

Winninowie Conservation Park Management Plan

North Region

South Australia



June 2000



**Department for
Environment and Heritage**
Government of South Australia



This plan of management has been prepared and adopted in pursuance of section 38 of the *National Parks and Wildlife Act 1972*.



Government of South Australia

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Department for Environment and Heritage

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Cover Photo: Winninowie Conservation Park and Spencer Gulf from Mt Grainger by Peter D Canty. Reproduced with his permission

Foreword

The proclamation of Winninowie Conservation Park in 1990 was recognition of its biological and ecological importance. It is a coastal area located between Pt Augusta and Pt Pirie that has unique physical and biological conditions including large tidal range and extremes of water temperature. It supports mangrove, samphire and sea-grass communities, with many species having sub-tropical affiliations making this area unique in southern Australia. The Yatala Harbor Aquatic Reserve overlaps a portion of Winninowie Conservation Park.

The reserve is best known by the local community and surrounds the small holiday town of Miranda, but visitors from further afield are increasing. It is used for recreational fishing, crabbing, nature study (especially bird watching) and by local school groups.

Winninowie Conservation Park is one of a number of reserves for which staff of the North Region of the Department for Environment and Heritage is responsible and includes remnant natural habitat of high biodiversity value, and some fauna and flora species of conservation significance. The plan establishes a number of objectives to conserve the physical and biological values of the unique inter-tidal zone by reducing and managing threats to the reserve, including human impacts.

I have adopted the plan in accordance with Section 38 of the National Parks and Wildlife Act 1972 after considering all representations and advice presented to me, and fully support the management direction proposed for Winninowie Conservation Park. I urge you to read the plan, and visit and enjoy the park.



The Hon. IAIN FREDERICK EVANS, BAppSc (Building Technology), MP

MINISTER FOR ENVIRONMENT AND HERITAGE
MINISTER FOR RECREATION, SPORT AND RACING

Acknowledgments

Sonia Croft, contract planner produced the draft plan. Tim Croft assisted with field assessment work, particularly in collecting flora information. The work of J. D. Reilly in compiling background information is acknowledged. Tom Gerschwitz provided logistic support, input and guidance for the “management framework”. Pearce Dougherty, and Alex McDonald of DEH provided critical comments. Kathleen Smith and Sandy Carruthers, Geographic Analysis and Research Unit, Department for Housing and Urban Development, assisted with the production of maps for the plan. Kerry Steinberner, Jenny Bourne, Stuart Beinke and John Watkins prepared the final plan with assistance from Jo Spencer and Benita Richter.

Abbreviations

The following abbreviations are used in this document:

BP Before Present

DEH: Department for Environment and Heritage (Note: this Department incorporates what is known as the “National Parks and Wildlife SA” and is responsible for managing *National Parks and Wildlife Act, 1972* reserves - including Winninowie Conservation Park).

PIRSA Department for Primary Industries and Resources SA

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Planning Process

This management plan for Winninowie Conservation Park has been prepared in accordance with the *National Parks and Wildlife Act 1972*.

Section 38 of the Act states that a management plan is required for each reserve (or park) and should “set forth proposals” in relation to the management and improvement of the reserve and the methods by which it is aimed to accomplish the objectives of the Act in relation to the reserve.

Upon completion of a draft plan an announcement is made in the Government Gazette and the plan is placed on public exhibition for three months. During this period any interested person may make submissions which are then referred, with the draft plan, to the Reserves Advisory Committee for their comments and suggestions.

Three submissions were received on the draft Winninowie Conservation Park Management Plan. These submissions provided comment on the policy on shacks, release of rehabilitated animals, pest animal control procedures, a proposed board-walk, provision of interpretation about Yatala Harbor and impacts of oils spill. Corrections and additions to biological and technical information were also provided.

The Minister, after considering all representations and advice, may then adopt the management plan with or without alterations. Notice of such official adoption is published in the Government Gazette and copies of the final plan are made available for sale to the public.

Once a plan of management is adopted, its provisions must be carried out in relation to the reserve in question, and no operations undertaken unless they are in accordance with the plan. The Act, however, makes provision for amending the adopted plan, and this process, involving a period of public consultation, is similar to the one described above.

Although dedicated in 1990, no previous management plan has been prepared for this reserve. This plan outlines proposals to conserve the cultural and natural values of the reserve, while providing for public use.

Those readers who have an interest in obtaining more detailed information on the natural and cultural resources of Winninowie Conservation Park can contact either the North Region Office of National Parks and Wildlife SA at Port Augusta, or the Southern Flinders District Office at Mount Remarkable National Park. Staff based at these offices are responsible for maintaining reserve records and hold resource information that can be accessed by the general public.

Enquiries in the first instance should be directed to:

District Ranger Southern Flinders
Department for Environment and Heritage
PMB 7
Mambray Creek via PT PIRIE SA 5540
Telephone (08) 8634 7068 Fax (08) 8634 7085

1 Synopsis

This is the first management plan to be prepared for Winninowie Conservation Park.

Management responsibility

This reserve is in the care and control of the District Ranger, Southern Flinders District within North Region, National Parks and Wildlife SA.

Location

Winninowie Conservation Park is located on the east coast of Upper Spencer Gulf within 50km of the two main regional centres, Port Augusta and Port Pirie, as well as near the small coastal settlement of Miranda sited on the reserve's coastal boundary (refer Figure 1). The reserve covers an area of 7,847 hectares with around 95 percent of its area subject to tidal inundation.

Proclamation

The reserve was proclaimed a Conservation Park in 1990 to conserve excellent examples of several coastal and marine ecosystems with sub-tropical affiliations in a temperate environment. These include significant stands of the grey mangrove, *Avicennia marina* var. *resinifera*, seagrass and samphire salt marsh communities, and which collectively, comprise the majority of the reserve's 7,847 hectares. Its large tidal range and extremes of water temperature make this area unique in southern Australia.

Major Uses

The reserve is predominantly used for recreational fishing, crabbing, nature study (especially bird watching) and by local school groups. Although mainly attracting the attention of the local community, an increasing number of day visitors based at nearby National Parks and Conservation Parks, are "discovering" the reserve. Future management of the reserve will provide facilities to cater for low impact, passive recreational activities of visitors, which are in keeping with the need to protect natural features of the reserve.

The management plan highlights the need for

- conservation of the unique inter-tidal coastal zone
- reducing and managing threats, including human impacts, to the biological and physical integrity of the reserve
- implementing a zoning plan

2 Background to the Reserve

The background resource information about Winninowie Conservation Park contained within this plan is intended to provide the reader with an overview of the reserve values and to assist in understanding the management proposals.

Resource information about the reserve's flora, fauna, geology and soils can be found in the publications cited in the References to this Plan.

