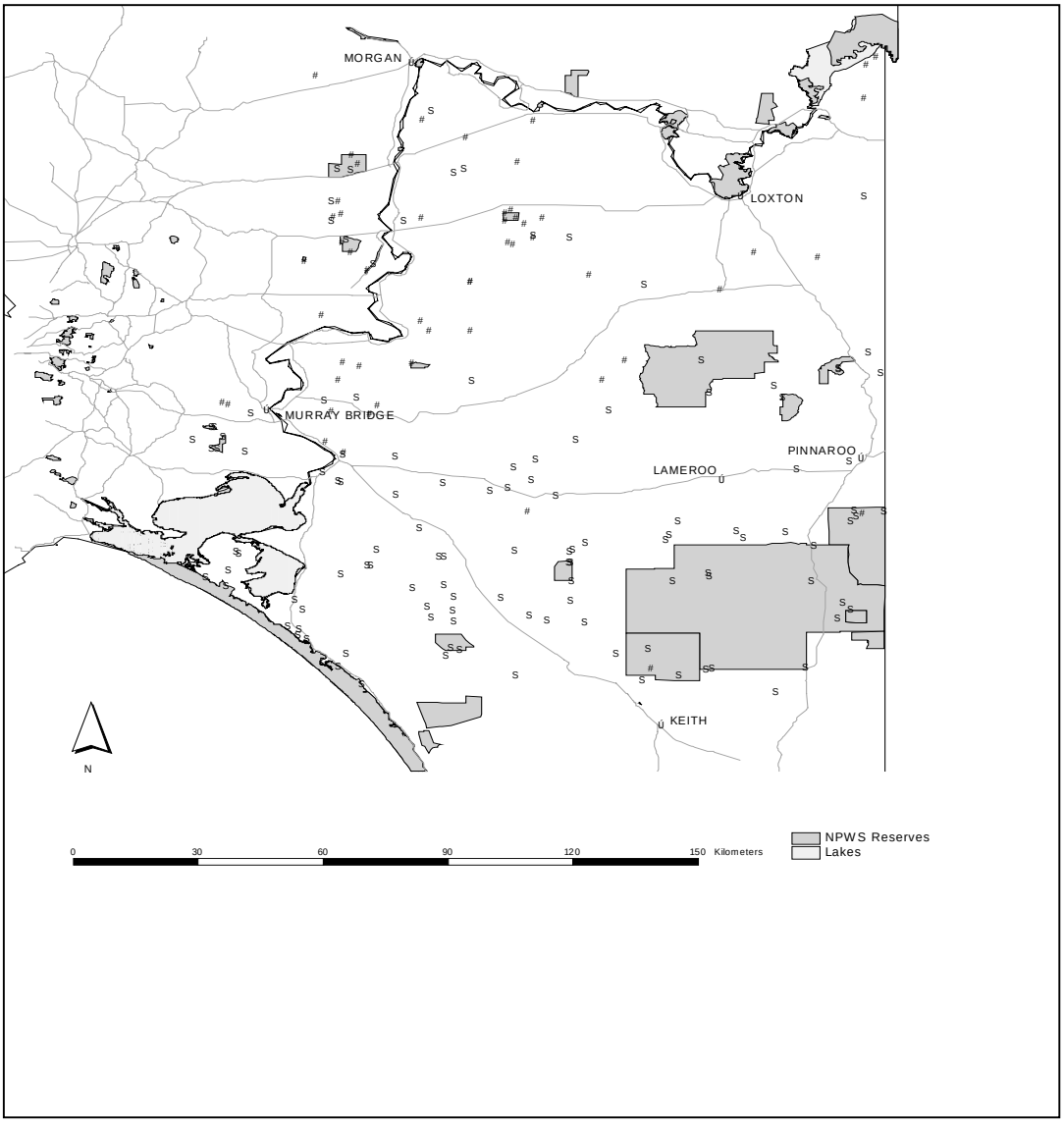


Figure 90.
Distribution of sites representing PATN group 1 (closed circles) and other bird groups (open circles).

Figure 91 .
The Grey Butcherbird was one of the most commonly recorded species during the survey. **Photo SAOA.**

Figure 92.
Mallee Ringneck parrots were a species characteristic to PATN group 1. **Photo SAOA.**

GROUP NUMBER 2

Number of sites **18**
Number of species in group **42**
Mean number of species **13**
Range **6-24**

This small group consists of 18 quadrats (Figure 93) which are situated in a range of eucalypt and non-eucalypt woodland sites predominantly in the north-west of the study area. The species characteristic of this group are the Southern Whiteface and Grey Shrikethrush which are species characteristic of such habitats. The most frequently recorded species were Singing Honeyeater, Australian Magpie and Southern Whiteface.

Species	Common Name	Frequency	Chi Squ	Prop./Freq	Groups
Lichenostomus virescens	Singing Honeyeater	11	0.07	0.23	4
Gymnorhina tibicen	Australian Magpie	11	6.07	0.12	5
Aphelocephala leucopsis	Southern Whiteface	10	**19.64**	0.42	3
Barnardius zonarius	Mallee Ringneck	9	0.73	0.15	4
Sturnus vulgaris	Common Starling	8	0.08	0.17	5
Pomatostomus superciliosus	White-browed Babbler	8	1.54	0.10	4
Rhipidura leucophrys	Willie Wagtail	7	0.16	0.10	5
Corvus coronoides	Australian Raven	6	0.39	0.19	4
Acanthiza uropygialis	Chestnut-rumped Thornbill	6	1.60	0.19	3
Phaps chalcoptera	Common Bronzewing	6	1.60	0.09	5
Corvus mellori	Little Raven	5	0.61	0.09	5
Psephotus varius	Mulga Parrot	5	0.39	0.17	3
Phylidonyris albifrons	White-fronted Honeyeater	5	2.45	0.14	5
Malurus splendens	Splendid Fairy-wren	5	0.11	0.24	4
Oreoica gutturalis	Crested Bellbird	4	0.03	0.11	4
Ocyphaps lophotes	Crested Pigeon	4	0.01	0.12	4
Daphoenositta chrysoptera	Pallid Cuckoo	4	0.51	0.24	4
Petroica goodenovii	Red-capped Robin	4	1.69	0.17	5
Cracticus torquatus	Grey Butcherbird	3	2.69	0.05	5
Melanodryas cucullata	Hooded Robin	3	1.48	0.13	4
Malurus lamberti	Variegated Wren	3	2.16	0.05	5
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	3	0.01	0.06	4
Northiella haematogaster	Bluebonnet	2	2.54	0.18	3
Climacteris picumnus	Brown Treecreeper	2	4.29	0.13	2
Pomatostomus ruficeps	Chestnut-crowned Babbler	2	0.02	0.40	2
Pachycephala inornata	Gilbert's Whistler	2	0.61	0.50	2
Strepera versicolor	Grey Currawong	2	0.11	0.03	5
Passer domesticus	House Sparrow	2	1.85	0.40	2
Drymodes brunneopygia	Southern Scrub-robin	2	0.54	0.05	4
Pardalotus striatus	Striated Pardalote	2	2.82	0.04	4
Epthianura albifrons	White Fronted Chat	2	1.98	0.08	4
Malurus leucopterus	White-winged Wren	2	8.02	1.00	1
Acanthiza nana	Yellow Thornbill	2	1.85	0.07	4
Colluricincla harmonica	Grey Shrikethrush	1	**10.99**	0.01	5
Microeca leucophaea	Jacky Winter	1	2.91	0.05	3
Psephotus haematonotus	Red-rumped Parrot	1	7.56	0.05	4
Anthus novaeseelandiae	Richard's Pipit	1	3.84	0.25	4
Pachycephala rufiventris	Rufous Whistler	1	1.30	0.05	4
Pardalotus punctatus	Yellow-rumped Pardalote	1	1.40	0.01	5
Lichenostomus leucotis	White-eared Honeyeater	1	0.54	0.02	4
Lichenostomus ornata	Yellow-plumed Honeyeater	1	1.10	0.03	5
Manorina flavigula	Yellow-throated Miner	1	0.02	0.08	3

Floristic PATN Group	Frequency

Geijera linearifolia, Myoporum platycarpum Low open woodland	3
Lepidosperma congestum/laterale/viscidum, Lomandra effusa, Lepidosperma carphoides, Stipa sp. Very open grassland	2
Stipa sp Open tussock grassland	2
Unclassified	2
Alectryon oleifolius Tall very open shrubland	1
Atriplex stipitata, +/- M. tricoptera,+/- M. pentatropis,+/- Zygophyllum Low open shrubland	1
Callitris preissii Low open woodland	1
Eucalyptus calycogona, E. dumosa Very open mallee	1
Eucalyptus gracilis, E. oleosa Very open mallee	1
Halosarcia sp. Low very open shrubland	1
Maireana sedifolia , +/- Lycium australe Shrubland	1
Maireana sedifolia Very open shrubland	1
Melaleuca acuminata, M. lanceolata+/- Eucalyptus socialis/E. leptophylla Tall open shrubland	1

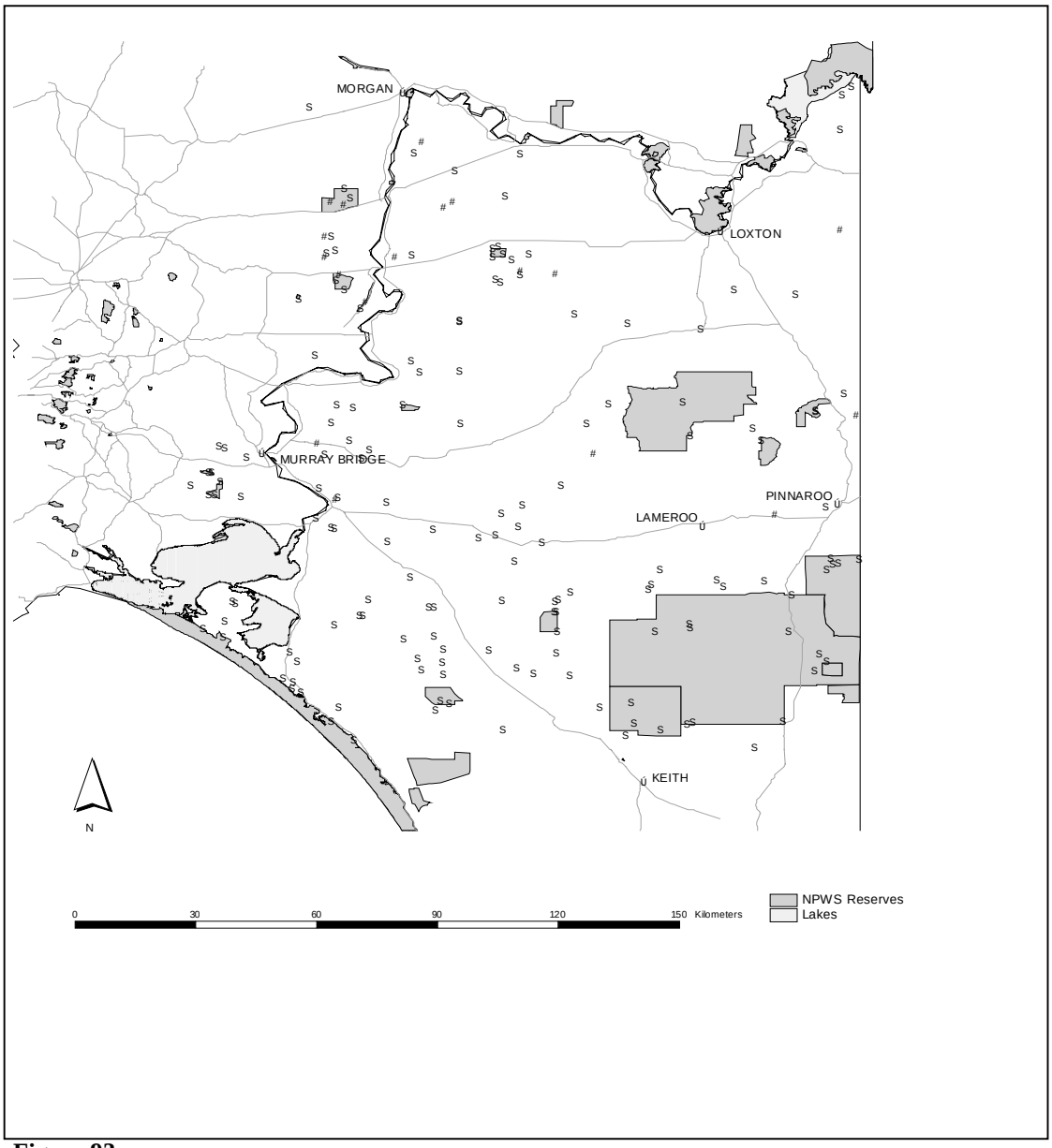


Figure 93.
Distribution of sites representing PATN group 2 (closed circles) and other bird groups (open circles).

Figure 94.
The Splendid Fairy-wren was recorded infrequently through the study area. **Photo L. Pedler.**

GROUP NUMBER 3

Number of sites **45**
Number of species in group **54**
Mean number of species **16**
Range **5-28**

Group 3 consists of 45 sites that are distributed in the south and south-east of the study area (Figure 95) and are primarily open woodland or shrubland habitats. The characteristic species of this group were the Superb Blue Wren, Singing Honeyeater (Figure 96) and Red-rumped Parrot, which are species that primarily occupy more open shrubland, woodland and farmland habitats. The Slender-billed Thornbill and the introduced European Goldfinch were present only in this group. The most frequently recorded species were Superb Blue Wren and Grey Shrikethrush

Species	Common Name	Frequency	Chi Squ.	Prop./Freq	Groups
Malurus cyaneus	Superb Blue Wren	28	**15.27**	0.55	3
Colluricincla harmonica	Grey Shrikethrush	27	0.39	0.23	5
Rhipidura leucophrys	Willie Wagtail	23	0.65	0.32	5
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	22	0.30	0.43	4
Gymnorhina tibicen	Australian Magpie	22	5.11	0.24	5
Pomatostomus superciliosus	White-browed Babbler	20	0.08	0.25	4
Pachycephala pectoralis	Golden Whistler	18	0.59	0.32	3
Smicrornis brevirostris	Weebill	17	1.72	0.18	4
Sturnus vulgaris	Common Starling	17	2.45	0.37	5
Pardalotus punctatus	Yellow-rumped Pardalote	16	1.59	0.20	5
Epthianura albifrons	White Fronted Chat	14	0.08	0.54	4
Lichenostomus virescens	Singing Honeyeater	14	**6.71**	0.29	4
Acanthiza nana	Yellow Thornbill	13	1.39	0.48	4
Strepera versicolor	Grey Currawong	13	4.27	0.19	5
Pardalotus striatus	Striated Pardalote	12	0.99	0.24	4
Ocyphaps lophotes	Crested Pigeon	12	0.12	0.36	4
Malurus lamberti	Variegated Wren	11	1.39	0.19	5
Corvus mellori	Little Raven	11	1.53	0.19	5
Oreoica gutturalis	Crested Bellbird	10	0.01	0.27	4
Phylidonyris novaehollandiae	New Holland Honeyeater	9	0.13	0.24	3
Psephotus haematonotus	Red-rumped Parrot	8	6.08	0.42	4
Geopelia placida	Peaceful Dove	8	5.23	0.50	2
Cracticus torquatus	Grey Butcherbird	8	1.32	0.12	5
Phaps chalcoptera	Common Bronzewing	8	2.68	0.12	5
Barnardius zonarius	Mallee Ringneck	7	5.53	0.11	4
Lichenostomus ornata	Yellow-plumed Honeyeater	6	1.77	0.16	5
Lichenostomus leucotis	White-eared Honeyeater	6	3.49	0.13	4
Pachycephala rufiventris	Rufous Whistler	6	0.01	0.27	4
Gliciphila melanops	Tawny-crowned Honeyeater	5	1.57	0.17	4
Melanodryas cucullata	Hooded Robin	5	0.37	0.22	4
Corvus coronoides	Australian Raven	5	1.40	0.16	4
Malurus splendens	Splendid Fairy-wren	4	0.71	0.19	4
Sericornis frontalis	White-browed Scrubwren	4	0.19	0.50	3
Hylacola cauta	Shy Heathwren	4	0.14	0.13	4
Daphoenositta chrysoptera	Pallid Cuckoo	4	0.71	0.24	4
Microeca leucophaea	Jacky Winter	4	2.80	0.19	3
Carduelis carduelis	Goldfinch	4	0.97	1.00	1
Northiella haematogaster	Bluebonnet	4	5.81	0.36	3
Drymodes brunneopygia	Southern Scrub-robin	3	6.74	0.07	4
Lichenostomus cratitia	Purple-gaped Honeyeater	3	1.11	0.10	4
Passer domesticus	House Sparrow	3	3.84	0.60	2
Phaps elegans	Brush Bronzewing	3	0.57	0.50	2
Manorina flavigula	Yellow-throated Miner	2	3.60	0.15	3
Aphelocephala leucopsis	Southern Whiteface	2	3.36	0.08	3
Acanthiza iredalei	Slender-billed Thornbill	2	1.05	1.00	1
Myiagra inquieta	Restless Flycatcher	2	2.40	0.29	2
Petroica goodenovii	Red-capped Robin	2	0.06	0.09	5

Leipoa ocellata	Malleefowl	2	4.46	0.11	3
Cincloramphus cruralis	Brown Songlark	2	1.85	0.33	3
Phylidonyris albifrons	White-fronted Honeyeater	1	7.09	0.03	5
Acanthiza lineata	Striated Thornbill	1	6.84	0.50	2
Anthus novaeseelandiae	Richard's Pipit	1	8.65	0.25	4
Psephotus varius	Mulga Parrot	1	0.28	0.03	3
Acanthiza uropygialis	Chestnut-rumped Thornbill	1	0.01	0.03	3

Floristic PATN Group	**Frequency**
Eucalyptus diversifolia open mallee	7
Eucalyptus incrassata , *Leptospermum coriaceum* very open mallee	6
Melaleuca acuminata, M. lanceolata+/- Eucalyptus socialis/E. leptophylla tall open shrubland	6
Allocasuarina verticillata, Eucalyptus leucoxylon ssp. Low woodland	3
Eucalyptus dumosa, +/- E. leptophylla mallee	3
Eucalyptus gracilis, E. oleosa very open mallee	3
Allocasuarina pusilla, Leptospermum coriaceum, +/- Banksia ornata tall open shrubland	2
Eucalyptus diversifolia, Olearia axillaris very open mallee	2
Eucalyptus leptophylla, +/- Melaleuca lanceolata open mallee	2
Eucalyptus leptophylla, E. socialis open mallee	2
Eucalyptus leucoxylon ssp. Low woodland	2
Melaleuca brevifolia tall open shrubland	2
Callitris canescens, Eucalyptus dumosa, E. porosa tall very open shrubland	1
Callitris preissii Low open woodland	1
Melaeuca uncinata closed shrubland	1
Melaleuca halmaturorum tall open shrubland	1
Xanthorrhoea caespitosa/semiplana, +/- Banksia marginata tall open shrubland	1

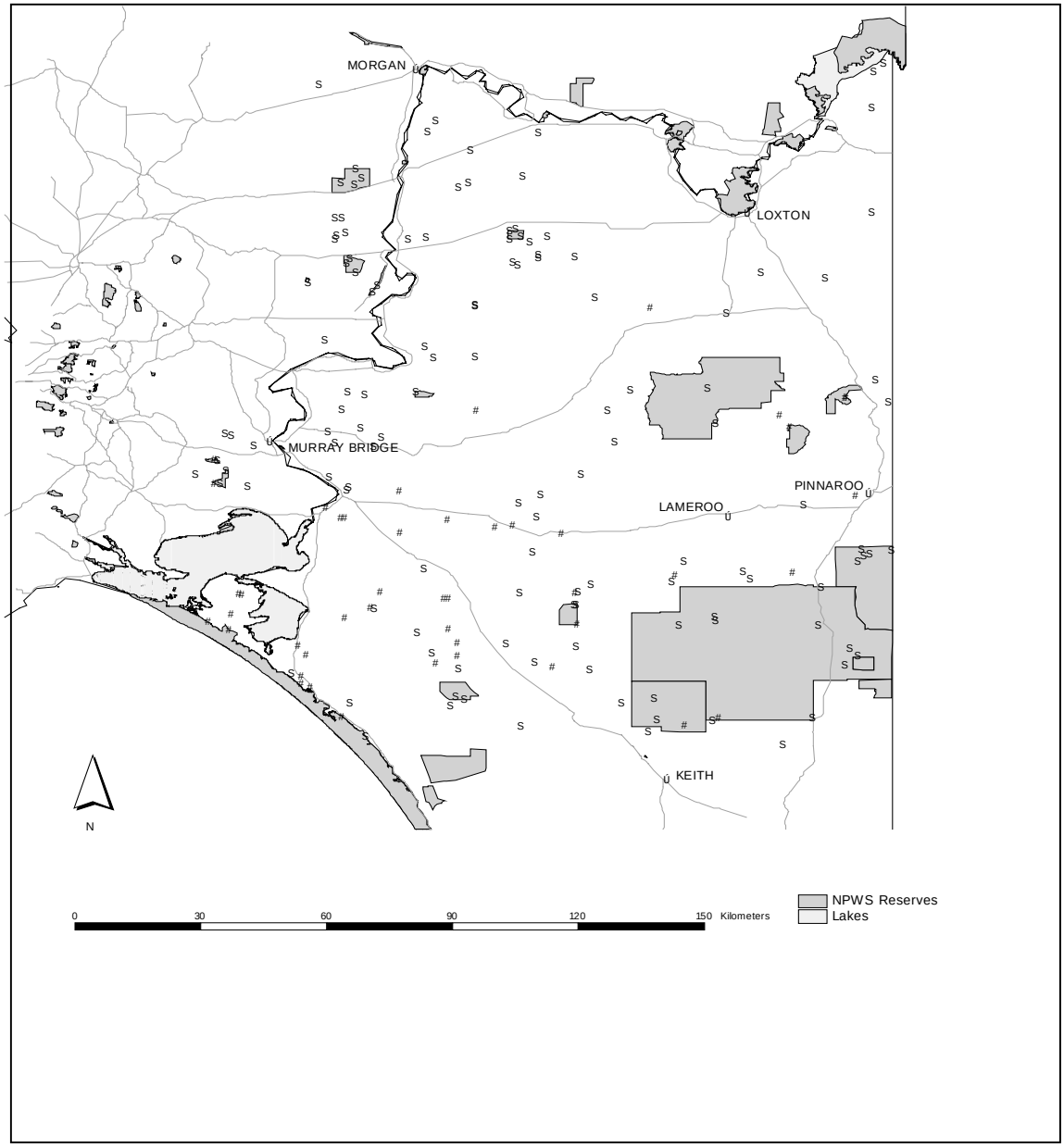


Figure 95.
Distribution of sites representing PATN group 3 (closed circles) and other bird groups (open circles).

Figure 96.
The Singing Honeyeater was one of the species characteristic of PATN group 3. Photo

GROUP NUMBER 4

Number of sites **47**
Number of species in group **43**
Mean number of species **19**
Range **5-39**

This group consists of 47 quadrats which are found across the southern half of the study area in a range of mallee/heath habitats on sandy soils (Figure 97). These habitats provide a large number of nectar producing plants, hence the high incidence of honeyeaters. The characteristic species are Southern Scrub-robin (Figure 97), New Holland Honeyeater, Shy Heathwren and Golden Whistler . The most frequently recorded species were Southern Scrub-robin, Golden Whistler and Grey Shrikethrush.

Species	Common Name	Frequency	Chi Squ	Prop./Freq	Groups
Drymodes brunneopygia	Southern Scrub-robin	37	**52.72**	0.86	4
Pachycephala pectoralis	Golden Whistler	34	**21.98**	0.61	3
Colluricincla harmonica	Grey Shrikethrush	33	0.05	0.29	5
Malurus lamberti	Variegated Wren	32	3.82	0.54	5
Pardalotus punctatus	Yellow-rumped Pardalote	32	14.93	0.39	5
Pomatostomus superciliosus	White-browed Babbler	30	2.77	0.38	4
Strepera versicolor	Grey Currawong	29	5.83	0.43	5
Phylidonyris novaehollandiae	New Holland Honeyeater	27	**26.91**	0.73	3
Gymnorhina tibicen	Australian Magpie	26	0.01	0.28	5
Phaps chalcoptera	Common Bronzewing	26	0.01	0.38	5
Smicrornis brevirostris	Weebill	26	2.43	0.28	4
Hylacola cauta	Shy Heathwren	24	**25.22**	0.75	4
Malurus cyaneus	Superb Blue Wren	22	4.22	0.43	3
Lichenostomus cratitia	Purple-gaped Honeyeater	20	14.57	0.65	4
Lichenostomus leucotis	White-eared Honeyeater	18	2.00	0.39	4
Corvus mellori	Little Raven	17	0.04	0.29	5
Phylidonyris albifrons	White-fronted Honeyeater	17	4.14	0.46	5
Barnardius zonarius	Mallee Ringneck	14	0.98	0.23	4
Cracticus torquatus	Grey Butcherbird	14	0.57	0.22	5
Gliciphila melanops	Tawny-crowned Honeyeater	13	2.71	0.43	4
Rhipidura leucophrys	Willie Wagtail	13	2.32	0.18	5
Leipoa ocellata	Malleefowl	11	5.52	0.58	3
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	10	1.37	0.20	4
Lichenostomus virescens	Singing Honeyeater	10	0.96	0.21	4
Corvus coronoides	Australian Raven	9	0.01	0.29	4
Epthianura albifrons	White Fronted Chat	8	2.00	0.31	4
Sturnus vulgaris	Common Starling	8	0.03	0.17	5
Acanthiza nana	Yellow Thornbill	7	0.10	0.26	4
Psephotus haematonotus	Red-rumped Parrot	6	0.02	0.32	4
Melanodryas cucullata	Hooded Robin	4	7.23	0.17	4
Oreoica gutturalis	Crested Bellbird	4	4.27	0.11	4
Pardalotus striatus	Striated Pardalote	4	1.21	0.08	4
Lichenostomus ornata	Yellow-plumed Honeyeater	3	5.67	0.08	5
Pachycephala rufiventris	Rufous Whistler	3	2.02	0.14	4
Phaps elegans	Brush Bronzewing	3	0.05	0.50	2
Sericornis frontalis	White-browed Scrubwren	3	0.46	0.38	3
Cincloramphus cruralis	Brown Songlark	2	2.60	0.33	3
Acanthiza lineata	Striated Thornbill	1	7.99	0.50	2
Anthus novaeseelandiae	Richard's Pipit	1	5.29	0.25	4
Cinclosoma castanotum	Chestnut Quailthrush	1	0.32	0.08	2
Ocyphaps lophotes	Crested Pigeon	1	0.01	0.03	4
Petroica goodenovii	Red-capped Robin	1	0.01	0.04	5
Turdus merula	Blackbird	1	0.01	0.50	2

Floristic PATN Group	Frequency

Eucalyptus diversifolia Open mallee	9
Allocasuarina pusilla, Leptospermum coriaceum, +/- Banksia ornata Tall open shrubland	6
Eucalyptus incrassata , Leptospermum coriaceum Very open mallee	5
Eucalyptus incrassata Open mallee	5
Melaleuca acuminata, M. lanceolata+/- Eucalyptus socialis/E. leptophylla Tall open shrubland	4
Eucalyptus leucoxylon ssp. Low woodland	3
Xanthorrhoea caespitosa/semiplana, +/- Banksia marginata Tall open shrubland	3
Eucalyptus calycogona, E. dumosa Very open mallee	2
Eucalyptus dumosa, +/- E. leptophylla Mallee	2
Eucalyptus leptophylla, E. socialis Open mallee	2
Eucalyptus rugosa, +/- E. leptophylla Open mallee	2
Eucalyptus arenacea Low woodland	1
Eucalyptus oleosa, Melaleuca lanceolata, Acacia halliana/microcarpa, Dodonaea hexandra Very low open mallee	1
Eucalyptus porosa+/- Lomandra effusa Low woodland	1
Melaleuca halmaturorum Tall open shrubland	1

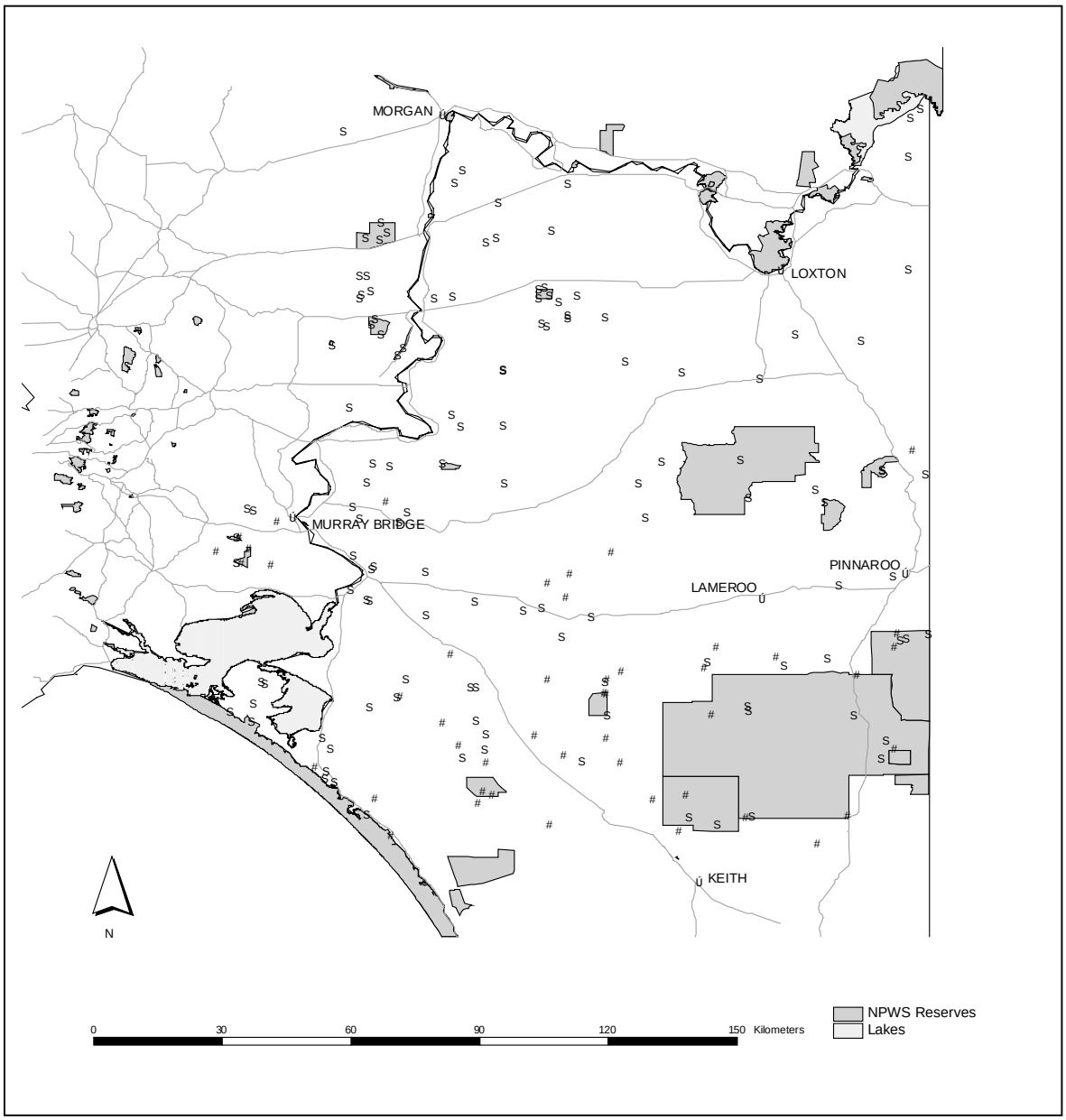


Figure 97.
Distribution of sites representing PATN group 4 (closed circles) and other bird groups (open circles).

Figure 98.
A Southern Scrub-robin on its nest in Scorpion Springs CP. This species was characteristic of PATN group 4.
Photo J. Davis.

GROUP NUMBER 5

Number of sites	**10**
Number of species in group	**20**
Mean number of species	**10**
Range	**5-15**

This small group (10 quadrats) is represented by a small number of sites occurring in Billiatt CP and in the Ngarkat complex of parks that were recently burnt (Figure 99). The single characteristic species of this group is the Tawny-crowned Honeyeater that takes advantage of early post-fire successional stages in heathlands. This group has the lowest mean number of bird species of all the PATN groups. The most frequently recorded species were Tawny-crowned Honeyeater (Figure 100) and Yellow-rumped Pardalote.

Species	Common Name	Frequency	Chi Squ	Prop./Freq	Groups
Gliciphila melanops	Tawny-crowned Honeyeater	10	**34.78**	0.3	4
Pardalotus punctatus	Yellow-rumped Pardalote	7	0.65	0.1	5
Colluricincla harmonica	Grey Shrikethrush	6	0.20	0.1	5
Phylidonyris albifrons	White-fronted Honeyeater	5	2.61	0.1	5
Smicrornis brevirostris	Weebill	4	0.65	<0.1	4
Corvus mellori	Little Raven	3	0.49	0.1	5
Cracticus torquatus	Grey Butcherbird	3	0.22	<0.1	5
Petroica goodenovii	Red-capped Robin	3	0.42	0.1	5
Strepera versicolor	Grey Currawong	3	1.03	<0.0	5
Hylacola cauta	Shy Heathwren	2	0.07	0.1	4
Daphoenositta chrysoptera	Pallid Cuckoo	1	2.48	0.1	4
Gymnorhina tibicen	Australian Magpie	1	4.42	<0.1	5
Lichenostomus cratitia	Purple-gaped Honeyeater	1	3.05	<0.1	4
Lichenostomus ornata	Yellow-plumed Honeyeater	1	2.03	<0.1	5
Malurus cyaneus	Superb Blue Wren	1	0.93	<0.1	3
Malurus lamberti	Variegated Wren	1	3.28	<0.1	5
Malurus splendens	Splendid Fairy-wren	1	1.75	<0.1	4
Phaps chalcoptera	Common Bronzewing	1	1.26	<0.1	5
Rhipidura leucophrys	Willie Wagtail	1	0.42	<0.1	5
Sturnus vulgaris	Common Starling	1	0.24	<0.1	5

Floristic PATN Group	Frequency
Eucalyptus incrassata , Leptospermum coriaceum Very open mallee	3
Callitris verrucosa Tall open shrubland	2
Allocasuarina pusilla, Leptospermum coriaceum, +/- Banksia ornata Tall open shrubland	1
Eucalyptus arenacea Low woodland	1
Eucalyptus leucoxylon ssp. Low woodland	1
Eucalyptus porosa Low very open woodland	1
Unclassified	1

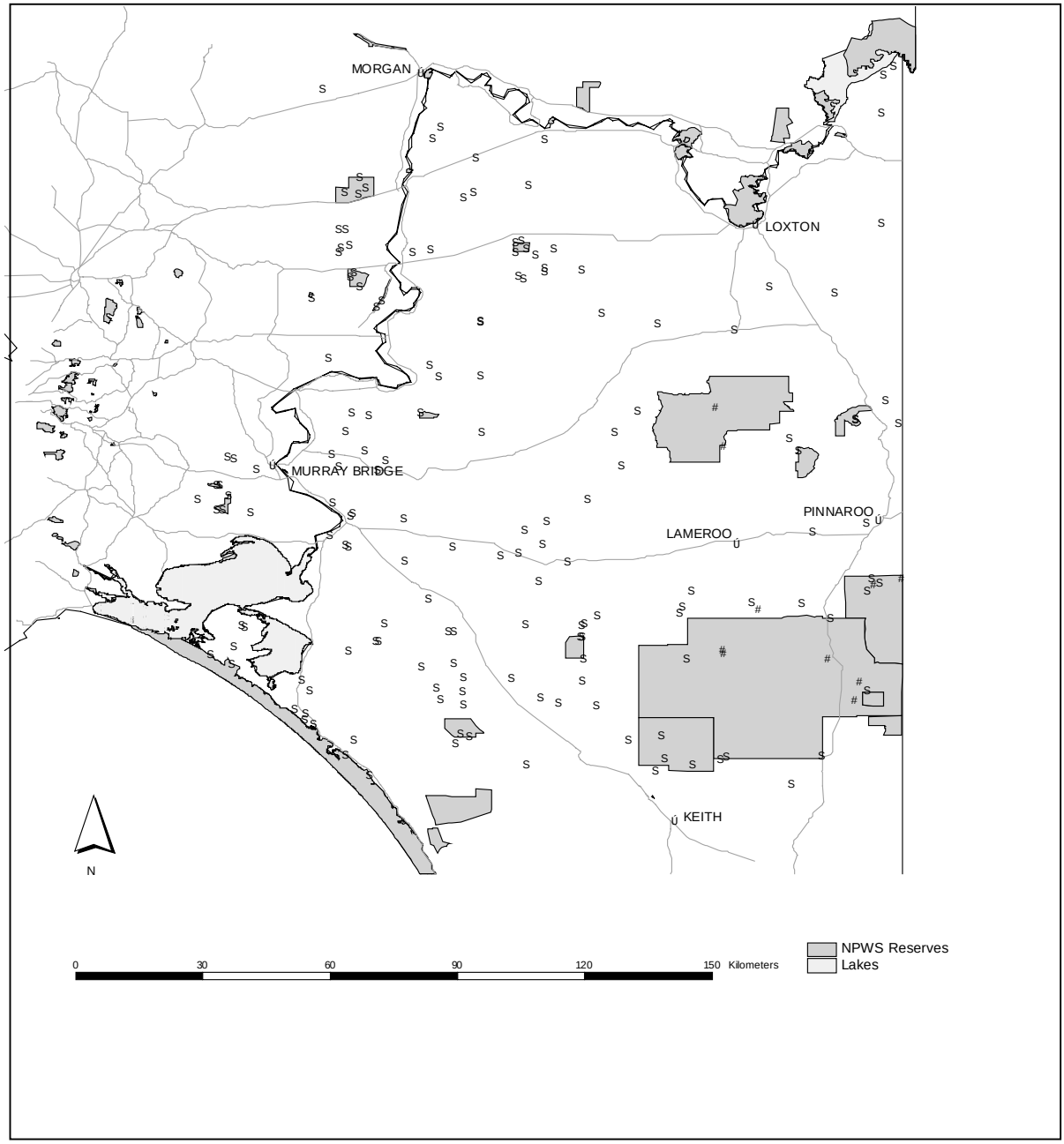


Figure 99.
Distribution of sites representing PATN group 5 (closed circles) and other bird groups (open circles).

Figure 100.
The Tawny Crowned Honeyeater was most strongly associated with early post-fire successional heathlands. Photo NPWSA

SPECIES OF CONSERVATION SIGNIFICANCE
The following descriptions have been drawn from the cited references. More detailed descriptions of these species and their ecology can be obtained from these reference and the forthcoming Kahrimanis and Carruthers (in prep.)

Black-eared Miner *Manoria melanotis*
The Black-eared Miner usually occupies long unburnt (>60 years) mallee *E. gracilis*, *E. incrassata* and *E. oleosa* with a shrubby and/or *Triodia* understorey (Blakers, *et al*. 1984; Forward and Reid 1996). It was formerly found throughout the Murray Mallee region and is currently distributed in National Parks in north-western Victoria and Bookmark Biosphere Reserve in SA (Christidis and Holderness 1998).

Its diet consists of invertebrates and nectar, mainly from eucalypts. Its taxonomic status is unclear and hybridisation with the Yellow-throated Miner is a major concern (Joseph 1996). The number of the "genetically true" species is unknown, however it is considered one of Australia's most threatened birds (Stephens 1992)

Clearing and habitat fragmentation, interbreeding with Yellow-throated Miner, loss of habitat through wildfire, and low recruitment rates are considered the major threats to the species (Silveira 1993).

Regent Honeyeater (*Xanthomyza phrygia*)
The Regent Honeyeater was formerly found throughout south-east Australia from Adelaide to Dalby in SE Queensland. Its present distribution is now confined to south-eastern Victoria and New South Wales. It is now considered as a vagrant species in South Australia and western Victoria.

Its preferred habitat is temperate eucalypt woodland and open forest, including forest edges, woodland, farmland and urban areas of mature eucalypts. The Regent Honeyeater primarily eats nectar and arthropods, but will raid orchards for cultivated fruit.

Threats include loss and fragmentation of habitat through clearance for agriculture, fence posts or firewood, eucalypt dieback or lack of habitat regeneration, and competition with other honeyeater species.

Slender-billed Thornbill (*Acanthiza iredalei*)
In South Australia, most records of this species are from the Ninety Mile Plain with some occurrences in the South East. In the Murray Mallee it has been recorded for the Carcuma CP, Ngarkat CP and Mount Rescue CP and was recorded from only two quadrats during the survey. In Victoria it occurs in the Big and Little Deserts and Wyperfield NP.

A secretive species, this bird is virtually confined to

low heathland dominated by casuarinas and banksias interspersed with other heath plants such as paperbarks and hakeas. Much of its preferred habitat has been cleared and that remaining, though largely protected in conservation reserves, appears fragmented and vulnerable to fire, especially in South Australia (Silveira 1993, Garnett 1992a,b; Blakers *et al.* 1984).

Malleefowl (*Leipoa ocellata*) (Figure 101)
The Malleefowl was once wide spread throughout large continuous semi-arid areas of western and southern Australia, including every state except Queensland and Tasmania. In the Murray Mallee they have been recorded in various mallee-type habitats ranging from coastal mallee with a heath or thicket understorey in the south to semi-arid mallee with a saltbush, bluebush or *Triodia* spp. understorey in the north. Malleefowl were recorded from 19 quadrats during the survey. There is only one currently known population in the Western Murray Flats, this being in the Ferries McDonald CP. Billiatt CP is considered a stronghold for the Malleefowl (Cutten 1998) and a substantial population occurs in the Army Firing Range east of Murray Bridge (pers. comm., S. Pillman).

This species builds mounds out of decomposing organic matter for the incubation of its eggs, and after egg laying, the male tends to the nest. Malleefowl eat insects, seeds, buds and lerps and do not require permanent water. Sheep and rabbit grazing in uncleared areas, excessive chick mortality due to starvation and predation of eggs and chicks by foxes are considered major factors in its decline in areas of suitable habitat. Isolation of populations (inbreeding), aging populations and fire also pose threats to the Malleefowl. A Recovery Plan for the Malleefowl (Benshemesh 1993) is currently being updated

Red-lored Whistler *(Pachycephala rufogularis*)
The Red-lored Whistler occurs in north-western Victoria, eastern SA and central NSW and has recently been discovered on the Eyre Peninsula. It has been recorded in the Billiatt region and the Ninety-mile Desert (Ngarkat and Carcuma Conservation Parks) and adjacent Sunset Country and Big Desert in Victoria. West of the River Murray it has been recorded as an autumn visitor near Adelaide. North of the River Murray the Red-lored Whistler is known from Gluepot and Calperum Stations in the Bookmark Biosphere Reserve (Silveira 1993) and from Danngali CP (Forward and Reid 1996).

Red-lored Whistlers breed in areas where mallee eucalypts 5-8m tall form an open canopy over a moderately dense but patchy shrub layer (Garnett 1992b). Clearance of mallee resulting in reduced and fragmented available habitat is a major cause of its reduced distribution.

Plains-wanderer (*Pedionomus torquatus*)
The Plains-wanderer occurs in south-eastern Australia, where its current stronghold is the Riverina district of south-western NSW. Also known in western and north-central Victoria, the Adelaide Plains and Yorke and Eyre Peninsulas. The Plains-wanderer is an endemic species that is the only member of the Pedionomidae. It prefers patches of sparse grassland and similar low, open vegetation and occasionally it is recorded in cereal stubble. The Plains-wanderer feeds on insects and seeds and is generally encountered singly, in pairs or in family parties.

Clearance of habitat, overgrazing by stock and rabbits and spraying to control locust plagues are considered to be major threats to its survival.

Regent Parrot (*Polytelis anthopeplus*)
This species is distributed through north-western Victoria, south-eastern South Australia and south-western NSW and is endemic to the Murray Block. It breeds along the Murray River from Boundary Bend in NSW to Morgan in South Australia (Silveira 1993). There are records from Billiatt CP, and many of the smaller Murray River island parks and near river parks. It was not recorded during the survey. Major SA breeding populations are near Renmark and in the Cobdogla to Kingston-on-Murray region (Burbidge 1985).

It breeds exclusively in hollows in large, senescent or dead River Red Gums within the river floodplain along the Murray River (Burbidge 1985). It feeds primarily in mallee as well as orchards, cereal crops and vineyards (Garnett 1992a).

Clearance of breeding sites along the Murray River and clearance of feeding habitat such as *E. largiflorens* woodlands are considered the major reasons for its decline. Competition for nesting hollows with introduced Honeybees, timber cutting, poisoning, illegal trapping and shooting by orchardists are also implicated in their decline (Silveira 1993)

Mallee Emu-wren (*Stipiturus mallee*)
The Mallee Emu-wren is endemic to the mallee of south-eastern Australia, the species occurs in low heathlands and mallee shrublands with hummock grass in north-western Victoria and adjacent parts of South Australia. In South Australia the Mallee Emu-wren is found in an area bounded by Nadda, Peebinga, Pinnaroo and Comet Bore. It has been recorded in Carcuma, Billiatt and Ngarkat Conservation Parks.

Its preferred habitat is considered to be *Triodia* hummock grassland within low woodland dominated by mallee eucalypts and/or *Callitris* or heath with banksias and casuarinas (Garnett 1992a). Assumed to feed mainly on insects, vegetable matter and seeds.

Figure 101.
Malleefowl have been the subject of much research in mallee of south-eastern Australia. **Photo SAOA.**

More than half the habitat within its restricted range has already been cleared. Its weak flight makes it vulnerable to predation and fire It is also threatened by habitat modification by introduced herbivores (Silveira 1993).

Western Whipbird (*Psophodes nigrogularis leucogaster*)

The Western Whipbird occupies mallee in southern South Australia and north-western Victoria. In South Australia the Western Whipbird occurs on Eyre and Yorke Peninsulas' and a few sites in the Murray Mallee. It has disappeared from the Malinong area and Comet bore in the Mallee, but has been recorded adjacent to and in Billiatt CP and the Ninety-Mile Desert. It was not recorded during the survey.

It occurs in thickets with a dense shrubby understorey, below an open mallee eucalypt layer. Most records are from vegetation last burnt 10-25 years previously. The Western Whipbird usually nests close to the ground and consequently they are vulnerable to predators. The major factors considered responsible for their decline are habitat clearance and altered fire regimes. Egg collectors are still believed to be a threat to remaining populations

Bush Stone-curlew (*Burhinus grallarius*)

This species was once widespread in grassy woodlands throughout Australia. It has almost disappeared from the south-east of the continent, but remains common in the north and on many continental islands such as Kangaroo Island. It is considered vulnerable in Victoria and endangered in South Australia. It was not recorded on the survey but there are records on the northern side of the Murray River at Calperum and in the Chowilla Game Reserve (Forward and Reid 1996).

The Bush Stone-curlew inhabits woodland with short or scattered grass, but persists in many wheat-growing areas despite their intense agricultural development. Its diet consists of insects, spiders and invertebrates. It gathers in loose flocks of up to 10 individuals and nests each year in the same location (Blakers *et al.* 1984). The rarity and continual decline of the Bush stone-curlew has been attributed to predation by foxes, clearance of habitat for agriculture or its degradation by pastoralism and the removal of the ground strata from habitat (Garnett 1992b).

DISCUSSION

Analysis of the Murray Mallee bird data revealed a total of five groups: three mallee groups and two heathland/woodland groups reflecting a north (xeric - dry) to south (mesic -wetter) gradient. One group was

represented by bird species which inhabit eucalypt and non-eucalypt habitats.

As a result, several groups of mallee birds could be identified which generally represent suites of species that occur over much larger areas in the mallee of south eastern Australia. Two of the mallee groups were more southern and had no similarities with the South Olary Plains mallee bird species group (Forward and Reid 1996), however they are similar in composition to groups derived from the South East Biological Survey bird data (Hopton *et al.,* in prep.).

The Murray Mallee PATN group 1 was most similar to the South Olary Plains PATN group 2 (Mallee Woodlands) with numerous species in common including Mallee Ringneck, Grey Skrikethrush. Weebill and Brown Treecreeper. The vegetation in both groups were *E. oleosa, E. gracilis* Open mallee and *E. leptophylla, E. socialis* Open mallee.

The Murray Mallee PATN group 2 had some similarities with the South Olary Plains PATN group 3 (Birds of Chenopod shrublands) with Southern Whiteface and Singing Honeyeater in common. The habitats in both groups were typically Low open shrubland, Low open woodland or Very open- Open grasslands.

Broad comparison with work conducted in north-western Victoria (Emison and Bren 1989) shows a number of similarities with identified bird communities of the Murray Mallee. In the Victorian mallee bird species group, three significant species were identified that occurred in the Murray Mallee mallee group: Malleefowl, Chestnut Quail-thrush and Yellow-rumped Pardalote. Another Victorian group of heath and mallee similar to the Murray Mallee PATN group 4 also had several species in common: Southern Scrub-robin, Shy Hylacola, Purple-gaped Honeyeater, White-eared Honeyeater, White-fronted Honeyeater and Golden Whistler.

The Murray Mallee mallee and woodland group had many similarities with both the South Olary Plains separate mallee and woodland groups: characterised by the presence of Mallee Ringneck, Mulga Parrot, Chestnut-rumped Thornbill, Southern Whiteface and Striped Honeyeater. This shows the degree of overlap in the bird communities associated with these two distinctive habitats in this region, as well as reflecting the mosaic nature of the distribution of habitats.

Biogeographic considerations

The Murray Mallee occupies transition zone between three South Australian regions: the chenopod shrublands and woodlands of the South Olary Plains, Mt Lofty Ranges and the woodlands and heathlands of the South East. On a national scale, the area is an intergradation between the Bassian (scleromorphic eucalypt forests of southern Australia) and Eyrean (Acacia and dunefield ecosystems of arid Australia) zoogeographical zones (Schodde 1982). Overall though, the survey area has more in common with the Eyrean zone. The southern Australian mallee zone is described by Schodde (1990) as overlying the interface between the Bassian and Eyrean biotas, which is reflected in the composition of the bird fauna.

Schodde (1990) listed 150 indigenous birds of the Mediterranean Mallee, of which 112 (75%) were recorded on the Murray Mallee survey. Of these indigenous mallee species in the current survey area, 35 are of Eyrean origin and 29 Bassian. Schodde (1990) designated 15 mallee-dependent species, and 10 of these were recorded during the survey. These figures are lower than that recorded by Forward and Reid (1996) for the South Olary Plains although only the lower half of that survey area is in the northern-most limits of the mallee zone. The lower number of species probably reflects the effects of habitat and fragmentation on Murray Mallee habitats compared with the South Olary Plains.

Of the four most dominant families in the Mediterranean-type Mallee (Schodde 1990) the Murray Mallee contains 75% of the species: 17 of 21 species of honeyeaters (Meliphagidae); 10 of 13 acanthizid warblers (Acanthizidae-Pardalotidae); five of nine whistlers (Pachycephalidae) and 11 out of 14 parrots (Psittacidae). This is consistent with the proportions recorded by Forward and Reid (1996) in the mallee of the South Olary Plains.

The mallee-dependent species recorded on the Murray Mallee survey are listed below and those that are endemic to the Mediterranean Mallee (Schodde 1990) are annotated with 'E':

Malleefowl E
Southern Scrub-robin E
Gilbert's Whistler E
Red-lored Whistler E
Chestnut Quail-thrush
Shy Heathwren E
Purple-gaped Honeyeater E
Yellow-plumed Honeyeater E
Grey-fronted Honeyeater E

The shift in the distribution and abundance of bird species has been discussed by a number of authors. Boehm (1952) described changes in distribution of birds in the agricultural zone near the Murray River due to vegetation clearance and other disturbance factors. He described the expansion of the ranges of Crested Pigeon, Galah, Little Corella and Ground Cuckoo-shrike away from the Murray Mallee (Boehm 1952, 1983) and others (Pearse 1929; Mack 1970). Boehm (1952) documented the decline of Chestnut Quail-thrush and Shy Heathwren through loss of habitat for agriculture. He observed that species, such as the Shy Heathwren and Grey-fronted Honeyeater, were frequently found in patches of mallee in early stages of

regeneration following clearance. The decline of species such as the Plains-wanderer, Bush Thick-knee, Australian Bustard, were noted by Pearse, Mack and Boehm (see bibliography in this volume and Forward and Robinson (1996) for more detail.

A few species of uncertain or indeterminate biogeographic affinities and which are considered typical elements of neither mallee nor arid Australian regions (Schodde 1982, 1990) have been recorded in the region as vagrants, notably the Olive-backed Oriole and the White-bellied Cuckoo-shrike.

There are two finer-scaled biogeographic gradients or corridors evident in the study region as revealed by avian distribution patterns. First, there is the steep rainfall and habitat gradient encountered between the eastern scarp of the North Mount Lofty ranges and the Because of its higher rainfall much of the native vegetation in the extreme south-west of the region has

As outlined earlier, the presence of the River Murray, immediately to the south of the South Olary Plains study region, has a strong influence on the bird communities and distribution patterns described here. Conservation management must endeavour to take these links and networks into account.

