FLORA AND FAUNA SURVEY OF GUM LAGOON CONSERVATION PARK 1995-1996,

AND IMPLICATIONS FOR PARK MANAGEMENT

R. J.-P. Davies,

Nature Conservation Society of SA Inc.

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THE NCSSA

The Nature Conservation Society of South Australia Inc. (NCSSA) is a voluntary organisation, whose aim is to foster conservation of the State's biodiversity. Members come from a wide range of ages and interests. We organise a variety of activities, including speakers at monthly meetings and regular biological surveys. While some grants are received to support particular projects and to assist in our administration, much of the work of the Society is done on a voluntary basis.

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NCSSA also presents informed submissions to various levels of government and is active in lobbying on issues such as biodiversity conservation, nature reserves, off-park conservation and natural resources legislation.

Membership is open to everyone, and the bi-monthly newsletter *Xanthopus* ensures that members are updated on Society activities.

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FRONT COVER: River red gums at Gum Lagoon

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The majority of the data presented in this report was collected during two major week long flora and fauna surveys in Gum Lagoon Conservation Park, undertaken by the Nature Conservation Society of South Australia, in September 1995 and October 1996. This was supplemented by subsequent flora surveys by Richard Davies (assisted by volunteers Phillipa Tansing and Samantha Laver) and by Rosemary Taplin and Denzel Murfet; and by historical bird surveys from 1982 to present by Hugh and Max Possingham. Data from clearance applications assessments, held by the Department for Environment, Heritage and Aboriginal Affairs, for areas now included in the park, have also been included.

Persons involved in the project were as follows:

Coordinators:	Hugh Possingham, Max Possingham, Jason van Weenen (1995); Richard Davies (1996)
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EXECUTIVE SUMMARY

This report describes in details the findings of two Nature Conservation Society of South Australia surveys of the flora and vertebrate fauna of Gum Lagoon Conservation Park, in September 1995 and October 1996. This is supplemented by information from associated vegetation and bird surveys, and data in the DEHAA "Reserves Database".

A total of 39 vegetation quadrats, 29 vertebrate sites and 52 bird sites were sampled throughout the park, covering all landforms and soil types in the park, using the "Biological Survey of South Australia" methodology.

The findings of the above study were as follows:

- 11 distinct floristic communities were identified in the Gum Lagoon Conservation Park, including five that are threatened in the South East.
- Three hundred and seventy five indigenous plant species were recorded in the park, including four which are nationally threatened or rare, 42 which are threatened, rare or uncommon in South Australia, and 28 threatened, rare or uncommon in the South East region.
- Twelve native mammal species were recorded in the park, including three that are rare in South Australia, and one rare in the South East region.
- Nineteen reptile species and five amphibian species were recorded in the park, including one lizard which is rare in South Australia and threatened in the South East, and another that is regionally rare.
- One hundred and forty six native bird species were recorded in the park, including three which are nationally threatened or rare, thirteen which are threatened, or rare in South Australia, and 31 which are threatened, rare or uncommon in the South East region.
- Sixty two exotic plant species, eight feral mammals species and five introduced bird species where recorded for the park.

Each of the most significant plant communities, and flora & fauna species found in the park is discussed in detail, including threats to, and management recommendations for, each species.

MANAGEMENT RECOMMENDATIONS

The following recommendations were made, based on the survey findings:

> Drains should not be constructed through Gum Lagoon Conservation Park, or near enough to the park to change the park's hydrology. ***ONGOING PRIORITY***
>
> New tracks should not be constructed within the park, and a program of closure of the existing tracks through sensitive areas should be implemented. ***HIGH PRIORITY***
>
> Firebreaks around and through the park should be maintained using a slasher rather than a bulldozer, using washed down equipment and working from the least weedy areas to the more weedy areas. ***ONGOING PRIORITY***
>
> The length of firebreak supporting the nationally threatened *Senecio macrocarpus* (large-fruit groundsel) should only be slashed in late autumn after the *Senecio* has died back to its rootstock, and slashing should be undertaken sufficiently frequently to suppress the regeneration of *Melaleuca*. ***VERY HIGH PRIORITY***

Burning trial (along with monitoring and post fire weeding) should be undertaken in the vicinity of known populations of the nationally threatened large-fruit groundsel (*Senecio macrocarpus*) and metallic sun-orchid (*Thelymitra epipactoides*). ***HIGH PRIORITY***

The Fire Management Plan for Gum Lagoon Conservation Park needs to take into account the habitat requirements of the nationally significant Slender-billed Thornbill (*Acanthiza iredalei hedleyi*) and Malleefowl (*Leipoa ocellata*). ***HIGH PRIORITY***

The control of perennial veldt grass (**Ehrharta calycina*) and bridle creeper (**Myrsiphyllum asparagoides*) within the park, should be given a ***VERY HIGH PRIORITY***.

Weed control in the vicinity of metallic sun-orchid (*Thelymitra epipactoides*), large-fruit groundsel (*Senecio macrocarpus*), and dwarf centrolepis (*Centrolepis cephaloformis* ssp. *cephaloformis*) should be given a ***VERY HIGH PRIORITY***.

Weed management in regionally threatened plant communities in the park should be given ***VERY HIGH PRIORITY***, in particular:
river red gum (*Eucalyptus camaldulensis*) Open Forest/Woodland
South Australian blue gum (*Eucalyptus leucoxylon*) Low Open Forest/Low Woodland
Wimmera mallee (*E. wimmerensis*) Open Mallee

The control of rabbits in the park is of ***VERY HIGH PRIORITY***, especially in the vicinity of:
the nationally endangered metallic sun-orchid (*Thelymitra epipactoides*)
nesting mounds of the nationally vulnerable Malleefowl (*Leipoa ocellata*)
warrens of the Common Wombat (*Vombatus ursinus*), which is rare in South Australia
the regionally threatened plant communities South Australian blue gum (*Eucalyptus leucoxylon*) Low Open Forest/Low Woodland, and Wimmera mallee (*E. wimmerensis*) Open Mallee

The control of foxes is of ***VERY HIGH PRIORITY*** in the park, especially in the vicinity of:
nesting mounds of the nationally vulnerable Malleefowl (*Leipoa ocellata*)
populations of the the nationally significant Slender-billed Thornbill (*Acanthiza iredalei hedleyi*)
populations of Red-necked Wallaby (*Macropus rufogriseus*), which is rare in South Australia.

The control of goats is of ***HIGH PRIORITY*** in the park.

Local field days should be held to inform adjacent landholders about the occurrence and significance of Eastern Grey Kangaroo (*Macropus giganteus*), Red-necked Wallaby (*Macropus rufogriseus*), and Common Wombat (*Vombatus ursinus*) in the park. ***HIGH PRIORITY***

Permanent quantitative vegetation monitoring sites urgently need to be set up in a selection of wetlands in the park, including in Gum Lagoon and Naen Naen swamps, to determine any long term trends attributable to changes in hydrology. ***VERY HIGH PRIORITY***

Permanent quantitative monitoring sites urgently needs to be set up for the Gum Lagoon Conservation Park populations of metallic sun-orchid (*Thelymitra epipactoides*), and large-fruit groundsel (*Senecio macrocarpus*), to determine long term trends in population size for these nationally threatened species. ***VERY HIGH PRIORITY***

An ongoing quantitative program of monitoring wetland birds urgently needs to be set up in a selection of wetlands in the park, including Gum Lagoon and Naen Naen swamps, to determine any long term trends attributable to changes in hydrology. ***VERY HIGH PRIORITY***

An ongoing quantitative monitoring program needs to be set up to determine long term trends in population size for the nationally significant Malleefowl (*Leipoa ocellata*) and Slender-billed Thornbill (*Acanthiza iredalei hedleyi*) in Gum Lagoon Conservation Park. ***VERY HIGH PRIORITY***

A kangaroo-proof fence around the area of scrubby blue gum (*Eucalyptus leucoxylon* ssp. *stephaniae*) Low Open Forest in the south western corner of Section 9 Hundred Wells needs to be constructed to prevent heavy browsing of the understorey of this regionally threatened plant community. ***HIGH PRIORITY***

INTRODUCTION

by R. Davies

Gum Lagoon Conservation Park is situated in the South East of South Australia (Figure 1). At 8437 hectares in size, Gum Lagoon Conservation Park contains one of the largest areas of non-coastal wetland native vegetation remaining in the region.

The western 4013 hectares of Gum Lagoon Conservation Park was proclaimed in 1972, with a further two parcels of land (totalling 2573 hectares) to the east of the initial area being proclaimed in 1983 and 1988 respectively. In response to applications to clear native vegetation on Naen Naen Park Station and Section 27 Hundred of Laffer, a further 1947 hectares of native vegetation to the north-east of the original area, was acquired and proclaimed as an addition to the park in 1993.

Prior to the current survey, the flora and fauna of Gum Lagoon Conservation Park was poorly known. In the South East, reasonably detailed biological surveys comparable with the present survey in Gum Lagoon Conservation Park had only been carried out in Coorong National Park and Coorong Game Reserve (Robinson 1982), Messent Conservation Park (Owens *et al* 1995), and Big Heath Conservation Park (Paton 1983). The current survey is the first in the park to include vertebrate sampling and PATN analysis of vegetation communities.

All previous surveys of Gum Lagoon Conservation Park had been rapid surveys covering only localised areas of the park. These included plant and bird surveys in 1987 by Tim Croft of the Native Vegetation Retention Unit (NVRU) of the then Department of Environment and Planning (DEP), as part of the assessment of the above mentioned clearance applications. One quadrats was also sampled during the South East vegetation survey carried out by the Information Systems Branch, Department of Environment and Natural Resources (DENR), in 1991. A brief survey of Gum Lagoon Conservation Park was carried out by members of the NVRU in October 1984, but was never analysed and written up (Owens, *et al.* 1995).

The current survey was undertaken by the Nature Conservation Society of South Australia in response to need for biological information on Gum Lagoon Conservation Park to adequately assess the impact of a proposed major drain to be cut through the centre of the park. This drain was proposed by the Upper South East Dryland Salinity and Flood Management Plan (Upper South East Dryland Salinity and Flood Management Plan Steering Committee 1993) as part of an engineering scheme aimed at reducing the increasing salinity problems in the Upper South East.

The eastern sections of the park already contain minor drains and levees constructed before the area was acquired as a park. The levees were constructed along low-lying sections of eastern and southern boundaries of the park, and water flow into the park from adjacent private land is still being regulated by a number of minor gates. Localised dieback of areas of *Melaleuca brevifolia* immediately inside the park boundary at the eastern end of the park indicate that changes in hydrology are already having an impact on the park. The results of the present study will also provide information on how water flow from adjacent private land should be managed to maintain and enhance the existing biodiversity in the park.

This survey followed the methodology of a survey undertaken by DENR in 1994 (Owens *et al.* 1995), to assess the impact of the same scheme on Messent Conservation Park. However, the current survey was able to be more comprehensive as it was undertaken over two years instead of one in the case of the Messent survey. The seasonality of the Gum Lagoon survey

(September and October) was also different from that of the Messent survey (December), to maximise number of annual and geophyte plant species recorded. Both surveys utilised the standard sampling, analysis and presentation techniques developed as part of the Department of Environment Heritage and Aboriginal Affairs (DEHAA) 'Biological Survey of South Australia'.

Figure 1: Location of Gum Lagoon Conservation Park and adjacent conservation parks in the Upper South East of South Australia (map courtesy of Department for Environment & Heritage)

FLORA

by R. Davies

AIMS

The aims of this survey were to:

1. Collate all previous information on the vegetation of Gum Lagoon Conservation Park.
2. Sample the vegetation on all landforms and soil types in the park using the techniques and standards established for the 'Biological Survey of South Australia'.
3. Provide the State Herbarium with properly documented voucher specimens of the vascular plants collected during the survey.
4. Prepare and digitise a 1:10 000 scale vegetation map of the study area using the clearest, most-recent aerial photography available.
5. Enter all survey data into the South Australian Survey Database.
6. Carry out a pattern analysis of the vegetation data collected on the survey to define floristic plant communities using techniques established by the 'Biological Survey of South Australia'.
7. Identify significant plant communities occurring in the park, document in which habitats and locations they occur, and describe any threats.
8. Document the locations & habitats of, and threats to, populations of rare and threatened plant species occurring in the park.
9. Collect data relevant to the management of the vegetation in the park, in particular significant plant communities and threatened plant species.

METHODS

Thirty nine 30m X 30m vegetation quadrats sites were sampled throughout the park, sites being located to ensure coverage of all landforms and soil types in the park. The locations of these sites are presented in Table 1 and Figure 2, along with details on sampling dates. Sampling and recording was according to the techniques and standards established for the 'Biological Survey of South Australia' as described in Geographic Analysis and Research Unit (1997). Thirty four of these sites were also sampled for birds, while 25 were sampled for other vertebrates (Table 1).

Location data, along with detailed information on the physical environment and vegetation, was entered onto standard 'Biological Survey of South Australia' data sheets, for each quadrat. At least one voucher specimen was collected of every vascular plant species encountered in quadrats, along with details on the quadrat in which it was collected. Opportunistic collections were also made of species not encountered in quadrats. All specimens were lodged with the State Herbarium for identification or checking of field identifications and, depending on specimen quality, as many specimens as possible were incorporated into the Herbarium collection. Determinations were made by Rosemary Taplin.

Plant species lists for the park were compiled from the above data, along with data from the 1987 plant surveys by Tim Croft (DEP), and the 1991 South East vegetation survey by the Information Systems Branch, DENR. The DEHAA 'Reserve Database' was consulted to ensure that all available flora data for the park was incorporated.

Figure 2: Location of flora & fauna sampling sites in Gum Lagoon Conservation Park

Plant quadrat data was analysed using the PATN software package to determine floristic community groups as described by Belbin (1987a,b,c). ESRI's ARC/INFO Geographical Information Systems software was used to display species and group distribution and analyse geographic trends in the data. The analysis pathway using PATN is detailed in Copley and Kemper (1992).

Vegetation mapping was undertaken using aerial photography and extensive ground truthing.

Table 1: Location of flora and fauna sites sampled in Gum Lagoon Conservation Park, and the date of sampling

Site Id	Easting	Northing	1:50 000 Map Sheet	Landform	Flora	Birds	Vertebrates[1]
TIL 0201	407471	5986573	6825-2 TILLEY SWAMP	Dune slope	2/9/91		
GL00101	422800	5991850	6925-4 LAFFER	Dunefield	17/9/95	1995	16-19/9/95
GL00201	420750	5992700	6925-4 LAFFER	Plain	17/9/95	1995	16-20/9/95
GL00301	423700	5991100	6925-4 LAFFER	Floodplain	17/9/95	1995	16-19/9/95
GL00401	421900	5991650	6925-4 LAFFER	Dunefield	17/9/95	1995	16-19/9/95
GL00501	412600	5986400	6925-3 DIDICOOLUM	Hill	18/9/95	1995	17-20/9/95
GL00601	423250	5991450	6925-4 LAFFER	Consolidated dunefield	18/9/95	1995 & 1996	16-19/9/95
GL00701	422550	5990200	6925-4 LAFFER	Dunefield	19/9/95	1995	
GL00801	419300	5993250	6925-4 LAFFER	Sand plain	20/9/95	1995	
GL00901	413400	5985700	6925-3 DIDICOOLUM	Sand plain	18/9/95	1995	17-20/9/95
GL01001	413300	5985900	6925-3 DIDICOOLUM	Rises	18/9/95	1995	17-20/9/95
GL01101	418500	5988450	6925-4 LAFFER	Sand plain	20/9/95	1995	16-19/9/95
GL01201	418050	5988300	6925-4 LAFFER	Dunefield	19/9/95	1995	17-20/9/95
GL01301	412950	5982050	6925-3 DIDICOOLUM	Drainage line	19/9/95		
GL01401	412950	5983050	6925-3 DIDICOOLUM	Dunefield	19/9/95	1996	
GL01501	414100	5985750	6925-3 DIDICOOLUM	Floodplain	20/9/95	1995	
GL01601	413150	5985850	6925-3 DIDICOOLUM	Sand plain		1995	17-20/9/95
GL01701	413250	5985750	6925-3 DIDICOOLUM	Sand plain		1995	17-20/9/95
GL01801	413350	5985600	6925-3 DIDICOOLUM	Rise			17-20/9/95
GL01901	413200	5984050	6925-3 DIDICOOLUM	Rise		1996	17-20/9/95
GL02001	412800	5983100	6925-3 DIDICOOLUM	Rise	22/10/96	1996	2-5/10/96
GL02101	412600	5983300	6925-3 DIDICOOLUM	Low hills	22/10/96	1996	2-5/10/96
GL02201	412600	5983400	6925-3 DIDICOOLUM	Low hills	22/10/96	1996	2-5/10/96
GL02301	412500	5983600	6925-3 DIDICOOLUM	Rises	23/10/96	1996	2-5/10/96
GL02401	412400	5984100	6925-3 DIDICOOLUM	Rises	23/10/96	1996	2-5/10/96
GL02501	412300	5984500	6925-3 DIDICOOLUM	Rises	23/10/96	1996	
GL02601	411700	5984900	6925-3 DIDICOOLUM	Floodplain	23/10/96		
GL02701	411150	5985800	6925-3 DIDICOOLUM	Floodplain	24/10/96		
GL02801	408100	5986200	6825-2 TILLEY SWAMP	Hill	03/10/96	1996	2-6/10/96
GL02901	409100	5986400	6825-2 TILLEY SWAMP	Hill	03/10/96	1996	3-5/10/96
GL03001	408450	5985450	6825-2 TILLEY SWAMP	Consolidated dunefield	15/11/96	1996	2-5/10/96
GL03101	410550	5982950	6925-3 DIDICOOLUM	Rises	24/10/96	1996	3-5/10/96
GL03201	412000	5980100	6925-3 DIDICOOLUM	Low hills	24/10/96	1996	2-4/10/96
GL03301	425650	5986250	6925-3 DIDICOOLUM	Sand plain	16/11/96	1996	2-5/10/96
GL03401	425000	5986600	6925-3 DIDICOOLUM	Sand plain	16/11/96	1996	
GL03501	423950	5987000	6925-3 DIDICOOLUM	Sand plain	16/11/96	1996	2-5/10/96

Table 1 (continued): Location of flora and fauna sites sampled in Gum Lagoon Conservation Park, and the date of sampling

Site Id	Easting	Northing	1:50 000 Map Sheet	Landform	Flora	Birds	Vertebrates[1]
GL03601	424100	5986150	6925-3 DIDICOOLUM	Sand plain	17/11/96	1996	
GL03701	423500	5985400	6925-3 DIDICOOLUM	Sand plain	17/11/96	1996	
GL03801	423000	5983100	6925-3 DIDICOOLUM	Low rise		1996	2-5/10/96
GL03901	426700	5985250	6925-3 DIDICOOLUM	Sand plain	16/11/96	1996	
GL04001	416250	5988100	6925-4 LAFFER	Sand plain	04/10/96	1996	2-4/10/96
GL04101	421750	5992250	6925-4 LAFFER	Rises	02/10/96	1996	3-6/10/96
GL04201	423000	5990400	6925-4 LAFFER	Rises	02/10/96	1996	4-6/10/96
GL04301	412900	5982950	6925-3 DIDICOOLUM	Floodplain	24/10/96		
GL04401	425550	5985550	6925-3 DIDICOOLUM	Plain	17/11/96		
GL04501	421700	5991100	6925-4 LAFFER	Low hill		1995	
GL04601	415500	5988100	6925-4 LAFFER	Rises		1995	
GL04701	414500	5987800	6925-4 LAFFER	Rises		1995	
GL04801	414500	5987400	6925-3 DIDICOOLUM	Plain		1995	
GL04901	415500	5988300	6925-4 LAFFER	Low rises		1995	
GL05001	416000	5989600	6925-4 LAFFER	Low hills		1995	
GL05101	415500	5989000	6925-4 LAFFER	Plain		1995	
GL05201	413400	5986600	6925-3 DIDICOOLUM	Flood plain		1995	
GL05301	413400	5985700	6925-3 DIDICOOLUM	Flood plain		1995	
GL05401	414300	5986600	6925-3 DIDICOOLUM	Rise		1995	
GL05501	413300	5984700	6925-3 DIDICOOLUM	Rise		1995	
GL05601	413200	5985500	6925-3 DIDICOOLUM	Rise		1995	
GL05701	413500	5985400	6925-3 DIDICOOLUM	Flood plain		1995	
GL05801	412800	5986400	6925-3 DIDICOOLUM	Flood plain		1995	
GL05901	414400	5987000	6925-3 DIDICOOLUM	Rise		1995	
GL06001	413300	5987000	6925-3 DIDICOOLUM	Rise		1995	

[1] Vertebrates other than birds

RESULTS & DISCUSSION

Overview

Eleven distinct floristic vegetation groups were defined in Gum Lagoon Conservation Park as described below. Five plant communities found in the park are described as vulnerable in the South East (see *Significant Plant Communities* section below). A map showing extent of each plant communities in the park is given in Figure 3 (attached inside the back cover of the report).

Three hundred and seventy five indigenous plant species were recorded for the park, of which four species are nationally threatened or rare; 42 are threatened, rare or uncommon in South Australia; and 28 threatened, rare or uncommon in the South East (see *Significant Plant Species* section below). Complete lists of indigenous plant species recorded for the park are given in Appendices 2 & 3, along with their conservation ratings and record sources. Sixty two exotic plant species were also recorded for the park (Appendix 4).

Floristic Vegetation Analysis

A dendrogram showing the results of the vegetation analysis is presented in Figure 4. As a result of this analysis, ten distinct floristic vegetation groups were defined as described below. Another distinct wetland vegetation community is also described, although not sampled by quadrat methodology and thus not defined by the PATN analysis. The species composition of quadrats in each group is given in Appendix 1.

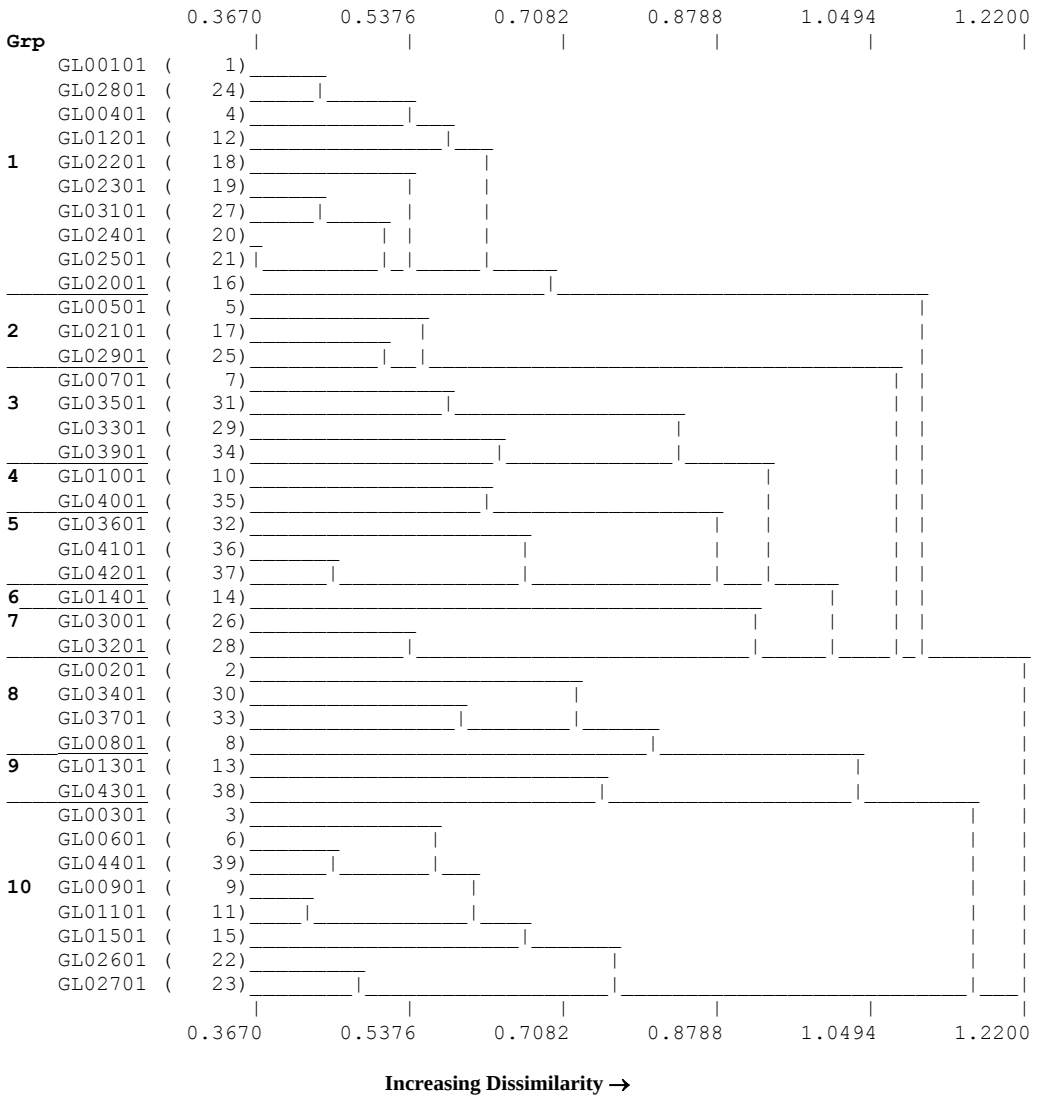

Figure 4: Dendrogram of Floristic Groups from the Vegetation Analysis of Gum Lagoon Conservation Park

Floristic Community Group 1

Dominant species & structure of overstoreys

1. *Banksia ornata-Xanthorrhoea caespitosa-Leptospermum myrsinoides* Shrubland
2. *Eucalyptus arenacea* Low (Open) Woodland
3. *E. fasciculosa* Low Open Woodland
4. *E. diversifolia* Open Mallee on sand

Description

This floristic community occupies extensive areas of the western and northeastern sections of Gum Lagoon Conservation Park where it occurs on ridges and swales, on skeletal sands.

The structure of this floristic community group varies from Low Woodlands and Low Open Woodlands dominated by *Eucalyptus arenacea* or *E. fasciculosa* over sparse *E. incrassata*, to Open Mallee dominated by *E. diversifolia*, to Shrublands dominated by *Banksia ornata*, *Xanthorrhoea caespitosa and Leptospermum myrsinoides*.

The analysis indicated no significant differences in understorey species composition between sites with the various Eucalypt overstoreys and treeless examples of this floristic community. In all instances, the middense shrub stratum is most frequently dominated by *Banksia ornata*, *Xanthorrhoea caespitosa*, *Leptospermum myrsinoides*, *Calytrix tetragona*, and *Hibbertia riparia*, and the sparse ground stratum by *Hypolaena fastigiata*, *Schoenus breviculmis*, and *Lepidobolus drapetocoleus.* Other frequently occurring species are listed in Table 2.

This floristic community group can be distinguished from other groups by the presence of the character species *Banksia ornata*, *Adenanthos terminalis*, *Calytrix alpestris*, *Phyllota pleurandroides* and *Cryptandra tomentosa*, and the absence of *Melaleuca uncinata.*

Significant plant species

Six species listed by Lang & Kraehenbuehl (1999) as being of state significance were recorded from this community. One of these species (*Sphaerolobium minus*) is listed as rare, and while five are uncommon (viz. *Thelymitra benthamiana, Hakea repullulans, Phyllota remota, Santalum murrayanum, Leucopogon woodsii*). A further three species which are uncommon at the regional level were also recorded (viz. *Acacia brachybotrya, Pultenaea acerosa, Boronia filifolia*).

Table 2: The most frequent plant species occurring in Floristic Community Group 1, their frequencies and proportional occurrences in quadrats sampling this community in Gum Lagoon Conservation Park, and total numbers of floristic community groups in which each was recorded

	Cover abundance									
Species	R	T	1	2	3	4	5	Freq.	Prop. occur.	No. gps
Hibbertia riparia	1	0	8	1	0	0	0	10	1	7
Hypolaena fastigiata	1	0	9	0	0	0	0	10	1	5
Schoenus breviculmis	0	4	6	0	0	0	0	10	1	3
Xanthorrhoea caespitosa	0	1	6	3	0	0	0	10	1	4
Correa reflexa	3	6	0	0	0	0	0	9	0.9	5
Lepidobolus drapetocoleus	0	2	7	0	0	0	0	9	0.9	4
Lepidosperma carphoides	4	3	2	0	0	0	0	9	0.9	4
Leptospermum myrsinoides	0	0	8	1	0	0	0	9	0.9	5
Adenanthos terminalis	2	5	1	0	0	0	0	8	0.8	1
Banksia ornata	0	2	4	1	0	1	0	8	0.8	2
Calytrix alpestris	3	4	1	0	0	0	0	8	0.8	2
Calytrix tetragona	1	2	5	0	0	0	0	8	0.8	6
Daviesia brevifolia	2	6	0	0	0	0	0	8	0.8	3
Astroloma conostephioides	1	4	2	0	0	0	0	7	0.7	3
Billardiera cymosa	7	0	0	0	0	0	0	7	0.7	6
Boronia coerulescens ssp. *coerulescens*	2	5	0	0	0	0	0	7	0.7	3
Brachyloma ericoides ssp. *ericoides*	3	4	0	0	0	0	0	7	0.7	7
Cryptandra tomentosa	6	1	0	0	0	0	0	7	0.7	2
Dillwynia hispida	1	6	0	0	0	0	0	7	0.7	2
Drosera macrantha ssp. *planchonii*	3	2	2	0	0	0	0	7	0.7	2
Isopogon ceratophyllus	1	4	2	0	0	0	0	7	0.7	4
Leucopogon costatus	1	3	3	0	0	0	0	7	0.7	2
Allocasuarina muelleriana ssp. *muelleriana*	2	3	0	1	0	0	0	6	0.6	3
Allocasuarina pusilla	0	5	0	1	0	0	0	6	0.6	2
Baeckea behrii	3	0	1	2	0	0	0	6	0.6	3
Banksia marginata	0	4	2	0	0	0	0	6	0.6	6
Eucalyptus arenacea	1	0	2	3	0	0	0	6	0.6	1
Hibbertia sericea var.	1	0	5	0	0	0	0	6	0.6	7
Lepidosperma viscidum	0	0	6	0	0	0	0	6	0.6	5
Phyllota pleurandroides	2	0	3	1	0	0	0	6	0.6	1
Pyrorchis nigricans	2	4	0	0	0	0	0	6	0.6	4

Figure5: ***Eucalyptus arenacea*** **Low (Open) Woodland**

Figure 6: ***Banksia ornata-Xanthorrhoea caespitosa-Leptospermum myrsinoides*** **Shrubland**

Floristic Community Group 2

Dominant species & structure of overstorey

Eucalyptus diversifolia Low Mallee on calcrete

Description

This floristic community occupies the higher calcareous ridges in the western section of Gum Lagoon Conservation Park. The community occurs on limestone derived sands and loamy sands, with frequently outcropping calcrete.

Eucalyptus diversifolia dominates the top stratum of this floristic community, which varies from Low Mallee to Closed Mallee in structure. The shrub and ground strata are sparse to middense and most frequently dominated by *Acacia myrtifolia* var. *myrtifolia*, *Acrotriche cordata*, *Gahnia lanigera*, *Hakea vittata*, *Pomaderris obcordata*, *Lepidosperma viscidum*, and *Schoenus nitens.* Other frequently occurring species are listed in Table 3.

This floristic community group can be distinguished from other groups by the presence of the character species *Gahnia lanigera*, *Grevillea lavandulacea* var. *sericea*, *Hakea vittata*, *Olearia ciliata* var. *ciliata*, *Pomaderris obcordata,* and *Choretrum glomeratum.*

Figure 7: ***Eucalyptus diversifolia* Low Mallee on calcrete**

Significant plant species

One population of the perennial herb *Haloragis eichleri* was recorded from this community. This species is listed by Briggs & Leigh (1996) as nationally rare.

A further seven species listed by Lang & Kraehenbuehl (1999) as being of state or regional significance were also recorded from the community. This included one populations of *Euphrasia collina* ssp. *collina*, which is listed as poorly known but considered to either rare or threatened in South Australia. Of the six other significant taxa, two are uncommon at the state level (*Lomandra sororia*, *Grevillea lavandulacea* var. *sericea*), and four at the regional level (viz. *Acacia brachybotrya*, *Eucalyptus rugosa*, *Ixodia achillaeoides* ssp. *alata*, *Pultenaea acerosa*).

Table 3: The most frequent plant species occurring in Floristic Community Group 2, their frequencies and proportional occurrences in quadrats sampling this community in Gum Lagoon Conservation Park, and total numbers of floristic community groups in which each was recorded

	Cover abundance									
Species	R	T	1	2	3	4	5	Freq	Prop. occur.	No. gps
Acacia myrtifolia var. *myrtifolia*	0	2	1	0	0	0	0	3	1	2
Acrotriche cordata	0	0	2	1	0	0	0	3	1	2
Allocasuarina muelleriana ssp. *muelleriana*	3	0	0	0	0	0	0	3	1	3
Billardiera cymosa	3	0	0	0	0	0	0	3	1	6
Calytrix tetragona	1	1	1	0	0	0	0	3	1	6
Drosera macrantha ssp. *planchonii*	1	2	0	0	0	0	0	3	1	2
Eucalyptus diversifolia	0	0	0	1	0	1	1	3	1	3
Gahnia lanigera	0	0	3	0	0	0	0	3	1	1
Grevillea lavandulacea var. *sericea*	3	0	0	0	0	0	0	3	1	1
Hakea vittata	1	0	2	0	0	0	0	3	1	2
Hibbertia sericea	3	0	0	0	0	0	0	3	1	7
Olearia ciliata var. *ciliata*	3	0	0	0	0	0	0	3	1	1
Opercularia turpis	3	0	0	0	0	0	0	3	1	3
Pimelea glauca	1	2	0	0	0	0	0	3	1	2
Pomaderris obcordata	0	0	3	0	0	0	0	3	1	2
Pultenaea acerosa	0	2	1	0	0	0	0	3	1	2
Acacia spinescens	1	0	1	0	0	0	0	2	0.67	5
Cassytha glabella forma *dispar*	1	1	0	0	0	0	0	2	0.67	4
Choretrum glomeratum	1	1	0	0	0	0	0	2	0.67	1
Correa reflexa	1	1	0	0	0	0	0	2	0.67	5
Daviesia brevifolia	2	0	0	0	0	0	0	2	0.67	3
Diuris pardina	2	0	0	0	0	0	0	2	0.67	2
Eucalyptus leptophylla	1	1	0	0	0	0	0	2	0.67	3
Goodenia geniculata	1	1	0	0	0	0	0	2	0.67	4
Grevillea ilicifolia var. *ilicifolia*	1	1	0	0	0	0	0	2	0.67	2
Isopogon ceratophyllus	2	0	0	0	0	0	0	2	0.67	4
Lepidosperma viscidum	0	0	2	0	0	0	0	2	0.67	5
Lomandra micrantha ssp. *micrantha*	1	1	0	0	0	0	0	2	0.67	3
Melaleuca lanceolata ssp. *lanceolata*	2	0	0	0	0	0	0	2	0.67	3
Phyllangium divergens	0	1	1	0	0	0	0	2	0.67	6
Poranthera microphylla	2	0	0	0	0	0	0	2	0.67	3
Pterostylis plumosa	1	0	1	0	0	0	0	2	0.67	4
Schoenus nitens	0	0	2	0	0	0	0	2	0.67	4
Spyridium vexilliferum var. *vexilliferum*	1	0	1	0	0	0	0	2	0.67	2
Stackhousia aspericocca	1	1	0	0	0	0	0	2	0.67	4
Tetraria capillaris	0	1	1	0	0	0	0	2	0.67	4
Thomasia petalocalyx	1	1	0	0	0	0	0	2	0.67	6
Thysanotus patersonii	2	0	0	0	0	0	0	2	0.67	5
Xanthorrhoea caespitosa	2	0	0	0	0	0	0	2	0.67	4
Xanthosia dissecta var. *floribunda*	1	1	0	0	0	0	0	2	0.67	3

Floristic Community Group 3

Dominant species & structure of overstoreys

1. *Eucalyptus incrassata* (Open) Mallee
2. *E. leucoxylon* Very Low Open Woodland

Description

This floristic community occurs on low undulating sand rises on plains subject to seasonal inundation by water of low salinity. It is mainly confined to localised areas at the eastern ends of the north eastern and eastern sections of the Conservation Park.