2.1 Location

Winninowie Conservation Park is located on the east coast of Upper Spencer Gulf within 50km of the two main regional centers, Port Augusta and Port Pirie. The small coastal shack settlement of Miranda is surrounded on three sides by the reserve and the coast on the fourth side (refer Figure 1). The reserve covers an area of 7,847 hectares, comprising Sections 11, 71-105, 134, 138, 152, 201, 202, 206, 210, 217 and 219, Hundred of Winninowie, County of Frome, and allotments 303, 306 and 307 of Deposited Plan Number 22473.

The reserve is managed by staff located at Mambray Creek within the Mount Remarkable National Park (South Flinders Ranges), approximately 15 km south east of Winninowie Conservation Park. The reserve adjoins 28km of coastline, including the Yatala Harbor Aquatic Reserve (refer Figure 2). The inter-tidal zone of the Yatala Harbor Aquatic Reserve is an area of joint jurisdiction between Primary Industries and Resources South Australia (PIRSA), and the Department for Environment and Heritage (DEH). The Blanche Harbor Aquatic Reserve extends from the west coast of Spencer Gulf to within 2 kms of Redcliff Point.

The reserve conserves ecosystems and wildlife species of State and National significance. The reserve has high value to the regional community with many residents having a strong sense of local "ownership" and affiliations with the reserve. It is not widely known of outside the local region

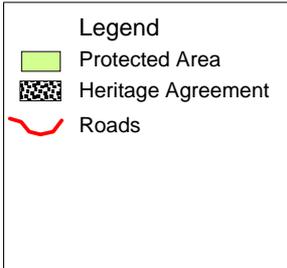


Figure 1

**Winninowie Conservation Park
Location Map**

This map designed and created by
Park Systems using PAMS.
Date: March 2000



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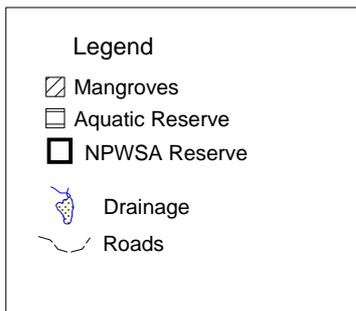
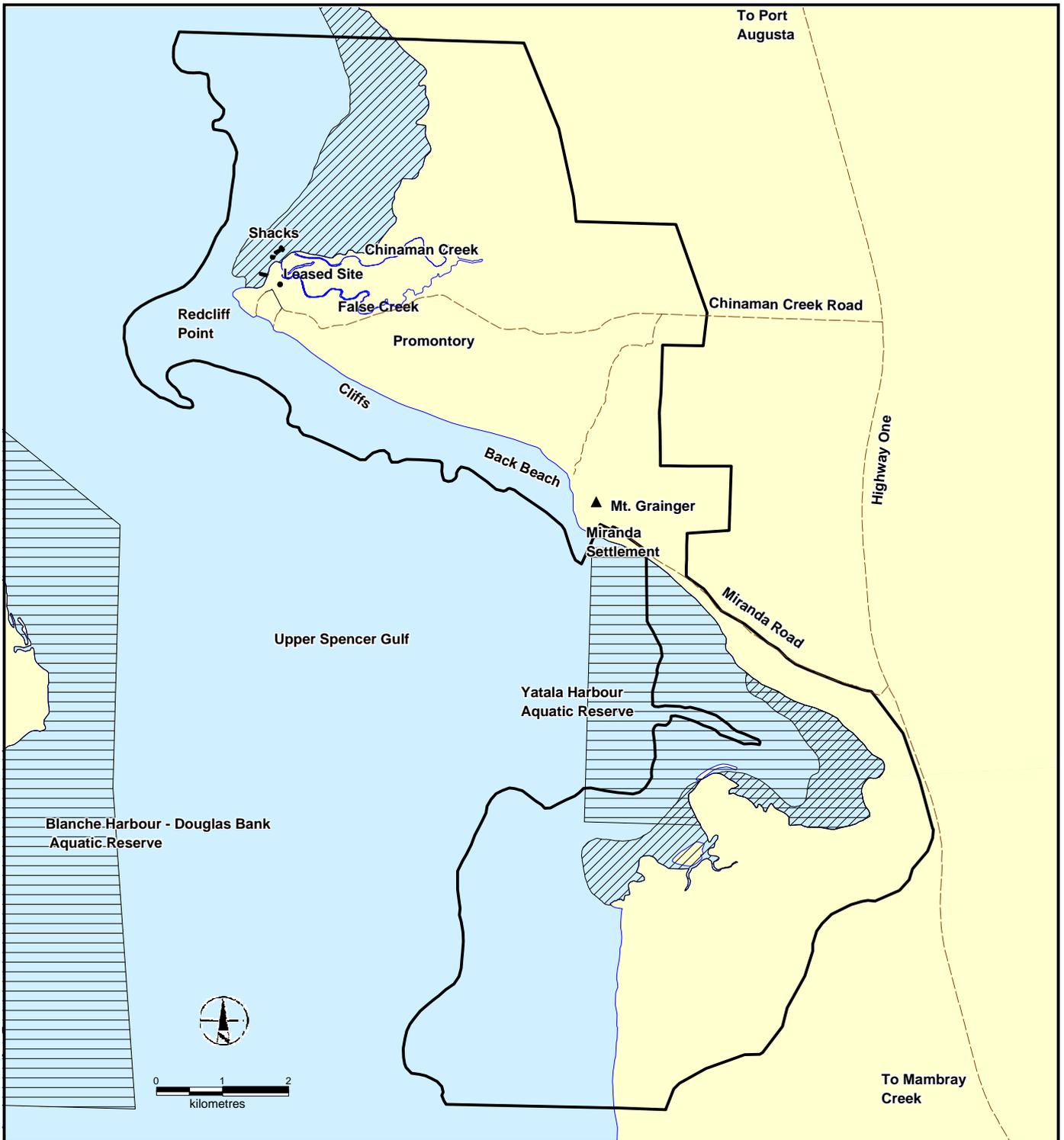


Figure 2
Winninowie Conservation Park
Reserve Features

This map designed and created by
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 Date: March 2000

2.2 Reserve Proclamation

In December 1973, the South Australian Government acquired approximately 60 hectares of freehold land, including a residence at Chinaman Creek. This land passed into the control of the then, State Planning Authority, for the purpose of constructing the proposed Redcliff Petrochemical Complex. From 1971 to the early 1980's several companies expressed interest in building a petrochemical plant at Redcliff. This site is now within the reserve. It was considered suitable for a petrochemical complex because of its proximity to: raw materials and hydrocarbon feedstocks; a regional centre; road and rail services; available flat land suitable for construction and to act as a buffer zone; and it was the closest deep water to a natural gas source at Cooper Basin (Dow Chemical (Australia) Ltd, 1980). During this time The State Planning Authority acquired a total of 2,050 ha for the project.