Conservation Considerations

As described above, the Murray Mallee contains numerous bird species that have significant conservation status on an Australian basis:

Endangered
- Regent Honeyeater

Vulnerable
- Malleefowl
- Red-lored Whistler
- Regent Parrot
- Plains-wanderer
- Western Whipbird
- Mallee Emu-wren

Several species are also rated in South Australia:

Endangered
- Black-eared Miner
- Plains-wanderer

Vulnerable
- Malleefowl
- Bush Stone Curlew
- Slender-billed Thornbill
- Blue-winged Parrrot
- Striped Honeyeater
- Australian Bustard
- Painted Button-quail
- Diamond Firetail
- Mallee Emu-wren
- Yellow-tailed Black Cockatoo
- Regent Parrot\
- Western Whipbird
- Little Lorikeet

The presence of these numerous rated species and the biogeographical location of the Murray Mallee highlights the area to be of conservation importance for bird species for the a number of reasons:

A variety of species is present with origins from both the Bassian and Eyrean biogeographic zones. This may be important for the conservation of some species depending on their status in the centre of those zones.

Many species are at the edge of their normal ranges which may be significant if the rest of the range has been severely affected in some way. The South Olary Plains, having little clearance or extensive disturbance itself, is a valuable habitat and refuge for species that have been severely affected in the Murray Mallee.

Many species have significantly declined over their range particularly in agricultural areas due to the effects of land clearance, overgrazing and altered or inappropriate fire regimes. These impacts lead to fragmentation of remaining populations and competition with other species for the limited habitat, particularly for nest sites and appropriate food sources. Some species specifically require a dense shrub stratum in which to live (e.g. Red-lored Whistler) and others need deep leaf litter in which to feed or build nests with (e.g. Malleefowl, White-winged Chough). Both these shrub and ground (litter) strata of the vegetation are lost in areas that are overgrazed or inappropriately burned and may never recover properly even when the impact is minimised or removed. Loss of nest sites for species that require large trees with hollows is also a serious problem. The extensive, uncleared tracts of mallee vegetation in the South Olary Plains, particularly in the southern portion, provide opportunities for long-term conservation that have largely been lost over most of the Murray Mallee.

Species significantly affected by habitat fragmentation due to clearance are:
- Malleefowl
- Red-lored Whistler
- Regent Parrot
- Swift parrot
- Plains-wanderer
- Bush Thick-knee
- Striated Grasswren
- Slender-billed Thornbill
- Blue-winged Parrot
- Chestnut Quail-thrush
- Regent Honeyeater
- Striped Honeyeater
- Painted Honeyeater
- Australian Bustard
- Painted Button-quail
- Diamond Firetail.

Some of these species are also at severe risk from predation by introduced predators such as foxes and cats, often because of their ground-feeding or ground-dwelling habits:

Malleefowl
Regent Parrot
Plains-wanderer
Bush Thick-knee
Striated Grasswren
Australian Bustard
Painted Button-quail
Diamond Firetail

With reduced grazing levels and proper management, impact on the natural vegetation can be minimised but if allowed to be too concentrated in any one area over long periods of time important avian food sources, nesting material and roosting sites (particularly those in the lower vegetation strata) are depleted or permanently removed. Both Reid and Fleming (1992) and Smith and Smith (1994) have highlighted the bird conservation problems posed by overgrazing in arid Australia generally and in western New South Wales. Smith and Smith identified habitat fragmentation (through clearance for agriculture) and overgrazing of pastoral lands as the twin biggest causes of decline of birds in western New South Wales. The review by Robinson and Traill (1996), puts the known decline of mallee and woodland birds into a national perspective.

Conclusions & Conservation Recommendations

by J. N. Foulkes[1]

THE MURRAY MALLEE STUDY AREA

The 14 850 square kilometre area that constitutes the Murray Mallee study encompasses a range of environments: the sand dune systems of the north-west, the Western Murray flats that rise into the Mount Lofty Ranges; and the sand-plains of the southern portion of the study area.

The Murray Mallee area constitutes a transition zone between three biogeographic regions in South Australia: the south-east, the northern arid zone and the Mount Lofty Ranges. Flora and fauna species found in the area generally have affinities with one or more of these regions. There is high variability in species richness in the Murray Mallee with species from all three regions being found; many of which are at the limits of their natural distribution.

The Murray Mallee also straddles the boundary between two major Australian zoogeographic regions: the Bassian region of temperate southern and eastern Australia and the Eyrean region of the semi-arid and arid inland, although most of the survey area is in the Eyrean zone. Thus the vertebrate fauna of the survey area comprises species with generally Bassian or Eyrean affinities, but mostly the latter. Hence, many species that are associated with these regions are occurring at the edge of their Australian range in the Murray Mallee survey area.

BIOLOGICAL COMMUNITIES

Thirty-five different floristic PATN groups were identified in the Murray Mallee in South Australia, with four major communities extending over large parts of the area:

- *Eucalyptus incrassata, Leptospermum coriaceum* Very open mallee of the dunes and undulating plains;
- *E. leptophylla, E. socialis* Open mallee of the dune crests, swales and undulating plains;
- *E. socialis, E. gracilis* Very open mallee on the plains; and, *Banksia ornata, +/- Allocasuarina pusilla, Leptospermum coriaceum* Tall open shrublands of the undulating plains, dune slopes and crests in the southern third of the study area.

Floristic vegetation mapping of the area, determined from PATN analysis, aerial photography and field checking, identified 37 regional plant communities. Most of these correlated with the groupings identified in the floristic PATN analysis. Due to under representation of sites some PATN groups did not correlate with a mappable plant community. Due to a lack of representative sites in every plant community, some extra communities were mapped, but had no correlating PATN group.

Bird species of the area tend to occur in one of five habitat-specific groups: those of open mallee associations of the north and west of the study area, eucalypt and non-eucalypt woodlands of the north-west, open woodland or shrublands of the south-east, mallee/heaths on the sandy soils of the southern half, and early post-fire successional heaths in Billiatt and Ngarkat Conservation Parks.

Reptile species similarly exhibit habitat-linked groups: those of mixed woodlands in the north and north-west of the study area, unburnt mallee/*Triodia* associations, open mallee woodland communities with a heath understorey in the southern half of the study area and, open mallee of the south-eastern corner of the study area.

Native mammal species richness is too low to detect clear patterns but amongst the small terrestrial species the two most common species (Silky Mouse, Western Pygmy Possum) seem to be specific to mallee heath and woodland habitats.

SPECIES RICHNESS

The field survey in 1991, with over 18 000 observations of flora and fauna, recorded a moderate proportion of this total species richness for the area with 626 plant taxa, 31 mammals, 168 birds, 55 reptiles and 4 amphibians. Using the data from the biological survey sites can therefore provide a reliable indication of potential areas with high species richness within the range of environments sampled and so provide pointers to areas of particular conservation significance. The decline in numbers of the now endangered, vulnerable or rare flora and fauna species and communities in the Murray Mallee can be attributed to a number of factors. Stephens (1992) has compiled a list of causes of decline and ongoing threats to the environment for the Murray Darling Basin mallee and Copley (in Stephens 1992) provides a more detailed assessment of the threats applicable to the mallee in South Australia and the processes required to achieve conservation objectives in the region. More recently Kahrimanis (1999) has conducted a preliminary to a biodiversity plan for the Murray-Darling Basin in South Australia which provides details of the known biodiversity assets, knowledge gaps and conservation issues.

The identification of priorities for the conservation of threatened species and communities in the Murray Mallee requires a comprehensive understanding of the distribution of species, their biology and threats to their

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survival across all species of plants and animals (vertebrates and invertebrates). Our knowledge of some of these groups, such as birds is good, whereas for others, such as invertebrates it is poor or non-existent.

Management and research priorities are usually species-based rather than community or habitat based and they correlate with the degree of endangerment or threat for a species with a perceived degree of rarity. Many species have suffered major reductions in abundance and range as shown by the survey data, and some may be in danger of extinction in the near future.

Some of these species may now have reached a new equilibrium within the modified remnants they occupy. Other species perceived to be common and/or widespread may, in fact be under threat through long term decline or chance effects such as fire. For example, habitat fragmentation has increased the probabilities of extinction through the effects of fire, drought, flood, grazing and predation. Fragmentation and the large distances between fragments has also decreased the chance of species recolonising and increased the probabilities of inbreeding depression of remaining populations.

The presence of many species at low densities in a range of relatively small habitat fragments may give a false impression of their abundance and persistence. For example a species such as the Common Brushtail Possum may be just "hanging on" and may well disappear quite quickly (Kemper & Foulkes 1997). Many people, however, still believe them to be common.

From the accounts for each of the species in each of the preceding chapters, it is plain to see the common threads with the recognition of major threats within the region. These threats and possible remedial actions are summarised below:

Firstly, the most significant and obvious impact on the Murray Mallee ecosystems has been habitat destruction, which affects both flora and fauna.

- Vegetation clearance for agriculture, horticulture, housing, industry and mining has been a major threat and cause of local extinctions over much of the Murray Mallee. The clearance of large areas of native vegetation is now prohibited in South Australia and is less of a threat than in the past however, controls on further clearance need to be maintained.

- Vegetation clearance has resulted in the fragmentation and isolation of communities and habitats and their resident populations. This fragmentation has increased the risk of populations becoming extinct through fire, drought, predation and competition.

  Fragmentation has also decreased the probability of most species recolonising such areas. These effects have been worsened by stock and rabbit grazing, weed invasion and fire within the habitat fragments.

  It is necessary to manage habitat fragments to maintain key species, especially through management of grazing and fire. Revegetating areas to link habitat fragments in coordinated and integrated programs is also required to reduce the effects of fragmentation. Translocation or transplantation of species may have to be considered in some areas however, this should only be considered at sites where threats no longer operate. The resources required to achieve this objective at present are mostly prohibitive given the requirements for conserving what is still present.

- Grazing by rabbits and domestic stock has removed many species of plants from areas throughout the region, on both private and public lands, including conservation reserves. This has prevented regeneration of many herbaceous, shrub and tree species to the point where many plant communities are now senescent and in decline. It has also severely depleted the availability of food and shelter for a wide range of animal species, which has increased their vulnerability to predation.

  Although rabbit numbers have reduced to about a third of their original since RCD, follow up control measures such as ripping and fumigating of remaining "pockets" of rabbits are required to reduce the likelihood of populations increasing to high levels again. Solutions to reduce the threat of grazing include the physical fencing of remnants to exclude introduced herbivores and allow natural regeneration, destruction of rabbit warrens and further promotion of biological control agents for rabbits.

  Legislation or regulation may be required to remove stock grazing pressures from other important areas. Tax deductibility incentives for costs of works to protect such areas should be made more widely known.

- Competition and displacement by introduced pasture and weed plant species has severely restricted regeneration of many native plants and led to local extinctions of grass, herb, forb and shrub species. There is also the additional problem of increased 'edge' for invasion in the many small and fragmented patches surrounded by potential invasive weeds from agricultural areas. Weed control can be a long term and expensive option that may involve use of herbicides to control particular species. Use of biological control agents are available for the control of some species.

- Altered fire frequencies and scale have affected the distribution and abundance of many species of plants and communities. Fires have either become "too frequent" or on too large a scale for fire-sensitive species or "too infrequent" for fire-adapted species. For example, each of the threatened mallee bird species are believed to be in that situation because of fires occurring too frequently through their preferred habitat(s). Other species may be threatened by infrequent fires.

Fire management of bush remnants is predominantly based on the prevention of fires. Habitat fragmentation has reduced the options for many remnants which means that fire management must become more proactive than reactive. A major management objective should be to identify and classify;
all long-unburnt habitats (40+ years)
all habitats approaching this successional stage (approx. 20-40 years)
all habitats burnt 10-20 years ago and
all habitats burnt within the past 10 years.

This will allow rapid preparation of fire management plans to exclude and/or suppress fires in key areas.

- Predation by introduced carnivores, particularly the fox and cat, has contributed significantly to the decline of a range of mammal and bird species. However, habitat degradation may have been a major contributing factor to this by decreasing these species' food and cover and increasing their vulnerability to predation.

  However, a major food source for both cats and foxes has been the widespread and often abundant rabbit. Where rabbit control programs are established, care should be taken to minimise the impacts of predation by foxes and cats as they shift to preying on a greater proportion of native species. Integrated pest control should be undertaken as part of any conservation program.

- Removal of tree hollows through scrub clearance, woodcutting for firewood and fence-posts, collecting for the aviary-trade, or destruction by fire, has decreased nesting and roosting sites for a wide range of birds, mammals, reptiles and invertebrates. This decreased availability has been compounded by competition for remaining hollows by introduced birds and honeybees.

- Woodcutting and brush cutting have altered several habitats and communities in the past, although both are now fairly tightly controlled in South Australia and Victoria.

  It is important to maintain control of these activities and encourage establishment of plantations to replace the threats to remnant native vegetation with supplementary habitats which may also be strategically placed to provide linking corridors.

- Although soil salinisation is seen as primarily affecting agricultural lands, it also affects many remnants of native vegetation.

- Introduced Honeybees compete for food and tree hollows with birds (eg. honeyeaters and parrots), mammals (eg. Bats and possums) and native invertebrates (eg. native bees). These effects may also include the decline of some native plant species due to reduced effectiveness of pollination and seed-set.

CONCLUSIONS

From this summary, it is clear that the major aims for conservation of species and communities in the Murray Mallee should be to:

- prevent further clearance of habitats;
- reduce degradation and encourage rehabilitation of remaining populations, habitats and communities, and
- re-connect isolated populations, habitats and communities.

As part of this process the following steps need to be undertaken:

- Identify priorities for endangered and vulnerable species and communities

- Identify groups of endangered or vulnerable species that could best be tackled jointly through the preparation of multi-species Recovery Plans

- Identify threats to endangered or vulnerable species that could most appropriately be controlled through a common Threat Abatement Plan

- Identify key areas critical to the conservation of endangered and vulnerable species or communities.

RESOURCES AND BIBLIOGRAPHY

MAPS
1:50,000 Topographic

Name	Number	Sheet	Date
Meningie	6726	1	1990
Magrath Flat	6726	2&3	1997
Narrung	6726	4	1979
Moblong	6727	1	1981
Wellington	6727	2	1986
Alexandrina	6727	3	1986
Monarto	6727	4	1980
Cambrai	6728	1	1983
Mannum	6728	2	1982
Mt. Mary	6729	1	1991
Sandleton	6729	2	1977
Coonalpyn	6826	1	1991
Culburra	6826	2	1975
Woods Well	6826	3	1986
Binnie	6826	4	1991
Karoonda	6827	1	1976
Buccleuch	6827	2	1975
Moorlands	6827	3	1976
Wynarka	6827	4	1975
Bakara	6828	1	1977
Bandon	6828	2	1977
Caurnamont	6828	3	1977
Swan Reach	6828	4	1977
Cadell	6829	1	1977
Notts Well	6829	2	1977
Blanchetown	6929	3	1977
Morgan	6829	4	1976
Prura	6926	1	1991
Rescue	6926	2	1986
Tintinara	6926	3	1976
Carcuma	6926	4	1976
Kulkami	6927	1	1975
Parrakie	6927	2	1975
Jabuk	6927	3	1975
Marama	6927	4	1975
Caliph	6928	1	1977
Nobah	6928	2	1977
Halidon	6928	3	1977
Mantung	6928	4	1977
Overland Corner	6929	1	1976
Moorook	6929	2	1976
Holder	6929	3	1991
Pooginook	6929	4	1977
Quondong Bore	7026	1	1976
Shaugh	7026	2	1988
McCallum	7026	3	1988
Bainton	7026	4	1976
Prinpun Bore	7027	1	1976
Pinnaroo	7027	2	1989
Lameroo	7027	3	1976
Name	**Number**	**Sheet**	**Date**

Karte	7027	4	1976
Taplan	7028	1	1977
Peebinga	7028	2	1977
Kumara	7028	3	1977
Paruna	7028	4	1977
Paringa	7029	1	1991
Yamba	7029	2	1991
Loxton	7029	3	1986

1:100,00 Topographic

Name	**Number**	**Date**
Meningie	6726	1976
Mobilong	6727	1975
Mannum	6728	1980
Eudunda	6729	1980
Coonalpyn	6826	1981
Moorlands	6827	1981
Swan Reach	6828	1972
Morgan	6829	1972
Tintinara	6926	1981
Parrakie	6927	1981
Mantung	6928	1973
Moorook	6929	1972
McCallum	7026	1981
Pinnaroo	7027	1981
Paruna	7028	1973
Renmark	7029	1970

1:250,000 Topographic

Name	**Grid**	**Number**	**Date**
Adelaide	SI	54-9	1978
Renmark	SI	54-10	1970
Barker	SI	54-13	1970
Pinnaroo	SI	54-14	1981

1:250,000 Geological

Name	**Date**
Adelaide	1969
Renmark	1971
Barker	1962
Pinnaroo	1979

Aerial Photographs

Map sheet	**Scale**	**Survey**	**Photo**	**Date**
Adelaide 1:2500,000	1:40,000	4274	2-8	04/02/91
		4275	20-38	04/02/91
Map sheet	**Scale**	**Survey**	**Photo**	**Date**
		4275	76-96	04/02/91

		4277	2-10	07/02/91
		4277	56-76	07/02/91
		4277	126-142	07/02/91
		4277	218-224	07/02/91
		4278	36-50	10/02/91
		4278	118-132	10/02/91
		4278	200-206	10/02/91
Barker 1:250,000		3959	26-42	06/01/89
		3959	84-98	06/01/89
		3959	102-112	06/01/89
		4276	16-40	04/02/91
		4276	70-100	04/02/91
		4279	2-18	10/02/91

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APPENDIX I

List of all sites surveyed on the Murray Mallee Biological Survey. Sites are listed in 1:100,000 mapsheets and further divided into the 1:50,000 mapsheets. Fauna survey quadrats where permanent photographic monitoring points were established are shown in bold.

Meningie Mapsheet

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
67261 MENINGIE								
MG00101	**350200**	**6047050**	**54**	**2.0 SE MENINGIE**	**stream channel**	**sand**	**10**	**46**
MG00201	**352311**	**6043988**	**54**	**6.0 SE MENINGIE**	**swamp**	**clay loam**	**5**	**57**
MG01001	361557	6059276	54	16.0 NE MENINGIE	plain (includes undulating plain)	sand	5	43
MG01101	361117	6056240	54	13.5 NE MENINGIE	dune slope	sand	4	46
MG01201	361295	6056185	54	13.5 NE MENINGIE	swamp	clay loam	4	57
MG01301	350900	6049500	54	1.5 NE MENINGIE	hill slope	sand	30	46
MG01401	350200	6047000	54	2.0 SE MENINGIE	plain (includes undulating plain)	sand	10	43
MG01501	346522	6044581	54	0.6 SE MOUNT SANDY	dune slope	sand	15	46
MG01601	346720	6044502	54	0.6 E MOUNT SANDY	closed depression	sand	10	46
MG01701	354510	6042967	54	8.0 SE MENINGIE	dune slope	sand	10	43
MG01801	353093	6044018	54	6.0 SE MENINGIE	dune footslope	sand	10	43
MG01901	359700	6042800	54	12.0 SE MENINGIE	swale	sand	10	43
MG02001	359550	6042850	54	12.0 SE MENINGIE	dune crest	sand	12	43
YU00501	**361657**	**6056281**	**54**	**14.0 NE MENINGIE**	**plain (includes undulating plain)**	**sand**	**4**	**49**
67262 MAGRATH FLAT								
MF00101	**363154**	**6028950**	**54**	**4.5 NE VILLA DA YUMPA**	**hill crest**	**sand**	**20**	**46**
MF00201	**361446**	**6024357**	**54**	**1.0 SE VILLA DA YUMPA**	**dune slope**	**sand**	**10**	**47**
MF00601	359550	6028100	54	3.5 NW VILLA DA YUMPA	dune crest	sand	30	46
MF00701	363479	6027575	54	4.0 NE VILLA DA YUMPA	swale	sand	10	43
MG00301	**348700**	**6038300**	**54**	**11.0 NW MAGRATH FLAT**	**plain (includes undulating plain)**	**sand**	**10**	**49**
MG00401	**351274**	**6037178**	**54**	**8.5 NW MAGRATH FLAT**	**swamp**	**medium clay**	**10**	**57**
MG00501	**351150**	**6034900**	**54**	**6.5 NW MAGRATH FLAT**	**hill crest**	**sand**	**10**	**46**
MG00601	**353512**	**6033793**	**54**	**0.5 N THE NEEDLES**	**dune slope**	**sandy loam**	**10**	**46**
MG00701	349742	6035909	54	8.5 NW MAGRATH FLAT	hill slope	sand	10	46
MG00801	351274	6037356	54	8.5 NW MAGRATH FLAT	hill slope	sand	10	46
MG00901	351203	6037286	54	8.5 NW MAGRATH FLAT	swamp	sand	10	49
MG02101	360897	6039813	54	11.5 NE MAGRATH FLAT	swale	sand	10	43
MG02201	360869	6040406	54	12.0 NE MAGRATH FLAT	dune crest	sand	10	43
MG02301	359461	6040656	54	12.5 NE MAGRATH FLAT	dune slope	sand	10	43
67264 NARRUNG								
NA00101	**335235**	**6063659**	**54**	**5.0 SE NARRUNG**	**swamp**	**medium clay**	**10**	**56**
NA00201	**336030**	**6063113**	**54**	**6.0 SE NARRUNG**	**plain (includes undulating plain)**	**sandy loam**	**20**	**51**
NA00301	**333489**	**6056906**	**54**	**9.0 N LONG POINT**	**plain (includes undulating plain)**	**sand**	**10**	**49**
NA00401	**328000**	**6054500**	**54**	**3.0 SE YALKURI H.S.**	**hill slope**	**sand**	**10**	**47**
NA00501	**333200**	**6051750**	**54**	**3.5 NW LONG POINT**	**hill crest**	**sandy loam**	**20**	**46**
NA00601	333900	6063800	54	5.0 S NARRUNG	dune crest	sand	10	47
NA00701	332882	6061892	54	6.5 S NARRUNG	plain (includes undulating plain)	sand	9	46
NA00801	333779	6056627	54	8.5 N LONG POINT	plain (includes undulating plain)	sandy loam	10	49

Mobilong Mapsheet

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
67271 MOBILONG								
MB00201	**359850**	**6123400**	**54**	**20.0 NE MURRAY BRIDGE**	**plain (includes undulating plain)**	**loam**	**75**	**38**
MB00301	**356358**	**6116461**	**54**	**14.25 NE MURRAY BRIDGE**	**plain (includes undulating plain)**	**loam**	**58**	**1**
MB00601	**358300**	**6112750**	**54**	**15.5 E MURRAY BRIDGE**	**hill slope**	**loam**	**75**	**29**
MB02301	359716	6123571	54	20.0 NE MURRAY BRIDGE	plain (includes undulating plain)	loam	80	31
MB02401	359743	6123423	54	20.0 NE MURRAY BRIDGE	plain (includes undulating plain)	sandy loam	80	31
MB02401	353200	6119320	54	12.75 NE MURRAY BRIDGE	plain (includes undulating plain)	loam	58	1
MB02501	355858	6116592	54	13.75 NE MURRAY BRIDGE	plain (includes undulating plain)	loam	50	29
MB02501	351480	6108790	54	9.5 SW MURRAY BRIDGE	plain (includes undulating plain)	loam	30	31
MB02601	358330	6114180	54	15.5 NE MURRAY BRIDGE	hill slope	loam	65	29
MB02601	350854	6109349	54	0.0 MURRAY BRIDGE	dune crest	sand	35	40
MB02701	358320	6113850	54	15.5 NE MURRAY BRIDGE	swale	loam	60	29
MB02801	358300	6113300	54	15.5 E MURRAY BRIDGE	swale	loam	60	31
MB02901	359700	6111950	54	17.0 E MURRAY BRIDGE	plain (includes undulating plain)	loam	65	31
MB03001	356950	6111900	54	14.0 E MURRAY BRIDGE	dune crest	sand	65	43
MB03101	356720	6108230	54	10.26 N TAILEM BEND	plain (includes undulating plain)	loam	30	31
MB03201	356710	6108100	54	10.26 SE TAILEM BEND	dune crest	sand	30	40
MB03301	349190	6109740	54	7.0 SW MURRAY BRIDGE	plain (includes undulating plain)	loam	40	1
TB00101	**356900**	**6101750**	**54**	**5.0 NW TAILEM BEND**	**plain (includes undulating plain)**	**sandy loam**	**20**	**11**
TB00301	**361787**	**6098385**	**54**	**2.85 E TAILEM BEND**	**dune crest**	**sand**	**30**	**40**
TB01201	361720	6098264	54	2.75 E TAILEM BEND	plain (includes undulating plain)	loam	20	11
TB02301	359670	6101730	54	4.5 N TAILEM BEND	plain (includes undulating plain)	sandy loam	50	1
67272 WELLINGTON								
MG01001	343499	6070517	54	8.0 SW MCDOUGALL HILL	hill slope	sand	30	1
MM00901	359705	6071045	54	7.5 SE NINE MILE TURN OFF	swale	sand	10	40
MM01001	359744	6070815	54	7.75 SE NINE MILE TURN OFF	open depression	sand	10	44
TB00201	**361300**	**6097600**	**54**	**2.75 E TAILEM BEND**	**plain (includes undulating plain)**	**loam**	**20**	**20**
TB00501	**356459**	**6091596**	**54**	**4.5 NE WELLINGTON**	**plain (includes undulating plain)**	**sandy loam**	**10**	**1**
TB00601	**360221**	**6088559**	**54**	**8.0 E WELLINGTON**	**hill crest**	**clay loam**	**10**	**46**
TB00701	**361139**	**6088356**	**54**	**9.0 E WELLINGTON**	**plain (includes undulating plain)**	**clay loam**	**10**	**32**
TB01301	362404	6098097	54	3.25 E TAILEM BEND	plain (includes undulating plain)	loam	40	1
TB01401	361501	6097440	54	2.25 E TAILEM BEND	plain (includes undulating plain)	loam	30	1
67274 MONARTO								
FM00201	330350	6100300	54	4.5 E HARRIOT HILL	N/A	N/A	0	0
FM00301	328600	6099000	54	3.0 ESE HARRIOT HILL	N/A	N/A	0	0
MB00901	338250	6111250	54	2.0 W MURRAY BRIDGE	N/A	N/A	0	0
MO00101	329100	6105800	54	5.5 S MONARTO SOUTH	N/A	N/A	0	0
MO00201	332400	6114600	54	5.0 NE MONARTO SOUTH	N/A	N/A	0	0

Mannum Mapsheet

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
67281 CAMBRAI								
SR00601	**362450**	**6167700**	**54**	**9.5 NNE BLACK HILL**	**N/A**	**N/A**	**0**	**0**
67282 MANNUM								
BT02001	359795	6126109	54	2.5 N WHISPERING PINES	stream channel	sand	45	40
BT02101	359801	6126557	54	2.0 N WHISPERING PINES	swamp	clay loam	45	29
MA00101	**355300**	**6145800**	**54**	**5.5 NE PELLARING FLAT**	**N/A**	**N/A**	**0**	**0**
MB00101	**361057**	**6129298**	**54**	**1.0 SW WHISPERING PINES**	**other**	**clay loam**	**80**	**11**
MB01501	361475	6128539	54	13.0 NE POMPOOTA	plain (includes undulating plain)	clay loam	75	29
MB03601	354681	6129342	54	4.0 S EVER-GREEN	stream channel	clay loam	60	1
MB03701	348895	6129250	54	1.5 N POVERTY CORNER	plain (includes undulating plain)	clay loam	55	4

Eudunda Mapsheet

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
67291 MT MARY								
BO00101	**3.25 00**	**6228400**	**54**	**N/A**	**N/A**	**N/A**	**0**	**0**
BO00201	344800	6228400	54	N/A	N/A	N/A	0	0
BO00301	354900	6211900	54	N/A	N/A	N/A	0	0
67292 SANDLETON								
BO00401	349200	6207800	54	N/A	N/A	N/A	0	0
BR00301	362000	6196000	54	8.5 W BLANCHETOWN	N/A	N/A	0	0
BR00401	359200	6197200	54	13.0 W BLANCHETOWN	N/A	N/A	0	0
BR00501	359000	6185300	54	16.5 NW SWAN REACH	N/A	N/A	0	0
BR00601	357000	618.25 0	54	18.0 NW SWAN REACH	N/A	N/A	0	0

Coonalpyn Mapsheet

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
68261 COONALPYN								
CA00701	**404526**	**6065019**	**54**	**4.5 NW TAURAGAT HILL**	**swale**	**sand**	**35**	**40**
CA02401	394200	6066460	54	5.0 NE KI KI	dune crest	sand	50	43
CA02501	395000	6066390	54	5.5 NE KI KI	swale	sand	40	46
CA02601	390950	6058856	54	4.25 S KI KI	plain (includes undulating plain)	sand	30	46
CA02701	391445	6058913	54	4.45 S KI KI	hill slope	loam	50	31
CA02801	401200	6064320	54	6.5 NW TAURAGAT HILL	dune crest	sand	50	43
CA02901	401190	6063930	54	6.25 NW TAURAGAT HILL	swale	clay loam	30	31
CA03001	404000	6064820	54	4.75 NW TAURAGAT HILL	dune crest	sand	60	46
CA03101	406600	6063080	54	2.0 N TAURAGAT HILL	swale	sand	40	46
CA03201	405425	6063994	54	3.25 NW TAURAGAT HILL	swale	sand	40	40
CA03501	405000	6067420	54	6.75 NW TAURAGAT HILL	plain (includes undulating plain)	sand	30	40
CN00101	**387192**	**6062702**	**54**	**4.5 SE PERIDINYA**	**plain (includes undulating plain)**	**clay loam**	**40**	**46**
CN00301	**401340**	**6048500**	**54**	**5.0 E COONALYPN**	**dune crest**	**sand**	**40**	**46**
CN00401	**387328**	**6052954**	**54**	**7.5 NW ROVERS GAP**	**swale**	**sand**	**20**	**44**
CN00601	**389600**	**6048580**	**54**	**7.0 W COONALYPN**	**plain (includes undulating plain)**	**sandy loam**	**20**	**40**
CN01001	386805	6062805	54	4.5 SE PERIDINYA	plain (includes undulating plain)	clay loam	40	34
CN01001	**389630**	**6044220**	**54**	**8.25 SW COONALYPN**	**plain (includes undulating plain)**	**sandy loam**	**30**	**50**
CN01301	403100	6050480	54	6.8 E COONALYPN	plain (includes undulating plain)	sandy loam	20	31
CN01401	402780	6050930	54	9.0 E COONALYPN	plain (includes undulating plain)	sand	20	43
CN01501	405025	6047790	54	8.75 E COONALYPN	dune slope	sand	40	46
CN01601	404930	6048137	54	8.75 E COONALYPN	swale	sandy loam	30	31
CN01701	405313	6047870	54	9.0 E COONALYPN	swale	sand	25	43
CN01801	395040	6051460	54	0.25 E ROVERS GAP	dune crest	sand	30	46
CN01901	395354	6051789	54	0.65 NE ROVERS GAP	plain (includes undulating plain)	sand	20	43
CN02001	389660	6043310	54	8.25 SW COONALYPN	dune slope	sand	20	43
CN02101	391060	6051790	54	3.75 W ROVERS GAP	plain (includes undulating plain)	sandy loam	30	31
68262 CULBURRA								
BB00101	**389191**	**6031364**	**54**	**0.75 NE MT BOOTHBY**	**hill slope**	**sand**	**100**	**46**
BB00201	**391416**	**6030500**	**54**	**2.75 SE MT BOOTHBY**	**swale**	**loam**	**20**	**40**
BB00301	**388040**	**6028240**	**54**	**2.85 S MT BOOTHBY**	**plain (includes undulating plain)**	**sand**	**20**	**44**
BB00701	392584	6030034	54	4.0 SE MT BOOTHBY	plain (includes undulating plain)	sandy loam	20	46
BB00801	388699	6030854	54	8.8 W REEDY WELLS	hill crest	clay loam	130	46
BB00901	388100	6028300	54	2.75 S MT BOOTHBY	hill slope	sandy loam	30	46
BB01001	388.75	6028087	54	3.0 S MT BOOTHBY	closed depression	sand	20	43
BB01101	388921	6027420	54	3.5 S MT BOOTHBY	hill crest	sandy loam	20	46
BB01201	388261	6028009	54	3.0 S MT BOOTHBY	plain (includes undulating plain)	sand	20	43
BB01301	397400	6031250	54	10.0 SW CULBURRA	hill crest	sand	20	43
BB01401	396860	6025150	54	10.0 SE MT BOOTHBY	hill crest	sandy loam	30	50
CA03601	409395	6040879	54	5.8 NE CULBURRA	swale	sandy loam	45	49
CN00901	**389737**	**6040316**	**54**	**9.5 NE MT BOOTHBY**	**swale**	**sandy loam**	**30**	**49**
CN03101	389700	6040080	54	9.1 NE MT BOOTHBY	hill crest	sandy loam	50	46
TT00101	**408634**	**6042695**	**54**	**6.25 NE CULBURRA**	**dune slope**	**sand**	**30**	**44**
TT00501	**405291**	**6021965**	**54**	**14.0 S CULBURRA**	**swamp**	**clay loam**	**15**	**56**
TT00601	408242	6041.25	54	6.25 NE CULBURRA	dune crest	sand	50	46
TT01101	405136	6021764	54	14.25 S CULBURRA	dune crest	sand	20	43
TT01201	405546	6022152	54	14.0 S CULBURRA	plain (includes undulating plain)	sand	15	43
TT01301	398100	6019750	54	14.75 SE MT BOOTHBY	dune crest	sand	20	43
TT01401	398030	6019550	54	14.75 SE MT BOOTHBY	closed depression	sand	15	43

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
68263 WOODS WELL								
CN00801	**384268**	**6041860**	**54**	**5.0 NE MIDWAY**	**hill slope**	**loam**	**70**	**51**
CN02701	386447	6035815	54	3.5 SW COORUMBEENA	hill slope	sand	60	46
CN02801	386128	6035793	54	3.5 SW COORUMBEENA	dune crest		50	46
CN02901	382274	6039539	54	2.0 N MIDWAY	dune crest	sand	60	46
CN03001	380904	6039172	54	2.0 N MIDWAY	dune slope	sand	20	46
CN03301	377250	6042300	54	4.5 NW TARRARA	plain (includes undulating plain)	sand	20	40
CN03401	378334	6040355	54	2.0 NW TARRARA	plain (includes undulating plain)	sand	10	43
CN03501	381826	6022224	54	1.0 NE SUNWOOD	hill crest	sandy loam	20	46
CN03601	376735	6028677	54	2.0 E BATABA	plain (includes undulating plain)	sand	20	46
MF00301	**367351**	**6018062**	**54**	**1.0 SW STONY WELL**	**open depression**	**sand**	**10**	**55**
MF00401	372396	6020195	54	4.0 NW NORTH WARREENA	hill slope	sand	20	46
MF00501	369167	6.25 993	54	4.5 N NARANGA	dune crest	sand	30	46
68264 BINNIE								
CN00201	**385814**	**6062720**	**54**	**4.0 SE PERIDINYA**	**closed depression**	**sandy loam**	**40**	**31**
CN00501	**379325**	**6051910**	**54**	**1.5 NE BINNIE LOOKOUT**	**hill slope**	**clay loam**	**110**	**46**
CN00701	**383186**	**6045199**	**54**	**1.5 NW KANGAROO FLAT**	**open depression**	**sand**	**50**	**44**
CN01101	377781	6062275	54	1.0 NE YURUGA	dune crest	sand	40	43
CN01201	377550	6062000	54	0.5 NE YURUGA	plain (includes undulating plain)	clay loam	40	40
CN02201	377863	6051055	54	4.6 SE BINNIE WELL	dune crest	sand	160	43
CN02301	377808	6050822	54	0.3 S BINNIE LOOKOUT	hill slope	clay loam	150	46
CN02401	379400	6052300	54	2.0 NE BINNIE LOOKOUT	closed depression	sandy loam	100	35
CN02501	380439	6048714	54	1.0 NW BINNIE WELL	hill slope	sand	40	44
CN02601	385700	6044950	54	0.5 E KANGAROO FLAT	closed depression	sand	30	50
CN03201	376204	6043609	54	0.5 W ALAMIL	plain (includes undulating plain)	sandy loam	10	43
MG02401	364247	6057939	54	1.5 SW SANDY PEAK	dune slope	sand	20	43
YU00201	**370306**	**6064825**	**54**	**2.0 NE NAMINGA**	**plain (includes undulating plain)**	**loam**	**60**	**51**
YU00301	**367984**	**6059537**	**54**	**3.0 E SANDY PEAK**	**plain (includes undulating plain)**	**sand**	**20**	**35**
YU00401	**368760**	**6059511**	**54**	**3.5 E SANDY PEAK**	**plain (includes undulating plain)**	**sand**	**30**	**46**
YU01101	373847	6070222	54	5.3 NE HAWKSNEST TRIG PT	swale	sand	40	43
YU01301	369968	6047869	54	0.5 E OONDOOROO	plain (includes undulating plain)	sand	10	43
YU01401	364682	6059165	54	0.5 SW SANDY PEAK	hill slope	clay loam	20	46
YU01501	365208	6059200	54	7.75 SW HAWKS NEST	dune crest	sand	50	46
YU01601	373550	6053250	54	1.0 E BARNHILL	plain (includes undulating plain)	sand	40	46
YU01701	373958	6053585	54	1.5 E BARN HILL	plain (includes undulating plain)	sand	60	46
YU01801	367266	6059531	54	2.0 E SANDY PEAK	plain (includes undulating plain)	clay loam	30	46
YU01901	371300	6061850	54	1.0 N MCDONALD DOWNS	hill slope	clay loam	60	46

Moorlands Mapsheet

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
68271 KAROONDA								
MI00101	**393265**	**6123631**	**54**	**2.8 NE MINDIYARRA**	**plain (includes undulating plain)**	**sandy loam**	**60**	**31**
MI00101	394653	6114424	54	0.6 NW MEIARI BORE	plain (includes undulating plain)	clay loam	60	37
MI00201	391776	6103844	54	0.4 NW HOBAB BORE	plain (includes undulating plain)	loam	90	31
MI00301	391300	6104600	54	1.1 NW HOBAB BORE	hill slope	sandy loam	100	31
MI01001	407933	6120989	54	0.5 SW LOWALDIE TOWNSHIP	dune footslope	sand	60	31
PE01301	399837	6116241	54	0.5 SW KARKOONDA P.O.	dune crest	sand	60	40
PE01401	399777	6116002	54	0.5 SW KARKOONDA P.O.	dune footslope	sand	60	31
68272 BUCCLEUCH								
PE00201	**404165**	**6094025**	**54**	**8.0 NE BUCCLEUCH**	**hill crest**	**loam**	**90**	**31**
PE00301	**408541**	**6089542**	**54**	**8.5 NW JABUK OVAL**	**swale**	**clay loam**	**110**	**31**
PE00401	**402787**	**6086676**	**54**	**2.2 NW PEAKE**	**plain (includes undulating plain)**	**clay loam**	**20**	**31**
PE00501	**407600**	**6078200**	**54**	**8.0 SE PEAKE**	**hill slope**	**sandy loam**	**40**	**33**
PE00601	**398316**	**6085940**	**54**	**3.0 S BUCCLEUCH**	**plain (includes undulating plain)**	**sandy loam**	**15**	**31**
PE00701	409010	6090096	54	8.0 NW JABUK OVAL	dune crest	sand	110	43
PE00801	402834	6086584	54	2.0 NW PEAKE	plain (includes undulating plain)	clay loam	20	33
PE01501	407150	6094570	54	9.0 N PEAKE	dune crest	sand	80	40
PE01601	407149	6094109	54	9.0 N PEAKE	swale	sandy loam	90	40
PE01701	403735	6094031	54	8.0 NE BUCCLEUCH	hill slope	clay loam	90	31
SH00101	**386600**	**6088220**	**54**	**5.0 SW SHERLOCK**	**plain (includes undulating plain)**	**clay loam**	**15**	**34**
SH00201	387549	6098303	54	5.0 W UPSAN DOWNS	plain (includes undulating plain)	sand	20	33
SH00301	387644	6097873	54	4.8 SW UPSAN DOWNS	plain (includes undulating plain)	sandy loam	20	31
SH00401	396549	6090030	54	1.5 NW BUCCLEUCH	plain (includes undulating plain)	loam	20	29
SH00501	393637	6090502	54	2.5 E SHERLOCK	plain (includes undulating plain)	clay loam	20	29
SH00701	387551	6087920	54	4.5 SW SHERLOCK	plain (includes undulating plain)	sandy loam	15	31
YU00601	391800	6075400	54	5.0 SE FLOWERY	plain (includes undulating plain)	sand	20	34
68273 MOORLANDS								
CO00101	**374783**	**6084045**	**54**	**6.0 E COOKE PLAINS**	**hill slope**	**sandy loam**	**10**	**29**
CO00201	374400	6083900	54	6.0 E COOKE PLAINS	swamp	medium clay	5	0
MM00801	364308	6075423	54	7.5 SW COOK PLAINS	plain (includes undulating plain)	sandy loam	10	46
SH00601	385540	6091951	54	9.0 E MOORLANDS	plain (includes undulating plain)	clay loam	20	33
TB00401	**374349**	**6097263**	**54**	**4.5 NW MOORLANDS**	**plain (includes undulating plain)**	**sandy loam**	**20**	**34**
TB00801	375676	6091383	54	2.5 SW MOORLANDS	hill footslope	clay loam	10	0
TB00901	375900	6091700	54	2.5 SW MOORLANDS	open depression	sandy loam	10	0
TB01101	368700	6096200	54	8.5 NW MOORLANDS	plain (includes undulating plain)	clay loam	20	20
YU00101	380800	6072450	54	2.0 S COOMANDOOK			0	0
YU00101	382587	6070943	54	3.1 SE COOMANDOOK	closed depression	sandy loam	30	40
YU00701	382500	6071032	54	2.9 SE COOMANDOOK	dune slope	sand	40	46
YU00901	368666	6076973	54	7.0 S COOK PLAINS	hill slope	sand	10	40
YU01001	369145	6077364	54	6.5 S COOK PLAINS	plain (includes undulating plain)	sand	10	45
YU01201	373375	6070619	54	8.8 SW COOMANDOOK	dune slope	sand	40	46
68274 WYNARKA								
LO00301	379870	6119900	54	9.0 NW WYNARKA	plain (includes undulating plain)	clay loam	55	29
MB00401	**364600**	**6117710**	**54**	**6.9 NW CHAPMAN BORE**	**hill slope**	**sand**	**100**	**31**
MB00501	**369730**	**6114790**	**54**	**3.5 NE CHAPMAN**	**swale**	**loam**	**80**	**35**

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
				BORE				
MB00701	**367790**	**6111700**	**54**	**0.08 W CHAPMAN BORE**	**dune crest**	**sand**	**80**	**40**
MB00901	367680	6111744	54	0.1 W CHAPMAN BORE	plain (includes undulating plain)	sand	80	31
MB01001	373940	6122308	54	14.5 NW WYNARKA	plain (includes undulating plain)	clay loam	55	29
MB01101	363600	6123680	54	12.75 NW CHAPMAN BORE	dune crest	sand	100	40
MB01201	363515	6124047	54	13.25 NW CHAPMAN BORE	dune slope	sand	95	40
MB01301	363584	6117378	54	7.0 NW CHAPMAN BORE	plain (includes undulating plain)	loam	80	31
MB01401	364400	6117730	54	7.0 NW CHAPMAN BORE	hill crest	loam	100	29
MB01601	369690	6115280	54	4.0 NE CHAPMAN BORE	dune slope	sand	90	40
MB01701	369784	6114156	54	3.0 NE CHAPMAN BORE	hill slope	loam	90	31
MB01801	371900	61.25 00	54	4.0 NE CHAPMAN BORE	plain (includes undulating plain)	sandy loam	85	31
MB01901	372131	6112499	54	4.25 NE CHAPMAN BORE	dune crest	sand	90	40
MB02001	372780	6112490	54	4.9 NE CHAPMAN BORE	open depression	sandy loam	90	31
MB02101	374050	6117200	54	8.25 NE CHAPMAN BORE	hill crest	loam	80	29
MI00401	379977	6101796	54	10.5 SW WYNARKA	plain (includes undulating plain)	loam	20	29
MI00501	383606	6111415	54	0.5 WYNARKA	hill slope	loam	70	29
MI00601	375810	6106750	54	9.5 SW WYNARKA	dune crest	sand	110	40
MI00601	375400	6106720	54	10.0 SW WYNARKA	swale	sand	100	40
MI00701	375374	6106703	54	10.0 SW WYNARKA	swale	sandy loam	100	29
TB02401	371280	6104100	54	0.25 NE NATURI	plain (includes undulating plain)	sand	60	29
TB02501	367940	6108250	54	3.5 S CHAPMAN BORE	plain (includes undulating plain)	sandy loam	80	31

Swan Reach Mapsheet

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
68281 BAKARA								
BA00101	**392599**	**6157860**	**54**	**7.9 SE BAKARA**	**dune footslope**	**sandy loam**	**60**	**29**
BA00201	**392591**	**6157541**	**54**	**8.0 SE BAKARA**	**dune crest**	**sand**	**70**	**33**
MM00301	403640	6179965	54	20.0 N GALGA	N/A	N/A	0	0
MM00501	405830	6178090	54	15.0 NW MANTUNG	N/A	N/A	0	0
MM00601	408170	6174130	54	7.5 W MANTUNG	N/A	N/A	0	0
MM00701	408120	6173250	54	7.0 W MANTUNG	N/A	N/A	0	0
MM00901	401840	6171470	54	11.0 NW GALGA	N/A	N/A	0	0
MM01001	402940	6170840	54	11.0 NW GALGA	N/A	N/A	0	0
MM01101	403573	6168442	54	1.5 SW EASTERN WELL	Plain (includes undulating plain)	sandy loam	60	29
MM01201	396418	6169634	54	0.8 NE BAKARA WELL	Plain (includes undulating plain)	loam	60	0
SR00601	386300	6168300	54	4.5 NW BAKARA	plain (includes undulating plain)	sand	50	0
SR00701	386100	6167550	54	4.5 NW BAKARA	hill slope	clay loam	50	2
SR01801	389058	6181360	54	3.8 W NAIDA HOMESTEAD	plain (includes undulating plain)	sandy loam	50	2
SR01901	387168	6161856	54	2.5 SW BAKARA	dune crest	sand	80	29
SR02001	387234	6161989	54	2.3 SW BAKARA	plain (includes undulating plain)	clay loam	70	29
SR02101	387600	6176300	54	11.5 NW BAKARA WELL	dune slope	sand	60	0
SR02201	388300	6176300	54	11.0 NW BAKARA WELL	plain (includes undulating plain)	sandy loam	45	29
68282 BANDON								
BA00401	389550	6140853	54	4.5 SW COPEVILLE	plain (includes undulating plain)	loam	65	1
CP00301	**392860**	**6140950**	**54**	**7.0 S COPEVILLE**	**plain (includes undulating plain)**	**loam**	**70**	**29**
CP00401	399946	6143751	54	6.5 SW COPEVILLE	plain (includes undulating plain)	clay loam	85	29
CP00501	399428	6144419	54	6.0 SW COPEVILLE	stream channel	sandy loam	85	29
CP00601	393838	6145750	54	4.0 S COPEVILLE	plain (includes undulating plain)	clay loam	75	29
MI00201	394551	6140764	54	8.0 S COPEVILLE	plain (includes undulating plain)	sandy loam	65	33
MI00301	392536	6127719	54	1.0 E PERPONDA	stream channel	sand	100	40
MI00401	393356	6133402	54	17.0 S COPEVILLE	plain (includes undulating plain)	loam	80	29
68283 CAURNAMONT								
BA00501	380468	6145460	54	5.0 NE PERNONG	plain (includes undulating plain)	loam	70	19
CP00101	**380230**	**6144127**	**54**	**6.5 NE PURNONG**	**plain (includes undulating plain)**	**loam**	**70**	**1**
CP00201	**382481**	**6140683**	**54**	**7.0 NE CHUCKA BEND**	**other**	**clay loam**	**45**	**11**
CP00401	379122	6144124	54	6.0 NE PURNONG			70	33
CP00401	380712	6140667	54	5.0 NE CHUCKA BEND	plain (includes undulating plain)	clay loam	55	33
CP00501	383712	6147409	54	12.5 NE PURNONG	stream channel	clay loam	70	29
LO00101	**378087**	**6129366**	**54**	**10.5 SE BOWHILL**	**plain (includes undulating plain)**	**loam**	**75**	**31**
LO00201	379855	6129250	54	11.0 SE BOWHILL	stream channel	sand	80	40
MB00801	**365259**	**6128423**	**54**	**11.5 S YOUNGHUSBAND**	**hill slope**	**clay loam**	**50**	**31**
MB02201	363635	6128334	54	11.5 S YOUNGHUSBAND	stream channel	sandy loam	70	31
MB03401	363993	6130470	54	17.0 NE POMPOOTA	plain (includes undulating plain)	sandy loam	120	29
MB03501	364961	6131526	54	8.0 S YOUNGHUSBAND	stream channel	sand	110	40
68284 SWAN REACH								
RI00101	368250	6163700	54	5.0 N WONGULLA	N/A	N/A	0	0
RI00201	366900	6161500	54	4.5 NW WONGULLA	N/A	N/A	0	0
SR00101	**380004**	**6179466**	**54**	**10.75 NE SWAN REACH**	**plain (includes undulating plain)**	**loam**	**35**	**33**
SR00201	**.75 608**	**6178613**	**54**	**7.0 NE SWAN REACH**	**plain (includes undulating plain)**	**sandy loam**	**55**	**2**
SR00301	**381135**	**6175341**	**54**	**10.0 NE SWAN REACH**	**plain (includes**	**sandy loam**	**40**	**29**

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
					undulating plain)			
SR00401	379642	6179272	54	10.5 NE SWAN REACH	plain (includes undulating plain)	sandy loam	35	2
SR00501	375853	6178744	54	7.5 NE SWAN REACH	dune crest	sand	55	40

Morgan Mapsheet

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
68291 CADELL								
BL00601	386998	6228250	54	4.5 S CADELL	dune crest	sand	30	33
BL00701	386767	6227902	54	5.0 S CADELL	swale	sandy loam	30	34
BL00801	386833	6226981	54	6.0 S CADELL	swale	loam	30	29
BL00901	390429	6223466	54	9.5 NW RAMCO	plain (includes undulating plain)	sandy loam	30	29
BL01001	387199	6229224	54	3.5 E CADELL	plain (includes undulating plain)	sandy loam	30	34
BL01601	390561	6226713	54	7.5 SE CADELL	dune slope	sand	30	33
WK00101	**407826**	**6213514**	**54**	**4.0 SE WAIKERIE**	**plain (includes undulating plain)**	**sandy loam**	**40**	**29**
WK00701	399365	6212298	54	8.5 SW WAIKERIE	plain (includes undulating plain)	sandy loam	30	0
WK01101	407622	6214672	54	3.0 SE WAIKERIE	plain (includes undulating plain)	loam	40	37
68292 NOTTS WELL								
AL04801	385250	6197000	54	6.25 NW NOTTS WELL	dune slope	sand	40	33
BL00301	**390750**	**6207700**	**54**	**16.5 NE NOTTS WELL**	**dune crest**	**sand**	**50**	**33**
BL00401	**390400**	**6197200**	**54**	**6.5 NE NOTTS WELL**	**plain (includes undulating plain)**	**loam**	**40**	**21**
BL00501	**387842**	**6195496**	**54**	**4.0 N NOTTS WELL**	**plain (includes undulating plain)**	**clay loam**	**40**	**8**
BL00701	390100	6204100	54	12.75 NE NOTTS WELL	dune crest	sand	40	33
BL00801	390215	6203989	54	12.75 NE NOTTS WELL	swale	sandy loam	35	29
BL00901	390700	6207550	54	16.5 NE NOTTS WELL	swale	sandy loam	40	29
BL01701	392133	6197446	54	7.5 NE NOTTS WELL	plain (includes undulating plain)	loam	40	8
MM00101	402525	6182455	54	14.0 SE NOTTS WELL	N/A	N/A	0	0
SR01501	393781	6181817	54	11.2 SE NOTTS WELL	plain (includes undulating plain)	sandy loam	60	0
SR01601	394173	6182086	54	11.1 SE NOTTS WELL	plain (includes undulating plain)	sandy loam	60	2
SR01701	390662	6182310	54	3.25 W NAIDA HOMESTEAD	plain (includes undulating plain)	sandy loam	55	33
WK00201	**403952**	**6199361**	**54**	**5.5 NE BOONGALA**	**open depression**	**loam**	**55**	**29**
WK00301	405450	6190650	54	5.5 SE NEW WELL	other	loam	60	29
WK00401	405386	6190817	54	5.5 SE NEW WELL	dune crest	sand	70	33
WK00501	399793	6202333	54	7.5 N BOONGALA	dune crest	sand	50	33
WK00601	399.25	6203023	54	8.1 N BOONGALA	swale	loam	45	29
WK00801	404000	6199650	54	5.9 NE BOONGALA	dune crest	sand	60	29
WK00901	395103	6198804	54	10.5 NE NOTTS WELL	plain (includes undulating plain)	loam	50	29
WK01001	394400	6198350	54	10.5 NE NOTTS WELL	dune crest	sand	50	33
68293 BLANCHETOWN								
BL01001	381162	6205990	54	11.0 NE BLANCHETOWN	dune crest	sand	40	33
BL01101	381177	6205632	54	11.0 NE BLANCHETOWN	swale	sand	35	33
BL01801	379333	6202398	54	8.0 NE BLANCHETOWN	plain (includes undulating plain)	clay loam	30	2
BR00101	362300	6198300	54	10.0 WNW BLANCHETOWN	N/A	N/A	0	0
BR00201	**363600**	**6198300**	**54**	**8.0 W BLANCHETOWN**	**N/A**	**N/A**	**0**	**0**
68294 MORGAN								
BL00101	**381977**	**6216934**	**54**	**5.5 SE MURKBO**	**plain (includes undulating plain)**	**clay loam**	**30**	**21**
BL00201	**379898**	**6213539**	**54**	**6.5 SE MURKBO**	**dune crest**	**sand**	**50**	**40**
BL00601	380316	6213949	54	6.0 SE MURKBO	plain (includes undulating plain)	sand	40	0
BL01101	379200	6230050	54	4.0 SE MORGAN	dune slope	sand	30	33
BL01201	379312	6229789	54	4.0 SE MORGAN	plain (includes undulating plain)	sand	40	29
BL01301	379394	6232203	54	2.5 SE MORGAN	plain (includes undulating plain)	N/A	30	29
BL01401	383950	6227550	54	9.0 SE MORGAN	dune crest	sand	30	33
BL01501	384000	6227150	54	9.0 SE MORGAN	swale	sandy loam	30	29