The structure of the top strata of this floristic community group varies from middense to very sparse and is most frequently dominated by *Eucalyptus incrassata* or less frequently *E. leucoxylon.* The shrub and ground strata are middense and sparse respectively, and most frequently dominated by *Melaleuca uncinata*, *M. brevifolia*, *Baeckea behrii*, *Darwinia micropetala*, *Hibbertia riparia*, *Dillwynia hispida*, *Pultenaea tenuifolia*, *Baumea juncea*, and *Hypolaena fastigiata.* Other frequently occurring species are listed in Table 4.

This floristic community group can be distinguished from other groups by the presence of the character species *Melaleuca uncinata*, *Exocarpos sparteus*, *Darwinia micropetala*, *Dillwynia hispida*, and *Levenhookia pusilla*, and the absence of *Melaleuca lanceolata*, *Adenanthos terminalis*, *Phyllota pleurandroides*, *Hakea nodosa* and *Gahnia filum.*

Significant plant species

Five species of state significance were recorded from this community, of which four (*Schoenus sculptus, Comesperma polygaloides, Isolepis stellata, Phyllangium distylis*) are listed by Lang & Kraehenbuehl (1999) as rare, and one as uncommon (viz. *Orthoceras strictum*). Of these, one (*Schoenus sculptus*) is considered vulnerable in the South East.

A further three species listed as regionally rare (*Trachymene pilosa, Gnephosis drummondii, Stylidium calcaratum*) and three regionally uncommon species (*Boronia filifolia, Dichelachne crinita, Stipa mundula*) were also recorded from the community.

Table 4: The most frequent plant species occurring in Floristic Community Group 3, their frequencies and proportional occurrences in quadrats sampling this community in Gum Lagoon Conservation Park, and total numbers of floristic community groups in which each was recorded

	Cover abundance								Prop.	No.
Species	R	T	1	2	3	4	5	Total	occur.	Gps
Calytrix tetragona	2	2	0	0	0	0	0	4	1	6
Eucalyptus incrassata	1	0	1	1	1	0	0	4	1	5
Hibbertia riparia	0	1	2	1	0	0	0	4	1	7
Levenhookia pusilla	2	1	1	0	0	0	0	4	1	3
Melaleuca uncinata	0	1	3	0	0	0	0	4	1	4
Baeckea behrii	1	0	1	1	0	0	0	3	0.75	3
Billardiera cymosa	3	0	0	0	0	0	0	3	0.75	6
Darwinia micropetala	2	0	1	0	0	0	0	3	0.75	2
Daucus glochidiatus	1	1	1	0	0	0	0	3	0.75	7
Dillwynia hispida	1	1	1	0	0	0	0	3	0.75	2
Exocarpos sparteus	1	2	0	0	0	0	0	3	0.75	3
Lepidosperma carphoides	3	0	0	0	0	0	0	3	0.75	4
Melaleuca brevifolia	1	1	0	1	0	0	0	3	0.75	4
Pultenaea tenuifolia	1	0	2	0	0	0	0	3	0.75	5
Acacia farinosa	2	0	0	0	0	0	0	2	0.5	1
Acacia spinescens	0	2	0	0	0	0	0	2	0.5	5
Astroloma conostephioides	2	0	0	0	0	0	0	2	0.5	3
Baumea juncea	0	0	2	0	0	0	0	2	0.5	3
Brachyloma ciliatum	0	1	1	0	0	0	0	2	0.5	3
Brachyloma ericoides ssp. *ericoides*	2	0	0	0	0	0	0	2	0.5	7
Centrolepis aristata	1	1	0	0	0	0	0	2	0.5	5
Centrolepis polygyna	1	1	0	0	0	0	0	2	0.5	4
Centrolepis strigosa	2	0	0	0	0	0	0	2	0.5	5
Chamaescilla corymbosa var. *corymbosa*	0	2	0	0	0	0	0	2	0.5	3
Correa reflexa	1	1	0	0	0	0	0	2	0.5	5
Cyperus tenellus	0	2	0	0	0	0	0	2	0.5	1
Dianella brevicaulis/revoluta	2	0	0	0	0	0	0	2	0.5	8
Drosera peltata	0	2	0	0	0	0	0	2	0.5	4
Goodenia geniculata	1	1	0	0	0	0	0	2	0.5	4
Hakea rugosa	2	0	0	0	0	0	0	2	0.5	3
Hypolaena fastigiata	0	0	2	0	0	0	0	2	0.5	5
Juncus bufonius	1	0	1	0	0	0	0	2	0.5	2
Lepidosperma viscidum	0	1	1	0	0	0	0	2	0.5	5
Leptocarpus brownii	0	0	1	1	0	0	0	2	0.5	4
Logania linifolia	1	1	0	0	0	0	0	2	0.5	4
Phyllangium divergens	1	1	0	0	0	0	0	2	0.5	6
Neurachne alopecuroidea	1	1	0	0	0	0	0	2	0.5	4
Schoenus breviculmis	0	1	1	0	0	0	0	2	0.5	3
Stipa mollis	2	0	0	0	0	0	0	2	0.5	3
Tetraria capillaris	1	1	0	0	0	0	0	2	0.5	4
Tricoryne elatior	1	1	0	0	0	0	0	2	0.5	3
Wahlenbergia gracilenta	1	1	0	0	0	0	0	2	0.5	6
Xanthorrhoea caespitosa	2	0	0	0	0	0	0	2	0.5	4

Floristic Community Group 4

Dominant species & structure of overstorey

Eucalyptus fasciculosa Woodland

Description

This floristic community occurs on localised low rises of sandy loam at the western and northeastern sections of the Conservation Park.

The top stratum of this community is dominated by *Eucalyptus fasciculosa* and varies from Low Woodland to Woodland in structure. The shrub strata is middense and most commonly dominated by *Eucalyptus diversifolia, Acacia leiophylla, Baeckea behrii, Banksia marginata, Banksia ornata, Dodonaea viscosa* ssp. *spatulata, Calytrix tetragona*, and *Thomasia petalocalyx*, while *Kunzea pomifera, Baumea juncea, Centrolepis strigosa, Levenhookia dubia, Millotia tenuifolia*, and *Pelargonium littorale* dominate the sparse ground strata. Other frequently occurring species are listed in Table 5.

This floristic community group can be distinguished from other groups by the presence of the character species *Eucalyptus fasciculosa, Acacia leiophylla, Dodonaea viscosa* ssp. *spatulata*, and *Rutidosis multiflora*, and by the absence of *Eucalyptus leucoxylon, Melaleuca uncinata, Adenanthos terminalis, Phyllota pleurandroides and Rhagodia candolleana.*

Significant plant species

No plant species listed as significant by Lang & Kraehenbuehl (1999) were recorded from this community.

Table 5: The most frequent plant species occurring in Floristic Community Group 4, their frequencies and proportional occurrences in quadrats sampling this community in Gum Lagoon Conservation Park, and total numbers of floristic community groups in which each was recorded

	Cover abundance								Prop.	No.
Species	R	T	1	2	3	4	5	Freq.	occur.	gps
Acacia leiophylla	0	1	1	0	0	0	0	2	1	3
Baeckea behrii	1	0	0	1	0	0	0	2	1	3
Banksia marginata	1	0	0	1	0	0	0	2	1	6
Calytrix tetragona	0	1	1	0	0	0	0	2	1	6
Centrolepis strigosa	0	0	2	0	0	0	0	2	1	5
Crassula sieberiana ssp. *tetramera*	0	1	1	0	0	0	0	2	1	6
Dianella brevicaulis/revoluta	1	1	0	0	0	0	0	2	1	8
Drosera whittakeri	0	1	1	0	0	0	0	2	1	4
Eucalyptus fasciculosa	0	0	0	2	0	0	0	2	1	2
Hibbertia riparia	0	2	0	0	0	0	0	2	1	7
Hypolaena fastigiata	0	1	1	0	0	0	0	2	1	5
Levenhookia dubia	0	0	2	0	0	0	0	2	1	3
Millotia muelleri	0	1	1	0	0	0	0	2	1	5
Millotia tenuifolia	0	0	2	0	0	0	0	2	1	6
Rutidosis multiflora	1	0	1	0	0	0	0	2	1	3
Thomasia petalocalyx	1	0	1	0	0	0	0	2	1	6
Wahlenbergia gracilenta	2	0	0	0	0	0	0	2	1	6

Table 5 (continued): The most frequent plant species occurring in Floristic Community Group 4, their frequencies and proportional occurrences in quadrats sampling this community in Gum Lagoon Conservation Park, and total numbers of floristic community groups in which each was recorded

	Cover abundance									
Species	R	T	1	2	3	4	5	Freq.	Prop. occur.	No. gps
Acacia longifolia var. *sophorae*	1	0	0	0	0	0	0	1	0.5	4
Acacia pycnantha	1	0	0	0	0	0	0	1	0.5	5
Acianthus pusillus	0	1	0	0	0	0	0	1	0.5	2
Acrotriche affinis	1	0	0	0	0	0	0	1	0.5	4
Astroloma humifusum	0	1	0	0	0	0	0	1	0.5	7
Banksia ornata	0	0	1	0	0	0	0	1	0.5	2
Baumea juncea	0	0	1	0	0	0	0	1	0.5	3
Billardiera cymosa	0	1	0	0	0	0	0	1	0.5	6
Brachycome perpusilla	1	0	0	0	0	0	0	1	0.5	2
Brachyloma ericoides ssp. *ericoides*	1	0	0	0	0	0	0	1	0.5	7
Caladenia carnea var. *carnea*	0	1	0	0	0	0	0	1	0.5	5
Calandrinia granulifera	1	0	0	0	0	0	0	1	0.5	2
Correa reflexa	1	0	0	0	0	0	0	1	0.5	5
Cotula australis	0	0	1	0	0	0	0	1	0.5	2
Daucus glochidiatus	1	0	0	0	0	0	0	1	0.5	7
Dillwynia sericea	0	1	0	0	0	0	0	1	0.5	3
Dodonaea viscosa ssp. *spatulata*	0	0	1	0	0	0	0	1	0.5	2
Eucalyptus diversifolia	0	0	0	1	0	0	0	1	0.5	3
Euchiton sphaericus	0	1	0	0	0	0	0	1	0.5	2
Glossodia major	1	0	0	0	0	0	0	1	0.5	2
Hakea rugosa	1	0	0	0	0	0	0	1	0.5	3
Hakea vittata	1	0	0	0	0	0	0	1	0.5	2
Helichrysum leucopsideum	1	0	0	0	0	0	0	1	0.5	3
Hibbertia sericea	1	0	0	0	0	0	0	1	0.5	7
Isolepis marginata	1	0	0	0	0	0	0	1	0.5	4
Isolepis nodosa	0	1	0	0	0	0	0	1	0.5	4
Isopogon ceratophyllus	1	0	0	0	0	0	0	1	0.5	4
Kunzea pomifera	0	0	0	1	0	0	0	1	0.5	4
Lepidosperma concavum	0	1	0	0	0	0	0	1	0.5	4
Leptospermum coriaceum	1	0	0	0	0	0	0	1	0.5	3
Leptospermum myrsinoides	0	1	0	0	0	0	0	1	0.5	5
Melaleuca lanceolata ssp. *lanceolata*	1	0	0	0	0	0	0	1	0.5	3
Microseris lanceolata	0	1	0	0	0	0	0	1	0.5	7
Phyllangium divergens	0	1	0	0	0	0	0	1	0.5	6
Muehlenbeckia adpressa	0	1	0	0	0	0	0	1	0.5	2
Pelargonium littorale	0	0	0	1	0	0	0	1	0.5	4
Persoonia juniperina	1	0	0	0	0	0	0	1	0.5	2
Pterostylis nana	0	1	0	0	0	0	0	1	0.5	4
Pterostylis pedunculata	0	1	0	0	0	0	0	1	0.5	2
Ranunculus sessiliflorus var. *sessiliflorus*	1	0	0	0	0	0	0	1	0.5	4
Senecio picridioides	1	0	0	0	0	0	0	1	0.5	4
Thelymitra pauciflora	1	0	0	0	0	0	0	1	0.5	2
Wahlenbergia stricta ssp. *stricta*	1	0	0	0	0	0	0	1	0.5	3
Xanthorrhoea caespitosa	1	0	0	0	0	0	0	1	0.5	4
Xanthosia dissecta var. *floribunda*	0	1	0	0	0	0	0	1	0.5	3

Figure 8: ***Eucalyptus fasciculosa*** **Woodland over** ***Kunzea pomifera***

Floristic Community Group 5

Dominant species & structure of overstoreys

1. *Melaleuca lanceolata* Low Woodland & Tall Shrubland
2. *Eucalyptus leucoxylon* ssp. *stephaniae* Low Woodland
3. *E. wimmerensis* Open Mallee

Description

This floristic community occurs on localised low broad rises of sandy loam, towards the eastern ends of the northeastern and eastern sections of the Conservation Park.

The top strata of this floristic community group varies from Low Woodland, to Open Mallee, to Tall Shrubland in structure, and is most frequently dominated by *Melaleuca lanceolata*, with *Eucalyptus wimmerensis, E. leucoxylon* ssp. *stephaniae* and *M. uncinata* as less frequent codominant. The ground stratum is sparse to very sparse and most frequently dominated by *Daucus glochidiatus*, *Levenhookia dubia*, *Millotia tenuifolia*, *Calandrinia calyptrata*, *Crassula sieberiana* ssp. *tetramera*, *Lepidosperma viscidum*, *Stipa scabra* ssp. *falcata*, and *Trachymene pilosa.* Other frequently occurring species are listed in Table 6.

This floristic community group can be distinguished from other groups by the presence of the combination of character species *Crassula closiana*, *Hypoxis glabella* var. *glabella*, *Podotheca angustifolia*, *Rhagodia candolleana*, *Threlkeldia diffusa*, *Brachycome goniocarpa*, *Calandrinia calyptrata*, *Pimelea stricta*, *Plantago* sp. *B*, *Stipa exilis*, and *Stipa scabra* ssp. *falcata*

Significant plant species

Although very localised, this community contained a disproportionately large number of plant species listed as either nationally significant in Briggs & Leigh (1996), or as of state or regional significance in Lang & Kraehenbuehl (1999). A number of these species were not found in any other community in the park.

This was the only plant community in which the nationally rare tree *Eucalyptus wimmerensis* was located, this species being confined to very localised areas in the northeastern section of the Conservation Park.

Two species of state significance were also recorded from this community, of which one (*Schoenus sculptus*) is listed as rare at the state level and vulnerable in the South East, while one is uncommon in South Australia (viz. *Lomandra sororia*).

The community also provides habitat for eight species of regional significance: *Trachymene cyanopetala* is listed as poorly known from the South East but considered either rare or threatened, while *Gnephosis drummondii*, *Stipa acrociliata*, *Stipa exilis*, *Trachymene pilosa* & *Triglochin calcitrapum* are regionally rare, and *Brachycome lineariloba* & *Calandrinia calyptrata* are regionally uncommon.

Table 6: The most frequent plant species occurring in Floristic Community Group 5, their frequencies and proportional occurrences in quadrats sampling this community in Gum Lagoon Conservation Park, and total numbers of floristic community groups in which each was recorded

	Cover abundance									
Species	R	T	1	2	3	4	5	Freq.	Prop. occur.	No. gps
Centrolepis aristata	1	1	1	0	0	0	0	3	1	5
Centrolepis strigosa	1	1	1	0	0	0	0	3	1	5
Crassula closiana	2	1	0	0	0	0	0	3	1	1
Daucus glochidiatus	0	1	2	0	0	0	0	3	1	7
Dianella brevicaulis/revoluta	3	0	0	0	0	0	0	3	1	8
Drosera glanduligera	2	1	0	0	0	0	0	3	1	4
Helichrysum leucopsideum	0	2	1	0	0	0	0	3	1	3
Hypoxis glabella var. *glabella*	3	0	0	0	0	0	0	3	1	2
Isolepis marginata	1	2	0	0	0	0	0	3	1	4
Levenhookia dubia	0	1	2	0	0	0	0	3	1	3
Melaleuca lanceolata ssp. *lanceolata*	0	0	0	3	0	0	0	3	1	3
Millotia tenuifolia	0	1	2	0	0	0	0	3	1	6
Podotheca angustifolia	2	1	0	0	0	0	0	3	1	1
Pultenaea tenuifolia	2	1	0	0	0	0	0	3	1	5
Rhagodia candolleana	1	2	0	0	0	0	0	3	1	1
Rutidosis multiflora	2	0	1	0	0	0	0	3	1	3
Senecio glossanthus	3	0	0	0	0	0	0	3	1	3
Threlkeldia diffusa	1	2	0	0	0	0	0	3	1	1
Thysanotus patersonii	2	1	0	0	0	0	0	3	1	5
Triglochin centrocarpum	2	0	1	0	0	0	0	3	1	5
Acacia pycnantha	2	0	0	0	0	0	0	2	0.67	5
Amyema melaleucae	2	0	0	0	0	0	0	2	0.67	2
Angianthus preissianus	0	2	0	0	0	0	0	2	0.67	5
Billardiera cymosa	2	0	0	0	0	0	0	2	0.67	6
Brachycome goniocarpa	0	2	0	0	0	0	0	2	0.67	1
Brachyloma ericoides ssp. *ericoides*	2	0	0	0	0	0	0	2	0.67	7
Calandrinia calyptrata	0	0	2	0	0	0	0	2	0.67	1
Calandrinia granulifera	1	1	0	0	0	0	0	2	0.67	2
Cassytha melantha	2	0	0	0	0	0	0	2	0.67	2
Centrolepis polygyna	1	0	1	0	0	0	0	2	0.67	4
Comesperma volubile	1	1	0	0	0	0	0	2	0.67	4
Crassula sieberiana ssp. *tetramera*	0	0	2	0	0	0	0	2	0.67	6
Danthonia geniculata	0	2	0	0	0	0	0	2	0.67	2
Danthonia setacea var. *setacea*	0	2	0	0	0	0	0	2	0.67	4
Distichlis distichophylla	0	2	0	0	0	0	0	2	0.67	2
Drosera whittakeri	0	1	1	0	0	0	0	2	0.67	4
Epilobium billardierianum	2	0	0	0	0	0	0	2	0.67	3
Eucalyptus incrassata	0	2	0	0	0	0	0	2	0.67	5
Euchiton sphaericus	2	0	0	0	0	0	0	2	0.67	2
Eutaxia microphylla var. *microphylla*	0	2	0	0	0	0	0	2	0.67	3
Gnephosis drummondii	0	2	0	0	0	0	0	2	0.67	4
Goodenia geniculata	1	1	0	0	0	0	0	2	0.67	4
Hydrocotyle callicarpa	0	2	0	0	0	0	0	2	0.67	4
Isolepis platycarpa	2	0	0	0	0	0	0	2	0.67	3
Lepidosperma viscidum	0	1	1	0	0	0	0	2	0.67	5
Levenhookia pusilla	0	2	0	0	0	0	0	2	0.67	3
Lomandra micrantha ssp. *micrantha*	2	0	0	0	0	0	0	2	0.67	3
Melaleuca uncinata	0	1	0	1	0	0	0	2	0.67	4
Microseris lanceolata	2	0	0	0	0	0	0	2	0.67	7

Table 6 (continued): The most frequent plant species occurring in Floristic Community Group 5, their frequencies and proportional occurrences in quadrats sampling this community in Gum Lagoon Conservation Park, and total numbers of floristic community groups in which each was recorded

	Cover abundance									
Species	R	T	1	2	3	4	5	Freq.	Prop. occur.	No. gps
Millotia muelleri	1	0	1	0	0	0	0	2	0.67	5
Phyllangium divergens	1	1	0	0	0	0	0	2	0.67	6
Pelargonium littorale	1	1	0	0	0	0	0	2	0.67	4
Pimelea stricta	2	0	0	0	0	0	0	2	0.67	1
Plantago sp. B	0	1	1	0	0	0	0	2	0.67	1
Sebaea ovata	1	1	0	0	0	0	0	2	0.67	5
Senecio picridioides	2	0	0	0	0	0	0	2	0.67	4
Stipa exilis	1	0	1	0	0	0	0	2	0.67	1
Stipa scabra ssp. *falcata*	0	0	0	2	0	0	0	2	0.67	1
Trachymene pilosa	0	0	2	0	0	0	0	2	0.67	3
Wahlenbergia gracilenta	2	0	0	0	0	0	0	2	0.67	6

Figure 9: ***Eucalyptus wimmerensis* Open Mallee over *Stipa scabra* ssp. *falcata***

Floristic Community Group 6

Dominant species & structure of overstorey

Eucalyptus camaldulensis Open Forest

Description

This floristic community occurs on low sandy rises adjacent to the broad, treeless and shrubless depressions at the southern end of the western section of the Conservation Park.

The top stratum of this floristic community group is dominated by middense *Eucalyptus camaldulensis*. A sparse shrub stratum dominated by *Acacia brachybotrya and Acacia longifolia* var. *sophorae* occurs over a sparse ground stratum dominated by *Isolepis nodosa*, *Lepidosperma concavum* and *Crassula sieberiana* ssp. *tetramera.* Other frequently occurring species are listed in Table 7.

This floristic community group can be distinguished from other groups by the presence of the character species *Eucalyptus camaldulensis* var. *camaldulensis*, *Muehlenbeckia adpressa*, *Calandrinia eremaea*, *Cotula australis*, *Geranium solanderi* var. *solanderi*, *Hyalosperma demissum*, *Hydrocotyle laxiflora*, *Oxalis perennans*, and *Pterostylis pedunculata*, and the absence of *Melaleuca brevifolia*, *Eucalyptus fasciculosa* and *E. leucoxylon.*

Figure 10: ***Eucalyptus camaldulensis* Open Forest**

Significant plant species

One species listed by Lang & Kraehenbuehl (1999) as regionally rare (*Calandrinia eremaea*) and one listed as regionally uncommon (*Acacia brachybotrya*) were recorded from this community.

Table 7: The most frequent plant species occurring in Floristic Community Group 6, their frequencies and proportional occurrences in quadrats sampling this community in Gum Lagoon Conservation Park, and total numbers of floristic community groups in which each was recorded

	Cover abundance									
Species	R	T	1	2	3	4	5	Freq.	Prop. occur.	No. Gps
Acacia brachybotrya	0	0	0	1	0	0	0	1	1	4
Acacia longifolia var. *sophorae*	0	0	0	1	0	0	0	1	1	4
Astroloma humifusum	1	0	0	0	0	0	0	1	1	7
Caladenia carnea var. *carnea*	1	0	0	0	0	0	0	1	1	5
Calandrinia eremaea	0	1	0	0	0	0	0	1	1	2
Clematis microphylla	1	0	0	0	0	0	0	1	1	3
Cotula australis	1	0	0	0	0	0	0	1	1	2
Crassula sieberiana ssp. *tetramera*	0	0	1	0	0	0	0	1	1	6
Daucus glochidiatus	0	1	0	0	0	0	0	1	1	7
Dianella brevicaulis/revoluta	1	0	0	0	0	0	0	1	1	8
Eucalyptus camaldulensis var. *camaldulensis*	0	0	0	0	0	1	0	1	1	2
Geranium solanderi var. *solanderi*	1	0	0	0	0	0	0	1	1	2
Hibbertia sericea	1	0	0	0	0	0	0	1	1	7
Hyalosperma demissum	0	1	0	0	0	0	0	1	1	2
Hydrocotyle laxiflora	0	1	0	0	0	0	0	1	1	2
Isolepis marginata	1	0	0	0	0	0	0	1	1	4
Isolepis nodosa	0	0	0	1	0	0	0	1	1	4
Kunzea pomifera	1	0	0	0	0	0	0	1	1	4
Lepidosperma concavum	0	0	0	0	1	0	0	1	1	4
Leptospermum coriaceum	1	0	0	0	0	0	0	1	1	3
Levenhookia dubia	1	0	0	0	0	0	0	1	1	3
Melaleuca halmaturorum ssp. *halmaturorum*	0	1	0	0	0	0	0	1	1	4
Millotia muelleri	0	1	0	0	0	0	0	1	1	5
Millotia tenuifolia var.	1	0	0	0	0	0	0	1	1	6
Muehlenbeckia adpressa	1	0	0	0	0	0	0	1	1	2
Oxalis perennans	0	1	0	0	0	0	0	1	1	2
Pterostylis pedunculata	0	1	0	0	0	0	0	1	1	2
Ranunculus sessiliflorus var. *sessiliflorus*	0	1	0	0	0	0	0	1	1	4
Senecio picridioides	0	1	0	0	0	0	0	1	1	4
Triglochin centrocarpum	1	0	0	0	0	0	0	1	1	5

Floristic Community Group 7

Dominant species & structure of overstorey

Eucalyptus leucoxylon Low Open Forest

Description

This floristic community occurs on loamy sands, in very localised closed depressions in between consolidated dunefields at the western edge and southwestern corner, of the western sections of the Conservation Park.

The top stratum of this floristic community group is Low Open Forest in structure and dominated by *Eucalyptus leucoxylon*. *Banksia marginata*, *Bursaria spinosa*, *Calytrix tetragona*, *Correa reflexa*, *Leptospermum myrsinoides*, and *Thomasia petalocalyx* dominate the very sparse shrub stratum of this group, while *Hibbertia sericea*, *Lasiopetalum baueri*, *Danthonia geniculata*, *Lepidobolus drapetocoleus*, *Oxalis perennans*, and *Hydrocotyle laxiflora* dominate the middense ground stratum. Other frequently occurring species are listed in Table 8.

This floristic community group can be distinguished from other groups by the presence of the character species *Brunonia australis*, *Bursaria spinosa*, *Danthonia geniculata, Poa rodwayi*, *Lasiopetalum baueri,* and *Oxalis perennans*, and the absence of *Melaleuca lanceolata.*

Figure 11: ***Eucalyptus leucoxylon* Low Open Forest**

Table 8: The most frequent plant species occurring in Floristic Community Group 7, their frequencies and proportional occurrences in quadrats sampling this community in Gum Lagoon Conservation Park, and total numbers of floristic community groups in which each was recorded

	Cover abundance									
Species	R	T	1	2	3	4	5	Freq.	Prop. occur.	No. Gps
Banksia marginata	1	0	1	0	0	0	0	2	1	6
Brunonia australis	1	1	0	0	0	0	0	2	1	2
Burchardia umbellata	1	1	0	0	0	0	0	2	1	4
Bursaria spinosa	2	0	0	0	0	0	0	2	1	2
Calytrix tetragona	2	0	0	0	0	0	0	2	1	6
Clematis microphylla	1	1	0	0	0	0	0	2	1	3
Comesperma volubile	1	1	0	0	0	0	0	2	1	4
Correa reflexa	2	0	0	0	0	0	0	2	1	5
Danthonia geniculata	0	0	2	0	0	0	0	2	1	2
Dianella brevicaulis/revoluta	1	1	0	0	0	0	0	2	1	8
Eucalyptus leucoxylon	0	0	0	0	0	2	0	2	1	5
Helichrysum leucopsideum	0	2	0	0	0	0	0	2	1	3
Hibbertia sericea	1	0	1	0	0	0	0	2	1	7
Lasiopetalum baueri	1	0	1	0	0	0	0	2	1	1
Lepidobolus drapetocoleus	0	1	1	0	0	0	0	2	1	4
Leptospermum myrsinoides	2	0	0	0	0	0	0	2	1	5
Lomandra juncea	1	1	0	0	0	0	0	2	1	3
Oxalis perennans	0	1	1	0	0	0	0	2	1	2
Pelargonium littorale	1	1	0	0	0	0	0	2	1	4
Poa rodwayi	0	2	0	0	0	0	0	2	1	2
Stipa mollis	1	1	0	0	0	0	0	2	1	3
Acacia brachybotrya	1	0	0	0	0	0	0	1	0.5	4
Acacia longifolia var. *sophorae*	1	0	0	0	0	0	0	1	0.5	4
Acacia pycnantha	0	1	0	0	0	0	0	1	0.5	5
Acrotriche affinis	0	1	0	0	0	0	0	1	0.5	4
Allocasuarina pusilla	1	0	0	0	0	0	0	1	0.5	2
Arthropodium strictum	1	0	0	0	0	0	0	1	0.5	2
Astroloma humifusum	1	0	0	0	0	0	0	1	0.5	7
Brachyloma ericoides ssp. *ericoides*	1	0	0	0	0	0	0	1	0.5	7
Cassytha glabella forma *dispar*	1	0	0	0	0	0	0	1	0.5	4
Dodonaea viscosa ssp. *spatulata*	1	0	0	0	0	0	0	1	0.5	2
Eucalyptus leptophylla	1	0	0	0	0	0	0	1	0.5	3
Exocarpos sparteus	1	0	0	0	0	0	0	1	0.5	3
Gonocarpus elatus	1	0	0	0	0	0	0	1	0.5	3
Gonocarpus tetragynus	1	0	0	0	0	0	0	1	0.5	4
Goodenia blackiana	1	0	0	0	0	0	0	1	0.5	3
Hakea muelleriana	1	0	0	0	0	0	0	1	0.5	3
Helichrysum scorpioides	0	1	0	0	0	0	0	1	0.5	4
Hibbertia riparia	0	1	0	0	0	0	0	1	0.5	7
Hydrocotyle laxiflora	0	0	1	0	0	0	0	1	0.5	2
Hypolaena fastigiata	0	1	0	0	0	0	0	1	0.5	5
Isolepis nodosa	0	0	0	0	0	1	0	1	0.5	4
Kennedia prostrata	1	0	0	0	0	0	0	1	0.5	2
Kunzea pomifera	0	1	0	0	0	0	0	1	0.5	4
Lepidosperma carphoides	0	1	0	0	0	0	0	1	0.5	4
Lomandra collina	1	0	0	0	0	0	0	1	0.5	2
Lomandra sororia	1	0	0	0	0	0	0	1	0.5	3
Microseris lanceolata	1	0	0	0	0	0	0	1	0.5	7
Microtis frutetorum	1	0	0	0	0	0	0	1	0.5	3

Table 8 (continued): The most frequent plant species occurring in Floristic Community Group 7, their frequencies and proportional occurrences in quadrats sampling this community in Gum Lagoon Conservation Park, and total numbers of floristic community groups in which each was recorded

	Cover abundance								Prop.	No.
Species	R	T	1	2	3	4	5	Freq.	occur.	Gps
Neurachne alopecuroidea	1	0	0	0	0	0	0	1	0.5	4
Plantago hispida	0	1	0	0	0	0	0	1	0.5	2
Schoenus breviculmis	0	1	0	0	0	0	0	1	0.5	3
Thomasia petalocalyx	0	0	1	0	0	0	0	1	0.5	6
Tricoryne elatior	1	0	0	0	0	0	0	1	0.5	3

Significant plant species

Three plants species listed by Lang & Kraehenbuehl (1999) as being of state significance were recorded from *Eucalyptus leucoxylon* Low Open Forest, two of which are listed as rare (*Myoporum parvifolium*, *Poa rodwayi*) and one uncommon (*Lomandra sororia*). *Myoporum parvifolium* and *Poa rodwayi* were only recorded during the survey from this community, which is very localised in the Conservation Park.

One regionally uncommon species was also recorded from this community (viz. *Acacia brachybotrya*).

Figure 12: **Perennial veldt grass (****Ehrharta calycina***) invading *Eucalyptus leucoxylon* Low Open Forest at the western edge of Gum Lagoon Conservation Park**

Floristic Community Group 8

Dominant species & structure of overstoreys

1. *Melaleuca halmaturorum* Low Open Woodland & Tall Very Open Shrubland
2. *Halosarcia indica* ssp. *leiostachya* Low Open Shrubland

Description

This floristic community occurs on saline sandy clay loam flats subject to seasonal inundation, in the northeastern and eastern sections of the Conservation Park.

Where present, the tree or tall shrub stratum is dominated by *Melaleuca halmaturorum*, and varies from Very Low Open Woodland to Tall Very Open Shrubland in structure. A low shrub stratum is most frequently dominated by sparse to middense *Halosarcia indica* ssp. *leiostachya*, *Halosarcia lepidosperma*, *Sarcocornia quinqueflora*, and *Lawrencia squamata*, while *Angianthus preissianus*, and *Centrolepis cephaloformis* ssp. *cephaloformis* are the most frequent dominants in the sparse to middense ground strata. Other frequently occurring species are listed in Table 9.

This floristic community group can be distinguished from other groups by the presence of the character species *Halosarcia indica* ssp. *leiostachya*, *Halosarcia lepidosperma*, *Sarcocornia quinqueflora*, *Centrolepis cephaloformis* ssp. *cephaloformis*, *Lawrencia squamata, Bulbine bulbosa*, and *Triglochin mucronatum.*

Significant plant species

Four species listed by Lang & Kraehenbuehl (1999) as being of state significance were recorded from this community. Of these, two (*Centrolepis cephaloformis* ssp. *cephaloformis*, *Schoenus sculptus*) are listed as rare at the state level and threatened in the South East, while two are uncommon in South Australia (viz. *Quinetia urvillei, Utricularia tenella*). This was the only plant community in the park from which *Centrolepis cephaloformis* ssp. *cephaloformis* and *Quinetia urvillei* were collected.

The community also provides habitat for five species listed as being of regional significance: *Halosarcia lepidosperma* and *Hydrocotyle medicaginoides* are poorly known from the South East but are considered either rare or threatened, while *Calandrinia eremaea* and *Gnephosis drummondii* are listed as regionally rare, and *Brachycome lineariloba* regionally uncommon.

Table 9: The most frequent plant species occurring in Floristic Community Group 8, their frequencies and proportional occurrences in quadrats sampling this community in Gum Lagoon Conservation Park, and total numbers of floristic community groups in which each was recorded

	Cover abundance									
Species	R	T	1	2	3	4	5	Freq.	Prop. occur.	No. Gps
Halosarcia indica ssp. *leiostachya*	0	0	2	2	0	0	0	4	1	1
Angianthus preissianus	0	1	2	0	0	0	0	3	0.75	5
Bulbine bulbosa	1	1	1	0	0	0	0	3	0.75	1
Halosarcia lepidosperma	0	1	2	0	0	0	0	3	0.75	1
Melaleuca halmaturorum ssp. *halmaturorum*	1	1	1	0	0	0	0	3	0.75	4
Sarcocornia quinqueflora	0	2	0	1	0	0	0	3	0.75	1
Senecio glossanthus	2	0	1	0	0	0	0	3	0.75	3
Centrolepis cephaloformis ssp. *cephaloformis*	0	1	0	1	0	0	0	2	0.5	1
Centrolepis polygyna	0	2	0	0	0	0	0	2	0.5	4
Daucus glochidiatus	1	1	0	0	0	0	0	2	0.5	7
Epilobium billardierianum	1	1	0	0	0	0	0	2	0.5	3
Gahnia filum	2	0	0	0	0	0	0	2	0.5	2
Lawrencia squamata	1	0	0	1	0	0	0	2	0.5	1
Leptocarpus brownii	0	2	0	0	0	0	0	2	0.5	4
Samolus repens	0	2	0	0	0	0	0	2	0.5	2
Triglochin centrocarpum	0	1	1	0	0	0	0	2	0.5	5
Triglochin mucronatum	0	1	1	0	0	0	0	2	0.5	1

Figure 13: ***Melaleuca halmaturorum*** **Low Open Woodland**

Floristic Community Group 9

Dominant species & structure of top stratum

Schoenus nitens - *Selliera radicans* Sedgeland/Herbland

Description

This floristic community occurs on silty clay loam and loamy sand, on the broad, treeless and shrubless depressions at the southern end of the western section of the Conservation Park. More localised areas also occur at Gum Lagoon.

This floristic community group consists of a middense Sedgeland/Herbland dominated by *Schoenus nitens*, *Selliera radicans*, *Angianthus preissianus*, and *Hydrocotyle medicaginoides*, with emergent shrubs of *Melaleuca brevifolia.* Other frequently occurring species are listed in Table 10.

This floristic community group can be distinguished from other groups by the presence of the character species *Pultenaea vestita*, *Selliera radicans*, *Gnaphalium indutum*, *Podolepis canescens*, and *Stenopetalum lineare.*

Significant plant species

One species listed by Lang & Kraehenbuehl (1999) as being of state significance was recorded from this community: *Senecio squarrosus* is listed as uncommon in South Australia.