Environmental impact studies and associated scientific investigations between 1974 and 1980 revealed not only the environmental significance of the proposed site, but also the dangers to the ecology of the region, of such a development. By 1981, the Proponent Company, and the State Government were facing major opposition from the media, academics and conservationists over environmental issues related to the proposed plant and in 1982/3, the proposal for a petrochemical complex at Redcliff was abandoned.

The site acquired for the project (2,050 hectares) remained under State Planning Authority control until this department became part of the new S.A. Department for Environment and Planning (DEP), in 1983. The S.A. National Parks and Wildlife Service as part of the DEP was technically responsible for the site from 1983 onwards. Interest was expressed in having the area dedicated as a reserve under the *National Parks and Wildlife Act, 1972* and active management of the site began in December 1985, including road-works and shack removal (Reilly, 1991).

Moves were made to expand the proposed reserve, incorporating Crown Land to the south around the coastline of Yatala Harbor. The vegetation of the eastern most portion of the original site had been altered by agricultural use and was exchanged for mallee and acacia scrub on the eastern boundary. In March 1990 the site, by this stage comprising 4,318 ha, was dedicated as a Conservation Park. The reserve area was subsequently increased further to its present 7,847 hectares when the reserve's western boundary was extended from high water mark to low water mark.

2.3 Natural Features

Climate

The climate is semi-arid with hot dry summers and cool winters. The average annual rainfall varies from 250mm in the north of the reserve to 300mm in the south. Most rain falls during April to October, although heavy falls can also occur in late summer.

January's average temperature is 25°C and average daily maximum is 30°C. The average July temperature is 12°C and average daily minimum is 8°C. The sea moderates daily temperature extremes in both summer and winter, and frosts are uncommon in the reserve (Reilly, 1991).

Wind pattern is strongly influenced by the Gulf and surrounding topography. The presence of the South Flinders Ranges on the eastern side of the Gulf and the Simmens Plateau on the western side, funnel prevailing winds in a predominantly north-south direction in winter, and a south-north direction in summer. Conditions are generally calmer in winter than summer probably due to the more intensive heating and cooling of the land in summer (Chittleborough, Maschmedt and Wood, 1974). Strong afternoon sea breezes, in particular, are common between September and February.

Geology and Landform

Landform

Winninowie Conservation Park includes 28km of Upper Spencer Gulf coastline and most of the reserve is low-lying coastal plain. The reserve is characterised by a system of tidal creeks, bordered by mangrove woodland extending into low lying playa lakes and samphire communities. Around 95 percent of the reserve is subject to tidal inundation during king tides.

Geology

Northern Spencer Gulf, including Winninowie Conservation Park, occupies an elongate depression between two major geological provinces, the Adelaide Geosyncline (the Flinders Ranges) to the east and the Stuart Shelf (the Simmens Plateau) to the west. Rocks on both side are Precambrian in age (greater than 540 million years BP). They are folded and faulted within the Flinders Ranges but are essentially flat on the western side of the Gulf. The Precambrian bedrock forms an irregular surface beneath the Gulf and is exposed in places such as Mt. Grainger (Gostin, Hails and Belperio, 1984). Mt Grainger, 64m above sea level is the highest point within the reserve. It is geologically similar to the other coastal "monadnocks" along this section of coast and comprises thinly bedded quartzite flanked by thin red sand overlying calccrete. A monadnock is an isolated remnant of hard rock remaining distinctly above its surroundings in the late stages of an erosion cycle (Dow Chemical (Australia) Limited, 1980).

Elsewhere, over 200 metres of Cainozoic (less than 65 million years BP) sediments have been deposited over the Precambrian bedrock, and hence underlies the coastal plains (including the reserve) and the Gulf. These comprise mainly fluvial and alluvial fan sediments shed from the Ranges on both sides of the Gulf. As seen at the red cliffs south of Chinaman Creek, the latest (Pleistocene) cycle of alluvial sediments are exposed. The cliff sediments include mottled clays with sand and gravel, some fossil soil horizons and crystalline gypsum. Wind blown quartz sand and clay pellet lunette deposits are associated with the alluvial sediments, indicating aridity and dune building episodes (Gostin *et al.*, 1984).

Quaternary (less than 1.8 million years BP) oscillations of sea level resulted in a number of marine transgressions and regressions into northern Spencer Gulf, resulting in alternations of marine and alluvial sediments in the sub-surface of the gulf. Marine strata from these transgressions do not outcrop within the reserve but occur beneath the sea floor where they have been studied by submarine coring and seismic reflection profiling techniques (Belperio, 1995).

The Holocene sea flooded the northern Gulf and reached present level about 6,600 years ago. Much of the reserve area was then under several metres of water with the coast up to 5km further inland than its present position. Shell beds and large rounded quartzite boulders at the base of Mt Grainger indicate sea level was up to 4m higher than at present (Belperio, Hails, Gostin and Polach, 1984). Peritidal sedimentation began at this time with the vertical accumulation of sediments in shallow seagrass

meadows. Bioclastic sediment accumulated rapidly creating bioclastic seagrass beds. This has been the most important sedimentary process that has occurred in Northern Spencer Gulf, there being a 60% decrease in the sub-tidal area of the Gulf since the initial Holocene inundation.

Sea level gradually fell from 6,600 years BP to the present as a result of isostatic uplift of the northern Gulf (Belperio, 1995). As the sea level fell, wide tidal flats (intertidal and supratidal areas) evolved on the surface of the seagrass banks (Harbison and Wiltshire, 1993). The wide tidal flats created ideal conditions for colonisation by intertidal mangrove woodlands and samphire flats about 1,400 years ago, and for continued progradation of the coastline seawards. Old mangrove stumps can now be excavated several kilometres inland from where they grow today. Today, the mud-flats are dissected by a network of small tidal creeks and a number of major ones (eg Chinaman Creek). Erosion of the red alluvial cliffs together with north-westward longshore drift created a series of sand spits at Redcliff Point.

Longshore drift has also been responsible for the very uniform southern coastline of Redcliff Point (ie the northern coastline of Yatala Harbor) and the fan ridges between the elevated tree covered promontory and Mt Grainger. These ridges are formed mainly of shells and aggraded to a few metres above sea level (Chittleborough *et al.*, 1974).

Seismology

The reserve lies within one of the most active seismic zone in Australia (Hiern *et al.*, 1973 cited in Chittleborough *et al.*, 1974). Numerous earth tremors (up to two a week) have been recorded at the Chinaman Creek Seismic station.

Water Resources

There are no permanent surface streams in the reserve, all drainage being ephemeral and subject at times to high flows of short duration following thunderstorm activity.

Ground water occurs at depth, in a confined aquifer beneath the reserve. Salinities range from approximately 1,000 to 30,000 ppm with general increase in salinity from the recharge area of the Lower Flinders Ranges out to the coast. Yields of 100 to 500 kilolitres per day can be expected (Dow Chemical (Australia) Limited, 1980).