Tintinara Mapsheet

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
69261 PRURA								
BV00201	**442128**	**6068937**	**54**	**2.5 SW PRURA HILL**	**open depression**	**sand**	**90**	**34**
BV00301	**442950**	**6070800**	**54**	**1.5 W PRURA HILL**	**plain (includes undulating plain)**	**sand**	**90**	**40**
BV00901	437947	6070282	54	4.5 E PINE AVENUE	hill crest	sand	90	40
BV01001	437850	6070350	54	9.5 E PINE AVENUE	plain (includes undulating plain)	sand	90	37
BV01101	442200	6069250	54	2.0 SW PRURA HILL	dune crest	sand	100	43
BV01201	442500	6069750	54	1.5 SW PRURA HILL	open depression	sandy loam	80	34
BV01301	443050	6070350	54	0.5 W PRURA HILL	plain (includes undulating plain)	sand	90	43
BV01401	441750	6071250	54	2.0 NW PRURA HILL	open depression	sandy loam	90	0
BV01501	445075	6057100	54	N/A	N/A	N/A	100	43
BV01601	448600	6063700	54	N/A	plain (includes undulating plain)	sand	100	34
BV01701	448550	6065150	54	N/A	plain (includes undulating plain)	sand	90	34
BV01801	448700	6066490	54	N/A	plain (includes undulating plain)	sand	100	40
CA01801	433000	6049750	54	15.0 SW BOX FLAT	dune footslope	sand	60	43
NG00201	**452791**	**6057612**	**54**	**13.5 SE BAAN HILL**	**dune crest**	**sand**	**110**	**48**
NG00301	**453105**	**6056344**	**54**	**14.5 SE BAAN HILL**	**plain (includes undulating plain)**	**sand**	**100**	**40**
NG00401	**444092**	**6054950**	**54**	**4.0 S BOX FLAT**	**hill slope**	**sandy loam**	**90**	**33**
NG01201	442263	6066937	54	3.5 S PRURA HILL	dune slope	sand	90	40
NG01301	442025	6066890	54	3.5 SW PRURA HILL	hill slope	sand	90	43
NG01601	453052	6057602	54	13.5 SE BAAN HILL	plain (includes undulating plain)	sand	100	43
NG01701	453115	6055883	54	15.8 SE BAAN HILL	plain (includes undulating plain)	sand	100	43
NG.25 01	449900	6051700	54	N/A	closed depression	sandy loam	100	33
NG02801	440750	6044000	54	N/A	hill crest	sand	70	46
NG02901	441024	6044652	54	N/A	plain (includes undulating plain)	sand	70	43
NG03001	440400	6044390	54	N/A	plain (includes undulating plain)	sand	70	43
69262 RESCUE								
CB00101	**436592**	**6020342**	**54**	**2.0 NE GAMBAK PARK**	**hill slope**	**clay loam**	**60**	**46**
CB00201	435060	6019100	54	0.7 NW GAMBAK PARK	plain (includes undulating plain)	loam	40	46
CB00301	436450	6020700	54	2.1 NE GAMBAK PARK	dune slope	sand	60	43
CB00401	437500	6017950	54	2.0 SE GAMBAK PARK	swale	clay loam	60	55
CB00501	439882	6017654	54	5.0 E GAMBAK PARK	hill slope	medium clay	50	46
CB00601	439899	6016633	54	5.0 SE GAMBAK PARK	open depression	sandy loam	30	43
MR00101	**438200**	**6031200**	**54**	**7.5 NNW RABBIT ISLAND DAM**	**hill crest**	**sand**	**40**	**46**
MR00201	**438821**	**6024418**	**54**	**1.5 WNW RABBIT ISLAND DAM**	**plain (includes undulating plain)**	**sandy loam**	**0**	**46**
MR00301	**445600**	**6022400**	**54**	**3.5 E GOSSE HILL**	**plain (includes undulating plain)**	**sand**	**60**	**35**
MR00401	438251	6032704	54	N/A	plain (includes undulating plain)	sand	60	43
MR00501	437400	6032200	54	N/A	hill footslope	sandy loam	60	35
MR00601	437800	6031200	54	N/A	plain (includes undulating plain)	sand	50	43
MR00701	437700	6029430	54	N/A	plain (includes undulating plain)	sand	50	43
MR00801	437250	6028300	54	N/A	hill footslope	sandy loam	60	46
MR00901	443496	6021915	54	N/A	plain (includes undulating plain)	sand	75	46
MR01001	444100	6022100	54	N/A	plain (includes undulating plain)	sand	60	43
MR01101	441542	6022580	54	N/A	closed depression	sand	100	43
MR01201	441200	6023000	54	N/A	hill slope	sand	95	46
MR01301	437922	6024376	54	N/A	hill slope		0	31
MR01401	437294	6024270	54	N/A	hill slope	sand	70	43
MR01501	436626	6024544	54	N/A	hill crest	sand	80	43
MR01601	436650	6024760	54	N/A	plain (includes undulating plain)	sand	90	43

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
NG01001	**453970**	**6024770**	**54**	**2.2 ENE TAMBOORE**	**dune slope**	**sand**	**90**	**43**
NG01101	**452460**	**6024200**	**54**	**1.5 NE TAMBOORE**	**plain (includes undulating plain)**	**clay loam**	**70**	**55**
NG02601	451380	6040590	54	N/A	hill crest	sand	100	40
NG02701	451380	6040400	54	N/A	plain (includes undulating plain)	sand	100	43
69263 TINTINARA								
CB00301	414500	6030800	54	2.2 N TINTINARA	plain (includes undulating plain)	loam	20	46
CB00401	427002	6025225	54	1.7 S LYNONGA	dune slope	sand	40	43
CB00501	426850	6025850	54	1.2 S LYNONGA	dune slope	sand	50	43
CB00601	419804	6016284	54	2.0 SW YARRANDOO	swamp	clay loam	20	57
TT00201	**412872**	**6040898**	**54**	**12.8 N TINTINARA**	**dune slope**	**sandy loam**	**60**	**46**
TT00301	**422220**	**6040400**	**54**	**4.5 NE HUON DOWNS**	**plain (includes undulating plain)**	**loam**	**90**	**30**
TT00401	**429974**	**6029641**	**54**	**2.5 SE PURPLE DOWNS**	**dune slope**	**sand**	**50**	**43**
TT00701	409666	6040978	54	5.8 NE CULBURRA	open depression	sand	50	49
TT00801	422360	6040350	54	4.6 NE HUON DOWNS	hill slope	medium clay	95	46
TT00901	430114	6029515	54	2.6 SE PURPLE DOWNS	open depression	clay loam	40	35
TT01001	410185	6028492	54	4.75 W TINTINARA	dune slope	sand	20	43
TT01501	414020	6018400	54	1.0 N NOORUMBA	plain (includes undulating plain)	sand	20	46
69264 CARCUMA								
CA00101	423200	6068400	54	2.5 SW ONE TREE HILL	open depression	sandy loam	60	37
CA00101	**422150**	**6067850**	**54**	**3.5 SW ONE TREE HILL**	**hill crest**		**70**	**40**
CA00201	421600	6067100	54	4.5 SW ONE TREE HILL	hill slope	sand	70	43
CA00201	**418936**	**6065305**	**54**	**8.0 SW ONE TREE HILL**	**open depression**	**sand**	**60**	**33**
CA00301	**418300**	**6064900**	**54**	**8.5 SW ONE TREE HILL**	**open depression**	**sand**	**60**	**40**
CA00401	**418090**	**6061278**	**54**	**7.0 NW NULUNGERY**	**plain (includes undulating plain)**	**clay loam**	**60**	**46**
CA00501	**418643**	**6061184**	**54**	**7.0 NW NULUNGERY**	**plain (includes undulating plain)**	**sand**	**60**	**43**
CA00601	**418794**	**6047827**	**54**	**0.5 SE GUM FLAT**	**dune slope**	**sand**	**60**	**46**
CA00801	418800	6055150	54	1.5 NW NULUNGERY	dune crest	sand	70	40
CA00801	**418950**	**6054800**	**54**	**1.0 W NULUNGERY**	**swale**	**sand**	**40**	**50**
CA00901	418757	6058532	54	4.5 NW NULUNGERY	dune slope	sand	70	40
CA01001	418793	6057893	54	3.5 NW NULUNGERY	dune slope	sand	60	40
CA01101	414400	6054850	54	5.5 W NULUNGERY	open depression	sand	50	44
CA01201	414850	6059850	54	7.5 NW NULUNGERY	dune footslope	sand	50	33
CA01301	415250	6060500	54	7.5 NW NULUNGERY	dune crest	sand	70	43
CA01401	418400	6065000	54	8.0 SW ONE TREE HILL	hill slope	sand	70	43
CA01501	418150	6048150	54	0.5 SE GUM FLAT	open depression	medium clay	30	0
CA01601	418250	6047700	54	0.5 S GUM FLAT	plain (includes undulating plain)	sand	40	43
CA01701	419550	6048550	54	1.0 NE GUM FLAT	plain (includes undulating plain)	sand	50	40
CA01901	431079	6046642	54	5.0 SE ASHFIELD PARK	dune crest	sand	70	43
CA02001	414500	6054100	54	5.5 W NULUNGERY	plain (includes undulating plain)	sand	40	44
CA02101	412900	6053200	54	7.5 SW NULUNGERY	swale	sand	40	46
CA02201	412922	6054039	54	7.5 W NULUNGERY	plain (includes undulating plain)	sand	40	44
CA03301	415750	6065800	54	2.5 S KIAKA	plain (includes undulating plain)	sandy loam	40	40
CA03701	413600	6062750	54	6.0 SW KIAKA	hill slope	sandy loam	40	33
CA03801	413250	6062700	54	6.5 SW KIAKA	hill slope	sand	40	46

Parrakie Mapsheet

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
69271 KULKAMI								
BT00201	**452793**	**6119879**	**54**	**11.0 NW WHIRA**	**swale**	**sand**	**85**	**45**
BT01801	452800	6120250	54	11.0 NW WHIRA	dune slope	sand	95	40
BT01901	453376	6125601	54	16.0 N WHIRA	dune slope	sand	90	40
KU01101	431650	6126300	54	17.0 NW KULKAMI	plain (includes undulating plain)	sandy loam	70	33
KU02101	444100	6108400	54	2.0 SE MULPATA TOWNSHIP	plain (includes undulating plain)	sand	85	45
KU02201	444350	6108750	54	1.5 SE MULPATA TOWNSHIP	plain (includes undulating plain)	sand	85	33
KU02301	435218	6101038	54	8.3 S KULKAMI	dune slope	sand	100	40
KU02401	435845	6109735	54	1.5 NE KULKAMI	dune slope	sand	100	40
KU.25 01	435832	6109888	54	1.5 NE MULPATA	dune crest	sand	105	40
KU02601	435885	6109482	54	1.5 E KULKAMI	plain (includes undulating plain)	sandy loam	85	37
KU02701	431800	6112900	54	4.5 NW KULKAMI	dune slope	sand	90	40
KU02801	431841	6112734	54	4.5 NW KULKAMI	swale	sand	80	35
KU03601	442450	6114700	54	5.0 NW MULPATA	dune crest	sand	100	40
KU03701	441650	6114650	54	5.0 NW MULPATA	swale	sandy loam	90	37
KU03801	442200	6114650	54	5.0 NW MULPATA	swale	sand	90	35
KU03901	434600	6120150	54	11.0 N KULKAMI	dune slope	sand	80	40
KU04001	435095	6119891	54	11.0 N KULKAMI	swale	sand	70	45
KU04601	453050	6109850	54	2.5 SW WHIRA	dune slope	sand	100	40
KU04701	453481	6110208	54	2.5 SW WHIRA	swale	sand	90	35
69272 PARRAKIE								
BV00101	**445213**	**6075346**	**54**	**9.7 SE WEONA HOMESTEAD**	**plain (includes undulating plain)**	**clay loam**	**90**	**37**
BV00401	436642	6074343	54	1.5 N GARRA	dune slope	sandy loam	80	40
BV00501	447748	6074822	54	4.9 SW SUNNY HILL HOMESTEAD	dune slope	sandy loam	90	40
BV00601	447725	6074406	54	5.2 SW SUNNY HILL HOMESTEAD	dune slope	sandy loam	95	43
BV00701	447256	6074222	54	5.5 SW SUNNY HILL HOMESTEAD	other	clay loam	90	37
BV00801	445219	6.75 213	54	9.8 SE WEONA HOMESTEAD	dune crest	sandy loam	90	40
JA00401	431860	6092000	54	2.9 NE LYNLEE	dune slope	sand	90	40
KU02901	435094	6096199	54	2.85 NW REBEL RIDGE	dune slope	sand	90	40
KU03001	434860	6096090	54	3.0 NW REBEL RIDGE	closed depression	clay loam	85	33
KU03101	441870	6090920	54	1.5 W NEW BOLD	dune crest	sand	90	40
KU03201	443730	6086100	54	1.8 NE WILKAWAT	plain (includes undulating plain)	clay loam	90	37
KU03301	434550	6084150	54	2.5 E PARRAKIE	plain (includes undulating plain)	clay loam	85	37
KU04801	450100	6088500	54	1.5 S BEWS HILL	plain (includes undulating plain)	clay loam	90	37
69273 JABUK								
JA00101	**414789**	**6084091**	**54**	**0.5 NW JABUK OVAL**	**plain (includes undulating plain)**	**sandy loam**	**80**	**31**
JA00201	**419164**	**6083841**	**54**	**4.2 SW GERANIUM P.O.**	**plain (includes undulating plain)**	**sandy loam**	**110**	**31**
JA00301	**427731**	**6084335**	**54**	**4.1 E GERANIUM P.O.**	**plain (includes undulating plain)**	**sandy loam**	**70**	**31**
JA00501	431777	6091742	54	2.7 NE LYNLEE	dune slope	sandy loam	100	40
JA00601	427289	6093640	54	9.8 NE GERANIUM P.O.	dune crest	sand	80	40
JA00701	426896	6093823	54	9.8 NE GERANIUM P.O.	swale	sandy loam	80	37
JA00801	426687	6093509	54	9.2 NE GERANIUM P.O.	dune footslope	sand	80	40
JA00901	423494	6089909	54	5.8 N GERANIUM P.O.	dune slope	sand	90	45
JA01001	420388	6079636	54	5.5 SW GERANIUM P.O.	plain (includes undulating plain)	sandy loam	80	34
JA01101	426530	6075041	54	9.8 NW GERANIUM P.O.	dune footslope	sand	80	40
JA01201	426362	6075251	54	9.5 NW GERANIUM P.O.	dune crest	sand	80	40
JA01301	421643	6091974	54	7.8 NW GERANIUM	plain (includes undulating plain)	sandy loam	80	31
JA01401	413100	6083700	54	2.3 SW JABUK OVAL	plain (includes undulating plain)	loam	80	31
PE00101	**409505**	**609.75 7**	**54**	**6.0 NW GLENLEIGH.**	**other**	**sand**	**90**	**31**
PE00901	409668	6096441	54	7.0 NW GLENLEIGH.	swale	loam	90	34

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
PE01001	409676	6096247	54	7.0 NW GLENLEIGH.	dune slope	sand	90	40
69274 MARAMA								
KU00201	**425873**	**6124101**	**54**	**4.5 NE PILCHERA BORE**	**swale**	**sandy loam**	**80**	**31**
KU00301	**427805**	**6113849**	**54**	**6.8 NE MARAMA P.O.**	**swale**	**sandy loam**	**90**	**37**
KU00401	**419459**	**6103306**	**54**	**7.2 SW MARAMA P.O.**	**dune crest**	**sand**	**80**	**40**
KU01301	425600	6124200	54	4.0 NE PILCHERA BORE	dune crest	sand	80	40
KU01401	425205	6124597	54	4.0 NE PILCHERA BORE	plain (includes undulating plain)	sandy loam	70	33
KU01501	427340	6120866	54	5.8 SE PILCHERA BORE	dune crest	sand	80	40
KU01601	427405	6120680	54	6.0 SE PILCHERA BORE	swale	sandy loam	80	37
KU01701	427404	6113217	54	6.2 NE MARAMA P.O.	dune slope	sand	100	0
KU01801	430800	6108900	54	5.2 SW MARAMA P.O.	plain (includes undulating plain)	clay loam	80	37
KU01901	425229	6107090	54	0.2 SW MARAMA P.O.	plain (includes undulating plain)	loam	90	31
KU02001	419454	6103411	54	7.1 SW MARAMA P.O.	swale	loam	80	37
MI00901	412900	6123600	54	0.4 NE BORRIKA P.O.	plain (includes undulating plain)	sand	50	33
PE01101	414300	6111900	54	4.5 N YURGO OVAL	plain (includes undulating plain)	sand	70	37
PE01201	414431	6107425	54	0.35 W YURGO OVAL	dune slope	sand	75	0

Mantung Mapsheet

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
69281 CALIPH								
AL00401	447650	6166380	54	1.9 S PASADENA HOMESTEAD	dune crest	sand	60	34
AL00501	447570	6166257	54	2.0 S PASADENA HOMESTEAD	swale	medium clay	50	0
AL04501	447137	6174418	54	5.5 S FRELYNE HOMESTEAD	swale	medium clay	50	0
AL04601	447094	6174021	54	5.75 S FRELYNE HOMESTEAD	dune crest	medium clay	50	29
WA00101	**436241**	**6157119**	**54**	**1.8 SE WANDALE**	**dune crest**	**sand**	**70**	**33**
WA00301	436022	6157314	54	1.6 SE WANDALE	plain (includes undulating plain)	medium clay	70	34
WA01301	439590	6180504	54	5.0 E KOOWA	plain (includes undulating plain)	medium clay	50	0
WA01401	437559	6170923	54	2.6 NE BAYAH	plain (includes undulating plain)	medium clay	60	29
WA01501	437166	6170857	54	1.8 NE BAYAH	open depression	medium clay	50	29
WA01601	440621	6164220	54	6.75 E CALIPH	plain (includes undulating plain)	medium clay	60	29
WA01701	441081	6164574	54	7.25 E CALIPH	plain (includes undulating plain)	medium clay	50	0
WA01801	440796	6164507	54	7.0 E CALIPH	dune crest	sand	60	29
69282 NOBAH								
AL00601	450318	6149933	54	2.0 NW SCHELL WELL	plain (includes undulating plain)	sandy loam	70	29
AL00701	452300	6146850	54	2.5 S SCHELL WELL	dune crest	sand	80	33
AL00801	452208	6146450	54	2.5 S SCHELL WELL	swale	sandy loam	75	33
AL00901	450800	6143900	54	1.5 SW WINARD	dune crest	sand	105	40
AL01001	450842	6143616	54	1.5 SW WINARD	swale	sand	80	33
BT00101	**450650**	**6131500**	**54**	**4.5 SE NOBAH BORE**	**dune slope**	**sand**	**85**	**40**
BT00301	448900	6139900	54	1.5 S TAMARISK	plain (includes undulating plain)	sand	70	33
BT00401	449000	6138900	54	3.0 S TAMARISK	dune slope	sand	80	40
BT00501	449504	6136686	54	1.5 NE NOBAH BORE	plain (includes undulating plain)	sandy loam	70	33
BT00601	449358	6136139	54	0.5 NE NOBAH BORE	plain (includes undulating plain)	sandy loam	70	34
BT00701	449050	6133850	54	2.0 S NOBAH BORE	swale	loam	75	34
BT00801	449352	6133644	54	2.0 S NOBAH BORE	dune slope	sand	80	40
BT00901	450200	6131050	54	4.5 SE NOBAH BORE	swale	sandy loam	80	33
BT01001	451723	6127847	54	8.0 SE NOBAH BORE	dune slope	sand	75	40
BT01101	451720	6128037	54	8.0 SE NOBAH BORE	swale	sand	75	40
KU00101	**431615**	**6130697**	**54**	**1.5 NW TANA-MERA HOMESTEAD**	**plain (includes undulating plain)**	**sandy loam**	**70**	**31**
KU00801	431586	6133472	54	6.5 SW WILDARA HOMESTEAD	plain (includes undulating plain)	sand	80	40
KU00901	431544	6134070	54	6.0 SW WILDARA HOMESTEAD	plain (includes undulating plain)	sandy loam	70	35
KU01001	431700	6130450	54	1.5 NW TANA-MERA HOMESTEAD	dune slope	sand	70	40
KU01201	431650	6126950	54	17.0 NW KULKAMI	dune slope	sand	80	40
KU03401	439900	6139800	54	1.0 SW WANBI DOWNS HOMESTEAD	swale	sand	80	33
KU03401	439950	6139350	54	1.0 SW WANBI DOWNS HOMESTEAD	dune slope	sand	80	0
WA00401	433462	6154116	54	3.5 NW WANBI	plain (includes undulating plain)	sandy loam	70	29
WA00501	439053	6148463	54	4.5 SE WANBI	plain (includes undulating plain)	sand	70	33
WA00601	439002	6148751	54	4.5 SE WANBI	hill slope	sandy loam	70	29
69283 HALIDON								
BB00401	426315	6143172	54	3.0 NE HALIDON	swale	medium clay	70	0
BB00501	426328	6143306	54	3.2 NE HALIDON	dune crest	sand	90	40
KU00501	.25 835	6137967	54	3.0 SE HALIDON	dune slope	sand	80	33
KU00601	426080	6137665	54	3.4 SE HALIDON	dune slope	sand	70	34
KU00701	418145	6126917	54	4.5 KILPALIE	dune slope	sand	60	0
69284 MANTUNG								
BB00601	418608	6157980	54	1.7 NE KIMBERLEY	plain (includes	medium clay	70	0

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
				PARK HOMESTEAD	undulating plain)			
MM00401	410400	6179900	54	8.0 SE MANTUNG	N/A	N/A	0	0
MM00801	417330	6173420	54	2.0 NE MANTUNG	N/A	N/A	0	0
MM01101	424930	6172590	54	9.0 E MANTUNG	N/A	N/A	0	0
MM01201	423460	6170095	54	8.0 E MANTUNG	N/A	N/A	0	0
MM01301	422260	6165110	54	9.7 SE MANTUNG	N/A	N/A	0	0
MM01301	409301	6164459	54	2.5 SW MERCUNDA HOMESTEAD	plain (includes undulating plain)	medium clay	60	29
WA00201	**422400**	**6160500**	**54**	**6.25 SW GUMVIEW HOMESTEAD**	**plain (includes undulating plain)**	**medium clay**	**70**	**35**
WA00901	429752	6172562	54	5.0 NE HAMPTON	swale	medium clay	60	34
WA01001	429779	6172333	54	4.75 NE HAMPTON HOMESTEAD	dune crest	sand	70	34
WA01101	429440	6161200	54	5.25 NE KNIGHT WELL	dune slope	sand	70	0
WA01201	429482	6161075	54	5.0 NE KNIGHT WELL	plain (includes undulating plain)	sand	70	0

Moorook Mapsheet

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
69292 MOOROOK								
MM00401	437543	6186648	54	3.8 NE WUNKAR	plain (includes undulating plain)	sand	50	33
MM00501	436866	6199430	54	1.7 S YINKANIE	plain (includes undulating plain)	medium clay	40	29
69293 HOLDER								
MM00101	416293	6195314	54	11.0 N MAGGEA	dune crest	sand	70	29
MM00201	416265	6195170	54	11.0 N MAGGEA	swale	loam	65	29
MM00301	425001	6194004	54	14.5 NE MAGGEA	plain (includes undulating plain)	loam	60	29
MM00601	427449	6206449	54	9.0 NE KURLANA	dune crest	sand	70	33
MM00701	427400	6205800	54	8.0 NE KURLANA	swale	sandy loam	60	29
WA00701	422321	6182565	54	4.4 SW ARKONA FLATS	dune crest	sand	60	29
WA00801	422298	6182427	54	4.7 SW ARKONA FLATS	swale	sand	60	29
WK00301	409344	6209207	54	0.5 N KANNI	plain (includes undulating plain)	clay loam	55	29
69294 POOGINOOK								
WK00401	409200	6209700	54	0.7 N KANNI	dune crest	sand	60	34
WK00501	416173	6211661	54	2.3 SW AKOONAH HOMESTEAD	plain (includes undulating plain)	sandy loam	55	29
WK00601	424864	6211306	54	2.2 S EREMOPHILA PARK	swale	sandy loam	70	29
WK00701	424875	6211187	54	2.3 S EREMOPHILA PARK	dune crest	sand	80	33

McCallum Mapsheet

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
70261 QUONDONG BORE								
NG00101	**479186**	**6067166**	**54**	**4.0 SE QUANDONG BORE**	**stream channel**	**sand**	**130**	**48**
NG00501	**478300**	**6054880**	**54**	**1.9 SW PERTENDI BORE**	**plain (includes undulating plain)**	**N/A**	**115**	**0**
NG00601	**486183**	**6047581**	**54**	**7.5 NNW KIRRA**	**plain (includes undulating plain)**	**sand**	**120**	**43**
NG00701	**488211**	**6045108**	**54**	**3.5 NNW KIRRA**	**plain (includes undulating plain)**	**sand**	**100**	**43**
NG02001	488309	6045023	54	N/A	plain (includes undulating plain)	sand	120	40
NG02101	486110	6047675	54	N/A	plain (includes undulating plain)	sand	130	40
NG03401	479895	6067193	54	4.1 SE QUANDONG BORE	open depression	clay loam	120	40
NG03501	481631	6067213	54	5.0 SE QUANDONG BORE	dune crest	sand	140	45
NG03601	481325	6067210	54	5.0 SE QUANDONG BORE	swale	sand	135	45
NG03701	481189	6067206	54	5.0 SE QUANDONG BORE	dune crest	sand	130	40
SS01701	477654	6071053	54	0.75 N QUANDONG BORE	hill slope	sand	105	40
70262 SHAUGH								
MR01701	489038	6034345	54	5.5 SW MT SHAUGH	dune slope	sand	130	40
MR01801	491470	6034450	54	3.5 SW MT SHAUGH	plain (includes undulating plain)	sand	130	43
MR01901	491985	6034435	54	3.0 SW MT SHAUGH			130	0
MR02001	487550	6030500	54	3.0 W HAWICK	plain (includes undulating plain)	sand	120	43
MR02101	487150	6030550	54	3.0 W HAWICK	plain (includes undulating plain)	sand	120	43
MR02201	491841	6020222	54	11.5 E KANGARINGA	plain (includes undulating plain)	sandy loam	120	34
MR02301	491975	6020270	54	11.5 E KANGARINGA	dune crest	sand	120	40
NG00801	**484970**	**6042030**	**54**	**5.5 W KIRRA**	**plain (includes undulating plain)**	**sand**	**130**	**40**
NG03101	484670	6041970	54	5.5 W KIRRA	plain (includes undulating plain)	sand	130	43
NG03201	481270	6040770	54	9.0 W KIRRA	plain (includes undulating plain)	sandy loam	120	40
NG03301	481162	6041300	54	9.0 W KIRRA	plain (includes undulating plain)	clay loam	120	40
70263 MCCALLUM								
NG00901	**477121**	**6025136**	**54**	**4.7 N BALARGORANG**	**plain (includes undulating plain)**	**sand**	**110**	**43**
NG01401	461405	6024244	54	3.0 N CONWAY PARK	plain (includes undulating plain)	sand	90	43
NG03401	469798	6016461	54	3.5 S KYNOCH STATION	swale	sandy loam	100	43
OH0301	476700	6024400	54	4.0 N BALARGORANG	plain (includes undulating plain)	sand	110	43
SD00101	**469770**	**6016550**	**54**	**3.5 S KYNOCH STATION**	**dune slope**	**sandy loam**	**110**	**43**
70264 BAINTON								
NG01801	461900	6053580	54	N/A	dune slope	sand	115	40
NG01901	468015	6055659	54	N/A	plain (includes undulating plain)	sand	100	40
NG02201	472742	6054654	54	N/A	plain (includes undulating plain)	sand	110	43
NG02301	470400	6054880	54	N/A	plain (includes undulating plain)	sand	110	43
NG02401	470288	6054683	54	N/A	plain (includes undulating plain)	sand	110	43
OH00512	476700	6024400	54	N/A			110	43
QB00301	**461467**	**6069863**	**54**	**23.0 S LAMEROO**	**plain (includes undulating plain)**	**sand**	**105**	**45**
QB00801	460122	6069872	54	22.0 S LAMEROO	plain (includes undulating plain)	sand	100	40
QB00901	459153	6069671	54	22.0 S LAMEROO	open depression	sand	100	40

QB01001	460011	6068821	54	22.0 S LAMEROO	dune slope	sand	130	45

Pinnaroo Mapsheet

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
70271 PRINPUN BORE								
PB00401	**495639**	**6126880**	**54**	**6.6 NE PRINPUN BORE**	**open depression**	**sandy loam**	**60**	**31**
PB01801	484035	6126774	54	8.0 NW PRINPUN BORE	closed depression	sand	90	33
PB01901	484405	6126335	54	8.0 NW PRINPUN BORE	dune crest	sand	90	40
PB02001	492474	6125374	54	3.0 NE PRINPUN BORE	open depression	loam	70	0
PB02101	491788	6124534	54	2.5 NE PRINPUN BORE	dune crest	sand	90	40
PB02301	484356	6121629	54	2.0 SW HILLYFIELDS	dune crest	sand	90	40
PB02401	484580	6121000	54	3.0 SW HILLYFIELDS	swale	sandy loam	90	33
PB02501	481628	6117614	54	3.0 SW HILLYFIELDS	plain (includes undulating plain)	sand	90	40
PI00301	481848	6113000	54	7.5 SW HILLYFIELDS	dune slope	sand	110	40
PI00401	485849	6114540	54	5.0 NW COORA	dune crest	sand	110	0
PI00501	489728	6111017	54	0.3 S COORA	plain (includes undulating plain)	sandy loam	100	37
PI00601	485643	6101629	54	6.5 SE HILLYFIELDS	swale	loam	100	37
PI02001	478400	6114050	54	8.0 SW HILLYFIELDS	dune slope	sand	100	40
70272 PINNAROO								
PI00101	**487724**	**6096566**	**54**	**4.0 NE PINNAROO**	**plain (includes undulating plain)**	**sandy loam**	**100**	**29**
PI00701	480630	6087800	54	8.5 S CHANDOS	open depression	sandy loam	110	37
PI00801	495550	6080340	54	17.0 SE PINNAROO	dune slope	sand	120	43
PI00901	493087	6081839	54	16.0 SE PINNAROO	open depression	sandy loam	110	37
PI01001	493056	6081708	54	16.0 SE PINNAROO	dune crest	sand	120	40
PI01101	477950	6095400	54	3.0 NE CHANDOS	dune crest	sand	90	31
PI01201	479340	6084770	54	11.5 SW PINNAROO	plain (includes undulating plain)	sand	120	34
SS00101	**488983**	**6079481**	**54**	**18.5 SW PINNAROO**	**dune slope**	**sand**	**110**	**40**
SS00201	**488075**	**6075524**	**54**	**22.5 SW PINNAROO**	**open depression**	**sandy loam**	**100**	**34**
SS00301	**489600**	**6077450**	**54**	**20.5 SW PINNAROO**	**plain (includes undulating plain)**	**sand**	**90**	**49**
SS00401	**491121**	**6078103**	**54**	**20.0 SW PINNAROO**	**plain (includes undulating plain)**	**sand**	**90**	**45**
SS00501	**496344**	**6079355**	**54**	**20.5 SE PINNAROO**	**swale**	**sand**	**110**	**11**
SS00601	481750	6079700	54	1.0 NE PINE SPRINGS	swale	sand	110	34
SS00701	481814	6079879	54	1.0 NE PINE SPRINGS	other	sand	120	45
SS00801	482103	6079905	54	1.5 NE PINE SPRINGS	dune crest	sand	120	40
SS00901	477813	6072046	54	29.0 SW PINNAROO	plain (includes undulating plain)	sand	110	43
SS01001	488993	6079762	54	18.0 SW PINNAROO	dune slope	sandy loam	100	34
SS01101	488900	6079150	54	18.5 SW PINNAROO	plain (includes undulating plain)	medium clay	100	37
SS01201	488446	6077191	54	21.0 SW PINNAROO	open depression	sand	90	43
SS01301	486000	6071700	54	26.5 SW PINNAROO	open depression	sandy loam	110	37
SS01401	487900	6072600	54	25.5 SW PINNAROO	dune slope	sand	120	43
SS01501	495620	6078850	54	19.5 SE PINNAROO	open depression	sand	100	0
SS01601	495007	6078358	54	20.0 SE PINNAROO	dune slope	sand	130	43
70273 LAMEROO								
KU04101	458099	6090610	54	2.1 E LAMEROO	plain (includes undulating plain)	sandy loam	100	3
KU04201	461900	6080127	54	11.5 SE LAMEROO	dune slope	sand	110	40
KU04301	462024	6080831	54	11.0 SE LAMEROO	plain (includes undulating plain)	sand	110	40
PI00201	**474742**	**6093922**	**54**	**5.0 E PARILLA**	**plain (includes undulating plain)**	**sandy loam**	**90**	**3**
PI01301	467372	6093599	54	2.0 W PARILLA	plain (includes undulating plain)	sand	110	40
PI01401	471792	6080129	54	11.0 SE SCRUBBY SPRINGS	plain (includes undulating plain)	sand	120	40
PI01501	470775	6090842	54	3.25 SE PARILLA	dune crest	sand	115	40
PI01601	470800	6090950	54	3.25 SE PARILLA	plain (includes undulating plain)	sandy loam	100	37
QB00101	**459680**	**6072380**	**54**	**18.0 SE LAMEROO**	**swale**	**sand**	**110**	**43**
QB00201	**472050**	**6071950**	**54**	**19.0 S SCRUBBY SPRINGS**	**dune slope**	**sand**	**110**	**43**
QB00401	459573	6072291	54	18.0 SE LAMEROO	dune crest	sand	120	43
QB00501	465500	6075700	54	17.5 SE LAMEROO	dune crest	sand	120	40
QB00601	465642	6075642	54	17.5 SE LAMEROO	swale	sand	110	40
QB00701	471632	6071935	54	19.0 S SCRUBBY	plain (includes	sand	110	43

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
				SPRINGS	undulating plain)			
70274 KARTE								
BT01201	458827	6119638	54	2.5 NE MALLEE HILLS	dune crest	sandy loam	90	40
BT01301	459101	6120206	54	2.5 NE MALLEE HILLS	open depression	sandy loam	80	40
BT01401	459400	6121684	54	3.0 NE MALLEE HILLS	stream channel	sandy loam	80	33
BT01501	459529	6116241	54	5.5 NW GURRAI	dune crest	sand	100	40
BT01601	459526	6116447	54	5.5 NW GURRAI	swale	clay loam	90	34
BT01701	459510	6116924	54	6.0 NW GURRAI	open depression	loam	85	37
KA00101	**471100**	**6118720**	**54**	**2.25 SW KARTE**	**swale**	**sandy loam**	**90**	**40**
KA00201	**468780**	**6122600**	**54**	**4.5 NW KARTE**	**swale**	**sand**	**80**	**31**
KA00301	475063	6122757	54	3.4 NE KARTE	plain (includes undulating plain)	sand	70	33
KA00401	472820	6120580	54	0.5 NE KARTE	plain (includes undulating plain)	sand	90	33
KA00501	471250	6118350	54	2.9 SW KARTE	swale	clay loam	90	37
KA00601	471150	6118630	54	2.25 SW KARTE	dune crest	sand	100	40
KA00701	466950	6115050	54	3.75 NE GURRAI	plain (includes undulating plain)	sand	90	34
KA00801	468600	6122800	54	5.0 NW KARTE	dune crest	sand	90	40
KA00901	469000	6122500	54	4.0 NW KARTE	plain (includes undulating plain)	clay loam	80	37
KU04401	456100	6110050	54	1.0 S WIRRAH	dune slope	sand	110	40
KU04501	456035	6110146	54	0.9 S WIRRAH	swale	sandy loam	100	40
PI01701	473238	6111121	54	9.5 S KARTE	dune crest	sand	130	40
PI01801	473592	6111360	54	9.5 S KARTE	swale	sand	95	33
PI01901	474851	6104579	54	3.0 SE CLAYPAN BORE	plain (includes undulating plain)	clay loam	95	34

Paruna Mapsheet

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
70281 TAPLAN								
AL00201	**479912**	**6166932**	**54**	**13.5 SW TAPLAN**	**dune crest**	**sand**	**60**	**36**
AL01501	480716	6167110	54	13.5 SW TAPLAN	plain (includes undulating plain)	clay loam	60	29
AL01601	488500	6177300	54	0.4 W TAPLAN	plain (includes undulating plain)	clay loam	50	29
AL03301	487520	6159388	54	1.0 SE MERIBAH	dune footslope	sandy loam	40	29
70282 PEEBINGA								
AL03401	494700	6145080	54	7.1 SE MOONAH BORE	stream channel	sand	60	40
AL03501	494780	6144940	54	7.25 SE MOONAH BORE	swale	sand	80	34
AL03601	496253	6153041	54	7.5 NE MOONAH BORE	dune crest	sand	80	40
AL03701	496667	6152739	54	7.25 NE MOONAH BORE	swale	sand	60	31
AL03801	484870	6143489	54	8.0 SW MOONAH BORE	plain (includes undulating plain)	sand	45	29
AL03901	486780	6143400	54	7.5 SW MOONAH BORE	dune crest	sand	45	40
AL04001	482600	6146700	54	7.75 SW MOONAH BORE	dune crest	sand	60	33
AL04101	482405	6146821	54	8.0 SW MOONAH BORE	swale	sand	45	33
AL04201	481180	6148251	54	8.5 SW MOONAH BORE	plain (includes undulating plain)	loam	45	29
AL04301	487730	6150078	54	1.8 W MOONAH BORE	dune slope	sand	55	40
AL04401	487798	6150143	54	1.7 W MOONAH BORE	swale	sand	40	33
PB00101	**492472**	**6134140**	**54**	**0.8 SE PEEBINGA**	**swale**	**sand**	**70**	**34**
PB00201	**484994**	**6128506**	**54**	**3.5 S MOOTATUNGA**	**dune crest**	**sand**	**95**	**40**
PB00301	**485200**	**6128250**	**54**	**3.75 S MOOTATUNGA**	**swale**	**sand**	**80**	**33**
PB00601	489914	6129045	54	5.8 SW PEEBINGA	dune crest	sand	80	40
PB00701	490283	6128562	54	6.4 SW PEEBINGA	swale	sand	70	33
PB00801	485342	6129248	54	2.75 S MOOTATUNGA	swale	sandy loam	70	37
PB00901	479920	6127600	54	0.5 SW KRINGIN	dune crest	sand	90	40
PB01001	480000	6127700	54	0.7 SW KRINGIN	swale	sandy loam	80	37
PB01101	481200	6135860	54	5.5 NW MOOTATUNGA	dune crest	sand	85	40
PB01201	481150	6136000	54	5.6 NW MOOTATUNGA	swale	sand	70	33
PB01301	480500	6135950	54	6.0 NW MOOTATUNGA	swale	sandy loam	65	37
PB01401	493501	6138394	54	4.25 NE PEEBINGA	plain (includes undulating plain)	sandy loam	60	37
PB01501	493087	6139084	54	5.0 NE PEEBINGA	dune crest	sand	80	40
PB01501	492400	6134050	54	0.8 SE PEEBINGA	dune crest	sand	90	40
PB01601	487367	6140295	54	5.0 N BUTCHERS SOAK	plain (includes undulating plain)	loam	70	29
PB01701	487396	6139347	54	4.5 N BUTCHERS SOAK	dune crest	sand	90	40
PB02201	495503	6126980	54	6.7 NE PRINPUN BORE	dune crest	sand	60	45
70283 KUMARA								
AL01201	459843	6146785	54	2.5 NW BRIAKEN PARK	dune crest	sand	70	33
AL01301	455080	6143304	54	5.25 SW BRIAKEN PARK	closed depression	clay loam	70	37
AL01401	454867	6143155	54	5.5 SW BRIAKEN PARK	dune slope	sand	80	40
AL02201	472130	6146960	54	4.25 SE ENOOMAH BORE	dune slope	sandy loam	70	33
AL02301	472630	6146910	54	4.75 SE ENOOMAH BORE	stream channel	sandy loam	70	40
AL02401	475800	6148545	54	1.0 E MALVEU	dune slope	sandy loam	60	33
AL02501	464759	6148339	54	3.25 W ENOOMAH BORE	dune crest	sand	70	40
AL02601	465209	6148299	54	2.7 W ENOOMAH BORE	swale	sandy loam	70	0
AL02701	469920	6143180	54	5.3 SE ENOOMAH BORE	closed depression	clay loam	70	34
AL02801	469935	6143300	54	5.2 SE ENOOMAH BORE	dune crest	sandy loam	70	40
AL02901	475970	6141522	54	6.2 NE KUMARA BORE	dune crest	sandy loam	80	40
AL03001	475659	6141733	54	6.1 NE KUMARA BORE	closed depression	sandy loam	80	33
AL03101	460048	6150533	54	6.1 N BRIAKEN PARK	swale	sandy loam	70	31
AL03201	460073	6150636	54	6.25 N BRIAKEN PARK	dune crest	sand	80	40
BT02201	458744	6141004	54	3.8 SW BRIAKEN PARK	plain (includes undulating plain)	sand	70	33
70284 PARUNA								
AL00101	**463868**	**6168783**	**54**	**9.5 SW PATA**	**plain (includes undulating plain)**	**sandy loam**	**45**	**2**
AL00301	**455332**	**6155577**	**54**	**1.0 SE ALAWOONA**	**dune crest**	**sand**	**70**	**36**
AL01101	455401	6155728	54	1.0 SE ALAWOONA	plain (includes undulating plain)	clay loam	65	29

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
AL01701	463883	6168674	54	10.0 SW PATA	dune crest	sand	50	36
AL01801	463427	6168140	54	13.5 NE ALAWOONA	plain (includes undulating plain)	clay loam	50	29
AL01901	463900	6168600	54	10.0 SW PATA	swale	sandy loam	50	29
AL02001	472120	6156300	54	3.5 SW PARUNA	swale	sand	50	33
AL02101	472100	6156400	54	3.5 SW PARUNA	dune crest	sand	55	33
AL04701	473600	6155050	54	3.1 NE PARUNA	dune slope	sandy loam	50	40

Renmark Mapsheet

SITEID	Easting	Northing	AMG zone	Distance (km) Direction Nearest Location	Landform	Surface soil texture	Altitude (m)	PATN group
70291 PARINGA								
RE00101	**494435**	**6236261**	**54**	**46.0 NE PARINGA**	**plain (includes undulating plain)**	**sandy loam**	**60**	**29**
RE00201	**491307**	**6221968**	**54**	**10.5 NE PARINGA**	**hill crest**	**sand**	**60**	**6**
RE00301	**491945**	**6233497**	**54**	**20.0 NE PARINGA**	**dune crest**	**sandy loam**	**70**	**29**
RE00501	492115	6233202	54	19.5 NE PARINGA	plain (includes undulating plain)	sandy loam	70	6
RE00601	496100	6231360	54	21.0 NE PARINGA	plain (includes undulating plain)	clay loam	60	10
RE00701	494057	6237498	54	49.0 NE PARINGA	plain (includes undulating plain)	sandy loam	60	21
RE01001	492990	6213180	54	13.5 SE PARINGA	plain (includes undulating plain)	clay loam	50	2
RE01101	493311	6213546	54	14.0 SE PARINGA	dune crest	sand	55	33
RE01201	493211	6213731	54	13.0 SE PARINGA	plain (includes undulating plain)	clay loam	50	29
70292 YAMBA								
RE00401	**491480**	**6188350**	**54**	**5.0 E NOORA**	**swamp**	**medium clay**	**20**	**52**
RE00801	493528	6188435	54	7.0 E NOORA	swamp	medium clay	20	0
RE01301	480913	6206294	54	6.0 SW YAMBA	dune slope	sandy loam	40	29
70293 LOXTON								
RE00901	474450	6196300	54	16.5 NE LOXTON	plain (includes undulating plain)	sandy loam	40	29
RE01401	472400	6205900	54	6.0 SE LYRUP	dune slope	sandy loam	40	36

APPENDIX II

DAILY TEMPERATURES (^{o}C) RECORDED DURING THE MURRAY MALLEE VERTEBRATE FAUNA SURVEY, 21 SEPTEMBER TO 30 NOVEMBER 1991

Basecamp: Loxton **Group 1** **Week 1**					**Basecamp: Purnong** **Group 1** **Week 2**					**Basecamp: Lindisfarne** **Group 2** **Week 2**				
Date	**Sun**		**Shade**		**Date**	**Sun**		**Shade**		**Date**	**Sun**		**Shade**	
	Min	Max	Min	Max		Min	Max	Min	Max		Min	Max	Min	Max
21/10	11	36	15	27	28/10	8	38	14	31	30/10	6	41	8	28
22/10	6	38	10	27	29/10	11	43	15	33	31/10	3	33	5	21
23/10	7	41	10	28	30/10	4	46	10	31	01/11	3	38	9.5	22
24/10	6	39	10	29	31/10	3	42	8	26					
25/10	2	34	6	27	1/11	6	44	14	30					
26/10	1	33	5	24										

Basecamp: Yookamurra **Group 3** **Week 1**					**Basecamp: Jabuk** **Group 3** **Week 2**					**Basecamp: Nest Plains Farm** **North of Pinnaroo** **Groups 4 & 5** **Week 1**				
Date	**Sun**		**Shade**		**Date**	**Sun**		**Shade**		**Date**	**Sun**		**Shade**	
	Min	Max	Min	Max		Min	Max	Min	Max		Min	Max	Min	Max
24/10	-	35	10	-	28/10	9	36	10	25	03/11	8	-	11	-
25/10	9	36	8	22	29/10	18	38	15	28	04/11	6	30	10	23
26/10	9	27	3	19	30/10	14	35	16	28	05/11	5	29	9	22
27/10	1	-	3	-	31/10	3	32	10	21	06/11	6	40	10	26
					01/11	9	35	7	24	07/11	7	37	10	24
					02/11	9	-	15	-	08/11	3	28	6	19
										09/11	3	32	7	20
										10/11	-	40	-	23

Basecamp: Tintinara **Group 5** **Week 2**					**Basecamp: Meningie** **Group 6** **Week 1**					**Basecamp: Jabuk** **Group 6** **Week 2**				
Date	**Sun**		**Shade**		**Date**	**Sun**		**Shade**		**Date**	**Sun**		**Shade**	
	Min	Max	Min	Max		Min	Max	Min	Max		Min	Max	Min	Max
11/11	5	46	8	21	04/11	13.5	25	14	29	11/11	9	31	11	21
12/11	7	50	7	31	05/11	11	37	10	36	13/11	65	31	9	22
13/11	7	50	7	30	06/11	10.5	+50	11	36	13/11	5.5	35	8.5	22
14/11			7	32	07/11	13	31	8.5	24	14/11	7	42	8.5	23.5
15/11			11	27	8/11	9	31	9	24	15/11	10.5	32.5	9	28
16/11			10	31	09/11	10/5	27	11	21	16/11	6.5	29.5	12.5	22.5

Basecamp:Coonalpyn **Group 7** **Week 1**					**Basecamp: Yookamurra** **Group 7** **Week 2**					**Basecamp: Lindisfarne** **Murray** **Group 9** **Week 2**				
Date	**Sun**		**Shade**		**Date**	**Sun**		**Shade**		**Date**	**Sun**		**Shade**	
	Min	Max	Min	Max		Min	Max	Min	Max		Min	Max	Min	Max
19/11	5	36	8	25	25/11	10	45	12	36	24/11				
20/11	5	30	8	23	26/11	4	37	9	25	25/11			24	33.5
21/11	3	32	4	24	27/11	3	31	9	21	26/11			10	26.5
22/11	9	36	11	26	28/11	5	40	10	26	27/11			10	27
23/11	14	43	17	32	29/11	1	30	7	20	28/11			6	31
										29/11			6	20
										30/11			5	

Appendix III

SOUTH AUSTRALIAN NATIVE VEGETATION MAPPING PROGRAM
STRUCTURAL FORMATIONS

Life Form and Height of Tallest Stratum	**Foliage Projective Cover of Tallest Stratum**			
	(Dense) 100-70%	**(Mid-dense) <70-30%**	**(Sparse) <30-10%**	**(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
Shrubs>2m	Tall closed-shrubland	Tall shrubland	Tall open-shrubland	Tall sparse-shrubland
Shrubs<2m	Closed-shrubland	Shrubland	Open-shrubland	Sparse-shrubland
Hummock grasses		Hummock grassland	Open-hummock grassland	Sparse-hummock grassland
Graminoides and grasses	Closed (tussock) grassland	(Tussock) grassland	Open (tussock) grassland	
Sedges	Closed-sedgeland	Sedgeland	Open-sedgeland	
Herbs	Closed-herbland	Herbland	Open-herbland	
Ferns	Closed-fernland	Fernland		
Reeds/Rushers	Closed-reedland	Reedland		

Source: Adapted from:
Specht (1972) The Vegetation of South Australia. Government Printer, Adelaide
Specht, R.L., Roe, E.M., and V.H. Boughton (1974) Conservation of major plant communities in Australia and Papua New Guinea. *Australian Journal of Botany, Supplementary Series, Supplement No: 7*
Muir B.G. (1977) Biological Survey of the Western Australian Wheatbelt. Pt 2:Vegetation and Habitat Bendering Reserve. *Records of the Western Australian Museum, Supplement No: 3,* WA Museum, Perth)
Note: This table has been superseded by Forward and Robinson (1996) shown in Appendix IV.

Appendix IV

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 multistemmed, 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 10 cm in height. Examples of mat plants are *Kunzea pomifera*, *Myoporum parvifolium*, *Carpobrotus rossi* and *Mimulus repens*. .
Hummock Grass - Genera *Triodia* or *Plectrachne* only.
Grasses (tussock) - family Poaceae (Graminae); leaf sheath always split.
Sedges - herbaceous, usually perennial, erect, generally tufted; arise from stolons, tubers, bulbs, rhizomes or seeds. Leaf sheath never split. Includes Cyperaccae, 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 cryptogams 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 V

SCIENTIFIC RESEARCH PROJECTS CONDUCTED IN THE MURRAY MALLEE 1971 TO MID 1999

The following list includes the title, initial and surname of the researcher followed by the date the scientific permit was valid from and then the title of the research project. The list is sorted by year then in date order within year and alphabetically by researchers surname within each month. Further details of any of these projects after July 1984 can be found in Robinson and Canty (1985) and Canty (1987, 1988, 1989, a,b, 1991, 1994, 1998). Note that lists of projects prior to 1982 when the scientific permit system was computerised are incomplete.

1971-1980.

Dr H Haines 14/02/1971 Water metabolism in native mammals.

Mr EC Nelson 01/11/1973 Biogeography, taximetry and ecology of *Adenanthos* (Proteaceae).

Ms JG West 08/11/1974 Revision of the genus Dodonaea (Sapindaceae) in southern Australia.

Dr JD White25/03/1975 Reptile, mammal and amphibian surveys of Mt Rescue, Messent and Mt Boothby Conservation Parks.

Dr HA Ford 11/07/1975 The comparative ecology of honeyeaters in South Australia.

Mr DB Steen 01/12/1975 Wildlife filming for documentaries on the Murray River, water-holes and off-shore islands.

Dr HA Ford 01/01/1976 The comparative ecology of honeyeaters in South Australia.

Mr DE Lock 12/04/1976 Formation of dolomite in the Coorong, South Australia.

JS Womersley 01/10/1976 Herbarium collections from Ridley, Billiatt, Peebinga, Ferries McDonald, Mt Rescue and Mt Monster Conservation Parks.

Mr DE Symon 15/08/1977 Biological survey of the 90-mile Desert area.

Mrs EM Watson 22/08/1978 An evolutionary study of the Australian members of the genus *Bulbine* (Liliaceae).

Mr RH Fisher 01/10/1978 Study of butterflies in South Australia.

Mr CJM Glover 21/10/1978 Survey of fish in the South East.

Mr N Forde 15/01/1979 Feeding ecology of birds.

Mrs JA Gardner 15/01/1979 Revision of the higher categories of the tribe Stigmoderini (Coleoptera: Buprestidae).

Mr RA Leubbers 28/05/1979 Coorong archaeological survey.

Mr N Harvey 01/10/1979 Geomorphology student exercise, Coorong area.

Mrs JA Gardner 01/01/1980 Revision of the higher categories of the tribe Stigmoderini (Coleoptera: Buprestidae).

Mr N Forde 13/04/1980 Feeding ecology of birds.

Mr MB Smith 25/04/1980 The status of the Hairy-nosed Wombat (*Lasiorhinus latifrons*) in the Hundreds of Ridley and Fisher.

Dr S Barker 01/08/1980 Taxonomy of Australian Buprestidae.

Mr GP Browning 08/12/1980 The taxonomy of Myrmecia.

1981-1985

Mrs JA Gardner 22/01/1981 Revision of the higher categories of the tribe Stigmoderini (Coleoptera: Buprestidae).