Table 10: The most frequent plant species occurring in Floristic Community Group 9, their frequencies and proportional occurrences in quadrats sampling this community in Gum Lagoon Conservation Park, and total numbers of floristic community groups in which each was recorded

	Cover abundance								Prop.	No.
Species	R	T	1	2	3	4	5	Freq.	occur.	Gps
Schoenus nitens	0	0	1	0	0	1	0	2	1	4
Selliera radicans	0	0	2	0	0	0	0	2	1	2
Angianthus preissianus	0	0	0	1	0	0	0	1	0.5	5
Crassula sieberiana ssp. *tetramera*	1	0	0	0	0	0	0	1	0.5	6
Gnaphalium indutum	0	1	0	0	0	0	0	1	0.5	2
Hydrocotyle capillaris	0	1	0	0	0	0	0	1	0.5	6
Hydrocotyle medicaginoides	0	0	0	1	0	0	0	1	0.5	3
Melaleuca brevifolia	0	0	1	0	0	0	0	1	0.5	4
Melaleuca halmaturorum ssp. *halmaturorum*	1	0	0	0	0	0	0	1	0.5	4
Phyllangium divergens	1	0	0	0	0	0	0	1	0.5	6
Podolepis canescens	0	1	0	0	0	0	0	1	0.5	2
Pultenaea tenuifolia	0	1	0	0	0	0	0	1	0.5	5
Pultenaea vestita	0	1	0	0	0	0	0	1	0.5	2
Sebaea ovata	0	1	0	0	0	0	0	1	0.5	5
Senecio glossanthus	1	0	0	0	0	0	0	1	0.5	3
Senecio squarrosus	1	0	0	0	0	0	0	1	0.5	3
Stackhousia aspericocca	1	0	0	0	0	0	0	1	0.5	4
Stenopetalum lineare	1	0	0	0	0	0	0	1	0.5	2

Figure 14: ***Schoenus nitens* - *Selliera radicans* Sedgeland/Herbland**

Floristic Community Group 10

Dominant species & structure of overstoreys

1. *Melaleuca brevifolia* Open Shrubland & Low Shrubland
2. *Eucalyptus camaldulensis* Woodland

Description

This floristic community occurs on semi-saline loamy sand and sandy clay loam flats subject to seasonal inundation, in all sections of the Conservation Park.

The shrub stratum of this floristic community group is dominated by sparse to middense *Melaleuca brevifolia*, occurring over a sparse to middense lower stratum dominated by *Gahnia filum, Baumea juncea, Darwinia micropetala, Hypolaena fastigiata, and Leptocarpus brownii.* In the vicinity of Gum Lagoon, a tree stratum of sparse *Eucalyptus camaldulensis* occurs over the same understorey. Other frequently occurring species are listed in Table 11.

This floristic community group can be distinguished from other groups by the presence of the character species *Hakea nodosa, Baumea juncea, Darwinia micropetala,* and *Gahnia filum,* and by the absence of *Halosarcia* spp.

Figure 15: *Melaleuca brevifolia* Open Shrubland over *Gahnia filum* & *Leptocarpus brownii*, grading into *Eucalyptus incrassata* Open Mallee over *Melaleuca uncinata* on the low rise in the background

Table 11: The most frequent plant species occurring in Floristic Community Group 10, their frequencies and proportional occurrences in quadrats sampling this community in Gum Lagoon Conservation Park, and total numbers of floristic community groups in which each was recorded

	Cover abundance									
Species	R	T	1	2	3	4	5	Freq.	Prop. occur.	No. gps
Melaleuca brevifolia	0	0	0	0	4	3	1	8	1	4
Baumea juncea	2	1	4	0	0	0	0	7	0.88	3
Darwinia micropetala	0	3	3	1	0	0	0	7	0.88	2
Billardiera cymosa	5	0	0	0	0	0	0	5	0.62	6
Gahnia filum	0	1	3	1	0	0	0	5	0.62	2
Comesperma volubile	4	0	0	0	0	0	0	4	0.5	4
Dianella brevicaulis/revoluta	4	0	0	0	0	0	0	4	0.5	8
Drosera glanduligera	0	3	1	0	0	0	0	4	0.5	4
Hakea nodosa	1	3	0	0	0	0	0	4	0.5	1
Hypolaena fastigiata	0	1	2	1	0	0	0	4	0.5	5
Leptocarpus brownii	1	1	1	1	0	0	0	4	0.5	4

Significant plant species

This community contained the greatest concentration of significant plant species in the park. Of particular importance was the discovery during the current project, of the orchid *Thelymitra epipactoides* and the daisy *Senecio macrocarpus* within this floristic community. These species are listed by Briggs & Leigh (1996) as being nationally endangered and nationally vulnerable, respectively.

Seven species listed by Lang & Kraehenbuehl (1999) as being of state significance were also recorded from this community. One of these (*Euphrasia collina* ssp. *collina*) is poorly known in South Australia but suspected of being rare or threatened, one (*Schoenus laevigatus*) is rare at the state level, while five are uncommon (viz. *Villarsia umbricola* var. *umbricola, Pultenaea vestita, Utricularia tenella, Olearia lanuginosa, Senecio squarrosus*).

The community also provides habitat for five species listed as regional significant by Lang & Kraehenbuehl (1999): *Hydrocotyle medicaginoides* and *Poranthera triandra* are poorly known from the South East but are considered either rare or threatened, while *Gnephosis drummondii, Trachymene pilosa,* and *Podolepis canescens* are regionally rare.

Of these significant species, *Thelymitra epipactoides, Senecio macrocarpus, Schoenus laevigatus, Poranthera triandra, Villarsia umbricola* var. *umbricola, Olearia lanuginosa,* and *Podolepis canescens* were only found in this plant community in the park.

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Floristic Community Group 11

Dominant species & structure of community

Ruppia polycarpa (widgeon grass), *Myriophyllum simulans* (amphibious milfoil), *Lepilaena* spp. (water-mat) Herbland

Description

Although not sampled by quadrat, and thus not defined in the analysis, this floristic community is distinct since it consists solely of aquatic plants. It is confined to the semi permanent wetlands at Gum Lagoon and Naen Naen Swamp. The community is dominated by *Ruppia polycarpa*, *Myriophyllum simulans, Lepilaena patentifolia* and *L. cylindrocarpa*.

Figure 16: ***Eucalyptus camaldulensis*** **Woodland surrounding Gum Lagoon. Gum Lagoon supports** ***Ruppia polycarpa*** **(widgeon grass),** ***Myriophyllum simulans*** **(amphibious milfoil),** ***Lepilaena*** **spp. (water-mat) Herbland when wet**

Significant plant communities

***Eucalyptus camaldulensis* (river red gum) Open Forest & Woodland**
(Floristic Community Groups 6 & 10)

This community is listed in Croft *et al.* (1999) as vulnerable in the South East, where it is estimated that 171,845 hectares of the community occurred at the time of European settlement (Croft & Carpenter 1999). Croft & Carpenter estimate that only 7.8% of this community remains in the region and describe most surviving examples as extensively modified by a long history of extensive grazing by domestic stock and pasture development. Only 0.3% of the former distribution is conserved in the government reserve system (Croft & Carpenter 1999).

In Gum Lagoon Conservation Park, *Eucalyptus camaldulensis* Open Forest occurs on the low sandy rises adjacent to the broad, treeless and shrubless depressions at the southern end of the western section of the Conservation Park (see Figure 3). *Eucalyptus camaldulensis* Woodland occurs surrounding to the semipermanent wetlands at Gum Lagoon and Naen Naen Swamp (see Figure 3).

Red gum Woodlands and Open Forests provide critical habitats for a significant number of hollow dependent fauna species. The red gum trees contain hollows that provide important roosting and breeding sites for a number of bird, bat and nocturnal mammal species (Croft & Carpenter 1999). Croft estimated that red gum trees provide nesting sites for over 20% of the birds found in the region, particularly parrots, and including species of high conservation significance. Two such species found in Gum Lagoon Conservation Park, are the Yellow Tailed-tailed Black Cockatoo and Little Lorikeet, both of which are considered as vulnerable in South Australia. Adjacent to waterholes such as Gum Lagoon, the red gums provide nesting sites for waterfowls. The Eastern Grey Kangaroo, which is rare in South Australia, is also often associated with remnant red gum woodlands in the region (Croft & Carpenter 1999).

Red gum Open Forests in Gum Lagoon Conservation Park provides habitat for one regionally rare plant species (*Calandrinia eremaea*) and one regionally uncommon species (*Acacia brachybotrya*). *Villarsia umbricola* var. *umbricola*, which is uncommon throughout South Australia and rare in the South East, was found in the park only in red gum Woodland.

***E. leucoxylon* (South Australian blue gum) Low Open Forest & Low Woodland**
(Floristic Community Groups 5 & 7)

This community is listed in Croft *et al.* (1999) as vulnerable in the South East, where it is estimated that 146,485 hectares of the community occurred at the time of European settlement (Croft & Carpenter 1999). Croft & Carpenter estimate that only 10.7% of this community now remains in the region and describe remnants as being prone to invasion by introduced plant species such as grasses. Only 1.6% of the former distribution is conserved in the government reserve system (Croft & Carpenter 1999).

Of the various blue gum woodlands in the south East, *Eucalyptus leucoxylon* ssp. *stephaniae* (scrubby blue gum) woodland is the rarest, Croft & Carpenter (1999) estimating that, of the original 15,510 hectares previously occurring in the region, only 535 hectares still survive.

Eucalyptus leucoxylon ssp. *stephaniae* Low Open Forest occurs on loamy sand, in very localised closed depressions in between consolidated dunefields at the southwestern corner and near the north western corner, of the western sections of the Conservation Park (see

Figure 3 and Sites GL03001 & GL03201 in Figure 2). *Eucalyptus leucoxylon* ssp. *stephaniae* Low Woodland occurs adjacent to the southern boundary of Section 25 Hundred of Laffer (see Figure 3 and Site GL04201 in Figure 2).

Eucalyptus leucoxylon woodland is characterised by its abundance of birdlife, which is related to the large amounts of nectar produced by blue gum flowers over the winter months (Croft & Carpenter 1999). Occasional larger trees also support hollows suitable for parrots and cockatoos. *Eucalyptus leucoxylon* Low Open Forest & Low Woodland in Gum Lagoon Conservation Park provides significant habitat for a number of bird species of high conservation significance such as the Little Lorikeet, Crested Shrike-tit, Shining Bronze-Cuckoo and Crested Bellbird.

In the park, three plants species of state significance were recorded from *Eucalyptus leucoxylon* Low Open Forest, two of which are rare (*Myoporum parvifolium*, *Poa rodwayi*) and one uncommon (*Lomandra sororia*). *Myoporum parvifolium* and *Poa rodwayi* were only recorded from this community. One regionally uncommon species was also recorded from this community, viz *Acacia brachybotrya.*

Heavy browsing apparently by kangaroos appears to be a threat to this community at the south western corner of the western section of the park. The construction of kangaroo-proof fencing around this area is a high priority.

***E. wimmerensis* (Wimmera mallee) Open Mallee**
(Floristic Community Group 5)

This community has close affinities with the *Eucalyptus odorata* (peppermint box) mallee describes in Croft & Carpenter (1999) as occurring west of Keith on saline soils in the vicinity of salt lagoons. *Eucalyptus odorata* mallee is endangered in the South East (Croft *et al.* 1999).

It is estimated that of the 3120 hectares of peppermint box mallee occurring in the South East at the time of European settlement, only 250 hectares remain (Croft & Carpenter 1999). Only 0.5% of its former distribution is conserved in the government reserve system.

In Gum Lagoon Conservation Park, Wimmera mallee Open Mallee is confined to a very localised low rise of sandy loam, surrounded by semi saline wetlands, at the eastern edge of the north eastern section of the Conservation Park (see Figure 3 and Site GL04101 in Figure 2).

Croft & Carpenter (1999) describes peppermint box as being important for nectivorous bird since it produces abundant nectar. The same is likely to apply to the closely related Wimmera mallee. *E. wimmerensis* Open Mallee also provides suitable breeding habitat for the nationally vulnerable Malleefowl, an active mound being found in this community in the park.

Despite its very localised occurrence in the park, *E. wimmerensis* Open Mallee was found to be particularly plant species rich and to contain a number of plant species not found outside this community. The nationally rare tree, *Eucalyptus wimmerensis*, was only located in this community in the park, as was the regionally rare *Stipa acrociliata*, *Stipa exilis* & *Triglochin calcitrapum*, and the regionally uncommon *Calandrinia calyptrata*.

Also found in this community was *Trachymene cyanopetala* which is poorly known from the South East but considered either rare or threatened, *Lomandra sororia* which is uncommon in South Australia, and *Brachycome lineariloba* which is regionally uncommon.

Due its close proximity to the edge of the park, the predominance of small herbs in the understorey, and the more fertile soil on which it occurs, this community is highly vulnerable weed invasion. Abundant droppings indicate that rabbit browsing is also a threat to the community.

Figure 17: **Active Malleefowl mound *E. wimmerensis* (Wimmera mallee) Open Mallee inside the north eastern boundary of Gum Lagoon Conservation Park**

Melaleuca lanceolata* (dryland tea-tree) Low Woodland & Tall Shrubland *(Floristic Community Group 5)

Melaleuca lanceolata Low Woodland is listed in Croft *et al*. (1999) as endangered in the South East, with only 0.4% of its original area conserved in the government reserve system. Of the 67,990 hectares originally occurring in the South East, only 7.0% survives (Croft & Carpenter 1999).

In Gum Lagoon Conservation Park, *Melaleuca lanceolata* Low Woodland & Tall Shrubland occurs on localised low rises of sandy loam, surrounded by semi saline wetlands, towards the eastern end of the eastern section of the Conservation Park (see Figure 3 and Site GL03601 in Figure 2). This is atypical of the community as described by Croft & Carpenter (1999). Croft describes inland occurrences of *Melaleuca lanceolata* Low Woodland as occurring on well-drained stony rendzina soils, often in association with *Eucalyptus leucoxylon*.

Melaleuca lanceolata Tall Shrubland was the only community in which *Trachymene cyanopetala* was located in the park. This plant is poorly known from the South East but considered either rare or threatened in the region. *Schoenus sculptus* which is rare at the state level and vulnerable in the South East was also recorded from this community.

Ruppia polycarpa* *(widgeon grass), Myriophyllum simulans* *(amphibious milfoil), Lepilaena* *spp. (water-mat) Herbland
(Floristic Community Group 11)

This plant community is listed as vulnerable in the South East (Croft *et al.* 1999), and poorly conserved South Australia-wide (Neagle 1995, Davies 1982). It is estimated that 2,845 hectares of this community occurred in the South East at the time of European settlement (Croft & Carpenter 1999). While 41.1% of this community still remains in the region, this community has been dramatically affected through extensive, systematic drainage (Croft & Carpenter 1999). Croft & Carpenter describe many surviving examples as being degraded through grazing by domestic stock, pasture improvement and drainage. Only 0.1% of the former distribution is conserved in the government reserve system (Croft & Carpenter 1999).

Ruppia - *Myriophyllum* - *Lepilaena* Herbland in Gum Lagoon Conservation Park, provides important habitat for a wide range of waterbirds including the nationally rare Freckled Duck and a number of species listed as vulnerable or rare throughout South Australia (viz Latham's Snipe, the Australasian Shoveler, Musk Duck, Blue-billed Duck, Great Crested Grebe, and Baillon's Crake).

In Gum Lagoon Conservation Park, this community is confined to the semi permanent wetlands at Gum Lagoon and Naen Naen Swamp.

Significant plant species

Overview

Of the plant species recorded for Gum Lagoon Conservation Park, four are listed by Briggs and Leigh (1996) or Lang & Kraehenbuehl (1999) as being of national significance, while 42 species and 28 species are listed by Lang and Kraehenbuehl (1999) as being of state and regional significance respectively. These species are listed in Table 12 and the most significant are described below.

Species of National Significance

Metallic sun-orchid (*Thelymitra epipactoides*)

Thelymitra epipactoides is a geophyte producing a raceme of flowers in September-October. This large, fleshy sun-orchid occurs in a variety of colour forms characterised by a distinctive iridescent sheen. It is distributed from southern Eyre Peninsula to southeastern Victoria, with populations in New South Wales just south of Sydney (Davies 1992, 1995). Its biology and ecology have been well studied in Victoria and reviewed by Cropper (1993). The species is listed as nationally endangered by Briggs and Leigh (1996).

Four plants of *Thelymitra epipactoides* were found during the 1995 NCSSA survey, in *Melaleuca brevifolia* Open Scrub (with emergent *Eucalyptus leucoxylon*, *E. fasciculosa*, *E. incrassata*, and *M. uncinata*) with an understorey dominated by *Baumea juncea* on an undulating plain subject to waterlogging. The plants occurred at the edge of a shallow drain that had been bulldozed into the park in Section 25 Hundred of Laffer.

The species presence next to a drain agrees with observations by Cropper (1993) that flowering of the species is stimulated by disturbance. Data presented by Cropper suggest that the species may decline due to a lack of disturbance, in particular by fire; or that it may persist undetected, as the tuberoid is able to remain dormant for at least nine years.

The species is also conserved in five or six other conservation reserves in the South East: Messent, Mount Boothby and Big Heath Conservation Parks; Coorong National Park; possibly Bool Lagoon Game Reserve; and one small Heritage Agreement area. It has also been recorded from Monarto Conservation Park on the eastern foothills of the Mount Lofty Ranges, and in Wanilla Conservation Park on Eyre Peninsula. (Davies 1992, 1995)

While the species has a wide range and occurs in at number of reserves, Davies (1995) described most of these populations as being "very small and subject to threats such as weed invasion, competition from native shrubs, bee keeping, rabbits, trampling, collectors and firebreak and road construction". At the time of writing none of these conserved populations in South Australia were being actively managed.

Minor drains in or adjacent to Gum Lagoon Conservation Park are unlikely to have a direct significant effect on *Thelymitra epipactoides*, since the species is stimulated by disturbance. However, if drains significantly changed the water regime of *Melaleuca uncinata*, *M. brevifolia* Shrubland in the park, the impact could be serious for the species. Calder *et al* (1989) advise that for the conservation of the species "it is essential to maintain the soil water regime involving winter waterlogging and summer dry. Alterations to the soil water regime could have adverse effects on survival." Thus the construction of drains through *Thelymitra epipactoides* habitat should be avoided, and instead localised burning should be undertaken to promote the regeneration of the species.

The habitat of the species is also highly vulnerable to invasion by weeds, in particular perennial veldt grass (*Ehrharta calycina*) and bridle creeper (*Myrsiphyllum asparagoides*) if disturbed. Thus the construction of drains could also indirectly threaten the species by promoting weed invasion. To minimise weed invasion from adjacent agricultural land, it is desirable not to burn vegetation right to the edge of the park, where the park abuts cleared land. Many weeds, in particular perennial veldt grass, readily colonise burnt vegetation (Davies 1997).

Large-fruit groundsel (*Senecio macrocarpus*)

Senecio macrocarpus is an erect narrow-leaved rayless daisy growing 20-40 cm high from a perennial rootstock. It is distinguished from its closest relatives, particularly *S. squarrosus*, by its larger flower heads and its elongated seed apex. The species is found in South Australia and Victoria and previously occurred in Tasmania where it is now presumed extinct (Davies 1992). *S. macrocarpus* is rated as nationally vulnerable species (Briggs and Leigh 1996).

During October 1996, approximately half a dozen plants of *Senecio macrocarpus* were located growing on a bulldozed fire break immediately inside the southern boundary of Gum Lagoon Conservation Park, 750 metres northeast of the southwestern corner of Section 9. These plants were occurring on clay soil in a broad depression subject to seasonal waterlogging, vegetated with *Melaleuca brevifolia* Low Shrubland. Searches of *M. brevifolia* Shrubland adjacent to this population and elsewhere in the park failed to locate further populations. This indicated that the species is occurring as a successional species in this plant community, only growing after disturbance and is being out competed by *M. brevifolia* at the later stages of succession.

This compares with populations of *S. macrocarpus* in Messent Conservation Park, where the species has been observed to persist in the absence of disturbance. That park contains an estimated 35,000 plants of the species occurring in sedgeland or herbland communities (Davies 1995). Seven years of monitoring of permanent quadrats in Messent Conservation Park, has found that *S. macrocarpus* has persisted in this plant community, even though the area was last burn in 1977 (R. Davies, pers. obs., 1999).

Other than the Gum Lagoon and Messent Conservation Park populations, only three other very small populations are known to survive in South Australia: a population of nine plants near Daly Head on Yorke Peninsula; three or four plants on Narrung Peninsula adjacent to Lake Alexandrina; and approximately a dozen plants in the Tarcowie Parklands in the Mid North (Davies 1995, Davies pers. obs. 1999)

In Victoria, where *S. macrocarpus* is listed as endangered, the species range has contracted to regions around Melbourne (Gullen, Cheal & Walsh 1990). Here a total of 10 populations survive, eight in rail reserves and two on public lands, and most are under immediate threat of extinction due to habitat destruction and deleterious fire regimes (R.F.Parsons, pers. com. 1991). In that state, *S. macrocarpus* occurs largely in Basalt Plains Grasslands, where it only occurs in areas that have been burn every three to four years. In that habitat, less frequent fires result in thick swards of *Themeda triandra* (kangaroo grass) which out-competes the *Senecio* (Scarlett 1984).

Since the only known population of *S. macrocarpus* in Gum Lagoon Conservation Park is very small and occurs on a firebreak at the edge of the park, the careful active management of the species in the park is of the very high priority. This section of firebreak should only be slashed in late autumn after the *Senecio* has died back to its rootstock, and slashing should be undertaken sufficiently frequently to suppress the regeneration of *Melaleuca*. Since this population abuts cleared farmland and occurs on heavier soil, it is highly vulnerable to weed

invasion. While the area is presently largely weed free, the population should be monitored annually for weed invasion. Any weeds should be removed by hand pulling and spot spraying using glyphosate to minimise off target damage.

Since *S. macrocarpus* apparently requires disturbance to persist in *Melaleuca brevifolia* Shrublands, it is also recommended that trial burns be undertaken of the small area of *Melaleuca* Shrubland occurring adjacent to the population. A permanent quantitative monitoring site should be set up in this area (see methodologies in Davies 1995) so that the long term effects of such burning can be determined, for the *Senecio*, other native species, and weed species. Since weeds readily invade burnt areas, this area will also need to be actively weeded.

Eichler's raspwort (*Haloragis eichleri*)

Haloragis eichleri is a low, short-lived, perennial herb 25 to 50 centimetres tall, which regenerates annually from a perennial rootstock and usually occurs in areas with heavy sheet limestone. It is a post-disturbance coloniser growing from seed following fire or clearance (Davies 1986). The species is listed in Briggs and Leigh (1996) as nationally rare. The species is endemic to South Australia except for a localised occurrence near Portland in Victoria, where the species is considered vulnerable (Gullan, Cheal and Walsh 1990).

In Gum Lagoon Conservation Park the species was located in *Eucalyptus diversifolia* Low Mallee on a low calcrete ridges in Section 9 Hundred of Wells, three kilometres north northeast of the south western corner of the park.

The species also conserved in the South East, in Coorong National Park and Aberdour Conservation Park; on Kangaroo Island in Flinders Chase National Park, and in MountTaylor, Cape Gantheaume and Vivonne Bay Conservation Parks; and on Eyre Peninsula in Lincoln National Park (Briggs and Leigh 1996; Davies 1986).

Wimmera mallee (*Eucalyptus wimmerensis*)

Eucalyptus wimmerensis is a mallee with a tall erect habit, six to ten metres tall. It is distinguished from the closely related *Eucalyptus odorata* by its consistent mallee habit; the rough bark for up to two metres only and the slightly narrower leaves (Nicolle 1997). The species is largely confined to Wimmera region of western Victoria, but extends into South Australia near Bordertown.

In Gum Lagoon Conservation the species is confined to small localised rises surrounded by ephemeral semi-saline wetland, in the north eastern section of the park, the largest population occurring near the north eastern corner of Section 27 Hundred Laffer. It occurs in the park as a codominant with *Melaleuca lanceolata.*

Species of State Significance

Overview

Of the plant species recorded for the park, one is listed as vulnerable in South Australia, 15 species are rare in the state, one is poorly known but suspected of being either rare or threatened in South Australia, and 25 species are uncommon at the state level (Lang & Kraehenbuehl 1999). Of these species, one is listed as endangered in the South East, two are vulnerable at the regional level, while six are listed as poorly known but suspected of being either rare or threatened in the region.

Details on quadrats in which these species were recorded, their cover/abundance at these sites, and the floristic communities in which they occur, are given in Table 13. Descriptions of the most significant species are given below.

Scaly haekeria (*Haekeria pholidota*)

Haekeria pholidota is a bushy, erect shrub up to 1.2 metres tall, with scaly, cypress-like foliage and terminal clusters of white-cream *Cassinia*-like flowers. The species is a post-disturbance coloniser growing from seed following fire or clearance. However, unlike many plants of this type which become very common over extensive areas following disturbance, *H. pholidota* generally occurs as isolated plants, clumps or small, localised patches. (Owens *et al.* 1995)

The species is apparently rare in Gum Lagoon Conservation Park, it not being recorded during the 1995 and 1996 surveys. The only sighting was an opportunistic sighting by Tim Croft in February 1991, just inside the southern boundary of park.

Owens *et al.* (1995) describe the species as being endemic to the mallee districts on each side of the Victoria-South Australia border. In South Australia, the species extends from north of Kingston in the South-East, to the Karoonda district in the Murray Mallee (Owens *et al.* 1995). This area of the state has been selectively and intensively cleared due to its heavier soils. Consequently, the species is listed by Lang & Kraehenbuehl (1999) as vulnerable in South Australia.

East of the border, large areas of vegetation in similar land systems remain uncleared and the species is not regarded as rare or threatened in Victoria (Gullan, Cheal and Walsh 1990).

Dwarf centrolepis (*Centrolepis cephaloformis* ssp. *cephaloformis*)

Centrolepis cephaloformis ssp. *cephaloformis* is a minute annual herb forming round moss-like or burr-like tufts, 0.4 to two centimetres in diameter. The species occurs in mallee and disturbed communities on sand and other infertile soils, as well as on the margins of clay pans and salt marshes (Jessop & Toelken 1986). The species is listed as rare throughout South Australia, and endangered in the South East (Lang & Kraehenbuehl 1999). The species also occurs interstate in Western Australia and Victoria where it is more common.

The species was collected during the 1995 & 1996 surveys of Gum Lagoon Conservation Park, at the northern edge of Section 27 Hundred of Laffer, and near the northeastern corner of Section 40 Hundred of Petherick. At both locations the species occurred in *Melaleuca halmaturorum* Low Open Woodland. Lang & Kraehenbuehl (1999) record the species as not occurring in any other conservation reserves in the South East. However, they record the species as occurring in Hinks, Bascombe Wells and Acraman Creek Conservation Parks on Eyre Peninsula, in Flinders Ranges National Park in the Flinders Ranges, and in two Heritage Agreement areas in the Southern Lofty Region.

Due to its small size the species is highly vulnerable to weed invasion, especially if salt tolerant exotic perennial grasses such as tall wheat-grass (*Elymus elongatus*) were planted nearby. That species is presently being actively promoted by PIRSA for revegetating salt affected areas and is beginning to invade the north eastern sections of the park via the road verges.

Purple eyebright (*Euphrasia collina* ssp. *collina*)

Euphrasia collina ssp. *collina* is a semiparasitic perennial or undershrub to 80 centimetres tall, with rootlets often connected to other plants by nodular swellings. This taxon is distinguished from other South Australian species and subspecies of *Euphrasia* by its white to lilac flowers; the lack of hairs on the external surface of the sepals; the pilose hairs on the outsides of the petal lobes; and its narrow upper leaves which usually have only one (occasionally two) lobe(s).

In South Australia, the species is confined to the South East and listed as poorly known but suspected of being either rare or threatened (Lang & Kraehenbuehl 1999). The species also occurs interstate in New South Wales, Tasmania, and Victoria, where the species is more common.

E. collina ssp. *collina* was recorded three times in Gum Lagoon Conservation Park during the NCS 1996 survey, from *Eucalyptus diversifolia* Low Mallee on the crest of a calcrete ridge at the northern end of Section 9 Hundred Wells, and in openings in *Melaleuca brevifolia* Low Shrubland towards the north western corner of Section 30 Hundred Wells. The species is only known from one other conservation reserve in South Australia, Big Heath Conservation Park (Lang & Kraehenbuehl 1999).

Gimlet bog-rush (*Schoenus sculptus*)

Schoenus sculptus is a small annual sedge three to 20 centimetres tall, with short, narrow, channelled leaves, longer but slender striated stems, and brownish to purplish leaf sheafs and spikelets.

The species is listed as rare in South Australia, and vulnerable in the South East (Lang and Kraehenbuehl 1999). The species also occurs on Eyre Peninsula, in the Southern Lofty Region and on Kangaroo Island. Interstate, the species occurs in southwestern Victoria, where it is also rare (Gullan, Cheal and Walsh 1990), and in Western Australia.

The species was recorded three times during the 1996 NCS survey, once in the northeastern corner of Section 40 Hundred Petherick, and twice in the northern half of Section 42 Hundred Petherick, all in the far eastern section of the park. Associated plant communities varied from *Eucalyptus incrassata* Mallee, to *Melaleuca lanceolata* Tall Shrubland, to *M. halmaturorum* Low Open Woodland.

The species is also conserved in Penola and Mary Seymour Conservation Parks in the South East; Kelly Hill Caves and Beyeria Conservation Parks on Kangaroo Island, and in Bascombe Wells Conservation Park on Eyre Peninsula (Lang and Kraehenbuehl 1999).

Table 12: Significant plant species recorded from Gum Lagoon Conservation Park

	Conservation status (Lang & Kraehenbuehl 1999; Briggs & Leigh 1996)		
Species	**Australia**	**SA**	**SE**
Thelymitra epipactoides	3Eca	E	E
Senecio macrocarpus	3Vca	V	V
Haloragis eichleri	3Rca	R	R
Eucalyptus wimmerensis	R	K	K
Haekeria pholidota		V	V
Euphrasia collina ssp. *collina*		K	K
Centrolepis cephaloformis ssp. *cephaloformis*		R	E
Schoenus sculptus		R	V
Triglochin minutissimum		R	K
Brachycome parvula var. *lissocarpa*		R	R
Centrolepis glabra		R	R
Comesperma polygaloides		R	R
Isoetes drummondii		R	R
Isolepis stellata		R	R
Leucopogon clelandii		R	R
Myoporum parvifolium		R	R
Phyllangium distylis		R	R
Poa rodwayi		R	R
Schoenus laevigatus		R	R
Sphaerolobium minus		R	R
Zieria veronicea		R	R
Isolepis hookeriana		U	K
Isoetes muelleri		U	K
Lobelia rhombifolia		U	K
Olearia tubuliflora		U	K
Quinetia urvillei		U	R
Orthoceras strictum		U	R
Pterostylis alata		U	R
Pterostylis fitzgeraldii		U	R
Pultenaea vestita		U	R
Thelymitra benthamiana		U	R
Villarsia umbricola var. *umbricola*		U	R
Corybas incurvus		U	U
Grevillea lavandulacea var. *sericea*		U	U
Hakea repullulans		U	U
Lawrencia spicata		U	U
Leucopogon woodsii		U	U
Lomandra sororia		U	U
Microtis parviflora		U	U
Olearia lanuginosa		U	U
Phyllota remota		U	U
Santalum murrayanum		U	U
Senecio squarrosus		U	U
Thelymitra canaliculata		U	U
Utricularia dichotoma		U	U
Utricularia tenella		U	U

Table 12 (continued): Significant plant species recorded from Gum Lagoon Conservation Park

	Conservation status (Lang & Kraehenbuehl 1999; Briggs & Leigh 1996)		
Species	**Australia**	**SA**	**SE**
Acianthus caudatus var. *caudatus*			K
Amyema preissii			K
Halosarcia lepidosperma			K
Hydrocotyle medicaginoides			K
Poranthera triandra			K
Stenopetalum lineare			K
Trachymene cyanopetala			K
Calandrinia eremaea			R
Lilaeopsis polyantha			R
Podolepis canescens			R
Stipa nodosa			R
Trachymene pilosa			R
Acacia acinacea			U
Acacia brachybotrya			U
Acacia hakeoides			U
Boronia filifolia			U
Brachycome lineariloba			U
Bulbine semibarbata			U
Calandrinia calyptrata			U
Dichelachne crinita			U
Eucalyptus rugosa			U
Hypoxis vaginata var. *vaginata*			U
Ixodia achillaeoides ssp. *alata*			U
Pterostylis nutans			U
Pultenaea acerosa			U
Stipa mundula			U
Thelymitra juncifolia			U
Wilsonia humilis var. *humilis*			U

Species of Regional Significance

Of the 28 plant species of region significance recorded for Gum Lagoon Conservation Park, five are listed by Lang & Kraehenbuehl (1999) as rare in the South East, seven are listed as poorly known but suspected of being either rare or threatened in the region, and 16 are regionally uncommon. Details on quadrats in which they have were recorded, their cover/abundance at these sites, and the floristic communities in which they occur, are given in Table 13.

Table 13: Details of populations of significant plant species recorded from quadrats in Gum Lagoon Conservation Park.

Species	AUST	SA	SE	Quadrat Patch Id	Cover/ Abundance	Floristic Community Grp
Acacia brachybotrya			U	GL01401	2	6
				GL02001	N	1
				GL02101	N	2
				GL03101	N	1
				GL03201	N	7
Boronia filifolia			U	GL00701	N	3
				GL002501	1	1
Brachycome lineariloba			U	GL00201	T	8
				GL004101	T	5
Calandrinia calyptrata			U	GL004101	1	5
Calandrinia eremaea			R	GL00201	T	8
				GL001401	T	6
Centrolepis cephaloformis ssp. *cephaloformis*		R	E	GL00201	2	8
				GL03701	T	8
Comesperma polygaloides		R	R	GL003301	N	3
Dichelachne crinita			U	GL003901	N	3
Eucalyptus rugosa			U	GL002101	N	2
Eucalyptus wimmerensis	R	K	K	GL004101	2	5
Euphrasia collina. ssp. *collina*		K	K	GL002601	T	10
				GL002701	N	10
				GL002901	1	2
Gnephosis drummondii			R	GL00301	N	10
				GL003601	T	5
				GL003701	T	8
				GL003901	T	3
Grevillea lavandulacea var. *sericea*		U	U	TIL0201	N	2
				GL002101	N	2
				GL002901	N	2
				GL00501	N	2
Hakea repullulans		U	U	GL002401	T	1
Haloragis eichleri	3Rca	R	R	GL002101	N	2
Halosarcia lepidosperma			K	GL00201	1	8
				GL003401	T	8
				GL003701	1	8
Hydrocotyle medicaginoides			K	GL00201	1	8
				GL00601	T	10
Isolepis stellata		R	R	GL003901	T	3
Ixodia achillaeoides ssp. alata			U	GL002101	N	2
Leucopogon woodsii		U	U	GL00101	T	1
				GL002501	N	1
Lomandra sororia		U	U	GL002101	N	2
				GL003001	N	7
				GL004101	N	5
Myoporum parvifolium		R	R	GL003201	N	7
Olearia lanuginosa		U	U	GL002601	1	10
				GL002701	N	10
Orthoceras strictum		U	R	GL003901	N	3
Phyllangium distylis		R	R	GL003901	T	3
Phyllota remota		U	U	GL002401		1

Table 13 (continued): Details of populations of significant plant species recorded from quadrats in Gum Lagoon Conservation Park.

Species	AUST	SA	SE	Quadrat Patch Id	Cover/ Abundance	Floristic Community Grp
Poa rodwayi		R	R	GL003001	T	7
				GL003201	T	7
Podolepis canescens			R	GL002601	T	10
Poranthera triandra			K	GL002701	N	10
Pultenaea acerosa			U	TIL0201	T	2
				GL002101	T	2
				GL002201	N	1
				GL002901	T	2
				GL00501	1	2
Pultenaea vestita		U	R	GL002601	2	10
Quinetia urvillei		U	R	GL00201	T	8
Santalum murrayanum		U	U	GL002501	N	1
Schoenus laevigatus		R	R	GL00301	T	10
Schoenus sculptus		R	V	GL003601	N	5
				GL003701	T	8
				GL003901	1	3
Senecio squarrosus		U	U	GL002601	N	10
				GL01301	N	9
Sphaerolobium minus		R	R	GL002201	N	1
Stipa acrociliata			R	GL004101	N	5
Stipa exilis			R	GL004101	1	5
Stipa mundula			U	GL003301	T	3
Stylidium calcaratum			R	GL003901	T	3
Thelymitra benthamiana		U	R	GL003101	T	1
Thelymitra epipactoides	3Eca	E	E	GL00301	N	10
Trachymene cyanopetala			K	GL003601	1	5
Trachymene pilosa			R	GL00301	N	10
				GL004101	1	5
				GL00701	1	3
Triglochin calcitrapum			R	GL004101	T	5
Utricularia tenella		U	U	GL00201	T	8
				GL00301	N	10
Villarsia umbricola var. *umbricola*		U	R	GL00901	N	10

Weed Invasion

Although, sixty two exotic plant species have been recorded for the park (Appendix 4), the majority of the park is largely weed free. However, existing drains and tracks create ideal conditions for the invasion of weeds into the park. Many weeds colonise readily the disturbed edges of track, and both earthmoving equipment used to maintain the tracks and cars provide effective vectors for weed seed.