Soils

Soils are either absent or only poorly developed over much of the reserve, namely on the coastal marine sediments of salt marshes mud flats and shell ridges. These sediments contain highly saline gypseous "flour," gypseous clay and silty clay, and shell fragments, respectively.

True soil cover is confined to: the woodland promontory near Chinaman Creek (red sands over clay and gypsum); Mt Grainger (red sand over calcrete); and a narrow strip between the eastern reserve boundary and the western edge of the alluvial plain - roughly delineated as that land above the 10m contour line.

The alluvial plain consists of recent deposits of red/brown sandy loams and clay loams with gravel lenses. Thin and poorly developed calcretes are present locally. The alluvial plain also contains red aeolian dunes, blown out in places (Chittleborough *et al.*, 1974).

In general, the soils and sediment deposits increase in salinity towards the coast. Soils of the alluvial plain are largely non-sodic and alkaline with highly saline sub-surface horizons (Chinnock, 1974).

Chittleborough *et al.*, (1974) recognised nine land units (areas of similar landform, stratigraphy, soil and vegetation) in the area now forming the reserve.

Soil Erosion

The following areas within the reserve are affected by soil erosion:

- the coastal cliff on the southern edge of the promontory; erosion possibly initiated by past sheep grazing;
- south-eastern face of Mt Grainger and low sand dunes flanking Mt Grainger; erosion due to off-road recreational vehicle activity, compounded by rabbit activity;
- dune areas to the north of Mt Grainger and areas of blow-outs at the extreme north-eastern boundary of the reserve; wind erosion has been exacerbated by wind and rabbit activity (Reilly, 1991).

Vegetation

The reserve is characterised by a system of tidal creeks, bordered by mangrove woodland extending into low lying playa lakes and samphire communities. Further inland, vegetation grades into mallee, saltbush and bluebush communities. The reserve conserves a high diversity of coastal flora including several rare and vulnerable plants. The marine flora within the reserve has State and National conservation values, including sub-tropical relict communities. Northern Spencer Gulf has the largest area of mangrove, samphire and seagrasses in South Australia, of which Winninowie Conservation Park conserves a significant area. In recognition of being a nationally important wetland, the Upper Spencer Gulf mangrove system (which includes the mangroves within Winninowie Conservation Park) is listed on the “*Directory of Important Wetlands In Australia.*”

The reserve’s vegetation displays a considerable range of variation, often over short distances. Over 230 indigenous plant species (FNS, 1970s,a), 13 bryophytes (mosses and liverworts) and 12 lichens have been recorded within the reserve. Fifteen plant associations are recognised within the reserve (Chinnock, 1974; Croft and Croft, field survey, 1995). Figure 3 shows the vegetation associations. These are strongly influenced by landforms and soils/sediment deposits. Considerable interest has been taken in the vegetation of the coastal monadnocks on the eastern side of Upper Spencer Gulf (Mt Grainger, Mt Gullet, Mt Mambray and Mt Ferguson). Mt Grainger is considered to have the highest conservation value of the four monadnocks, as it has the highest floristic diversity and is least disturbed (Chinnock, 1980a). In addition, the reserve conserves mangrove, samphire and seagrass communities of State and National conservation value (Harbison and Wiltshire, 1993).

Marine Vegetation Associations

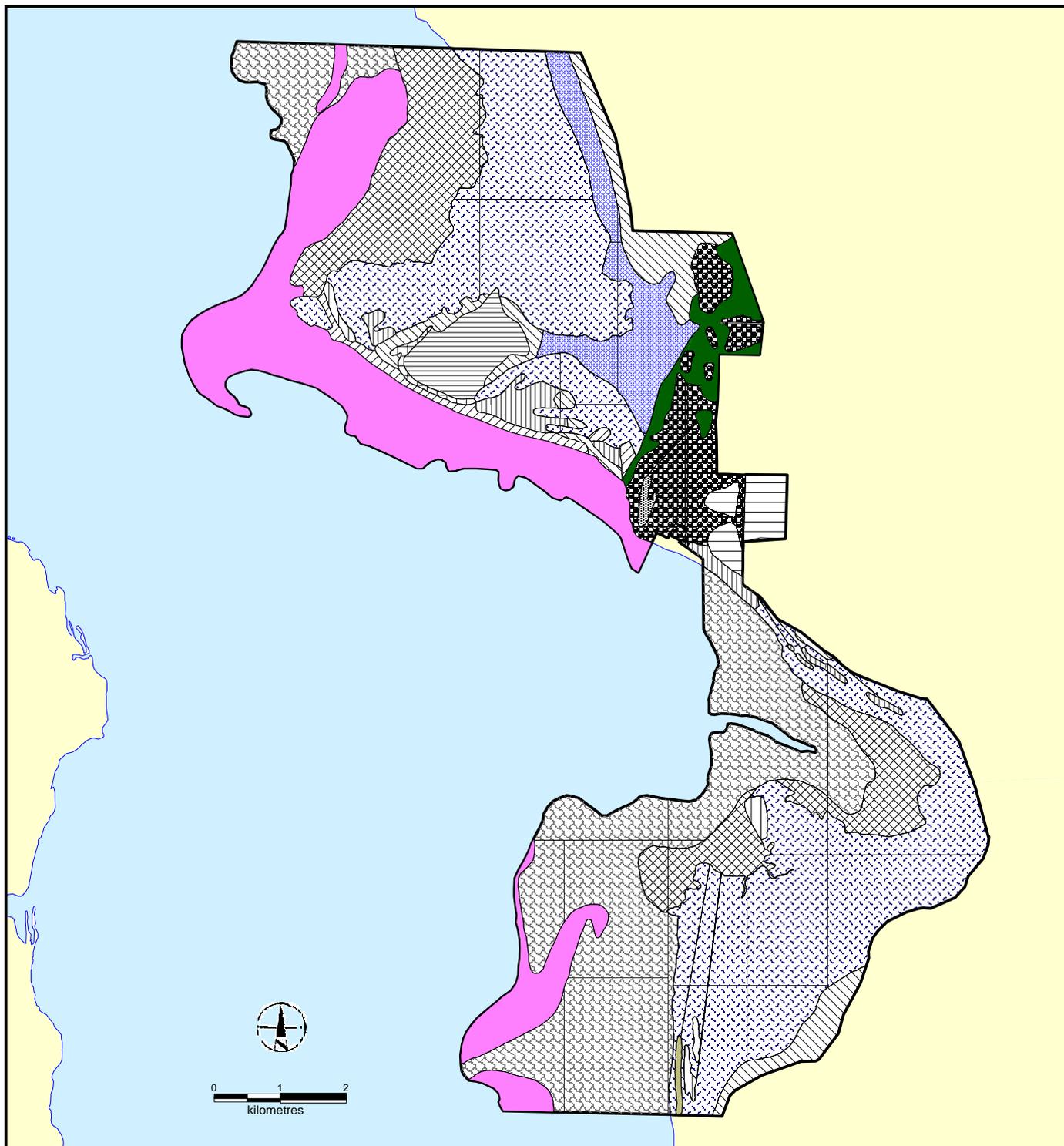
1. *Avicennia marina* var. *resinifera* (Grey mangrove) low woodland.