Ms VM Cruickshank 01/04/1981 Plant paintings for illustrated guidebooks.

Ms J Tideman 28/09/1981 Fauna survey of the Sedan region.

Dr RW Thorp 02/10/1981 Ecology of pollinating insects.

Mr GP Browning 08/12/1981 The taxonomy of Myrmecia.

Mrs JA Gardner 25/01/1982 Revision of the higher categories of the tribe Stigmoderini (Coleoptera: Buprestidae).

Mr HJ Eckert 25/01/1982 Collection of specimens for distribution and taxonomy studies for the 'Checklist of Birds of South Australia'.

Mr RA Leubbers 05/02/1982 Coorong archaeological survey.

Ms VM Cruickshank 01/04/1982 Plant paintings for illustrated guidebooks.

Ms VM Cruickshank 01/04/1982 Plant paintings for illustrated guidebooks.

Mr GRN Smith 01/07/1982 The ecology of feral predators.

Ms SL Williams 01/07/1982 Can artificially supplied surface waters affect avian community structure in arid regions ?

Mr N Forde 01/08/1982 Feeding ecology of birds.

Mr N Forde 01/08/1982 Feeding ecology of honeyeaters.

Dr S Barker 01/08/1982 Taxonomy of Buprestid beetles.

Mr F Collet 01/08/1982 Weeds of Australia.

Dr S Enrody-Younga 01/09/1982 Historic biogeography of southern Africa.

Dr NA Locket 01/09/1982 Sense organs of scorpions.

Mr RH Fisher 30/09/1982 Study of butterflies in South Australia.

Mr R Marcussen 01/10/1982 Wildlife photography.

Ms EM Canning 01/11/1982 Plant propagation and genera revision study.

Prof RB Knox 25/11/1982 Breeding systems and pollination biology of Acacias in southern Australia.

Ms C Shanahan 01/12/1982 Cytogenetic studies of Australian scorpions.

Mr WDF MacKenzie 31/12/1982 Photographic and taxonomic studies of bats and birds.

Mr DJ Bedford 31/12/1982 A revision of Xanthorrhoea for publication in 'Flora of Australia'.

Mr AS Wheeler 01/01/1983 Collection and photography of Lepidoptera.

Mr GP Browning 01/01/1983 The taxonomy of *Myrmecia*.

Mrs JA Gardner 25/01/1983 Revision of the higher categories of the tribe Stigmoderini (Coleoptera: Buprestidae).

Mr TJ Bradley 31/01/1983 Study of birds in Cromer and Hale Conservation Parks, Para Wirra Recreation Park and the Coorong National Park.

Mr HJ Eckert 31/01/1983 Collection of specimens for distribution and taxonomy studies for the 'Checklist of Birds of South Australia'.

Mr HJ Eckert 31/01/1983 Checklist of birds of South Australia: collections from the Murraylands and Innes for the South Australian Museum.

Mr FA Brunings 14/03/1983 Mist-netting of bats and birds for photographic and taxonomic studies.

Mr WDF MacKenzie 14/03/1983 Mist netting of bats and birds for photographic and taxonomic studies.

Dr CA Henley 19/03/1983 Preparation of an animal encyclopaedia and fungi field guide.

Dr DC Paton 25/03/1983 Reproductive strategies of native plants.

Ms VM Cruickshank 01/04/1983 Plant paintings for illustrated guidebooks.

Mr DR Hartley 01/05/1983 Plant collections from NPWS reserves in the Adelaide Hills.

Mr LG Joseph 15/05/1983 Biology and conservation of the Black-eared Miner (*Manorina melanotis*).

Mr GRN Smith 01/07/1983 Ecology of feral predators.

Ms SL Williams 01/07/1983 Ecology of water use by Australian birds.

Mrs F Reay 31/07/1983 Survey of plant parasitic nematodes.

Dr MB Thompson 01/08/1983 River Murray wetlands, their characteristics, significance and management.

Dr FD Morgan 01/09/1983 Psylloidea of Australia.

Dr NA Locket 01/09/1983 Sense organs of scorpions.

Mrs BD Endersby 01/09/1983 Biological surveys of selected parks by the Strathalbyn Field Naturalists' Club.

Dr KE Takeuchi 01/09/1983 Studies on the environmental changes due to human activities in the semi-arid regions of Australia.

Dr RV Southcott 01/11/1983 Effects of bushfires on invertebrates.

Mr SC Flavel 02/12/1983 Microchiroptera of South Australia.

Mr RH Fisher 01/01/1984 Study of Butterflies in South Australia.

Mrs JA Gardner 26/01/1984 Revision of the higher categories of the tribe Stigmoderini (Coleoptera: Buprestidae).

Mr TJ Bradley 07/03/1984 Population studies of birds in the northern Mount Lofty Ranges.

Ms VM Cruickshank 02/04/1984 Plant paintings for illustrated guidebooks.

Dr DC Paton 01/06/1984 Reproductive strategies of native plants.

Mr WJ Tagell 01/07/1984 Population studies of birds in the northern Mount Lofty Ranges.

Mrs F Reay 01/08/1984 Plant nematodes of Australia.

Mr HJ Eckert 01/08/1984 Specimen collection for distribution and taxonomic studies for the 'Checklist of birds of South Australia'.

Mr JR Jones 18/08/1984 Vertebrate pests control school, small mammal exercise.

Mrs AE Cam 22/08/1984 Mallee birds of South Australia.

Dr GR Cam 22/08/1984 Mallee birds of South Australia.

Dr S Barker 31/08/1984 Taxonomy of Buprestid Beetles.

Mr TP Morley 01/09/1984 Reptile survey of Swan Reach and Marne Valley Conservation Parks.

Mr N Forde 02/09/1984 Feeding ecology of birds.

Dr NH Brittan 01/11/1984 Research into the genera *Arthropodium* and *Dichopogon*.

Mr JR Jones 01/11/1984 Vertebrate pests control school, small mammal survey.

Mr GR Pink 20/12/1984 Feeding ecology of birds.

Ms R Pratt 20/12/1984 Feeding ecology of birds.

Mr JG Joseph 20/12/1984 Feeding ecology of birds.

Mr KE Matters 20/12/1984 Feeding ecology of birds.

Mr PS Beaumont 20/12/1984 Feeding ecology of birds.

Ms KJ Mallett 01/01/1985 Diet and reproduction of the common wombat (*Vombatus ursinus*).

Mr SC Flavel 01/01/1985 Microchiroptera of South Australia.

Mr RH Fisher 04/02/1985 Study of Butterflies in South Australia.

Mr WJ Tagell 15/03/1985 Population studies of birds in the Mount Lofty Ranges and on Kangaroo Island.

Mr TJ Bradley 15/03/1985 Population studies of birds in the Mount Lofty Ranges.

Ms VM Cruickshank 10/04/1985 Plant paintings for illustrated guidebooks.

Dr DC Paton 01/07/1985 Reproductive strategies of native plants.

Mrs F Reay 01/08/1985 Plant parasitic nematodes associated with bushland soils in Australia.

Ms PA Paton 14/08/1985 Bird banding in the Adelaide Hills, the Murray Mallee and Kangaroo Island regions under the ANPWS Australian Bird & Bat Banding Scheme.

Mr DJ Williams 16/08/1985 Bird banding in the Adelaide Hills, Murray Mallee and Kangaroo Island regions under the ANPWS Australian Bird & Bat Banding Scheme.

Dr TC Burton 16/08/1985 Bird banding in the Adelaide Hills, Murray Mallee and Kangaroo Island regions under the ANPWS Australian Bird & Bat Banding Scheme.

Mr N Forde 01/09/1985 Feeding ecology of birds.

Mr GR Pink 01/09/1985 Feeding ecology of birds.

Dr GR Cam 01/09/1985 Mallee birds of South Australia.

Ms R Pratt 01/09/1985 Feeding ecology of birds.

Mr JG Joseph 01/09/1985 Feeding ecology of birds.

Mrs AE Cam 01/09/1985 Mallee birds of South Australia.

Mr PS Beaumont 01/09/1985 Feeding ecology of birds.

Dr FD Morgan 01/09/1985 Psylloidea of Australia.

Mr KE Matters 01/09/1985 Feeding ecology of birds.

Dr J Woinarski 20/09/1985 The effects of broom-bush harvesting on vertebrates in north-west Victoria.

Dr S Barker 01/10/1985 Taxonomy of Buprestid Beetles.

Mr DM Peake-Jones 28/11/1985 Population dynamics of selected passerines in the Mount Lofty Ranges.

Mr S Roffey 01/12/1985 Research trials on ALCOA mine rehabilitation areas.

Dr NA Locket 12/12/1985 Studies on scorpions.

Mr EJ McAlister 19/12/1985 Seed collection for the Botanic Gardens of Adelaide.

1986.

Mr RH Fisher 01/02/1986 Study of Butterflies in South Australia.

Dr DC Paton 01/03/1986 Movement of animals along corridors of vegetation in South Australia.

Mr C Rich 13/03/1986 Mallee birds of South Australia.

Mr WJ Tagell 01/04/1986 Population studies of birds in the Mount Lofty Ranges and on Kangaroo Island.

Mr DE Murfet 14/04/1986 Botanical inventories for National Parks and Wildlife Service reserves.

Ms VM Cruickshank 01/05/1986 Plant paintings for illustrated guidebooks.

Dr MS Harvey 01/05/1986 Diagnoses of the families of water mites occurring in Australia (Hydracarina, Acarina, Arachnida).

Mr ATD Bennett 12/05/1986 Bird banding under the Australian National Parks and Wildlife Service Australian Bird Banding Scheme.

Mr TJ Bradley 26/05/1986 Population studies of birds in the Mount Lofty Ranges.

Mr PN Gibbons 28/05/1986 Plant identification and distribution in the South East and the Murraylands Regions.

Mr NJ Speck 02/06/1986 Bird banding in the Mt Lofty Ranges, Murray Mallee and Kangaroo Island regions under the ANPWS Australian Bird & Bat Banding Scheme.

Mr J Cancalosi 03/06/1986 Australian wildlife photography for use in an educational program in the USA.

Ms CL Gross 26/06/1986 The reproductive ecology of a semi-arid mallee community.

Mr DJ Williams 01/07/1986 Bird banding under the Australian National Parks and Wildlife Service Australian Bird Banding Scheme.

Dr TC Burton 01/07/1986 Bird banding in the Mt Lofty Ranges, Murray Mallee and Kangaroo Island regions under the ANPWS Australian Bird and Bat Banding Scheme.

Dr DC Paton 01/07/1986 Reproductive strategies of native plants.

Ms PA Paton 01/07/1986 Bird banding in the Mt Lofty Ranges, Murray Mallee and Kangaroo Island regions under the ANPWS Australian Bird and Bat Banding Scheme.

Mr M Clements 04/07/1986 A revision of the *Pterostylis rufa* group (family Orchidaceae).

Mr DJ Paull 09/07/1986 Remnant populations of the Short-nosed Bandicoot (*Isoodon obesulus*) in the southern Mount Lofty Ranges.

Mr K Rule 01/08/1986 Taxonomic revision of *Eucalyptus leucoxylon*.

Mr JRW Jones 12/08/1986 Vertebrate pests control school: small mammal population and species monitoring and control exercise.

Dr U Hofmann 25/08/1986 Floral morphology of the Gyrostemonaceae, Bataceae and Gentianales.

Mr KE Matters 01/09/1986 Feeding ecology of birds.

Mr C Rich 01/09/1986 Mallee birds of South Australia.

Mrs AE Cam 01/09/1986 Mallee birds of South Australia.

Mr N Forde 01/09/1986 Feeding ecology of birds.

Mr PS Beaumont 01/09/1986 Feeding ecology of birds.

Ms R Pratt 01/09/1986 Feeding ecology of birds.

Mr GR Pink 01/09/1986 Feeding ecology of birds.

Mr JG Joseph 01/09/1986 Feeding ecology of birds.

Dr GR Cam 01/09/1986 Mallee birds of South Australia.

Mr DM Peake-Jones 09/09/1986 Population dynamics of birds: various projects under the direction of Dr DC Paton and Mr TJ Bradley.

Mr RJP Davies 15/09/1986 Threatened plant species of the Murray Mallee Region of South Australia.

Dr BC Sutton 20/09/1986 Diseases of native Australian plants of potential use in ornamental horticulture.

Mr SC Cropper 15/10/1986 The biology and systematics of Australian orchids.

Mr DN Wigzell 16/10/1986 Population studies of birds in the Mount Lofty Ranges.

Dr P Reddell 17/10/1986 Mycorrhizal fungi associated with the Australian flora.

Mr R Peakall 24/10/1986 Genetic systems of Australian terrestrial orchids.

Mr CA Gardiner 01/11/1986 Research trials on ALCOA mine rehabilitation areas.

Mr RJ Bates 24/11/1986 Taxonomic research in the Orchidaceae.

Ms A Wells 10/12/1986 The caddis flies of South Australia.

1987.

Dr NA Locket 01/01/1987 Studies on scorpions.

Mr AM Buick 09/02/1987 Population dynamics of birds: various projects under the direction of Dr DC Paton and Mr TJ Bradley.

Dr JS Matthew 09/02/1987 Population dynamics of birds: various projects under the direction of Dr DC Paton and Mr TJ Bradley.

Mr RJP Davies 28/02/1987 Threatened plant species of the Flinders Ranges, Mount Lofty Ranges, Murray Mallee and South East regions of South Australia.

Mr GA Carpenter 03/03/1987 Population dynamics of birds: various projects under the direction of Dr DC Paton and Mr TJ Bradley.

Mr SM Bosch 09/03/1987 Population dynamics of birds: various projects under the direction of Dr DC Paton and Mr TJ Bradley.

Mr JL Read 20/03/1987 Ecology of firetail finches (*Emblema* spp) in South Australia.

Mr P Hodgson 31/03/1987 The ectoparasites of Australian bats (Chiroptera).

Mr EF Boehm 30/04/1987 Botanical collection from Anstey Hill Recreation Park.

Mr C Evans 01/05/1987 Population studies of birds in the Mount Lofty Ranges.

Ms VM Cruickshank 01/05/1987 Plant paintings for illustrated guidebooks.

Mr DE Murfet 01/05/1987 Botanical inventories for National Parks and Wildlife Service reserves.

Mr PN Gibbons 01/06/1987 Plant identification and distribution in the South East and the Eyre Peninsula regions.

Mr GR Pink 01/07/1987 Feeding ecology of birds.

Dr JS Matthew 01/07/1987 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Mr SC Flavel 01/07/1987 Reproductive ecology of three species of bats.

Mr AM Buick 01/07/1987 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Mr DJ Williams 01/07/1987 Population dynamics of birds: various projects under the Australian National Parks and Wildlife Service Australian Bird and Bat Banding Scheme.

Mr B Foreman 01/07/1987 The relationship of bird numbers (species and individuals) to habitat status.

Mr TP Morley 01/07/1987 Survey of the distribution of South Australian reptiles.

Mr WJ Tagell 01/07/1987 Population studies of birds in the Mount Lofty Ranges and on Kangaroo Island.

Dr DC Paton 01/07/1987 Reproductive strategies of native plants.

Dr GR Cam 01/07/1987 Mallee birds of South Australia.

Mr NJ Speck 01/07/1987 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Mr RH Fisher 01/07/1987 Study of butterflies in South Australia.

Ms PA Paton 01/07/1987 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Mrs AE Cam 01/07/1987 Mallee birds of South Australia.

Mr JG Joseph 01/07/1987 Feeding ecology of birds.

Ms L Jansen 01/07/1987 Reproductive ecology of three species of insectivorous bats in South Australia.

Ms CL Gross 01/07/1987 The reproductive ecology of a semi-arid mallee community.

Ms R Pratt 01/07/1987 Feeding ecology of birds.

Mr PS Beaumont 01/07/1987 Population dynamics and feeding ecology of birds.

Mr GA Carpenter 01/07/1987 Population dynamics of birds: various projects under the direction of Dr DC Paton and Mr TJ Bradley.

Mr C Rich 01/07/1987 Mallee birds of South Australia.

Ms DJ Patkin 01/07/1987 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Dr WB Sherwin 01/07/1987 Conservation genetics of the Brush-tailed Possum (*Trichosurus vulpecula*).

Mr SM Bosch 01/07/1987 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Mr ATD Bennett 01/07/1987 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Dr W Ivantsoff 01/07/1987 A revision of the freshwater genus of hardyheads *Craterocephalus*.

Mr DJ Paull 01/07/1987 Remnant populations of the Short-nosed Bandicoot (*Isoodon obesulus*) in the southern Mount Lofty Ranges.

Ms CL Gross 01/07/1987 The reproductive ecology of a semi-arid mallee community.

Mr KE Matters 01/07/1987 Feeding ecology of birds.

Mr N Forde 01/07/1987 Feeding ecology of birds.

Ms JB Woodman 03/07/1987 Flora of the coastal regions of South Australia.

Mr AJ Bransbury 13/07/1987 A survey to determine the distribution and status of the Hooded Plover (*Charadrius rubricollis*) in South Australia.

Ms LE Padgham 26/08/1987 Poster on common orchids of South Australia.

Ms AM Prescott 01/09/1987 Illustrated guide to the wildflowers of the southern Mount Lofty Ranges.

Prof DK Walker 01/09/1987 Anatomical studies of the Pteridophyte genera *Anogramma, Lycopodium, Schizaea, Gleichenia, Phylloglossum* and *Todea.*
Mr PG Seager 11/09/1987 Feeding ecology of birds.

Mr M Clark 11/09/1987 Feeding ecology of birds.

Dr V Bittrich 01/10/1987 Morphological and cytological studies of the Aizoaceae.

Mr AC Exner 01/10/1987 The relationship of bird numbers (species and individuals) to habitat status.

Dr P Weinstein 25/10/1987 Bionomics of host-parasite interactions in Trigonalid wasps.

Miss JD Taylor 11/11/1987 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Dr HT Imai 01/12/1987 Karyological survey of the Australian ant *Myrmecia pilosula* complex.

Mrs R Taplin 23/12/1987 Flora of the southern Mount Lofty Ranges area.

1988.

Mr RJ Bates 04/01/1988 Taxonomic research in the Orchidaceae.

Mr A Sutherland 05/02/1988 Revegetation of farmland in South Australia.

Ms MD Rast 07/03/1988 Mistletoe occurrence in relation to different vegetation communities in the Mt Lofty Ranges (Env Associations 3.2.1. to 3.3.19 Laut et al 1977).

Mr JL Read 01/04/1988 Ecology of firetail finches (*Emblema* species) in South Australia.

Mr KB Bossard 01/05/1988 Collection of reptiles, fish and invertebrates to further distribution records.

Ms VM Cruickshank 01/05/1988 Plant paintings for illustrated guidebooks.

Ms D Crawford 01/05/1988 Research trials on ALCOA mine rehabilitation areas.

Mr TP Morley 01/07/1988 Survey of the distribution of South Australian reptiles.

Mr SM Bosch 01/07/1988 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Ms PA Paton 01/07/1988 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Ms L Jansen 01/07/1988 Reproductive ecology of three species of insectivorous bats in South Australia.

Mr NJ Speck 01/07/1988 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Miss JD Taylor 01/07/1988 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Dr DC Paton 01/07/1988 Reproductive strategies of native plants.

Mr AM Buick 01/07/1988 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Mrs AE Cam 01/07/1988 Mallee birds of South Australia.

Mr DJ Paull 01/07/1988 Remnant populations of the Short-nosed Bandicoot (*Isoodon obesulus)* in the southern Mount Lofty Ranges.

Ms DJ Patkin 01/07/1988 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Dr GR Cam 01/07/1988 Mallee birds of South Australia.

Ms CL Gross 01/07/1988 The reproductive ecology of a semi-arid mallee community.

Mr GA Carpenter 01/07/1988 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Dr NA Locket 01/07/1988 Studies on scorpions.

Mr PS Beaumont 01/07/1988 Population dynamics and feeding ecology of birds.

Mr DJ Williams 01/07/1988 Population dynamics of birds: various projects under the Australian National Parks and Wildlife Service Australian Bird Banding Scheme.

Mr ATD Bennett 01/07/1988 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Mr B Foreman 01/07/1988 The relationship of bird numbers (species and individuals) to habitat status.

Mr WJ Tagell 01/07/1988 Population studies of birds in the Mount Lofty Ranges and on Kangaroo Island.

Dr JS Matthew 01/07/1988 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Mr DE Murfet 10/08/1988 Plants of the southern Mount Lofty Ranges.

Mr N Forde 22/08/1988 Feeding ecology of birds.

Mr AC Exner 23/08/1988 The relationship of bird numbers (species and individuals) to habitat status.

Mr DA Frahn 23/08/1988 Botanical inventory for the Riverland area.

Dr RA Tedman 23/08/1988 Comparative anatomy of the Australian Sea-lion (*Neophoca cinerea*).

Mr C Rich 30/08/1988 General biology of birds in the Mount Lofty Ranges, Murray Mallee and lower Flinders Ranges under the ANPWS Australian Bird and Bat Banding Scheme.

Dr MA McDowall 01/09/1988 Plant taxonomy and propagation.
Mr PG Seager 12/09/1988 Feeding ecology of birds.

Mr K Rule 13/10/1988 Taxonomic revision of Eucalyptus leucoxylon.

Dr P Weinstein 01/11/1988 Bionomics of host-parasite interactions in Trigonalid wasps.

Mrs PF Cooke 05/11/1988 The trapping of small mammals for demonstration purposes.

Mr SA Crowhurst 15/11/1988 Feeding ecology of birds.

Mr JL Read 19/12/1988 Ecology of the Pygmy Copperhead Snake (*Austrelaps* sp).

Dr V Caleca 20/12/1988 Revision of the Australian *Hadronotoides* and *Mirotelenomus* (Insecta: Hymenoptera: Scelionidae).

1989.

Mr A Stolarski 01/01/1989 General insect collection for the South Australian Museum.

Mr G D'Aubert 01/01/1989 Collection of propagation materials for the Mount Annan Botanic Gardens.

Mr RJ Bates 01/01/1989 Taxonomic research in the Orchidaceae and general botanical collecting for the State Herbarium.

Mrs R Taplin 01/01/1989 Flora of the southern Mount Lofty Ranges area.

Dr FH Dawson 02/02/1989 The biological, distribution and control of *Crassula helmsii*.

Mr RH Fisher 27/02/1989 Study of butterflies in South Australia.

Dr MIH Brooker 01/03/1989 *Eucalyptus* taxonomy.

Mr A Sutherland 10/03/1989 Revegetation of farmland in South Australia.

Mr G Howie 01/04/1989 Aspects of field botany in South Australia: surveys by FNSSA Botany Club.

Mr R Hall 01/04/1989 Aspects of field botany in South Australia: surveys by FNSSA Botany Club.

Mrs G Briggs 01/04/1989 Aspects of field botany in South Australia: surveys by FNSSA Botany Club.

Dr AG Spooner 01/04/1989 Aspects of field botany in South Australia: surveys by FNSSA Botany Club.

Mrs J Howie 01/04/1989 Aspects of field botany in South Australia: surveys by FNSSA Botany Club.

Mrs TM Hall 01/04/1989 Aspects of field botany in South Australia: surveys by FNSSA Botany Club.

Mr P Reece 01/04/1989 Aspects of field botany in South Australia: surveys by FNSSA Botany Club.

Mr AJ Coventry 14/04/1989 Distribution of semi-arid reptiles and amphibians.

Ms VM Cruickshank 14/04/1989 Plant paintings for illustrated guidebooks.

Mr J Val 18/04/1989 The foraging behaviour and diet of the Southern Scrub Robin (*Drymodes brunneopygia*).

Mrs TM Hall 19/04/1989 General botanical collections for the State Herbarium.

Dr H Prendergast 22/06/1989 Collection of seeds from arid and semi-arid plants having some economic value, for the seed bank of the Royal Botanic Gardens, England.

Mr TP Morley 01/07/1989 Survey of the distribution of South Australian reptiles.

Miss JD Taylor 01/07/1989 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Ms L Jansen 01/07/1989 The ecology and population dynamics of birds: various project under the direction of Dr DC Paton.

Mr NJ Speck 01/07/1989 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Mr AM Buick 01/07/1989 Population dynamics of birds: various projects under the direction of Dr DC Paton and Mr TJ Bradley.

Mr ATD Bennett 01/07/1989 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Mr PS Beaumont 01/07/1989 Population dynamics and feeding ecology of birds.

Ms CL Gross 01/07/1989 The reproductive ecology of a semi-arid mallee community.

Mr DJ Williams 01/07/1989 Population dynamics of birds: various projects under the Australian National Parks and Wildlife Service Australian Bird and Bat Banding Scheme.

Dr GC Kirby 01/07/1989 Breeding of Sturt's Desert Pea (Clianthus formosus).

Dr DC Paton 01/07/1989 Interactions between honeybees and native biota.

Dr DC Paton 01/07/1989 Reproductive strategies of native plants.

Mr GA Carpenter 01/07/1989 Population dynamics of birds: various projects under the direction of Dr DC Paton and Mr TJ Bradley.

Ms DJ Patkin 01/07/1989 Population dynamics of birds: various projects under the direction of Dr DC Paton and Mr TJ Bradley.

Ms APC Renfrey 01/07/1989 *Danthonia clelandii* Vick, an endemic perennial tussock grass of South Australia. Its distribution, status and reproductive biology.

Ms PA Paton 01/07/1989 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Mr MD Brownlow 20/07/1989 Classification and growth characteristics of the remnant wetland vegetation of the south east agricultural region of South Australia.

Mr G D'Aubert 01/08/1989 Collection of propagation materials for the Mount Annan Botanic Gardens.

Mr BJ Brock 11/08/1989 Feeding ecology of birds.

Mr D Hawes 11/08/1989 Feeding ecology of birds.

Mr JG Joseph 11/08/1989 Feeding ecology of birds.

Mr PG Seager 11/08/1989 Feeding ecology of birds.

Ms R Pratt 11/08/1989 Feeding ecology of birds.

Mr N Forde 11/08/1989 Feeding ecology of birds.

Mr GR Pink 11/08/1989 Feeding ecology of birds.

Ms L Oaten 11/08/1989 Feeding ecology of birds.

Mr SC Flavel 11/08/1989 Ecology of insectivorous bats.

Mr M Clark 11/08/1989 Feeding ecology of birds.

Mr TW Fuhlbohm 11/08/1989 Feeding ecology of birds.

Ms L Jansen 11/08/1989 Ecology of insectivorous bats.

Ms JB Woodman 07/09/1989 Reference material for paintings of South Australian flora.

Dr NA Locket 28/09/1989 Studies on scorpions.

Dr R Hnatiuk 01/10/1989 General plant collections: herbarium specimens and living material.

Mr PL Baldacchino 22/10/1989 Management guidelines for the Kenneth Stirling Conservation Park.

Mr DA Frahn 27/10/1989 Botanical inventory for the Riverland area.

Mr MR Newton 27/10/1989 Introduction of sciomyzid flies for biological control of exotic helicid land snails.

Prof RB Nordenstam 27/10/1989 Generic monographs and tribal classification of the family Compositae.

Dr IR Dadour 30/10/1989 The determinants of variability in habitat preference within and between populations of the Cabbage White Butterfly (*Pieris rapae*).

Dr IR Dadour 30/10/1989 Population genetics of the Wanderer Butterfly (*Danaus plexippus*).

Mr AC Exner 01/11/1989 The relationship of bird numbers (species and individuals) to habitat status.

Mr WG Burrows 01/11/1989 The relationship of bird numbers (species and individuals) to habitat status: ANPWS banding with B Foreman.

Mr B Foreman 01/11/1989 The relationship of bird numbers (species and individuals) to habitat status.

Ms JA Norman 01/11/1989 The relationship of bird numbers (species and individuals) to habitat status: ANPWS banding with B Foreman.

Mr JR Jones 27/11/1989 Vertebrate pests control school: small mammal population and species monitoring exercise.

Dr RA Tedman 01/12/1989 Comparative anatomy of the Australian otariids, *Neophoca* and *Arctocephalus*.

1990.

Mr AJ McArthur 03/01/1990 Review of the genus *Camponotus* (Formicidae).

Mrs JL Murphy 15/01/1990 Establishing a reference herbarium of local vegetation for the Keith District Office of the Department of Agriculture.

Miss EK Lawson 23/01/1990 Collection of plant specimens from around South Australia for the State Herbarium and development of a teachers' identification aid package.

Mr A Dudley 01/02/1990 Reptile, amphibian and invertebrate photography.

Mr DJ Paull 01/03/1990 Populations of the Southern Brown Bandicoot (*Isoodon obesulus*) in South Australia.

Mrs R Taplin 22/03/1990 Flora of the southern Mount Lofty Ranges area.

Mr G Howie 01/04/1990 Aspects of field botany in South Australia: surveys by FNSSA Botany Club.

Mrs J Howie 01/04/1990 Aspects of field botany in South Australia: surveys by FNSSA Botany Club.

Mrs G Briggs 01/04/1990 Aspects of field botany in South Australia: surveys by FNSSA Botany Club.

Mrs TM Hall 01/04/1990 Aspects of field botany in South Australia: surveys by FNSSA Botany Club.

Mr P Reece 01/04/1990 Aspects of field botany in South Australia: surveys by FNSSA Botany Club.

Dr AG Spooner 01/04/1990 Aspects of field botany in South Australia: surveys by FNSSA Botany Club.

Mr M Lane 01/04/1990 Survey of leaf litter invertebrates at Anstey Hill Recreation Park.

Mr R Hall 01/04/1990 Aspects of field botany in South Australia: surveys by FNSSA Botany Club.

Mrs TM Hall 01/05/1990 General botanical collections for the State Herbarium.

Ms VM Cruickshank 16/05/1990 Plant paintings for illustrated guidebooks.

Mr PM Goonan 16/05/1990 Fauna and flora survey of selected wetlands along the River Murray.

Mr PR Foster 28/05/1990 Population dynamics of birds: various projects under the direction of Dr DC Paton and Mr TJ Bradley.

Mr PR Foster 28/05/1990 Population dynamics of birds: various projects under the direction of Dr DC Paton and Mr TJ Bradley.

Mr DJ Mitchell 01/06/1990 Survey of reptiles in Cobbler Creek Recreation Park.

Mr TP Morley 01/07/1990 Survey of the distribution of South Australian reptiles.

Mr PR Foster 01/07/1990 Population dynamics of birds: various projects under the direction of Dr DC Paton and Mr TJ Bradley.

Mr DJ Williams 01/07/1990 Population dynamics of birds: various projects under the Australian National Parks and Wildlife Service Australian Bird and Bat Banding Scheme.

Mr NJ Speck 01/07/1990 Population dynamics of birds: various projects under the direction of Dr DC Paton and Mr TJ Bradley.

Mr PG Seager 01/07/1990 Feeding ecology of birds.

Dr DC Paton 01/07/1990 Interactions between honeybees and native biota.

Ms DJ Patkin 01/07/1990 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Ms PA Paton 01/07/1990 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Dr GC Kirby 01/07/1990 Breeding of Sturt's Desert Pea (*Clianthus formosus*).

Mr ATD Bennett 01/07/1990 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Ms L Oaten 01/07/1990 Feeding ecology of birds.

Miss JD Taylor 01/07/1990 Population dynamics of birds: various projects under the direction of Dr D.C. Paton and Mr T.J. Bradley.

Dr DC Paton 01/07/1990 Reproductive strategies of native plants.

Mr GA Carpenter 01/07/1990 Population dynamics of birds: various projects under the direction of Dr DC Paton and Mr TJ Bradley.

Ms D Padley 05/07/1990 Petroleum geochemistry of the Otway and Duntroon Basins.

Dr H Prendergast 01/08/1990 Collection of seeds from arid and semi-arid plants having some economic value, for the seed bank of the Royal Botanic Gardens, England.

Mr RH Fisher 06/08/1990 Study of butterflies in South Australia.

Mr GR Pink 22/08/1990 Feeding ecology of birds.

Mr D Hawes 22/08/1990 Feeding ecology of birds.

Ms R Pratt 22/08/1990 Feeding ecology of birds.

Mr A Stolarski 22/08/1990 General insect collection for the South Australian Museum.

Mr N Forde 22/08/1990 Feeding ecology of birds.

Mr C Rich 22/08/1990 General biology of birds in the Mount Lofty Ranges, Murray Mallee and lower Flinders Ranges under the ANPWS Australian Bird and Bat Banding Scheme.

Mr BJ Brock 22/08/1990 Feeding ecology of birds.

Mr JG Joseph 22/08/1990 Feeding ecology of birds.

Mr TW Fuhlbohm 22/08/1990 Feeding ecology of birds.

Ms JA Norman 01/09/1990 The relationship of bird numbers (species and individuals) to habitat status: ANPWS banding with B Foreman.

Mr AC Exner 01/09/1990 The relationship of bird numbers (species and individuals) to habitat status.

Mr RJ Bates 01/09/1990 Taxonomic research in the Orchidaceae and general botanical collecting for the State Herbarium.

Mr BJ Luxton 01/09/1990 Population dynamics of birds: various projects under the direction of Dr DC Paton and Mr TJ Bradley.

Mr DL Jones 01/09/1990 Revision of the Orchidaceae for publication in the 'Flora of Australia'.

Mr M Clark 01/09/1990 The relationship of bird numbers (species and individuals) to habitat status.

Mr B Foreman 01/09/1990 The relationship of bird numbers (species and individuals) to habitat status.

Mr J Mazzone 01/10/1990 The status of Acacia rhetinocarpa in the Monarto area.

Mr LA Craven 01/10/1990 Taxonomic studies of *Melaleuca* and its allies (Myrtaceae).

Dr NA Locket 02/10/1990 Studies on scorpions.

Dr ML Selley 15/10/1990 Sceening of soil microorganisms for potential new drugs.

Mr MD Brownlow 23/10/1990 Growth characteristics of the emergent wetland vegetation of the South East of South Australia.

Dr EG Matthews 01/11/1990 Insect collecting for taxonomic studies from parks in the Adelaide Hills.

Mr PS Beaumont 01/11/1990 Population dynamics and feeding ecology of birds.

Mr MR Newton 05/11/1990 Introduction of sciomyzid flies for biological control of exotic helicid land snails.

Mr R Noye 23/11/1990 Conservation strategies for the South Australian Carpet Python, an endangered species.

Dr A Yen 26/11/1990 The invertebrate fauna of Triodia.

1991.

Dr HF Beyrle 08/01/1991 Biochemical characteristic and parasitic interactions between orchids and mycorrhizal fungi.

Dr R Narendranathan 23/01/1991 Anti bacterial properties of native plants.

Mr WA Head 11/02/1991 General surveys of the mammals of South Australia by the Field Naturalists' Society, Mammal Club.

Miss EK Lawson 01/03/1991 Collection of plant specimens from around South Australia for the State Herbarium and development of a teachers' identification aid package.

Mr JE Johnson 07/03/1991 Impact and stock assessment of inland fish populations.

Mr RV Smith 20/03/1991 Invertebrate sampling in Monarto and Ferries McDonald Conservation Parks.

Mr A Sutherland 01/04/1991 Revegetation of farmland in South Australia.

Mr A Lowrie 12/04/1991 Revisions of the plant families Droseraceae, Lentibulariaceae and Stylidiaceae.

Mr AF Longbottom 15/04/1991 Taxonomy and distribution of arachnids, molluscs and associated invertebrates.

Mr AJ McArthur 24/04/1991 Review of the genus Camponotus (Formicidae).

Dr ME Longmore 04/05/1991 Remote sensing monitoring of Ferries McDonald and Monarto Conservation Parks.

Dr G Annison 10/05/1991 Import replacement potential and nutritional value of Australian Acacia (wattle tree) gums.

Ms VM Cruickshank 18/06/1991 Plant paintings for illustrated guidebooks.

Mr DE Murfet 20/06/1991 The distribution and status of plants in South Australia: collections and site inventories.

Ms JA Norman 01/07/1991 The relationship of bird numbers (species and individuals) to habitat status: ANPWS banding with B Foreman.

Mr B Foreman 01/07/1991 The relationship of bird numbers (species and individuals) to habitat status.

Mr AC Exner 01/07/1991 The relationship of bird numbers (species and individuals) to habitat status.

Mr WA Head 01/07/1991 General surveys of the mammals of South Australia by the Field Naturalists' Society, Mammal Club.

Mr TP Morley 01/07/1991 Survey of the distribution of South Australian reptiles.

Dr DC Paton 12/07/1991 Reproductive strategies of native plants.

Mr GA Carpenter 12/07/1991 Population dynamics of birds: various projects under the direction of Dr DC Paton and Mr TJ Bradley.

Ms PA Paton 12/07/1991 Population dynamics of birds: various projects under the direction of Dr DC Paton and Mr TJ Bradley.

Mr PM Goonan 12/07/1991 Population dynamics of birds: various projects under the direction of Dr DC Paton and Mr TJ Bradley.

Miss JD Taylor 12/07/1991 Population dynamics of birds: various projects under the direction of Dr DC Paton and Mr TJ Bradley.

Ms DJ Patkin 12/07/1991 Population dynamics of birds: various projects under the direction of Dr DC Paton and Mr TJ Bradley.

Dr DC Paton 12/07/1991 Interactions between honeybees and native biota.

Ms L Jansen 12/07/1991 The ecology and population dynamics of birds: various projects under the direction of Dr DC Paton.

Mr C Rich 19/07/1991 General biology of birds in the Mount Lofty Ranges, Murray Mallee and lower Flinders Ranges under the ANPWS Australian Bird and Bat Banding Scheme.

Mr DJ Mitchell 19/07/1991 Survey of reptiles in Cobbler Creek Recreation Park.

Mr JG Joseph 01/08/1991 Feeding ecology of birds.

Ms R Pratt 01/08/1991 Feeding ecology of birds.

Ms L Oaten 01/08/1991 Feeding ecology of birds.

Mr D Hawes 01/08/1991 Feeding ecology of birds.

Mr GR Pink 01/08/1991 Feeding ecology of birds.

Mr N Forde 01/08/1991 Feeding ecology of birds.

Mr BJ Brock 01/08/1991 Feeding ecology of birds.

Mr PG Seager 01/08/1991 Feeding ecology of birds.

Mrs M Simmons 01/08/1991 *Acacia* specimens for use in illustrated guidebooks.

Mr TW Fuhlbohm 01/08/1991 Feeding ecology of birds.

Ms EL Liebing 05/08/1991 The relationship of bird numbers (species and individuals) to habitat status: banding under the direction of A Exner.

Dr BJ Crespi 01/09/1991 The social biology of Australian gall thrips (Insecta: Thysanoptera).

Mr PS Beaumont 01/09/1991 Population dynamics and feeding ecology of birds.

Mrs G Briggs 05/09/1991 Aspects of field botany in South Australia: surveys by FNSSA Botany Club.

Mr DJ Williams 05/09/1991 Population dynamics of birds: various projects under the ANPWS Australian Bird & Bat Banding Scheme.

Dr PJ Lang 06/09/1991 Reference collections for 'Plants of Conservation Significance in SA' and personal use.

Ms SL Williams 06/09/1991 Assessing the success of a Malleefowl habitat enhancement program in increasing the survivorship of young Malleefowl.

Mr CP Qualls 16/09/1991 Evolution of viviparity in *Lersita bougainvillii*.

Dr RA Tedman 16/09/1991 Comparative anatomy of the Australian otariids, *Neophoca* and *Arctocephalus*.

Mr AJ Coventry 01/10/1991 Distribution of semi-arid reptiles and amphibians.

Miss DP O'Keefe 01/10/1991 Properties of the scorpion hepatopancreas.

Dr NA Locket 01/10/1991 Studies on scorpions.

Dr ME Longmore 23/10/1991 Remote sensing monitoring of Ferries McDonald and Monarto Conservation Parks.

Ms JA Pedler 24/10/1991 Population dynamics of birds: various projects under the direction of Dr DC Paton.

Mr PJ Jessop 01/11/1991 General collection of plant specimens for the State Herbarium.

Mr PJ Jessop 01/11/1991 Response of arid rangeland vegetation to cattle grazing and the development of indicator species for range assessment.

Mr MD Brownlow 01/11/1991 Growth characteristics of the emergent wetland vegetation of the South East of South Australia.

Dr D Beardsell 21/11/1991 Development of *Baeckea* species for cut flower production.

Mr RJ Bates 12/12/1991 Taxonomic research in the Orchidaceae and general botanical collecting for the State Herbarium.

Mr PB McQuillan 13/12/1991 Foodplant relationships and community structure of native moths (Lepidoptera).

1992.

Mr TB Reardon 14/02/1992 Taxonomy and distribution of South Australian bats: surveys through the 'Batwatch' program.

Mr DB Hirst 01/03/1992 Invertebrate collection from the upper South-East for the South Australian Museum collection.

Miss EK Lawson 05/03/1992 Collection of plant specimens from around South Australia for the State Herbarium and development of a teachers' identification aid package.

Mr MR Newton 05/03/1992 Introduction of sciomyzid flies for biological control of exotic helicid land snails.

Mr DA Frahn 17/03/1992 Plant surveys of the Riverland area.

Mr RH Fisher 18/03/1992 Study of butterflies in South Australia.

Mr A Sutherland 01/04/1992 Revegetation of rural areas in South Australia.

Ms L Queale 08/04/1992 General collection permit issued to the curator's assistant, Mammalogy Section, South Australian Museum.

Ms CA Grgurinovic 05/05/1992 Taxonomic study of the genus *Mycena* in south-eastern Australia.

Mr JA Simpson 11/05/1992 Taxonomic studies of Australian Pholiotoideae.

Mr PM Goonan 12/05/1992 Fauna and flora survey of selected wetlands along the River Murray.

Mr AA Flaherty 15/05/1992 Opportunistic vertebrate collections for the South Australian Museum.

Mr IW Mundy 26/05/1992 The relationship of bird numbers (species and individuals) to habitat status: ANPWS banding with B Foreman.

Mr LW Best 01/06/1992 Release of the Boneseed beetle *Chrysolina picturata* as a biological control agent of Boneseed (*Chrysanthemoides monilifera*).

Ms JB Woodman 05/06/1992 Reference material for paintings of South Australian flora.

Mr AJ McArthur 05/06/1992 Review of the genus *Camponotus* (Formicidae).

Dr DC Paton 01/07/1992 Ecology of domestic and feral cats in South Australia.

Mrs G Briggs 01/07/1992 Aspects of field botany in South Australia: surveys by FNSSA Botany Club.

Mr TP Morley 01/07/1992 Survey of the distribution of South Australian reptiles.

Mr AC Exner 01/07/1992 The relationship of bird numbers (species and individuals) to habitat status.

Mr DE Murfet 01/07/1992 The distribution and status of plants in South Australia: collections and site inventories.

Mr N Forde 01/07/1992 Feeding ecology of birds.

Mr B Foreman 01/07/1992 The relationship of bird numbers (species and individuals) to habitat status.

Mr WA Head 01/07/1992 General surveys of the mammals of South Australia by the Field Naturalists' Society, Mammal Club.

Dr DC Paton 03/07/1992 Reproductive strategies of native plants.

Dr DC Paton 03/07/1992 Interactions between honeybees and native biota.

Mr DJ Williams 03/07/1992 Population dynamics of birds: various projects under the Australian National Parks and Wildlife Service Australian Bird and Bat Banding Scheme.

Mr C Rich 19/08/1992 General biology of birds in the Mount Lofty Ranges, Murray Mallee and lower Flinders Ranges.

Ms VM Cruickshank 20/08/1992 Plant paintings for illustrated guidebooks.

Miss KJ Bell 24/08/1992 Plant life-cycle and regenerative mechanisms register.

Dr PA Woolley 01/09/1992 Reproductive biology (of *Sminthopsis psammophila*) & interspecific affinities within the genus *Sminthopsis* based on penis morphology.

Dr PJ Lang 01/09/1992 Reference collections for 'Plants of Conservation Significance in SA' and personal use.

Mr LA Craven 01/10/1992 Taxonomic studies of Melaleuca and its allies (Myrtaceae).

Dr A Worz 01/10/1992 Building up a worldwide herbarium collection for comparative taxonomic and phytogeographical research.

Mr TE Dennis 07/10/1992 Bird banding projects directed at migratory waders and off-shore species, coastal raptors, Hooded Plovers and pelicans.

Dr AA Martin 12/10/1992 Illustrated keys to early development (eggs, embryos and larvae) of anurans of temperate south-eastern Australia.

Dr GC Kirby 20/10/1992 Breeding of Sturt's Desert Pea (*Swainsona formosa*).

Miss DP O'Keefe 22/10/1992 Properties of the scorpion hepatopancreas.

Mr PS Beaumont 28/10/1992 Population dynamics and feeding ecology of birds.

Dr NA Locket 01/11/1992 Studies on scorpions.

Mr CP Qualls 01/11/1992 Evolution of viviparity in *Lersita bougainvillii*.

Dr HP Linder 16/11/1992 Systematics of the Danthonieae (Poaceae).

Dr SC Donnellan 27/11/1992 Conservation genetics of the Malleefowl (*Leipoa ocellata*).

Mrs R Taplin 01/12/1992 The distribution and status of plants in South Australia.

Mr K O'Connell 23/12/1992 The ecological impact of cutting brush (*Melaleuca uncinata*).

Mr BE Pierce 24/12/1992 Impact and stock assessment of inland fish populations.

1993.

Dr J Chappill 01/01/1993 Revision of the plant family Sterculiaceae for the Flora of Australia.

Mr LA Craven 01/02/1993 Taxonomic studies of *Melaleuca* and its allies (Myrtaceae), and germplasm collection of *Gossypium* (Malvaceae).

Miss TT Hall 18/02/1993 Interactions between the Portugese Millipede (*Ommatoiulus moreletti*) and native millipedes.

Dr SM Carthew 18/02/1993 Factors which influence patterns of mating in the Proteaceae.

Prof DS Chandler 19/02/1993 Use of members of the beetle family Pselaphidae as indicators of forest quality.

Mr JHH Vredebregt 19/02/1993 The taxonomy of plants in the Caryophyllaceae.

Mr TB Reardon 25/02/1993 Taxonomy and distribution of South Australian bats.

Miss EK Lawson 01/03/1993 Collection of plant specimens from around South Australia for the State Herbarium and development of a teachers' identification aid package.

Dr RA Tedman 12/03/1993 Comparative anatomy of the Australian otariids, *Neophoca* and *Arctocephalus*.

Mr D Cenzato 13/03/1993 The effects of temperature and water availability on the fruiting sequence of coprophilous fungi in Western Grey Kangaroo dung.

Dr SG Taylor 13/03/1993 Edge effects in the open forest remnants of the southern Mount Lofty Ranges, South Australia.

Mr RJ Bates 13/03/1993 Taxonomic research in the Orchidaceae and general botanical collecting for the State Herbarium.

Mr RH Fisher 01/04/1993 Study of butterflies in South Australia.

Mr A Sutherland 01/04/1993 Revegetation of rural areas in South Australia.

Dr GR Walker 07/04/1993 Ecological processes for management of wetlands and floodplains - floodplain vegetation health.

Mr T Gush 16/04/1993 1993 entomological expedition to South Australia.

Dr RE Clay 27/04/1993 Habitat assessment of Danggali Conservation Park and Chowilla Regional Reserve.

Miss SC Fryar 01/05/1993 Ecology of wood-decay fungi.

Dr MIH Brooker 01/05/1993 *Eucalyptus* taxonomy.

Mr DA Frahn 01/05/1993 Plant surveys of the Riverland area.

Dr D Beardsell 11/05/1993 Establishment of national seed orchards for native trees.

Mr TS Croft 04/06/1993 Opportunistic vertebrate collections for the South Australian Museum.

Dr DC Paton 01/07/1993 Reproductive strategies of native plants and interactions between honeybees and native fauna.

Mrs G Briggs 01/07/1993 Aspects of field botany in South Australia: surveys by FNSSA Botany Club.

Dr DC Paton 01/07/1993 Ecology of domestic and feral cats in South Australia.

Dr DC Paton 01/07/1993 Studies into the ecology and population dynamics of selected bird groups.

Mr C Rich 01/07/1993 General biology of birds in the Mount Lofty Ranges, Murray Mallee and lower Flinders Ranges.

Mr N Forde 01/07/1993 Feeding ecology of birds.

Mr DJ Williams 01/07/1993 Population dynamics of birds: various projects under the Australian Bird Banding Scheme.

Mr TP Morley 01/07/1993 Survey of the distribution of South Australian reptiles.

Ms M Kangas 01/07/1993 Impact and stock assessment of inland fish populations.

Mr TE Dennis 01/07/1993 Bird banding projects directed at migratory waders and off-shore species, coastal raptors, Hooded Plovers and pelicans.

Mrs E Facelli 21/07/1993 Effect of mycorrhizal infection on plant competition.

Mr KW Smith 23/07/1993 A comparison of different mallee bird communities.

Mr JW Rowden 01/08/1993 Phylogeny and the evolution of display behaviour in the parrot genus *Neophema* (Aves: Psittaciformes).

Mr B Foreman 01/08/1993 The relationship of bird numbers (species and individuals) to habitat status.

Mr DL Jones 01/08/1993 Revision of the Orchidaceae for publication in the 'Flora of Australia'.

Ms L Queale 17/08/1993 General collection permit issued to the curator's assistant, Mammalogy Section, South Australian Museum.

Ms L Rose 20/08/1993 Estuarine management in South Australia: a case study of the residual Murray estuary.

Ms M Tio 01/09/1993 Taxonomy and biology of the Platform-weaving Spider - genus *Corasoides*

Dr PJ Lang 01/09/1993 Reference collections for 'Plants of Conservation Significance in SA' and personal use.

Ms VM Cruickshank 10/09/1993 Plant paintings for illustrated guidebooks.

Mr CP Qualls 22/09/1993 Evolution of viviparity in *Lersita bougainvillii*.

Mr DE Murfet 24/09/1993 The distribution and status of plants in South Australia: collections and site inventories.

Mr P Ward 01/10/1993 Soil survey - Angove's Scrub

Prof S Pruett-Jones 01/10/1993 Comparative biology of Australian fairy-wrens.

Mrs A Spooner 12/10/1993 Revision of the genus *Olearia* (Compositae).

Miss TM Zubrinich 25/10/1993 An ecophysiological, morphological and genetic investigation of *Eucalyptus largiflorens* in relation to salinity and water regimes on the Chowilla Floodplain.

Mr PS Beaumont 28/10/1993 Population dynamics and feeding ecology of birds.

Ms D Hellbrugge 01/11/1993 Revision of the genus *Pelargonium*.

Ms AL Reid 01/11/1993 Systematics of the Onychophora - Peripatopsidae.

Dr U Meve 01/11/1993 Karyology of Asclepiadaceae.

Dr NA Locket 01/11/1993 Studies on scorpions.

Dr DW Winkler 01/11/1993 Phylogeny and evolution of swallows (Aves: Hirundinidae) of the world.

Dr MS Webster 29/11/1993 Comparative biology of Australian fairy-wrens.

Mr WA Head 29/11/1993 General surveys of the mammals of South Australia by the Field Naturalists' Society, Mammal Club.

Dr MN Hutchinson 30/11/1993 Second World Congress of Herpetology field trips.

Mrs M Parletta 13/12/1993 The marketing and research of genus *Olearia*.

Ms B York Main 24/12/1993 The systematics and biology of trapdoor spiders.

1994.

Miss BR Horner 01/01/1994 The importance of *Banksia marginata* and *Banksia ornata* as a source of food for the Western Pygmy Possum (*Cercartetus concinnus*).

Dr C Gack 01/01/1994 Comparative bioacoustic and taxonomic research, morphological investigation and phylogenetic systematics studies on beetles.

Dr SC Donnellan 20/01/1994 Conservation genetics of the Malleefowl (*Leipoa ocellata*).

Dr B Owe-Larsson 01/03/1994 Revision of the lichen family Hymeneliaceae for the 'Flora of Australia'.

Miss EK Lawson 01/03/1994 Collection of plant specimens from around South Australia for the State Herbarium and development of a teachers' identification aid package.

Dr MP Schwarz 03/03/1994 Preliminary investigation of the usefulness of native bees for ecological and evolutionary research in South Australia.

Mr D Finlayson 22/03/1994 A survey of the macroscopic freshwater algae of South Australia: part I - the Characeae.

Mr AJ McArthur 22/03/1994 Review of the genus *Camponotus* (Formicidae).

Mr A Allanson 01/04/1994 Native revegetation projects in South Australia.

Dr RE Clay 01/04/1994 Habitat assessment of Danggali Conservation Park and Chowilla Regional Reserve.

Mr RH Fisher 01/04/1994 Study of butterflies in South Australia.

Mr AA Flaherty 08/04/1994 Opportunistic vertebrate collections for the South Australian Museum.

Miss SC Fryar 08/04/1994 Ecology of wood-decay fungi.

Mrs R Taplin 08/04/1994 The distribution and status of plants in South Australia.

Dr PJ Suter 01/05/1994 Monitoring river health initiative.

Mr G Starr 25/05/1994 Assessment of genetic variation, mating system and gene flow between fragmented populations of the shrub *Hakea carinata*, an endemic of South Australia.

Mr DA Frahn 27/05/1994 Plant surveys of the Riverland area.

Mrs EJ Salkin 01/06/1994 Study of the *Brachycome* (Compositae).

Dr NL Bougher 05/06/1994 The taxonomy of larger fungi for the 'Flora of Australia'.

Mrs M Simmons 06/06/1994 *Acacia* specimens for use in illustrated guidebooks.

Miss T Lebel 10/06/1994 Taxonomy and biodiversity of hypogeous, truffle-like fungi of Australia.

Mr N Forde 01/07/1994 Feeding ecology of birds.

Dr DC Paton 06/07/1994 Reproductive strategies of native plants and interactions between honeybees and native fauna.

Dr DC Paton 06/07/1994 Studies into the ecology and population dynamics of selected bird groups.