Of particular concern is further spread around the park, of the weeds perennial veldt grass (**Ehrharta calycina*), and bridle creeper (**Myrsiphyllum asparagoides*). Both species are serious environmental weeds able to out compete most native ground stratum species and, in the case of bridle creeper, also shrub species. Perennial veldt grass is particularly serious after fire, rapidly out competing regenerating natives. (Davies 1997). The species is presently being actively promoted by the South Australian Department of Primary Industries & Resources (PIRSA) for revegetating drifting sand areas.

Perennial veldt grass is becoming a major problem along the central western boundary of Section 27 Hundred Lafer. An infestation of bridle creeper was observed on the southern road verge of Cantara Road 0.7 kilometres east of the telephone exchange, adjacent to the southern boundary of Section 27 Hundred Laffer.

Although presently confined to the very edge of the park, **Phalaris* and tall wheat-grass (**Elymus elongatus*) have the potential to become serious weeds along tracks and drains traversing wetland areas of the park. The latter species is presently being actively promoted by PIRSA for revegetating salt affected areas and is beginning to invade the North Eastern sections of the park via the road verges of Cantara and Wicks Roads.

At particular risk from this spread of weeds are plant species and plant communities that are very localised in the park and occur on the more fertile soil types. Two such species are the nationally threatened metallic sun-orchid (*Thelymitra epipactoides*) and large-fruit groundsel (*Senecio macrocarpus*). Two plant communities particularly at risk are *Eucalyptus wimmerensis* Mallee and *E. leucoxylon* Low Woodland & Woodland, which are very localised and occur on relatively fertile soils near the edge of the park. These communities contain a number of species not found elsewhere in the park.

MAMMALS, REPTILES & AMPHIBIANS

by R. Davies

AIMS

The aim of this survey was to:

1. Collate all previous information on the mammals, reptiles and amphibians of Gum Lagoon Conservation Park.
2. Sample the mammals, reptiles and amphibians in all plant communities and habitat types in the park using the techniques and standards established for the 'Biological Survey of South Australia'.
3. Provide the South Australian Museum with a set of properly documented voucher specimens of the amphibians, reptiles and small mammals collected during the survey.
4. Document the locations & habitats of, and threats to, populations of rare and threatened mammal, reptile and amphibian species occurring in the park.
5. Collect data relevant to the management of the park's fauna, in particular any threatened species.

METHODS

Vertebrate sampling was carried out from 15th to 20th September 1995 and 30th September to 6th October 1996. Sampling was undertaken at thirteen sites in 1995, with a further sixteen different sites being sampled in 1996. The location of sites sampled is given in Table 1 on page 8. With the exception of one site in 1995, which was too rocky for the digging of pitfall holes, all sites were sampled using a 50m line of six pitfalls. Traps used consisted of 455mm x 380mm sheets of white, high-impact, polystyrene sheet joined into a cylinder using a slotted H section plastic strip (HM12). This resulted in a pitfall trap 125mm in diameter and 380mm deep.

A separate line of 15 Elliott traps was run in association with each pitfall line sampling the same habitat within the quadrat, and two possum/cat size traps were placed at each end. A line of six micro-pitfalls, consisting of plastic vials measuring 80mm x 20mm and filled with 70% alcohol, was set adjacent to the main pitfall line.

All traplines were run for four nights, with the exception of two sites in 1996, one of which was sampled over five nights and the other over three nights. Reptiles and mammals were also sampled by searching each of the twenty-nine quadrats at least once during the survey periods.

The maximum and minimum temperatures and weather conditions during the 1985 and 1986 fauna surveys are given in Table 14.

Observations of vertebrates encountered outside quadrats were recorded on special 'opportunistic' data sheets. Although a harp trap was set up adjacent to the camp site over two days of the 1996 survey, no bats were caught.

At least one specimen of each small mammal and reptile species recorded for the survey area was preserved as a museum specimen. Larger species that had been collected from the general region in the past and did not present any identification problems were not collected.

A small amount of vehicle and walking spotlight searching was carried out both at the trapping sites and opportunistically but the demands of quadrat sampling and specimen processing did not allow this to be carried out systematically.

Samples of liver tissue were taken from all vertebrate specimens collected, and this was stored in liquid nitrogen. These tissue samples were lodged within the South Australian Museum. Invertebrates were collected from the micro-pitfall traps or opportunistically around each quadrat. These samples were similarly lodged within the Museum

A summary of sampling effort over the whole survey is given in Table 15. The total number of observations of mammals, reptiles and amphibians during the two surveys are presented in Table 16

Table 14: Maximum and minimum temperatures and weather conditions during the 1995 and 1996 NCSSA fauna surveys of Gum Lagoon Conservation Park

Date	Minimum (ºC)	Maximum (ºC)	Weather conditions
15/9/95	-*	-*	cold night, mild to warm day
16/9/95	-*	-*	cold night, mild to warm day
17/9/95	-*	-*	cold night, mild to warm day
18/9/95	-*	-*	foggy morning, mild to warm day
19/9/95	-*	-*	foggy morning, cool cloudy day
20/9/95	-*	-*	foggy morning, cool cloudy day with patchy rain
1/10/96	-*	16.5	cloud, showers
2/10/96	12	18	cloud, occasional showers
3/10/96	-*	28.5	sunny
4/10/96	10	28.5	sunny, high cloud, late showers
5/10/96	10.5	18	cloudy
6/10/96	6.5	-	60% cloud - fine

* Faulty thermometer

Table 15: Trapping and spotlight effort during the 1995 and 1996 NCSSA fauna surveys of Gum Lagoon Conservation Park

Site	Pitfall Trap Nights	Elliott Trap Nights	Cage Trap Nights	Vehicle Spotlight Hours	Harp Trap Nights	Mist Net Hours
GL00101	0	60	8			
GL00201	24	60	8			
GL00301	24	60	8			
GL00401	24	60	8			
GL00501	24	60	8			
GL00601	24	60	8			
GL00901	24	60	8			
GL01001	24	60	8			
GL01101	24	60	8			
GL01201	24	60	8			
GL01601	24	60	8			
GL01701	24	60	8	1		
GL01801	24	60	8	5		3
GL01901	24	60	8			
GL02001	24	60	8			
GL02101	24	60	8			
GL02201	24	60	8			
GL02301	24	60	8			
GL02401	24	60	8			
GL02801	24	60	8			
GL02901	24	60	8			
GL03001	24	60	8			
GL03101	24	60	8			
GL03201	24	60	8			
GL03301	24	60	8			
GL03501	24	60	8			
GL03801	24	60	8			
GL04001	30	75	10			
GL04101	24	60	8			
GL04201	24	60	8			
Old Naen Naen Pk Homestead					4	
Total	702	1815	242	6	4	3

Table 16: Numbers of individual observations of mammals, reptiles and amphibians during the 1995 and 1996 NCSSA fauna surveys of Gum Lagoon Conservation Park

Fauna group	Quadrats	Opportunistic	Total
Mammals	256 (29 sites)	34	290
Reptiles	132 (28 sites)	13	145
Amphibians	183 (26 sites)	11	194

RESULTS & DISCUSSION

Mammal species

Seven species of native mammals were recorded from Gum Lagoon Conservation Park during the NCSSA surveys of 1995 and 1996. A further five species were recorded from the park by the previous Native Vegetation Retention Unit (Department of Environment) and adjacent landholders. All these species and the sources of records are listed in Appendix 5. For those species caught or observed at fauna sampling sites, the site numbers and plant communities in which each species was recorded is given in Appendix 9.

Of these species, three are listed in NPWSA (1999) as being of state significance, while one is listed in Croft *et al.* (1999) as being of regional significance. These species are listed in Appendix 5 and described below.

The eight introduced mammals recorded from the park are listed in Appendix 5.

Species of State Significance

Eastern Grey Kangaroo (*Macropus giganteus*)

The Eastern Grey Kangaroo is a widespread species of the wetter forests and woodlands of eastern Australia, but is listed as rare in South Australia (NPWSA 1999). In South Australia the species is confined to the South East, where the species reaches its western most limit in Australia.

The species is also locally common in the South East at a few sites south of Penola and east of Mount Gambier mostly in native forest reserves. Isolated populations also occurring in the Noolook Forest near Robe and near The Gap (Croft & Carpenter 1999).

During the NCCSA survey of Gum Lagoon Conservation Park, an Eastern Grey Kangaroo was observed in *Melaleuca brevifolia*, *M. uncinata* Open Shrubland toward the eastern corner of Section 25 Hundred Laffer. It is important that landholders adjacent to the park be informed of the presence and importance of the species, so that they are not hunted in mistake for the common Western Grey Kangaroo.

Red-necked Wallaby (*Macropus rufogriseus*)

The Red-necked Wallaby has a wide distribution in eastern and southeastern Australia, from southern Queensland along the coast to the South East of South Australia, where it is at the extreme southwestern limit of its natural range. It also occurs in Tasmania.

The species was formally abundant throughout the South East of South Australia, but has undertaken a marked decline since European settlement (Aitken 1983), due to vegetation clearance and fox predation (Croft *et al.* 1999). The species is now considered to be rare throughout South Australia (NPWSA 1999). It is now mostly confined to larger remnant blocks of native vegetation with a dense understorey, south of Naracoorte. However, it is also patchily distributed elsewhere north to Messent Conservation Park and Bordertown (Croft *et al.* 1999; Croft & Carpenter 1999).

Red-necked Wallaby inhabits eucalypt forests and woodlands with a shrubby understorey, as well as tall coastal shrublands. Since the species grazes on grasses and herbs, it generally occurs adjacent to open areas (Croft *et al.* 1999).

In Gum Lagoon Conservation Park, a total of nine Red-necked Wallaby were observed in October & November 1996, along the western edge of the park, 0.7-0.9 kms, 1.6 kms, 2.8 kms, 4.2 kms and 6.5 kms northwest of the southwestern corner of the park. All animals were feeding on adjacent farmland, but were variously sheltering in *Eucalyptus diversifolia* Low Mallee on limestone, *E. arenacea* Low woodland or at the edge of *Melaleuca brevifolia* Open Shrubland. The park is near the northern boundary of this species distribution in South Australia. Since the species is considered rare, particularly in the Upper South East, the protection of Red-necked Wallaby in the park is essential to prevent further contraction of its range.

Owens *et al.* (1995) describe major drains as a significant barrier to Red-necked Wallaby movement. They further describe the species as not moving far from natural vegetation across cleared farmland. Thus the construction of drains through the sections of the park or adjacent vegetation containing the species could result in the fragmentation of populations. The resulting subpopulations would be under increased threat from inbreeding depression and the loss of the genetic capacity to respond to altered environments. Drain construction could also increase fox predation, especially on young animals, by opening up access into areas of Red-necked Wallaby habitat.

Management of the wallaby in the park should concentrate on fox control, and the prevention of further fragmentation of habitat by track or drain construction. It is also important that adjacent landholders be informed of the presence and importance of the species, so that they are not hunted in mistake for the common Western Grey Kangaroo.

Common Wombat (*Vombatus ursinus*)

The Common Wombat is a widespread nocturnal, burrowing species recorded from southeastern Queensland, New South Wales, Victoria and Tasmania. In South Australia it is at the western limit of its range.

In South Australia, the Common Wombat has undergone a major decline in both distribution and numbers since European settlement. Their original distribution covered much of the South East at least as far north as the Tatiara district and Tailem Bend. They were common around Meningie at the time of settlement in 1866 but had disappeared by 1900. One isolated colony persisted near Wellington until 1920. Today the northern limit is the Coorong National Park and Game Reserve to about Salt Creek and Messent Conservation Park and the surrounding remnant natural vegetation. Throughout the rest of the South East they have a highly fragmented distribution (Owens *et al.* 1995). The species is thus listed as rare in South Australia (NPWSA 1999) and vulnerable in the South East (Croft *et al.* 1999).

South Australian populations of Common Wombat are now mostly confined to refugia within 20km of the coast, on the eastern sides of dune ridges (Croft & Carpenter 1999). In the Upper South East, wombat burrows generally occur in slopes immediately above the watertable where relief or vegetation provide cover (Mallett & Cooke 1986). In these areas the species relies on having perennial grasses and sedges in close proximity, along with low rabbit and stock numbers, so that young wombats have adequate food when they are first becoming self reliant in early summer (Mallett & Cooke 1986). The species also feeds on the roots of trees and shrubs (Croft *et al.* 1999).

During the NCSSA survey of Gum Lagoon Conservation Park, Common Wombat warrens were observed in the bases of dunes adjacent to the broad herbland flats in the vicinity of the southeastern corner of Section 9 Hundred Wells. Wombat droppings were also observed near the western edge of Gum Lagoon in Section 30 Hundred Wells.

Owens *et al.* (1995) described major drains as a significant barrier to wombat movement. Given the needs of the species to move between their burrows and grazing areas, populations in Gum Lagoon Conservation Park could be severely disrupted and potentially locally threatened if major drains were constructed through the sections of the park or adjacent vegetation containing the species. Similarly, the deliberate increased flooding of the broad herbland flats at the southern end of the park could also affect the species by removing a food source for young wombats.

Management of the wombat in the park should concentrate on rabbit control around these herbland flats, and the prevention of further fragmentation of habitat by drain construction. It is also important that adjacent landholders be informed of the importance of the species, since some landholders consider the species as a management problem due to their burrow construction and damage to fences.

Species of Regional Significance

Little Pygmy Possum (*Cercartetus lepidus*)

Little Pygmy Possum is a species of South Eastern Australia, where it is confined to Tasmania, western Victoria and South Australia. The species has a restricted range within South Australia, where it has been recorded from Kangaroo Island, mallee areas of the Murray Mallee, and the Upper South East (Croft *et al.* 1999). The species is listed as rare in the South East (Croft *et al.* 1999), the Upper South East representing the northwestern limit of this species range on the Australian mainland.

Little Pygmy Possum is the smallest of all the possums and is largely nocturnal, largely feeding on a wide range of invertebrates and small lizards. It nests in a variety of places including old bird nests, and inhabits a range of eucalypt habitats including mallee, forest and woodland (Croft *et al.* 1999).

In Gum Lagoon Conservation Park the species was trapped in pitfalls at site GL00401 near the northeastern corner of Section 27 Hundred Laffer; at GL01201on former Naen Naen Park Station; at GL00901, GL01001 and GL01701 immediately west of Gum Lagoon; at GL00501 a kilometre northwest of Gum Lagoon; and at GL02201, and GL02401 two kms south and southwest of Gum Lagoon (see Figure 2). Habitats varied from *Eucalyptus arenacea* Woodland, to *E. fasciculosa* Woodland, to *E. camaldulensis* Woodland, to *E. diversifolia* Mallee over limestone (Floristic Communities 1, 2, 4 & 10).

Little Pygmy Possum also occurs in the South East in Messent, Martin Washpool, Fairview, Mt Scott and Big Heath Conservation Parks; and in the Murray Mallee in Ngarkat Conservation Park (Croft & Carpenter 1999).

Owens *et al.* (1995) describe the species as one which would have difficulty crossing major drains built in parks, and thus would potentially dissappear from smaller sections of Gum Lagoon Conservation Park if they were isolated from the rest of the park by such drains.

Feral Species

Eight feral mammal species have been recorded from the park: Goat, Fallow Deer, Brown Hare, House Mouse, Rabbit, Sheep, Rat and Fox (see Appendix 5). Of greatest concern is the impact that goats, rabbits, and foxes could have on the parks flora and fauna if numbers were allowed to build up.

Goat (*Capra hircus*)

During the 1995 NCSSA survey, one adult and two juveniles were observed at the central western edge of the park. While goat numbers are apparently still very low, the presence of juveniles indicates the population is breeding. It is of high priority that goat control be implemented before goat number build up to numbers that begin to impact on the parks flora, in particular rare species and plant communities.

Rabbits (*Oryctolagus cuniculus*)

Rabbit droppings and diggings were recorded during the 1995 survey from inside the northwestern boundary of Sections 25 Hundred Laffer, from near the eastern boundary of the previous Naen Naen Park Station, and from immediately west of Gum Lagoon in Section 30 Hundred of Wells. During the 1996 survey, rabbit numbers were observed to be particularly common on the northern boundary of Section 30 Hundred Wells. Subsequently, rabbit droppings have also been observed on low ridges and levees inside the boundaries of the eastern sections of the park.

While rabbit numbers are apparently presently low, certain rare and threatened plant species occurring in the park are at particular risk because of their low numbers. It is of particularly high priority to control rabbits in the vicinity of any populations of the nationally threatened metallic sun-orchid (*Thelymitra epipactoides*) and large-fruit groundsel (*Senecio macrocarpus*). Due to the need for juvenile wombats to have a ready supply of perennial grasses when they are first weaned, rabbit control around the southern broad herbland flats in Section 9 Hundred Wells, and Section 37 Hundred Petherick is also of high priority.

The presence of abundant rabbit droppings in *Eucalyptus wimmerensis* Open Mallee indicates that rabbit control in the vicinity of this regionally threatened plant community is also a high priority.

Fox (*Vulpes vulpes*)

Fox droppings were recorded during the 1995 survey from inside the northwestern boundary of Sections 25 Hundred Laffer, and immediately west of Gum Lagoon in Section 30 Hundred of Wells. Foxes are a major threat to ground dwelling birds, smaller ground dwelling mammals, and reptiles, in particular very localised rare and threatened species.

Of highest priority should be the control of foxes in the vicinity of Malleefowl (*Leipoa ocellata*) mounds and populations of Red-necked Wallaby (*Macropus rufogriseus*).

Fallow deer (*Dama dama)*

Six deer were observed in April 2000, two at Gum Lagoon and four jumping the fence along the northern boundary of Section 30 Hundred Wells.

Reptile species

Seventeen species of native reptiles were recorded from Gum Lagoon Conservation Park during the NCSSA surveys of 1995 and 1996. A further two species were recorded from the park by adjacent landholders. All these species and the sources of records are listed in Appendix 6.

Of these species, one is listed in NPWSA (1999) as being of state significance, and one is listed in Croft & Carpenter (1999) as being of regional significance. These species are listed in Appendix 6 and described below.

Species of State Significance

Rosenberg's Goanna (*Varanus rosenbergi*)

Rosenberg's Goanna is abundant on Kangaroo Island however the mainland population appears to be in decline (Mark Hutchinson, pers. comm., cited in Owens *et al.* 1995). Unlike Gould's Goanna (*Varanus gouldii*), Rosenberg's Goanna appears to disappear from cleared areas (Hutchinson 1992). This combined with their use of a large home range makes the species dependent on large areas of remnant vegetation (Owens *et al.* 1995). The species is thus listed as rare in South Australia (NPWSA 1999) and vulnerable in the South East (Croft & Carpenter 1999).

Rosenberg's Goanna prefers heaths, and sclerophyll forests and woodlands with a heathy understorey, on loamy and stony soils. The species shelters in burrows including those made in termite mounds, hollow logs and rock crevices. It feeds on reptiles and their eggs, large insects, spiders, scorpions, centipedes, mice and carrion (Croft & Carpenter 1999).

In Gum Lagoon Conservation Park, a goanna was observed within the park by an adjacent landowner. Since the more common Gould's Goanna is not recorded as occurring as far south as Gum Lagoon Conservation Park (Houston 1998), this was probably a Rosenberg's Goanna. However, this record requires further confirmation. Rosenberg's Goanna was the only species of goanna recorded for nearby Messent Conservation Park by Owens *et al.* (1995).

Species of Regional Significance

Mitchell's Short-tailed Snake (*Suta nigriceps*)

Mitchell's Short-tailed Snake is a nocturnal species generally occurring in mallee habitats. It shelters under leaf litter, fallen timber or *Triodia* clumps, and feeds on skinks and other smaller snakes (Croft & Carpenter 1999).

Croft cites the only other record of the species for the South East as being from the Hundred of Lochaber, and thus lists the species as regionally rare.

In Gum Lagoon Conservation Park, Mitchell's Short-tailed Snake was found in and under logs, corrugated iron and plywood in *Eucalyptus fasciculosa* Woodland on the former Naen Naen Park Station, including at Site GL04001 (Figure 2).

Amphibian species

Five species of amphibians were recorded from Gum Lagoon Conservation Park during the NCSSA surveys of 1995 and 1996. All these species and the sources of records are listed in Appendix 6.

None of these species are listed in NPWSA (1999) as being of state significance, or by Croft & Carpenter (1999) as being of regional significance.

BIRDS

by M. Possingham, H. Possingham & R. Davies

AIMS

The aim of this survey was to:

1. Summarise previous information on the avifauna birds of Gum Lagoon Conservation Park, in particular observations made during nine visits to the park from 1982 to 1996.
2. Sample the birds in all plant communities and habitat types in the park.
3. Document the locations & habitats of, and threats to, populations of rare and threatened birds species occurring in the park.
4. Collect data relevant to the management of the park's bird fauna, in particular any threatened species.

METHODS

The majority of the data in this section is from two surveys of Gum Lagoon Conservation Park, undertaken by the Nature Conservation Society during August, September and November 1995 and October 1996. The locations of the 52 survey sites sampled in the park during these two surveys are given in Table 1 on page 8.

During the 1995 survey, more accessible areas of the park were intensively sampled using the transect method (Bell *et al.* 1985) for the purpose of estimating species abundance. Transect sites were laid out during a visit by three observers in August 1995. While these transects covered all major habitats in the park, some were not sampled during 1995. Ten observers recorded bird data during the main visit in September followed up by one observer during November. Thirty-two transects were surveyed over 14 days, resulting in 5523 species sightings of 9725 birds.

The 1996 survey aimed to covered additional habitats, however this was only partially achieved due to high water levels limiting access to some sites. During this year avifauna was surveyed using the standard area search methodology as used by the "Biological Survey of South Australia" (Copley & Kemper 1992). A team of six observers surveyed 25 mainly new sites using the area search method, resulting in 710 species sightings of 1427 birds.

During both the 1995 and 1996 surveys, observations of birds at other locations were recorded. These records were not intended to cover all birds observed away from the official sites but were observations that would add to the knowledge of bird populations in the park. The standard DEHAA form for "Opportunistic Observations" was used.

Additional data of a less formal nature was collected between 1982 and 1992. During this period five visits of three to five days duration where undertaken by Max and Hugh Possingham.

A more detailed presentation and analysis of the bird data reported here will be presented in Possingham & Possingham (2000, in prep.).

RESULTS & DISCUSSION

One hundred and forty six species of native birds were recorded from Gum Lagoon Conservation Park during the NCSSA surveys of 1995 and 1996, and during previous surveys by Max and Hugh Possingham over the preceding 14 years. All these species and the sources of records are listed in Appendix 7, along the bird numbers recorded during each survey. Also recorded from the park were five introduced species as listed in Appendix 8. For species observed at fauna sampling sites, the site numbers and plant communities in which each species was recorded are given in Appendix 9.

Of the native bird species recorded for the park, three are listed in Schedule 1 of the Endangered Species Protection Act 1992 (26 May 1999) or Garnett (1992) as being of national significance. A further 13 are listed in NPWSA (1999) as being of state significance, while 31 are listed in Carpenter & Reid (1999) as being of regional significance. These species are listed in Appendix 7 and the most significant are described below.

Species of National Significance

Malleefowl (*Leipoa ocellata*)

The Malleefowl is a ground frequenting bird which occurs from the central west coast of Western Australia, through to the western slopes of Great Dividing Range of New South Wales. However, the species is listed in Schedule 1 of the Endangered Species Protection Act 1992 (26 May 1999) as nationally vulnerable due to declines in population sizes throughout its range due to habitat clearance, grazing and predation by introduced predators, in particular foxes (Blakers *et al*. 1984). The species is also listed as vulnerable in South Australia (NPWSA 1999); and vulnerable in the South East (Carpenter & Reid 1999).

Malleefowl is a sedentary and territorial species that incubates its eggs in mounds. The species depends on the shoots and flowers of herbs for food in winter, and the fruit and seeds of acacias and other shrubs in summer and autumn. The species is vulnerable to feral animals, foxes being predators of eggs laid in the mounds, and rabbits being competitors for food. (Blakers *et al*. 1984)

Large populations of Malleefowl occur in Gum Lagoon Conservation Park. Nine birds were observed in October & November 1996 alone. These were seen 1) along the western edge of the Section 9 Hundred Wells, 2) along the tracks running north and northwest from the broad herbland in the southeast corner of Section 9 Hundred Wells, 3) in the northern corner of Section 42 Hundred Petherick, and 4) adjacent to the northwestern border of Section 27 Hundred Laffer. Habitats were mostly *Eucalyptus diversifolia* Mallee on sheet limestone or sand, but observations were also made in *E. wimmerensis* Open Mallee, and *Eucalyptus incrassata* Open Mallee with an understorey of *Melaleuca uncinata.* One bird was observed foraging on exotic pasture immediately adjacent to the western boundary of the park.

A further four Malleefowl were recorded from bird transects during the NCS surveys and a further 21 opportunistic sighting were made in the park during and before the same surveys. These sightings were from woodland, mallee, heath, dense shrubland and edge habitats. An active nesting mound was also observed during the 1996 survey. These observations indicate that the species uses all habitats in the park except for *Melaleuca* flats subject to inundation.

Malleefowl also occurs in the Upper South East in Messent Conservation Park. A survey in 1994 failed to relocate the species in the park and it was postulated that the species failed to survive the December 1977 fire, which burnt the majority of the park (Owens *et al.* 1995). However the species was observed near the centre of the park in the mid-1980s (R. Davies, pers. obs.). Malleefowl also occur in the Martin Washpool-Tilley Swamp region

(Stewart *et al*. 1998) and further south to Fairview and Mount Scott Conservation Parks (Possingham 1983).

Malleefowl reaches some of its highest population densities in the South East and the region can be regarded as the national stronghold for the species (Croft *et al.* 1999). Gum Lagoon Conservation Park, with its large area of suitable habitat and apparently large Malleefowl populations, may be essential for the species' long-term survival in the district.

Given their vulnerability fox predation, the construction of any drains or further tracks into the park are likely to have a negative impact on Malleefowl populations by increasing access to foxes.

Fire is also an important management issue for Malleefowl in Gum Lagoon Conservation Park, the species relying on both burnt and unburnt areas. The species requires unburnt areas for shelter and breeding (accumulated litter for nests) while fire favours food plants such as *Acacia* species (Croft *et al.* 1999).

Figure 18: **Malleefowl (*Photograph: B.E. Furby*).**

Slender-billed Thornbill (*Acanthiza iredalei hedleyi*)

The Slender-billed Thornbill is a species restricted to southern South Australia, Western Victoria and Western Australia. The subspecies occurring in the Upper South East, Lower Murray Mallee and adjacent areas of western Victoria is isolated from the remainder of the populations and inhabits different habitats (Croft *et al.* 1999). The species feeds off insects and small spiders occurring in bushes (Blakers *et al.* 1984).

While the South East subspecies is not listed in Schedule 1 of the Endangered Species Protection Act 1992 (26 May 1999) as nationally endangered or vulnerable, the species as a whole is listed in Garnett (1992) as poorly known but suspected of being rare or threatened at the nationally level. The species is listed as vulnerable in South Australia (NPWSA 1999); and vulnerable in the South East (Carpenter & Reid 1999).

Slender-billed Thornbills were sighted in larger numbers during three visits between 1983 and 1987 in Gum Lagoon Conservation Park. It was particularly prolific in 1987, 32 individuals being sighted mainly in *Melaleuca brevifolia* heath but also in shrubby grassland, woodland and forest. The species appears to have declined in the park since then, only two recorded being made during the 1996 survey and none in 1995. These two records were from *Eucalyptus leucoxylon* woodland. The survival of the species in the South East is probably dependent on large areas of native vegetation such as in this park.

Inappropriate fire management is a potential threat to the species in Gum Lagoon Conservation Park. Limited data suggest that the species may avoid late succession habitat (Croft *et al.* 1999). Predation by foxes and cats is considered a further serious threat (Croft *et al.* 1999).

Due to the Slender-billed Thornbill's preference for *Melaleuca brevifolia* flats, a habitat that is dependant on seasonal water logging, significant changes to hydrological regimes in Gum Lagoon Conservation Park due to drainage schemes, could significantly affect this species. The isolation of sections of habitat during any major drain construction in the park could also be detrimental to the species. Such drains could also increase access by foxes and cats.

Freckled Duck (*Stictonetta naevosa*)

While Freckled Duck has been recorded at some time in most regions of Australia, reports of breeding are clustered in the Murray-Darling region and southwestern Western Australia (Blakers *et al.* 1984). However, it is a nomadic species and during drought periods inland it concentrates on wetlands in the South East (Croft & Carpenter 1999). The species is not listed in Schedule 1 of the Endangered Species Protection Act 1992 (26 May 1999), but is listed in Garnett (1992) as rare Australia-wide. The species is listed as vulnerable in South Australia (NPWSA 1999); and vulnerable in the South East (Carpenter & Reid 1999).

In the Upper South East, breeding has been reported from seasonal *Melaleuca halmaturorum* and *M. brevifolia* wetlands (Croft & Carpenter 1999).

Freckled Duck was recorded four times during the drought of 1982 and 1983, from semi permanent lagoons in Gum Lagoon Conservation Park. Drainage schemes constructed in or near the park have the potential to affect this drought time refuge for the species.

Species of State Significance

Yellow-tailed Black-cockatoo (*Calyptorhynchus funereus*)

The Yellow-tailed Black Cockatoo is listed as vulnerable in South Australia (NPWSA 1999); and vulnerable in the South East (Carpenter & Reid 1999). The species has been regularly recorded in Gum Lagoon Conservation Park where it is sometimes seen feeding on *Banksia* or roosting overnight in *Eucalyptus camaldulensis* trees. However, it is mainly recorded as an overhead transient.

The main factor threatening the species in the South East is the past and ongoing clearance of hollow bearing trees such as old red gums, needed by the species for breeding (Croft *et al.* 1999). While pine plantations in the South East provide a food source for Yellow-tailed Black Cockatoo, they do not develop adequate sized hollows (ie. with entrances >15cm). The large *E. camaldulensis* trees around Gum Lagoon and the now dry lagoons in the southern region of this park possibly providing nesting hollows for the species, or could when the trees become older. It is important that the hydrological management of the farmland south of park maintains a sufficiently high water table for the survival of the mature red gums. It is also important that flooding of these lagoons with fresh water is allowed to occur at least in high rainfall years, to enable the recruitment of *E. camaldulensis* seedlings.

Yellow-tailed Black Cockatoos have also been recorded from the nearby Martin Washpool Conservation Park (Stewart *et al.* 1998; H & M. Possingham, per. obs. 3-4/1/1997) but not from Messent Conservation Park (Owens *et al.* 1995).

Crested Shrike-tit (*Falcunculus frontatus frontatus*)

The southeastern and eastern subspecies of the Crested Shrike-tit have been recorded from Queensland, New South Wales and Victoria into South Australia. The South East population is continuous with the remainder of the Australian population (Croft *et al.* 1999). While more common interstate, the Crested Shrike-tit is listed as vulnerable in South Australia (NPWSA 1999); and vulnerable in the South East (Carpenter & Reid 1999).

The Crested Shrike-tit is sedentary species of open woodlands, which feeds by tearing off bark in search of insects. In the South East it prefers *Eucalyptus camaldulensis*, *E. leucoxylon* and *E. viminalis ssp cygnetensis* woodlands, habitats that have been heavily cleared in the region. Tree decline and lack of recruitment is a major threat for the species, the species preferring younger trees (Croft *et al.* 1999).

The species was recorded twice in Gum Lagoon Conservation Park once during 1982 and once in 1995, both from forest habitat surrounding the southern dry lagoons. The species has not been recorded from other nearby parks (Owens *et al.* 1995; Stewart *et al.* 1998). These Gum Lagoon populations are important as they occur at the very western limit of the southeastern subspecies (Croft *et al.* 1999, Blakers *et al.* 1984).

Given the localised nature of these habitats in Gum Lagoon Conservation Park and their importance for the Crested Shrike-tit, areas of *E. camaldulensis* and *E. leucoxylon* woodland should be particularly avoided if any drainage works or further track construction is planned for the park. These habitats should be considered as a high priority for rabbit control, especially at the edge of the park where rabbit browsing is likely to be inhibiting tree regeneration.

Latham's Snipe (*Gallinago hardwickii*)

Latham's Snipe is a migratory wader that breeds in northern Japan and spends southern hemisphere summers mainly near the coasts of northern, eastern and southeastern Australia (Blakers *et al.* 1984). The species is listed as vulnerable in South Australia (NPWSA 1999) and vulnerable in the South East (Carpenter & Reid 1999). The species generally occupies muddy edges of fresh and saline swamps and pools, wet grass and heath. It probes in the mud for worms and also eats aquatic larvae of insects and some seeds (Blakers *et al.* 1984).

In Gum Lagoon Conservation Park, Latham's Snipe was observed seven times, mainly in wet areas: five on grassy shrubby flats, one in pasture and one on a *Melaleuca halmaturorum* flat. Due to its dependence on areas that remain wet into summer, the species is likely to be vulnerable to any major changes to the flooding regime in Gum Lagoon Conservation Park.

Little Lorikeet (*Glossopsitta pusilla*)

The Little Lorikeet is a species of southeastern and eastern Australia, extending from northern Queensland to southeastern South Australia. In South Australia it is at the western margin of its range, and is now largely confined to the South East region. In the past it has been recorded as an autumn-winter visitor to the Mount Lofty Ranges, but is now recorded only as an odd vagrant (Croft *et al.* 1999, Blakers *et al.* 1984). The species is listed as vulnerable in South Australia (NPWSA 1999), and vulnerable in the South East (Carpenter & Reid 1999).

The species is nomadic, moving around to maintain contact with flowering trees. It feeds mainly on nectar and pollen, principally from eucalypts, and mainly stays in the tops of trees (Blakers *et al.* 1984). The continual decline of the main trees on which it depends, *Eucalyptus camaldulensis*, *E. leucoxylon* and *E. fasciculosa*, is the main threat to the species in the South East (Croft *et al.* 1999).

The species was only observed once from Gum Lagoon Conservation Park, in August 1995, examining a nest hole in a *E. camaldulensis* tree. The species was also recorded recently in the South East, from Deep Swamp (Stewart 1996).

Given the nomadic habit of the species and its habitat preference, the localised patches of eucalypt woodland throughout the park are likely to be used by the species. In particular, the large *E. camaldulensis* trees at Gum Lagoon and around the now dry lagoons in the southern region of this park are important for the species. Hydrological management of the farmland south of the park should maintain a sufficiently high water table for the survival of these mature trees. It is also important that flooding of these lagoons with fresh water be allowed to occur at least in high rainfall years, and that rabbit control be instituted, to enable the recruitment of *E. camaldulensis* seedlings.

Blue-winged Parrot (*Neophema chrysostoma*)

The Blue-winged Parrot is confined to southeastern Australia and the adjacent interiors. The species undertakes a regular migration, its winter range extending as far north as the Queensland border, but breeding is confined to the Murray-Darling and southeastern Australia south of 36° latitude, including Tasmania (Blakers *et al.* 1984). The species is listed as vulnerable in South Australia (NPWSA 1999), and vulnerable in the South East (Carpenter & Reid 1999). It uses a wide range of habitats including eucalypt woodlands, saltbush shrublands, coastal salt marshes and dune systems, mountain heaths and lignum swamps (Blakers *et al.* 1984).

The Blue-winged Parrot was observed ten times in Gum Lagoon Conservation Park, in 1983 & 1995 either as an overhead transient or settled in *Eucalyptus arenacea* Low Woodland with a sand heath understorey. The species has also been observed near Martin Washpool Conservation Park feeding on dandelion seeds, and breeding in Penola CP (Possingham, 1983). It is most often recorded as an overhead transient.