On intertidal mud flats and tidal creeks.

The *Avicennia marina* var. *resinifera* low woodland at Chinaman Creek within the reserve is a large undisturbed stand of mangroves. This area of mangroves is intersected by over 60 kms of tidal creeks, the largest of which is Chinaman Creek. Since 1980 there appears to be significant regeneration and colonisation within, and to the southern edge, of the low woodland. An extensive stand of mangroves also borders the eastern and southern shoreline of the Yatala Harbor Section of the reserve. These mangroves are contained within, and adjoin, the Yatala Harbor Aquatic Reserve (dedicated 1983). In Yatala Harbor several conditions of mangrove woodland occur (colonising, die-back and extinct).

2. *Zostera mucronata* - *Posidonia australis* (Seagrass) closed herbland.

The shallow (less than 10m) subtidal and lower intertidal regions of Northern Spencer Gulf are dominated by extensive seagrass communities. These, along with mangrove and samphire communities are considered to be the most important ecological features of Northern Spencer Gulf (Harbison and Wiltshire, 1993). Within the reserve the extensive seagrass beds extend into the Gulf for a considerable distance (Chinnock, 1974). The seagrass communities are a primary source of organic matter, stabilise sediments and are important habitat for fish and crustaceans. In addition to their high ecological value, the seagrass banks are important as they contain a record of sea level changes (refer Geology and Landforms, above).



Legend
Vegetation Associations

- Acacia ligulata* Tall closed shrubland
- Acacia ligulata* Tall shrubland
- Atriplex paludosa* + others Open shrubland
- Atriplex vesicaria* Low shrubland
- Atriplex vesicaria* + others Open shrubland
- Avicennia marina* var *resinifera* Low woodland
- Eremophila alternifolia* Shrubland
- Eucalyptus socialis* + others Tree mallee
- Halosarcia halocnemoides* + Low open shrubland
- Maireana pyramidata* Open shrubland
- Myoporum insulare* Tall shrubland
- Myoporum platycarpum* Low open woodland
- Olearia axillaris* + others Tall shrubland
- Sand/Ocean
- Sclerostegia tenuis* + others Low open shrubland
- Zostera mucronata* + others Closed herbland

Figure 3

**Winninowie Conservation Park
Vegetation Associations**

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Terrestrial Vegetation Associations

3. *Halosarcia halocnemoides* - *H. leiostachya* (Samphire) low open shrubland.

On extratidal low mud flats.

Numerous low shrubs and ephemerals occur in this zone including *Sarcocornia* species. Tidal inundation occurs over the low-lying parts twice daily, while high areas are flooded two to three times per fortnight (Reilly, 1991). This association is also associated with the cyanobacteria/algal mats constructed by a number of species of blue-green algae.

4. *Sclerostegia tenuis* (Slender glasswort) - ***Halosarcia* spp.** (Samphire) low open shrubland.

On supratidal transitional soils between the upper mudflats and the alluvial plain.

In good rainfall years a high number and abundance of ephemerals and chenopods are present. A number of gypseous mounds occur in this zone and several species are restricted solely to these mounds including *Malococera gracilis*, *Osteocarpum diptercarpum*, and *Scerolaena divaricata* (pale poverty –bush).

5. *Atriplex paludosa* (Marsh saltbush) - ***Nitraria billardierei*** (Nitre bush) open shrubland.

On supratidal upper mud flats.

Halosarcia spp. are dominant in depressions.

6. *Olearia axillaris* (Coast daisy bush) - ***Pittosporum phylliraeoides* var. *microcarpa*** (Native apricot) - ***Geijera linearifolia*** (Sheep bush) +/- ***Alectryon oleifolius* ssp. *canescens*** (Bullock bush) +/- ***Melaleuca lanceolata*** (Dryland teatree) tall shrubland.

On shell ridges.

Common understorey species include *Atriplex vesicaria*, *Olearia pimeleoides* (showy daisy-bush), *Stipa* (spear grass) spp., *Zygophyllum aurantiacum* (shrubby twinleaf) and *Tetragonia implexicoma* (bower spinach). The sandy shell ridges to the south-east of Miranda are also covered in *Melaleuca lanceolata* ssp *lanceolata*, a feature absent from the shell ridges in the Chinaman Creek section of the reserve.

7. *Acacia ligulata* (Umbrella bush) tall shrubland.

A small, but well-defined bank of *Acacia ligulata* occurs on the low sand dune running SE from the Chinaman Creek settlement to near the cliffs on the southern edge of the promontory.

Succulent species are common in the understorey. This association also occurs on shell ridges in the Yatala Harbor section of the reserve.

8. *Myoporum insulare* (Common boobialla) tall shrubland occurs on the coastal sand dune adjacent to Yatala Harbor.

9. *Atriplex vesicaria* (Bladder saltbush) low shrubland.

On supratidal upper mud flats (surrounding the promontory and in the NE section of the reserve).

Although few other perennial shrubs are present, this association is rich with ephemerals, and lichens and bryophytes are also prominent. Previous extensive grazing along the coast surrounding Yatala Harbor has resulted in the invasion of *Maireana brevifolia* (yanga bush) into this association.

10. *Atriplex vesicaria* (Bladder saltbush) - ***Maireana* spp.** (Bluebush) - ***Lycium australe*** (Australian boxthorn) open shrubland.

Occupies a small area of low (10m) red coastal cliffs at the southern edge of the promontory.

This association contains several species not found elsewhere in the reserve, including *Cratystylis conocephala* (bluebush daisy) and *Alyxia buxifolia* (sea box).

11. *Myoporum platycarpum* (False sandalwood) low open woodland.

Covers the promontory to the SE of Redcliff Point.

Acacia papyrocarpa (western myall) is common towards the north eastern end of the reserve (the SE limit of the distribution of this species) while *Casuarina pauper* (black oak) is common along the coast above the 10m red cliff. The understorey is dominated by chenopods, and in particular, *Maireana pyramidata* (black bluebush).

12. *Maireana pyramidata* (Black bluebush) open shrubland.

Occupies a narrow irregular band, bordering the mallee vegetation association.

13. *Eucalyptus socialis* (Beaked red mallee) - *Eucalyptus oleosa* (Red mallee) - *Eucalyptus gracilis* (Yorrell) tree mallee.

Dominates most of Mt Grainger, occurring on red sand, and also extends north across sand dunes onto the alluvial plain. The rocky western slopes of Mount Grainger are covered in shrub mallee (less than 3 metres tall). A small stand of tree mallee exists on the northern side of the Chinaman Creek access road.