Dr DC Paton 06/07/1994 Ecology of domestic and feral cats in South Australia.

Mr KW Smith 22/07/1994 A comparison of different mallee bird communities.

Mr JW Rowden 01/08/1994 Phylogeny and the evolution of display behaviour in the parrot genus *Neophema* (Aves: Psittaciformes).

Dr JK Scott 01/08/1994 Biological control of *Emex* species.

Mrs E Facelli 25/08/1994 Effect of mycorrhizal infection on plant competition.

Mr RJ Bates 26/08/1994 Taxonomic research in the Orchidaceae and general botanical collecting for the State Herbarium.

Mr DL Jones 26/08/1994 Revision of the Orchidaceae for publication in the 'Flora of Australia'.

Ms CA Jones 29/08/1994 'Murray Corridor of Green' revegetation project.

Ms CF Wilkins 30/08/1994 Evolution and taxonomy of the tribe Lasiopetalae (Sterculiaceae).

Dr EM Bennett 30/08/1994 Revision of the tribe Lasiopetalae (Sterculiaceae).

Mr GT Chandler 01/09/1994 Taxonomic revision of the Gorse Bitter-pea *Daviesia ulicifolia*.

Mr PG Stott 01/10/1994 Foxes, cats, rabbits and native fauna: coordinated pest control in the Bookmark Biosphere Reserve.

Prof S Pruett-Jones 01/10/1994 Comparative biology of Australian fairy-wrens.

Mr BJ Lepschi 04/10/1994 Taxonomic studies in *Melaleuca* and its allies (Myrtaceae).

Ms VM Cruickshank 04/10/1994 Plant paintings for illustrated guidebooks.

Mr I Radford 07/10/1994 Phenotypic and genotypic variation within the *Senecio lautus* species complex.

Mr WA Head 09/10/1994 General surveys of the mammals of South Australia by the Field Naturalists' Society, Mammal Club.

Dr EG Matthews 01/11/1994 Taxonomy of Tenebrionidae (Coleoptera).

Mr ACR Weber 01/11/1994 General mammal survey and photography, South Australia.

Dr SM Carthew 22/11/1994 Factors which influence patterns of mating in the Proteaceae.

Mr DE Murfet 22/11/1994 The distribution and status of plants in South Australia: collections and site inventories.

Mr MJ Bayly 30/12/1994 Cladistic biogeography of Eriostemon and related genera.

Mr I Wright 30/12/1994 Variation in *Eucalyptus diversifolia*.

1995.

Ms EL Liebing 01/01/1995 Population dynamics of birds at Arbury Park Outdoor School, Mt George and environs.

Ms J Roberts 16/01/1995 Health of Black Box trees at Chowilla.

Mr TB Reardon 24/01/1995 Taxonomy and distribution of South Australian bats.

Ms BD Kranz 01/02/1995 Eusociality in Australian gall thrips.

Dr SC Donnellan 01/02/1995 Conservation genetics of the Malleefowl (*Leipoa ocellata*).

Dr BJ Coman 01/02/1995 An investigation of potential pathogens in Australian possums.

Dr NA Locket 28/02/1995 Studies on scorpions.

Dr MP Schwarz 28/02/1995 Preliminary investigation of the usefulness of native bees for ecological and evolutionary research in South Australia.

Mr RJ Myers 01/03/1995 Water course management - A field guide.

Dr MIH Brooker 02/03/1995 *Eucalyptus* taxonomy.

Dr RE Clay 07/03/1995 Habitat assessment of Danggali Conservation Park and Chowilla Regional Reserve.

Mr AJ McArthur 14/03/1995 Review of the genus *Camponotus* (Formicidae).

Mr KD Fairey 15/03/1995 Taxonomy and biogeography of the moths of the *'ocellata/oressarona'* species group of the genus *Anthela* (Lepidoptera: Anthelidae).

Mr PB McQuillan 29/03/1995 The floodplant relationships of Geometrid moths.

Mr PB McQuillan 29/03/1995 Foodplant relationships and community structure of native moths (Lepidoptera).

Mr A Allanson 01/04/1995 Native revegetation projects in South Australia.

Mr T Gush 01/04/1995 Entomological expedition to South Australia.

Miss JL Cutten 07/04/1995 Mount Lofty Ranges Emu-wren (*Stipiturus malachurus intermedius*) Recovery Plan actions - banding, monitoring and genetic studies.

Miss SC Fryar 01/05/1995 Ecology of wood-decay fungi.

Mr RB Grund 23/05/1995 Thematic Identification of Remnant Bush and Tussock Lands in coastal South Australia.

Dr RE Clay 23/05/1995 Soil survey - Cobbler's Creek

Mr RH Fisher 30/05/1995 Study of butterflies in South Australia.

Mr G Starr 01/06/1995 Assessment of genetic variation, mating system and gene flow between fragmented populations of the shrub *Hakea carinata*, an endemic of South Australia.

Mr B Lambie 06/06/1995 Opportunistic surveying and collecting of plant and animal species in Bookmark Biosphere.

Mr WA Head 07/06/1995 General surveys of the mammals of South Australia by the Field Naturalists' Society, Mammal Club.

Mr DA Frahn 14/06/1995 Plant surveys of the Riverland area.

Mr KW Smith 20/06/1995 A comparison of different mallee bird communities.

Mr TE Dennis 20/06/1995 Bird banding projects directed at migratory waders and off-shore species, coastal raptors, Hooded Plovers osprey and pelicans.

Miss JL Chivell 01/07/1995 The effect of habitat fragmentation on the pollination biology of Grevillea species.

Dr DC Paton 01/07/1995 Reproductive strategies of native plants and interactions between honeybees and native fauna.

Dr DC Paton 01/07/1995 Ecology of domestic and feral cats in South Australia.

Dr DC Paton 01/07/1995 Studies into the ecology and population dynamics of selected bird groups.

Mr SJ Walker 11/07/1995 A re-evaluation of the skeletal abnormalities of frogs in the Adelaide Hills region.

Mr P Reece 28/07/1995 Aspects of field botany in South Australia: surveys by FNSSA Botany Club.

Dr SL Williams 01/08/1995 Developing techniques for surveying the distribution and abundance of malleefowl in Bookmark Biosphere using thermal sensing techniques.

Mr IJ Hough 10/08/1995 Movements of birds in the Mount Lofty Ranges, Murray Mallee and South East.

Mr C Rich 10/08/1995 General biology of birds in the Mount Lofty Ranges, Murray Mallee, lower Flinders Ranges and Coonalpyn region.

Mr R Brandle 01/09/1995 Penguin Breeding Monitoring Study - Granite Island.

Dr F Udovicic 07/09/1995 Generic limits in Australian Rhamnaceae and "Flora of Australia" Treatment of all genera except **Pomaderris*.

Dr GC Kirby 08/09/1995 Endophytic fungi in Native Grasses.

Mr DL Jones 26/09/1995 Revision of the Orchidaceae for publication in the 'Flora of Australia'.

Mr M Clements 26/09/1995 A revision of the *Pterostylis rufa* group (family Orchidaceae).

Ms VM Cruickshank 10/10/1995 Plant paintings for illustrated guidebooks.

Dr GF Gross 10/10/1995 Collection of specimens of insects of the Order Hemiptera, suborder Heteroptera - especially familiar Pentatomidae and Miridae.

Ms CA Jones 11/10/1995 Murraylands and Fleurieu regions revegetation projects and surveys.

Dr B Sneddon 01/11/1995 Flora of Australia - Treatment of *Microseris* (Asteraceae).

Mr MT Kidman 01/11/1995 Habitat and Vegetation Surveys within the Bookmark Biosphere Reserve.

Prof P Garnock-Jones 01/11/1995 Taxonomy of *Scleranthus* (Caryophyllaleae).

Dr M Clarke 01/11/1995 Reproductive biology and ecology of the Black-eared (*Manorina melanotis*) and Yellow-throated Miner (*M. flavigula*).

Mr I Radbone 28/11/1995 Studies in natural resources - student field exercises.

Dr SM Carthew 01/12/1995 Factors which influence patterns of mating in the Proteaceae.

1996.

Mr R Taylor 01/01/1996 Botanical surveys, monitoring and revegetation programs in South Australia.

Ms YM Steed 23/01/1996 Survey for vegetation sites along Dept of Road Transport roadsides.

Mr DE Murfet 24/01/1996 The distribution and status of plants in South Australia: collections and site inventories.

Mrs R Taplin 30/01/1996 The distribution and status of plants in South Australia.

Ms V Webb 01/02/1996 Comparative study between managed and non-managed wetland system in the Murray Valley - Impact of European Carp on wetlands.

Mr D Finlayson 01/02/1996 A survey of the macroscopic freshwater algae of South Australia: part I - the Characeae.

Dr SC Donnellan 01/02/1996 Conservation genetics of the Malleefowl (*Leipoa ocellata*).

Miss N Schiller 13/02/1996 The influence of European Carp on the ecology of freshwater creeks associated with the River Murray at Chowilla Game Reserve.

Miss EK Lawson 01/03/1996 Collection of plant specimens from around South Australia for the State Herbarium and development of a teachers' identification aid package.

Ms J Gibbs 01/03/1996 Field Ecology Camp - Brookfield CP Kaiser Stuhl CP and Pt Gawler.

Mr MT Kidman 01/03/1996 Bat survey of Reny and Hunchee Islands Calperum.

Mr G Luck 01/03/1996 The effects of edges on bird communities in the Murray Mallee of South Australia.

Miss E Reed 05/03/1996 A study of disarticulation, dispersal and transport of Macropod (Kangaroo) skeletal remains.

Ms BD Kranz 13/03/1996 Eusociality in Australian gall thrips.

Mr TB Reardon 27/03/1996 Taxonomy and distribution of South Australian bats.

Dr ER Schmidt 01/04/1996 The Psocoptera and semi-arid regions of south-eastern Australia.

Mr TJ Mertens 16/04/1996 Aboriginal land management training programme - Torrens Valley Institute of TAFE

Dr MP Schwarz 18/04/1996 Preliminary investigation of the usefulness of native bees for ecological and evolutionary research in South Australia.

Dr DA MacKay 01/05/1996 An experimental study of an ant-plant mutualism.
Mr KW Smith 01/05/1996 Survey of Katarapko Reserve.

Dr A Cheshire 06/05/1996 Collection of plant material for teaching purposes.

Dr RE Clay 08/05/1996 Soil survey - Cobbler's Creek

Mr G Starr 23/05/1996 Assessment of genetic variation, mating system and gene flow between fragmented populations of the shrub *Hakea carinata*, an endemic of South Australia.

Ms B Cadzow 03/06/1996 The influence of flowering species on (distribution) behaviour and diet of three species of pygmy possum.

Ms JB Woodman 03/06/1996 Reference material for paintings of South Australian flora.

Miss JL Cutten 04/06/1996 Mount Lofty Ranges Emu-wren (*Stipiturus malachurus intermedius*) Recovery Plan actions - banding, monitoring and genetic studies.

Mrs M Barnett 24/06/1996 Indigenous plant species of Southern Lofty Ranges (in particular, Adelaide Hills, Fleurieu Peninsula and Kangaroo Island).

Mr KW Smith 01/07/1996 A comparison of different mallee bird communities.

Dr DC Paton 01/07/1996 Studies into the ecology and population dynamics of selected bird groups.

Miss JL Chivell 01/07/1996 The effect of habitat fragmentation on the pollination biology of *Grevillea* species.

Dr DC Paton 01/07/1996 Ecology of domestic and feral cats in South Australia.

Dr DC Paton 01/07/1996 Reproductive strategies of native plants and interactions between honeybees and native fauna.

Mr GC Medlin 01/07/1996 General surveys of the Mammals of SA.

Mr TE Dennis 01/07/1996 The demography, social structure and breeding biology of the Australasian Osprey *Pandion haliaetus cristatus* in South Australia.

Dr GC Kirby 16/07/1996 Endophytic fungi in Native Grasses.

Dr MIH Brooker 26/07/1996 Eucalyptus taxonomy.

Miss SK Gallasch 01/08/1996 The impact of the introduced Portuguese Millipede on 2 Australian native Millipedes habitat choice and demography at three sites.

Mr RB Grund 06/08/1996 Thematic Identification of Remnant Bush and Tussock Lands in Coastal South Australia.

Mr DR Maddison 01/09/1996 The phylogenetic relationships among families within the beetle sub-order Adephaga, with an emphasis on ground beetles, or Carabidae.

Miss JL Chivell 01/09/1996 The effect of habitat fragmentation on the pollination biology of Grevillea species.

Mr C Rich 01/09/1996 General biology of birds in the Mount Lofty Ranges, Murray Mallee, lower Flinders Ranges and Coonalpyn region.

Ms JM Hart 01/09/1996 The Revision of the Australian Apiaceae.

Mr JK Moulton 01/09/1996 Phylogenetic relationships among black fly (Diptera: Simuliidae) genera based upon DNA sequence data.

Mr DA Frahn 01/09/1996 Plant surveys of the Riverland area.

Ms A Ben Kahn 01/09/1996 Ecology and Genetics of several rare orchid species (*Caladena*) in South Australia.

Ms L Heard 16/09/1996 Upper Mid North, North Spencer Gulf and Northern Adelaide Plains Native Vegetation Survey.

Dr G Cassis 01/10/1996 Biodiversity and Systematics of the Australian Heteroptera. Insecta: Heteroptera).

Ms L Rawlings 01/10/1996 Conservation genetics and systematics of Australian Pythons using DNA markers.

Mr RJ Myers 16/10/1996 Water course management - A field guide. Submerged and Edge Plant ID and Information Sheets.

Mr B Lambie 28/10/1996 Opportunistic surveying and collecting of plant and animal species in Bookmark Biosphere.

Ms CA Jones 31/10/1996 Murraylands and Fleurieu regions revegetation projects and surveys.

Mr SJ Walker 01/11/1996 Identification of diseases contributing to the decline of frog populations in South Australia.

Dr M Clarke 01/11/1996 Reproductive biology and ecology of the Black-eared (*Manorina melanotis*) and Yellow-throated Miner (*M. flavigula*).

Dr P Kolesik 01/11/1996 The geography and population dynamics of gall midges (Diptera: Cecidomyiidae).

Mr J McLaughlin 27/11/1996 Black-eared Miner Recovery Program: Field Management Actions.

Ms T Littely 01/12/1996 Fleurieu swamps biological survey.

Dr SM Carthew 01/12/1996 Factors which influence patterns of mating in the Proteaceae.

Ms U Trinkaus 09/12/1996 Revision of the *Buellia epigaea* group (Lichenes).

Mr R Fisher 11/12/1996 Study of butterflies in South Australia.

Ms A Paltridge 18/12/1996 Ecology, historical decline and management of Fairy Terns in South Australia.

1997.

Ms A Hudd 01/01/1997 A comparison of species diversity in remnant patches of Spinifex.

Ms EL Liebing 01/01/1997 Population dynamics of birds at Arbury Park Outdoor School, Mt George and environs.

Mrs PS Catcheside 10/01/1997 'Fungimap' - a survey of fungi in South Australia.

Ms S Dominelli 21/01/1997 Distribution, roost requirements, habitat use and status of the little pied bat (Chalinolobus picatis) and the greater long-eared bat (Nyctophilus timariensis) in the Bookmark Biosphere Reserve.

Mr DE Murfet 01/02/1997 The distribution and status of plants in South Australia: collections and site inventories.

Ms MS Marsh 01/02/1997 Influence of carp on composition and abundance of cyanobacteria and other phtyplankton in wetlands of the lower Murray River.

Dr DA MacKay 14/02/1997 Pollination biology of plants in fragmented habitats.

Mr AJ McArthur 18/02/1997 Review of the genus *Camponotus* (Formicidae).

Mr JA Walker 01/03/1997 Taxonomic revision of the Blaberid genus *Caloampra*.

Mr R Taylor 12/03/1997 Botanical surveys, monitoring and revegetation programs in South Australia.

Mr R Taylor 19/03/1997 Botanical surveys, monitoring and revegetation programs in South Australia.

Dr RB Halliday 01/04/1997 Bioprospecting in Australian terrestrial invertebrates.

Miss E Reed 09/04/1997 A study of disarticulation, dispersal and transport of Macropod (Kangaroo) skeletal remains.

Ms VM Cruickshank 29/04/1997 Plant paintings for illustrated guidebooks.

Dr NA Locket 29/04/1997 Studies on scorpions.

Ms E Raulings 05/05/1997 A systematic and biogeographic study of *Stylidium* in eastern Australia.

Dr CM Kemper 05/05/1997 General collection permit issued to the Curator of Mammals, South Australian Museum.

Ms S Dominelli 30/05/1997 General surveying and monitoring activities associated with habitat and species recovery in Bookmark Biosphere Reserve.

Mrs M Simmons 01/06/1997 *Acacia* specimens for use in the illustrated guidebook 'Acacias of Australia'.

Mr PM Goonan 03/06/1997 Monitoring River Health Initiative - South Australian program.

Mr PM Goonan 03/06/1997 Monitoring River Health Initiative - South Australian program.

Dr CHS Watts 03/06/1997 Hybridization in the carp gudgeon's *Hypseleotris klunzingeri* and *H. regalis* and H. spp.

Dr DC Paton 01/07/1997 Reproductive strategies of native plants and interactions between honeybees and native fauna.

Dr DC Paton 01/07/1997 Ecology of domestic and feral cats in South Australia.

Dr DC Paton 01/07/1997 Studies into the ecology and population dynamics of selected bird groups.

Mr RB Grund 10/07/1997 Butterflies of South Australia.

Mr KW Smith 23/07/1997 A comparison of different mallee bird communities.

Dr A Cheshire 23/07/1997 Collection of plant material for teaching purposes.

Mr SR Donaldson 01/08/1997 Field collection for the Australian National Botanic Gardens.

Ms CA Pearce 01/08/1997 Mycology - studies of the Australian Phyllachoraceae.

Dr MP Schwarz 04/08/1997 Preliminary investigation of the usefulness of native bees for ecological and evolutionary research in South Australia.

Dr AD Austin 08/08/1997 Biology and systematics of parasitic Hymenoptera (Insecta).

Mr TE Dennis 13/08/1997 The demography, social structure and breeding biology of the Australasian Osprey *Pandion haliaetus cristatus* in South Australia.

Dr J Keesing 14/08/1997 Impact and stock assessment of inland fish populations.

Dr M Clarke 14/08/1997 Reproductive biology and ecology of the Black-eared (*Manorina melanotis*) and Yellow-throated Miner (*M. flavigula*).

Mr WA Head 15/08/1997 General surveys of the mammals of South Australia by the Field Naturalists' Society, Mammal Club.

Miss JL Chivell 01/09/1997 The effect of habitat fragmentation on the pollination biology of Grevillea species.

Miss LP Smith 02/09/1997 A systematic study of the Australian Geranium.

Dr MIH Brooker 03/09/1997 *Eucalyptus* taxonomy.

Mr C Rich 04/09/1997 General biology of birds in the Mount Lofty Ranges, Murray Mallee, lower Flinders Ranges and Coonalpyn region.

Ms B Cadzow 18/09/1997 The influence of flowering species on (distribution) behaviour and diet of three species of pygmy possum.

Dr MF Duretto 01/10/1997 Systematic studies in Rutaceae and in particular *Boronia*.

Ms KL Wilson 01/10/1997 A taxonomic revision of the Cyperaceae and Polygonaceae of Australia.

Dr DA MacKay 22/10/1997 An experimental study of an ant-plant mutualism.

Ms CA Jones 30/10/1997 Murraylands and Fleurieu regions revegetation projects and surveys.

Dr CM Kemper 01/11/1997 General collection permit issued to the Curator of Mammals, South Australian Museum.

Dr MH Sweet 01/11/1997 The phylogeny of the genus *Plinthisus*.

Mrs R Skinner 27/11/1997 Aquatic animal propagule banks of temporary wetlands.

Mr B Lambie 17/12/1997 Bookmark sustainable floriculture.

Mrs PS Catcheside 18/12/1997 'Fungimap' - a survey of fungi in South Australia.

1998.

Ms JB Woodman 21/01/1998 Reference material for paintings of South Australian flora.

Mr D Goodwins 30/01/1998 Vegetation surveys under the Biological Survey of South Australia program.

Mr ES Volschenk 02/02/1998 A revision of the scorpion genus *Lychas* in Australia.

Dr MA Whalen 03/02/1998 Ecology and Life History of South Australian *Frankenias.*

Ms EL Liebing 04/02/1998 Population dynamics of birds at Arbury Park Outdoor School, Mt George and environs.

Ms V Scott 12/02/1998 Fauna survey of Mt Billy Conservation Park.

Mrs TM Hall 18/02/1998 Aspects of field botany in South Australia: surveys by FNSSA Botany Club.

Ms YM Steed 05/03/1998 Threatened Plant Action Group surveys.

Mr R Taylor 18/03/1998 Botanical surveys, monitoring and revegetation programs in South Australia.

Mr AV Slee 01/04/1998 Eucalyptus systematics, particularly the development of interactive computer keys.

Dr RE Clay 07/04/1998 Habitat assessment and monitoring in Bookmark Biosphere Reserve.

Mr G Leske 28/04/1998 Collection of plant specimens for the State Herbarium.

Prof RD Campbell 01/05/1998 Taxonomy of *Hydra* (Cnidaria: Hydrozoa) of Australia.

Ms UAM Carnegie 01/05/1998 'Fungimap' - a survey of fungi in South Australia.

Ms OJ Knapman 01/06/1998 Small mammals inhabiting native vegetation in south-east South Australia.

Mr RC Nash 14/06/1998 Virus infections in native orchids.

Mr AJ McArthur 01/07/1998 Review of the genus *Camponotus* (Formicidae).

Dr DC Paton 01/07/1998 Ecology of domestic and feral cats in South Australia.

Dr DC Paton 01/07/1998 Studies into the ecology and population dynamics of selected bird groups.

Dr DC Paton 01/07/1998 Reproductive strategies of native plants and interactions between honeybees and native fauna.

Dr M Clarke 24/07/1998 Reproductive biology and ecology of the Black-eared (*Manorina melanotis*) and Yellow-throated Miner (*M. flavigula*).

Ms S Dominelli 31/07/1998 General surveying and monitoring activities associated with habitat and species recovery in Bookmark Biosphere Reserve.

Ms S Dominelli 31/07/1998 Distribution, roost requirements, habitat use and status of the Little Pied Bat (*Chalinolobus picatus*) and the Greater Long-eared Bat (*Nyctophilus timoriensis*) in the Bookmark Biosphere Reserve.

Mr KW Smith 31/07/1998 A comparison of different mallee bird communities.

Mrs M Simmons 01/08/1998 Acacia specimens for use in the illustrated guidebook 'Acacias of Australia'.

Prof JT Wiskich 19/08/1998 Collection of plant material for teaching purposes.

Mr RB Grund 26/08/1998 Butterflies of South Australia.

Mr TE Dennis 26/08/1998 The demography, social structure and breeding biology of the Australasian Osprey *Pandion haliaetus cristatus* in South Australia.

Mr V Dietemann 01/09/1998 Collection of entire colonies of various species of the ant genus *Myrmecia* for behavioural studies.

Mr K Rule 02/09/1998 New subspecies of *Eucalyptus leucoxylon* in South Australia.

Dr S Barker 02/09/1998 Revision of *Castiarina* and *Cisseis* (Coleoptera: Buprestidae).

Mr GT Chandler 04/09/1998 Revision of *Daviesia* and *Pittosporaceae.*

Mr GC Medlin 15/09/1998 General surveys of the Mammals of SA.

Mr J Beaton 16/09/1998 Reptile and amphibian distribution and status in South Australia.

Ms VM Cruickshank 23/09/1998 Wildflowers of the Flinders Ranges and elsewhere.

Mr PM Goonan 01/10/1998 Monitoring River Health Initiative - South Australian program.

Dr G Cassis 01/10/1998 Biodiversity and systematics of the Australian Heteroptera.

Dr I Karnefelt 01/10/1998 Field studies of lichens in the genera *Caloplaca, Fulgensia, Teloschistes* and *Xanthoria* (Teloschistaceae) for the Flora of Australia project.

Mr C Rich 14/10/1998 General biology of birds in the Mount Lofty Ranges, Murray Mallee, lower Flinders Ranges and Coonalpyn region.

Ms CA Jones 03/11/1998 Murraylands and Fleurieu regions revegetation projects and surveys.

Ms GR Pfennig 09/11/1998 Revegetation research on the Chowilla Floodplain, Bookmark Biosphere Reserve.

Dr SM Carthew 02/12/1998 Factors Which Influence Patterns Of Mating In The Proteaceae.

Mr SM Watharow 02/12/1998 Observations of parasitism and diets of South Australian snakes and Lizards.

Dr DA MacKay 02/12/1998 An experimental study of an ant-plant mutualism.

Dr AD Austin 02/12/1998 Biology And Systematics Of Parasitic Hymenoptera (Insecta).

Dr M Daccordi 17/12/1998 Coleoptera Chrysomelidae, Carabidae And Choleridae Of The Gondwanian Lines: Biogeography, Ecology And Evolution.

Ms EL Liebing 22/12/1998 Population dynamics of birds at Arbury Park Outdoor School, Mt George And Immediate Environs.

1999.

Mr ES Volschenk 01/01/1999 A Revision Of The Scorpion Genus *Lychas* In Australia.

Mrs PS Catcheside 08/01/1999 'Fungimap' - a survey of fungi in South Australia.

Mr D Nicolle 14/01/1999 Systematic studies of eucalyptus series subulatae.

Mr P Crisp 03/02/1999 Movement And Persistance Of Exotic Phytoseiidae (*Phytoseiulus persimilis* and *Galendromus occidentalis*) in dry sclerophyll woodland in South Australia.

Dr KP Nicolson 10/02/1999 Vegetation surveys under the Biological Survey of South Australia program.

Mr GJ Smith 16/02/1999 Taxonomy and systematics of the Xylariaceae of Australia.

Ms L Rawlings 23/02/1999 Conservation Genetics And Systematics Of Australian Pythons Using DNA markers.

Mr CM Leigh 24/02/1999 Use of hair sampling techniques to confirm recent sightings of the brush-tailed Phascogale (Phascogale tapoatafa) in the Mt Lofty Ranges of South Australia.

Prof S Marshall 01/03/1999 Systematics of Sphaeroceridae (Diptera).

Dr LJ Kaila 15/03/1999 Revision of the Australian species of *Elachistid* moths (Gelechioidea).

Dr MA Whalen 15/03/1999 Ecology and Life History of South Australian i.

Miss ML Ballestrin 14/04/1999 Determination of herbivory levels on *Eucalyptus largiflorens, Eucalyptus gracilis* and the "Green Variant" at Chowilla, SA.

Mr TB Reardon 14/04/1999 Taxonomy and distribution of South Australian bats.

Mr R Taylor 29/04/1999 Botanical surveys, monitoring, revegetation, local herbariums and herbicide trials in South Australia.

Mr G Leske 10/05/1999 Collection of plant specimens for the State Herbarium.

Dr BJ Rees 17/05/1999 The fungi genera *Gymnopilus, Pyrrhoglossum* and *Phaeocollybia* in southern Australia.

Mrs TM Hall 17/06/1999 Aspects of field botany in South Australia: surveys by FNSSA Botany Club.

Mr AJ McArthur 01/07/1999 Review of the genus *Camponotus* (Formicidae).

Dr SM Carthew 20/07/1999 Distribution and abundance of Feathertail Gliders in south-east South Australia.

Dr SW Dunkle 01/09/1999 Distribution of Australian dragonflies (Odonata).

Appendix VI

PLANT SPECIES RECORDED FROM THE MURRAY MALLEE STUDY AREA

Species are arranged in alphabetical order of family. Plant taxonomy follows Jessop (1993) and common names are from the SA FLORA database. The taxonomy is current to the time of each survey. Any taxonomic changes that have occurred to the species are highlighted by (nc).

* Introduced species

(nc) Non current taxonomy

Conservation status codes are shown in bold following the scientific name, listed in sequence Australian (species)/South Australian/Regional, according to Briggs and Leigh (1995) and Lang and Kraehenbuhl (1994). Regional status refers only to the Murray region.

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** – having a low overall frequency of occurrence: confined to a restricted range or scattered sparsely over a wider area. Not currently exposed to significant threats but warranting monitoring and protective measures to prevent reduction of populations

K **Uncertain** – likely to be either threatened or rare but insufficient data for a more precise assessment.

U **Uncommon** – less common species of interest but not rare enough to warrant special protective measures.

Extra conservation codes according to Briggs and Leigh (1998)

X **Presumed Extinct**

C **Conserved populations exist**

Q **Not assessed but possible significant**

3 **Species with range of greater than 100km**

A **Reserved populations over 1000 individuals**

The remaining columns indicate the source of plant species records as follows:

1. Murray Mallee survey D.E.P. 1991 (this survey), site data
2. Victorian Mallee survey 1985-1987, site data
3. SE Coast survey 1982, 1983, 1986, 1987, site data
4. Murray Mallee Management Plan 1991, site data
5. Western Murray Flats 1992, site data
6. Temperate Grassland –WWF 1991-1994, site data
7. Western Murray Mallee (MK HYDE) 1992, site data
8. SE Fire Study (NCS) 1994, site data
9. Coastal Dune & Clifftop 1996, site data

Species	Common Name

		1	2	3	4	5	6	7	8	9
ADIANTACEAE										
Cheilanthes austrotenuifolia	annual rock-fern	1								
AIZOACEAE										
Carpobrotus modestus	inland pigface						6	7		
Carpobrotus modestus/rossii	native pigface	1								
Carpobrotus rossii	native pigface	1		3						9
Disphyma crassifolium ssp. *clavellatum*	round-leaf pigface		2	3						
**Mesembryanthemum aitonis*	angled iceplant		2							
**Mesembryanthemum crystallinum*	common iceplant	1	2	3						
**Mesembryanthemum nodiflorum*	slender iceplant	1	2							
**Micropterum papulosum*		1								
**Psilocaulon tenue*	match-head plant	1	2							
Tetragonia eremaea	desert spinach		2							
Tetragonia eremaea/tetragonoides	native spinach	1								
Tetragonia implexicoma	bower spinach	1		3						9
AMARANTHACEAE										
Hemichroa pentandra **-U-**	trailing hemichroa	1								
Ptilotus seminudus	rabbit-tails	1	2							
Ptilotus sp.	mulla mulla	1	2							
Ptilotus spathulatus forma	pussy-tails						6	7		
Ptilotus spathulatus forma *spathulatus*	pussy-tails	1	2		4					
APOCYNACEAE										
Alyxia buxifolia	sea box	1								9
ASCLEPIADACEAE										
**Asclepias rotundifolia*	broad-leaf cotton-bush	1		3						
ASPLENIACEAE										
Pleurosorus rutifolius	blanket fern	1								
AZOLLACEAE										
Azolla filiculoides	Pacific azolla					5				
BORAGINACEAE										
**Buglossoides arvensis*	sheepweed						6	7		
Cynoglossum australe	Australian hound's-tongue	1	2	3						
**Echium plantagineum*	Salvation Jane	1	2	3			6			
Halgania andromedifolia	scented blue-flower	1			4			7		
Halgania cyanea	rough blue-flower	1	2		4			7		
Myosotis australis	austral forget-me-not									9
**Neatostema apulum*	hairy sheepweed	1					6	7		
Omphalolappula concava	burr stickseed		2							
Plagiobothrys elachanthus	hairy forget-me-not		2							
CAMPANULACEAE										
Wahlenbergia fluminalis	river bluebell		2							
Wahlenbergia gracilenta	annual bluebell	1	2				6	7		
Wahlenbergia litticola	coast bluebell	1								
Wahlenbergia luteola	yellow-wash bluebell							7		
Wahlenbergia multicaulis	Tadgell's bluebell		2							
Wahlenbergia sp.	native bluebell	1		3				7		

Species	Common Name	1	2	3	4	5	6	7	8	9
Wahlenbergia stricta ssp. *stricta*	tall bluebell	1								
CARYOPHYLLACEAE										
**Arenaria serpyllifolia* (nc)	thyme-leaved sandwort	1								
Caryophyllaceae sp.	pink family						6			
**Cerastium balearicum*	chickweed									9
**Cerastium glomeratum*	common mouse-ear chickweed	1								9
Cerastium semidecandrum	small mouse-ear chickweed						6			
**Gypsophila tubulosa*	annual chalkwort		2							
**Herniaria cinerea*	rupturewort		2							
**Minuartia mediterranea*	slender sandwort									9
**Petrorhagia velutina*	velvet pink	1								
**Sagina maritima*	sea pearlwort									9
**Silene apetala*	sand catchfly	1	2							
**Silene nocturna*	Mediterranean catchfly	1					6			9
**Silene* sp.	catchfly	1	2							
**Spergularia diandra*	lesser sand-spurrey		2							
**Spergularia rubra*	red sand-spurrey		2							
**Stellaria media*	chickweed	1								9
CASUARINACEAE										
Allocasuarina luehmannii **-UV**	bull oak	1							8	
Allocasuarina mackliniana ssp.	Macklin's oak-bush		2						8	
Allocasuarina muelleriana ssp.	common oak-bush		2						8	
Allocasuarina muelleriana ssp. *muelleriana*	common oak-bush	1	2							
Allocasuarina pusilla **NR**	dwarf oak-bush	1	2						8	
Allocasuarina verticillata	drooping sheoak	1		3			6			
Casuarina pauper	black oak	1	2							
CENTROLEPIDACEAE										
Centrolepis sp.	centrolepis	1								
Centrolepis strigosa	hairy centrolepis	1								
CHENOPODIACEAE										
Atriplex acutibractea ssp.	pointed saltbush	1								
Atriplex eardleyae	Eardley's saltbush	1	2							
Atriplex leptocarpa	slender-fruit saltbush		2							
Atriplex lindleyi (nc)	baldoo		2							
Atriplex paludosa ssp. *cordata*	marsh saltbush	1								
Atriplex paludosa ssp. *paludosa* **Q**	marsh saltbush			3						
Atriplex papillata **RXX**	coral saltbush		2							
**Atriplex prostrata*	creeping saltbush					5				
Atriplex pumilio	mat saltbush		2							
Atriplex semibaccata	berry saltbush	1				5				
Atriplex sp.	saltbush	1	2							
Atriplex spongiosa	pop saltbush		2							
Atriplex stipitata	bitter saltbush	1	2		4					
Atriplex vesicaria ssp.	bladder saltbush	1	2							
Chenopodium curvispicatum	cottony goosefoot	1	2		4					
Chenopodium desertorum ssp.	desert goosefoot	1	2							
Chenopodium desertorum ssp. *desertorum*	frosted goosefoot	1						7		
Chenopodium desertorum ssp. *microphyllum*	small-leaf goosefoot	1								
Chenopodium desertorum ssp. *rectum*	erect goosefoot	1								

Species	Common Name	1	2	3	4	5	6	7	8	9
Chenopodium sp.	goosefoot	1								
Dissocarpus paradoxus	ball bindyi	1								
Einadia nutans ssp.	climbing saltbush	1	2				6			
Einadia nutans ssp. *nutans*	climbing saltbush	1			4			7		
Enchylaena tomentosa var.	ruby saltbush						6	7		
Enchylaena tomentosa var. *tomentosa*	ruby saltbush	1	2	3	4		6			
Eriochiton sclerolaenoides	woolly-fruit bluebush	1	2					7		
Halosarcia pergranulata ssp. *pergranulata*	black-seed samphire	1								
Halosarcia pruinosa	bluish samphire		2							
Halosarcia sp.	samphire	1		3						
Maireana appressa	pale-fruit bluebush	1	2							
Maireana brevifolia	short-leaf bluebush	1	2		4			7		
Maireana ciliata	hairy fissure-plant		2							
Maireana enchylaenoides	wingless fissure-plant	1								
Maireana eriantha	woolly bluebush							7		
Maireana erioclada	rosy bluebush	1			4					
Maireana georgei	satiny bluebush							7		
Maireana oppositifolia	salt bluebush	1								
Maireana pentagona **R**	slender fissure-plant				4					
Maireana pentatropis	erect mallee bluebush	1	2		4					
Maireana pyramidata	black bluebush	1	2							
Maireana radiata	radiate bluebush	1			4					
Maireana rohrlachii **3RCR**	Rohrlach's bluebush	1			4					
Maireana sedifolia	bluebush	1	2							
Maireana sp.	bluebush/fissure-plant	1	2					7		
Maireana trichoptera	hairy-fruit bluebush	1			4					
Maireana turbinata	top-fruit bluebush		2							
Malacocera tricornis	goat-head soft-horns		2							
Osteocarpum acropterum var.	bonefruit		2							
Osteocarpum salsuginosum	inland bonefruit		2							
Rhagodia candolleana ssp. *candolleana*	seaberry saltbush	1		3				7		9
Rhagodia crassifolia	fleshy saltbush	1			6		6	7		
Rhagodia parabolica	mealy saltbush	1						7		
Rhagodia preissii ssp. *preissii*	mallee saltbush	1			4					
Rhagodia spinescens	spiny saltbush	1	2							
Rhagodia ulicina	intricate saltbush	1								
Salsola kali	buckbush	1	2		2	5				
Sarcocornia blackiana	thick-head samphire	1								
Sarcocornia quinqueflora	beaded samphire	1				5				
Sarcocornia sp.	samphire			3						
Sclerolaena brachyptera	short-wing bindyi		2							
Sclerolaena brevifolia	small-leaf bindyi	1								
Sclerolaena diacantha	grey bindyi	1	2		4			7		
Sclerolaena divaricata	tangled bindyi		2							
Sclerolaena obliquicuspis	oblique-spined bindyi	1	2							
Sclerolaena parviflora	small-flower bindyi	1			4			7		
Sclerolaena patenticuspis	spear-fruit bindyi	1								
Sclerostegia arbuscula	shrubby samphire	1				5				
Suaeda australis	austral seablite			3		5				
Threlkeldia diffusa	coast bonefruit	1		3						9

CHLOANTHACEAE

Dicrastylis verticillata	whorled sand-sage	1								

Species	Common Name	1	2	3	4	5	6	7	8	9
COMPOSITAE										
**Achillea* sp.	yarrow	1								
Actinobole uliginosum	flannel cudweed	1	2					7		
Angianthus disarticulata (nc)		1								
Angianthus milenei (nc)		1								
Angianthus tomentosus	hairy angianthus	1	2							
**Arctotheca calendula*	Cape weed	1					6	7		
Argentipallium blandowskianum	woolly everlasting	1								
Argentipallium obtusifolium	blunt everlasting	1								
**Aster subulatus*	aster-weed		2			5				
Asteridea athrixioides forma *athrixioides*	wirewort	1								
Blennospora drummondii	dwarf button-flower	1	2							
Brachycome basaltica var. *gracilis* **R**	swamp daisy		2							
Brachycome ciliaris var. *ciliaris*	variable daisy	1	2					7		
Brachycome ciliaris var. *lanuginosa*	woolly variable daisy	1						7		
Brachycome goniocarpa	dwarf daisy	1								
Brachycome lineariloba	hard-head daisy	1	2				6			
Brachycome sp.	native daisy	1	2							
Calocephalus citreus **-U-**	lemon beauty-heads		2							
Calotis erinacea	tangled burr-daisy	1								
Calotis hispidula	hairy burr-daisy	1	2							
Calotis sp.	burr-daisy	1								
**Carduus tenuiflorus*	slender thistle	1								
**Carthamus lanatus*	saffron thistle	1	2				6	7		
Cassinia arcuata **-U-**	drooping cassinia				4					
Cassinia uncata	sticky cassinia	1						7		
**Centaurea melitensis*	Malta thistle	1	2					7		
**Centaurea* sp.	centaury							7		
Centipeda cunninghamii	common sneezeweed		2							
Chrysocephalum apiculatum	common everlasting	1					6	7		
Chrysocephalum baxteri	white everlasting	1							8	
Chrysocephalum semicalvum ssp. *semicalvum*	scented button-bush				4					
Chrysocephalum semipapposum	clustered everlasting	1								
**Cirsium vulgare*	spear thistle	1	2			5				
Compositae sp.	daisy family	1								
**Cotula coronopifolia*	water buttons					5				
Craspedia glauca	billy-buttons	1								
Cratystylis conocephala	bluebush daisy	1			4					
**Cynara cardunculus*	artichoke thistle			3						
**Dittrichia graveolens*	stinkweed	1	2	3						
Eclipta platyglossa **-UU**	yellow twin-heads		2							
Elachanthus pusillus **-U-**	elachanth		2							
Eriochlamys behrii	woolly mantle		2							
Euchiton sphaericus	annual cudweed	1	2							
Gnaphalium indutum	tiny cudweed									9
**Hedypnois rhagadioloides*	Cretan weed		2				6			
Helichrysum leucopsideum	satin everlasting	1	2		4			7	8	9
Helichrysum scorpioides **-NR**	button everlasting	1								
Helichrysum sp. (nc)		1								
**Helminthotheca echioides*	ox-tongue		2							
Hyalosperma demissum	dwarf sunray						6			
Hyalosperma glutinosum ssp. *glutinosum*	golden sunray		2							

Species	Common Name	1	2	3	4	5	6	7	8	9
Hyalosperma semisterile	orange sunray		2				6			
**Hypochaeris glabra*	smooth cat's ear	1	2				6	7	8	
**Hypochaeris radicata*	rough cat's ear	1						7		9
**Hypochaeris* sp.	cat's ear	1								
Isoetopsis graminifolia	grass cushion	1	2				6			
Ixiolaena leptolepis	narrow plover-daisy		2							
**Lactuca serriola*	prickly lettuce		2							
Lagenifera huegelii	coarse bottle-daisy	1								
Leptorhynchos squamatus	scaly buttons	1								
Leptorhynchos tetrachaetus **-U-**	little buttons						6			
Leucophyta brownii	coast cushion bush			3						9
Microseris lanceolata	yam daisy	1	2				6			
Millotia muelleri	common bow-flower		2							
Millotia perpusilla	tiny bow-flower		2							
Millotia sp.	millotia/bow-flower	1								
Millotia tenuifolia var.	soft millotia	1	2				6			
Minuria leptophylla	minnie daisy	1					6			
Olearia axillaris	coast daisy-bush	1		3						9
Olearia brachyphylla (nc)	short-leaf daisy-bush	1			4					
Olearia ciliata var. *ciliata*	fringed daisy-bush	1							8	
Olearia floribunda var. *floribunda*	heath daisy-bush	1								
Olearia lanuginosa **-U-**	woolly daisy-bush	1							8	
Olearia lepidophylla	club-moss daisy-bush	1	2		4			7	8	
Olearia magniflora **-U-**	splendid daisy-bush	1			4					
Olearia muelleri	Mueller's daisy-bush	1	2		4					
Olearia passerinoides ssp. *glutescens* **-RR**	sticky daisy-bush	1								
Olearia passerinoides ssp. *passerinoides* **-U-**	feather daisy-bush	1			4					
Olearia picridifolia **-R-**	rasp daisy-bush	1								
Olearia pimeleoides ssp. *pimeleoides*	pimelea daisy-bush	1			4					
Olearia ramulosa	twiggy daisy-bush	1		3						
*Olearia rudis***-U-**	azure daisy-bush	1	2							
**Onopordum acaulon*	horse thistle	1	2					7		
Ozothamnus decurrens	ridged bush-everlasting	1								
Ozothamnus retusus **-Q-**	notched bush-everlasting	1	2							
Ozothamnus turbinatus **-U-**	coast bush-everlasting									9
Picris sp.	picris									9
Podolepis capillaris	wiry podolepis	1	2							
Podolepis muelleri **-K-**	button podolepis							7		
Podolepis rugata var.	pleated copper-wire daisy							7		
Podolepis rugata var. *rugata*	pleated copper-wire daisy	1								
Podolepis tepperi	delicate copper-wire daisy	1	2				6	7		
Podotheca angustifolia	sticky long-heads	1	2					7		
Pogonolepis muelleriana	stiff cup-flower	1	2				6			
Pseudognaphalium luteoalbum	Jersey cudweed	1	2							
Pycnosorus pleiocephalus	soft billy-buttons		2							
**Reichardia tingitana*	false sowthistle	1	2				6	7		9
Rhodanthe pygmaea	pigmy daisy	1	2				6			
**Senecio elegans*	purple groundsel									9
Senecio glossanthus	annual groundsel	1	2				6			
Senecio hispidulus (nc)			2							
Senecio lautus	variable groundsel	1	2	3	4			7		9
Senecio odoratus var. *odoratus*	scented groundsel			3						
Senecio picridioides	purple-leaf groundsel	1							8	

Species	Common Name	1	2	3	4	5	6	7	8	9
**Senecio pterophorus* var. *pterophorus*	African daisy	1								
Senecio quadridentatus	cotton groundsel	1	2							
Senecio sp.	groundsel	1								
Senecio tenuiflorus	woodland groundsel							7		
**Sonchus asper* ssp.	rough sow-thistle		2							
**Sonchus asper* ssp. *glaucescens*	rough sow-thistle									9
Sonchus megalocarpus	coast sow-thisle			3						9
**Sonchus oleraceus*	common sow-thistle	1	2			5	6			9
Sonchus sp.	sow-thistle	1	2			5		7		
Trichanthodium skirrophorum	woolly yellow-heads	1								
**Urospermum picroides*	false hawkbit									9
Vittadinia australasica var.	sticky New Holland daisy							7		
Vittadinia australasica var. *australasica*	sticky New Holland daisy	1								
Vittadinia blackii	narrow-leaf New Holland daisy	1						7		
Vittadinia cervicularis var. *cervicularis*	waisted New Holland daisy	1								
Vittadinia cuneata var.	fuzzy New Holland daisy	1					6			
Vittadinia cuneata var. *cuneata* forma *cuneata*	fuzzy New Holland daisy	1								
Vittadinia dissecta var. *hirta*	dissected New Holland daisy	1	2		4			7		
Vittadinia gracilis	woolly New Holland daisy	1	2				6	7		
Vittadinia megacephala	giant New Holland daisy	1					6	7		
Vittadinia sp.	New Holland daisy	1						7		
**Xanthium* sp.	burr		2							
**Xanthium spinosum*	Bathurst burr					5				
CONVOLVULACEAE										
Calystegia sepium **-Q-**	large bindweed					5				
Convolvulus erubescens (nc)	Australian bindweed	1	2				6			
Convolvulus remotus	grassy bindweed	1					6	7		
Cressa cretica	rosinweed		2							
Cuscuta tasmanica **-K-**	Tasmanian dodder		2							
Dichondra repens	kidney weed	1								9
CRASSULACEAE										
Crassula closiana	stalked crassula									9
Crassula colorata var.	dense crassula	1	2				6			
Crassula decumbens var. *decumbens*	spreading crassula									9
Crassula sieberiana ssp. *tetramera*	Australian stonecrop	1	2				6			9
Crassula sp.	crassula/stonecrop	1								
CRUCIFERAE										
**Alyssum linifolium*	flax-leaf alyssum		2					7		
Arabidella trisecta	shrubby cress		2							
**Brassica tournefortii*	wild turnip	1	2		4		6	7		
**Cakile maritima* ssp. *maritima*	two-horned sea rocket	1		3						
**Carrichtera annua*	Ward's weed	1	2							
Cruciferae sp.	cress family						6			
Geococcus pusillus	earth cress		2							
Lepidium leptopetalum	shrubby peppercress	1								
Lepidium pseudohyssopifolium **-UU**			2							
**Sisymbrium erysimoides*	smooth mustard	1	2				6			
**Sisymbrium irio*	London mustard		2							
**Sisymbrium orientale*	Indian hedge mustard		2							
*Sisymbrium sp.	wild mustard	1								

Species	Common Name	1	2	3	4	5	6	7	8	9
Stenopetalum lineare	narrow thread-petal	1	2							
Stenopetalum sphaerocarpum	round-fruit thread-petal	1								
CUPRESSACEAE										
Callitris canescens	scrubby cypress pine	1								
Callitris glaucophylla	white cypress-pine		2							
Callitris preissii	southern cypress pine	1	2		4		6			
Callitris verrucosa	scrub cypress pine	1	2		4				8	
CYPERACEAE										
Baumea juncea	bare twig-rush	1								
Cyperus gymnocaulos	spiny flat-sedge	1	2							
Cyperus victoriensis	yelka		2							
Eleocharis acuta	common spike-rush		2			5				
Gahnia deusta	limestone saw-sedge	1								
Gahnia filum	smooth cutting-grass	1								
Gahnia lanigera	black grass saw-sedge	1					6	7		
Isolepis marginata	little club-rush									9
Isolepis nodosa	knobby club-rush	1		3		5				9
Lepidosperma carphoides	black rapier-sedge	1	2						8	
Lepidosperma concavum	spreading sword-sedge								8	
Lepidosperma concavum/laterale	sword-sedge	1								
Lepidosperma congestum	clustered sword-sedge	1							8	
Lepidosperma gladiatum	coast sword-sedge	1								9
Lepidosperma laterale (nc)	sharp sword-sedge	1					6			
Lepidosperma longitudinale	pithy sword-sedge	1								
Lepidosperma semiteres	wire rapier-sedge	1								
Lepidosperma sp.	sword-sedge/rapier-sedge	1								
Lepidosperma viscidum	sticky sword-sedge	1	2		4				8	
Schoenoplectus pungens	spiky club-rush					5				
Schoenoplectus validus	river club-rush					5				
Schoenus breviculmis	matted bog-rush	1	2						8	
Schoenus deformis	small bog-rush	1								
Schoenus racemosus	sandhill bog-rush	1								
Schoenus sp.	bog-rush	1								
Schoenus subaphyllus	desert bog-rush	1	2		4					
Tetraria capillaris	hair sedge	1								
DILLENIACEAE										
Hibbertia riparia	guinea-flower	1	2					7	8	
Hibbertia riparia (canescens)	grey guinea-flower	1								
Hibbertia riparia (glabriuscula)	smooth guinea-flower	1								
Hibbertia sericea var.	silky guinea-flower								8	
Hibbertia sericea var. *scabrifolia*	rough-leaf guinea-flower	1								
Hibbertia sericea var. *sericea*	silky guinea-flower	1							8	
Hibbertia sp.	guinea-flower		2							
Hibbertia virgata	twiggy guinea-flower	1	2		4			7	8	
DROSERACEAE										
Drosera glanduligera	scarlet sundew						6			
Drosera macrantha ssp. *planchonii*	climbing sundew	1							8	
Drosera whittakeri (nc)	scented sundew	1							8	

Species	Common Name	1	2	3	4	5	6	7	8	9
EPACRIDACEAE										
Acrotriche affinis	ridged ground-berry	1	2						8	
Acrotriche cordata	blunt-leaf ground-berry	1								
Acrotriche depressa **-U-**	native currant	1								
Acrotriche serrulata	cushion ground-berry	1								
Astroloma conostephioides	flame heath	1	2						8	
Astroloma humifusum	cranberry heath	1	2							
Brachyloma ciliatum	fringed brachyloma	1								
Brachyloma daphnoides **-NR**	daphne heath	1	2						8	
Brachyloma ericoides ssp.	brush heath								8	
Brachyloma ericoides ssp. *ericoides*	brush heath	1	2							
Leucopogon clelandii **-R-**	Cleland's beard-heath	1	2							
Leucopogon cordifolius	heart-leaf beard-heath	1	2							
Leucopogon costatus	twiggy beard-heath	1							8	
Leucopogon parviflorus	coast beard-heath	1		3						9
Leucopogon rufus **-U-**	ruddy beard-heath	1	2						8	
Leucopogon sp.	beard-heath	1								
Leucopogon woodsii **-U-**	nodding beard-heath	1	2						8	
Styphelia exarrhena	desert heath	1							8	
EUPHORBIACEAE										
Adriana klotzschii	coast bitter-bush	1		3			6			
Bertya mitchellii	Mitchell's bertya	1	2		4				8	
Beyeria lechenaultii	pale turpentine bush	1			4			7		
Beyeria opaca	dark turpentine bush	1	2		4					
Euphorbia drummondii	caustic weed	1						7		
**Euphorbia paralias*	sea spurge									9
Euphorbia parvicaruncula	rough-seeded spurge		2							
**Euphorbia peplus*	petty spurge	1								
**Euphorbia terracina*	false caper	1		3			6	7		9
Poranthera microphylla	small poranthera		2							
FRANKENIACEAE										
Frankenia foliosa	leafy sea-heath	1	2							
Frankenia pauciflora var.	southern sea-heath	1								
Frankenia pauciflora var. *fruticulosa*	southern sea-heath			3						
Frankenia serpyllifolia	thyme sea-heath		2							
Frankenia sp.	sea-heath					5				
GENTIANACEAE										
**Centaurium spicatum*	spike centaury	1								
Sebaea ovata	yellow sebaea						6			
GERANIACEAE										
**Erodium botrys*	long heron's-bill	1					6	7		
**Erodium cicutarium*	cut-leaf heron's-bill	1	2				6	7		
Erodium crinitum	blue heron's-bill	1	2							
Erodium cygnorum ssp.	blue heron's-bill						6			
Erodium sp.	heron's-bill/crowfoot	1					6			
Geranium potentilloides var. *potentilloides*	downy geranium									9
Geranium retrorsum	grassland geranium									9
Geranium solanderi var. *solanderi*	austral geranium	1								
Pelargonium australe	australian pelargonium	1								9