On the evidence of these observations, and considering its migratory habit and wide variety of preferred habitats, it is likely that Gum Lagoon Conservation Park is only occasionally visited by the species, the park providing useful but not critical habitat.

Figure 19: **Blue-winged Parrot (*Photograph: B.E. Furby*)**

Elegant Parrot (*Neophema elegans*)

The Elegant Parrot is confined to two disjunct populations, one in the southern half of South Australia and western Victoria, and the other on southwestern Western Australia. This species is listed as poorly known but suspected of being rare or threatened in South Australia and the South East (Carpenter & Reid 1999).

The Elegant Parrot is a small, fast-flying parrot that is thought to disperse in small numbers in the South East during summer (Croft & Carpenter 1999). It usually lives where there is grass, both native and introduced, in eucalypt woodland, mallee, acacia scrub and tussock grassland. It feeds on the seeds of grass and other herbs and shrubs (Blakers *et al.* 1984).

In Gum Lagoon Conservation Park, the Elegant Parrot was recorded only two times, from Shrubland.

Like the Blue-winged Parrot, this species is a partial migrant with unpredictable movements, which utilises a wide range of habitats. It is likely that Gum Lagoon Conservation Park is only occasionally visited by the species, the park providing useful but not critical habitat.

Painted Button-quail (*Turnix varia*)

Although Painted Button-quail has not yet been recorded for Gum Lagoon Conservation Park, it has been recorded in nearby Martin Washpool Conservation Park. It is probable that the species occurs in Gum Lagoon Conservation Park since the park contains suitable habitat and the species is difficult to observe. The species lives in eucalypt forest, woodland and heath where there is a layer of leaf and twig litter (Blakers *et al.* 1984).

Painted Button-quail is listed as vulnerable in South Australia (NPWSA 1999), and vulnerable in the South East (Carpenter & Reid 1999). Further searches need to be undertaken to determine if and where the species occur in the park, so that fox baiting can target these areas.

Other species of state significance

A further eight bird species listed as rare in South Australia (NPWSA 1999) were recorded from Gum Lagoon Conservation Park. Of these, the Australasian Shoveler (*Anas rhynchotis*), Musk Duck (*Biziura lobata*), Blue-billed Duck (*Oxyura australis*), Great Crested Grebe (*Podiceps cristatus*), and Baillon's Crake (*Porzana pusilla*) all depend on the more permanent wetlands in the park, and could be significantly affected by any drainage scheme constructed in or near the park.

Changes in hydrology associated with such a drainage scheme could also affect the structure of the dense damp heath and *Melaleuca brevifolia* flats important for the rare Southern Emu-wren (*Stipiturus malachurus malachurus*), large populations of which occur in Gum Lagoon Conservation Park. This species is highly sedentary and requires dense undergrowth (Blakers *et al.* 1984). Owens *et al.* (1995) listed this species as one which could be readily isolated by the construction of major drains through it habitat, due to its limited mobility.

Figure 20: **Blue-billed Duck (*Photograph: B.E. Furby*)**

The rare Shining Bronze-Cuckoo (*Chrysococcyx lucidus*) was only observed in *Eucalyptus leucoxylon* Low Woodland, further indicating the need for protection of this very localised habitat in the park.

The rare Beautiful Firetail (*Stagonopleura bella*) was recorded in small numbers in almost all of the habitats in Gum Lagoon Conservation Park. Although this species also occurs in nearby Martin Washpool and Bunbury Conservation Parks its numbers are apparently low. It has not been recorded for Messent Conservation Park (Owens *et al.* 1995).

Figure 21: **Beautiful Firetail (*Photograph: B.E. Furby*)**

Species of Regional Significance

Yellow Thornbill (*Acanthiza nana*)

The Yellow Thornbill is a sedentary foliage-foraging species of southeastern and eastern Australia, that reaches the western limit of its distribution in the Mount Lofty Ranges of South Australia (Blakers *et al.* 1984). The species is listed as vulnerable in the South East (Carpenter & Reid 1999) where it is largely confined to areas of *Allocasuarina verticillata, A. luehmannii, Melaleuca lanceolata* and *M. halmaturorum* (Croft & Carpenter 1999).

The Yellow Thornbill was only recorded once in Gum Lagoon Conservation Park, in October 1996, in *Eucalyptus arenacea* woodland near a lagoon. The species has also been observed in nearby Martin Washpool Conservation Park in *Allocasuarina verticillata*.

Spotted Nightjar (*Eurostopodus argus*)

The Spotted Nightjar is a nocturnal species that ranges over most of Australia. It occurs in a range of habitats including forests and woodlands, roosting in open sites during day and feeding on flying insects by night (Blakers *et al.* 1984). While common elsewhere in South Australia, the species is listed as vulnerable in the South East (Carpenter & Reid 1999).

In Gum Lagoon Conservation Park, Spotted Nightjar was recorded only once, from Sand Heath vegetation.

Crested Bellbird (*Oreoica gutturalis*)

The Crested Bellbird is widespread over much of Australia but has declined in northern, eastern and southeastern Australia (Blakers *et al.* 1984). While the species it is still common in the arid regions of South Australia, is listed as vulnerable in the South East (Carpenter & Reid 1999). The species appears to be disappearing from all but the largest blocks of vegetation in this region.

Crested Bellbird occurs in a range of habitats including eucalypt woodlands, mallee and heath where it occupies the thickest part of the vegetation near the ground. It lives off caterpillars and seeds (Blakers *et al.* 1984).

In Gum Lagoon Conservation Park, the Crested Bellbird was recorded 26 times over 13 years, from a range of habitats including *Eucalyptus fasciculosa* Woodland, *E. leucoxylon* Low Woodland and *E. incrassata* Mallee.

Purple-gaped Honeyeater (*Lichenostomus cratitius*)

The Purple-gaped Honeyeater is a mallee and heath species that is confined to southern South Australia, western Victoria and southern Western Australia. The species is listed as rare in the South East (Carpenter & Reid 1999).

The species feeds on insects gleaned from foliage and bark, and on eucalypt and banksia nectar (Blakers *et al.* 1984).

In Gum Lagoon Conservation Park, Purple-gaped Honeyeaters were observed in small numbers in *Eucalyptus incrassata* and *E. diversifolia* Open Mallee, *Melaleuca brevifolia* Open Shrubland with emergent flowering eucalypts, and *M. halmaturorum* Low Open Woodland.

MANAGEMENT RECOMMENDATIONS

by R. Davies

DRAIN CONSTRUCTION

***RECOMMENDATION 1*: Drains should not be constructed through the park, or near enough to the park to change the park's hydrology.**

Priority: *Ongoing*

Justification

Drains as barriers

Owens *et al.* 1995 describe major drains as a significant barrier to movement of the Red-necked Wallaby and Common Wombat, both of which are now rare in South Australia. Owens *et al.* describe the Red-necked Wallaby as not moving far from natural vegetation across cleared farmland. Thus the construction of drains through the sections of the park or adjacent vegetation containing the species could result in the fragmentation of populations. The resulting subpopulations would be under increased threat from inbreeding depression and the loss of the genetic capacity to respond to altered environments.

Given the needs of the Common Wombat to move between their burrows and grazing areas, populations in Gum Lagoon Conservation Park could be severely disrupted and potentially locally threatened if major drains were constructed through the sections of the park or adjacent vegetation containing the species.

Drains are also likely to affect a number of bird species occurring in the park, that are highly sedentary and require dense undergrowth. For example, Owens *et al.* (1995) list the rare Southern Emu-wren as a species likely to be readily isolated by the construction of major drains through it habitat, due to its limited mobility. Gum Lagoon is an important habitat for this species. The nationally significant Slender-billed Thornbill is a species that could be similarly affected.

Drains providing access to feral animals & weeds

The habitat of the nationally endangered metallic sun-orchid (*Thelymitra epipactoides*) is highly vulnerable to invasion by weeds, in particular perennial veldt grass (**Ehrharta calycina*) and bridle creeper (**Myrsiphyllum asparagoides*) if disturbed. Thus the construction of drains in its habitat could threaten the species by promoting weed invasion.

The construction of further drains into the park could also threaten the nationally vulnerable large-fruit groundsel (*Senecio macrocarpus*) by facilitating the invasion of exotic perennial grasses such as *Phalaris* or tall wheat-grass (**Elymus elongatus*).

Drain construction could also increase fox predation on native fauna including some rare and threatened species, by facilitating fox access into the park. Particularly vulnerable are Red-necked Wallaby juveniles. Similarly affected would be the nationally significant Slender-

billed Thornbill, for which fox and cat predation is considered a serious threat (Croft *et al.* 1999).

The nationally vulnerable Malleefowl (*Leipoa ocellata*) is vulnerable to feral animals, foxes being predators of eggs layed in the mounds, and rabbits being competitors for food (Blakers *et al*. 1984). The construction of any drains or further tracks into the park are likely to have a negative impact on Malleefowl populations by increasing access to foxes and rabbits.

Impact of altered hydrology

The construction of further drains through or in the vicinity of Gum Lagoon Conservation Park is likely to increase the rate of water drainage from ephemeral and semi-permanent wetlands in the park, in turn resulting in these wetlands drying earlier in summer. This would have an impact on a number of threatened and rare plant communities and species occurring in the park.

The plant community most likely to be affected by such changes in hydrology is the regionally vulnerable *Ruppia polycarpa* (widgeon grass), *Myriophyllum simulans* (amphibious milfoil), *Lepilaena* spp. (water-mat) Herbland. This community consist of floating aquatic plant and only occurs where there is semi-permanent wetlands.

Also likely to be affected in the longer term is the regionally vulnerable *Eucalyptus camaldulensis* (river red gum) woodland. If drains result in changes to the frequency and duration of flooding in the park, this could inhibit recruitment of red gum seedlings and lead to the eventual loss of the red gum overstorey.

Red gum trees provide critical habitat for a significant number of hollow dependents fauna species occurring in the park. The numerous hollows that the red gum trees contain provide important roosting and breeding sites for a number of bird, bat and nocturnal mammal species (Croft & Carpenter 1999). The red gum trees also provide nesting sites for over 20% of the birds found in the region, particularly parrots, including species of high conservation significance such as the Yellow-tailed Black Cockatoo and Little Lorikeet (Croft & Carpenter 1999), both of which occur in the park.

A lack of red gum recruitment would be of particular concern for the Crested Shrike-tit, which particularly favours younger trees of red gum (Croft *et al.* 1999). This species, which is listed as vulnerable in South Australia, occurs in Gum Lagoon Conservation Park.

Changes in hydrology associated with drain construction could also affect the structure of the dense damp heath and *Melaleuca brevifolia* flats important for the rare Southern Emu-wren, large populations of which occur in Gum Lagoon Conservation Park. This species is highly sedentary and requires dense undergrowth (Blakers *et al.* 1984). This habitat is also used extensively by the nationally significant Slender-billed Thornbill, which could be significantly affected if changes in hydrology resulted in the further dieback of *Melaleuca* plants.

If drains significantly changed the water regime of *Melaleuca uncinata*, *M. brevifolia* shrubland where the nationally endangered metallic sun-orchid (*Thelymitra epipactoides*), occurs, the impact could be serious for the species. Calder *et al* (1989) advise that for the conservation of the species "it is essential to maintain the soil water regime involving winter waterlogging and summer drying. Alterations to the soil water regime could have adverse effects on survival."

Drainage schemes constructed in or near the park have the potential to affect drought time refuges for the nationally rare Freckled Duck in the park. Also which is dependent on areas

that remain wet into summer, is likely to be vulnerable to any major changes to the flooding regime in the park. This species is listed as vulnerable in South Australia. Similarly, six bird species of state significance depend on the more permanent wetlands in the park. These species (Latham's Snipe, Australasian Shoveler, Musk Duck, Blue-billed Duck, Great Crested Grebe, and Baillon's Crake) would be significantly affected if drain construction resulted in a reduction in frequency and duration of flooding of these wetland.

While the main expected outcome of drains in the park and adjacent areas would be a reduction in flooding in the park, an increase in flooding could occur if drains were constructed to the south of the park to channel water from adjacent farmland into the park. While this could have a beneficial impact on red gum recruitment, negative impacts would result if the water were saline or polluted with fertilisers. Also, the increased frequency of flooding of the broad herbland flats at the southern end of the park could detrimentally affect Common Wombat populations by removing a food source for young wombats.

TRACK CONSTRUCTION & MAINTENANCE

***RECOMMENDATION 2*: New tracks should not be constructed within the park, and a program of closing of the existing tracks through sensitive areas should be implemented as a high priority.**

Priority: *High*

Justification

As with drains, tracks create ideal conditions for the invasion of weeds into the park. Many weeds colonise readily the disturbed edges of track, and both earthmoving equipment used to maintain the tracks and cars provide effective vectors for weed seed.

Of particular concern is further spread around the park, of the weeds perennial veldt grass (**Ehrharta calycina*), and bridle creeper (**Myrsiphyllum asparagoides*). Both species are serious environmental weeds able to out compete most native ground stratum species and, in the case of bridle creeper, also shrub species. Although presently confined to the very edge of the park, **Phalaris* and tall wheat-grass (**Elymus elongatus*) have the potential to become serious weeds along tracks traversing wetland areas of the park.

At particular risk from this spread of weeds are plant species and plant communities that are very localised in the park and occur on the more fertile soil types. Two such species are the nationally threatened metallic sun-orchid (*Thelymitra epipactoides*) and large-fruit groundsel (*Senecio macrocarpus*). Two plant communities particularly at risk are *Eucalyptus wimmerensis* Mallee and *E. leucoxylon* Low Woodland & Woodland, which are very localised and occur on relatively fertile soils near the edge of the park. These communities contain a number of species not found elsewhere in the park.

Tracks also facilitate access into the park for feral animals, in particular foxes, cats and rabbits. As mentioned in the previous section, species particularly at risk include Red-necked Wallaby juveniles, the Slender-billed Thornbill and Malleefowl.

Figure 22: **Malleefowl on private land adjacent to Gum Lagoon Conservation Park: tracks through native vegetation make this nationally threatened species more vulnerable to fox predation**

***RECOMMENDATION 3*: Firebreaks around and through the park should be maintained using a slasher rather than a bulldozer, using washed down equipment and working from the least weedy areas to the more weedy areas.**

Priority: *Ongoing*

Justification

Earthmoving equipment used to maintain the tracks provide effective vectors for weed seed. While slashers can also spread weed seed, they do not repeatedly disturb the soil and create condition ideal for weed invasion.

Since some areas of the park have local heavy infestations of serious environmental weeds, it is important that the slasher be washed down before work commences and that the least weedy areas be slashed before the more weedy areas. The central western boundary of Section 27 Hundred of Laffer is one such area containing heavy infeststions of perennial veldt grass (**Ehrharta calycina*).

***RECOMMENDATION 4*: The length of firebreak supporting the nationally threatened *Senecio macrocarpus* (large-fruit groundsel) should only be slashed in late autumn after the *Senecio* has died back to its rootstock, and slashing should be undertaken sufficiently frequently to suppress the regeneration of *Melaleuca*.**

Priority: *Very High*

Justification

Since the only known population of the nationally vulnerable *Senecio macrocarpus* in Gum Lagoon Conservation Park is very small, very localised, and occurs on a firebreak at the edge of the park, the careful active management of the species in the park is of very high priority.

FIRE MANAGEMENT

***RECOMMENDATION 5*: Burning trial (along with monitoring and post fire weeding) should be undertaken in the vicinity of known populations of large-fruit groundsel (*Senecio macrocarpus*) and metallic sun-orchid (*Thelymitra epipactoides*).**

Priority: *High*

Justification

Where the nationally vulnerable large-fruit groundsel (*Senecio macrocarpus*) grows in *Melaleuca brevifolia* shrublands, it apparently only occurs after disturbance. Thus the only known population in Gum Lagoon Conservation Park occurs on a firebreak at the edge of the park, but not in the adjacent undisturbed native vegetation in the park. However the bulldozing of native vegetation is not recommended since this greatly increases the chance of weed invasion. Instead it is recommended that fire be used to regenerate the species. This recommendation is based on the finding in Victoria that the species only persists in *Themeda* grasslands that are regularly burnt (Scarlett 1984).

Since the ideal frequency and timing of burns is not known, it is recommended that trial burns be undertaken in the *M. brevifolia* shrubland occurring adjacent to this population. A permanent quantitative monitoring site should be set up in this area (see methodologies in Davies 1995) so that the long term effects of different burning regimes can be determined for the *Senecio*, other native species, and weed species. Since weeds readily invade burnt areas, and this area occurs next to cleared farmland, the actively weeding of the trial site will be essential.

Similar burning trials, monitoring and weeding are recommended for the nationally endangered metallic sun-orchid (*Thelymitra epipactoides*). In Gum Lagoon Conservation Park, the species is only known from four plants near the northeastern corner of the park. The species' presence next to an old shallow minor drain agrees with observations by Cropper (1993) that flowering of the species is stimulated by disturbance. Data presented by Cropper suggest that the species may decline due to a lack of disturbance, in particular fire.

The habitat of this species is also highly vulnerable to invasion by weeds, in particular perennial veldt grass (**Ehrharta calycina*) and bridle creeper (**Myrsiphyllum asparagoides*) if disturbed. Thus to minimise weed invasion from adjacent agricultural land, it is desirable

not to burn vegetation right to the edge of the park. Many weeds, in particular perennial veldt grass, readily colonise burnt vegetation (Davies 1997).

***RECOMMENDATION 6*: The Fire Management Plan for Gum Lagoon Conservation Park needs to take into account the habitat requirements of the Slender-billed Thornbill (*Acanthiza iredalei hedleyi*) and Malleefowl (*Leipoa ocellata*).**

Priority: *High*

Justification

Inappropriate fire management is a potential threat to the nationally significant Slender-billed Thornbill (*Acanthiza iredalei hedleyi*) in Gum Lagoon Conservation Park. Long periods between fires creates older woody shrubs and tree areas, less favourable to good populations of the thornbill (Croft *et al.* 1999).

Fire is also an important management issue for the nationally vulnerable Malleefowl (*Leipoa ocellata*) in Gum Lagoon Conservation Park, the species relying on both burnt and unburnt areas. The species requires unburnt areas for shelter and breeding (accumulated litter for nests) while fire favours food plants such as *Acacia* species (Croft *et al.* 1999).

WEED MANAGEMENT

***RECOMMENDATION 7*: The control of perennial veldt grass (**Ehrharta calycina*) and bridle creeper (**Myrsiphyllum asparagoides*) within Gum Lagoon Conservation Park, should be given high priority.**

Priority: *Very High*

Justification

As yet, only localised infestations of perennial veldt grass (**Ehrharta calycina*) and bridle creeper (**Myrsiphyllum asparagoides*) occur within Gum Lagoon Conservation Park. Both species are serious environmental weeds able to out compete most native ground stratum species and, in the case of bridle creeper, also shrub species. Perennial veldt grass is particularly serious after fire, rapidly out competing regenerating natives (Davies 1997).

***RECOMMENDATION 8*: Weed control in the vicinity of the threatened plant species metallic sun-orchid (*Thelymitra epipactoides*), large-fruit groundsel (*Senecio macrocarpus*), and dwarf centrolepis (*Centrolepis cephaloformis* ssp. *cephaloformis*) should be given a high priority within Gum Lagoon Conservation Park.**

Priority: *Very High*

Justification

The nationally endangered metallic sun-orchid (*Thelymitra epipactoides*) occurs on sandy loams prone to weed invasion, in particular by the serious environmental weed perennial veldt

grass (**Ehrharta calycina*). This grass already occurs in nearby areas of the park, and is being actively promoted by the state government department PIRSA, for stabilising sandy soils on agricultural land in the South East.

The only known population of the nationally vulnerable large-fruit groundsel (*Senecio macrocarpus*) in Gum Lagoon Conservation Park is particularly vulnerable to weed invasion since it is confined to a firebreak at the very edge of the park. It is recommended that weed control be undertaken annually around this population, using handpulling and the spot spraying of glyphosate to minimise off target damage.

The small size of the regionally endangered dwarf centrolepis (*Centrolepis cephaloformis* ssp. *cephaloformis*) makes it particularly vulnerable to weed invasion, especially if salt tolerant exotic perennial grasses such as tall wheat-grass (**Elymus elongatus*) were planted nearby. This species is presently being actively promoted by PIRSA for revegetating salt affected areas.

***RECOMMENDATION 9*: Weed control in the regionally threatened plant communities a) river red gum (*Eucalyptus camaldulensis*) Open Forest & Woodland b) South Australian blue gum (*Eucalyptus leucoxylon*) Low Open Forest & Low Woodland, and c) Wimmera mallee (*E. wimmerensis*) Open Mallee, should be given high priority in Gum Lagoon Conservation Park.**

Priority: *Very High*

Justification

The regionally threatened plant communities *Eucalyptus leucoxylon* (South Australian blue gum) Low Open Forest/Low Woodland, and *E. wimmerensis* (Wimmera mallee) Open Mallee are particularly prone to weed invasion. Both communities occur on relatively fertile soils prone to weed invasion. They are also largely confined to localised areas at the edge of the park, adjacent agricultural land and firebreaks providing a source of weed propagules.

E. wimmerensis (Wimmera mallee) Open Mallee is particularly important as it contains the most diverse native understorey of all communities in the park, and a number of plant species, including rare species, not found outside this community. The predominance of small native herbs in the understorey of this community makes it particularly vulnerable to weed invasion.

FERAL ANIMAL CONTROL

***RECOMMENDATION 10*: The control of rabbits in the park is of high priority, especially in the vicinity of:**

- **the nationally endangered metallic sun-orchid (*Thelymitra epipactoides*)**
- **warrens of the Common Wombat (*Vombatus ursinus*), which is rare in South Australia**
- **nesting mounds of the nationally vulnerable Malleefowl (*Leipoa ocellata*)**
- **the regionally threatened plant communities South Australian blue gum (*Eucalyptus leucoxylon*) Low Open Forest/Low Woodland, and Wimmera mallee (*E. wimmerensis*) Open Mallee**

Priority: *Very High*

Figure 23: **Tall wheat-grass (****Elymus elongatus***) invading the edge of Gum Lagoon Conservation Park from adjacent farm land, with the regionally threatened plant community *Eucalyptus wimmerensis* Open Mallee in the background**

Figure 24: **Active rabbit warren inside the north eastern boundary of Gum Lagoon Conservation Park**

During the NCS survey, rabbit numbers were observed to be particularly high on the northern boundary of Section 30 Hundred Wells, with evidence of rabbits also being observed 1) near the northwestern boundary of Sections 25 Hundred Laffer, 2) towards the eastern boundary of the previous Naen Naen Park Station, and 3) immediately west of Gum Lagoon in Section 30 Hundred of Wells. Although rabbits are apparently still localised in the park, the relatively recent bulldozing of new tracks and shallow drains within what is now Gum Lagoon Conservation Park has provided ideal opportunities for rabbits to penetrate throughout much of the park, particularly the more sandy, drier areas.

The only known population of the nationally endangered metallic sun-orchid (*Thelymitra epipactoides*) occurs at the edge of an old shallow drain leading from the edge of the park. This species is particularly prone to browsing by rabbits and the drain provides ready access for rabbits to penetrate the park from nearby agricultural land.

Due to the need for juvenile wombats to have a ready supply of perennial grasses when they are first weaned, rabbit control around the southern broad herbland flats in Section 9 Hundred Wells, and Section 37 Hundred Petherick is of high priority.

The control of rabbits around breeding Malleefowl is important as the species depends on the shoots and flowers of herbs for food in winter, rabbits being competitors for this food source.

Firebreaks through sand ridges, at the edge of the park, provide ideal habitats for rabbit warrens, with native vegetation in the park providing shelter for warrens and adjacent agricultural land providing good green pick. Since the regionally threatened plant communities *Eucalyptus leucoxylon* Low Open Forest & Low Woodland, and *E. wimmerensis* Open Mallee are largely confined to sandy or sandy loam soils at the edge of the park, they are particularly prone to rabbit browsing.

Particularly at risk are the plant species, including rare species, only found in the park in *E. wimmerensis* Open Mallee. Impacted in the longer term by rabbits inhibiting blue gum seedling recruitment, are species such as the Crested Shrike-tit and Little Lorikeet which rely on this species of tree for food and shelter. These species are vulnerable in South Australia.

Given the vulnerability of these communities to soil disturbance, and their very localised occurrences in the park, it is recommended that warrens be manually filled rather than ripped after fumigation.

***RECOMMENDATION 11*: The control of foxes is of high priority in the park, especially in the vicinity of:**

- **nesting mounds of the nationally vulnerable Malleefowl (*Leipoa ocellata*)**
- **populations of the nationally significant Slender-billed Thornbill (*Acanthiza iredalei hedleyi*)**
- **populations of Red-necked Wallaby (*Macropus rufogriseus*), which is rare in South Australia.**

Priority: *Very High*

Justification

Foxes are a major threat to many of the significant fauna species occurring in the park. The sightings of fox scats indicate that foxes are using existing tracks to gain access into the centre of the park. Fox droppings were recorded during the 1995 survey, from inside the

northwestern boundary of Sections 25 Hundred Laffer, and immediately west of Gum Lagoon in Section 30 Hundred Wells.

The nationally vulnerable Malleefowl is vulnerable to fox predation, particularly of eggs layed in the mounds (Blakers *et al*. 1984). Fox predation is also considered a serious threat to the nationally significant Slender-billed Thornbill, and juveniles of the regionally rare Red-necked Wallaby (Croft *et al*. 1999).

RECOMMENDATION 12: The control of goats is of high priority in the park.

Priority: *High*

Justification

Tracks and the presence of semi-permanent water provide ideal conditions for goat numbers to build up from their present low level. The 1995 sighting of two goat kids at the central western edge of the park, indicates that this is already occurring. Goats pose as a serious threat to rare and threatened plant species and communities occurring in the park.

EXTENSION ACTIVITIES WITH ADJACENT LANDOWNERS

RECOMMENDATION 13: Local field days should be held to inform adjacent landholders about the occurrence and significance of Eastern Grey Kangaroo (*Macropus giganteus*), Red-necked Wallaby (*Macropus rufogriseus*), and Common Wombat (*Vombatus ursinus*) in Gum Lagoon Conservation.

Priority: *High*

Justification

In South Australia, the Red-necked Wallaby, Eastern Grey Kangaroo and Common Wombat have all decline significantly in numbers since European settlement, and are now listed as rare in this state. In the South East, all three species reach the western-most limits of their Australia-wide distributions.

Where they occur at the edge of Gum Lagoon Conservation Park, the Red-necked Wallaby and Eastern Grey Kangaroo both move into adjacent farmland to feed. It is important that landholders adjacent to the park be informed of the presence and importance of these species, so that they are not hunted in mistake for the common Western Grey Kangaroo.

The Common Wombat is similarly at risk from being hunted, since some landholders consider the species as a management problem due to its burrow construction and damage to fences. It is important that adjacent landholders likewise be informed of the importance of the species, and the fact that the species is protected, including on private land.

MONITORING

RECOMMENDATION 14: **Permanent quantitative vegetation monitoring sites urgently needs to be set up in a selection of wetlands in Gum Lagoons Conservation Park, including Gum Lagoon and Naen Naen swamps, to determine any long term trends attributable to changes in hydrology.**

Priority: *Very High*

Justification

Rather than being filled by rivers, wetlands in the South East are recharged by the slow across-ground flow of water in a northwesterly direction, between low ranges such as the Black Range. Thus wetland in Gum Lagoon Conservation Park are dependent on the flow of water from largely cleared private land to the southeast of the park.

Given the past and proposed schemes to drain privately owned land in the Upper South East, wetlands in Gum Lagoon Conservation Park, in particular the semi permanent wetlands Gum Lagoon and Naen Naen Swamps, are under risk from changes in hydrology. Any schemes that result in the wetlands filling less frequently or drying earlier in summer, are likely to be deleterious for wetland species. On the other hand, increased flow due to the construction of drains feeding into the park could also have a negative impact if the water is saline or carrying pollutants such as fertilisers.

It is only by the use of a quantitative vegetation monitoring program that long term trends, attributable to changes in hydrology, will be detected in time for them to be remedied before permanent damage is done. Such a program needs to include permanent quadrats set up in each of the wetland communities, in all sections of the park.

RECOMMENDATION 15**: Permanent quantitative monitoring sites urgently needs to be set up for the Gum Lagoon Conservation Park populations of metallic sun-orchid (*Thelymitra epipactoides*), and large-fruit groundsel (*Senecio macrocarpus*), to determine long term trends in population size for these nationally threatened species.**

Priority: *Very High*

Justification

Both these nationally threatened species are known to decline in the absence of disturbance such as fire. However, such disturbance also increases the chance of weed invasion. Monitoring is necessary to determine if fire management in the park is appropriate, and weed management adequate, for the survival of these species.

RECOMMENDATION 16**: An ongoing quantitative program of monitoring wetland birds urgently needs to be set up in a selection of wetlands in Gum Lagoons Conservation Park, including Gum Lagoon and Naen Naen swamps, to determine any long term trends attributable to changes in hydrology.**

Priority: *Very High*

Justification

Drainage schemes constructed in or near the park have potential to affect wetland bird species utilising wetland in Gum Lagoon Conservation Park. Potentially at risk are drought time refuges for the nationally rare Freckled Duck, and summer refuges for Latham's Snipe, a species which is vulnerable in South Australia.

Also at threat are five bird species listed as rare in South Australia, which depend on the more permanent wetlands in the park. These species (Australasian Shoveler, Musk Duck, Blue-billed Duck, Great Crested Grebe, and Baillon's Crake) would be significantly affected if drain construction resulted in the reduction in the frequency and duration of flooding of these wetlands.

It is only by the use of ongoing quantitative program of monitoring wetland birds, that long term trends attributable to changes in hydrology, will be detected in time for them to be remedied before permanent damage is done.

***RECOMMENDATION 17*: An ongoing quantitative monitoring program needs to be set up to determine long term trends in population size for Malleefowl (*Leipoa ocellata*) and Slender-billed Thornbill (*Acanthiza iredalei hedleyi*) in Gum Lagoon Conservation Park.**

Priority: *Very High*

Justification

Populations of the nationally significant Malleefowl and Slender-billed Thornbill in Gum Lagoon Conservation Park are potentially under threat from inappropriate fire management, predation by foxes, and drain construction. It is only with ongoing, quantitative programs for both species, that it will be possible to determine whether present and future management programs for the species are effective.

FENCE CONSTRUCTION

RECOMMENDATION 18: **A kangaroo-proof fence around the regionally threatened scrubby blue gum (*Eucalyptus leucoxylon* ssp. *stephaniae*) Low Open Forest in the south western corner of Section 9 Hundred Wells needs to be constructed to prevent heavy browsing of the understorey.**

Priority: *High*

Justification

Scrubby blue gum (*Eucalyptus leucoxylon* ssp. *stephaniae*) Low Open Forest plant community is threatened in the South East of South Australia and is extremely localised in Gum Lagoon Conservation Park. The area in question is situated in the very south western corner of the park and is being heavily utilised by kangaroos travelling between the park and the adjacent pastures. Understorey species are consequently being heavily browsed.

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APPENDIX 1

A TWO-WAY TABLE OF THE FLORISTIC ANALYSIS OF VEGETATION IN GUM LAGOON CONSERVATION PARK

Key to "Floristic Community Id Numbers"

Floristic Community Group 1: *Banksia ornata-Xanthorrhoea caespitosa-Leptospermum myrsinoides* Shrubland
Eucalyptus arenacea Low (Open) Woodland
E. fasciculosa Low Open Woodland
E. diversifolia Open Mallee on sand

Floristic Community Group 2: *Eucalyptus diversifolia* Low Mallee on calcrete

Floristic Community Group 3: *Eucalyptus incrassata* (Open) Mallee
E. leucoxylon Very Low Open Woodland

Floristic Community Group 4: *Eucalyptus fasciculosa* Woodland

Floristic Community Group 5: *Melaleuca lanceolata* Low Woodland & Tall Shrubland
Eucalyptus leucoxylon ssp. *stephaniae* Low Woodland
E. wimmerensis Open Mallee

Floristic Community Group 6: *Eucalyptus camaldulensis* Open Forest

Floristic Community Group 7: *Eucalyptus leucoxylon* Low Open Forest

Floristic Community Group 8: *Melaleuca halmaturorum* Low Open Woodland & Tall Very Open Shrubland
Halosarcia indica ssp. *leiostachya* Low Open Shrubland

Floristic Community Group 9: *Schoenus nitens* - *Selliera radicans* Sedgeland/Herbland

Floristic Community Group 10: *Melaleuca brevifolia* Open Shrubland & Low Shrubland
Eucalyptus camaldulensis Woodland

	FLORISTIC COMMUNITY ID NUMBER									
	1	2	3	4	5	6	7	8	9	10
	GGGGGGGGGG	GGG	GGGG	GG	GGG	G	GG	GGGG	GG	GGGGGGGG
QUADRAT	LLLLLLLLLL	LLL	LLLL	LL	LLL	L	LL	LLLL	LL	LLLLLLLL
PATCH	0000000000	000	0000	00	000	0	00	0000	00	00000000
ID	0201223222	022	0333	14	344	1	33	0330	14	00401122
NUMBER	1842231450	519	7539	00	612	4	02	2478	33	36491567
	0000000000	000	0000	00	000	0	00	0000	00	00000000
PLANT SPECIES	1111111111	111	1111	11	111	1	11	1111	11	11111111
Acacia brachybotrya	* *	*				*|	*			
Acacia farinosa			**								
Acacia leiophylla			*	**	*						
Acacia longifolia var. *sophorae*				*		*|	*			*
Acacia myrtifolia var. *myrtifolia*	* * *	***									
Acacia pycnantha	*	*	*	*	**		*				
Acacia spinescens	*** *	**	**		*					**	*
Acianthus pusillus				*	*						
Acrotriche affinis	*** *	*	*	*			*				
Acrotriche cordata		***									**
Adenanthos terminalis	****** **										
Allocasuarina muelleriana ssp. *muelleriana*	** ****	***	*								
Allocasuarina pusilla	*** ***					*					
Amyema melaleucae				**				*			
Angianthus preissianus			*	*	*		*	**	*		*