The understorey of this association is much more varied on Mt Grainger than the mallee areas north, on the plain.

14. *Eremophila alternifolia* (Narrow-leaved fuchsia bush) shrubland occurs.

On the rocky quartzite upper, western slopes of Mt Grainger.

15. *Acacia ligulata* (Umbrella bush) tall closed shrubland.

This association occupies previously cropped farmland to the east of Mt Grainger, and is characterised by a low native species diversity.

Plant Species of Conservation Significance

The coastal flora of the reserve is best represented by the Eyre Peninsula botanical region and is considered part of that region. However it is located close to the boundaries of a number of botanical regions and the vegetation in the higher areas of the reserve, not subject to tidal inundation, may be more closely represented by a the Flinders Ranges botanical region. Species of conservation significance that have been recorded within Winninowie Conservation Park are shown in Table 1. None of the species shown in Table 1 are listed under the Commonwealth *Endangered Species Protection Act 1992* as endangered or vulnerable.

Table 1: Flora of conservation significance in Winninowie Conservation Park. (Lang & Kraehenbuehl, 2000; FNS, 1970sb; Murfet & Denzel, 1998; Croft & Croft, 1995; Chinnock, 1980b)

Scientific Name	Common Name	Conservation Rating			
		Aus	SA	EP	FR
<i>Acacia victoriae</i> ssp. <i>victoriae</i>	Elegant wattle			U	
<i>Alyxia buxifolia</i>	Sea box				R
<i>Atriplex spongiosa</i>	Pop saltbush				R
<i>Brachycome leptocarpa</i>	Small hairy daisy		U	R	U
<i>Calandrinia volubilis</i>	Twining purslane	2Va	U	U	
<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Round leaf pigface				R
<i>Elachanthus glaber</i>	Shiny elachanth	3R-	K	K	*
<i>Elachanthus pusillus</i>	Elachanth		U	R	R
<i>Eragrostis dielsii</i> var. <i>dielsii</i>	Mulka grass			K	
<i>Eucalyptus leptophylla</i>	Narrow-leaf red mallee				R
<i>Eucalyptus oleosa</i>	Red mallee				R
<i>Halosarcia halocnemoides</i> ssp. <i>halocnemoides</i>	Grey samphire			U	*
<i>Halosarcia lepidosperma</i>			Q	Q	*
<i>Maireana appressa</i>	Pale-fruit bluebush			U	
<i>Malacocera gracilis</i>	Slender soft-horns	3K-	K	K	*
<i>Millotia perpusilla</i>	Tiny bow flower				R
<i>Olearia calcarea</i>	Crinkle-leaf daisy bush		U	U	K
<i>Orobancha cernua</i> var. <i>australiana</i>	Australian broomrape		U	V	*
<i>Osteocarpum saluginosum</i>	Inland bonefruit			V	R
<i>Poa crassicaudex</i>	Thick-stem tussock grass			U	
<i>Radyera farragei</i>	Desert rose mallow			U	R
<i>Ranunculus pentandrus</i> var. <i>platycarpus</i>	Smooth buttercup			K	R
<i>Santalum spicatum</i>	Sandalwood		K	K	V
<i>Sarcocornia quinqueflora</i>	Beaded samphire				Q
<i>Sarcozona bicarinata</i>	Ridged noon-flower	3K-	K	K	*
<i>Sclerolaena brachyptera</i>	Short-wing bindyi			U	
<i>Sclerolaena divaricata</i>	Tangled bindyi				R
<i>Sclerolaena ventricosa</i>	Salt bindyi				R
<i>Stipa platychaeta</i>	Flat-awn spear-grass				R
<i>Stipa puberula</i>	Small rusty spear-grass		R	K	*

Key

Aus	Australia
SA	South Australia
EP	Eyre Peninsula Botanical Region
FR	Flinders Ranges Botanical Region
Blank space	Common species of no conservation significance in this botanical region
*	Species that does not occur in this region
U	Uncommon
R	Rare
K	Uncertain, but likely to be at least rare
V	Vulnerable
Q	Not yet assessed but flagged as being of possible significance
2	Species with a restricted distribution and with a maximum range less than 100km
3	Species with a range of at least 100km but occurring in only small populations (often highly restricted and localized habitats)
a	Adequately reserved with at least 1000 plants known to occur in reserves
-	Unknown number of plants occurring in reserves

Fauna

Birds (Avifauna)

124 species of birds (some unconfirmed) are recorded for the reserve. The following factors contribute to the high diversity of bird species recorded in the reserve, several of which are considered nationally vulnerable or endangered:

- the reserve is located in a transitional climatic region between semi-arid/arid and temperate zones;
- the reserve adjoins a marine ecosystem with tropical, sub-tropical and temperate characteristics, providing a diversity of habitats and conditions;
- the wide range of vegetation associations within the reserve provide a variety of habitats and food sources;
- in years of high rainfall in the interior, migratory marine birds use the north/south configuration of Spencer Gulf as a wetland corridor (Reilly, 1991)

Birds of particular conservation significance recorded in the reserve are eastern curlew, elegant parrot, slender-billed thornbill, Australian bustard, rock parrot, osprey, white-bellied sea eagle, calamanthus, chirruping wedgebill and spotted nightjar (Matheson, 1976 and Matthew, pers. comm. 1995). In 1992, a single observation of the orange-bellied parrot was recorded in the reserve, a species not previously recorded for the region (SAOA, 1992). Other notable species include red-capped plovers, pied and sooty oystercatchers and the migratory wader species curlew sandpiper, greenshank, red-necked stint and sharp-tailed sandpiper. There is also a significant Pied Cormorant rookery amongst the mangroves.

Reptiles and Amphibians

32 species of reptiles are recorded for the reserve with 11 others likely to occur. None of the species known to occur in the reserve are rare and restricted in distribution. However, Ehmann *et al.*, (1975) considered that the local populations of four species recorded in the reserve - the spiny-tailed gecko, *Strophurus intermedius*, the mallee worm-lizard, *Aprasia inaurita*, and two skinks, *Lerista edwardsae* and *Lerista terdigitata* - could be seriously affected by habitat disturbance. Another species likely to occur in the reserve, the samphire slender blue-tongue, *Cyclodomorphus venustus*, is highly restricted and is considered rare or insufficiently known (Ehmann pers. com. 2000). The herpetofauna of the reserve may have been depleted by feral and domestic cats and fluctuating populations of foxes (Reilly, 1991).

Common reptile species in the reserve include the sleepy lizard, *Tiliqua rugosa*, the painted dragon, *Pogona pictus*; the saltbush morethia skink, *Morethia adalaidensis*; the south-eastern morethia skink, *Morethia boulengeri*; the verigated dtella, *Gehyra verigata*; Bynoe's prickly gecko, *Heteronotia binoei*; and the southern robust slider, *Lerista picturata* (Ehmann *et al.*, 1975; Ehmann & Tyler, 1995)

Although no amphibians have been recorded within the reserve, *Neobatrachus pictus* (Painted Trilling Frog) or *N. centralis* (Desert Trilling Frog) are likely to occur in the reserve's several freshwater soaks.