Species	Common Name	1	2	3	4	5	6	7	8	9
Pelargonium littorale	native pelargonium	1								
Pelargonium rodneyanum	magenta pelargonium	1								
GOODENIACEAE										
Dampiera lanceolata var. *lanceolata*	grooved dampiera	1			4					
Dampiera marifolia	velvet dampiera	1	2						8	
Dampiera rosmarinifolia	rosemary dampiera	1			4					
Goodenia blackiana	native primrose	1							8	
Goodenia fascicularis	silky goodenia		2							
Goodenia geniculata	bent goodenia	1	2						8	
Goodenia pinnatifida **-Q-**	cut-leaf goodenia	1	2				6			
Goodenia pusilliflora	small-flower goodenia	1	2				6			
Goodenia robusta	woolly goodenia	1	2						8	
Goodenia varia	sticky goodenia	1	2		4			7		
Goodenia willisiana	silver goodenia	1	2					7	8	
Scaevola albida var. *albida*	pale fanflower	1								
Scaevola calendulacea **-V-**	dune fanflower									9
Scaevola crassifolia	cushion fanflower									9
Scaevola sp.	fanflower	1								
Scaevola spinescens	spiny fanflower	1			4					
Velleia arguta	toothed velleia	1	2				6			
GRAMINEAE										
Agrostis avenacea var.	common blown-grass		2			5				
**Aira caryophyllea*	silvery hair-grass						6			
**Aira cupaniana*	small hair-grass						6			
Amphipogon caricinus var. *caricinus*	long grey-beard grass	1	2		4					
Amphipogon sp.	grey-beard grass	1								
Amphipogon strictus var. *setifer*	spreading grey-beard grass	1	2							
Austrofestuca littoralis	coast fescue									9
**Avellinia michelii*	avellinia						6			
**Avena barbata*	bearded oat			3			6	7		
**Avena* sp.	oat	1								
Bromus arenarius	sand brome		2							
**Bromus diandrus*	great brome	1	2				6			9
**Bromus rigidus*	rigid brome						6			
**Bromus rubens*	red brome	1	2				6	7		
Bromus sp.	brome	1		3				7		9
Bromus sterilis (nc)			2							
**Critesion marinum*	sea barley-grass					5				
**Critesion murinum* ssp. *glaucum*	blue barley-grass		2				6	7		9
**Cynodon dactylon*	couch		2							
Danthonia aff. *setacea* (nc)			2							
Danthonia caespitosa	common wallaby-grass		2		4		6	7		9
Danthonia geniculata	kneed wallaby-grass	1	2						8	
Danthonia pilosa var.	velvet wallaby-grass		2							
Danthonia setacea var. *setacea*	small-flower wallaby-grass	1	2				6			
Danthonia sp.	wallaby-grass	1							8	
Distichlis distichophylla	emu-grass					5				
**Ehrharta calycina*	perennial veldt grass	1					6			
**Ehrharta longiflora*	annual veldt grass									9
**Elymus farctus*	sea wheat-grass									9
Enneapogon nigricans	black-head grass						6			

Species	Common Name	1	2	3	4	5	6	7	8	9
Enneapogon sp.	bottle-washers/nineawn	1								
Gramineae sp.	grass family	1		3		5				9
**Holcus lanatus*	Yorkshire fog					5				
Homopholis proluta	rigid panic	1								
**Hordeum* sp. (nc)		1								
**Lagurus ovatus*	hare's tail grass	1								9
**Lolium perenne x rigidum*	hybrid ryegrass						6			
**Lolium rigidum*	Wimmera ryegrass						6			
Neurachne alopecuroidea	fox-tail mulga-grass	1	2						8	
Panicum effusum var. *effusum*	hairy panic	1					6			
**Parapholis incurva*	curly ryegrass						6			9
Paspalidium constrictum	knotty-butt paspalidium		2							
Paspalidium jubiflorum	Warrego summer-grass		2							
**Paspalum distichum*	water couch					5				
**Paspalum vaginatum*	salt-water couch					5				
**Pennisetum clandestinum*	kikuyu					5				
**Pentaschistis airoides*	false hair-grass	1	2					7		
Phragmites australis	common reed					5				
**Poa annua*	winter grass									9
Poa crassicaudex	thick-stem tussock-grass	1								
Poa fordeana **-U-**	Forde's poa						6			
Poa labillardieri var. *labillardier*	common tussock-grass	1								
Poa poiformis	coast tussock-grass			3						9
Poa sp.	meadow-grass/tussock-grass	1								
**Polypogon monspeliensis*	annual beard-grass					5				
**Rostraria cristata*	annual cat's-tail		2	3			6			9
**Schismus barbatus*	Arabian grass	1	2							
Spinifex sericeus	rolling spinifex									9
Sporobolus mitchellii	rat-tail couch		2							
Stipa acrociliata	graceful spear-grass							7		
Stipa acrociliata group	branched spear-grass						6			
Stipa acrociliata group/elegantissima	branched spear-grass	1	2							
Stipa drummondii	cottony spear-grass	1								
Stipa elegantissima	feather spear-grass						6	7		
Stipa eremophila	rusty spear-grass	1	2		4		6	7		
Stipa exilis	heath spear-grass		2				6	7		
Stipa flavescens	coast spear-grass									9
Stipa mollis	soft spear-grass									9
Stipa mollis group	soft spear-grass		2				6	7		
Stipa nitida	Balcarra spear-grass				4		6	7		
Stipa nitida group (nc)	spear-grass	1								
Stipa nodosa	tall spear-grass	1								
Stipa pilata **-K-**	prickly spear-grass						6	7		
Stipa scabra group	falcate-awn spear-grass		2							
Stipa scabra ssp.	rough spear-grass		2					7		
Stipa sp.	spear-grass							7		
Stipa trichophylla		1	2						8	
Stipa variabilis	variable spear-grass							7		
Themeda triandra	kangaroo grass	1								
Triodia irritans	spinifex	1					6			
Triodia irritans var. (nc)					4			7	8	
**Vulpia bromoides*	squirrel-tail fescue	1	2					7		
**Vulpia ciliata*	fringed fescue		2					7		

Species	Common Name	1	2	3	4	5	6	7	8	9
**Vulpia fasciculata*	sand fescue						6			
**Vulpia muralis*	wall fescue		2				6			
**Vulpia myuros* forma *megalura*	fox-tail fescue						6	7		
**Vulpia myuros* forma *myuros*	rat's-tail fescue						6			
**Vulpia* sp.	fescue		2	3			6			
GYROSTEMONACEAE										
Codonocarpus cotinifolius	desert poplar	1								9
Gyrostemon australasicus	buckbush wheel-fruit	1								
HALORAGACEAE										
Glischrocaryon behrii	golden pennants	1								
Gonocarpus elatus	hill raspwort	1	2						8	
Gonocarpus mezianus	broad-leaf raspwort	1								
Gonocarpus sp.	raspwort	1								
Gonocarpus tetragynus	small-leaf raspwort	1								
Haloragis acutangula forma	smooth raspwort	1							8	
Myriophyllum crispatum **-TT**	upright milfoil	1								
HYPOXIDACEAE										
Hypoxis sp.	yellow star-lily	1	2				6			
IRIDACEAE										
**Gynandriris setifolia*	thread iris	1								
**Romulea minutiflora*	small-flower onion-grass	1					6	7		
**Romulea rosea* var. *australis*	common onion-grass						6			
JUNCACEAE										
Juncus aridicola	inland rush	1								
**Juncus capitatus*	dwarf rush		2							
Juncus pallidus	pale rush						6			
Juncus pauciflorus	loose-flower rush	1								
Luzula sp.	wood-rush	1								
JUNCAGINACEAE										
Triglochin calcitrapum	spurred arrowgrass	1								
Triglochin centrocarpum	dwarf arrowgrass		2							
Triglochin sp.	arrowgrass/water-ribbons									9
Triglochin striatum	streaked arrowgrass					5				
LABIATAE										
Ajuga australis form A	Australian bugle					5				
Lycopus australis **-RR**	Australian gipsywort		2							
**Marrubium vulgare*	horehound					5				
**Mentha x piperita* var.	peppermint	1	2			5	6	7		
Prostanthera aspalathoides	scarlet mintbush					5				
Prostanthera serpyllifolia ssp. *microphylla*	small-leaf mintbush	1			4			7		
Prostanthera sp.	mintbush	1								
**Salvia verbenaca* form	wild sage	1								
**Salvia verbenaca* form A	wild sage	1	2			5				
Teucrium racemosum	grey germander						6			
Westringia eremicola	slender westringia						6			
Westringia rigida	stiff westringia	1								

Species	Common Name	1	2	3	4	5	6	7	8	9
Cassytha glabella forma *dispar*	slender dodder-laurel	1			4			7		
Cassytha glabella forma *glabella* **-E-**	slender dodder-laurel	1	2						8	
Cassytha melantha	coarse dodder-laurel								8	
Cassytha pubescens	downy dodder-laurel	1	2		4					
LEGUMINOSAE										
Acacia acanthoclada-**U-**	harrow wattle	1	2						8	
Acacia ancistrophylla var. *lissophylla*	hook-leaf wattle	1			4					
Acacia beckleri	Beckler's rock wattle				4					
Acacia brachybotrya	grey mulga-bush							7		
Acacia calamifolia	wallowa	1			4			7		
Acacia cochlearis (nc)		1	2							
Acacia colletioides	veined wait-a-while	1								
Acacia cupularis	cup wattle	1								
Acacia farinosa	mealy wattle			3						
Acacia hakeoides	hakea wattle	1								
Acacia halliana (nc)	Hall's wattle	1	2					7		
Acacia halliana/microcarpa		1								
Acacia leiophylla	coast golden wattle		2							
Acacia ligulata (nc)	umbrella bush									9
Acacia ligulata	umbrella bush	1	2		4		6	7		
Acacia lineata **-R-**	streaked wattle	1						7		
Acacia longifolia var. *sophorae*	coastal wattle	1		3						9
Acacia microcarpa	manna wattle	1								
Acacia montana **-R-**	mallee wattle	1								
Acacia myrtifolia (nc)	Myrtle wattle	1								
Acacia nyssophylla	spine bush	1	2		4					
Acacia oswaldii	umbrella wattle	1	2							
Acacia pycnantha	golden wattle	1								
Acacia rigens	nealie	1	2		4			7		
Acacia rupicola	rock wattle	1								
Acacia sclerophylla	hard-leaf wattle	1	2		4					
Acacia spinescens	spiny wattle	1	2					7	8	
Acacia wilhelmiana	dwarf nealie	1			4					
Aotus subspinescens	mallee aotus	1	2							
Cassia sturtii (nc)	grey cassia				4					
Daviesia arenaria **-U-**	sand bitter-pea	1								
Daviesia benthamii ssp. *humilis* **-R-**	mallee bitter-pea	1								
Daviesia brevifolia	leafless bitter-pea	1	2						8	
Dillwynia hispida	red parrot-pea	1	2						8	
Dillwynia sericea	showy parrot-pea	1	2							
Dillwynia uncinata	silky parrot-pea	1								
Eutaxia diffusa **-U-**	large-leaf eutaxia	1								
Eutaxia microphylla var. *microphylla*	common eutaxia	1			4			7		
Eutaxia sp.	eutaxia	1	2						8	
Glycyrrhiza acanthocarpa **-Q-**	native liquorice		2							
Gompholobium ecostatum	dwarf wedge-pea	1								
Kennedia prostrata	scarlet runner	1	2							9
Lotus australis	austral trefoil			3						9
**Medicago minima* var. *minima*	little medic	1	2				6	7		
**Medicago polymorpha* var. *polymorpha*	burr-medic		2			5	6	7		9
**Medicago* sp.	medic	1					6			
**Medicago truncatula*	barrel medic		2							

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**Melilotus indica*	King Island melilot									9
Phyllota pleurandroides	heathy phyllota	1	2						8	
Phyllota remota **-U-**	slender phyllota	1	2						8	
Pultenaea acerosa	bristly bush-pea	1								
Pultenaea canaliculata var. **-U-**	soft bush-pea	1								
Pultenaea densifolia **-U-**	dense bush-pea	1								
Pultenaea prostrata **-NR**	silky bush-pea	1	2						8	
Pultenaea tenuifolia	narrow-leaf bush-pea	1	2							
Senna artemisioides ssp.	desert senna	1								
Senna artemisioides ssp. *filifolia*	fine-leaf desert senna	1			4					
Senna artemisioides ssp. *petiolaris*	flat-stalk senna		2		4					
Templetonia egena	broombush templetonia	1								
Templetonia sulcata **-U-**	flat mallee-pea	1			4					
**Trifolium arvense* var. *arvense*	hare's-foot clover		2							
**Trifolium* sp.	clover					5	6			
**Trifolium subterraneum*	subterranean clover	1						7		
**Trifolium tomentosum*	woolly clover		2							
LILIACEAE										
Arthropodium fimbriatum	nodding vanilla-lily	1					6			
Arthropodium minus	small vanilla-lily						6			
Arthropodium strictum	common vanilla-lily	1								
**Asphodelus fistulosus*	onion weed	1		3		5	6	7		
Bulbine bulbosa	bulbine-lily	1								
Chamaescilla corymbosa var. *corymbosa*	blue squill	1								
Corynotheca licrota **-R-**	sand lily	1								
Dianella brevicaulis	short-stem flax-lily									9
Dianella brevicaulis/revoluta var.	black-anther flax-lily	1	2						8	
Dianella longifolia var.	pale flax-lily		2							
Dianella revoluta (nc)								7		
Dianella revoluta var. *revoluta*	black-anther flax-lily			3	4			7		
Laxmannia orientalis	dwarf wire-lily	1								
Liliaceae sp.	lily family								8	
Lomandra collina	sand mat-rush	1	2				6		8	
Lomandra densiflora	soft tussock mat-rush	1								
Lomandra effusa	scented mat-rush	1	2		4		6	7		
Lomandra juncea	desert mat-rush	1	2					7	8	
Lomandra leucocephala ssp. *robusta*	woolly mat-rush	1	2		4			7	8	
Lomandra micrantha ssp.	small-flower mat-rush							7		
Lomandra micrantha ssp. *micrantha*	small-flower mat-rush	1					6			
Lomandra multiflora ssp. *dura*	hard mat-rush						6			
**Myrsiphyllum asparagoides*	bridal creeper	1					6			
Thysanotus baueri	mallee fringe-lily	1	2		4			7		
Thysanotus fractiflexus **-U-**	zig-zag fringe-lily	1								
Thysanotus juncifolius	rush fringe-lily		2							
Thysanotus patersonii	twining fringe-lily	1	2						8	
Tricoryne elatior (nc)	yellow rush-lily	1	2					7		
Wurmbea dioica ssp. *dioica* (nc)	early star-lily	1	2				6			
Xanthorrhoea caespitosa	sand-heath yacca	1							8	
Xanthorrhoea semiplana ssp. *semiplana*	yacca		2							
Linum marginale	native flax	1					6			

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LOGANIACEAE										
Logania linifolia	flax-leaf logania	1							8	
Logania nuda	leafless logania	1								
Mitrasacme paradoxa (nc)	wiry mitrewort	1								
LORANTHACEAE										
Amyema melaleucae	tea-tree mistletoe	1								
Amyema miquelii	box mistletoe	1	2							
Amyema miraculosum ssp. *boormanii*	fleshy mistletoe	1								
Amyema preissii	wire-leaf mistletoe	1	2		4					
Lysiana exocarpi ssp. *exocarpi*	harlequin mistletoe	1								
MALVACEAE										
Abutilon fraseri (nc)	dwarf lantern-bush		2							
Lavatera plebeia	Australian hollyhock			3						
Lawrencia squamata	thorny lawrencia	1	2		4					
Sida intricata	twiggy sida		2							
MARSILEACEAE										
Marsilea drummondii	common nardoo					5				
MYOPORACEAE										
Eremophila alternifolia	narrow-leaf emubush	1								
Eremophila crassifolia	thick-leaf emubush	1			4					
Eremophila deserti	turkey-bush	1								
Eremophila glabra (nc)	tar bush	1			4			7		
Eremophila longifolia	weeping emubush	1								
Eremophila scoparia	broom emubush	1								
Myoporum insulare	common boobialla			3						9
Myoporum montanum	native myrtle	1								
Myoporum platycarpum (nc)	false sandalwood	1	2		4			7		
MYRTACEAE										
Baeckea behrii	silver broom-bush	1	2		4				8	
Baeckea crassifolia	desert baeckea	1	2						8	
Baeckea ericaea	mat baeckea	1							8	
Callistemon rugulosus var. *rugulosus*	scarlet bottlebrush	1								
Calytrix alpestris **-NR**	snow heath-myrtle	1	2						8	
Calytrix tetragona	common fringe-myrtle	1	2		4				8	
Eucalyptus arenacea	dune stringybark	1	2						8	
Eucalyptus baxteri	brown stringybark	1	2							
Eucalyptus brachycalyx	gilja	1			4					
Eucalyptus calycogona (nc)	square-fruit mallee	1	2							
Eucalyptus camaldulensis var. *camaldulensis*	river red gum	1	2							
Eucalyptus cyanophylla	blue-leaf mallee	1	2					7		
Eucalyptus diversifolia	coastal white mallee	1		3						
Eucalyptus dumosa	white mallee	1	2		4			7		
Eucalyptus fasciculosa	pink gum	1								
Eucalyptus foecunda (nc)	narrow-leaved mallee	1	2		4			7		
Eucalyptus gracilis	yorrell	1	2		4			7		
Eucalyptus incrassata	ridge-fruited mallee	1	2		4				8	
Eucalyptus leptophylla	narrow-leaf red mallee	1						7	8	
Eucalyptus leucoxylon (nc)	South Australian blue gum		2							

Species	Common Name	1	2	3	4	5	6	7	8	9
Eucalyptus leucoxylon ssp.	South Australian blue gum	1								
Eucalyptus leucoxylon ssp. *stephaniae* **-NR**	scrubby blue gum								8	
Eucalyptus oleosa	red mallee	1	2		4			7		
Eucalyptus oleosa x *socialis*								7		
Eucalyptus porosa	mallee box	1						7		
Eucalyptus rugosa	coastal white mallee	1								
Eucalyptus socialis	beaked red mallee	1	2		4			7		
Eucalyptus viminalis ssp. *cygnetensis*	rough-bark manna gum	1								
Eucalyptus yalatensis	Yalata mallee	1						7		
Kunzea pomifera	muntries	1	2						8	9
Leptospermum coriaceum	dune tea-tree	1	2		4				8	
Leptospermum myrsinoides	heath tea-tree	1	2						8	
Melaleuca acuminata	mallee honey-myrtle	1	2		4			7		
Melaleuca brevifolia	short-leaf honey-myrtle	1	2						8	
Melaleuca halmaturorum ssp. *halmaturorum*	swamp paper-bark	1								
Melaleuca lanceolata ssp. *lanceolata*	dryland tea-tree	1	2	3	4			7	8	
Melaleuca uncinata	broombush	1	2						8	
Melaleuca wilsonii **-R-**	Wilson's honey-myrtle	1	2							
Micromyrtus ciliata **-RR**	fringed heath-myrtle	1	2							
ONAGRACEAE										
Epilobium billardierianum ssp. x *intermedium*	variable willow-herb	1								
**Ludwigia peploides* ssp. *montevidensis*	water primrose					5				
**Oenothera stricta* ssp. *stricta*	common evening primrose	1		3			6			
OPHIOGLOSSACEAE										
Ophioglossum lusitanicum	austral adder's-tongue	1					6			
ORCHIDACEAE										
Acianthus pusillus	mosquito orchid	1								
Caladenia filamentosa var. *tentaculata*	wispy spider-orchid	1								
Caladenia latifolia	pink caladenia	1								
Caladenia sp.	spider-orchid	1								
Corybas despectans	coast helmet-orchid									9
Corybas incurvus (nc)	slaty helmet-orchid	1								
Cyrtostylis robusta	robust gnat-orchid	1								
Cyrtostylis sp.	gnat-orchid	1								
Eriochilus cucullatus	parson's bands	1								
Genoplesium nigricans/rufum	midge-orchid	1								
Microtis/Prasophyllum sp.	onion orchid/leek-orchid	1								
Orchidaceae sp.	orchid family	1								
Orthoceras strictum **-U-**	horned orchid		2							
Prasophyllum elatum	tall leek-orchid	1								
Prasophyllum occidentale	plains leek-orchid						6			
Prasophyllum odoratum	scented leek-orchid	1								
Prasophyllum sp.	leek-orchid	1								
Pterostylis cycnocephala/mutica	greenhood	1								
Pterostylis dolichochila	mallee shell-orchid	1								
Pterostylis longifolia	tall greenhood	1								
Pterostylis mutica	midget greenhood						6			
Pterostylis nana	dwarf greenhood	1							8	
Pterostylis plumosa	bearded greenhood	1								
Pterostylis robusta	large shell-orchid	1								

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Pterostylis sanguinea	blood greenhood	1								
Pterostylis sp.	greenhood								8	
Pterostylis vittata (nc)	banded greenhood	1								
Pyrorchis nigricans	black fire-orchid	1								
Thelymitra aristata	great sun-orchid	1							8	
Thelymitra benthamiana **-U-**	leopard sun-orchid	1								
Thelymitra nuda	scented sun-orchid	1								
Thelymitra sp.	sun-orchid	1								
OXALIDACEAE										
Oxalis perennans	native sorrel	1	2							
**Oxalis pes-caprae*	soursob	1	2				6			
Oxalis sp.	sorrel	1								9
PITTOSPORACEAE										
Billardiera cymosa	sweet apple-berry	1						7		
Bursaria spinosa	sweet bursaria	1	2		4			7	8	9
Cheiranthera alternifolia	hand-flower	1	2				6		8	
Pittosporum phylliraeoides var. *microcarpa*	native apricot	1								
PLANTAGINACEAE										
**Plantago bellardii*	hairy plantain	1			4					
**Plantago coronopus* ssp.	bucks-horn plantain	1					6	7		
Plantago cunninghamii	clay plantain					5				
Plantago drummondii	dark plantain		2							
Plantago sp.	plantain		2							
Plantago turrifera	crowned plantain	1	2							
POLYGALACEAE										
Comesperma calymega	blue-spike milkwort	1								
Comesperma polygaloides **-U-**	mauve milkwort	1	2							
Comesperma scoparium	broom milkwort	1								
Comesperma volubile	love creeper	1								
Muehlenbeckia adpressa	climbing lignum	1								
Muehlenbeckia diclina ssp. *diclina*	twiggy lignum	1								
Muehlenbeckia florulenta	lignum	1								
Muehlenbeckia gunnii	coastal climbing lignum	1	2			5				
Persicaria decipiens	slender knotweed	1		3						9
Persicaria lapathifolia **-U-**	pale knotweed					5				
Persicaria prostrata **-U-**	creeping knotweed					5				
Rumex bidens	mud dock	1	2							
Rumex brownii (nc)	slender dock		2							
**Rumex crispus*	curled dock		2							
Rumex sp.	dock					5				
PORTULACACEAE										
Calandrinia brevipedata **-U-**	short-stalked purslane					5				
Calandrinia calyptrata	pink purslane									9
Calandrinia calyptrata/eremaea	purslane	1					6			
Calandrinia eremaea	dryland purslane	1								
Calandrinia granulifera	pigmy purslane	1	2							9
Calandrinia sp.	purslane/parakeelya	1	2							

Species	Common Name	1	2	3	4	5	6	7	8	9
PRIMULACEAE										
**Anagallis arvensis*	pimpernel	1						7		
Samolus repens	creeping brookweed	1		3			6			9
PROTEACEAE										
Adenanthos forrestii (nc)		1		3		5				
Adenanthos terminalis	yellow gland-flower	1								
Banksia marginata	silver banksia	1	2						8	
Banksia ornata	desert banksia	1							8	
Conospermum patens	slender smoke-bush	1	2						8	
Grevillea huegelii	comb grevillea	1	2							
Grevillea ilicifolia var.	holly-leaf grevillea	1			4					
Grevillea ilicifolia var. *ilicifolia*	holly-leaf grevillea	1	2						8	
Grevillea ilicifolia var. *lobata*	lobed holly-leaf grevillea	1								
Grevillea lavandulacea var.	spider-flower	1							8	
Grevillea lavandulacea var. *lavandulacea*	spider-flower		2							
Grevillea lavandulacea var. *sericea* **-U-**	spider-flower	1								
Grevillea pterosperma	dune grevillea	1							8	
Hakea carinata	erect hakea	1	2							
Hakea leucoptera ssp. *leucoptera*	silver needlewood	1								
Hakea muelleriana	heath needlebush	1								
Hakea repullulans **-U-**	furze hakea	1	2						8	
Hakea rostrata	beaked hakea	1							8	
Hakea rugosa	dwarf hakea	1								
Hakea vittata	limestone needlebush	1								
Isopogon ceratophyllus	horny cone-bush	1								
Persoonia juniperina	prickly geebung	1	2						8	
RANUNCULACEAE										
Clematis microphylla	old man's beard	1	2						8	
Ranunculus amphitrichus **-U-**	small river buttercup	1		3				7		9
RESTIONACEAE										
Hypolaena fastigiata	tassel rope-rush					5				
Lepidobolus drapetocoleus	scale shedder	1	2						8	
Leptocarpus brownii	coarse twine-rush	1	2						8	
RHAMNACEAE										
Cryptandra amara (nc)		1								
Cryptandra amara var. *amara*	spiny cryptandra				4			7		
Cryptandra leucophracta	white cryptandra	1			4					
Cryptandra tomentosa (nc)		1	2		4			7	8	
Cryptandra tomentosa	heath cryptandra	1	2						8	
Cryptandra tomentosa complex	cryptandra	1								
Pomaderris obcordata	wedge-leaf pomaderris	1								
Pomaderris paniculosa ssp.		1								
**Rhamnus alaternus*	blow-fly bush	1								
Spyridium eriocephalum (nc)	heath spyridium		2					7		
Spyridium eriocephalum var. *eriocephalum*	heath spyridium	1								
Spyridium phylicoides	narrow-leaf spyridium	1								
Spyridium subochreatum (nc)			2							
Spyridium subochreatum var.	velvet spyridium	1							8	

Species	Common Name	1	2	3	4	5	6	7	8	9
ROSACEAE										
Acaena echinata var.	sheep's burr	1								
Acaena novae-zelandiae	biddy-biddy	1								
Aphanes australiana	Australian piert	1								9
RUBIACEAE										
Galium gaudichaudii	rough bedstraw	1	2							
**Galium murale*	small bedstraw	1					6			9
Galium sp.	bedstraw	1								
Opercularia scabrida	stalked stinkweed	1								
Opercularia turpis	twiggy stinkweed	1	2							
RUTACEAE										
Boronia coerulescens ssp. *coerulescens*	blue boronia	1	2		4			7	8	
Boronia filifolia	slender boronia	1								
Boronia inornata ssp. *leptophylla*	dry-land boronia	1								
Correa glabra **-U-**	rock correa	1								
Correa reflexa	common correa								8	
Correa reflexa var. *reflexa*	common correa	1	2							
Correa schlechtendalii	mallee correa							7		
Eriostemon pungens	prickly wax-flower	1	2						8	
Geijera linearifolia	sheep bush	1			4					
Microcybe multiflora var. *multiflora*	small-leaf microcybe				4					
Microcybe pauciflora	yellow microcybe	1						7		
Phebalium brachyphyllum **3RC-R-**	limestone phebalium	1								
Phebalium bullatum	silvery phebalium	1	2		4					
Phebalium lowanense **3VC-T-**	lowan phebalium	1	2							
Zieria veronicea **-R-**	pink zieria	1								
SANTALACEAE										
Choretrum glomeratum var. *glomeratum*	white sour-bush	1								
Exocarpos aphyllus	leafless cherry	1			4					
Exocarpos cupressiformis	native cherry	1								
Exocarpos sparteus	slender cherry	1							8	
Exocarpos syrticola	coast cherry									9
Leptomeria aphylla **-U-**	leafless currant-bush	1								
Santalum acuminatum	quandong	1	2		4			7		
Santalum murrayanum **-U-**	bitter quandong	1								
SAPINDACEAE										
Alectryon oleifolius ssp. *canescens*	bullock bush	1	2							
Dodonaea bursariifolia	small hop-bush	1	2		4					
Dodonaea hexandra	horned hop-bush	1								
Dodonaea humilis	dwarf hop-bush	1								
Dodonaea stenozyga	desert hop-bush	1	2		4					
Dodonaea viscosa ssp.	sticky hop-bush	1								
Dodonaea viscosa ssp. *angustissima*	narrow-leaf hop-bush	1	2		4					
Dodonaea viscosa ssp. *spatulata*	sticky hop-bush	1								
SCROPHULARIACEAE										
Euphrasia collina ssp.	eyebright		2						8	
Euphrasia collina ssp. *tetragona*	coast eyebright	1							8	
**Parentucellia latifolia*	red bartsia	1					6			

Species	Common Name	1	2	3	4	5	6	7	8	9
Veronica hillebrandii	rigid speedwell	1								
**Zaluzianskya divaricata*	spreading night-phlox						6			
SOLANACEAE										
Cyphanthera myosotidea	small-leaf ray-flower	1								
Grammosolen dixonii **-U-**	Dixon's ray-flower	1								
Lycium australe	Australian boxthorn	1	2							
**Lycium ferocissimum*	African boxthorn	1		3		5		7		9
Lycium sp.	boxthorn	1								
Nicotiana goodspeedii	small-flower tobacco	1								
**Solanum nigrum*	black nightshade	1								
Solanum simile	Kangaroo apple	1								
STACKHOUSIACEAE										
Stackhousia aspericocca ssp. "One-sided inflorescence" W.R.Barker 697	one-sided candles	1								
Stackhousia monogyna	creamy candles	1	2							
Stackhousia spathulata	coast candles									9
STERCULIACEAE										
Lasiopetalum baueri	slender velvet-bush	1	2							
Lasiopetalum behrii	pink velvet-bush	1	2		4					
Lasiopetalum discolor	coast velvet-bush									9
Thomasia petalocalyx	paper-flower	1								
STYLIDIACEAE										
Levenhookia dubia	hairy stylewort	1								
Levenhookia pusilla	tiny stylewort	1								
Stylidium graminifolium	grass trigger-plant	1								
THYMELAEACEAE										
Pimelea flava ssp. *dichotoma*	diosma riceflower	1					6	7		
Pimelea glauca	smooth riceflower	1							8	
Pimelea linifolia ssp. *linifolia*	slender riceflower		2							
Pimelea micrantha	silky riceflower	1					6			
Pimelea octophylla	woolly riceflower	1	2							
Pimelea phylicoides	heath riceflower	1								
Pimelea serpyllifolia ssp. *serpyllifolia*	thyme riceflower	1	2	3			6	7		9
Pimelea sp.	riceflower	1								
Pimelea stricta	erect riceflower	1								
TYPHACEAE										
Typha domingensis	narrow-leaf bulrush					5				
Typha orientalis	broad-leaf bulrush					5				
UMBELLIFERAE										
Apium prostratum ssp. *prostratum* var. *prostratum*	native celery									9
**Berula erecta*	water parsnip					5				
**Bupleurum semicompositum*	hare's ear	1					6	7		
Daucus glochidiatus	native carrot	1	2				6			9
Hydrocotyle laxiflora	stinking pennywort	1								9
Hydrocotyle sp.	pennywort	1								
Hydrocotyle verticillata **-Q-**	shield pennywort					5				

Species	Common Name	1	2	3	4	5	6	7	8	9
Trachymene cyanopetala	purple trachymene	1								
Trachymene pilosa	dwarf trachymene	1								
Xanthosia dissecta var. *dissecta* (nc)	cut-leaved xanthosia	1								
Xanthosia dissecta var. *floribunda*	cut-leaf xanthosia	1								
Xanthosia pusilla	hairy xanthosia	1								
URTICACEAE										
Parietaria debilis	smooth-nettle	1	2							9
Urtica incisa **-U-**	scrub nettle					5				
**Urtica urens*	small nettle	1				5				
VERBENACEAE										
**Phyla canescens*	lippia		2							
VIOLACEAE										
Hybanthus floribundus ssp. *floribundus*	shrub violet	1	2		4				8	
ZYGOPHYLLACEAE										
Zygophyllum ammophilum (nc)	sand twinleaf	1								
Zygophyllum apiculatum	pointed twinleaf	1	2		4					
Zygophyllum aurantiacum (nc)	shrubby twinleaf	1	2		4					
Zygophyllum aurantiacum/eremaeum	shrubby twin-leaf	1								
Zygophyllum billardierei (nc)	coast twinleaf									9
Zygophyllum crenatum	notched twinleaf		2							
Zygophyllum eremaeum	pale-flower twin-leaf		2							
Zygophyllum glaucum	pale twinleaf	1	2		4			7		
Zygophyllum iodocarpum	violet twinleaf		2							
Zygophyllum ovatum	dwarf twinleaf	1	2		4					
Zygophyllum sp.	twinleaf	1	2							

Appendix VII

Plant species and frequency of occurrence on Murray Mallee biological survey and Victorian Mallee biological survey for sites used in PATN analysis. Species removed from the analysis are indicated by: '+' indicates one record from Murray Mallee survey; '#': indicates one record from Victorian Mallee survey; '●': indicates plant only identified to genus or family.

	Species	Common name	Frequency of Occurrence		
			SA	VIC	Total
	Abutilon fraseri (NC)	dwarf lantern-bush	0	2	2
+	*Abutilon otocarpum*	desert lantern-bush	0	1	1
	Acacia acanthoclada	harrow wattle	1	18	19
+	*Acacia acinacea*	wreath wattle	0	1	1
	Acacia brachybotrya	grey mulga-bush	18	53	71
	Acacia calamifolia	wallowa	30	43	73
	Acacia cochlearis (NC)		8	0	8
	Acacia colletioides	veined wait-a-while	2	2	4
#	*Acacia farinosa*	mealy wattle	1	0	1
+	*Acacia glandulicarpa*	hairy-pod wattle	0	1	1
	Acacia hakeoides	hakea wattle	8	31	39
	Acacia halliana (NC)	Hall's wattle	2	0	2
	Acacia halliana / microcarpa		0	19	19
	Acacia ligulata	umbrella bush	28	74	102
	Acacia lineata	streaked wattle	3	1	4
+	*Acacia lineolata* (NC)	dwarf myall	0	1	1
	Acacia longifolia var. *sophorae*	coastal wattle	20	1	21
+	*Acacia melvillei* (NC)		0	1	1
	Acacia microcarpa	manna wattle	18	0	18
#	*Acacia montana*	mallee wattle	1	0	1
	Acacia myrtifolia (NC)	Myrtle wattle	18	2	20
	Acacia notabilis	notable wattle	0	3	3
	Acacia nyssophylla	spine bush	13	26	39
	Acacia oswaldii	umbrella wattle	3	29	32
	Acacia pycnantha	golden wattle	47	3	50
	Acacia rigens	nealie	26	75	101
#	*Acacia rupicola*	rock wattle	1	0	1
+	*Acacia salicina*	willow wattle	0	1	1
	Acacia sclerophylla	hard-leaf wattle	14	45	59
●	*Acacia* sp.	wattle	0	9	9
	Acacia spinescens	spiny wattle	137	76	213
	Acacia stenophylla	river cooba	0	18	18
	Acacia trineura	three-nerve wattle	0	3	3
	Acacia wilhelmiana	dwarf nealie	13	71	84
#	*Acaena echinata* var.	sheep's burr	1	0	1
	Acaena novae-zelandiae	biddy-biddy	2	0	2
# ●	**Achillea* sp.	yarrow	1	0	1
	Acianthus pusillus	mosquito orchid	16	0	16
	Acrotriche affinis	ridged ground-berry	60	40	100
	Acrotriche cordata	blunt-leaf ground-berry	37	0	37
	Acrotriche depressa	native currant	2	0	2
	Acrotriche serrulata	cushion ground-berry	9	0	9
	Actinobole uliginosum	flannel cudweed	17	390	407
	Adenanthos forrestii (NC)		12	0	12
	Adenanthos terminalis	yellow gland-flower	56	25	81
	Adriana hookeri	mallee bitter-bush	0	11	11
	Adriana klotzschii	coast bitter-bush	2	0	2
	Agrostis avenacea var.	common blown-grass	0	37	37
	Ajuga australis form A	Australian bugle	0	42	42

	Species	Common name	Frequency of Occurrence		
			SA	VIC	Total
	Alectryon oleifolius ssp. *canescens*	bullock bush	11	62	73
	Allocasuarina luehmannii	bull oak	1	36	37
	Allocasuarina mackliniana ssp.	Macklin's oak-bush	0	11	11
	Allocasuarina muelleriana ssp. *muelleriana*	common oak-bush	158	57	215
	Allocasuarina pusilla	dwarf oak-bush	58	104	162
	Allocasuarina verticillata	drooping sheoak	11	0	11
	**Alopecurus geniculatus*	marsh fox-tail	0	3	3
	Alternanthera denticulata	lesser joyweed	0	15	15
	**Alyssum linifolium*	flax-leaf alyssum	0	37	37
#	*Alyxia buxifolia*	sea box	1	0	1
	Amphibromus nervosus	veined swamp wallaby-grass	0	3	3
	Amphipogon caricinus var. *caricinus*	long grey-beard grass	10	77	87
	Amphipogon strictus var. *setifer*	spreading grey-beard grass	13	6	19
	**Amsinckia lycopsoides*	bugloss fiddleneck	0	4	4
	Amyema linophyllum ssp. *orientale*	casuarina mistletoe	0	3	3
	Amyema melaleucae	tea-tree mistletoe	4	0	4
	Amyema miquelii	box mistletoe	4	14	18
	Amyema miraculosum ssp. *boormanii*	fleshy mistletoe	1	3	4
+	*Amyema pendulum* ssp. *pendulum*	drooping mistletoe	0	1	1
	Amyema preissii	wire-leaf mistletoe	2	8	10
●	*Amyema* sp.	mistletoe	0	3	3
	**Anagallis arvensis*	pimpernel	4	3	7
+	*Angianthus brachypappus*	spreading angianthus	0	1	1
	Angianthus disarticulata (NC)		25	0	25
	Angianthus milenei (NC)		3	5	8
+ ●	*Angianthus* sp.		0	1	1
	Angianthus tomentosus	hairy angianthus	1	65	66
	Aotus subspinescens	mallee aotus	50	155	205
	Aphanes australiana	Australian piert	0	2	2
	Arabidella trisecta	shrubby cress	0	2	2
	**Arctotheca calendula*	Cape weed	14	24	38
#	**Arenaria serpyllifolia* (NC)	thyme-leaved sandwort	1	0	1
	Argentipallium blandowskianum	woolly everlasting	6	5	11
	Argentipallium obtusifolium	blunt everlasting	9	22	31
	Aristida contorta	curly wire-grass	0	5	5
+	*Arthropodium aff. minus* (NC)		0	1	1
	Arthropodium fimbriatum	nodding vanilla-lily	56	3	59
	Arthropodium minus	small vanilla-lily	0	5	5
	Arthropodium strictum	common vanilla-lily	10	0	10
	**Asclepias rotundifolia*	broad-leaf cotton-bush	9	0	9
+	**Asparagus officinalis*	asparagus	0	1	1
	Asperula conferta	common woodruff	0	10	10
	Asperula gemella	twin-leaf bedstraw	0	4	4
+	*Asperula scoparia* (NC)		0	1	1
	**Asphodelus fistulosus*	onion weed	12	11	23
	**Aster subulatus*	aster-weed	0	4	4
	Asteridea athrixioides forma *athrixioides*	wirewort	6	13	19
	Astroloma conostephioides	flame heath	138	98	236
	Astroloma humifusum	cranberry heath	142	48	190
	Atriplex acutibractea ssp.	pointed saltbush	8	3	11
	Atriplex eardleyae	Eardley's saltbush	1	11	12
	Atriplex leptocarpa	slender-fruit saltbush	0	54	54
	Atriplex limbata	spreading saltbush	0	2	2
	Atriplex lindleyi (NC)	baldoo	0	53	53
	Atriplex lindleyi ssp. *inflata*	corky saltbush	0	2	2
	Atriplex nummularia ssp. *nummularia*	old-man saltbush	0	15	15
#	*Atriplex paludosa* ssp. *cordata*	marsh saltbush	1	0	1

	Species	Common name	Frequency of Occurrence		
			SA	VIC	Total
	Atriplex papillata	coral saltbush	0	7	7
+	*Atriplex pseudocampanulata*	spreading saltbush	0	1	1
	Atriplex pumilio	mat saltbush	0	56	56
	Atriplex semibaccata	berry saltbush	1	2	3
●	*Atriplex* sp.	saltbush	1	12	13
	Atriplex spongiosa	pop saltbush	0	11	11
	Atriplex stipitata	bitter saltbush	23	4	27
	Atriplex suberecta	lagoon saltbush	0	5	5
	Atriplex vesicaria ssp.	bladder saltbush	9	86	95
	**Avellinia michelii*	avellinia	0	12	12
	**Avena barbata*	bearded oat	0	3	3
+	**Avena fatua*	wild oat	0	1	1
●	**Avena* sp.	oat	13	7	20
●	*Azolla* sp.	azolla	0	2	2
	Baeckea behrii	silver broom-bush	191	189	380
	Baeckea crassifolia	desert baeckea	106	182	288
	Baeckea ericaea	mat baeckea	22	8	30
	Banksia marginata	silver banksia	66	3	69
	Banksia ornata	desert banksia	105	69	174
	Baumea juncea	bare twig-rush	7	0	7
	Beaufortia micrantha (NC)		0	2	2
	Bertya mitchellii	Mitchell's bertya	20	89	109
	Beyeria lechenaultii	pale turpentine bush	21	28	49
	Beyeria opaca	dark turpentine bush	27	130	157
	Billardiera cymosa	sweet apple-berry	128	117	245
	Blennospora drummondii	dwarf button-flower	62	54	116
	Boronia coerulescens ssp. *coerulescens*	blue boronia	81	90	171
#	*Boronia filifolia*	slender boronia	1	0	1
	Boronia inornata ssp. *leptophylla*	dry-land boronia	7	0	7
	Brachycome basaltica var. *gracilis*	swamp daisy	0	7	7
	Brachycome ciliaris var. *ciliaris*	variable daisy	14	183	197
	Brachycome ciliaris var. *lanuginosa*	woolly variable daisy	1	1	2
+	*Brachycome dentata*	lobe-seed daisy	0	1	1
	Brachycome exilis	slender daisy	0	16	16
	Brachycome goniocarpa	dwarf daisy	1	16	17
	Brachycome lineariloba	hard-head daisy	10	602	612
	Brachycome perpusilla	tiny daisy	0	91	91
●	*Brachycome* sp.	native daisy	19	5	24
	Brachyloma daphnoides (NC)		6	25	31
	Brachyloma ericoides ssp. *ericoides*	brush heath	117	106	223
+	**Brachypodium distachyon*	false brome	0	1	1
	Bracteantha bracteata	golden everlasting	0	12	12
+ ●	**Brassica* sp.		0	1	1
	**Brassica tournefortii*	wild turnip	144	365	509
	Bromus arenarius	sand brome	0	11	11
	**Bromus diandrus*	great brome	3	9	12
	**Bromus madritensis*	compact brome	0	2	2
	**Bromus rubens*	red brome	11	309	320
●	*Bromus* sp.	brome	16	0	16
	Bromus sterilis (NC)		0	4	4
	**Buglossoides arvensis*	sheepweed	0	2	2
#	*Bulbine bulbosa*	bulbine-lily	1	0	1
	Bulbine semibarbata	small leek-lily	0	139	139
	**Bupleurum semicompositum*	hare's ear	13	0	13
	Bursaria spinosa	sweet bursaria	26	24	50
#	**Cakile maritima* ssp. *maritima*	two-horned sea rocket	1	0	1
	Caladenia dilatata complex	green-comb spider-orchid	0	28	28

	Species	Common name	Frequency of Occurrence		
			SA	VIC	Total
	Caladenia filamentosa complex	daddy-long-legs spider-orchid	0	5	5
	Caladenia filamentosa var. *tentaculata*	wispy spider-orchid	4	0	4
	Caladenia latifolia	pink caladenia	9	0	9
●	*Caladenia* sp.	spider-orchid	55	0	55
	Calandrinia calyptrata	pink purslane	4	0	4
	Calandrinia calyptrata / eremaea	purslane	5	0	5
	Calandrinia corrigioloides	strap purslane	0	24	24
	Calandrinia eremaea	dryland purslane	18	571	589
	Calandrinia granulifera	pigmy purslane	2	229	231
●	*Calandrinia* sp.	purslane / parakeelya	21	9	30
	Calandrinia volubilis	twining purslane	0	20	20
	Callistemon brachyandrus	prickly bottlebrush	0	5	5
	Callistemon rugulosus var. *rugulosus*	scarlet bottlebrush	4	0	4
+	*Callitriche sonderi*	matted water starwort	0	1	1
	Callitris canescens	scrubby cypress pine	19	0	19
	Callitris glaucophylla	white cypress-pine	0	2	2
	Callitris preissii	southern cypress pine	18	70	88
+	*Callitris rhomboidea*	Oyster Bay pine	0	1	1
	Callitris verrucosa	scrub cypress pine	133	294	427
	Calocephalus citreus	lemon beauty-heads	0	2	2
	Calocephalus sonderi	pale beauty-heads	0	21	21
	Calostemma purpureum	pink garland-lily	0	5	5
	Calotis aff. hispidula (NC)		0	42	42
	Calotis cuneifolia	purple burr-daisy	0	2	2
	Calotis erinacea	tangled burr-daisy	5	122	127
	Calotis hispidula	hairy burr-daisy	1	433	434
	Calotis scabiosifolia var. *scabiosifolia*	rough burr-daisy	0	2	2
	Calotis scapigera	tufted burr-daisy	0	3	3
# ●	*Calotis* sp.	burr-daisy	1	0	1
	Calytrix alpestris	snow heath-myrtle	17	42	59
	Calytrix tetragona	common fringe-myrtle	159	229	388
+	**Capsella bursapastoris*	shepherd's purse	0	1	1
+	**Carduus nutans*	nodding thistle	0	1	1
	**Carduus tenuiflorus*	slender thistle	8	13	21
	Carex bichenoviana	notched sedge	0	2	2
	Carex breviculmis	short-stem sedge	0	4	4
	Carex inversa var. *inversa*	knob sedge	0	5	5
	Carpobrotus modestus	inland pigface	0	27	27
	Carpobrotus modestus / rossii	native pigface	65	0	65
#	*Carpobrotus rossii*	native pigface	1	0	1
	**Carrichtera annua*	Ward's weed	21	13	34
	**Carthamus lanatus*	saffron thistle	5	30	35
	Cassinia uncata	sticky cassinia	6	1	7
	Cassytha glabella forma *dispar*	slender dodder-laurel	99	73	172
	Cassytha melantha	coarse dodder-laurel	51	37	88
	Cassytha pubescens	downy dodder-laurel	42	17	59
	Casuarina pauper	black oak	3	36	39
	**Centaurea melitensis*	Malta thistle	5	67	72
	**Centaurium spicatum*	spike centaury	1	1	2
	**Centaurium tenuiflorum*	branched centaury	0	3	3
	Centipeda cunninghamii	common sneezeweed	0	10	10
+	*Centipeda minima*	spreading sneezeweed	0	1	1
	Centipeda thespidioides	desert sneezeweed	0	4	4
	Centrolepis cephaloformis ssp. *cephaloformis*	cushion centrolepis	0	48	48
	Centrolepis polygyna	wiry centrolepis	0	9	9
# ●	*Centrolepis* sp.	centrolepis	1	0	1

	Species	Common name	Frequency of Occurrence		
			SA	VIC	Total
#	*Centrolepis strigosa*	hairy centrolepis	1	0	1
	**Cerastium glomeratum*	common mouse-ear chickweed	1	1	2
	Ceratogyne obionoides	wingwort	0	19	19
	Chamaescilla corymbosa var. *corymbosa*	blue squill	2	0	2
	Cheilanthes austrotenuifolia	annual rock-fern	2	1	3
	Cheiranthera alternifolia	hand-flower	7	0	7
+ ●	Chenopodiaceae sp.	goosefoot family	0	1	1
	**Chenopodium album*	fat hen	0	2	2
	Chenopodium cristatum	crested goosefoot	0	15	15
	Chenopodium curvispicatum	cottony goosefoot	22	72	94
	Chenopodium desertorum ssp.	desert goosefoot	16	261	277
	Chenopodium desertorum ssp. *desertorum*	frosted goosefoot	16	0	16
	Chenopodium desertorum ssp. *microphyllum*	small-leaf goosefoot	37	0	37
	Chenopodium desertorum ssp. *rectum*	erect goosefoot	5	0	5
	**Chenopodium murale*	nettle-leaf goosefoot	0	2	2
	Chenopodium nitrariaceum	nitre goosefoot	0	24	24
	Chenopodium pumilio	clammy goosefoot	0	2	2
# ●	Chenopodium sp.	goosefoot	1	0	1
	Chloris truncata	windmill grass	0	4	4
	**Chondrilla juncea*	skeleton weed	0	45	45
	Choretrum glomeratum var. *glomeratum*	white sour-bush	11	2	13
	Chrysocephalum apiculatum	common everlasting	6	85	91
	Chrysocephalum baxteri	white everlasting	0	5	5
	Chrysocephalum semipapposum	clustered everlasting	4	8	12
	Chthonocephalus pseudevax	ground-heads	0	29	29
	**Cirsium vulgare*	spear thistle	0	12	12
	Clematis microphylla	old man's beard	84	80	164
	Codonocarpus cotinifolius	desert poplar	1	11	12
	Comesperma calymega	blue-spike milkwort	3	43	46
	Comesperma polygaloides	mauve milkwort	6	0	6
	Comesperma scoparium	broom milkwort	2	4	6
	Comesperma volubile	love creeper	12	0	12
●	Compositae sp.	daisy family	3	0	3
	Conospermum patens	slender smoke-bush	7	13	20
	Convolvulus erubescens	Australian bindweed	3	43	46
	Convolvulus remotus	grassy bindweed	3	0	3
	**Conyza bonariensis*	flaxleaf fleabane	0	3	3
	Correa glabra	rock correa	15	0	15
	Correa reflexa var. *reflexa*	common correa	163	71	234
	Corybas incurvus	slaty helmet-orchid	2	0	2
#	*Corynotheca licrota*	sand lily	1	0	1
	Cotula australis	common cotula	0	6	6
	**Cotula bipinnata*	ferny cotula	0	5	5
	**Cotula coronopifolia*	water buttons	0	3	3
	Craspedia chrysantha (NC)	golden billy-buttons	0	13	13
	Craspedia glauca	billy-buttons	10	0	10
+ ●	*Craspedia* sp. (NC)	billy-buttons	0	1	1
	Crassula closiana	stalked crassula	0	11	11
	Crassula colorata var.	dense crassula	69	610	679
+	*Crassula decumbens* var. *decumbens*	spreading crassula	0	1	1
	Crassula exserta	large-fruit crassula	0	6	6
	Crassula peduncularis	purple crassula	0	4	4
	Crassula sieberiana ssp. *tetramera*	Australian stonecrop	30	348	378
●	*Crassula* sp.	crassula / stonecrop	7	8	15
	Cratystylis conocephala	bluebush daisy	4	0	4

	Species	Common name	Frequency of Occurrence		
			SA	VIC	Total
	Cressa cretica	rosinweed	0	9	9
	Crinum flaccidum	Murray Lily	0	4	4
+	**Critesion marinum*	sea barley-grass	0	1	1
	**Critesion murinum* ssp. *glaucum*	blue barley-grass	0	195	195
+	*Cryptandra amara* (NC)		0	1	1
	Cryptandra amara var. *amara*	spiny cryptandra	20	0	20
	Cryptandra leucophracta	white cryptandra	82	154	236
	Cryptandra propinqua	silky cryptandra	0	20	20
	Cryptandra tomentosa (NC)		16	138	154
	Cryptandra tomentosa complex	cryptandra	99	0	99
	Cullen pallidum	white scurf-pea	0	3	3
	Cuscuta tasmanica	Tasmanian dodder	0	2	2
+	*Cymbonotus preissianus*	austral bear's-ear	0	1	1
	**Cynodon dactylon*	couch	0	16	16
	Cynoglossum australe	Australian hound's-tongue	10	26	36
	Cynoglossum suaveolens	sweet hound's-tongue	0	15	15
+	*Cyperus concinnus* (NC)		0	1	1
+	*Cyperus difformis*	variable flat-sedge	0	1	1
+	*Cyperus gunnii* ssp. *gunnii*	flecked flat-sedge	0	1	1
	Cyperus gymnocaulos	spiny flat-sedge	0	10	10
+	*Cyperus lhotskyanus*		0	1	1
+	**Cyperus rotundus* ssp. *rotundus*	nut-grass	0	1	1
+ ●	*Cyperus* sp.	flat-sedge	0	1	1
+	*Cyperus victoriensis*	yelka	0	1	1
	Cyphanthera myosotidea	small-leaf ray-flower	7	28	35
	Cyrtostylis robusta	robust gnat-orchid	29	0	29
●	*Cyrtostylis* sp.	gnat-orchid	3	0	3
	Damasonium minus	star-fruit	0	4	4
	Dampiera lanceolata var. *lanceolata*	grooved dampiera	5	18	23
	Dampiera marifolia	velvet dampiera	35	89	124
	Dampiera rosmarinifolia	rosemary dampiera	55	24	79
	Danthonia aff. setacea (NC)		0	31	31
	Danthonia caespitosa	common wallaby-grass	0	293	293
	Danthonia carphoides var. *carphoides*	short wallaby-grass	0	2	2
	Danthonia duttoniana	brown-back wallaby-grass	0	3	3
+	*Danthonia eriantha*	hill wallaby-grass	0	1	1
	Danthonia geniculata	kneed wallaby-grass	2	4	6
	Danthonia pilosa var.	velvet wallaby-grass	0	25	25
	Danthonia setacea var. *setacea*	small-flower wallaby-grass	16	80	96
	Danthonia sp.	wallaby-grass	159	13	172
	Daucus glochidiatus	native carrot	20	436	456
	Daviesia arenaria	sand bitter-pea	1	2	3
	Daviesia benthamii ssp. *humilis*	mallee bitter-pea	2	0	2
	Daviesia brevifolia	leafless bitter-pea	60	32	92
+	*Daviesia genistifolia*	broom bitter-pea	0	1	1
	Dianella brevicaulis / *revoluta* var.	black-anther flax-lily	170	124	294
	Dianella longifolia var.	pale flax-lily	0	14	14
	Dichondra repens	kidney weed	4	1	5
#	*Dicrastylis verticillata*	whorled sand-sage	1	0	1
	Dillwynia hispida	red parrot-pea	51	80	131
	Dillwynia sericea	showy parrot-pea	3	6	9
	Dillwynia uncinata	silky parrot-pea	9	4	13
	Disphyma crassifolium ssp. *clavellatum*	round-leaf pigface	0	60	60
	Dissocarpus biflorus var. *biflorus*	two-horn saltbush	0	17	17
	Dissocarpus paradoxus	ball bindyi	1	6	7
+	*Distichlis distichophylla*	emu-grass	0	1	1
	**Dittrichia graveolens*	stinkweed	2	10	12