	FLORISTIC COMMUNITY ID NUMBER									
	1	2	3	4	5	6	7	8	9	10
	GGGGGGGGGG	GGG	GGGG	GG	GGG	G	GG	GGGG	GG	GGGGGGGG
QUADRAT	LLLLLLLLLL	LLL	LLLL	LL	LLL	L	LL	LLLL	LL	LLLLLLLL
PATCH	0000000000	000	0000	00	000	0	00	0000	00	00000000
ID	0201223222	022	0333	14	344	1	33	0330	14	00401122
NUMBER	1842231450	519	7539	00	612	4	02	2478	33	36491567
	0000000000	000	0000	00	000	0	00	0000	00	00000000
PLANT SPECIES	1111111111	111	1111	11	111	1	11	1111	11	11111111
Argentipallium obtusifolium	` *`	`*`	` `	` `	` `	` `	` `	` `	` `	` `
Arthropodium strictum	` `	` `	` `	` `	` *`	` `	` *`	` `	` `	` `
Astroloma conostephioides	`***** * *`	`* `	`** `	` `	` `	` `	` `	` `	` `	` `
Astroloma humifusum	`  * **  *`	`* `	` `	` *`	` *`	`*`	` *`	` `	` `	`  *`
Baeckea behrii	`* *** *  *`	` `	`*** `	`**`	` `	` `	` `	` `	` `	` `
Baeckea ericaea	`**  `	` `	` `	` `	` `	` `	` `	` `	` `	` `
Banksia marginata	`  *****  *`	`* `	`  * `	`**`	` `	` `	`**`	` `	` `	`  **`
Banksia ornata	`** * *****`	` `	` `	` *`	` `	` `	` `	` `	` `	` `
Baumea juncea	` `	` `	`  **`	`* `	` `	` `	` `	` `	` `	`****** *`
Billardiera cymosa	`* *** ** *`	`***`	`*** `	` *`	`* `	`**`	` `	` `	` `	`** *  **`
Boronia coerulescens ssp. *coerulescens*	`** ** ***  `	`* `	`*  `	` `	` `	` `	` `	` `	` `	` `
Boronia filifolia	`  *  `	` `	`*  `	` `	` `	` `	` `	` `	` `	` `
Brachycome goniocarpa	` `	` `	` `	` `	`**`	` `	` `	` `	` `	` `
Brachycome lineariloba	` `	` `	` `	` `	` *`	` `	` `	`* `	` `	` `
Brachycome perpusilla	` `	` `	` `	` *`	` *`	` `	` `	` `	` `	` `
Brachyloma ciliatum	`  **  `	` `	` **`	` `	`* `	` `	` `	` `	` `	` `
Brachyloma ericoides ssp. *ericoides*	`* *****  *`	`* `	`*  *`	`* `	`**`	` `	`* `	` `	` `	`**  *`
Brunonia australis	`  *  `	` `	` `	` `	` `	` `	`**`	` `	` `	` `
Bulbine bulbosa	` `	` `	` `	` `	` `	` `	` `	`* **`	` `	` `
Burchardia umbellata	`**  *  *`	` `	`  *`	` `	` `	` `	`**`	` `	` `	`**`
Bursaria spinosa	`  *  `	` `	` `	` `	` `	` `	`**`	` `	` `	` `
Caladenia carnea var. *carnea*	`  *  `	` `	` `	` *`	`* `	`*`	` `	` `	` `	`  *`
Calandrinia calyptrata	` `	` `	` `	` `	`**`	` `	` `	` `	` `	` `
Calandrinia eremaea	` `	` `	` `	` `	` `	`*`	` `	`* `	` `	` `
Calandrinia granulifera	` `	` `	` `	` *`	`**`	` `	` `	` `	` `	` `
Calytrix alpestris	`* ******* `	` *`	` `	` `	` `	` `	` `	` `	` `	` `
Calytrix tetragona	`******* * `	`***`	`****`	`**`	` `	` `	`**`	` `	` `	`  *`
Cassytha glabella forma *dispar*	`**  *  `	`**`	` `	` `	` `	` `	`* `	` `	` `	`* *`
Cassytha melantha	`*  **  `	` `	` `	` `	`**`	` `	` `	` `	` `	` `
Cassytha pubescens	`  * **`	` `	`  *`	` `	` `	` `	` `	` `	` `	` `
Centrolepis aristata	`  *  *  `	` `	`  **`	` `	`***`	` `	` `	`  *`	` `	`  *`
Centrolepis cephaloformis ssp. *cephaloformis*	` `	` `	` `	` `	` `	` `	`* *`	` `	` `	` `
Centrolepis polygyna	` `	`* *`	` `	`* *`	` `	` `	`* *`	` `	` `	`  *`
Centrolepis strigosa	` `	`* *`	`**`	`***`	` `	` `	`* `	` `	` `	`  *`
Chamaescilla corymbosa var. *corymbosa*	`  *  `	` `	`  **`	` `	` `	` `	` `	` `	` `	`**`
Choretrum glomeratum var.	`* *`	` `	` `	` `	` `	` `	` `	` `	` `	` `
Chorizandra enodis	` `	`  *`	` `	` `	` `	` `	` `	` `	` `	`  *`
Clematis microphylla	` `	` `	` `	` `	` `	`*`	`**`	` `	` `	`  *`
Comesperma calymega	`  *** * `	` `	`* `	` `	`* `	` `	` `	` `	` `	` `
Comesperma volubile	` `	`* `	` `	` `	`**`	` `	`**`	` `	` `	`***  *`
Correa reflexa	`** *******`	`**`	`** `	`* `	` `	` `	`**`	` `	` `	` `
Cotula australis	` `	` `	` `	`* `	` `	`*`	` `	` `	` `	` `
Cotula vulgaris var. *australasica*	` `	` `	` `	` `	`* `	` `	` `	`* `	` `	`* `
Crassula closiana	` `	` `	` `	`***`	` `	` `	` `	` `	` `	` `
Crassula sieberiana ssp. *tetramera*	`*  `	`  *`	` `	`**`	`**`	`*`	` `	` `	`* `	` `
Cryptandra tomentosa	`*** * *** `	` `	`* `	` `	` `	` `	` `	` `	` `	` `
Cyperus tenellus	` `	` `	`  **`	` `	` `	` `	` `	` `	` `	` `
Cyrtostylis robusta	` `	` `	` `	` `	`* `	` `	` `	` `	` `	`  *`
Dampiera dysantha	`  *  `	`* `	`  *`	` `	` `	` `	` `	` `	` `	` `
Danthonia geniculata	` `	` `	` `	` `	`* *`	` `	`**`	` `	` `	` `
Danthonia setacea var. *setacea*	`  **  `	` `	`  * `	` `	`**`	` `	` `	` `	` `	`  **`
Darwinia micropetala	` `	` `	`* **`	` `	` `	` `	` `	` `	` `	`***** **`
Daucus glochidiatus	`  *  `	`* `	`*** `	`* `	`***`	`*`	` `	`* *`	` `	` *  **`
Daviesia brevifolia	`**  ******`	`* *`	`*  `	` `	` `	` `	` `	` `	` `	` `
Dianella brevicaulis/revoluta var.	`  *  *`	`* `	`* *`	`**`	`***`	`*`	`**`	` `	` `	`**  **`

FLORISTIC COMMUNITY ID NUMBER

	1	2	3	4	5	6	7	8	9	10
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QUADRAT	LLLLLLLLLL	LLL	LLLL	LL	LLL	L	LL	LLLL	LL	LLLLLLLL
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ID	0201223222	022	0333	14	344	1	33	0330	14	00401122
NUMBER	1842231450	519	7539	00	612	4	02	2478	33	36491567
	0000000000	000	0000	00	000	0	00	0000	00	00000000
PLANT SPECIES	1111111111	111	1111	11	111	1	11	1111	11	11111111
Dillwynia hispida	** **** *		***							
Dillwynia sericea	* * * * *	*		*						
Distichlis distichophylla					**					*
Diuris pardina	*	* *								
Dodonaea viscosa ssp. *spatulata*				*			*			
Drosera glanduligera	* **				***			*		* ** *
Drosera macrantha ssp. *planchonii*	*******	***								
Drosera peltata			**		*			*		**
Drosera pygmaea	*		*							
Drosera whittakeri	* *		*	**	**					
Epilobium billardierianum ssp.			*		**			**		
Eucalyptus arenacea	** ****									
Eucalyptus camaldulensis var. *camaldulensis*						*				* *
Eucalyptus diversifolia	* * **	***		*						
Eucalyptus fasciculosa	* *			**						
Eucalyptus incrassata	* *** *	*	****		**					** *
Eucalyptus leptophylla	* **	**					*			
Eucalyptus leucoxylon ssp.	**		*		*	*	**			**
Euchiton sphaericus				*	**					
Euphrasia collina ssp. *collina*		*								**
Eutaxia microphylla var. *microphylla*			*		**					* **
Exocarpos sparteus	*		***				*			
Gahnia filum								* *		*** **
Gahnia lanigera		***								
Genoplesium rufum	**									*
Geranium solanderi var. *solanderi*						*	*			
Glossodia major	* * *			*						
Gnaphalium indutum									*	*
Gnephosis drummondii			*		*	*		*		*
Gompholobium ecostatum	****									
Gonocarpus elatus	** **	*					*			
Gonocarpus tetragynus	* * * *	*	*				*			
Goodenia blackiana	* **		*				*			
Goodenia geniculata	* * **	**	**		**					
Grevillea ilicifolia var. *ilicifolia*	*	* *								
Grevillea lavandulacea var. *sericea*		***								
Hakea muelleriana	* *					*				*
Hakea nodosa										** **
Hakea rostrata	** ** *	*	*							
Hakea rugosa			**	*						***
Hakea vittata		***		*						
Halosarcia indica ssp. *leiostachya*								****		
Halosarcia lepidosperma								***		
Helichrysum leucopsideum				*	***		**			
Helichrysum scorpioides	* *				*		*			*
Hibbertia riparia	**********	*	****	**	*		*			**
Hibbertia sericea var.	* **** *	***	*	*	*	*	**			
Hyalosperma demissum		*				*				
Hydrocotyle callicarpa	*	*			**					*
Hydrocotyle capillaris	*	*			*			*	*	**
Hydrocotyle laxiflora						*	*			
Hydrocotyle medicaginoides							*		*	* *
Hypolaena fastigiata	**********		**	**			*			* ***
Hypoxis glabella var. *glabella*					***			*		
Isolepis marginata				*	***	*		*		

	FLORISTIC COMMUNITY ID NUMBER									
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QUADRAT	GGGGGGGGGG	GGG	GGGG	GG	GGG	G	GG	GGGG	GG	GGGGGGGG
	LLLLLLLLLL	LLL	LLLL	LL	LLL	L	LL	LLLL	LL	LLLLLLLL
PATCH	0000000000	000	0000	00	000	0	00	0000	00	00000000
ID	0201223222	022	0333	14	344	1	33	0330	14	00401122
NUMBER	1842231450	519	7539	00	612	4	02	2478	33	36491567
	0000000000	000	0000	00	000	0	00	0000	00	00000000
PLANT SPECIES	1111111111	111	1111	11	111	1	11	1111	11	11111111
Isolepis nodosa				*		*	*			*
Isolepis platycarpa			*		**			*		
Isopogon ceratophyllus	* ******	* *	*	*						
Juncus bufonius			**					*		
Kennedia prostrata		*					*			
Kunzea pomifera	** *			*		*	*			
Lasiopetalum baueri						**				
Lawrencia squamata								**		
Laxmannia orientalis	*		*							
Lepidobolus drapetocoleus	**** *****	*	*				**			
Lepidosperma carphoides	* ********	*	* **				*			
Lepidosperma concavum	* *			*		*				*
Lepidosperma congestum		*	*		*					
Lepidosperma viscidum	*** ***	* *	**		* *					*
Leporella fimbriata	** **									
Leptocarpus brownii			**		*			**		** **
Leptospermum coriaceum	*			*		*				
Leptospermum myrsinoides	*********	*	*	*			**			
Leucopogon costatus	* **** **		*							
Leucopogon woodsii	* *									
Levenhookia dubia				**	***	*				
Levenhookia pusilla	*****		****		**					
Linum marginale		*			*					**
Logania linifolia	*	*	* *							*
Lomandra collina		*					*			
Lomandra juncea	*		*				**			
Lomandra micrantha ssp. *micrantha*	*	**			**					
Lomandra sororia		*			*		*			
Melaleuca brevifolia			* **					*	*	********
Melaleuca halmaturorum ssp. *halmaturorum*						*		***	*	*
Melaleuca lanceolata ssp. *lanceolata*		**		*	***					
Melaleuca uncinata			****		**			*		***
Microseris lanceolata	* *		*	*	**		*	*		**
Microtis frutetorum	* *	*					*			
Microtis parviflora		*			*					
Millotia muelleri			*		**	**	*	*		
Millotia tenuifolia var.	*	*	*		**	***	*			
Muehlenbeckia adpressa				*		*				
Neurachne alopecuroidea	*** *		**		*		*			
Olearia ciliata var. *ciliata*		***								
Olearia lanuginosa										**
Opercularia turpis		***	*							*
Oxalis perennans						*	**			
Pelargonium littorale				*	**		**			** *
Persoonia juniperina	*****			*						
Phyllangium divergens		**	**		*	**			*	*
Phyllota pleurandroides	** * ***									
Pimelea glauca		***								**
Pimelea stricta					**					
Plantago hispida					*	*	*			
Plantago sp. *B*					**					
Poa rodwayi					*	*	**			
Podolepis canescens									*	*
Podotheca angustifolia					***					
Pomaderris obcordata		***								**

	FLORISTIC COMMUNITY ID NUMBER									
	1	2	3	4	5	6	7	8	9	10
	GGGGGGGGGG	GGG	GGGG	GG	GGG	G	GG	GGGG	GG	GGGGGGGG
QUADRAT	LLLLLLLLLL	LLL	LLLL	LL	LLL	L	LL	LLLL	LL	LLLLLLLL
PATCH	0000000000	000	0000	00	000	0	00	0000	00	00000000
ID	0201223222	022	0333	14	344	1	33	0330	14	00401122
NUMBER	1842231450	519	7539	00	612	4	02	2478	33	36491567
	0000000000	000	0000	00	000	0	00	0000	00	00000000
PLANT SPECIES	1111111111	111	1111	11	111	1	11	1111	11	11111111
Poranthera microphylla	* * *	**	*							
Prasophyllum odoratum	*	*	*							
Pterostylis nana	* * **		*	*						*
Pterostylis pedunculata				*		*				
Pterostylis plumosa	* *	* *		*	*					**
Pultenaea acerosa	*	***								
Pultenaea tenuifolia	* *** *		***		***				*	** *
Pultenaea vestita									*	*
Pyrorchis nigricans	** * * * *	*	*		*					*
Ranunculus sessiliflorus var. *sessiliflorus*				*	*	*				*
Rhagodia candolleana ssp.					***					
Rutidosis multiflora	*			**	***					
Samolus repens								* *		***
Sarcocornia quinqueflora								***		
Schoenus apogon			*					*		*
Schoenus breviculmis	**********		**				*			
Schoenus nitens		**	*						**	*
Schoenus sculptus			*		*			*		
Sebaea ovata			*		* *			*	*	**
Selliera radicans									**	*
Senecio glossanthus					***			* **	*	
Senecio picridioides				*	*	*				* *
Senecio squarrosus					*				*	*
Spyridium eriocephalum var.	* *									
Spyridium vexilliferum var. *vexilliferum*	****	* *								
Stackhousia aspericocca ssp.	* *	**							*	* **
Stenopetalum lineare					*				*	
Stipa exilis					**					
Stipa mollis	* *		**				**			
Stipa scabra ssp. *falcata*					**					
Stylidium graminifolium	*	*								
Styphelia exarrhena	**	*								
Tetraria capillaris		**	* *		*					* * *
Thelymitra antennifera	*** *		*							**
Thelymitra nuda	*	*			*					
Thelymitra pauciflora	*			*						
Thelymitra rubra	* *									
Thomasia petalocalyx	*	**		**	*		*			**
Threlkeldia diffusa					***					
Thysanotus patersonii	****	**	*		***					*
Trachymene pilosa			*		**					*
Tricoryne elatior	*		**				*			
Tricoryne tenella	*	*	*							
Triglochin centrocarpum		*			***	*		* *		*
Triglochin mucronatum								* *		
Utricularia tenella								*		*
Villarsia umbricola var. *umbricola*										**
Wahlenbergia gracilenta	**	*	*	*	**	**				**
Wahlenbergia stricta ssp. *stricta*				*	*					*
Xanthorrhoea caespitosa	**********	**	**	*						
Xanthosia dissecta var. *floribunda*	* *	* *		*						
Xanthosia pusilla	* *	*								

Appendix 2

INDIGENOUS PLANT SPECIES RECORDED FROM GUM LAGOON CONSERVATION PARK: CONSERVATION STATUS & RECORD SOURCE

Key to "Conservation Status"

AUS Australia-wide status according to Briggs and Leigh (1996)
SA South Australia-wide status according to Lang & Kraehenbuehl (1999)
SE Status in the South East according to Lang & Kraehenbuehl (1999)
E=Endangered
V=Vulnerable
T=Threatened
R=Rare
U=Uncommon
K=Poorly known but suspected of being rare or threatened
2=Range of less than 100km
3=Range of more than 100km
C= Occurs in conservation reserve

Key to "Source of records"

1 NCS Survey September 1995: Quadrats
2 NCS Survey September 1995: Opportunistic collections
3 D.Murfet & R.Taplin April 1996: Western boundary track
4 D.Murfet & R.Taplin June 1996: Northern, centre & southern tracks
5 D.Murfet & R.Taplin December 1996: Western & southern boundary tracks
6 NCS Survey October 1996: Quadrat & opportunistic collections
7 D.Murfet & R.Taplin March 1997: Section 40 Hundred Petherick (eastern extension of park)
8 T. Croft, Native Vegetation Section, DEP, 1987: Sections 27 Hundred of Laffer
9 T. Croft, Native Vegetation Section, DEP, 3/6/87: Allotment 23 in D.P. 31026 (formerly Sections 85) Hundred of Laffer
10 South East vegetation survey, Information Systems Branch, DENR, 1991: Section 9 Hundred of Wells
11 Tim Croft, February 1991: Opportunistic sighting just inside southern boundary of park

Species	**Conservation status**			**Source of records**										
	AUS	**SA**	**SE**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Acacia acinacea			U						6					
Acacia brachybotrya			U	1	2	3			6					
Acacia cupularis					2		4					9		
Acacia farinosa							4		6					
Acacia hakeoides			U						6					
Acacia leiophylla				1			4		6		8	9		
Acacia longifolia var. *sophorae*				1		3			6					
Acacia myrtifolia var. *myrtifolia*				1		3			6		8	9	10	
Acacia pycnantha				1			4		6			9		
Acacia spinescens				1			4		6		8	9	10	
Acacia verticillata									6					
Acaena echinata									6					
Acianthus caudatus var. *caudatus*			K						6					
Acrotriche affinis				1					6			9		
Acrotriche cordata				1		3			6				10	
Adenanthos terminalis				1		3			6		8	9		
Agrostis avenacea var. *avenacea*						3			6					
Agrostis billardieri var. *billardieri*								5						
Allocasuarina mackliniana ssp. *mackliniana*									6					
Allocasuarina mackliniana ssp. *xerophila*					2	3								
Allocasuarina muelleriana ssp. *muelleriana*				1		3			6		8		10	
Allocasuarina pusilla				1		3			6		8	9	10	
Amyema melaleucae					2		4		6					
Amyema preissii			K			3								
Angianthus preissianus				1		3			6		8	9		
Argentipallium blandowskianum								5						
Argentipallium obtusifolium				1					6				10	
Arthropodium fimbriatum								5	6					

Species	**Conservation status**			**Source of records**										
	AUS	**SA**	**SE**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Astroloma conostephioides				1		3			6		8	9		
Astroloma humifusum				1		3			6		8	9		
Baeckea behrii				1		3			6		8	9		
Baeckea crassifolia														
Baeckea ericaea				1			4		6					
Banksia marginata				1	2	3			6		8	9	10	
Banksia ornata				1	2	3			6		8	9		
Baumea arthrophylla								5	6					
Baumea juncea				1		3			6			9		
Bertya mitchellii								5	6					
Billardiera cymosa				1	2	3			6				10	
Blennospora drummondii				1										
Boronia coerulescens ssp. *coerulescens*				1		3			6		8		10	
Boronia filifolia			U	1			4		6					
Brachycome lineariloba			U	1					6					
Brachycome parvula var. *lissocarpa*		R	R						6					
Brachycome perpusilla					2				6					
Brachyloma ciliatum									6					
Brachyloma ericoides ssp. *ericoides*				1		3			6		8	9		
Brunonia australis						3			6					
Bulbine bulbosa				1					6					
Burchardia umbellata				1		3					8	9		
Bursaria spinosa					2	3			6		8			
Caladenia cardiochila				1										
Caladenia carnea var. *carnea*				1					6					
Caladenia dilatata complex					2				6					
Caladenia latifolia				1										
Calandrinia calyptrata			U						6					
Calandrinia eremaea			R	1										

Species	**Conservation status**			**Source of records**										
	AUS	**SA**	**SE**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Calandrinia granulifera									6					
Callistemon rugulosus var. *rugulosus*									6					
Calytrix alpestris				1			4		6					
Calytrix tetragona				1		3			6		8	9	10	
Carpobrotus modestus				1			4							
Carpobrotus rossii							4							
Cassytha glabella forma *dispar*				1			4		6		8	9	10	
Cassytha melantha				1			4		6					
Cassytha pubescens				1		3			6			9	10	
Caustis pentandra						3			6		8			
Centipeda cunninghamii								5						
Centrolepis aristata				1				5	6					
Centrolepis cephaloformis ssp. *cephaloformis*		R	E	1					6					
Centrolepis glabra		R	R					5	6					
Centrolepis polygyna				1			4							
Centrolepis strigosa				1				5	6					
Chamaescilla corymbosa var. *corymbosa*				1					6					
Choretrum glomeratum var. *glomeratum*				1		3			6					
Chorizandra enodis								5	6					
Chrysocephalum baxteri									6					
Clematis microphylla				1	2				6					
Comesperma calymega									6					
Comesperma polygaloides		U	U					5	6					
Comesperma volubile				1	2	3			6					
Conospermum patens					2				6					
Convolvulus erubescens									6					
Correa reflexa var. *reflexa*				1	2	3			6		8	9	10	
Corybas sp.				1	2				6					
Cotula australis				1										

Species	**Conservation status**			**Source of records**										
	AUS	**SA**	**SE**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Cotula vulgaris var. *australasica*				1					6					
Craspedia glauca				1	2		4		6					
Crassula closiana									6					
Crassula colorata					2									
Crassula colorata var. *colorata*									6					
Crassula sieberiana ssp. *tetramera*				1					6					
Cryptandra tomentosa				1		3			6		8	9		
Cynoglossum australe						3			6					
Cynoglossum suaveolens									6					
Cyperus tenellus									6					
Cyrtostylis robusta							4		6				10	
Dampiera dysantha						3			6					
Danthonia geniculata								5	6					
Danthonia setacea var. *setacea*							4		6					
Darwinia micropetala				1		3			6			9		
Daucus glochidiatus				1		3			6					
Daviesia brevifolia				1		3			6		8	9	10	
Dianella brevicaulis				1			4							
Dianella revoluta var. *revoluta*				1		3			6		8	9	10	
Dichelachne crinita			U					5	6					
Dillwynia hispida				1					6					
Dillwynia sericea				1	2	3			6					
Distichlis distichophylla				1	2				6			9		
Diuris pardina				1					6				10	
Dodonaea humilis						3			6					
Dodonaea viscosa ssp. *Spatulata*					2				6			9		
Drosera glanduligera					2				6					
Drosera macrantha ssp. *Planchonii*				1			4		6			9	10	
Drosera peltata				1					6					

Species	**Conservation status**			**Source of records**										
	AUS	**SA**	**SE**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Drosera pygmaea							4		6					
Drosera whittakeri				1			4		6			9	10	
Eleocharis acuta								5	6					
Epacris impressa						3			6					
Epilobium billardierianum ssp. *x intermedium*				1					6					
Eucalyptus arenacea				1	2	3			6		8	9		
Eucalyptus camaldulensis var. *camaldulensis*				1			4							
Eucalyptus diversifolia				1	2	3			6		8	9	10	
Eucalyptus fasciculosa				1		3			6		8	9		
Eucalyptus incrassata				1		3			6		8	9	10	
Eucalyptus leptophylla				1		3			6		8		10	
Eucalyptus leucoxylon ssp. *stephaniae*				1		3			6			9		
Eucalyptus rugosa			U		2	3			6					
Eucalyptus wimmerensis	R	K	K						6					
Euchiton sphaericus									6					
Euphrasia collina ssp. *collina*		K	K						6					
Eutaxia microphylla var. *microphylla*				1		3			6		8			
Exocarpos sparteus				1	2	3			6		8			
Exocarpos syrticola							4							
Gahnia filum				1		3			6		8	9		
Gahnia lanigera				1		3			6					
Gahnia trifida							4					9		
Genoplesium rufum				1					6					
Geranium potentilloides var. *potentilloides*					2									
Geranium solanderi var. *solanderi*				1					6					
Glischrocaryon behrii								5	6					
Glossodia major				1					6					
Gnaphalium indutum									6					
Gnephosis drummondii			R	1				5	6					

Species	**Conservation status**			**Source of records**										
	AUS	**SA**	**SE**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Gompholobium ecostatum					2		4		6			9		
Gonocarpus tetragynus				1		3			6		8	9	10	
Goodenia blackiana				1			4		6					
Goodenia geniculata				1					6				10	
Goodenia willisiana				1			4							
Grevillea ilicifolia var. *ilicifolia*				1			4		6				10	
Grevillea lavandulacea var. *sericea*		U	U	1	2				6				10	
Haeckeria pholidota		V	V											11
Hakea muelleriana				1		3			6		8	9		
Hakea nodosa				1		3			6			9		
Hakea repullulans		U	U						6					
Hakea rostrata						3			6		8	9	10	
Hakea rugosa				1		3					8			
Hakea vittata				1		3			6				10	
Haloragis eichleri	3RCa	R	R						6					
Halosarcia halocnemoides ssp. *halocnemoides*				1			4							
Halosarcia indica ssp. *leiostachya*				1			4		6					
Halosarcia lepidosperma			K	1			4		6					
Halosarcia pergranulata ssp. *pergranulata*							4		6					
Halosarcia syncarpa			K						6					
Helichrysum leucopsideum				1					6					
Helichrysum scorpioides				1					6					
Hibbertia riparia				1	2	3			6		8	9	10	
Hibbertia sericea var. *scabrifolia*				1		3			6			9	10	
Hibbertia virgata									6			9		
Hyalosperma demissum				1					6					
Hydrocotyle callicarpa				1					6					
Hydrocotyle capillaris				1				5	6					
Hydrocotyle laxiflora				1	2		4		6			9		

Species	**Conservation status**			**Source of records**										
	AUS	**SA**	**SE**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Hydrocotyle medicaginoides			K	1				5	6					
Hypolaena fastigiata				1		3			6		8	9		
Hypoxis glabella var. *glabella*				1					6					
Hypoxis vaginata var. *vaginata*			U						6					
Isoetes muelleri		U	K						6					
Isolepis cernua									6					
Isolepis hookeriana		U	K	1										
Isolepis marginata				1	2			5	6					
Isolepis nodosa				1			4		6			9		
Isolepis platycarpa								5	6					
Isolepis stellata		R	R						6					
Isopogon ceratophyllus				1		3			6		8	9	10	
Ixodia achillaeoides ssp. *alata*			U					5	6					
Juncus bufonius									6					
Juncus kraussii						3			6					
Kennedia prostrata				1	2				6					
Kunzea pomifera				1		3			6		8	9		
Lasiopetalum baueri					2	3			6					
Lasiopetalum behrii									6					
Lawrencia glomerata							4		6		8			
Lawrencia spicata		U	U		2	3								
Lawrencia squamata				1	2		4		6					
Laxmannia orientalis									6				10	
Lepidobolus drapetocoleus				1		3			6			9	10	
Lepidosperma carphoides				1		3			6			9	10	
Lepidosperma concavum				1			4		6					
Lepidosperma congestum						3			6		8	9		
Lepidosperma viscidum				1		3			6		8			
Lepilaena cylindrocarpa									6					

Species	**Conservation status**			**Source of records**										
	AUS	**SA**	**SE**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Lepilaena patentifolia									6	7				
Leporella fimbriata				1					6					
Leptocarpus brownii				1		3			6		8	9		
Leptospermum continentale							4		6			9		
Leptospermum coriaceum				1										
Leptospermum myrsinoides						3			6		8	9		
Leucopogon clelandii		R	R						6	7	8			
Leucopogon costatus				1			4		6		8			
Leucopogon parviflorus				1	2									
Leucopogon woodsii		U	U	1		3								
Levenhookia dubia				1					6					
Levenhookia pusilla				1					6					
Lilaeopsis polyantha			R				4							
Linum marginale						3			6					
Lobelia rhombifolia		U	K					5						
Logania linifolia				1					6	7	8		10	
Lomandra collina				1	2	3			6					
Lomandra effusa				1										
Lomandra juncea							4		6		8	9		
Lomandra leucocephala ssp. *robusta*					2				6					
Lomandra micrantha ssp. *micrantha*						3			6					
Lomandra sororia		U	U						6					
Maireana oppositifolia				1						7				
Melaleuca brevifolia				1	2	3			6		8	9		
Melaleuca gibbosa									6					
Melaleuca halmaturorum ssp. *halmaturorum*				1		3			6			9		
Melaleuca lanceolata ssp. *lanceolata*				1	2	3			6				10	
Melaleuca uncinata				1					6		8			
Microlaena stipoides var. *stipoides*								5						

Species	**Conservation status**			**Source of records**										
	AUS	**SA**	**SE**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Microseris lanceolata									6					
Microtis unifolia complex				1					6		8			
Millotia muelleri				1					6					
Millotia tenuifolia var. *tenuifolia*				1					6					
Muehlenbeckia adpressa				1	2				6					
Myoporum insulare				1	2									
Myoporum parvifolium		R	R		2		4		6					
Myriophyllum muelleri								5	6					
Myriophyllum simulans									6					
Neurachne alopecuroidea									6					
Olearia axillaris					2									
Olearia ciliata var. *ciliata*				1	2	3			6				10	
Olearia floribunda var. *floribunda*						3								
Olearia lanuginosa		U	U			3								
Olearia ramulosa							4		6					
Olearia tubuliflora		U	K		2									
Opercularia turpis				1		3			6				10	
Orthoceras strictum		U	R						6					
Oxalis perennans				1	2				6					
Pelargonium littorale				1			4		6					
Persoonia juniperina				1			4		6		8	9		
Phyllangium distylis		R	R						6					
Phyllangium divergens				1					6					
Phyllota pleurandroides				1		3			6		8	9		
Phyllota remota		U	U			3			6					
Pimelea glauca				1			4		6					
Pimelea octophylla					2									
Pimelea stricta									6					
Plantago gaudichaudii									6					

Species	**Conservation status**			**Source of records**										
	AUS	**SA**	**SE**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Plantago hispida									6					
Plantago sp. *B*									6					
Poa crassicaudex								5						
Poa rodwayi		R	R						6					
Podolepis canescens			R				4		6					
Podotheca angustifolia									6					
Pogonolepis muelleriana				1										
Pomaderris obcordata				1		3			6					
Pomaderris paniculosa ssp. *paniculosa*					2				6					
Poranthera microphylla				1					6					
Poranthera triandra			K					5	6					
Potamogeton tricarinatus								5	6					
Prasophyllum odoratum									6					
Pseudognaphalium luteoalbum									6					
Pteridium esculentum				1	2		4							
Pterostylis nana				1	2				6				10	
Pterostylis nutans			U						6					
Pterostylis pedunculata				1	2		4		6					
Pterostylis plumosa				1			4		6				10	
Pterostylis sanguinea				1			4							
Puccinellia stricta var. *stricta*									6					
Pultenaea acerosa			U	1	2	3			6				10	
Pultenaea canaliculata var. *canaliculata*						3			6					
Pultenaea tenuifolia				1	2	3			6				10	
Pultenaea vestita		U	R				4		6					
Pyrorchis nigricans				1			4		6					
Quinetia urvillei		U	R	1	2									
Ranunculus sessiliflorus var. *sessiliflorus*				1					6					
Rhagodia candolleana ssp. *candolleana*					2				6					

Species	**Conservation status**			**Source of records**										
	AUS	**SA**	**SE**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Rhodanthe pygmaea									6					
Ruppia polycarpa									6					
Rutidosis multiflora				1	2				6					
Samolus repens				1			4		6			9		
Santalum murrayanum		U	U			3								
Sarcocornia quinqueflora				1			4		6					
Schoenus apogon				1					6					
Schoenus breviculmis				1							8	9	10	
Schoenus deformis				1		3			6					
Schoenus laevigatus		R	R	1		3								
Schoenus nitens				1					6				10	
Schoenus sculptus		R	V						6					
Sebaea ovata								5	6					
Selliera radicans				1			4		6					
Senecio glomeratus				1	2		4		6					
Senecio glossanthus				1					6					
Senecio lautus				1					6					
Senecio macrocarpus	3VCa	V	V		2				6					
Senecio picridioides				1					6					
Senecio quadridentatus				1			4		6					
Senecio sp.L								5						
Senecio squarrosus				1	2	3			6					
Sonchus hydrophilus								5						
Sphaerolobium minus		R	R						6					
Sporobolus virginicus							4							
Spyridium eriocephalum var. *eriocephalum*									6					
Spyridium phylicoides						3								
Spyridium subochreatum var. *laxiusculum*				1							8			
Spyridium vexilliferum var. *latifolium*													10	

Species	**Conservation status**			**Source of records**										
	AUS	**SA**	**SE**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Spyridium vexilliferum var. *vexilliferum*				1			4		6					
Stackhousia aspericocca ssp. *"Cylindrical inflorescence"(W.R.Barker 14)*				1				5	6					
Stackhousia aspericocca ssp. *"One-sided inflorescence"(W.R.Barker 697)*								5	6					
Stenopetalum lineare			K						6					
Stipa acrociliata			R	1		3			6					
Stipa drummondii				1					6	7				
Stipa elegantissima			R						6					
Stipa exilis			R					5	6					
Stipa flavescens									6	7				
Stipa hemipogon									6					
Stipa mollis				1		3			6					
Stipa mundula			U						6					
Stipa nodosa			R					5						
Stipa scabra ssp. *falcata*							4		6					
Stipa stipoides									6	7				
Stylidium calcaratum			R						6					
Stylidium graminifolium								5	6		8			
Styphelia exarrhena				1			4				8	9		
Suaeda australis							4		6					
Tetragonia implexicoma					2									
Tetraria capillaris				1	2	3			6		8			
Thelymitra antennifera				1					6				10	
Thelymitra benthamiana		U	R						6					
Thelymitra epipactoides	3ECa	E	E	1										
Thelymitra nuda				1					6					
Thelymitra rubra				1					6					
Thomasia petalocalyx				1		3			6			9	10	

Species	**Conservation status**			**Source of records**										
	AUS	**SA**	**SE**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Threlkeldia diffusa							4		6					
Thysanotus juncifolius							4							
Thysanotus patersonii				1			4		6			9	10	
Trachymene cyanopetala			K						6					
Trachymene pilosa			R	1					6					
Tricoryne tenella				1		3			6					
Triglochin calcitrapum			R						6					
Triglochin centrocarpum				1	2				6					
Triglochin minutissimum		R	K						6					
Triglochin mucronatum				1			4		6					
Triglochin striatum				1					6					
Triodia scariosa ssp. *scariosa*					2				6					
Trithuria submersa									6					
Utricularia dichotoma		U	U						6					
Utricularia tenella		U	U	1					6					
Villarsia umbricola var. *umbricola*		U	R	1	2				6					
Vittadinia australasica var. *australasica*								5						
Vittadinia cuneata var. *cuneata* forma *cuneata*							4		6					
Vittadinia dissecta var. *hirta*											8			
Wahlenbergia gracilenta				1					6					
Wahlenbergia stricta ssp. *stricta*				1					6					
Wilsonia backhousei				1			4		6		8	9		
Wilsonia humilis var. *humilis*			U				4					9		
Wilsonia rotundifolia							4		6		8	9		
Wurmbea dioica ssp. *dioica*									6					
Xanthorrhoea caespitosa				1		3			6		8	9	10	
Xanthosia dissecta var. *floribunda*				1		3			6				10	
Xanthosia pusilla									6				10	
Zieria veronicea		R	R		2									

Appendix 3

INDIGENOUS PLANT SPECIES RECORDED FROM GUM LAGOON CONSERVATION PARK: SPECIES IN EACH FAMILY AND COMMON NAMES

AIZOACEAE	
Carpobrotus modestus	inland pigface
Carpobrotus rossii	native pigface
Tetragonia implexicoma	bower spinach
BORAGINACEAE	
Cynoglossum australe	Australian hound's-tongue
Cynoglossum sp.	hound's-tongue
Cynoglossum suaveolens	sweet hound's-tongue
CAMPANULACEAE	
Lobelia rhombifolia	tufted lobelia
Wahlenbergia gracilenta	annual bluebell
Wahlenbergia stricta ssp. *stricta*	tall bluebell
CASUARINACEAE	
Allocasuarina mackliniana ssp. *mackliniana*	Macklin's oak-bush
Allocasuarina mackliniana ssp. *xerophila*	Macklin's oak-bush
Allocasuarina muelleriana ssp. *muelleriana*	common oak-bush
Allocasuarina pusilla	dwarf oak-bush
CENTROLEPIDACEAE	
Centrolepis aristata	pointed centrolepis
Centrolepis cephaloformis ssp. *cephaloformis*	cushion centrolepis
Centrolepis glabra	smooth centrolepis
Centrolepis polygyna	wiry centrolepis
Centrolepis strigosa	hairy centrolepis
Trithuria submersa	trithuria
CHENOPODIACEAE	
Halosarcia halocnemoides ssp. *halocnemoides*	grey samphire
Halosarcia indica ssp. *leiostachya*	brown-head samphire
Halosarcia lepidosperma	
Halosarcia pergranulata ssp. *pergranulata*	black-seed samphire
Halosarcia syncarpa	fused samphire
Maireana oppositifolia	salt bluebush
Rhagodia candolleana ssp. *candolleana*	seaberry saltbush
Sarcocornia quinqueflora	beaded samphire
Suaeda australis	austral seablite
Threlkeldia diffusa	coast bonefruit