Terrestrial Mammals

Historically, the coastal plain on the eastern side of Upper Spencer Gulf supported a rich variety and abundance of native mammals. Bone fragments found from earlier Aboriginal campsites within the reserve include those from the brush-tailed bettong, *Bettongia penicillata*, burrowing bettong, *Bettongia lesueur*, southern hairy-nosed wombat, *Lasiorhinus latifrons* and the tammar wallaby, *Macropus eugenii*. However European settlement, directly or indirectly, has severely impoverished native mammal populations all along the Spencer Gulf coastal plain, including Winninowie Conservation Park (South Australian Museum, cited in Dow Chemical (Australia) Limited, 1980).

Ten native mammal species have been recorded within the reserve, namely:

- Euro, *Macropus robustus* are distributed throughout the reserve;
- Red kangaroo, *Macropus rufus* mainly occupy the area north-east and east of Mt Grainger;
- Western grey kangaroo, *Macropus fuliginosus*. the population appears to fluctuate;
- Fat-tailed dunnart, *Sminthopsis crassicaudata*;
- Common dunnart, *Sminthopsis dolichura*;
- Mitchell's hopping mouse, *Notomys mitchelli*;
- Gould's wattled bat, *Chalinolobus gouldii*;

- Little Mastiff-bat, *Mormopterus planiceps*,
- Lesser long-eared bat, *Nyctophilus geoffroyi* (large populations occupy the mangrove wetlands north of Chinaman Creek);
- Echidna, *Tachyglossus aculeatus*: one individual only recorded (on western slopes on Mt Grainger in 1990).

Marine Fauna

The mangrove, seagrass and samphire communities within Winninowie Conservation Park and the Upper Spencer Gulf in general, support a great diversity and abundance of fauna. These include microorganisms, isopods, amphipods, polychaetes and molluscs that in turn support a great diversity and abundance of fish and crustacean species (Harbison and Wiltshire, 1993). These communities are also an important spawning and nursery area for numerous species of crustacean, molluscs and scale fish, many of which are of commercial importance. Many of the principal commercial species occur as juveniles in the tidal creeks around Chinaman Creek and Yatala Harbor, including large numbers of juvenile Western King Prawns at certain times of the year. King George Whiting and Garfish appear to have a strong dependence on the shallow seagrass meadows and mangroves for at least the juvenile stage of their life cycles (Reilly, 1991). To protect species of commercial importance, parts of Upper Spencer Gulf have been declared aquatic reserves. These aquatic reserves allow fish such as King George Whiting, Yellow Fin Whiting, Blue Swimmer Crabs and Western King Prawns to mature and breed within an area undisturbed by fishing. The Yatala Harbor Aquatic Reserve adjoins the reserve's coastline, south of Mt Grainger (refer figure 2).

At least 11 species of crustaceans (mainly crab and prawn species) and four cephalopod species (southern calamari, tiger squid, cuttlefish and blue-ringed octopus) occur in the reserve's tidal creeks and intertidal zone.

Bryde's whale, *Balaenoptera edeni*, pygmy sperm whale, *Kogia breviceps*, and the strap-toothed whale, *Mesoplodon layardii* have been sighted in Upper Spencer Gulf.

Other marine fauna recorded in waters adjacent to the reserve include the hawksbill turtle, *Eretmochelys imbricata*, Australian sea lion, *Neophoca cinereus*, common dolphin, *Delphinus delphis* and bottlenose dolphins, *Tursiops truncatus*. On several occasions small pods of dolphins have been observed at the mouth of Chinaman Creek.

Introduced Plants and Animals

The major pest plant within the reserve is African boxthorn, *Lycium ferocissimum*. An ongoing eradication programme began in 1987. Other pest plant species in the reserve include Wards Weed, *Carrichtera annua*, Salvation Jane, *Echium plantagineum*, Horehound, *Marrubium vulgare*, Tree Tobacco, *Nicotiana glauca* and Onion Weed, *Asphodelus fistulosus*.

A small outbreak (2-3 plants) of bridal creeper, *Myrsiphyllum asparagoides*, on the coastal cliffs of Mt Grainger, was controlled in September 1995. The reserve also has isolated “garden escapes” including cactus species. These are being controlled and monitored.

The primary introduced pest animal species in the reserve are the European rabbit, *Oryctolagus cuniculus*, the fox, *Vulpes vulpes* and the feral cat, *Felis catus*. Rabbits have caused significant damage to native vegetation in the past. Rabbit calicivirus disease has been effective in reducing the impact of rabbits since 1996 but no additional control has occurred since to severely reduce the population.

Conservation Values

Winninowie Conservation Park conserves a terrestrial-marine transition zone, characterized by a system of tidal creeks bordered by mangrove forest extending into low lying salt lakes and samphire communities. 95% of the area is subject to inundation by sea-water. Further inland, vegetation grades into a mallee and salt bush communities.

The coastal biodiversity of Winninowie Conservation Park is considered to be comparatively low in species richness, but high in species that are either relicts, endemic to the area or have tropical affinities (Edyvane, 1999). The marine ecology has evolved in response to the relatively unusual conditions including high salinities, large tidal range, wide temperature ranges, low wave energy and low surface fresh water inflow compared with the majority of South Australia's coast (Harbison and Wiltshire, 1993).

The Upper Spencer Gulf Mangrove System has been included in the Directory of Important Wetlands in Australia (Australian Nature Conservation Agency, 1996) which lists wetlands considered to be nationally important. The grey mangroves (*Avicennia marina*) in Winninowie Conservation Park are considered to be among the largest undisturbed stands remaining in South Australia.

The mangrove sediments supply abundant nutrients to blue-green algae, which form algal mats. These algal mats help bind the silt and clay particles together stabilizing sediments which reduces turbidity and contributes to a continuous advancement of the shoreline (progradation) with the mangrove community growing seaward. The mangroves on the western edge of Redcliff Point reduce sea currents and hence, erosion. The mangrove, algal mat, seagrass and samphire communities are important primary producers and are a major nutrient pool for Upper Spencer Gulf (Harbison and Wiltshire, 1993). They also provide feeding, nursery and breeding grounds for a variety of fish, crustacean and bird species.

The Winninowie Conservation Park (NPWSA) and Yatala Harbor Aquatic Reserves (PIRSA) overlap. They occur in the Winninowie biunit of the North Spencer Gulf bioregion (15% of the coastline and 3% of the area is currently conserved (ref. Table 2)) as described by the *Interim Marine and Coastal Regionalisation for Australia (IMCRA)* (Thackway and Cresswell, 1998; Edyvane, 1999).