	Species	Common name	Frequency of Occurrence		
			SA	VIC	Total
	Dodonaea bursariifolia	small hop-bush	51	112	163
	Dodonaea hexandra	horned hop-bush	54	3	57
	Dodonaea humilis	dwarf hop-bush	6	0	6
	Dodonaea stenozyga	desert hop-bush	9	9	18
#	*Dodonaea viscosa* ssp.	sticky hop-bush	1	0	1
	Dodonaea viscosa ssp. *angustissima*	narrow-leaf hop-bush	9	92	101
	Dodonaea viscosa ssp. *cuneata*	wedge-leaf hop-bush	0	5	5
	Dodonaea viscosa ssp. *spatulata*	sticky hop-bush	3	7	10
	Drosera glanduligera	scarlet sundew	0	3	3
	Drosera macrantha ssp. *planchonii*	climbing sundew	107	0	107
+ ●	*Drosera* sp.	sundew	0	1	1
	Drosera whittakeri (NC)	scented sundew	198	0	198
+	*Dysphania glomulifera* ssp. *glomulifera*	globular crumbweed	0	1	1
	**Echium plantagineum*	Salvation Jane	5	11	16
	Eclipta platyglossa	yellow twin-heads	0	10	10
	**Ehrharta calycina*	perennial veldt grass	9	1	10
	Einadia hastata (NC)		0	2	2
	Einadia nutans ssp.	climbing saltbush	31	207	238
#	*Einadia nutans* ssp. *nutans*	climbing saltbush	1	0	1
	Elachanthus glaber	shiny elachanth	0	2	2
	Elachanthus pusillus	elachanth	0	9	9
+	*Elatine gratioloides*	waterwort	0	1	1
	Eleocharis acuta	common spike-rush	0	12	12
+	*Eleocharis pallens*	pale spike-rush	0	1	1
	Eleocharis pusilla	small spike-rush	0	4	4
+	*Elymus scabrus* var. *scabrus*	native wheat-grass	0	1	1
+	**Emex australis*	three-corner jack	0	1	1
	Enchylaena tomentosa var. *tomentosa*	ruby saltbush	90	270	360
	Enneapogon avenaceus	common bottle-washers	0	2	2
+	*Enneapogon nigricans*	black-head grass	0	1	1
●	*Enneapogon* sp.	bottle-washers / nineawn	2	0	2
	Enteropogon acicularis	umbrella grass	0	7	7
	Epaltes australis	spreading nut-heads	0	2	2
+	*Epaltes cunninghamii*	tall nut-heads	0	1	1
	Eragrostis australasica	cane-grass	0	6	6
	Eragrostis dielsii var. *dielsii*	mulka	0	10	10
+	*Eragrostis falcata*	sickle love-grass	0	1	1
	Eragrostis lacunaria	purple love-grass	0	10	10
+	*Eragrostis setifolia*	bristly love-grass	0	1	1
#	*Eremophila alternifolia*	narrow-leaf emubush	1	0	1
	Eremophila crassifolia	thick-leaf emubush	16	31	47
	Eremophila deserti	turkey-bush	1	2	3
	Eremophila divaricata ssp. *divaricata*	spreading emubush	0	7	7
	Eremophila glabra (NC)	tar bush	6	97	103
	Eremophila longifolia	weeping emubush	2	8	10
+	*Eremophila maculata* var. *maculata*	spotted emubush	0	1	1
	Eremophila oppositifolia var. *oppositifolia*	opposite-leaved emubush	0	5	5
	Eremophila polyclada	twiggy emubush	0	2	2
	Eremophila scoparia	broom emubush	4	3	7
+ ●	*Eremophila* sp.	emubush / turkey-bush	0	1	1
	Eriochilus cucullatus	parson's bands	14	0	14
	Eriochiton sclerolaenoides	woolly-fruit bluebush	9	51	60
	Eriochlamys behrii	woolly mantle	0	22	22
	Eriostemon pungens	prickly wax-flower	13	41	54
	**Erodium botrys*	long heron's-bill	12	3	15
	**Erodium cicutarium*	cut-leaf heron's-bill	20	99	119

	Species	Common name	Frequency of Occurrence		
			SA	VIC	Total
	Erodium crinitum	blue heron's-bill	4	127	131
●	*Erodium* sp.	heron's-bill / crowfoot	3	1	4
+	*Eryngium plantagineum*	long eryngium	0	1	1
	Eucalyptus arenacea	dune stringybark	0	20	20
	Eucalyptus baxteri	brown stringybark	19	20	39
	Eucalyptus behriana	broad-leaf box	0	8	8
	Eucalyptus brachycalyx	gilja	23	0	23
	Eucalyptus calycogona (NC)	square-fruit mallee	61	91	152
	Eucalyptus calycogona x gracilis (NC)		0	11	11
	Eucalyptus camaldulensis var. *camaldulensis*	river red gum	0	41	41
	Eucalyptus cyanophylla	blue-leaf mallee	6	8	14
	Eucalyptus diversifolia	coastal white mallee	108	0	108
	Eucalyptus dumosa	white mallee	132	265	397
+	*Eucalyptus dumosa x socialis* (NC)		0	1	1
	Eucalyptus fasciculosa	pink gum	14	0	14
	Eucalyptus foecunda (NC)	narrow-leaved mallee	232	310	542
	Eucalyptus gracilis	yorrell	102	135	237
	Eucalyptus incrassata	ridge-fruited mallee	285	324	609
	Eucalyptus largiflorens	river box	0	90	90
	Eucalyptus leucoxylon (NC)	South Australian blue gum	0	10	10
	Eucalyptus leucoxylon ssp.	South Australian blue gum	35	0	35
	Eucalyptus microcarpa	grey box	0	2	2
	Eucalyptus oleosa	red mallee	79	128	207
+	*Eucalyptus oleosa x socialis*		0	1	1
	Eucalyptus porosa	mallee box	17	8	25
	Eucalyptus rugosa	coastal white mallee	8	0	8
	Eucalyptus socialis	beaked red mallee	159	186	345
#	*Eucalyptus viminalis* ssp. *cygnetensis*	rough-bark manna gum	1	0	1
	Eucalyptus yalatensis	Yalata mallee	13	0	13
	Euchiton sphaericus	annual cudweed	2	136	138
	Euphorbia drummondii	caustic weed	1	40	41
+	*Euphorbia parvicaruncula*	rough-seeded spurge	0	1	1
	**Euphorbia peplus*	petty spurge	3	0	3
	**Euphorbia terracina*	false caper	1	1	2
	Euphrasia collina ssp.	eyebright	0	18	18
#	*Euphrasia collina* ssp. *tetragona*	coast eyebright	1	0	1
#	*Eutaxia diffusa*	large-leaf eutaxia	1	0	1
	Eutaxia microphylla var. *microphylla*	common eutaxia	55	0	55
●	*Eutaxia* sp.	eutaxia	0	60	60
	Exocarpos aphyllus	leafless cherry	15	28	43
#	*Exocarpos cupressiformis*	native cherry	1	0	1
●	*Exocarpos* sp.	native cherry / ballart	0	2	2
	Exocarpos sparteus	slender cherry	46	38	84
	Exocarpos strictus	pale-fruit cherry	0	2	2
	Frankenia crispa	hoary sea-heath	0	5	5
	Frankenia foliosa	leafy sea-heath	0	8	8
	Frankenia pauciflora var.	southern sea-heath	2	0	2
	Frankenia serpyllifolia	thyme sea-heath	0	3	3
	Frankenia sessilis	small-leaf sea-heath	0	8	8
+ ●	*Frankenia* sp.	sea-heath	0	1	1
	Gahnia deusta	limestone saw-sedge	44	0	44
	Gahnia filum	smooth cutting-grass	3	0	3
	Gahnia lanigera	black grass saw-sedge	56	77	133
+	**Galium aparine*	cleavers	0	1	1
	Galium gaudichaudii	rough bedstraw	1	6	7
	**Galium murale*	small bedstraw	5	5	10

	Species	Common name	Frequency of Occurrence		
			SA	VIC	Total
# ●	*Galium* sp.	bedstraw	1	0	1
	Geijera linearifolia	sheep bush	10	0	10
	Genoplesium nigricans / *rufum*	midge-orchid	54	12	66
	Geococcus pusillus	earth cress	0	11	11
	Geranium solanderi var. *solanderi*	austral geranium	8	0	8
	Glischrocaryon behrii	golden pennants	82	161	243
+	*Glossostigma elatinoides*	small mud-mat	0	1	1
+	*Glycine canescens*	silky glycine	0	1	1
	Glycyrrhiza acanthocarpa	native liquorice	0	4	4
	Gnaphalium aff. sphaericum (NC)		0	17	17
	Gnaphalium indutum	tiny cudweed	0	4	4
+	*Gnephosis tenuissima*	dwarf golden-tip	0	1	1
	Gompholobium ecostatum	dwarf wedge-pea	5	0	5
	Gonocarpus elatus	hill raspwort	2	0	2
	Gonocarpus mezianus	broad-leaf raspwort	13	0	13
# ●	*Gonocarpus* sp.	raspwort	1	0	1
	Gonocarpus tetragynus	small-leaf raspwort	33	3	36
	Goodenia blackiana	native primrose	31	0	31
	Goodenia fascicularis	silky goodenia	0	14	14
	Goodenia geniculata	bent goodenia	39	53	92
	Goodenia glauca	pale goodenia	0	2	2
	Goodenia heteromera	spreading goodenia	0	3	3
	Goodenia pinnatifida	cut-leaf goodenia	4	38	42
	Goodenia pusilliflora	small-flower goodenia	0	85	85
	Goodenia robusta	woolly goodenia	39	63	102
●	*Goodenia* sp.	goodenia	0	2	2
	Goodenia varia	sticky goodenia	25	36	61
	Goodenia willisiana	silver goodenia	40	130	170
●	Gramineae sp.	grass family	70	0	70
#	*Grammosolen dixonii*	Dixon's ray-flower	1	0	1
	Grevillea huegelii	comb grevillea	6	57	63
	Grevillea ilicifolia var.	holly-leaf grevillea	16	89	105
	Grevillea ilicifolia var. *ilicifolia*	holly-leaf grevillea	26	0	26
	Grevillea ilicifolia var. *lobata*	lobed holly-leaf grevillea	4	0	4
	Grevillea lavandulacea var.	spider-flower	0	34	34
	Grevillea lavandulacea var. *sericea*	spider-flower	10	0	10
	Grevillea pterosperma	dune grevillea	20	85	105
	**Gynandriris setifolia*	thread iris	1	14	15
	**Gypsophila tubulosa*	annual chalkwort	0	36	36
	Gyrostemon australasicus	buckbush wheel-fruit	11	22	33
+	*Haeckeria ozothamnoides* (NC)	cottony haeckeria	0	1	1
	Haeckeria pholidota	scaly haeckeria	0	7	7
	Haegiela tatei	small nut-heads	0	3	3
	Hakea carinata	erect hakea	4	0	4
	Hakea leucoptera ssp. *leucoptera*	silver needlewood	1	5	6
	Hakea muelleriana	heath needlebush	123	161	284
	Hakea repullulans	furze hakea	2	1	3
	Hakea rostrata	beaked hakea	7	0	7
	Hakea rugosa	dwarf hakea	6	0	6
	Hakea tephrosperma	hooked needlewood	0	17	17
	Hakea vittata	limestone needlebush	33	0	33
	Halgania andromedifolia	scented blue-flower	4	24	28
	Halgania cyanea	rough blue-flower	27	141	168
#	*Haloragis acutangula* forma	smooth raspwort	1	0	1
	Haloragis acutangula / *odontocarpa*	raspwort	0	38	38
	Haloragis aspera	rough raspwort	0	7	7

	Species	Common name	Frequency of Occurrence		
			SA	VIC	Total
+	*Haloragis heterophylla*	variable raspwort	0	1	1
	Halosarcia halocnemoides ssp. *halocnemoides*	grey samphire	0	11	11
	Halosarcia indica ssp. *leiostachya*	brown-head samphire	0	2	2
	Halosarcia lylei	wiry samphire	0	2	2
	Halosarcia pergranulata ssp.	black-seed samphire	0	30	30
#	*Halosarcia pergranulata* ssp. *pergranulata*	black-seed samphire	1	0	1
	Halosarcia pruinosa	bluish samphire	0	15	15
	Halosarcia pterygosperma ssp. *pterygosperma*	winged-seed samphire	0	3	3
	Halosarcia sp.	samphire	3	1	4
	Harmsiodoxa blennodioides	hairypod cress	0	8	8
	Harmsiodoxa brevipes var. *brevipes*	short cress	0	41	41
	**Hedypnois rhagadioloides*	Cretan weed	0	11	11
	Helichrysum leucopsideum	satin everlasting	160	244	404
	Helichrysum scorpioides	button everlasting	12	0	12
●	*Helichrysum* sp.	everlasting	6	0	6
	**Heliotropium europaeum*	common heliotrope	0	2	2
	**Helminthotheca echioides*	ox-tongue	0	3	3
	Hemichroa pentandra	trailing hemichroa	2	0	2
●	Herb sp.		6	0	6
	**Herniaria cinerea*	rupturewort	0	20	20
	Hibbertia riparia	guinea-flower	289	303	592
	Hibbertia riparia (canescens)	grey guinea-flower	2	0	2
	Hibbertia riparia (glabriuscula)	smooth guinea-flower	21	0	21
	Hibbertia sericea var.	silky guinea-flower	0	22	22
	Hibbertia sericea var. *scabrifolia*	rough-leaf guinea-flower	125	0	125
#	*Hibbertia sericea* var. *sericea*	silky guinea-flower	1	0	1
●	*Hibbertia* sp.	guinea-flower	0	11	11
	Hibbertia virgata	twiggy guinea-flower	75	182	257
	Homopholis proluta	rigid panic	1	3	4
●	**Hordeum* sp. (NC)		6	0	6
	Hyalosperma cotula	sunray	0	2	2
	Hyalosperma demissum	dwarf sunray	0	99	99
	Hyalosperma glutinosum ssp. *glutinosum*	golden sunray	0	15	15
	Hyalosperma semisterile	orange sunray	0	68	68
	Hybanthus floribundus ssp. *floribundus*	shrub violet	15	34	49
+	*Hydrocotyle capillaris*	thread pennywort	0	1	1
	Hydrocotyle laxiflora	stinking pennywort	16	0	16
	Hydrocotyle medicaginoides	medic pennywort	0	15	15
+	*Hydrocotyle pilifera* var. *glabrata*	buttercup pennywort	0	1	1
	Hydrocotyle rugulosa	mallee pennywort	0	30	30
●	*Hydrocotyle* sp.	pennywort	10	0	10
	**Hymenolobus procumbens*	oval purse	0	19	19
+	*Hypericum gramineum*	small St John's wort	0	1	1
	**Hypochaeris glabra*	smooth cat's ear	147	550	697
	**Hypochaeris radicata*	rough cat's ear	24	0	24
●	**Hypochaeris* sp.	cat's ear	4	0	4
	Hypolaena fastigiata	tassel rope-rush	100	69	169
+	*Hypolepis rugosula*	ruddy ground-fern	0	1	1
	Hypoxis glabella var. *glabella*	tiny star	1	24	25
	Hypoxis glabella var. *glabella* / *vaginata* var. *vaginata* (NC)	yellow star	0	12	12
# ●	*Hypoxis* sp.	yellow star-lily	1	0	1
	Isoetopsis graminifolia	grass cushion	2	176	178
+	*Isolepis australiensis*	southern club-rush	0	1	1
	Isolepis marginata	little club-rush	0	129	129

	Species	Common name	Frequency of Occurrence		
			SA	VIC	Total
	Isolepis nodosa	knobby club-rush	7	2	9
+	*Isolepis platycarpa*	flat-fruit club-rush	0	1	1
+	*Isolepis subtilissima* (NC)		0	1	1
	Isopogon ceratophyllus	horny cone-bush	46	2	48
	Ixiolaena leptolepis	narrow plover-daisy	0	4	4
+	*Ixiolaena tomentosa*	woolly plover-daisy	0	1	1
	Jasminum didymum ssp. *lineare*	native jasmine	0	3	3
	Juncus aridicola	inland rush	0	4	4
+	**Juncus articulatus*	jointed rush	0	1	1
	Juncus bufonius	toad rush	0	4	4
	Juncus flavidus	yellow rush	0	5	5
+	*Juncus subsecundus*	finger rush	0	1	1
	Kennedia prostrata	scarlet runner	15	2	17
	Kippistia suaedifolia	fleshy kippistia	0	2	2
	Kunzea pomifera	muntries	81	48	129
+	**Lactuca saligna*	willow-leaf lettuce	0	1	1
	**Lactuca serriola*	prickly lettuce	0	36	36
	Lagenifera huegelii	coarse bottle-daisy	3	0	3
	**Lagurus ovatus*	hare's tail grass	20	0	20
	**Lamarckia aurea*	toothbrush grass	0	18	18
	Lasiopetalum baueri	slender velvet-bush	53	32	85
	Lasiopetalum behrii	pink velvet-bush	42	46	88
+	*Lavatera plebeia*	Australian hollyhock	0	1	1
	Lawrencia glomerata	clustered lawrencia	0	3	3
	Lawrencia squamata	thorny lawrencia	9	16	25
	Laxmannia orientalis	dwarf wire-lily	9	7	16
	**Leontodon taraxacoides* ssp. *taraxacoides*	lesser hawkbit	0	8	8
	**Lepidium africanum*	common peppercress	0	3	3
	Lepidium fasciculatum	bundled peppercress	0	3	3
	Lepidium leptopetalum	shrubby peppercress	2	28	30
	Lepidium papillosum	warty peppercress	0	5	5
	Lepidium pseudohyssopifolium		0	6	6
	Lepidium pseudopapillosum	erect peppercress	0	3	3
●	*Lepidium* sp.	peppercress	0	10	10
	Lepidobolus drapetocoleus	scale shedder	82	152	234
	Lepidosperma carphoides	black rapier-sedge	202	158	360
	Lepidosperma concavum / laterale	sword-sedge	65	0	65
	Lepidosperma congestum	clustered sword-sedge	139	0	139
#	*Lepidosperma gladiatum*	coast sword-sedge	1	0	1
	Lepidosperma laterale (NC)	sharp sword-sedge	49	0	49
#	*Lepidosperma longitudinale*	pithy sword-sedge	1	0	1
	Lepidosperma semiteres	wire rapier-sedge	4	0	4
# ●	*Lepidosperma* sp.	sword-sedge / rapier-sedge	1	0	1
	Lepidosperma viscidum	sticky sword-sedge	83	295	378
	Leptocarpus brownii	coarse twine-rush	9	0	9
#	*Leptomeria aphylla*	leafless currant-bush	1	0	1
	Leptorhynchos squamatus	scaly buttons	2	1	3
	Leptorhynchos tetrachaetus	little buttons	0	10	10
	Leptorhynchos waitzia	button immortelle	0	5	5
	Leptospermum coriaceum	dune tea-tree	206	284	490
	Leptospermum myrsinoides	heath tea-tree	86	75	161
	Leucopogon clelandii	Cleland's beard-heath	28	12	40
	Leucopogon cordifolius	heart-leaf beard-heath	32	33	65
	Leucopogon costatus	twiggy beard-heath	23	5	28
	Leucopogon parviflorus	coast beard-heath	2	0	2
	Leucopogon rufus	ruddy beard-heath	16	98	114

	Species	Common name	Frequency of Occurrence		
			SA	VIC	Total
# ●	*Leucopogon* sp.	beard-heath	1	0	1
	Leucopogon woodsii	nodding beard-heath	19	6	25
	Levenhookia dubia	hairy stylewort	1	3	4
	Levenhookia pusilla	tiny stylewort	9	0	9
●	Lichen sp.		413	0	413
	**Limonium lobatum*	winged sea-lavender	0	4	4
	Linum marginale	native flax	3	9	12
+	*Lobelia gibbosa*	tall lobelia	0	1	1
	Logania linifolia	flax-leaf logania	15	22	37
	Logania nuda	leafless logania	1	14	15
	**Lolium perenne*	perennial ryegrass	0	12	12
	**Lolium rigidum*	Wimmera ryegrass	0	5	5
●	**Lolium* sp.	ryegrass	0	10	10
	Lomandra collina	sand mat-rush	100	171	271
	Lomandra densiflora	soft tussock mat-rush	2	0	2
	Lomandra effusa	scented mat-rush	51	94	145
	Lomandra juncea	desert mat-rush	113	125	238
	Lomandra leucocephala ssp. *robusta*	woolly mat-rush	64	209	273
	Lomandra micrantha ssp. *micrantha*	small-flower mat-rush	36	0	36
	Lotus cruentus	red-flower lotus	0	4	4
#	*Luzula meridionalis*	common wood-rush	1	0	1
# ●	*Luzula* sp.	wood-rush	1	0	1
	Lycium australe	Australian boxthorn	4	8	12
	**Lycium ferocissimum*	African boxthorn	17	4	21
# ●	*Lycium* sp.	boxthorn	1	0	1
	Lysiana exocarpi ssp. *exocarpi*	harlequin mistletoe	4	2	6
	Lythrum hyssopifolia	lesser loosestrife	0	2	2
	Maireana aphylla	cotton-bush	0	2	2
	Maireana appressa	pale-fruit bluebush	1	14	15
	Maireana brevifolia	short-leaf bluebush	23	48	71
	Maireana ciliata	hairy fissure-plant	0	13	13
	Maireana enchylaenoides	wingless fissure-plant	17	44	61
	Maireana erioclada	rosy bluebush	7	56	63
+	*Maireana excavata*	bottle fissure-plant	0	1	1
	Maireana georgei	satiny bluebush	0	7	7
	Maireana lobiflora	lobed bluebush	0	3	3
	Maireana oppositifolia	salt bluebush	1	8	9
	Maireana pentagona	slender fissure-plant	0	4	4
	Maireana pentatropis	erect mallee bluebush	46	164	210
	Maireana pyramidata	black bluebush	4	27	31
	Maireana radiata	radiate bluebush	13	42	55
	Maireana rohrlachii	Rohrlach's bluebush	7	2	9
	Maireana sedifolia	bluebush	14	11	25
●	*Maireana* sp.	bluebush / fissure-plant	2	10	12
	Maireana trichoptera	hairy-fruit bluebush	4	22	26
	Maireana triptera	three-wing bluebush	0	11	11
	Maireana turbinata	top-fruit bluebush	0	19	19
	Malacocera tricornis	goat-head soft-horns	0	17	17
	**Marrubium vulgare*	horehound	12	20	32
+	*Marsdenia australis*	native pear	0	1	1
	Marsilea costulifera	narrow-leaf nardoo	0	3	3
	Marsilea drummondii	common nardoo	0	10	10
	Marsilea hirsuta	short-fruit nardoo	0	2	2
●	*Marsilea* sp. (NC)		0	3	3
	**Medicago minima* var. *minima*	little medic	3	251	254

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			SA	VIC	Total
	**Medicago polymorpha* var. *polymorpha*	burr-medic	0	37	37
●	**Medicago* sp.	medic	6	0	6
	**Medicago truncatula*	barrel medic	0	11	11
	Melaleuca acuminata	mallee honey-myrtle	127	33	160
	Melaleuca brevifolia	short-leaf honey-myrtle	7	7	14
	Melaleuca halmaturorum ssp. *halmaturorum*	swamp paper-bark	2	3	5
	Melaleuca lanceolata ssp. *lanceolata*	dryland tea-tree	198	120	318
	Melaleuca uncinata	broombush	124	129	253
	Melaleuca wilsonii	Wilson's honey-myrtle	1	3	4
+	**Melilotus alba*	Bokhara clover	0	1	1
	**Melilotus indica*	King Island melilot	0	2	2
	Menkea australis	fairy spectacles	0	89	89
	Mentha australis	river mint	0	5	5
+	*Mentha satureioides*	native pennyroyal	0	1	1
	**Mesembryanthemum aitonis*	angled iceplant	0	4	4
	**Mesembryanthemum crystallinum*	common iceplant	9	48	57
	**Mesembryanthemum nodiflorum*	slender iceplant	1	16	17
	Microcybe multiflora var.	small-leaf microcybe	0	3	3
	Microcybe pauciflora	yellow microcybe	2	0	2
	Micromyrtus ciliata	fringed heath-myrtle	1	84	85
#	**Micropterum papulosum*		1	0	1
	Microseris lanceolata	yam daisy	20	22	42
●	*Microtis* / *Prasophyllum* sp.	onion orchid / leek-orchid	8	0	8
	Millotia macrocarpa	large-fruit millotia	0	18	18
	Millotia muelleri	common bow-flower	0	209	209
	Millotia myosotidifolia	broad-leaf millotia	0	32	32
	Millotia perpusilla	tiny bow-flower	0	46	46
●	*Millotia* sp.	millotia / bow-flower	6	0	6
	Millotia tenuifolia var.	soft millotia	35	251	286
	Mimulus gracilis	slender monkey-flower	0	2	2
	Minuria cunninghamii	bush minuria	0	4	4
+	*Minuria denticulata*	woolly minuria	0	1	1
	Minuria integerrima	smooth minuria	0	3	3
	Minuria leptophylla	minnie daisy	1	14	15
	Mitrasacme paradoxa (NC)	wiry mitrewort	9	0	9
●	Moss sp.		468	0	468
	Muehlenbeckia adpressa	climbing lignum	3	0	3
	Muehlenbeckia diclina ssp. *diclina*	twiggy lignum	1	19	20
	Muehlenbeckia florulenta	lignum	0	38	38
	Muehlenbeckia gunnii	coastal climbing lignum	12	0	12
	Muehlenbeckia horrida	spiny lignum	0	3	3
	Myoporum montanum	native myrtle	1	1	2
	Myoporum parvifolium	creeping boobialla	0	5	5
	Myoporum platycarpum (NC)	false sandalwood	23	74	97
	Myosotis australis	austral forget-me-not	0	5	5
	Myosurus minimus var. *australis*	mousetail	0	7	7
	Myriocephalus rhizocephalus var. *rhizocephalus*	woolly-heads	0	5	5
	**Myrsiphyllum asparagoides*	bridal creeper	61	0	61
	**Neatostema apulum*	hairy sheepweed	1	1	2
+	*Neobassia proceriflora*	desert glasswort	0	1	1
	Neurachne alopecuroidea	fox-tail mulga-grass	101	98	199
	**Nicotiana glauca*	tree tobacco	0	6	6
	Nicotiana goodspeedii	small-flower tobacco	1	1	2
+ ●	*Nicotiana* sp.	tobacco	0	1	1
	Nicotiana velutina	velvet tobacco	0	36	36
	Nitraria billardierei	nitre-bush	0	27	27

	Species	Common name	Frequency of Occurrence		
			SA	VIC	Total
	**Oenothera stricta* ssp. *stricta*	common evening primrose	3	3	6
	Olearia axillaris	coast daisy-bush	10	0	10
	Olearia brachyphylla	short-leaf daisy-bush	6	15	21
	Olearia ciliata var. *ciliata*	fringed daisy-bush	11	17	28
	Olearia decurrens	winged daisy-bush	0	4	4
	Olearia floribunda var. *floribunda*	heath daisy-bush	15	0	15
	Olearia lanuginosa	woolly daisy-bush	4	3	7
	Olearia lepidophylla	club-moss daisy-bush	21	61	82
	Olearia magniflora	splendid daisy-bush	4	22	26
	Olearia muelleri	Mueller's daisy-bush	22	73	95
+	*Olearia passerinoides* ssp.	feather daisy-bush	0	1	1
	Olearia passerinoides ssp. *glutescens*	sticky daisy-bush	3	0	3
	Olearia passerinoides ssp. *passerinoides*	feather daisy-bush	2	0	2
	Olearia picridifolia	rasp daisy-bush	5	0	5
	Olearia pimeleoides ssp. *pimeleoides*	pimelea daisy-bush	5	99	104
	Olearia ramulosa	twiggy daisy-bush	2	1	3
	Olearia rudis	azure daisy-bush	1	27	28
	Olearia teretifolia	cypress daisy-bush	0	40	40
	Omphalolappula concava	burr stickseed	0	143	143
	**Onopordum acaulon*	horse thistle	2	39	41
	Opercularia scabrida	stalked stinkweed	3	0	3
+ ●	*Opercularia* sp.	stinkweed	0	1	1
	Opercularia turpis	twiggy stinkweed	19	51	70
	Ophioglossum lusitanicum	austral adder's-tongue	5	1	6
●	Orchidaceae sp.	orchid family	1	4	5
+	*Orobanche cernua* var. *australiana*	Australian broomrape	0	1	1
+	**Orobanche minor*	lesser broomrape	0	1	1
+	*Orthoceras strictum*	horned orchid	0	1	1
	Osteocarpum acropterum var.	bonefruit	0	27	27
	Osteocarpum salsuginosum	inland bonefruit	0	19	19
	**Osteospermum clandestinum*	tripteris	0	5	5
	Othonna gregorii	fleshy groundsel	0	8	8
	Oxalis perennans	native sorrel	25	123	148
	**Oxalis pes-caprae*	soursob	4	0	4
# ●	*Oxalis* sp.	sorrel	1	0	1
	Ozothamnus decurrens	ridged bush-everlasting	8	17	25
	Ozothamnus retusus	notched bush-everlasting	5	2	7
	Pachycornia triandra	desert glasswort	0	14	14
	Pachymitus cardaminoides	sand cress	0	10	10
#	*Panicum effusum* var. *effusum*	hairy panic	1	0	1
	**Papaver aculeatum*	bristle poppy	0	3	3
	**Papaver hybridum*	rough poppy	0	4	4
	**Papaver setigerum* (NC)	small-flower opium poppy	0	10	10
	**Parapholis incurva*	curly ryegrass	0	25	25
+	*Parapholis strigosa* (NC)	slender barb-grass	0	1	1
	**Parentucellia latifolia*	red bartsia	6	0	6
	Parietaria debilis	smooth-nettle	6	38	44
+	*Paspalidium constrictum*	knotty-butt paspalidium	0	1	1
	Paspalidium jubiflorum	Warrego summer-grass	0	17	17
	**Paspalum distichum*	water couch	0	4	4
	Pelargonium australe	australian pelargonium	1	55	56
	Pelargonium littorale	native pelargonium	5	0	5
	Pelargonium rodneyanum	magenta pelargonium	2	0	2
	**Pentaschistis airoides*	false hair-grass	56	188	244
	Persicaria prostrata	creeping knotweed	0	2	2
	Persoonia juniperina	prickly geebung	18	23	41

	Species	Common name	Frequency of Occurrence		
			SA	VIC	Total
	**Petrorhagia velutina*	velvet pink	1	17	18
+	**Phalaris minor*	lesser canary-grass	0	1	1
	**Phalaris paradoxa*	paradox canary-grass	0	4	4
	Phebalium brachyphyllum	limestone phebalium	7	0	7
	Phebalium bullatum	silvery phebalium	49	95	144
	Phebalium lowanense	lowan phebalium	1	1	2
	Phlegmatospermum eremaeum	spreading cress	0	7	7
	**Phyla canescens*	lippia	0	8	8
	Phyllota pleurandroides	heathy phyllota	63	47	110
	Phyllota remota	slender phyllota	12	6	18
+	**Picnomon acarna*	soldier thistle	0	1	1
	Picris angustifolia ssp. *angustifolia*	coast picris	0	5	5
	Pimelea flava ssp. *dichotoma*	diosma riceflower	8	0	8
	Pimelea glauca	smooth riceflower	15	2	17
+	*Pimelea linifolia* ssp. *linifolia*	slender riceflower	0	1	1
#	*Pimelea micrantha*	silky riceflower	1	0	1
	Pimelea microcephala ssp. *microcephala*	shrubby riceflower	0	22	22
	Pimelea octophylla	woolly riceflower	15	23	38
	Pimelea phylicoides	heath riceflower	1	5	6
	Pimelea serpyllifolia ssp. *serpyllifolia*	thyme riceflower	11	3	14
	Pimelea simplex ssp. *simplex*	desert riceflower	0	5	5
●	*Pimelea* sp.	riceflower	2	5	7
	Pimelea stricta	erect riceflower	9	3	12
	Pimelea trichostachya	spiked riceflower	0	21	21
	Pittosporum phylliraeoides var. *microcarpa*	native apricot	12	76	88
	Plagiobothrys elachanthus	hairy forget-me-not	0	30	30
	Plagiobothrys plurisepaleus	white rochelia	0	8	8
	**Plantago bellardii*	hairy plantain	12	0	12
+	**Plantago coronopus* ssp.	bucks-horn plantain	0	1	1
	Plantago cunninghamii	clay plantain	0	56	56
	Plantago drummondii	dark plantain	0	172	172
●	*Plantago* sp.	plantain	4	3	7
	Plantago turrifera	crowned plantain	9	29	38
	Plantago varia	variable plantain	0	3	3
#	*Pleurosorus rutifolius*	blanket fern	1	0	1
#	*Poa crassicaudex*	thick-stem tussock-grass	1	0	1
	Poa drummondiana	knotted poa	0	4	4
	Poa fax	scaly poa	0	7	7
+	*Poa fordeana*	Forde's poa	0	1	1
	Poa labillardieri var. *labillardieri*	common tussock-grass	4	2	6
	Poa sieberiana (NC)	grey tussock-grass	0	3	3
●	*Poa* sp.	meadow-grass / tussock-grass	2	0	2
	Podolepis canescens	grey copper-wire daisy	0	24	24
	Podolepis capillaris	wiry podolepis	7	234	241
+	*Podolepis jaceoides*	showy copper-wire daisy	0	1	1
	Podolepis rugata var. *rugata*	pleated copper-wire daisy	26	37	63
	Podolepis tepperi	delicate copper-wire daisy	6	132	138
	Podotheca angustifolia	sticky long-heads	75	318	393
	Pogonolepis muelleriana	stiff cup-flower	1	122	123
	Polycalymma stuartii	poached-egg daisy	0	170	170
	**Polycarpon tetraphyllum*	four-leaf allseed	0	4	4
	**Polypogon monspeliensis*	annual beard-grass	0	3	3
	Pomaderris obcordata	wedge-leaf pomaderris	10	0	10
	Pomaderris paniculosa ssp.		15	0	15
	Poranthera microphylla	small poranthera	0	181	181
	Prasophyllum elatum	tall leek-orchid	1	1	2
	Prasophyllum odoratum	scented leek-orchid	3	2	5

	Species	Common name	Frequency of Occurrence		
			SA	VIC	Total
# ●	*Prasophyllum* sp.	leek-orchid	1	0	1
	Pratia concolor	poison pratia	0	13	13
	Prostanthera aspalathoides	scarlet mintbush	14	13	27
	Prostanthera serpyllifolia ssp. *microphylla*	small-leaf mintbush	5	68	73
# ●	*Prostanthera* sp.	mintbush	1	0	1
	Pseudognaphalium luteoalbum	Jersey cudweed	0	12	12
	**Psilocaulon tenue*	match-head plant	1	9	10
+	*Psoralea tenax* (NC)		0	1	1
	Pterostylis biseta	two-bristle greenhood	0	6	6
	Pterostylis cycnocephala / *mutica*	greenhood	5	0	5
	Pterostylis dolichochila	mallee shell-orchid	32	0	32
	Pterostylis longifolia	tall greenhood	20	0	20
	Pterostylis mutica	midget greenhood	0	37	37
	Pterostylis nana	dwarf greenhood	165	45	210
	Pterostylis plumosa	bearded greenhood	17	0	17
#	*Pterostylis robusta*	large shell-orchid	1	0	1
●	*Pterostylis* sp. (NC)		14	0	14
	Pterostylis vittata (NC)	banded greenhood	60	0	60
	Ptilotus exaltatus var.	pink mulla mulla	0	16	16
	Ptilotus nobilis var. *nobilis*	yellow-tails	0	2	2
	Ptilotus seminudus	rabbit-tails	29	14	43
	Ptilotus sessilifolius var. *sessilifolius*	crimson-tails	0	5	5
●	*Ptilotus* sp.	mulla mulla	6	16	22
	Ptilotus spathulatus forma *spathulatus*	pussy-tails	12	213	225
#	*Pultenaea acerosa*	bristly bush-pea	1	0	1
#	*Pultenaea canaliculata* var.	soft bush-pea	1	0	1
	Pultenaea densifolia	dense bush-pea	11	6	17
	Pultenaea prostrata	silky bush-pea	8	11	19
	Pultenaea tenuifolia	narrow-leaf bush-pea	49	48	97
	Pycnosorus pleiocephalus	soft billy-buttons	0	10	10
	Pyrorchis nigricans	black fire-orchid	74	0	74
	Ranunculus pentandrus var. *platycarpus*	smooth buttercup	0	4	4
	Ranunculus pumilio var.	ferny buttercup	0	3	3
+	**Ranunculus scleratus*	celery buttercup	0	1	1
	Ranunculus sessiliflorus var.	annual buttercup	0	2	2
+ ●	*Ranunculus* sp.	buttercup	0	1	1
	Ranunculus undosus (NC)	swamp buttercup	0	2	2
	**Reichardia tingitana*	false sowthistle	5	131	136
	Rhagodia candolleana ssp. *candolleana*	seaberry saltbush	6	0	6
	Rhagodia crassifolia	fleshy saltbush	41	23	64
	Rhagodia parabolica	mealy saltbush	5	0	5
	Rhagodia preissii ssp. *preissii*	mallee saltbush	3	0	3
	Rhagodia spinescens	spiny saltbush	20	78	98
	Rhagodia ulicina	intricate saltbush	5	0	5
#	**Rhamnus alaternus*	blow-fly bush	1	0	1
	Rhodanthe corymbiflora	paper everlasting	0	20	20
	Rhodanthe laevis	smooth daisy	0	17	17
	Rhodanthe moschata	musk daisy	0	20	20
+	*Rhodanthe polygalifolia*	milkwort everlasting	0	1	1
	Rhodanthe pygmaea	pigmy daisy	1	301	302
	Rhodanthe stuartiana	clay everlasting	0	34	34
	Rhodanthe tietkensii	Tietken's daisy	0	13	13
	Rhyncharrhena linearis	climbing purple-star	0	4	4
	**Romulea rosea* var. *australis*	common onion-grass	1	1	2
	Rorippa eustylis	river bitter-cress	0	2	2

	Species	Common name	Frequency of Occurrence		
			SA	VIC	Total
	**Rostraria cristata*	annual cat's-tail	0	45	45
	**Rostraria pumila*	tiny bristle-grass	0	8	8
	Rumex brownii (NC)	slender dock	0	14	14
	**Rumex crispus*	curled dock	0	6	6
	Rumex crystallinus	glistening dock	0	2	2
●	*Rumex* sp.	dock	0	3	3
	**Sagina apetala*	annual pearlwort	0	6	6
	Salsola kali	buckbush	12	132	144
	**Salvia verbenaca form*	wild sage	3	14	17
	Samolus repens	creeping brookweed	4	0	4
	Santalum acuminatum	quandong	8	16	24
	Santalum murrayanum	bitter quandong	19	22	41
#	*Sarcocornia blackiana*	thick-head samphire	1	0	1
	Sarcocornia quinqueflora	beaded samphire	4	2	6
	Sarcozona praecox	sarcozona	0	3	3
	Scaevola aemula	fairy fanflower	0	11	11
	Scaevola albida var. *albida*	pale fanflower	2	0	2
# ●	*Scaevola* sp.	fanflower	1	0	1
	Scaevola spinescens	spiny fanflower	1	16	17
	**Schismus barbatus*	Arabian grass	1	235	236
+	*Schoenoplectus validus*	river club-rush	0	1	1
	Schoenus breviculmis	matted bog-rush	144	105	249
	Schoenus deformis	small bog-rush	12	0	12
	Schoenus racemosus	sandhill bog-rush	2	8	10
●	*Schoenus* sp.	bog-rush	3	0	3
	Schoenus subaphyllus	desert bog-rush	20	79	99
	Scleranthus minusculus	cushion knawel	0	101	101
	Scleroblitum atriplicinum	starry goosefoot	0	5	5
	Sclerolaena brachyptera	short-wing bindyi	0	56	56
	Sclerolaena decurrens	green bindyi	0	3	3
	Sclerolaena diacantha	grey bindyi	72	394	466
	Sclerolaena diacantha / uniflora	grey bindyi	0	2	2
	Sclerolaena divaricata	tangled bindyi	0	14	14
	Sclerolaena muricata var. *muricata*	five-spine bindyi	0	21	21
	Sclerolaena obliquicuspis	oblique-spined bindyi	19	86	105
	Sclerolaena parviflora	small-flower bindyi	4	128	132
	Sclerolaena patenticuspis	spear-fruit bindyi	4	0	4
	Sclerolaena stelligera	star bindyi	0	14	14
	Sclerolaena tricuspis	three-spine bindyi	0	29	29
	Sclerolaena uniflora	small-spine bindyi	0	3	3
#	*Sclerostegia arbuscula*	shrubby samphire	1	0	1
	Sclerostegia moniliformis (NC)		0	4	4
	Sclerostegia tenuis	slender samphire	0	10	10
	Senecio cunninghamii var. *cunninghamii*	shrubby groundsel	0	2	2
	Senecio glossanthus	annual groundsel	19	420	439
	Senecio hispidulus (NC)		0	4	4
	Senecio lautus	variable groundsel	100	204	304
+	*Senecio magnificus*	showy groundsel	0	1	1
+	*Senecio minimus* var. *minimus*	fine-tooth groundsel	0	1	1
	Senecio picridioides	purple-leaf groundsel	17	0	17
	Senecio platylepis (NC)	toothed groundsel	0	4	4
	**Senecio pterophorus* var. *pterophorus*	African daisy	5	0	5
	Senecio quadridentatus	cotton groundsel	13	116	129
	Senecio runcinifolius	thistle-leaf groundsel	0	7	7
●	*Senecio* sp.	groundsel	1	2	3
	*Senna artemisioides notho*ssp. *coriacea*	broad-leaf desert senna	0	19	19
	Senna artemisioides ssp.	desert senna	1	22	23

	Species	Common name	Frequency of Occurrence		
			SA	VIC	Total
	Senna artemisioides ssp. *filifolia*	fine-leaf desert senna	6	58	64
	Senna artemisioides ssp. *petiolaris*	flat-stalk senna	0	17	17
+	*Sida ammophila* (NC)	sand sida	0	1	1
	Sida corrugata var.	corrugated sida	0	12	12
	Sida fibulifera	pin sida	0	2	2
	Sida humillima (NC)		0	2	2
	Sida intricata	twiggy sida	0	2	2
●	*Sida* sp.	sida	0	5	5
	Sida trichopoda	high sida	0	2	2
	**Silene apetala*	sand catchfly	38	94	132
	**Silene gallica* var. *gallica* (NC)	French catchfly	0	2	2
	**Silene longicaulis*	Portuguese catchfly	0	102	102
	**Silene nocturna*	Mediterranean catchfly	3	9	12
●	**Silene* sp.	catchfly	2	4	6
	**Sisymbrium erysimoides*	smooth mustard	9	77	86
	**Sisymbrium irio*	London mustard	0	46	46
	**Sisymbrium orientale*	Indian hedge mustard	0	12	12
●	**Sisymbrium* sp.	wild mustard	17	0	17
	Solanum esuriale	quena	0	19	19
	Solanum laciniatum	cut-leaf kangaroo-apple	0	2	2
	**Solanum nigrum*	black nightshade	4	11	15
	Solanum simile	Kangaroo apple	2	8	10
●	*Solanum* sp.	nightshade / potato-bush	0	7	7
	**Sonchus asper* ssp.	rough sow-thistle	0	85	85
	**Sonchus oleraceus*	common sow-thistle	8	367	375
●	*Sonchus* sp.	sow-thistle	1	26	27
	**Spergularia diandra*	lesser sand-spurrey	0	68	68
	**Spergularia rubra*	red sand-spurrey	0	40	40
	Sporobolus mitchellii	rat-tail couch	0	2	2
+	*Sporobolus virginicus*	salt couch	0	1	1
	Spyridium eriocephalum (NC)	heath spyridium	0	61	61
	Spyridium eriocephalum var. *eriocephalum*	heath spyridium	17	0	17
	Spyridium phylicoides	narrow-leaf spyridium	6	0	6
	Spyridium subochreatum (NC)		0	105	105
	Spyridium subochreatum var.	velvet spyridium	59	0	59
	Stackhousia aspericocca ssp. *"One-sided inflorescence"(W.R.Barker 697)*	one-sided candles	16	0	16
	Stackhousia monogyna	creamy candles	1	20	21
	Stellaria filiformis	thread starwort	0	35	35
	**Stellaria media*	chickweed	5	1	6
	Stellaria multiflora	rayless starwort	0	50	50
+	**Stellaria palustris* var. *palustris*	swamp starwort	0	1	1
	Stemodia glabella	smooth bluerod	0	20	20
	Stenopetalum lineare	narrow thread-petal	6	354	360
	Stenopetalum sphaerocarpum	round-fruit thread-petal	2	205	207
	Stipa acrociliata group	branched spear-grass	12	37	49
	Stipa acrociliata group / *elegantissima*	branched spear-grass	11	0	11
+	*Stipa blackii*	crested spear-grass	0	1	1
	Stipa drummondii	cottony spear-grass	0	18	18
	Stipa elegantissima	feather spear-grass	61	162	223
	Stipa eremophila	rusty spear-grass	0	62	62
	Stipa gibbosa	swollen spear-grass	0	5	5
+	*Stipa hemipogon*	half-beard spear-grass	0	1	1
	Stipa mollis	soft spear-grass	0	338	338
	Stipa mollis group	soft spear-grass	128	0	128
	Stipa nitida group (NC)	spear-grass	93	0	93
	Stipa nodosa	tall spear-grass	0	11	11

	Species	Common name	Frequency of Occurrence		
			SA	VIC	Total
+	*Stipa pilata*	prickly spear-grass	0	1	1
	Stipa scabra group	falcate-awn spear-grass	0	584	584
	Stipa sp.	spear-grass	114	69	183
#	*Stipa variabilis*	variable spear-grass	1	0	1
	Stuartina muelleri	spoon cudweed	0	4	4
	Stylidium graminifolium	grass trigger-plant	2	1	3
	Styphelia exarrhena	desert heath	48	7	55
	Swainsona greyana	Darling pea	0	3	3
	Swainsona microphylla ssp. (NC)		0	8	8
	Swainsona oroboides complex	variable swainson-pea	0	4	4
	Swainsona stipularis	orange swainson-pea	0	2	2
+ ●	**Taraxacum* sp.	dandelion	0	1	1
	Templetonia egena	broombush templetonia	1	7	8
	Templetonia sulcata	flat mallee-pea	1	19	20
+	*Tetragonia eremaea*	desert spinach	0	1	1
	Tetragonia eremaea / tetragonoides	native spinach	2	0	2
	Tetragonia implexicoma	bower spinach	11	0	11
	Tetragonia tetragonioides	New Zealand spinach	0	36	36
	Tetraria capillaris	hair sedge	12	0	12
	Teucrium racemosum	grey germander	0	19	19
	Teucrium sessiliflorum	mallee germander	0	8	8
#	*Thelymitra aristata*	great sun-orchid	1	0	1
	Thelymitra benthamiana	leopard sun-orchid	3	0	3
	Thelymitra canaliculata	azure sun-orchid	0	2	2
	Thelymitra nuda	scented sun-orchid	36	11	47
●	*Thelymitra* sp.	sun-orchid	30	13	43
#	*Themeda triandra*	kangaroo grass	1	0	1
	Thomasia petalocalyx	paper-flower	36	0	36
	Threlkeldia diffusa	coast bonefruit	5	1	6
	Thysanotus baueri	mallee fringe-lily	29	218	247
	Thysanotus juncifolius	rush fringe-lily	0	13	13
	Thysanotus patersonii	twining fringe-lily	207	131	338
●	*Thysanotus* sp.	fringe-lily	0	5	5
	Trachymene cf. anisocarpa		0	5	5
	Trachymene cyanopetala	purple trachymene	2	105	107
	Trachymene pilosa	dwarf trachymene	2	12	14
	Trichanthodium skirrophorum	woolly yellow-heads	1	4	5
	Tricoryne elatior	yellow rush-lily	43	98	141
	**Trifolium arvense* var. *arvense*	hare's-foot clover	0	55	55
+	**Trifolium fragiferum* var. *fragiferum*	strawberry clover	0	1	1
	**Trifolium glomeratum*	cluster clover	0	8	8
●	**Trifolium* sp.	clover	0	2	2
	**Trifolium tomentosum*	woolly clover	0	36	36
	Triglochin calcitrapum	spurred arrowgrass	0	160	160
	Triglochin centrocarpum	dwarf arrowgrass	0	29	29
	Triglochin procerum var. *procerum* (NC)	water-ribbons	0	2	2
+ ●	*Triglochin* sp.	arrowgrass / water-ribbons	0	1	1
+	*Triglochin striatum*	streaked arrowgrass	0	1	1
	Triodia irritans var. (NC)		151	374	525
	Triodia scariosa ssp. *scariosa*	spinifex	0	23	23
	Triptilodiscus pygmaeus	small yellow-heads	0	14	14
+	*Trisetum spicatum* (NC)		0	1	1
+	*Typha domingensis*	narrow-leaf bulrush	0	1	1
	Undetermined victorian species		0	146	146
	**Urtica urens*	small nettle	1	17	18
+	**Vaccaria hispanica*	cow soapwort	0	1	1

	Species	Common name	Frequency of Occurrence		
			SA	VIC	Total
+	*Vallisneria spiralis*	river eel-grass	0	1	1
	Velleia arguta	toothed velleia	2	4	6
	Velleia connata	cup velleia	0	4	4
	Velleia paradoxa	spur velleia	0	10	10
	**Verbena officinalis*	common verbena	0	2	2
+	**Verbena supina*	trailing verbena	0	1	1
	**Veronica catenata* ssp. *catenata* (NC)	pink water-speedwell	0	2	2
#	*Veronica hillebrandii*	rigid speedwell	1	0	1
	**Veronica peregrina* ssp. (NC)		0	2	2
	Viola arvensis	field violet	0	2	2
	Vittadinia australasica var.	sticky New Holland daisy	0	6	6
	Vittadinia australasica var. *australasica*	sticky New Holland daisy	4	0	4
#	*Vittadinia blackii*	narrow-leaf New Holland daisy	1	0	1
	Vittadinia cervicularis var. *cervicularis*	waisted New Holland daisy	8	11	19
	Vittadinia cervicularis var. *subcervicularis* (NC)	waisted New Holland daisy	0	3	3
	Vittadinia condyloides	club-hair New Holland daisy	0	31	31
	Vittadinia cuneata var.	fuzzy New Holland daisy	1	16	17
	Vittadinia cuneata var. *cuneata* forma *cuneata*	fuzzy New Holland daisy	4	0	4
	Vittadinia dissecta var. *hirta*	dissected New Holland daisy	28	303	331
	Vittadinia gracilis	woolly New Holland daisy	13	75	88
	Vittadinia megacephala	giant New Holland daisy	6	3	9
+	*Vittadinia pterochaeta*	rough New Holland daisy	0	1	1
●	*Vittadinia* sp.	New Holland daisy	10	118	128
	**Vulpia bromoides*	squirrel-tail fescue	0	183	183
	**Vulpia fasciculata*	sand fescue	0	20	20
+	**Vulpia myuros* forma *megalura*	fox-tail fescue	0	1	1
	**Vulpia myuros* forma *myuros*	rat's-tail fescue	0	127	127
●	**Vulpia* sp.	fescue	10	6	16
	Wahlenbergia communis	tufted bluebell	0	22	22
	Wahlenbergia fluminalis	river bluebell	0	22	22
	Wahlenbergia gracilenta	annual bluebell	2	288	290
	Wahlenbergia gracilis	sprawling bluebell	0	5	5
	Wahlenbergia graniticola (NC)	granite bluebell	0	2	2
	Wahlenbergia litticola	coast bluebell	12	2	14
	Wahlenbergia multicaulis	Tadgell's bluebell	0	10	10
●	*Wahlenbergia* sp.	native bluebell	5	7	12
	Wahlenbergia stricta ssp. *stricta*	tall bluebell	5	10	15
	Wahlenbergia tumidifructa	swollen-fruit bluebell	0	2	2
	Waitzia acuminata var. *acuminata*	orange immortelle	0	100	100
	Westringia eremicola	slender westringia	5	5	10
	Westringia rigida	stiff westringia	29	136	165
+	*Wilsonia rotundifolia*	round-leaf wilsonia	0	1	1
	Wurmbea dioica ssp. *dioica*	early star-lily	7	70	77
●	**Xanthium* sp.	burr	0	2	2
	Xanthorrhoea caespitosa	sand-heath yacca	154	0	154
	Xanthorrhoea semiplana ssp. *semiplana*	yacca	0	9	9
	Xanthosia dissecta var. *dissecta* (NC)	cut-leaved xanthosia	6	0	6
#	*Xanthosia dissecta* var. *floribunda*	cut-leaf xanthosia	1	0	1
	Xanthosia pusilla	hairy xanthosia	8	0	8
#	*Zieria veronicea*	pink zieria	1	0	1
+	*Zygophyllum aff. ammophilum* (NC)		0	1	1
	Zygophyllum ammophilum (NC)	sand twinleaf	1	119	120
	Zygophyllum apiculatum	pointed twinleaf	63	125	188
	Zygophyllum aurantiacum (NC)	shrubby twinleaf	19	141	160
	Zygophyllum aurantiacum / *eremaeum*	shrubby twin-leaf	3	0	3

	Species	Common name	Frequency of Occurrence		
			SA	VIC	Total
	Zygophyllum billardierei (NC)	coast twinleaf	0	4	4
	Zygophyllum compressum	rabbit-ears twinleaf	0	2	2
	Zygophyllum crenatum	notched twinleaf	0	20	20
	Zygophyllum eremaeum	pale-flower twin-leaf	0	13	13
	Zygophyllum glaucum	pale twinleaf	1	20	21
	Zygophyllum iodocarpum	violet twinleaf	0	4	4
	Zygophyllum ovatum	dwarf twinleaf	6	43	49
●	*Zygophyllum* sp.	twinleaf	3	6	9

Appendix VIII

Combined SA and Victorian taxonomic plant species names used in PATN analysis.