COMPOSITAE

Angianthus preissianus	salt angianthus
Argentipallium blandowskianum	woolly everlasting
Argentipallium obtusifolium	blunt everlasting
Blennospora drummondii	dwarf button-flower
Brachycome lineariloba	hard-head daisy
Brachycome parvula var. *lissocarpa*	coast daisy
Brachycome perpusilla	tiny daisy
Centipeda cunninghamii	common sneezeweed
Chrysocephalum baxteri	white everlasting
Cotula australis	common cotula
Cotula vulgaris var. *australasica*	slender cotula
Craspedia glauca	billy-buttons
Euchiton sphaericus	annual cudweed
Gnaphalium indutum	tiny cudweed
Gnephosis drummondii	slender golden-tip
Haeckeria pholidota	scaly haeckeria
Helichrysum leucopsideum	satin everlasting
Helichrysum scorpioides	button everlasting
Hyalosperma demissum	dwarf sunray
Ixodia achillaeoides ssp. *alata*	hills daisy
Microseris lanceolata	yam daisy
Millotia muelleri	common bow-flower
Millotia tenuifolia var. *tenuifolia*	soft millotia
Olearia axillaris	coast daisy-bush
Olearia ciliata var. *ciliata*	fringed daisy-bush
Olearia floribunda var. *floribunda*	heath daisy-bush
Olearia lanuginosa	woolly daisy-bush
Olearia ramulosa	twiggy daisy-bush
Olearia tubuliflora	rayless daisy-bush
Podolepis canescens	grey copper-wire daisy
Podotheca angustifolia	sticky long-heads
Pogonolepis muelleriana	stiff cup-flower
Pseudognaphalium luteoalbum	Jersey cudweed
Quinetia urvillei	quinetia
Rhodanthe pygmaea	pigmy daisy
Rutidosis multiflora	small wrinklewort
Senecio glomeratus	swamp groundsel
Senecio glossanthus	annual groundsel
Senecio lautus	variable groundsel
Senecio macrocarpus	large-fruit groundsel
Senecio picridioides	purple-leaf groundsel
Senecio quadridentatus	cotton groundsel
Senecio sp.L	
Senecio squarrosus	squarrose groundsel
Sonchus hydrophilus	native sow-thistle
Vittadinia australasica var. *australasica*	sticky New Holland daisy
Vittadinia cuneata var. *cuneata* forma *cuneata*	fuzzy New Holland daisy
Vittadinia dissecta var. *hirta*	dissected New Holland daisy

CONVOLVULACEAE

Convolvulus erubescens	Australian bindweed
Wilsonia backhousei	narrow-leaf wilsonia
Wilsonia humilis var. *humilis*	silky wilsonia
Wilsonia rotundifolia	round-leaf wilsonia

CRASSULACEAE	
Crassula closiana	stalked crassula
Crassula colorata	dense crassula
Crassula colorata var. *colorata*	dense crassula
Crassula sieberiana ssp. *tetramera*	Australian stonecrop
CRUCIFERAE	
Stenopetalum lineare	narrow thread-petal
CYPERACEAE	
Baumea arthrophylla	swamp twig-rush
Baumea juncea	bare twig-rush
Caustis pentandra	thick twist-rush
Chorizandra enodis	black bristle-rush
Cyperus tenellus	tiny flat-sedge
Eleocharis acuta	common spike-rush
Gahnia filum	smooth cutting-grass
Gahnia lanigera	black grass saw-sedge
Gahnia trifida	cutting grass
Isolepis cernua	nodding club-rush
Isolepis hookeriana	grassy club-rush
Isolepis marginata	little club-rush
Isolepis nodosa	knobby club-rush
Isolepis platycarpa	flat-fruit club-rush
Isolepis stellata	star club-rush
Lepidosperma carphoides	black rapier-sedge
Lepidosperma concavum	spreading sword-sedge
Lepidosperma congestum	clustered sword-sedge
Lepidosperma viscidum	sticky sword-sedge
Schoenus apogon	common bog-rush
Schoenus breviculmis	matted bog-rush
Schoenus deformis	small bog-rush
Schoenus laevigatus	
Schoenus nitens	shiny bog-rush
Schoenus sculptus	gimlet bog-rush
Tetraria capillaris	hair sedge
DENNSTAEDTIACEAE	
Pteridium esculentum	bracken fern
DILLENIACEAE	
Hibbertia riparia	guinea-flower
Hibbertia sericea var. *scabrifolia*	rough-leaf guinea-flower
Hibbertia virgata	twiggy guinea-flower
DROSERACEAE	
Drosera glanduligera	scarlet sundew
Drosera macrantha ssp. *planchonii*	climbing sundew
Drosera peltata	pale sundew
Drosera pygmaea	tiny sundew
Drosera whittakeri	

EPACRIDACEAE	
Acrotriche affinis	ridged ground-berry
Acrotriche cordata	blunt-leaf ground-berry
Astroloma conostephioides	flame heath
Astroloma humifusum	cranberry heath
Brachyloma ciliatum	fringed brachyloma
Brachyloma ericoides ssp. *ericoides*	brush heath
Epacris impressa	common heath
Leucopogon clelandii	Cleland's beard-heath
Leucopogon costatus	twiggy beard-heath
Leucopogon parviflorus	coast beard-heath
Leucopogon woodsii	nodding beard-heath
Styphelia exarrhena	desert heath
EUPHORBIACEAE	
Bertya mitchellii	Mitchell's bertya
Poranthera microphylla	small poranthera
Poranthera triandra	three-petal poranthera
GENTIANACEAE	
Sebaea ovata	yellow sebaea
GERANIACEAE	
Geranium potentilloides var. *potentilloides*	downy geranium
Geranium solanderi var. *solanderi*	austral geranium
Pelargonium littorale	native pelargonium
GOODENIACEAE	
Brunonia australis	blue pincushion
Dampiera dysantha	shrubby dampiera
Goodenia blackiana	native primrose
Goodenia geniculata	bent goodenia
Goodenia willisiana	silver goodenia
Selliera radicans	shiny swamp-mat
GRAMINEAE	
Agrostis avenacea var. *avenacea*	common blown-grass
Agrostis billardieri var. *billardieri*	coast blown-grass
Danthonia geniculata	kneed wallaby-grass
Danthonia setacea var. *setacea*	small-flower wallaby-grass
Danthonia sp.	wallaby-grass
Dichelachne crinita	long-hair plume-grass
Distichlis distichophylla	emu-grass
Microlaena stipoides var. *stipoides*	weeping rice-grass
Neurachne alopecuroidea	fox-tail mulga-grass
Poa crassicaudex	thick-stem tussock-grass
Poa rodwayi	velvet tussock-grass
Puccinellia stricta var. *stricta*	Australian saltmarsh-grass
Sporobolus virginicus	salt couch
Stipa acrociliata	graceful spear-grass
Stipa drummondii	cottony spear-grass
Stipa elegantissima	feather spear-grass
Stipa exilis	heath spear-grass
Stipa flavescens	coast spear-grass

GRAMINEAE (continued)	
Stipa hemipogon	half-beard spear-grass
Stipa mollis	soft spear-grass
Stipa mundula	neat spear-grass
Stipa nodosa	tall spear-grass
Stipa scabra ssp. *falcata*	slender spear-grass
Stipa stipoides	coast spear-grass
Triodia scariosa ssp. *scariosa*	spinifex
HALORAGACEAE	
Glischrocaryon behrii	golden pennants
Gonocarpus tetragynus	small-leaf raspwort
Haloragis eichleri	Eichler's raspwort
Myriophyllum muelleri	hooded milfoil
Myriophyllum simulans	amphibious milfoil
HYPOXIDACEAE	
Hypoxis glabella var. *glabella*	tiny star
Hypoxis vaginata var. *vaginata*	yellow star
ISOETACEAE	
Isoetes muelleri	Mueller's quillwort
JUNCACEAE	
Juncus bufonius	toad rush
Juncus kraussii	sea rush
JUNCAGINACEAE	
Triglochin calcitrapum	spurred arrowgrass
Triglochin centrocarpum	dwarf arrowgrass
Triglochin minutissimum	tiny arrowgrass
Triglochin mucronatum	prickly arrowgrass
Triglochin striatum	streaked arrowgrass
LAURACEAE	
Cassytha glabella forma *dispar*	slender dodder-laurel
Cassytha melantha	coarse dodder-laurel
Cassytha pubescens	downy dodder-laurel
LEGUMINOSAE	
Acacia acinacea	wreath wattle
Acacia brachybotrya	grey mulga-bush
Acacia cupularis	cup wattle
Acacia farinosa	mealy wattle
Acacia hakeoides	hakea wattle
Acacia leiophylla	coast golden wattle
Acacia longifolia var. *sophorae*	coastal wattle
Acacia myrtifolia var. *myrtifolia*	myrtle wattle
Acacia pycnantha	golden wattle
Acacia spinescens	spiny wattle
Acacia verticillata	prickly Moses
Daviesia brevifolia	leafless bitter-pea
Dillwynia hispida	red parrot-pea
Dillwynia sericea	showy parrot-pea

LEGUMINOSAE (continued)	
Eutaxia microphylla var. *microphylla*	common eutaxia
Gompholobium ecostatum	dwarf wedge-pea
Kennedia prostrata	scarlet runner
Phyllota pleurandroides	heathy phyllota
Phyllota remota	slender phyllota
Pultenaea acerosa	bristly bush-pea
Pultenaea canaliculata var. *canaliculata*	soft bush-pea
Pultenaea tenuifolia	narrow-leaf bush-pea
Pultenaea vestita	feather bush-pea
Sphaerolobium minus	leafless globe-pea
LENTIBULARIACEAE	
Utricularia dichotoma	purple bladderwort
Utricularia tenella	pink bladderwort
LILIACEAE	
Arthropodium fimbriatum	nodding vanilla-lily
Bulbine bulbosa	bulbine-lily
Burchardia umbellata	milkmaids
Chamaescilla corymbosa var. *corymbosa*	blue squill
Dianella brevicaulis	short-stem flax-lily
Dianella revoluta var. *revoluta*	black-anther flax-lily
Laxmannia orientalis	dwarf wire-lily
Lomandra collina	sand mat-rush
Lomandra effusa	scented mat-rush
Lomandra juncea	desert mat-rush
Lomandra leucocephala ssp. *robusta*	woolly mat-rush
Lomandra micrantha ssp. *micrantha*	small-flower mat-rush
Lomandra sororia	sword mat-rush
Thysanotus juncifolius	rush fringe-lily
Thysanotus patersonii	twining fringe-lily
Tricoryne tenella	tufted yellow rush-lily
Wurmbea dioica ssp. *dioica*	early star-lily
Xanthorrhoea caespitosa	sand-heath yacca
LINACEAE	
Linum marginale	native flax
LOGANIACEAE	
Logania linifolia	flax-leaf logania
Phyllangium distylis	tiny mitrewort
Phyllangium divergens	wiry mitrewort
LORANTHACEAE	
Amyema melaleucae	tea-tree mistletoe
Amyema preissii	wire-leaf mistletoe
MALVACEAE	
Lawrencia glomerata	clustered lawrencia
Lawrencia spicata	salt lawrencia
Lawrencia squamata	thorny lawrencia
MENYANTHACEAE	
Villarsia umbricola var. *umbricola*	lax marsh-flower

MYOPORACEAE	
Myoporum insulare	common boobialla
Myoporum parvifolium	creeping boobialla
MYRTACEAE	
Baeckea behrii	silver broom-bush
Baeckea ericaea	mat baeckea
Callistemon rugulosus var. *rugulosus*	scarlet bottlebrush
Calytrix alpestris	snow heath-myrtle
Calytrix tetragona	common fringe-myrtle
Darwinia micropetala	small darwinia
Eucalyptus arenacea	dune stringybark
Eucalyptus camaldulensis var. *camaldulensis*	river red gum
Eucalyptus diversifolia	coastal white mallee
Eucalyptus fasciculosa	pink gum
Eucalyptus incrassata	ridge-fruited mallee
Eucalyptus leptophylla	narrow-leaf red mallee
Eucalyptus leucoxylon ssp. *stephaniae*	scrubby blue gum
Eucalyptus rugosa	coastal white mallee
Eucalyptus wimmerensis	Wimmera mallee
Kunzea pomifera	muntries
Leptospermum continentale	prickly tea-tree
Leptospermum coriaceum	dune tea-tree
Leptospermum myrsinoides	heath tea-tree
Melaleuca brevifolia	short-leaf honey-myrtle
Melaleuca gibbosa	slender honey-myrtle
Melaleuca halmaturorum ssp. *halmaturorum*	swamp paper-bark
Melaleuca lanceolata ssp. *lanceolata*	dryland tea-tree
Melaleuca uncinata	broombush
ONAGRACEAE	
Epilobium billardierianum ssp. *x intermedium*	variable willow-herb
ORCHIDACEAE	
Acianthus caudatus var. *caudatus*	mayfly orchid
Acianthus sp.	mosquito orchid
Caladenia cardiochila	heart-lip spider-orchid
Caladenia carnea var. *carnea*	pink fingers
Caladenia dilatata complex	green-comb spider-orchid
Caladenia latifolia	pink caladenia
Corybas sp.	helmet-orchid
Cyrtostylis robusta	robust gnat-orchid
Cyrtostylis sp.	gnat-orchid
Diuris pardina	spotted donkey-orchid
Genoplesium rufum	red midge-orchid
Glossodia major	purple cockatoo
Leporella fimbriata	fringed hare-orchid
Microtis unifolia complex	onion-orchid
Orthoceras strictum	horned orchid
Prasophyllum odoratum	scented leek-orchid
Prasophyllum sp.	leek-orchid
Pterostylis nana	dwarf greenhood
Pterostylis nutans	nodding greenhood

ORCHIDACEAE (continued)	
Pterostylis pedunculata	maroon-hood
Pterostylis plumosa	bearded greenhood
Pterostylis sanguinea	blood greenhood
Pyrorchis nigricans	black fire-orchid
Thelymitra antennifera	lemon sun-orchid
Thelymitra benthamiana	leopard sun-orchid
Thelymitra epipactoides	metallic sun-orchid
Thelymitra nuda	scented sun-orchid
Thelymitra rubra	salmon sun-orchid
OXALIDACEAE	
Oxalis perennans	native sorrel
PITTOSPORACEAE	
Billardiera cymosa	sweet apple-berry
Bursaria spinosa	sweet bursaria
PLANTAGINACEAE	
Plantago gaudichaudii	narrow-leaf plantain
Plantago hispida	hairy plantain
Plantago sp. *B*	little plantain
POLYGALACEAE	
Comesperma calymega	blue-spike milkwort
Comesperma polygaloides	mauve milkwort
Comesperma volubile	love creeper
POLYGONACEAE	
Muehlenbeckia adpressa	climbing lignum
PORTULACACEAE	
Calandrinia calyptrata	pink purslane
Calandrinia eremaea	dryland purslane
Calandrinia granulifera	pigmy purslane
POTAMOGETONACEAE	
Potamogeton tricarinatus	floating pondweed
Ruppia polycarpa	widgeon grass
PRIMULACEAE	
Samolus repens	creeping brookweed
PROTEACEAE	
Adenanthos terminalis	yellow gland-flower
Banksia marginata	silver banksia
Banksia ornata	desert banksia
Conospermum patens	slender smoke-bush
Grevillea ilicifolia var. *ilicifolia*	holly-leaf grevillea
Grevillea lavandulacea var. *sericea*	spider-flower
Hakea muelleriana	heath needlebush
Hakea nodosa	yellow hakea
Hakea repullulans	furze hakea
Hakea rostrata	beaked hakea
Hakea rugosa	dwarf hakea

PROTEACEAE (continued)	
Hakea vittata	limestone needlebush
Isopogon ceratophyllus	horny cone-bush
Persoonia juniperina	prickly geebung
RANUNCULACEAE	
Clematis microphylla	old man's beard
Ranunculus sessiliflorus var. *sessiliflorus*	annual buttercup
RESTIONACEAE	
Hypolaena fastigiata	tassel rope-rush
Lepidobolus drapetocoleus	scale shedder
Leptocarpus brownii	coarse twine-rush
RHAMNACEAE	
Cryptandra tomentosa	heath cryptandra
Pomaderris obcordata	wedge-leaf pomaderris
Pomaderris paniculosa ssp. *paniculosa*	mallee pomaderris
Spyridium eriocephalum var. *eriocephalum*	heath spyridium
Spyridium phylicoides	narrow-leaf spyridium
Spyridium subochreatum var. *laxiusculum*	velvet spyridium
Spyridium vexilliferum var. *latifolium*	winged spyridium
Spyridium vexilliferum var. *vexilliferum*	winged spyridium
ROSACEAE	
Acaena echinata	sheep's burr
RUBIACEAE	
Opercularia turpis	twiggy stinkweed
RUTACEAE	
Boronia coerulescens ssp. *coerulescens*	blue boronia
Boronia filifolia	slender boronia
Correa reflexa var. *reflexa*	common correa
Zieria veronicea	pink zieria
SANTALACEAE	
Choretrum glomeratum var. *glomeratum*	white sour-bush
Exocarpos sparteus	slender cherry
Exocarpos syrticola	coast cherry
Santalum murrayanum	bitter quandong
SAPINDACEAE	
Dodonaea humilis	dwarf hop-bush
Dodonaea viscosa ssp. *spatulata*	sticky hop-bush
SCROPHULARIACEAE	
Euphrasia collina ssp. *collina*	purple eyebright
STACKHOUSIACEAE	
Stackhousia aspericocca ssp. *"Cylindrical inflorescence"(W.R.Barker 14)*	bushy candles
Stackhousia aspericocca ssp. *"One-sided inflorescence"(W.R.Barker 697)*	one-sided candles

STERCULIACEAE	
Lasiopetalum baueri	slender velvet-bush
Lasiopetalum behrii	pink velvet-bush
Thomasia petalocalyx	paper-flower
STYLIDIACEAE	
Levenhookia dubia	hairy stylewort
Levenhookia pusilla	tiny stylewort
Stylidium calcaratum	spurred trigger-plant
Stylidium graminifolium	grass trigger-plant
THYMELAEACEAE	
Pimelea glauca	smooth riceflower
Pimelea octophylla	woolly riceflower
Pimelea stricta	erect riceflower
UMBELLIFERAE	
Daucus glochidiatus	native carrot
Hydrocotyle callicarpa	tiny pennywort
Hydrocotyle capillaris	thread pennywort
Hydrocotyle laxiflora	stinking pennywort
Hydrocotyle medicaginoides	medic pennywort
Lilaeopsis polyantha	Australian lilaeopsis
Trachymene cyanopetala	purple trachymene
Trachymene pilosa	dwarf trachymene
Xanthosia dissecta var. *floribunda*	cut-leaf xanthosia
Xanthosia pusilla	hairy xanthosia
ZANNICHELLIACEAE	
Lepilaena cylindrocarpa	long-fruit water-mat
Lepilaena patentifolia	spreading water-mat

Appendix 4

EXOTIC PLANT SPECIES RECORDED FROM GUM LAGOON CONSERVATION PARK

KEY: Source of records
1 NCS survey September 1995: Quadrats
2 NCS survey September 1995: Opportunistic collections
3 NCS survey October 1996: Quadrats & opportunistic collections
4 D.Murfet & R.Taplin June 1996

		Source of record			
Scientific name	**Common name**	**1**	**2**	**3**	**4**
**Acacia gonophylla*					4
**Acacia maxwellii*			2		
**Acacia retinodes var retinodes*			2		
**Acetosella vulgaris*	Sorrel				4
**Aira cupaniana*	small hair-grass			3	4
**Anagallis arvensis*	Pimpernel			3	4
**Arctotheca calendula*	Cape weed	1		3	4
**Avellinia michelii*	Avellinia	1		3	
**Avena barbata*	bearded oat			3	4
**Briza minor*	lesser quaking-grass	1		3	4
**Bromus diandrus*	great brome			3	4
**Bromus hordeaceus* ssp. *hordeaceus*	soft brome				4
**Bromus rubens*	red brome			3	4
**Carduus tenuiflorus*	slender thistle				4
**Centaurium tenuiflorum*	branched centaury			3	
**Cerastium glomeratum*	common mouse-ear chickweed	1		3	
**Chenopodium glaucum*	glaucous goosefoot				4
**Chondrilla juncea*	skeleton weed				4
**Cicendia filiformis*	slender cicendia	1		3	
**Cirsium vulgare*	spear thistle	1		3	4
**Crassula natans* var. *minus*	water crassula			3	4
**Critesion marinum*	sea barley-grass			3	4
**Critesion murinum* ssp. *glaucum*	blue barley-grass			3	
**Dittrichia graveolens*	Stinkweed				4
**Ehrharta calycina*	perennial veldt grass	1		3	
**Ehrharta longiflora*	annual veldt grass	1			
**Festuca arundinacea*	tall meadow fescue				4
**Galium murale*	small bedstraw	1		3	
**Hypochaeris glabra*	smooth cat's ear	1		3	4
**Hypochaeris radicata*	rough cat's ear			3	4
**Juncus capitatus*	dwarf rush			3	
**Lagurus ovatus*	hare's tail grass			3	4
**Lolium rigidum*	Wimmera ryegrass	1		3	
**Melilotus indica*	King Island melilot				4
**Myosotis discolor* ssp. *discolor*	yellow and blue forget-me-not	1	2	3	
**Myrsiphyllum asparagoides*	bridal creeper		2	3	
**Oenothera stricta* ssp. *stricta*	common evening primrose			3	4
**Parapholis incurva*	curly ryegrass			3	4

		Source of record			
Scientific name	**Common name**	**1**	**2**	**3**	**4**
**Phalaris minor*	lesser canary-grass			3	4
**Plantago coronopus*	bucks-horn plantain		2		
**Poa annua*	winter grass	1			
**Polypogon monspeliensis*	annual beard-grass			3	4
**Puccinellia distans*	reflexed poa			3	4
**Sagina apetala*	annual pearlwort			3	
**Schismus barbatus*	Arabian grass	1			
**Sonchus asper* ssp. *glaucescens*				3	4
**Sonchus oleraceus*	common sow-thistle	1		3	4
**Spergularia marina*	salt sand-spurrey	1			
**Spergularia media*	coast sand-spurrey			3	
**Stellaria media*	chickweed	1		3	4
**Suaeda baccifera*					4
**Taraxacum officinale*	dandelion	1			
**Trifolium arvense* var. *arvense*	hare's-foot clover			3	
**Trifolium campestre*	hop clover			3	
**Trifolium dubium*	suckling clover	1			
**Trifolium glomeratum*	cluster clover			3	
**Trifolium subterraneum*	subterranean clover	1		3	
**Urtica urens*	small nettle		2		
**Vulpia fasciculata*	sand fescue	1		3	
**Vulpia muralis*				3	
**Vulpia myuros* forma *megalura*	fox-tail fescue			3	
**Vulpia myuros* forma *myuros*	rat's-tail fescue			3	

Appendix 5

MAMMAL SPECIES RECORDS FROM GUM LAGOON CONSERVATION PARK

KEY: Source of records
1 NCS survey September 1995
2 NCS survey October 1996
3 Observed within park by adjacent landholder
4 Native Vegetation Retention Unit, Department of Environment, 5/10/84
5 Survey by R. Davies, April 2000

Native species

		Conservation status[1]			Source of records			
Scientific name	**Common name**	**AUS[2]**	**SA[3]**	**SE[4]**	**1**	**2**	**3**	**4**
Cercartetus concinnus	Western Pygmy Possum	-	-	-	1	2		
Cercartetus lepidus	Little Pygmy Possum	-	-	R	1	2		
Chalinolobus gouldii	Gould's Wattled Bat	-	-	-				4
Chalinolobus morio	Chocolate Wattled Bat	-	-	-				4
Macropus fuliginosus	Western Grey Kangaroo	-	-	-	1	2		
Macropus giganteus	Eastern Grey Kangaroo	-	R	-	1			
Macropus rufogriseus	Red-necked Wallaby	-	R	R	1			
Nyctophilus geoffroyi	Lesser Long-eared Bat	-	-	-				4
Pseudomys apodemoides	Silky mouse	-	-	-	1	2		
Tachyglossus aculeatus	Short-beaked Echidna	-	-	-				4
Vespadelus vulturnus	Little Forest Bat	-	-	-				4
Vombatus ursinus	Common Wombat	-	R	V	1			

[1] AUS=Australian status, SA=South Australian status, SE=Status in South East
C=common, U=Uncommon, R=Rare, V=Vulverable, E=Endangered,
[2] Endangered Species Protection Act 1992 Schedule 1 (26 May 1999 version)
[3] NPWSA (1999)
[4] Croft *et al.* (1999)

Feral species

		Source of records				
Scientific name	**Common name**	**1**	**2**	**3**	**4**	**5**
**Capra hircus*	Goat		2			
**Dama dama*	Fallow Deer			3		5
**Lepus capensis*	Brown Hare	1	2			
**Mus domesticus*	House Mouse	1	2			
**Oryctolagus cuniculus*	Rabbit	1	2			5
**Ovis aries*	Sheep			3		
**Rattus rattus*	Rat	1				
**Vulpes vulpes*	Fox	1				

Appendix 6

REPTILE AND AMPHIBIAN SPECIES RECORDS FROM GUM LAGOON CONSERVATION PARK

KEY: Source of records
1. NCS survey September 1995
2. NCS survey October 1996
3. Observed within park by adjacent landholder
4. Native Vegetation Retention Unit, Department of Environment, 5/10/84

Snakes		**Conservation status[1]**			**Source of records**			
Scientific name	**Common name**	**AUS[2]**	**SA[3]**	**SE[4]**	**1**	**2**	**3**	**4**
Notechis scutatus	Eastern Tiger Snake	-	-	-	1	2		4
Pseudechis porphyriacus	Red-bellied Black Snake						3	
Pseudonaja textilis	Eastern Brown Snake	-	-	-	1	2		4
Suta nigriceps	Mitchell's Short-tailed Snake	-	-	R	1	2		

Skinks		**Conservation status[1]**			**Source of records**			
Scientific name	**Common name**	**AUS[2]**	**SA[3]**	**SE[4]**	**1**	**2**	**3**	**4**
Bassiana duperreyi	Eastern Three-lined Skink	-	-	-	1	2		
Ctenotus robustus	Eastern Striped Skink	-	-	-		2	3	
Ctenotus uber	Spotted Ctenotus	-	-	-	1	2		
Hemiergis peronii	Four-toed Earless Skink	-	-	-	1	2	3	
Lampropholis delicata	Delicate Skink	-	-	-	1	2		
Lerista bougainvillii	Bougainville's Skink	-	-	-	1		3	
Morethia obscura	Mallee Snake-eye	-	-	-	1	2	3[5]	
Tiliqua scincoides	Eastern Bluetongue	-	-	-	1			4
Tiliqua rugosa	Sleepy Lizard	-	-	-	1	2		4

[1] AUS=Australian status, SA=South Australian status, SE=Status in South East C=common, U=Uncommon, R=Rare, V=Vulverable, E=Endangered,
[2] Endangered Species Protection Act 1992 Schedule 1 (26 May 1999 version)
[3] NPWSA (1999)
[4] Croft & Carpenter (1999)
[5] Recorded as *Morethia adelaidensis* but not verified; the fact that the more comprehensive NCSSA surveys observed numerous specimens of the more common *M. obscura* but not *M. adelaidensis*, while the NVRUnit survey only recorded *M. adelaidensis*, suggests that this was a misidentification. The nearest Museum record of *M. adelaidensis* is from Tilley Swamp, much nearer the coast (Helen Owens, pers. comm. 2000).

KEY: Source of records
1. NCS survey September 1995
2. NCS survey October 1996
3. Observed within park by adjacent landholder
4. Native Vegetation Retention Unit, Department of Environment, 5/10/84

Legless lizards		**Conservation status[1]**			**Source of records**		
Scientific name	**Common name**	**AUS[2]**	**SA[3]**	**SE[4]**	**1**	**2**	**3**
Aprasia striolata	Lined Worm-lizard	-	-	-	1	2	3
Pygopus lepidopodus	Common Scaly-foot	-	-	U	1	2	3

Dragons		**Conservation Status[1]**			**Source of records**		
Scientific name	**Common name**	**AUS[2]**	**SA[3]**	**SE[4]**	**1**	**2**	**4**
Amphibolurus norrisi	Mallee Tree-dragon	-	-	-	1		4[5]
Pogona barbata	Bearded Dragon	-	-	-	1	2	4

Others reptiles		**Conservation Status[1]**			**Source of records**	
Scientific name	**Common name**	**AUS[2]**	**SA[3]**	**SE[4]**	**1**	**3**
Varanus ?rosenbergi[6]	Rosenbergs Goanna	-	R	V		3
Chelodina longicollis	Long-necked Tortoise	-	-	-	1	

Frogs		**Conservation Status[1]**			**Source of records**		
Scientific name	**Common name**	**AUS[2]**	**SA[3]**	**SE[4]**	**1**	**2**	**4**
Crinia signifera	Brown Froglet	-	-	-	1		4
Limnodynastes dumerilii	Bull Frog	-	-	-	1	2	4
Limnodynastes ?tasmaniensis[7]	Spotted Grass Frog	-	-	-			4
Litoria ewingii	Brown Tree Frog	-	-	-	1		
Neobatrachus pictus	Painted Frog	-	-	-	1	2	4
Pseudophryne bibronii	Brown Toadlet				1		4

[1] AUS=Australian status, SA=South Australian status, SE=Status in South East C=common, U=Uncommon, R=Rare, V=Vulverable, E=Endangered,
[2] Endangered Species Protection Act 1992 Schedule 1 (26 May 1999 version)
[3] NPWSA (1999)
[4] Croft & Carpenter (1999)
[5] Misidentified as *Amphibolurus muricatus*, which does not occur in this area (Helen Owens, pers. comm. 2000).
[6] Recorded as *Varanus* sp., but probably *V. rosenbergi* as the more common *V. gouldi* does not occur as far south (Houston 1998; Helen Owens, pers. comm. 2000).
[7] Not confirmed and possibly misidentified immature *Limnodynastes dumerlii*; *L. tasmaniensis* has been previously recorded from the general area (Helen Owens, pers. comm. 2000) but was not recorded during the more detailed NCSSA surveys, although immature *L. dumerlii* were initially misidentified in the field, as this species.

Appendix 7

INDIGENOUS BIRD SPECIES RECORDS FROM GUM LAGOON CONSERVATION PARK AND FREQUENCIES OF SIGHTINGS DURING EACH SURVEY

Key to "Conservation Status"

AUS Australia-wide status according to Endangered Species Protection Act 1992 Schedule 1 (26 May 1999 version)
SA South Australia-wide status according to NPWSA (1999)
SE Status in the South East according to Carpenter & Reid (1999)
E Endangered
V Vulnerable
R Rare
U Uncommon
K Poorly known but suspected of being rare or threatened

Key to "Source of records"

1 H. & M. Possingham, visit to Gum Lagoon Conservation Park, 26-28/02/1982
2 H. & M. Possingham, visit to Gum Lagoon Conservation Park, October 1983
3 H. & M. Possingham, visit to Gum Lagoon Conservation Park, 16-19/12/1983
4 H. & M. Possingham, visit to Gum Lagoon Conservation Park, 14 18/08/1987
5 M. Possingham, visit to Gum Lagoon Conservation Park, 26-29/03/1992
6 M. Possingham, visit to Gum Lagoon Conservation Park, 27/08/1995
7 NCS survey, September /1995
8 M. Possingham, visit to Gum Lagoon Conservation Park, 29/11/1995
9 NCS survey, October 1996

		Conservation status			Source of records & no. observations								
Common name	**Species**	**AUS**	**SA**	**SE**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
ACANTHIZIDAE													
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*				48	25	64	92	36	4	76		17
Slender-billed Thornbill	*Acanthiza iredalei hedleyi*	K[1]	V	V		5	19	32					2
Striated Thornbill	*Acanthiza lineata*				44	4	46	101		7	78		12
Yellow Thornbill	*Acanthiza nana*			V									1
Brown Thornbill	*Acanthiza pusilla*				42	43	102	203	37	12	360	20	17
Buff-rumped Thornbill	*Acanthiza reguloides*				7	2	18	20	5	1	25	3	5
Shy Heathwren	*Calamanthus cautus*			U	1	2	7	2	4	3	100	10	7
Heathwren species	*Calamanthus* sp.				1		1						
White-browed Scrubwren	*Sericornis frontalis*			U	10	3	7	13	6	1	30	1	3
Weebill	*Smicrornis brevirostris*			U	12		13	20	16	3	26	3	5
ACCIPITRIDAE													
Collared Sparrowhawk	*Accipiter cirrhocephalus*			U	4		1	1			3		
Brown Goshawk	*Accipiter fasciatus*										6		1
Wedge-tailed Eagle	*Aquila audax*				4	2	4	4	4	1	22	2	4
Swamp Harrier	*Circus approximans*					1					9		2
Black-shouldered Kite	*Elanus axillaris*										1		
Little Eagle	*Hieraaetus morphnoides*								1				
ALCEDINIDAE													
Sacred Kingfisher	*Todiramphus sanctus*					3	5					2	
ANATIDAE													
Chestnut Teal	*Anas castanea*			U		5	17	13	6	2	89	4	8
Grey Teal	*Anas gracilis*					121	105	61	50	5	218	50	18
Australasian Shoveler	*Anas rhynchotis*		R	R		6	15	32	100	3	84	27	12

[1] Garnett (1992)

[1] Garnett (1992)

		Conservation status			Source of records & no. observations								
Common name	**Species**	**AUS**	**SA**	**SE**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Pacific Black Duck	*Anas superciliosa*					13	11	13		5	94	1	7
Hardhead	*Aythya australis*			U		9	12			3	219		
Musk Duck	*Biziura lobata*		R	U	1	2	1			2	3	1	6
Australian Wood Duck	*Chenonetta jubata*									1			
Black Swan	*Cygnus atratus*				7	4	6	2		3	22	7	11
Pink-eared Duck	*Malacorhynchus*					8					1		2
Blue-billed Duck	*Oxyura australis*		R	R		2	2						4
Freckled Duck	*Stictonetta naevosa*	R[1]	V	V		2	2						
Australian Shelduck	*Tadorna tadornoides*							6		1	13	15	3

[1] Garnett (1992)

ARDEIDAE													
Great (White) Egret	*Ardea alba*												3
White-necked Heron	*Ardea pacifica*			U		1	5					1	2
White-faced Heron	*Egretta novaehollandiae*				1	22	3	2	2		3	31	6
Nankeen Night Heron	*Nycticorax caledonicus*			U			1						
ARTAMIDAE													
Dusky Woodswallow	*Artamus cyanopterus*				24	3	12	41	2		49	8	8
Masked Woodswallow	*Artamus personatus*										20		
White-browed Woodswallow	*Artamus superciliosus*										10		
Grey Butcherbird	*Cracticus torquatus*			U	7	3	15	22	7	3	67	6	20
Australian Magpie	*Gymnorhina tibicen*				15	12	53	37	19	8	163	31	61
Grey Currawong	*Strepera versicolor*			U	30	7	16	34	12	5	77	7	10
CACATUIDAE													
Sulphur-crested Cockatoo	*Cacatua galerita*			U							21		
Galah	*Cacatua roseicapilla*				80	36	93	477	43	5	166	68	31
Little Corella	*Cacatua sanguinea*							2			19		

		Conservation status			Source of records & no. observations								
Common name	**Species**	**AUS**	**SA**	**SE**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Yellow-tailed Black-cockatoo	*Calyptorhynchus funereus*		V	V			3	75	12	1	24		
CAMPEPHAGIDAE													
White-winged Triller	*Lalage tricolor*						9				3		
CAPRIMULGIDAE													
Spotted Nightjar	*Eurostopodus argus*			V								1	
CASUARIIDAE													
Emu	*Dromaius novaehollandiae*				5	4	7	10	3	1	11	3	
CHARADRIIDAE													
Red-capped Plover	*Charadrius ruficapillus*					10						10	
Red-kneed Dotterel	*Erythrogonys cinctus*					2							
Black-fronted Dotterel	*Elseyornis melanops*					10		1	3		5		2
Masked Lapwing	*Vanellus miles*					73	2	12	1	3	45	6	11
Banded Lapwing	*Vanellus tricolor*										1		
COLUMBIDAE													
Crested Pigeon	*Ocyphaps lophotes*						2			1	1		
Common Bronzewing	*Phaps chalcoptera*				9	1	12	15	1	2	38	3	2
Brush Bronzewing	*Phaps elegans*				2	2	3	9	4	1	27	2	5
CORVIDAE													
Australian Raven	*Corvus coronoides*				26		42	31	7	2	14	4	9
Little Raven	*Corvus mellori*					4	14	2		2	28	1	11
CUCULIDAE													
Fan-tailed Cuckoo	*Cacomantis flabelliformis*					1		31	2	3	46		5
Horsfield's Bronze Cuckoo	*Chrysococcyx basalis*						4	22		1	50		7
Shining Bronze Cuckoo	*Chrysococcyx lucidus*		R	R							2		2