STATE	SPECIES NAME	ANALYSIS NAME USED
SA	*Acacia halliana*	*Acacia halliana/microcarpa*
VIC	*Acacia halliana/microcarpa*	*Acacia halliana/microcarpa*
SA	*Acacia microcarpa*	*Acacia halliana/microcarpa*
VIC	*Acacia sp*	*Acacia sp.*
SA	*Acaena echinata var.*	*Acaena echinata var.*
SA	**Achillea sp*	*Achillea sp.*
VIC	*Agrostis avenacea var.*	*Agrostis avenacea var.*
SAVIC	*Alectryon oleifolium ssp. canescens*	*Alectryon oleifolius ssp. canescens*
VIC	*Allocasuarina mackliniana ssp*	*Allocasuarina mackliniana ssp.*
SAVIC	*Allocasuarina muelleriana*	*Allocasuarina muelleriana ssp. muelleriana*
VIC	*Amyema sp.*	*Amyema sp.*
VIC	*Angianthus sp.*	*Angianthus sp.*
SAVIC	*Atriplex acutibractea ssp*	*Atriplex acutibractea ssp.*
SAVIC	*Atriplex sp*	*Atriplex sp.*
SAVIC	*Atriplex vesicaria ssp*	*Atriplex vesicaria ssp.*
VIC	** Avena barbata*	*Avena sp.*
VIC	** Avena fatua*	*Avena sp.*
SA	** Avena sp.*	*Avena sp.*
VIC	** Avena sp.*	*Avena sp.*
VIC	*Azolla sp.*	*Azolla sp.*
SAVIC	*Brachycome sp.*	*Brachycome sp.*
VIC	** Brassica sp.*	*Brassica sp.*
SA	** Bromus sp.*	*Bromus sp.*
SAVIC	*Caladenia filamentosa var.*	*Caladenia filamentosa var.*
SAVIC	*Caladenia filamentosa var. tentaculata*	*Caladenia filamentosa var.*
SA	*Caladenia sp.*	*Caladenia sp.*
SA	*Calandrinia calyptrata/eremaea*	*Calandrinia calyptrata/eremaea*
SAVIC	*Calandrinia sp.*	*Calandrinia sp.*
SA	*Calotis sp.*	*Calotis sp.*
VIC	*Carpobrotus modestus*	*Carpobrotus modestus/rossii*
SA	*Carpobrotus modestus/rossii*	*Carpobrotus modestus/rossii*
SA	*Carpobrotus rossii*	*Carpobrotus modestus/rossii*
SAVIC	*Casuarina cristata ssp. pauper*	*Casuarina pauper*
VIC	*Celastrus sp.*	*Celastrus sp.*
SA	*Centrolepis sp.*	*Centrolepis sp.*
VIC	*Chenopodiaceae sp.*	*Chenopodiaceae sp.*
SA	*Chenopodium desertorum ssp.*	*Chenopodium desertorum ssp.*
VIC	*Chenopodium desertorum ssp.*	*Chenopodium desertorum ssp.*
SA	*Chenopodium desertorum ssp. desertorum*	*Chenopodium desertorum ssp.*
SA	*Chenopodium desertorum ssp. microphyllum*	*Chenopodium desertorum ssp.*
SA	*Chenopodium desertorum ssp. rectum*	*Chenopodium desertorum ssp.*
SA	*Chenopodium sp.*	*Chenopodium sp.*
SA	*Compositae sp.*	*Compositae sp.*
SA	*Convolvulus sp.*	*Convolvulus sp.*
VIC	*Craspedia sp.*	*Craspedia sp.*
SAVIC	*Crassula colorata var.*	*Crassula colorata var.*
SAVIC	*Crassula sp.*	*Crassula sp.*
SA	*Cryptandra amara var. amara*	*Cryptandra amara var.*

STATE	SPECIES NAME	ANALYSIS NAME USED
VIC	*Cryptandra propinqua*	*Cryptandra propinqua/tomentosa*
SA	*Cryptandra tomentosa*	*Cryptandra propinqua/tomentosa*
VIC	*Cryptandra tomentosa*	*Cryptandra propinqua/tomentosa*
SA	*Cryptandra tomentosa "propinqua"*	*Cryptandra propinqua/tomentosa*
SA	*Cryptandra tomentosa s.l.*	*Cryptandra propinqua/tomentosa*
VIC	*Cyperus sp.*	*Cyperus sp.*
SA	*Cyrtostylis sp.*	*Cyrtostylis sp.*
VIC	*Danthonia caespitosa*	*Danthonia sp.*
VIC	*Danthonia carphoides var. carphoides*	*Danthonia sp.*
VIC	*Danthonia duttoniana*	*Danthonia sp.*
VIC	*Danthonia eriantha*	*Danthonia sp.*
SA	*Danthonia geniculata*	*Danthonia sp.*
VIC	*Danthonia geniculata*	*Danthonia sp.*
VIC	*Danthonia pilosa var.*	*Danthonia sp.*
SA	*Danthonia setacea var. setacea*	*Danthonia sp.*
VIC	*Danthonia setacea var. setacea*	*Danthonia sp.*
SA	*Danthonia sp.*	*Danthonia sp.*
VIC	*Danthonia sp.*	*Danthonia sp.*
VIC	*Danthonia sp. aff. setacea*	*Danthonia sp.*
SAVIC	*Daviesia genistifolia*	*Daviesia benthamii ssp. humilis*
VIC	*Dianella longifolia var.*	*Dianella longifolia var.*
SAVIC	*Dianella revoluta var.*	*Dianella revoluta var.*
SAVIC	*Dissocarpus paradoxus*	*Dissocarpus paradoxus var. paradoxus*
SA	*Dodonaea viscosa ssp.*	*Dodonaea viscosa ssp.*
VIC	*Drosera sp.*	*Drosera sp.*
SA	*Einadia nutans ssp.*	*Einadia nutans ssp.*
VIC	*Einadia nutans ssp.*	*Einadia nutans ssp.*
SA	*Einadia nutans ssp. nutans*	*Einadia nutans ssp.*
SA	*Enneapogon sp.*	*Enneapogon sp.*
VIC	*Eremophila sp.*	*Eremophila sp.*
SAVIC	*Erodium sp.*	*Erodium sp.*
SA	*Eucalyptus anceps sensu PJL*	*Eucalyptus "anceps"*
SAVIC	*Eucalyptus baxteri*	*Eucalyptus arenacea*
SAVIC	*Eucalyptus incrassata var. incrassata*	*Eucalyptus incrassata*
SAVIC	*Eucalyptus foecunda*	*Eucalyptus leptophylla*
SA	*Eucalyptus leucoxylon ssp.*	*Eucalyptus leucoxylon ssp.*
SAVIC	*Euphrasia collina ssp.*	*Euphrasia collina ssp.*
SAVIC	*Euphrasia collina ssp. tetragona*	*Euphrasia collina ssp.*
SAVIC	*Eutaxia microphylla var.*	*Eutaxia microphylla var. microphylla*
VIC	*Exocarpos sp.*	*Exocarpos sp.*
SA	*Frankenia pauciflora var.*	*Frankenia pauciflora var.*
VIC	*Frankenia sp.*	*Frankenia sp.*
SA	** Galium sp.*	*Galium sp.*
SAVIC	*Genoplesium nigricans/rufum*	*Genoplesium nigricans/rufum*
SA	*Gonocarpus sp.*	*Gonocarpus sp.*
VIC	*Goodenia sp.*	*Goodenia sp.*
SA	*Gramineae sp.*	*Gramineae sp.*
SA	*Grevillea ilicifolia var.*	*Grevillea ilicifolia var.*
VIC	*Grevillea ilicifolia var.*	*Grevillea ilicifolia var.*
SA	*Grevillea ilicifolia var. ilicifolia*	*Grevillea ilicifolia var.*
SA	*Grevillea ilicifolia var. lobata*	*Grevillea ilicifolia var.*
SAVIC	*Grevillea lavandulacea var.*	*Grevillea lavandulacea var.*
SAVIC	*Grevillea lavandulacea var. sericea*	*Grevillea lavandulacea var.*
SAVIC	*Haloragis acutangula forma*	*Haloragis acutangula forma/odontocarpa forma*

STATE	SPECIES NAME	ANALYSIS NAME USED
SAVIC	*Haloragis acutangula forma/odontocarpa forma*	*Haloragis acutangula forma/odontocarpa forma*
SAVIC	*Halosarcia pergranulata ssp.*	*Halosarcia pergranulata ssp.*
SAVIC	*Halosarcia pergranulata ssp. pergranulata*	*Halosarcia pergranulata ssp.*
VIC	*Halosarcia flabelliformis*	*Halosarcia sp.*
VIC	*Halosarcia halocnemoides ssp. halocnemoides*	*Halosarcia sp.*
VIC	*Halosarcia indica ssp. leiostachya*	*Halosarcia sp.*
VIC	*Halosarcia lylei*	*Halosarcia sp.*
VIC	*Halosarcia nitida*	*Halosarcia sp.*
VIC	*Halosarcia pruinosa*	*Halosarcia sp.*
VIC	*Halosarcia pterygosperma ssp. pterygosperma*	*Halosarcia sp.*
SA	*Halosarcia sp.*	*Halosarcia sp.*
VIC	*Halosarcia sp.*	*Halosarcia sp.*
SAVIC	*Helichrysum apiculatum var. apiculatum*	*Helichrysum apiculatum*
SA	*Helichrysum sp.*	*Helichrysum sp.*
SA	** Herb sp.*	*Herb sp.*
SA	*Hibbertia riparia "canescens"*	*Hibbertia riparia*
SA	*Hibbertia riparia "glabriuscula"*	*Hibbertia riparia*
VIC	*Hibbertia sericea var.*	*Hibbertia sericea var.*
SA	*Hibbertia sericea var. scabrifolia*	*Hibbertia sericea var.*
SA	*Hibbertia sericea var. sericea*	*Hibbertia sericea var.*
VIC	*Hibbertia sp.*	*Hibbertia sp.*
SAVIC	*Panicum prolutum*	*Homopholis proluta*
SA	** Hordeum sp.*	*Hordeum sp.*
VIC	*Helipterum demissum*	*Hyalosperma demissum*
VIC	*Helipterum hyalospermum*	*Hyalosperma glutinosum ssp. glutinosum*
VIC	*Helipterum jessenii*	*Hyalosperma semisterile*
SA	*Hydrocotyle sp.*	*Hydrocotyle sp.*
SA	** Hypochoeris sp.*	*Hypochoeris sp.*
SAVIC	*Hypoxis glabella*	*Hypoxis glabella var. glabella*
VIC	*Hypoxis glabella var. glabella/vaginata var. vaginata*	*Hypoxis glabella var. glabella/vaginata var. vaginata*
SA	*Hypoxis sp.*	*Hypoxis glabella/vaginata*
VIC	*Hypoxis hygrometrica var.*	*Hypoxis hygrometrica var.*
VIC	*Lepidium sp.*	*Lepidium sp.*
SA	*Lepidosperma congestum*	*Lepidosperma congestum/laterale/viscidum*
SA	*Lepidosperma congestum/laterale*	*Lepidosperma congestum/laterale/viscidum*
SA	*Lepidosperma laterale*	*Lepidosperma congestum/laterale/viscidum*
SA	*Lepidosperma viscidum*	*Lepidosperma congestum/laterale/viscidum*
VIC	*Lepidosperma viscidum*	*Lepidosperma congestum/laterale/viscidum*
SA	*Lepidosperma sp.*	*Lepidosperma sp.*
SA	*Leucopogon sp.*	*Leucopogon sp.*
SA	*Lichen sp.*	*Lichen sp.*
VIC	**Lolium sp.*	*Lolium sp.*
VIC	** Lolium temulentum forma*	*Lolium temulentum forma*
SAVIC	*Luzula meridionalis*	*Luzula sp.*
SAVIC	*Luzula sp.*	*Luzula sp.*
SA	**Lycium sp.*	*Lycium sp.*
SAVIC	*Maireana sp.*	*Maireana sp.*
VIC	*Marsilea sp.*	*Marsilea sp.*
SA	** Medicago sp.*	*Medicago sp.*
VIC	*Microcybe multiflora var.*	*Microcybe multiflora var.*
SA	*Microtis/Prasophyllum*	*Microtis/Prasophyllum*
SA	*Millotia sp.*	*Millotia sp.*
SAVIC	*Millotia tenuifolia var.*	*Millotia tenuifolia var.*

STATE	SPECIES NAME	ANALYSIS NAME USED
SA	*Moss sp.*	*Moss sp.*
VIC	*Nicotiana sp.*	*Nicotiana sp.*
VIC	*Olearia passerinoides ssp.*	*Olearia passerinoides ssp.*
SA	*Olearia passerinoides ssp. glutescens*	*Olearia passerinoides ssp.*
SA	*Olearia passerinoides ssp. passerinoides*	*Olearia passerinoides ssp.*
SAVIC	*Olearia rudis var. rudis*	*Olearia rudis*
VIC	*Opercularia sp.*	*Opercularia sp.*
SAVIC	*Orchidaceae sp.*	*Orchidaceae sp.*
VIC	*Osteocarpum acropterum var.*	*Osteocarpum acropterum var.*
SA	** Oxalis sp.*	*Oxalis sp.*
SA	*Panicum effusum var. effusum*	*Panicum effusum*
SAVIC	*Parietaria debilis*	*Parietaria cardiostegia/debilis*
SA	*Pimelea curviflora ssp. micrantha*	*Pimelea micrantha*
SAVIC	*Pimelea octophylla ssp. octophylla*	*Pimelea octophylla*
SAVIC	*Pimelea serpyllifolia*	*Pimelea serpyllifolia ssp. serpyllifolia*
SAVIC	*Pimelea sp.*	*Pimelea sp.*
VIC	** Plantago coronopus ssp.*	*Plantago coronopus ssp.*
SAVIC	** Plantago sp.*	*Plantago sp.*
SA	**Poa sp.*	*Poa sp.*
SAVIC	** Persicaria prostrata*	*Polygonum prostratum*
SA	*Pomaderris paniculosa ssp.*	*Pomaderris paniculosa ssp.*
SA	*Prasophyllum sp.*	*Prasophyllum sp.*
SA	*Prostanthera sp.*	*Prostanthera sp.*
SAVIC	*Pterostylis cycnocephala/mutica*	*Pterostylis cycnocephala/mutica*
SAVIC	*Pterostylis mutica*	*Pterostylis cycnocephala/mutica*
SA	*Pterostylis vittata*	*Pterostylis sanguinea*
SA	*Pterostylis sp.*	*Pterostylis sp.*
VIC	*Ptilotus exaltatus var.*	*Ptilotus exaltatus var.*
SAVIC	*Ptilotus sp.*	*Ptilotus sp.*
SA	*Pultenaea canaliculata var.*	*Pultenaea canaliculata var.*
VIC	*Ranunculus pumilio var.*	*Ranunculus pumilio var.*
VIC	*Ranunculus sessiliflorus var.*	*Ranunculus sessiliflorus var.*
VIC	*Ranunculus sp.*	*Ranunculus sp.*
SAVIC	*Rannunculus undosus*	*Ranunculus undosus*
VIC	*Rumex sp.*	*Rumex sp.*
SA	*Scaevola sp.*	*Scaevola sp.*
SA	*Schoenus sp.*	*Schoenus sp.*
SA	*Sclerolaena diacantha*	*Sclerolaena diacantha/uniflora*
VIC	*Sclerolaena diacantha*	*Sclerolaena diacantha/uniflora*
VIC	*Sclerolaena diacantha/uniflora*	*Sclerolaena diacantha/uniflora*
VIC	*Sclerolaena uniflora*	*Sclerolaena diacantha/uniflora*
SAVIC	*Senecio sp.*	*Senecio sp.*
VIC	*Cassia nemophila var. coriacea*	*Senna artemisioides ssp.*
VIC	*Cassia nemophila var. nemophila*	*Senna artemisioides ssp.*
VIC	*Cassia nemophila var. platypoda*	*Senna artemisioides ssp.*
SA	*Senna artemisioides nothossp. coriacea*	*Senna artemisioides ssp.*
SA	*Senna artemisioides ssp.*	*Senna artemisioides ssp.*
VIC	*Senna artemisioides ssp.*	*Senna artemisioides ssp.*
SA	*Senna artemisioides ssp. filifolia*	*Senna artemisioides ssp.*
SA	*Senna artemisioides ssp. petiolaris*	*Senna artemisioides ssp.*
VIC	*Sida corrugata var.*	*Sida corrugata var.*
VIC	*Sida sp.*	*Sida sp.*
SAVIC	** Silene sp.*	*Silene sp.*

STATE	SPECIES NAME	ANALYSIS NAME USED
SA	** Sisymbrium sp.*	*Sisymbrium sp.*
VIC	*Solanum sp.*	*Solanum sp.*
VIC	** Sonchus asper ssp.*	*Sonchus asper ssp.*
SAVIC	** Sonchus sp.*	*Sonchus sp.*
SAVIC	*Spyridium eriocephalum*	*Spyridium eriocephalum var. eriocephalum*
SAVIC	*Spyridium subochreatum*	*Spyridium subochreatum var.*
SAVIC	*Spyridium subochreatum var.*	*Spyridium subochreatum var.*
SAVIC	*Stipa mollis*	*Stipa mollis gp.*
SA	*Stipa acrociliata gp./elegantissima*	*Stipa sp.*
VIC	*Stipa blackii*	*Stipa sp.*
VIC	*Stipa drummondii*	*Stipa sp.*
VIC	*Stipa eremophila*	*Stipa sp.*
VIC	*Stipa gibbosa*	*Stipa sp.*
VIC	*Stipa hemipogon*	*Stipa sp.*
SA	*Stipa nitida gp.*	*Stipa sp.*
VIC	*Stipa nodosa*	*Stipa sp.*
VIC	*Stipa pilata*	*Stipa sp.*
VIC	*Stipa scabra group*	*Stipa sp.*
SA	*Stipa sp.*	*Stipa sp.*
VIC	*Stipa sp.*	*Stipa sp.*
SA	*Stipa variabilis*	*Stipa sp.*
VIC	*Swainsona microphylla ssp.*	*Swainsona microphylla ssp.*
VIC	*Taraxacum sp.*	*Taraxacum sp.*
VIC	*Tetragonia eremaea*	*Tetragonia eremaea/tetragonoides*
SA	*Tetragonia eremaea/tetragonoides*	*Tetragonia eremaea/tetragonoides*
VIC	*Tetragonia tetragonoides*	*Tetragonia eremaea/tetragonoides*
SA	*Thelymitra ?benthamiana*	*Thelymitra benthamiana*
SAVIC	*Thelymitra sp.*	*Thelymitra sp.*
VIC	*Thysanotus sp.*	*Thysanotus sp.*
SAVIC	*Gnephosis skirrophora*	*Tricanthodium skirrophorum*
VIC	** Trifolium sp.*	*Trifolium sp.*
VIC	*Triglochin sp.*	*Triglochin sp.*
SAVIC	*Triodia irritans var.*	*Triodia irritans var.*
VIC	** Veronica peregrina ssp.*	*Veronica peregrina ssp.*
SAVIC	*Vittadinia australasica var.*	*Vittadinia australasica var.*
SAVIC	*Vittadinia australasica var. australasica*	*Vittadinia australasica var.*
SA	*Vittadinia cuneata var.*	*Vittadinia cuneata var.*
VIC	*Vittadinia cuneata var.*	*Vittadinia cuneata var.*
SA	*Vittadinia cuneata var. cuneata forma cuneata*	*Vittadinia cuneata var.*
SAVIC	*Vittadinia sp.*	*Vittadinia sp.*
SAVIC	** Vulpia sp.*	*Vulpia sp.*
SAVIC	*Wahlenbergia sp.*	*Wahlenbergia sp.*
VIC	** Xanthium sp.*	*Xanthium sp.*
SAVIC	*Xanthorrhoea caespitosa*	*Xanthorrhoea caespitosa/semiplana*
SAVIC	*Xanthorrhoea semiplana ssp. semiplana*	*Xanthorrhoea caespitosa/semiplana*
SA	*Zygophyllum aurantiacum*	*Zygophyllum aurantiacum/eremaeum*
VIC	*Zygophyllum aurantiacum*	*Zygophyllum aurantiacum/eremaeum*
SA	*Zygophyllum aurantiacum/eremaeum*	*Zygophyllum aurantiacum/eremaeum*
VIC	*Zygophyllum eremaeum*	*Zygophyllum aurantiacum/eremaeum*
SAVIC	*Zygophyllum sp.*	*Zygophyllum sp.*

Appendix IX

MAMMAL SPECIES RECORDED FROM THE MURRAY MALLEE.

Mammal taxonomy follows Kemper, Reardon and Queale (2000). Species records are shown from the collections of the South Australian Museum as at July 1991 and do not include specimens collected during the present survey. Separate columns list species recorded on quadrats and opportunistically during this survey.

Introduced species are indicated with an asterisk. Threatened species categories for South Australia follows Robinson, Hutchinson and Casperson (2000) and are indicated in bold next to scientific name.

Single or interesting records are indicated in the 'other' column.

SPECIES		SOURCE			
SCIENTIFIC NAME	**COMMON NAME**	**SA MUSEUM**	**THIS SURVEY Quad**	**Opp**	**OTHER**
BOVIDAE					
**Capra hircus*	Goat	X	X		
**Ovis aries*	Sheep		X		
**Bos taurus*	Cattle			X	
BURRAMYIDAE					
Cercartetus concinnus	Western Pygmy-possum	X	X	X	
Cercartetus lepidus	Little Pygmy-possum	X	X		
CANIDAE					
Canis lupus dingo	Dingo	X (1891)			
**Vulpes vulpes*	European Fox	X	X		
DASYURIDAE					
Dasyurus maculatus **EX**	Spotted-tailed Quoll	X (1958)			
Ningaui yvonneae	Southern Ningaui	X	X		
Sminthopsis crassicaudata	Fat-tailed Dunnart	X	X		
Sminthopsis murina	Common Dunnart	X	X		
EMBALLONURIDAE					
Saccolaimus flaviventris **R**	Yellow-bellied Sheathtail Bat	X			
FELIDAE					
**Felis catus*	Cat	X	X	X	
LEPORIDAE					
**Lepus capensis*	Brown Hare	X	X	X	
**Oryctolagus cuniculus*	European Rabbit	X	X	X	
MACROPODIDAE					
Macropus eugenii **EX**	Tammar Wallaby	X (1929)			X
Macropus fuliginosus	Western Grey Kangaroo	X			
Macropus giganteus **R**	Eastern Grey Kangaroo	X			X
Macropus greyi **EX**	Toolache Wallaby	X			
Macropus robustus	Euro			X	
Macropus rufus	Red Kangaroo			X	
MOLOSSIDAE					
Mormopterus planiceps	Southern Freetail-bat	X			
Tadarida australis	White-striped Freetail-bat	X			
MURIDAE					
**Mus musculus*	House Mouse	X	X		
Notomys mitchellii	Mitchell's Hopping Mouse	X			
Pseudomys apodemoides	Silky Mouse	X	X		
Rattus lutreolus	Swamp Rat	X			
**Rattus rattus*	Black Rat	X			

SPECIES		SOURCE			
SCIENTIFIC NAME	**COMMON NAME**	**SA MUSEUM**	**THIS SURVEY Quad**	**Opp**	**OTHER**
ORNITHORHYNCHIDAE					
Ornithorhynchus anatinus **E**	Platypus	X		X	
MYRMECOBIIDAE					
Myrmecobius fasciatus **EX**	Numbat	X (1863)			
PERAMELIDAE					
Macrotis lagotis **EX**	Bilby	X (1891)			
PETAURIDAE					
Pseudocheirus peregrinus	Common Ringtail Possum	X	X		
PHALANGERIDAE					
Trichosurus vulpecula	Common Brushtail Possum	X	X	X	
POTOROIDAE					
Bettongia lesueur **E**	Burrowing Bettong				X –sub fossil
Bettongia penicillata **R**	Brush-tailed Bettong				X –sub fossil
Potorous platyops	Broad Faced Potoroo				X –sub fossil
TACHYGLOSSIDAE					
Tachyglossus aculeatus	Short-beaked Echidna	X	X	X	
VESPERTILIONIDAE					
Chalinolobus gouldii	Gould's Wattled Bat	X	X	X	
Chalinolobus morio	Chocolate Wattled Bat	X		X	
Minipoterus schreibersii	Large Bent-winged Bat	X			
Myotis macropus	Southern Myotis	X			
Vespadelus baverstocki	Inland Eptesicus	X		X	
Vespadelus darlingtoni	Large Forest Eptesicus	X			
Vespadelus regulus	King River Bat	X	X	X	
Vespadelus vulturnus	Liitle Forest Eptesicus	X		X	
Nyctophilus geoffroyi	Lesser Long-eared Bat	X	X	X	
VOMBATIDAE					
Lasiorhinus latifrons	Hairy –nosed Wombat	X	X	X	

Appendix X

AMPHIBIANS AND REPTILES RECORDED FROM THE MURRAY MALLEE REGION OF SOUTH AUSTRALIA

Reptile taxonomy and South Australian status follows that of Hutchinson and Edwards (2000).
Specimen records from the South Australian Museum are up to November 1991 and exclude specimens collected on the present survey. Interesting records are indicated in the annotations.

SPECIES		SOURCE		
Scientific Name	**Common Name**	**S.A. Museum**	**THIS SURVEY**	
			Quadrat	**Opp.**
AGAMIDAE				
Amphibolurus nobbi	Nobbi Dragon	X	X	X
Amphibolurus norrisi	Mallee Tree-Dragon	X	X	
Ctenophorus decresii	Tawny Dragon	X[1]		
Ctenophorus fordi	Mallee Dragon	X	X	X
Ctenophorus pictus	Painted Dragon	X	X	X
Pogona barbata	Eastern Bearded Dragon	X	X	X
Pogona vitticeps	Central Bearded Dragon	X	X	X
Tympanocryptis lineata	Five-lined Earless Dragon	X[2]		
BOIDAE				
Morelia spilota	Carpet Python	X		X
ELAPIDAE				
Acanthopsis antarcticus	Common Death Adder	X[3]		
Demansia psammophis	Yellow-faced Whipsnake	X[4]		
Drysdalia mastersii	Master's Snake	X	X	
Echiopsis curta **R**	Bardick	X		
Notechis scutatus	Eastern Tiger Snake	X[5]		
Pseudechis porphyriacus	Red-bellied Black Snake	X[6]		
Pseudonaja nuchalis	Western Brown Snake	X		X
Pseudonaja textilis	Eastern Brown Snake	X	X	X
Simoselaps australis	Coral Snake	X[7]		
Suta nigriceps	Mitchell's Short-tailed Snake	X	X	
Suta spectabilis	Mallee Black-headed Snake	X		
Vermicella annulata **R**	Common Bandy Bandy	X[8]		
GEKKONIDAE				
Diplodactylus damaeus	Beaded Gecko	X	X	
Diplodactylus stenodactylus	Sandplain Gecko		X	
SPECIES		**SOURCE**		

[1] Recent collections along river and further west
[2] Several records along river and Western Murray flats
[3] One museum record west of river 1980
[4] Records west of river 1900 and 1905, one record on river 1930
[5] Several records along the river and the south western Murray flats
[6] Several recent records from the south western Murray flats
[7] Five records prior to 1935
[8] Records collected in 1958 and 1983 along the river and 1989 and 1944 south of the river

Scientific Name	**Common Name**	**S.A. Museum**	**THIS SURVEY**	
			Quadrat	**Opp.**
Diplodactylus vittatus	Eastern Stone Gecko	X	X	
Gehyra variegata	Tree Dtella	X	X	X
Heteronotia binoei	Bynoe's Gecko	X	X	X
Phyllodactylus marmoratus	Marbled Gecko	X	X	X
Nephrurus milii	Barking Gecko	X	X	X
Strophurus intermedius	Southern Spiny-tailed Gecko	X	X	X
Strophurus williamsi	Eastern Spiny-tailed Gecko	X		
HYLIDAE				
Litoria peroni	Peron's Tree Frog	X		
MYOBATRACHIDAE				
Limnodynastes dumerili	Bull Frog	X	X	X
Limnodynastes tasmaniensis	Marbled Frog	X[9]		
Neobatrachus pictus	Painted Frog	X	X	X
Pseudophryne bibroni	Brown Toadlet		X[10]	
PYGOPODIDAE				
Aprasia inaurita	Red-tailed Worm Lizard	X		X
Aprasia striolata	Lined Worm-lizard	X	X	
Delma australis	Barred Snake-lizard	X	X	X
Delma butleri	Spinifex Snake-lizard	X	X	
Delma inornata	Olive Snake-lizard	X		
Delma molleri	Adelaide Snake-lizard	X		X
Lialis burtonis	Burton's Legless Lizard	X	X	X
Pygopus lepidopodus	Common Scaly-foot	X	X	
SCINCIDAE				
Bassiana duperreyi	Eastern Three-lined Skink		X	
Cryptoblepharus carnabyi	Speckled Wall Skink	X	X	X
Ctenotus atlas	Southern Spinifex Ctenotus	X	X	
Ctenotus brachyonyx	Brown Ctenotus	X	X	
Ctenotus brooksi	Sandhill Ctenotus	X	X	X
Ctenotus regius	Eastern Desert Ctenotus	X	X	X
Ctenotus robustus	Eastern Striped Skink	X	X	X
Ctenotus schomburgkii	Sandplain Ctenotus	X	X	
Ctenotus strauchii	Short-legged Ctenotus	X	X	
Ctenotus uber	Spotted Ctenotus	X	X	X
Egernia inornata	Desert Skink	X		
Egernia multiscutata	Bull Skink	X[11]		
Egernia striolata	Eastern Tree Skink	X	X	X
Eremiascincus richardsonii	Broad-banded Sandswimmer	X	X	X
SPECIES		**SOURCE**		

[9] Several records along river and western Murray Flats
[10] one record from southern boundary of study region SE Fire study 1994
[11] Four records from Mt Rescue C.P. 1975 and 1977

Scientific Name	**Common Name**	**S.A. Museum**	**THIS SURVEY**	
			Quadrat	**Opp.**
Hemiergis decresiensis	Three-toed Earless Skink	X		
Hemiergis millewae	Rusty Earless Skink	X	X	X
Hemiergis peronii	Four-toed Earless Skink	X	X	X
Lampropholis delicata	Delicate Skink	X	X	X
Lerista bougainvillii	Bougainville's Skink	X	X	X
Lerista dorsalis	Southern Four-toed Slider	X	X	
Lerista muelleri	Dwarf Three-toed Slider	X		
Lerista punctatovittata	Spotted Slider	X	X	X
Menetia greyii	Dwarf Skink	X	X	X
Morethia adelaidensis	Adelaide Snake-eye	X	X	
Morethia boulengeri	Common Snake-eye	X	X	X
Morethia obscura	Mallee Snake-eye	X	X	X
Tiliqua occipitalis	Western Bluetongue	X	X	X
Tiliqua rugosa	Sleepy Lizard	X	X	X
Tiliqua scincoides	Eastern Bluetongue	X	X	X
TYPHLOPIDAE				
Ramphotyphlops australis	Southern Blind Snake	X	X	
Ramphotyphlops bituberculatus	Rough-nosed Blind Snake	X	X	
VARANIDAE				
Varanus gouldii	Sand Goanna	X	X	X
Varanus varius	Lace Monitor			X[12]

[12] Only known from two records along river corridor

APPENDIX XI

BIRD SPECIES RECORDED FROM THE MURRAY MALLEE

Taxonomy and status categories follow Horton (2000). Species are listed alphabetically by genus within family. Species records are shown from the collections of the South Australian Museum (SAM) at July 1991 and do not include specimens collected during the survey. Separate columns indicate species recorded on survey quadrats (SURVEY) and opportunistic records (OPP.) during the survey.

Introduced species are indicated with an asterisk.

SPECIES	Common Name	SA STATUS	AUST. STATUS	SURVEY	OPP.	SAM
ACANTHIZIDAE Acanthizinae						
Acanthiza apicalis	**Inland Brown Thornbill**			X	X	X
Acanthiza chrysorrhoa	**Yellow-rumped Thornbill**			X	X	X
Acanthiza iredalei	**Slender-billed Thornbill**	V		X	X	X
Acanthiza lineata	**Striated Thornbill**			X		
Acanthiza nana	**Yellow Thornbill**			X	X	X
Acanthiza pusilla	**Brown Thornbill**					X
Acanthiza reguloides	**Buff-rumped Thornbill**			X		X
Acanthiza uropygialis	**Chestnut-rumped Thornbill**			X		X
Aphelocephala leucopsis	**Southern Whiteface**			X	X	X
Calamanthus campestris	**Rufous Fieldwren**			X		X
Calamanthus cautus	**Shy Heathwren (Shy Hylacola)**			X	X	X
Pyrrholaemus brunneus	**Redthroat**	R		X		X
Sericornis frontalis	**White-browed Scrubwren**			X		X
Smicrornis brevirostris	**Weebill**			X	X	X
ACCIPITRIDAE Accipitrinae						
Accipiter cirrhocephalus	**Collared Sparrowhawk**			X	X	X
Accipiter fasciatus	**Brown Goshawk**			X		X
Aquila audax	**Wedge-tailed Eagle**			X		X
Circus approximans	**Swamp (Marsh) Harrier**			X		X
Circus assimilis	**Spotted Harrier**			X	X	X
Elanus axillaris	**Black-shouldered Kite**				X	X
Elanus scriptus	**Letter-winged Kite**					X
Haliastur sphenurus	**Whistling Eagle (Whistling Kite)**			X	X	X
Hieraaetus morphnoides	**Little Eagle**			X		X
Milvus migrans	**Black Kite**				X	X
AEGOTHELIDAE						
Aegotheles cristatus	**Australian Owlet-nightjar**			X		X
ALAUDIDAE						
****Alauda arvensis***	**Skylark**			X	X	X
Mirafra javanica	**Singing Bushlark**				X	X
ALCEDINIDAE Halcyoninae				X		
Dacelo novaeguineae	**Laughing Kookaburra**			X		X
Todiramphus pyrrhopygia	**Red-backed Kingfisher**				X	X
Todiramphus sancta	**Sacred Kingfisher**			X		X
ANATIDAE Anatinae						
Anas castanea	**Chestnut Teal**				X	X

SPECIES	Common Name	SA STATUS	AUST. STATUS	SURVEY	OPP.	SAM
Anas platyrhynchos	**Mallard**					**X**
Anas rhynchotis	**Australasian Shoveler (Blue-winged Shoveler)**	**R**				**X**
Anas superciliosa	**Pacific Black Duck (Black Duck)**					**X**
Aythya australis	**Hardhead (White-eyed Duck)**					**X**
Chenonetta jubata	**Wood Duck (Maned Goose, Maned Duck)**				**X**	**X**
Malacorhynchus membranaceus	**Pink-eared Duck**					**X**
ANATIDAE Anserinae						
Cereopsis novaehollandiae	**Cape Barren Goose**	**R**		**X**		**X**
Cygnus atratus	**Black Swan**				**X**	**X**
ANATIDAE Dendrocygninae						
Dendrocygna eytoni	**Plumed Whistling-Duck**					**X**
ANATIDAE Oxyurinae						
Biziura lobata	**Musk Duck**	**R**				**X**
Oxyura australis	**Blue-billed Duck**	**R**				**X**
ANATIDAE Stictonettinae						
Stictonetta naevosa	**Freckled Duck**	**V**				**X**
ANATIDAE Tadorninae						
Tadorna tadornoides	**Mountain Duck (Australasian Shelduck)**				**X**	**X**
ANHINGIDAE						
Anhinga melanogaster	**Darter**					**X**
APODIDAE						
Apus pacificus	**Fork-tailed Swift**					**X**
ARDEIDAE						
Ardea alba	**Great (White) Egret**				**X**	**X**
Ardea ibis	**Cattle Egret**					**X**
Ardea pacifica	**Pacific (White-necked) Heron**				**X**	**X**
Botaurus poiciloptilus	**Australasian Bittern (Brown Bittern)**	**V**				**X**
Egretta garzetta	**Little Egret**					**X**
Egretta novaehollandiae	**White-faced Heron**			**X**		**X**
Ixobrychus minutus	**Little Bittern**	**R**				**X**
Nycticorax caledonicus	**Nankeen Night Heron (Rufous Night Heron)**					**X**
ARTAMIDAE						
Artamus cinereus	**Black-faced Woodswallow**					**X**
Artamus cyanopterus	**Dusky Woodswallow**			**X**	**X**	**X**
Artamus leucorhynchus	**White-breasted Woodswallow**					**X**
Artamus personatus	**Masked Woodswallow**			**X**	**X**	**X**
Artamus superciliosus	**White-browed Woodswallow**			**X**	**X**	**X**
Cracticus nigrogularis	**Pied Butcherbird**					**X**
Cracticus torquatus	**Grey Butcherbird**			**X**		**X**
Gymnorhina tibicen	**White-backed Magpie**			**X**	**X**	**X**
Strepera versicolor	**Grey Currawong**			**X**	**X**	**X**
Burhinus grallarius	**Bush Stone-curlew (Southern Stone-curlew, Bush Thick-knee)**	**V**				**X**

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CACATUIDAE						
Cacatua galerita	**Sulfur-crested Cockatoo**					**X**
Cacatua leadbeateri	**Major Mitchell's Cockatoo**	**R**		**X**	**X**	**X**
Cacatua roseicapilla	**Galah**			**X**	**X**	**X**
Cacatua sanguinea	**Little Corella**			**X**	**X**	**X**
Cacatua tenuirostris	**Long-billed Corella**					**X**
Calyptorhynchus funereus	**Yellow-tailed Black-cockatoo**	**V**		**X**	**X**	
Nymphicus hollandicus	**Cockatiel**			**X**	**X**	**X**
CAMPEPHAGIDAE						
Coracina maxima	**Ground Cuckooshrike**			**X**		**X**
Coracina novaehollandiae	**Black-faced Cuckooshrike**			**X**	**X**	**X**
Coracina papuensis	**White-bellied Cuckoo-shrike**	**R**				**X**
Lalage tricolor	**White-winged Triller**			**X**	**X**	**X**
CAPRIMULGIDAE						
Eurostopodus argus	**Spotted Nightjar**			**X**	**X**	**X**
CASUARIIDAE						
Dromaius novaehollandiae	**Emu**			**X**	**X**	**X**
CHARADRIIDAE						
Charadrius australis	**Inland Dotterel**					**X**
Charadrius ruficapillus	**Red-capped Dotterel (Red-capped Plover)**				**X**	**X**
Elseyornis melanops	**Black-fronted Dotterel (Black-fronted Plover)**				**X**	**X**
Erythrogonys cinctus	**Red-kneed Dotterel**					**X**
Vanellus miles	**Masked Lapwing**			**X**	**X**	**X**
Vanellus tricolor	**Banded Plover (Banded Lapwing)**			**X**	**X**	**X**
CLIMACTERIDAE						
Climacteris affinis	**White-browed Treecreeper**	**R**				**X**
Climacteris picumnus	**Brown Treecreeper**			**X**		**X**
Cormobates leucophaeus	**White-throated Treecreeper**					**X**
COLUMBIDAE						
****Columba livia***	**Feral Pigeon (Rock Dove)**			**X**	**X**	
Geopelia cuneata	**Diamond Dove**					**X**
Geopelia placida	**Peaceful Dove**			**X**		**X**
Ocyphaps lophotes	**Crested Pigeon**			**X**	**X**	**X**
Phaps chalcoptera	**Common Bronzewing**			**X**	**X**	**X**
Phaps elegans	**Brush Bronzewing**			**X**		**X**
****Streptopelia chinensis***	**Spotted Turtle-dove**			**X**		**X**
CORCORACIDAE						
Corcorax melanorhamphos	**White-winged Chough**			**X**	**X**	**X**
Struthidea cinerea	**Apostlebird**				**X**	**X**
CORVIDAE						
Corvus bennetti	**Little Crow**			**X**		**X**
Corvus coronoides	**Australian Raven**			**X**		**X**
Corvus mellori	**Little Raven**			**X**	**X**	**X**
CUCULIDAE						
Cacomantis flabelliformis	**Fan-tailed Cuckoo**			**X**		**X**
Chrysococcyx basalis	**Horsfield's Bronze Cuckoo (Rufous-tailed Bronze Cuckoo)**			**X**	**X**	**X**
Chrysococcyx osculans	**Black-eared Cuckoo**			**X**	**X**	**X**

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Cuculus pallidus	Pallid Cuckoo			X	X	X
DICAEIDAE						
Dicaeum hirundinaceum	Mistletoebird			X		X
DICRURIDAE						
Grallina cyanoleuca	Magpie-lark			X	X	X
Myiagra cyanoleuca	Satin Flycatcher	R				X
Myiagra inquieta	Restless Flycatcher (Scissor-grinder)			X		X
Rhipidura albiscapa	Grey Fantail			X	X	X
Rhipidura leucophrys	Willie Wagtail			X	X	X
Rhipidura rufifrons	Rufous Fantail					X
ESTRILDIDAE						
Stagonopleura bella	Beautiful Firetail	R				X
Stagonopleura guttata	Diamond Firetail	V		X		X
Taeniopygia guttata	Zebra Finch			X		X
EUPETIDAE						
Cinclosoma castanotum	Chestnut Quailthrush	R		X	X	X
Psophodes nigrogularis	Western Whipbird	V	V			X
FALCONIDAE						
Falco berigora	Brown Falcon			X	X	X
Falco cenchroides	Nankeen Kestrel			X		X
Falco longipennis	Australian Hobby			X	X	X
Falco peregrinus	Peregrine Falcon	R		X	X	X
Falco subniger	Black Falcon				X	X
FRINGILLIDAE Fringillinae						
**Carduelis carduelis*	Goldfinch			X		X
GLAREOLIDAE						
Glareola maldivarum	Oriental Pratincole					X
Stiltia isabella	Australian Pratincole					X
HAEMATOPODIDAE						
Haematopus longirostris	Pied Oystercatcer					X
HIRUNDINIDAE						
Cheramoeca leucosternum	White-backed Swallow				X	X
Hirundo neoxena	Welcome Swallow			X	X	X
Petrochelidon ariel	Fairy Martin			X	X	X
Petrochelidon nigricans	Tree Martin			X	X	X
LARIDAE Larinae						
Larus novaehollandiae	Silver Gull			X		X
LARIDAE Sterninae						
Chlidonias hybridus	Whiskered Tern			X		X
Sterna bergii	Crested Tern					X
Sterna caspia	Caspian Tern					X
Sterna nilotica	Gull-billed Tern					X
MALURIDAE Amytornithinae						
Amytornis striatus	Striated Grasswren	R				X
MALURIDAE Malurinae						
Malurus cyaneus	Superb Fairy Wren			X	X	X
Malurus lamberti	Variegated Wren			X	X	X
Malurus leucopterus	White-winged Wren			X		X
Malurus splendens	Black-backed Wren			X	X	X
Stipiturus malachurus	Southern Emu-wren	R		X		X

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Stipiturus mallee	Mallee Emu-wren	V	V			X
MEGAPODIIDAE						
Leipoa ocellata	Malleefowl	V	V	X	X	X
MELIPHAGIDAE						
Acanthagenys rufogularis	Spiny-cheeked Honeyeater			X	X	X
Anthochaera carunculata	Red Wattlebird			X	X	X
Anthochaera chrysoptera	Little Wattlebird			X		X
Certhionyx niger	Black Honeyeater					X
Certhionyx variegatus	Pied Honeyeater					X
Entomyzon cyanotis	Blue-faced Honeyeater	R			X	X
Gliciphila melanops	Tawny-crowned Honeyeater			X	X	X
Lichenostomus chrysops	Yellow-faced Honeyeater					X
Lichenostomus cratitius	Purple-gaped Honeyeater			X	X	X
Lichenostomus leucotis	White-eared Honeyeater			X	X	X
Lichenostomus ornatus	Yellow-plumed Honeyeater			X	X	X
Lichenostomus penicillatus	White-plumed Honeyeater			X	X	X
Lichenostomus plumulus	Grey-fronted Honeyeater			X		X
Lichenostomus virescens	Singing Honeyeater			X	X	X
Manorina flavigula	Yellow-throated Miner			X		X
Manorina melanocephala	Noisy Miner			X	X	X
Melithreptus brevirostris	Brown-headed Honeyeater			X	X	X
Melithreptus lunatus	White-naped Honeyeater					X
Philemon citreogularis	Little Friarbird	R				X
Phylidonyris albifrons	White-fronted Honeyeater			X		X
Phylidonyris novaehollandiae	New Holland Honeyeater			X	X	X
Plectorhyncha lanceolata	Striped Honeyeater	R		X		X
MELIPHAGIDAE Epthianurinae						
Ashbyia lovensis	Gibberbird					X
Epthianura albifrons	White-fronted Chat			X		X
Epthianura aurifrons	Orange Chat					X
Epthianura tricolor	Crimson Chat			X	X	X
MEROPIDAE						
Merops ornatus	Rainbow Bee-eater			X	X	X
MOTACILLIDAE						
Anthus novaeseelandiae	Richard's Pipit			X	X	X
MUSCICAPIDAE						
**Turdus merula*	Blackbird			X		X
NEOSITTIDAE						
Daphoenositta chrysoptera	Varied Sitttella			X		X
OTIDIDAE						
Ardeotis australis	Australian Bustard	V				X
PACHYCEPHALIDAE						
Colluricincla harmonica	Grey Shrikethrush			X	X	X
Oreoica gutturalis	Crested Bellbird			X	X	X
Pachycephala inornata	Gilbert's Whistler			X		X
Pachycephala pectoralis	Golden Whistler			X	X	X
Pachycephala rufiventris	Rufous Whistler			X		X
Pachycephala rufogularis	Red-lored Whistler	V	V			X

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PARDALOTIDAE						
Pardalotus punctatus	**Spotted Pardalote**			**X**		**X**
Pardalotus striatus	**Striated Pardalote**			**X**	**X**	**X**
PASSERIDAE Passerinae						
****Passer domesticus***	**House Sparrow**			**X**		**X**
PEDIONOMIDAE						
Pedionomus torquatus	**Plains-wanderer**	**E**	**V**			**X**
PELECANIDAE						
Pelecanus conspicillatus	**Australian Pelican**			**X**	**X**	**X**
PETROICIDAE						
Drymodes brunneopygia	**Southern Scrub-robin**			**X**	**X**	**X**
Melanodryas cucullata	**Hooded Robin**			**X**	**X**	**X**
Microeca fascinans	**Jacky Winter**			**X**		**X**
Petroica goodenovii	**Red-capped Robin**			**X**	**X**	**X**
Petroica multicolor	**Scarlet Robin**				**X**	**X**
Petroica phoenicea	**Flame Robin**	**R**				**X**
PHALACROCORACIDAE						
Phalacrocorax carbo	**Great Cormorant**			**X**	**X**	**X**
Phalacrocorax melanoleucos	**Little Pied Cormorant**					**X**
Phalacrocorax sulcirostris	**Little Black Cormorant**				**X**	**X**
Phalacrocorax varius	**Pied Cormorant**					**X**
PHASIANIDAE						
Coturnix chinensis	**King Quail**	**E**				**X**
Coturnix pectoralis	**Stubble Quail**				**X**	**X**
PODARGIDAE						
Podargus strigoides	**Tawny Frogmouth**			**X**	**X**	**X**
PODICIPEDIDAE						
Poliocephalus poliocephalus	**Hoary-headed Grebe**					**X**
Tachybaptus novaehollandiae	**Australasian Grebe**				**X**	**X**
POMATOSTOMIDAE						
Pomatostomus ruficeps	**Chestnut-crowned Babbler**			**X**		**X**
Pomatostomus superciliosus	**White-browed Babbler**			**X**	**X**	**X**
PSITTACIDAE						
Barnardius zonarius	**Australian Ringneck**			**X**	**X**	**X**
Glossopsitta concinna	**Musk Lorikeet**				**X**	**X**
Glossopsitta porphyrocephala	**Purple-crowned Lorikeet**			**X**	**X**	**X**
Glossopsitta pusilla	**Little Lorikeet**	**V**				**X**
Melopsittacus undulatus	**Budgerigah**			**X**	**X**	**X**
Neophema chrysostoma	**Blue-winged Parrot**	**V**		**X**		**X**
Neophema elegans	**Elegant Parrot**			**X**	**X**	**X**
Neophema splendida	**Scarlet-chested Parrot**	**R**				**X**
Northiella haematogaster	***Bluebonnet***			***X***	***X***	***X***
Platycercus elegans	**Crimson Rosella and Yellow Rosella**			**X**	**X**	**X**
Platycercus eximius	**Eastern Rosella**			**X**		**X**
Polytelis anthopeplus	**Regent Parrot**	**V**	**V**			**X**
Psephotus haematonotus	**Red-rumped Parrot**			**X**	**X**	**X**
Psephotus varius	**Mulga Parrot**			**X**	**X**	**X**
Trichoglossus haematodus	**Rainbow Lorikeet**					**X**

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PYCNONOTIDAE						
***Pycnonotus jocosus**	**Red-whiskered Bulbul**					**X**
RALLIDAE						
Fulica atra	**Eurasian Coot**					**X**
Gallinula tenebrosa	**Dusky Moorhen**					**X**
Gallinula ventralis	**Black-tailed Native-hen**			**X**	**X**	**X**
Gallirallus philippensis	**Buff-banded Rail (Banded Landrail)**					**X**
Porphyrio porphyrio	**Purple Swamphen**				**X**	**X**
Porzana fluminea	**Australian Spotted Crake**					**X**
Porzana pusilla	**Baillon's Crake (Marsh Crake)**	**R**				**X**
Porzana tabuensis	**Spotless Crake**					**X**
Rallus pectoralis	**Lewin's Rail**	**V**				**X**
RECURVIROSTRIDAE						
Cladorhynchus leucocephalus	**Banded Stilt**					**X**
Himantopus leucocephalus	**Black-winged Stilt (White-headed Stilt)**					**X**
Recurvirostra novaehollandiae	**Red-necked Avocet**					**X**
SCOLOPACIDAE Calidrinae						
Calidris acuminata	**Sharp-tailed Sandpiper**					**X**
Calidris alba	**Sanderling**					**X**
Calidris canutus	**Red Knot**					**X**
Calidris ferruginea	**Curlew Sandpiper**					**X**
Calidris melanotos	**Pectoral Sndpiper**					**X**
Calidris ruficollis	**Red-necked Stint**					**X**
Calidris subminuta	**Long-toed Stint**					**X**
Calidris tenuirostris	**Great Knot**					**X**
SCOLOPACIDAE Gallinagoninae						
Gallinago hardwickii	**Latham's Snipe (Japanese Snipe)**					**X**
SCOLOPACIDAE Tringinae						
Tringa glareola	**Wood Sandpiper**					**X**
Tringa nebularia	**Greenshank**				**X**	**X**
Tringa stagnatilis	**Marsh Sandpiper**					**X**
STRIGIDAE						
Ninox novaeseelandiae	**Southern Boobook**			**X**	**X**	**X**
STURNIDAE						
***Sturnus vulgaris**	**(Common,European) Starling**			**X**		**X**
SYLVIIDAE Acrocephalinae						
Acrocephalus australis	**Clamorous Reedwarbler**				**X**	**X**
SYLVIIDAE Cisticolinae						
Cisticola exilis	**Golden-headed Cisticila**	**R**				**X**
SYLVIIDAE Megalurinae						
Cincloramphus cruralis	**Brown Songlark**			**X**	**X**	**X**
Cincloramphus mathewsi	**Rufous Songlark**			**X**		**X**
Megalurus gramineus	**Little Grassbird**					**X**
THRESKIORNITHIDAE						
Platalea flavipes	**Yellow-billed Spoonbill**			**X**	**X**	**X**

Platalea regia	**Royal Spoonbill**					**X**
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Plegadis falcinellus	**Glossy Ibis**	**R**				**X**
Threskiornis molucca	**Australian White Ibis**			**X**		**X**
Threskiornis spinicollis	**Straw-necked Ibis**			**X**	**X**	**X**
TURNICIDAE						
Turnix varia	**Painted Button-quail**	**V**				**X**
Turnix velox	**Little Button-quail**				**X**	**X**
TYTONIDAE						
Tyto alba	**Barn Owl**					**X**
Tyto novaehollandiae	**Masked Owl**	**E**				**X**
ZOSTEROPIDAE						
Zosterops lateralis	**Silvereye**			**X**	**X**	**X**