		Conservation status			Source of records & no. observations								
Common name	**Species**	**AUS**	**SA**	**SE**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
DICAEIDAE													
Mistletoebird	*Dicaeum hirundinaceum*							1			1		
DICRURIDAE													
Magpie-lark	*Grallina cyanoleuca*				9	8	6	4	1	4	38	5	12
Restless Flycather	*Myiagra inquieta*				11	1	15	2		2	6		2
Grey Fantail	*Rhipidura albiscapa*				41	11	40	26	43	9	187	11	26
Willie Wagtail	*Rhipidura leucophrys*				16	5	14	21	17	4	33	4	13
FALCONIDAE													
Brown Falcon	*Falco berigora*				4	2		1			3		
Nankeen Kestrel	*Falco cenchroides*				4	2	2	2			13		4
Australian Hobby	*Falco longipennis*			U							1		1
Black Falcon	*Falco subniger*			U							1		
HIRUNDINIDAE													
Welcome Swallow	*Hirundo neoxena*				8	54	36	31	16	6	56	54	21
Fairy Martin	*Petrochelidon ariel*												3
Tree Martin	*Petrochelidon nigricans*				29	48	95	227	57	2	87	40	20
LARIDAE													
Whiskered Tern	*Chlidonias hybridus*												6
Silver Gull	*Larus novaehollandiae*					29				1	21	1	1
MALURIDAE													
Superb Fairy-wren	*Malurus cyaneus*				134	131	230	90	46	5	649	46	51
Variegated Fairy-wren	*Malurus lamberti*			U	18	13	38	6		2	21		4
Southern Emu-wren	*Stipiturus malachurus*		R	R	4		2	7	4	2	27	1	
MEGAPODIIDAE													
Malleefowl	*Leipoa ocellata*	V	V	V	1	1	5	1	6	1	3		7

		Conservation status			Source of records & no. observations								
Common name	**Species**	**AUS**	**SA**	**SE**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
MELIPHAGIDAE													
Spiny-cheeked Honeyeater	*Acanthagenys rufogularis*				10	2	9	24		2	56	3	6
Red Wattlebird	*Anthochaera carunculata*				10	11	14	161	68	6	564	14	82
Little Wattlebird	*Anthochaera chrysoptera*			U	24	1	11	36	13	5	41		
White-fronted Chat	*Epthianura albifrons*				6	7	26	35		4	113	11	29
Tawny-crowned Honeyeater	*Gliciphila melanops*			U	2	1	27	79	13	6	292	2	22
Yellow-faced Honeyeater	*Lichenostomus chrysops*							31					
Purple-gaped Honeyeater	*Lichenostomus cratitius*			R		4	15	3		1	26		15
White-eared Honeyeater	*Lichenostomus leucotis*				2		20	6	4	1	33	2	7
White-plumed Honeyeater	*Lichenostomus pencillatus*				2	2	4	10		1	9	3	
Singing Honeyeater	*Lichenostomus virescens*							1			1		
Noisy Miner	*Manorina melanocephala*				1					2	22		1
Brown-headed Honeyeater	*Melithreptus brevirostris*				4	3	32	67	30	9	81	10	20
White-fronted Honeyeater	*Phylidonyris albifrons*			U						3	43	2	
New Holland Honeyeater	*Phylidonyris novaehollandiae*				234	26	129	503	110	5	147	89	146
MOTACILLIDAE													
Richard's Pipit	*Anthus novaeseelandiae*				3	7	10	25	16	2	61		2
NEOSITTIDAE													
Varied Sittella	*Daphoenositta chrysoptera*						5	33		1	19		
ORIOLIDAE													
Black-faced Cuckooshrike	*Coracina novaehollandiae*				4	6	7	9	5	4	29		7
PACHYCEPHALIDAE													
Grey Shrike-thrush	*Colluricincla harmonica*				7	9	26	51	15	8	138	20	33
Crested Shrike-tit	*Falcunculus frontatus*		V	V	1						1		
Crested Bellbird	*Oreoica gutturalis*			V			6	6	1	1	5		7

		Conservation status			Source of records & no. observations								
Common name	**Species**	**AUS**	**SA**	**SE**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Golden Whistler	*Pachycephala pectoralis*			U	17	14	29	33	10	7	158	14	36
Rufous Whistler	*Pachycephala rufiventris*			U			3		1		4	1	
Striated Fieldwren	*Calamanthus fuliginosus*				1		1						
PARDALOTIDAE													
Spotted Pardalote	*Pardalotus punctatus*			U	1		6	10	7	1	30	3	16
Striated Pardalote	*Pardalotus striatus*				4	9	28	82	14	2	35	8	17
PASSERIDAE													
Beautiful Firetail	*Stagonopleura bella*		R	R	2			3		1	6	1	5
PELECANIDAE													
Australian Pelican	*Pelecanus conspicillatus*						1						
PETROICIDAE													
Southern Scrub-robin	*Drymodes brunneopygia*			U	10	3	25	17	8	7	48	6	10
Eastern Yellow Robin	*Eopsaltria australis*			U	14	1	26	16	21		6	1	1
Hooded Robin	*Melanodryas cucullata*			U	1	4	2	6	1				
Jacky Winter	*Microeca fascinans*			U	6		5	11	1		10		5
Scarlet Robin	*Petroica multicolor*				2		3	4	3	3	4		2
PHALACROCORACIDAE													
Great Cormorant	*Phalacrocorax carbo*									1			
Little Pied Cormorant	*Phalacrocorax melanoleucos*												1
Pied Cormorant	*Phalacrocorax varius*							1					2
PODARGIDAE													
Tawny Frogmouth	*Podargus strigoides*										1		1
PODICIPEDIDAE													
Great Crested Grebe	*Podiceps cristatus*		R	R							1		2
Hoary-headed Grebe	*Poliocephalus poliocephalus*				5	19	11		8	3	76	12	12

		Conservation status			Source of records & no. observations								
Common name	**Species**	**AUS**	**SA**	**SE**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
POMATOSTOMIDAE													
White-browed Babbler	*Pomatostomus superciliosus*			U	62	6	68	36	33	5	224	15	34
PSITTACIDAE													
Ring-necked Parrot	*Barnardius zonarius barnardi*			U	55	5	66	185	75	5	115	11	25
Musk Lorikeet	*Glossopsitta concinna*										3		4
Purple-crowned Lorikeet	*Glossopsitta porphyrocephala*				24	3	16	422	10	9	224	15	11
Little Lorikeet	*Glossopsitta pusilla*		V	V						1			
Blue-winged Parrot	*Neophema chrysostoma*		V	V			2				8		
Elegant Parrot	*Neophema elegans*		K[1]	K				1			1		
Eastern Rosella	*Platycercus eximius*				11	13	19	38	11	4	116	6	14
Red-rumped Parrot	*Psephotus haematonotus*				9	39	44	240	34	6	172	14	23
RALLIDAE													
Eurasian Coot	*Fulica atra*				25	8	53	3	3	2	39	1	16
Dusky Moorhen	*Gallinula tenebrosa*												1
Black-tailed Native-hen	*Gallinula ventralis*				3					3	19	100	10
Purple Swamphen	*Porphyrio porphyrio*										2		
Australian Spotted Crake	*Porzana fluminea*												11
Baillon's Crake	*Porzana pusilla*		R	R							1		
Spotless Crake	*Porzana tabuensis*			U									1
RECURVIROSTRIDAE													
Banded Stilt	*Cladorhynchus leucocephalus*										2		
Black-winged Stilt	*Himantopus himantopus*					23				2	65	20	111
SCOLOPACIDAE													
Latham's Snipe	*Gallinago hardwickii*		V	V		5	1				1		
STRIGIDAE													

		Conservation status			Source of records & no. observations								
Common name	**Species**	**AUS**	**SA**	**SE**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Southern Boobook	*Ninox novaeseelandiae*						2		1		1	1	
SYLVIIDAE													
Clamorous Reed-Warbler	*Acrocephalus australis*					1					6		
Brown Songlark	*Cincloramphus cruralis*										3	1	
Rufous Songlark	*Cincloramphus mathewsi*										4		
Little Grassbird	*Megalurus gramineus*					1	6			1	7	1	2
THRESKIORNITHIDAE													
Yellow-billed Spoonbill	*Platalea flavipes*						7						
Australian White Ibis	*Threskiornis molucca*					2					76		
Straw-necked Ibis	*Threskiornis spinicollis*					9				1	105	12	36
ZOSTEROPIDAE													
Silvereye	*Zosterops lateralis*				59	16	93	124	14	7	238	14	14

[1] Carpenter & Reid (1999)

Appendix 8

EXOTIC BIRD SPECIES RECORDS FROM GUM LAGOON CONSERVATION PARK AND FREQUENCIES OF SIGHTINGS DURING EACH SURVEY

Key to "Source of records"

1 H. & M. Possingham, visit to Gum Lagoon Conservation Park, 26-28/02/1982
2 H. & M. Possingham, visit to Gum Lagoon Conservation Park, October 1983
3 H. & M. Possingham, visit to Gum Lagoon Conservation Park, 16-19/12/1983
4 H. & M. Possingham, visit to Gum Lagoon Conservation Park, 14 18/08/1987
5 M. Possingham, visit to Gum Lagoon Conservation Park, 26-29/03/1992
6 @27/08/1995
7 NCS survey, September /1995
8 @29/11/1995
9 NCS survey, October 1996

		Source of records & no. observations								
Common name	**Species**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Eurasian Skylark	**Alauda arvensis*		2	2	2		1	23		
Mallard	**Anas platyrhynchos*							2		
European Goldfinch	**Carduelis carduelis*	2		12	48			18	3	
Common Starling	**Sturnus vulgaris*	19	11	21	38	2	3	150	10	17
Common Blackbird	**Turdus merula*		2	1	1	1		1		

Appendix 9

VERTEBRATE SPECIES RECORDED FROM FAUNA SAMPLING SITES IN GUM LAGOON CONSERVATION PARK, FREQUENCIES OF SIGHTINGS AND FLORISTIC COMMUNITY GROUPS INWHICH THEY OCCUR

Key to "Floristic Community Id Numbers"

Floristic Community Group 1:	*Banksia ornata-Xanthorrhoea caespitosa-Leptospermum myrsinoides* Shrubland *Eucalyptus arenacea* Low (Open) Woodland *E. fasciculosa* Low Open Woodland *E. diversifolia* Open Mallee on sand
Floristic Community Group 2:	*Eucalyptus diversifolia* Low Mallee on calcrete
Floristic Community Group 3:	*Eucalyptus incrassata* (Open) Mallee *E. leucoxylon* Very Low Open Woodland
Floristic Community Group 4:	*Eucalyptus fasciculosa* Woodland
Floristic Community Group 5:	*Melaleuca lanceolata* Low Woodland & Tall Shrubland *Eucalyptus leucoxylon* ssp. *stephaniae* Low Woodland *E. wimmerensis* Open Mallee
Floristic Community Group 6:	*Eucalyptus camaldulensis* Open Forest
Floristic Community Group 7:	*Eucalyptus leucoxylon* Low Open Forest
Floristic Community Group 8:	*Melaleuca halmaturorum* Low Open Woodland & Tall Very Open Shrubland *Halosarcia indica* ssp. *leiostachya* Low Open Shrubland
Floristic Community Group 9:	*Schoenus nitens - Selliera radicans* Sedgeland/Herbland
Floristic Community Group 10:	*Melaleuca brevifolia* Open Shrubland & Low Shrubland *Eucalyptus camaldulensis* Woodland

Key to "Bird Habitat Id Numbers"

Habitat 1: Mallee

Habitat 2: *Melaleuca* Forest or Scrub

Habitat 3: Sand Heath

Habitat 4: Woodland

Habitat 5: Gum forest bordering a lagoon

Habitat 6: *Melaleuca* woodland bordering a lagoon

Habitat 7: *Gahnia* over water with mallee border

Habitat 8: Mallee over grass

		FLORISTIC COMMUNITY ID NUMBER																																					
		1															2			3			4			5			6	7		8			10				
	QUADRAT PATCH ID NUMBER	GL001001	GL004001	GL012001	GL016001	GL017001	GL018001	GL019001	GL022001	GL022201	GL023001	GL024001	GL025001	GL028001	GL031101	GL005001	GL021001	GL029001	GL033001	GL035001	GL039001	GL010001	GL038001	GL044001	GL036001	GL041101	GL042001	GL014001	GL030001	GL032001	GL002001	GL034001	GL037001	GL003001	GL006001	GL009001	GL011101
MAMMALS																																							
Cercartetus concinnus	Western Pygmy-possum								2	2	1	3		1	1		3	2						1					1	2									
Cercartetus lepidus	Little Pygmy-possum		1	2		1				1		1				1						1														1		
Vulpes vulpes	Fox																																		1	1		
Lepus capensis	Brown Hare	1																													1							
Oryctolagus cuniculus	Rabbit	1		1		1																													1			
Macropus fuliginosus	Western Grey Kangaroo															1																						
Macropus giganteus	Eastern Grey Kangaroo																																		1			
Pseudomys apodemoides	Silky Mouse	1	4	4	4	4	2	4	3	3	4	3		3		4	3	4	2			3					1									1	3	
Mus domesticus	House Mouse									1		1						1	3	1		1	1	1					2		1							
REPTILES																																							
Amphibolurus norrisi	Mallee Tree-Dragon		2				1	1								1																		1			
Pogona barbata	Eastern Bearded Dragon																														2					1		
Notechis scutatus	Eastern Tiger Snake								1																														
Pseudonaja textilis	Eastern Brown Snake																																	1				
Suta nigriceps	Mitchell's Short-tailed Snake																							1														
Aprasia striolata	Lined Worm-lizard	1	1																	1																		
Pygopus lepidopodus	Common Scaly-foot			1				1											1					1										1			
Bassiana duperreyi	Eastern Three-lined Skink			2			2	2	1	1	1	2						1				1							2									
Ctenotus robustus	Eastern Striped Skink														1																							
Ctenotus uber	Spotted Ctenotus		1					1											1																			
Hemiergis peronii	Four-toed Earless Skink		1				1		1		1				1					1						1					1					1		
Lampropholis delicata	Delicate Skink		1			1	1				2	2			1	1	1					1							1	1						1		
Lerista bougainvillii	Bougainville's Skink																																	1				
Morethia obscura	Mallee Snake-eye	3	1	2	2		3	2	2			1		1	1	1		1		2		3				1									2			2
Tiliqua rugosa	Sleepy Lizard																		1	1			1			1					1				1			1
Tiliqua scincoides	Eastern Bluetongue																			1																		
AMPHIBIANS																																							
Limnodynastes dumerili	Bull Frog			1	1	3	1	2	1		2	3		1	1			2		1		1		1			1		1							1		
Neobatrachus pictus	Painted Frog	1	1	3	2	1	2		1		1	1		1		3		1	1	2		3	2	2		2	1				1			2		2	1	
Pseudophryne bibroni	Brown Toadlet																																	1				1

FLORISTIC COMMUNITY ID NUMBER

		1													2			3			4			5			6	7		8			10			
QUADRAT PATCH ID NUMBER		GL0010001	GL0010041	GL0010121	GL0010161	GL0010181	GL0010191	GL0010201	GL0010221	GL0010231	GL0010241	GL0010251	GL0010281	GL0010313	GL0010051	GL0010211	GL0010291	GL0010331	GL0010351	GL0010391	GL0010381	GL0010381	GL0010401	GL0010361	GL0010411	GL0010421	GL0010141	GL0010301	GL0010321	GL0010021	GL0010341	GL0010371	GL0010031	GL0010061	GL0010011	GL0010111
BIRDS RECORDED FROM QUADRATS WHERE VEGETATION ANALYSED																																				
Acanthagenys rufogularis	Spiny-cheeked Honeyeater	2		1	1										2										1				1			5	1		1
Acanthiza chrysorrhoa	Yellow-rumped Thornbill																									2	2			3			2		1
Acanthiza iredalei hedleyi	Slender-billed Thornbill																									2									
Acanthiza lineata	Striated Thornbill		6	4	1	10															10	2				3	1	4						10	7
Acanthiza pusilla	Brown Thornbill		1	7	8	34	24	1	1				2		3		2			2	34	1	1	1					1	12			2	14	34	4
Acanthiza reguloides	Buff-rumped Thornbill						3																			2										1
**Alauda arvensis*	Eurasian Skylark																													2			4	1		
Anas castanea	Chestnut Teal																													2						2
Anas rhynchotis	Australasian Shoveler																		2																	
Anas superciliosa	Pacific Black Duck	1				2															2												2		2	2
Anthochaera carunculata	Red Wattlebird	31	14	3	19	25	19				1	4	2	5	14		2	12	2	1	25	1	1	2	2	7	2	1	4	5		1	14	7	25	3
Anthochaera chrysoptera	Little Wattlebird			1		1	1														1													1	
Anthus novaeseelandiae	Richard's Pipit	1													1													1		2				3	
Aquila audax	Wedge-tailed Eagle		2	1		1	2														1							1							1	1
Aquila audax	Wedge-tailed Eagle nest																					1														
Artamus cyanopterus	Dusky Woodswallow	1	7	2			1															1						7								4
Aythya australis	Hardhead			1																																
Barnardius zonarius barnardi	Ring-necked Parrot	2		1	3	6	1	2				1		3	3	2		3			6		2				1	3	2	4					6	9
Cacatua galerita	Sulphur-crested Cockatoo			16																																1
Cacatua roseicapilla	Galah	16	24	3	7	23	1		3	5	2			5	2	4					23	1			3	2		2		2				2	23	13
Cacatua sanguinea	Little Corella			11																														2		
Cacomantis flabelliformis	Fan-tailed Cuckoo		2	3	6	5									3						5					2	1		1				1	5	1
Calamanthus cautus	Shy Heathwren	8	7	2		6	2	1	1				1		3			2			6											3		6	7
Calyptorhynchus funereus	Yellow-tailed Black-cockatoo																																			6
**Carduelis carduelis*	European Goldfinch						2																													3
Chrysococcyx basalis	Horsfield's Bronze Cuckoo	6	3	2	2	2	2								1	1			1		2	2				1							2	2	2
Chrysococcyx lucidus	Shining Bronze Cuckoo																									2										
Circus approximans	Swamp Harrier			2																																1

FLORISTIC COMMUNITY ID NUMBER

		1													2			3			4			5			6	7		8			10			
QUADRAT PATCH ID NUMBER		GL0010011	GL0040011	GL0012011	GL0016011	GL0010011	GL0019011	GL0020011	GL0022011	GL0023011	GL0024011	GL0025011	GL0028011	GL0031011	GL0005011	GL0021011	GL0029011	GL0033011	GL0035011	GL0039011	GL0010011	GL0038011	GL0040011	GL0036011	GL0041011	GL0042011	GL0014011	GL0030011	GL0032011	GL0020011	GL0034011	GL0037011	GL0030011	GL0060011	GL0010011	GL0011011
BIRDS RECORDED FROM QUADRATS WHERE VEGETATION ANALYSED																																				
Colluricincla harmonica	Grey Shrike-thrush	1	2	4	3	4	3		4		2		3		6	1					4	3	1	1	3	5		3		1	1		11	6	4	17
Coracina novaehollandiae	Black-faced Cuckooshrike		8	1	1																				3	2				4						
Corvus coronoides	Australian Raven		1				3		1	1			1									1			1			1					1	1		2
Corvus mellori	Little Raven	2	1	1		1									1						1				5	1				3				4	1	5
Cracticus torquatus	Grey Butcherbird	1	1		2	1	1				2	2	2		1	1					1	2			2				3	6				1	1	7
Cygnus atratus	Black Swan		4	1																										1						
Daphoenositta chrysoptera	Varied Sittella		2																																	
Dromaius novaehollandiae	Emu		2		1																															
Drymodes brunneopygia	Southern Scrub-robin			4	1										1							1	2		3	2						1	1	1		5
Egretta novaehollandiae	White-faced Heron																													1						
Elanus axillaris	Black-shouldered Kite																																1			
Epthianura albifrons	White-fronted Chat			2														4	5										2	5			2	77		1
Erythrogonys cinctus	Red-kneed Dotterel																	1																		
Falco cenchroides	Nankeen Kestrel											1										2						1					2	1		
Falco longipennis	Australian Hobby																																			1
Fulica atra	Eurasian Coot																						1													
Gallinula tenebrosa	Dusky Moorhen																									1										
Gliciphila melanops	Tawny-crowned Honeyeater	6	5	7	15	9	4			7	2	5	1		25		1	3		1	9					1							16	14	9	9
Glossopsitta concinna	Musk Lorikeet																					4														
Glossopsitta porphyrocephala	Purple-crowned Lorikeet		5		1	24	5	3							4				2	3	24						3							24	
Grallina cyanoleuca	Magpie-lark	1		2																				1		2	2			4			1	3		1
Gymnorhina tibicen	Australian Magpie	3		1	3	3	2				2	2	2					2	1	2	3	1			2			1	3	58	1	2	1	4	3	2
Himantopus himantopus	Black-winged Stilt			5														38												1						
Hirundo neoxena	Welcome Swallow						1		2				2			2		1					1				2			1			2			2
Lalage tricolor	White-winged Triller			2																																1
Larus novaehollandiae	Silver Gull																									1				6				1		2
Leipoa ocellata	Malleefowl																		1						2											
Leipoa ocellata	Malleefowl mound								1			1																									

FLORISTIC COMMUNITY ID NUMBER

		1														2			3			4			5			6	7		8			10			
QUADRAT PATCH ID NUMBER		GL00101	GL00401	GL00121	GL00161	GL00101	GL00191	GL00201	GL00221	GL00231	GL00241	GL00251	GL00281	GL00311	GL00311	GL00501	GL00211	GL00291	GL00331	GL00351	GL00391	GL00101	GL00381	GL00401	GL00361	GL00411	GL00421	GL00141	GL00301	GL00321	GL00202	GL00341	GL00371	GL00301	GL00601	GL00101	GL00111
BIRDS RECORDED FROM QUADRATS WHERE VEGETATION ANALYSED																																					
Lichenostomus cratitius	Purple-gaped Honeyeater	1	1						1			1				8	2		9		1										1		12			
Lichenostomus leucotis	White-eared Honeyeater		2	2	1		1										1									4				1			2			
Malurus cyaneus	Superb Fairy-wren				5	10	5														3	10		4			4	4	10		21			21	10	9
Malurus lamberti	Variegated Fairy-wren		5			5	1									10						5							4						5	
Manorina melanocephala	Noisy Miner	13																																		1
Melithreptus brevirostris	Brown-headed Honeyeater		1	2						2						2		1						1		1	7	4	3					2	1		15
Microeca fascinans	Jacky Winter																											4									
Myiagra inquieta	Restless Flycather																										2										
Ninox novaeseelandiae	Southern Boobook			1																																	
Oreoica gutturalis	Crested Bellbird																		2				1				1				1						
Pachycephala pectoralis	Golden Whistler	3	10	3	4	10	4		2	1	1	1	1			3		1		1		10	4	1	3	3	5				2	2	2	4	2	10	18
Pardalotus punctatus	Spotted Pardalote	1	2		1		1	2	2								1			1						2	1	3		1					2		2
Pardalotus striatus	Striated Pardalote		2	1		1	1	1														1		1		5	1	1	3	1					1	3
Petrochelidon ariel	Fairy Martin												3																								
Petrochelidon nigricans	Tree Martin	3				1	1	5					1				6					1		1				7							1	4
Phaps chalcoptera	Common Bronzewing	1		1		1										2						1								1	1				1	1
Phaps elegans	Brush Bronzewing																												3	1		1			3
Phylidonyris albifrons	White-fronted Honeyeater	1														1																14	15		1
Phylidonyris novaehollandiae	New Holland Honeyeater	72	71	7	32	40	58	3	9	3	9	3	7	1		35	3	3	3	11	10	40	7	22		1	14		8	5				48	51	40	48
Platycercus eximius	Eastern Rosella	3	5		1	3	1									1						3		3			4	1			6				3	2
Pomatostomus superciliosus	White-browed Babbler		14	1	5									4										4	4		7	4	4					10			8
Psephotus haematonotus	Red-rumped Parrot	4	19	15	6	11	4	2								1	2					11					6	5			7					11	14
Rhipidura albiscapa	Grey Fantail	1	1	6	5	8	1						2							1		8	5	2	2	1	4	1	1				2			8	25
Rhipidura leucophrys	Willie Wagtail		1																					2		3	4	1	1								1
Sericornis frontalis	White-browed Scrubwren															2																	1				
Smicrornis brevirostris	Weebill															5													3								
Stagonopleura bella	Beautiful Firetail		1	2		1	1															1							3						1	1	
Stipiturus malachurus malachurus malachurus	Southern Emu-wren		1	6			1																											1	4		

FLORISTIC COMMUNITY ID NUMBER

		1													2			3			4			5			6	7		8			10			
QUADRAT		G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
PATCH		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
ID		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NUMBER		0	0	1	1	1	1	2	2	2	2	2	2	3	0	2	2	3	3	3	1	3	4	3	4	4	1	3	3	0	3	3	0	0	1	1
BIRDS RECORDED FROM QUADRATS WHERE VEGETATION ANALYSED		1	4	2	6	0	9	0	2	3	4	5	8	1	5	1	9	3	5	9	0	8	0	6	1	2	4	0	2	2	4	7	3	6	0	1
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
**Sturnus vulgaris*	Common Starling	5	13	6	9	9							1	1							9		1		5	9				8				2	9	3
Strepera versicolor	Grey Currawong	1			1	6				1	1			1	3						6				1				1	2	1			1	6	10
Tadorna tadornoides	Australian Shelduck																																	1		
Threskiornis molucca	Australian White Ibis		75	1																														1		
Threskiornis spinicollis	Straw-necked Ibis		75																							34										
Vanellus miles	Masked Lapwing	1	1															1							1					1			3	11		2
Vanellus tricolor	Banded Lapwing																																	1		
Zosterops lateralis	Silvereye	2	1	5		13	2		2						10						13	1		2		1		1		5				9	13	5

		BIRD HABITAT ID NUMBER																		
		1					2		3			4			5	6	7	8		
	QUADRAT	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	PATCH	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	ID	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BIRDS RECORDED FROM	**NUMBER**	0	5	5	6	4	0	4	1	5	5	5	5	4	5	5	5	4	4	5
QUADRATS WHERE		7	5	6	0	7	8	5	5	4	9	2	0	6	3	7	8	8	9	1
VEGETATION NOT		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANALYSED		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagenys rufogularis	Spiny-cheeked Honeyeater	1				2	9		1	1				2	2	1		3	7	4
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		1			1	1	3					4	1		5		8	12	
Acanthiza lineata	Striated Thornbill		2	3					4	4			3	2	5	6			4	
Acanthiza pusilla	Brown Thornbill	2	13	15	9	1	20	8	27	13	11	13	14	24	7	27	4	11	26	4
Acanthiza reguloides	Buff-rumped Thornbill										6		8	4					3	
Accipiter cirrhocephalus	Collared Sparrowhawk							1								1				
Accipiter fasciatus	Brown Goshawk	1							1	1					1					
**Alauda arvensis*	Eurasian Skylark					2	2	1					2	1					1	7
Anas castanea	Chestnut Teal						3	4	2					2	48	1				
Anas gracilis	Grey Teal							2	1						202	3				
Anas rhynchotis	Australasian Shoveler	2													21	2				
Anas superciliosa	Pacific Black Duck				6	3	3		1			1		2	25	24		1		
Anthochaera carunculata	Red Wattlebird	7	16	3	25	13	2	7	28	19	23	7	22	53	22	12	5	8	123	20
Anthochaera chrysoptera	Little Wattlebird								3	6			2		12	9			1	1
Anthus novaeseelandiae	Richard's Pipit				1	7								1			2	19		19
Aquila audax	Wedge-tailed Eagle								1	1			1		2	3	1	1		
Artamus cyanopterus	Dusky Woodswallow					2			2	2			17		2			2		
Artamus personatus	Masked Woodswallow																		20	
Artamus superciliosus	White-browed Woodswallow																		10	
Aythya australis	Hardhead														61					
Barnardius zonarius barnardi	Ring-necked Parrot			2		1	3		9	3	8	4	2	2	15	11		4	15	
Biziura lobata	Musk Duck														1	1				
Cacatua galerita	Sulphur-crested Cockatoo						1						1						1	
Cacatua roseicapilla	Galah		3	1		9	2	3	18	2	8	2	1	2	53	9	5	3	1	7
Cacatua sanguinea	Little Corella	1											2							
Cacomantis flabelliformis	Fan-tailed Cuckoo	1	2		1			1	2				1	2	2	7	1		2	1
Calamanthus cauta	Shy Heathwren		2	2	8	18	1		8	6	3	1		2	1		3	11	4	2
Calyptorhynchus funereus	Yellow-tailed Black-cockatoo								1	11					6					
**Carduelis carduelis*	European Goldfinch			3									7		1	2				
Charadrius ruficapillus	Red-capped Plover										10									
Chrysococcyx basalis	Horsfield's Bronze Cuckoo	1	3	1	1	2			2	1	1			4	1	1	3		1	1
Cincloramphus cruralis	Brown Songlark						3													
Cincloramphus mathewsi	Rufous Songlark																			4

		BIRD HABITAT ID NUMBER																		
		1					2		3			4			5	6	7	8		
	QUADRAT	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	PATCH	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	ID	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BIRDS RECORDED FROM	**NUMBER**	0	5	5	6	4	0	4	1	5	5	5	5	4	5	5	5	4	4	5
QUADRATS WHERE		7	5	6	0	7	8	5	5	4	9	2	0	6	3	7	8	8	9	1
VEGETATION NOT		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANALYSED		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Circus approximans	Swamp Harrier										1				1					
Colluricincla harmonica	Grey Shrike-thrush	2	3	1	6		17	6	6	4	5	5	7	6	5	1	3		2	2
Coracina novaehollandiae	Black-faced Cuckooshrike			1	1			3			2				6					
Corvus coronoides	Australian Raven						4							1	1	1			1	
Corvus mellori	Little Raven				3	5	4													2
Cracticus torquatus	Grey Butcherbird		5	2		7	2	1	5	1	4		6	5		1	1	1	5	1
Cygnus atratus	Black Swan						1	3							11	1				
Daphoenositta chrysoptera	Varied Sittella								7							2				
Dromaius novaehollandiae	Emu							1		1										
Drymodes brunneopygia	Southern Scrub-robin				2		1	1	13	5	2	1		1	1	1	3		2	
Egretta novaehollandiae	White-faced Heron										10		1		1					
Eopsaltria australis	Eastern Yellow Robin								3							1				
Epthianura albifrons	White-fronted Chat	2	1				2	1			5			2			8	11		6
Erythrogonys cinctus	Red-kneed Dotterel										14									
Eurostopodus argus	Spotted Nightjar										1									
Falco berigora	Brown Falcon												1							
Falco cenchroides	Nankeen Kestrel											1					1	1	2	
Fulica atra	Eurasian Coot														25	3				
Glossopsitta concinna	Musk Lorikeet													1					2	
Glossopsitta porphyrocephala	Purple-crowned Lorikeet		4	7		7			45	25	5		10	10	13	28	1	5	16	3
Glossopsitta pusilla	Little Lorikeet																			
Grallina cyanoleuca	Magpie-lark					1	6	3					5	1						
Gymnorhina tibicen	Australian Magpie		1		8	2	21	3		5	19		10	12	5			1	9	7
Himantopus himantopus	Black-winged Stilt							9												
Hirundo neoxena	Welcome Swallow								1	1	20				15	7			10	
Lalage tricolor	White-winged Triller					5		1	13	4					31	30				
Lalage tricolor	White-winged Triller																			
Larus novaehollandiae	Silver Gull	2					2	4								1				
Leipoa ocellata	Malleefowl		1																	
Lichenostomus cratitius	Purple-gaped Honeyeater				4															
Lichenostomus leucotis	White-eared Honeyeater						2	2								2	4		1	10
Lichenostomus pencillatus	White-plumed Honeyeater	3																		
Malurus cyaneus	Superb Fairy-wren	10		9	6	15	57	15	5	14	19	19	53	85	24	30	15	45	66	75
Manorina melanocephala	Noisy Miner												1							
Megalurus gramineus	Little Grassbird																		1	

		BIRD HABITAT ID NUMBER																		
		1					2		3			4			5	6	7	8		
	QUADRAT	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	PATCH	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	ID	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BIRDS RECORDED FROM	**NUMBER**	0	5	5	6	4	0	4	1	5	5	5	5	4	5	5	5	4	4	5
QUADRATS WHERE		7	5	6	0	7	8	5	5	4	9	2	0	6	3	7	8	8	9	1
VEGETATION NOT		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANALYSED		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melithreptus brevirostris	Brown-headed Honeyeater	9		3	1	4			5	2	7		3	7	5	3	2		9	
Neophema chrysostoma	Blue-winged Parrot						1					5					1			1
Neophema elegans	Elegant Parrot																1			
Ninox novaeseelandiae	Southern Boobook										1									
Oreoica gutturalis	Crested Bellbird							1										2		
Pachycephala pectoralis	Golden Whistler	3	6	7	9	5	4	3	11	5	4	3		2	11	6	5	1	6	
Pachycephala rufiventris	Rufous Whistler														1	1				
Pardalotus punctatus	Spotted Pardalote	2		1					1	1	5		2	2	1				1	1
Pardalotus striatus	Striated Pardalote								4	1			2		3	7			1	
Petroica multicolor	Scarlet Robin							1								2				
Phaps chalcoptera	Common Bronzewing		2		5	3	2	1		2	1		2	7	1			1	6	
Phaps elegans	Brush Bronzewing			2		1			1	1	1		1	8		1	2	1	1	1
Phylidonyris albifrons	White-fronted Honeyeater	5					2											1		
Phylidonyris novaehollandiae	New Holland Honeyeater	21	60	53	70	120	1	1	79	73	81	24	35	129	53	67	25	28	144	6
Platalea flavipes	Yellow-billed Spoonbill	4	17	11	18	19		1	1	6	10	8	4	7			29	15	14	16
Platycercus eximius	Eastern Rosella			1	6	9	3	2	9		2		6	4	16	2		1	12	3
Podiceps cristatus	Great Crested Grebe													1	1					
Poliocephalus poliocephalus	Hoary-headed Grebe														28					
Pomatostomus superciliosus	White-browed Babbler	10					14	10	29	20	16		15	10	1	12		7	18	
Porphyrio porphyrio	Purple Swamphen														2					
Psephotus haematonotus	Red-rumped Parrot			1	2	2	2		6	6	2		3	4	16	9		2	15	
Rhipidura albiscapa	Grey Fantail	7	1	2	1		4	7	17	7	3		14		25	21				2
Rhipidura leucophrys	Willie Wagtail						8				1		6		7	2				
Sericornis frontalis	White-browed Scrubwren	1	1		1		1			1		2	2			7	1		1	
Smicrornis brevirostris	Weebill				1								2	5	2	1			5	3
Stagonopleura bella	Beautiful Firetail													1						
Stipiturus malachurus	Southern Emu-wren	1	1	2		2		1			3				1		2			
**Sturnus vulgaris*	Common Starling	1			2	10	1		14	3	10	2	4	6	13	5	3	3	10	5
Strepera versicolor	Grey Currawong		1	1	7	2	2	3	4	3	1	1	1	3	3		3	1	12	4
Tadorna tadornoides	Australian Shelduck					4									3	2				
Threskiornis spinicollis	Straw-necked Ibis								2						30					
Todiramphus sanctus	Sacred Kingfisher														1					
**Turdus merula*	Common Blackbird														1					
Vanellus miles	Masked Lapwing	1				1	4	3					2	1	2				6	
Vanellus tricolor	Banded Lapwing																			

		BIRD HABITAT ID NUMBER																		
		1					2		3			4			5	6	7	8		
	QUADRAT	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	PATCH	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	ID	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BIRDS RECORDED FROM	**NUMBER**	0	5	5	6	4	0	4	1	5	5	5	5	4	5	5	5	4	4	5
QUADRATS WHERE		7	5	6	0	7	8	5	5	4	9	2	0	6	3	7	8	8	9	1
VEGETATION NOT		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANALYSED		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zosterops lateralis	Silvereye	8	3	9	1		9	21	18	7	15	8	7	24	15	13	7		24	1