The terrestrial portion of the park occurs in the transition zone between two bioregions the Flinders and Olary Ranges (10.2% conserved in 11 parks), and Eyre and Yorke Block bioregion (8.9% conserved in 64 parks), as described by the *Interim Biogeographic Regionalisation of Australia (IBRA)* (Thackway and Cresswell, 1995b). The park falls in the broad grouping of the Eyre Botanical Region based on the composition of vegetation associations (defined by the South Australia Herbarium).

The Arden Environmental Association is a unit of the Flinders and Olary Ranges bioregion. It extends from Winninowie Conservation Park to the base of the Flinders Ranges, north to 30 kilometers south of Lake Torrens, and around the top of Spencer Gulf. It is characterized by plains with sand dunes and numerous lakes along the overflow course of Lake Torrens, and samphire or mangrove flats along the coastline. There is a cover of low chenopod shrubland and low open woodland with a chenopod shrub understorey used extensively for livestock grazing (Laut *et al.*, 1977). The only portion (3.5%) of Arden Environmental Association conserved occurs in Winninowie Conservation Park (ref Table 2).

The Glendella Environmental Association is a unit of the Eyre and Yorke Block bioregion. It extends from Winninowie Conservation Park to the base of the Flinders Ranges and south to Crystal Brook. It is characterized by coalescing alluvial fans, extending from low hills onto a narrow sandy plain with tidal flats on the coastal margin. There is a grassland and low shrubland cover on the plains, and mallee on the fans. The fans and plains are used for rotation cereal cultivation and livestock grazing and the hills for livestock grazing only (Laut *et.al*, 1977). 3.6% of Glendella Environmental Association is conserved in 3 reserves, 2.8% in Winninowie Conservation Park (ref Table 2).

Other significant attributes of Winninowie Conservation Park include a Geological Site at Red Cliff Point, which is listed on the State Heritage Register.

Winninowie Conservation Park is classed as an IUCN (World Conservation Union) Category 1a: Strict Nature Reserve: *an area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring*

Table 2 Conservation status of habitats occurring in Winninowie Conservation Park (Summary current as at March 2000).

Terrestrial Ecosystem classification							
IBRA ^a	Environ. Association ^b	Total Area (approx) (ha)	% uncleared vegetation*	Number of Heritage Agreements	Area (ha) conserved in Heritage Agreements	Area (ha) conserved by NPWSA	% Area conserved by NPWSA
<i>Flinders and Olary Ranges</i>		7 741 160	91.2	3	532	789 565	10.2
	<i>Arden</i>	80 190	70.5	0	0	2877	3.5
<i>Eyre and Yorke Block</i>		6 093 000	33.4	306	246,000	543 413	8.9
	<i>Glendella</i>	46 460	10.0	2	94	1 685	3.6

Marine Ecosystem Classification		Current Conservation by NPWSA & PIRSA		
IMCRA ^c	Coast line length	% Coast conserved	Area (ha)	% Area conserved
<i>Northern Spencer Gulf</i>	680 km	15.1	4 447 93.9	2.8

Ecosystem classifications

- a) Interim Biogeographic Regions of Australia (IBRA), Thackway and Creswell (1995a)
- b) Environmental Associations from Environments of South Australia, Laut et al (1977)
- c) Interim Marine and Coastal Regionalisation for Australia (IMCRA), Thackway and Cresswell (1998)

* Original area of this vegetation is not known because of vegetation clearance and/or incomplete mapping.

2.4 Cultural Features

Aboriginal

Winninowie Conservation Park is located in a region once occupied by the Nukunu whose territory stretched from Port Augusta and Quorn in the north along the coastal plain and western slopes of the ranges to Crystal Brook in the south (Reilly, 1991). However, the Pangkala group whose territory was situated on the western side of the Gulf and north of Port Augusta regularly visited the area (Ross and Jeffery, 1975).

The first European to sight the area was Matthew Flinders when he sailed up Spencer Gulf in 1802. Although Flinders caught no glimpse of the inhabitants, he found extensive signs of native occupation. Early explorers, including Edward John Eyre, and pioneers who entered the area in 1839 recorded little of the Aboriginal languages, beliefs or way of life.

Four Aboriginal campsites have been located within the reserve and a further 10 campsites have been recorded in the reserve's near vicinity (Ross and Jeffrey, 1975). The sites are believed to have been of recent origin; several worked glass artefacts suggest these sites were used after European settlement. The remains of Aboriginal cooking fires were present on the sites, when surveyed in 1974, including scattered skeletal remains of emu, bettong, kangaroo and wombat (Ross and Jeffrey, 1974).

A wide range of Aboriginal artefacts including "well-worked" implements was also recorded. These implements and flakes consisted of chert, chalcedony, agate, quartz (including a utilised quartz crystal) and quartzite. Quartz crystals are usually associated with healing or ceremonial rituals. These materials are foreign to the immediate vicinity of the sites, either having been brought in or traded for implement construction. Samples of the implement material are held by the South Australian Museum and also by the Redcliff Petrochemical Company.

Although no human skeletal or other remains have been discovered at the sites, it is possible such evidence may be exposed in future (Ross and Jeffrey, 1974). There is little evidence of burials or any other prolonged or permanent usage of the sites, which is more likely to have occurred nearer the creeks and waterholes of the Flinders Ranges. Fresh water supplies were and are still available from three sources: permanent springs along the western face of the South Flinders Range, freshwater soaks which rise around the coastline of Redcliff Point, and shallow sub-surface aquifers.

Further information on mythology and significance of the area for the Nukunu people is being sought.

Aboriginal Nomenclature

It is thought that the termination "-owie" in various place names throughout the region was widely used by the Aboriginal inhabitants, referring in general to a watering place. The reserve is contained within the Hundred of Winninowie and that was probably the name conferred on the area by the Nukunu.

Non-Aboriginal

Settlement of the coastal plain between the South Flinders Ranges and Upper Spencer Gulf (on which the reserve is sited) was associated not with pastoralism, but as a transport route for supplies and export of goods from the northern part of the State. The rapid spread of pastoralism throughout the South Flinders and well into the North Flinders by the early 1850's made it desirable that there should be a port as far up Spencer Gulf as possible. In 1852, John Grainger and A.L. Elder sailed up the Gulf in the government schooner "Yatala" and determined that Port Ferguson (described as "capacious, deep and secure") was a suitable port (Royal South Australian Almanac, 1848, cited in Reilly, 1991). Port Ferguson, now known as Yatala Harbor forms a large portion of the coastal boundary of the reserve. Mt Grainger, the highest point in the reserve and the highest of the four monadnocks extending along the eastern shoreline of Upper Spencer Gulf, was named after John Grainger, who along with Elder, was a director of the Mount Remarkable Mining Company.

In 1853, Henry Paul Minchen and Dr Matthew Moorehouse, Protector of Aborigines, established a ration station for Aborigines at Port Ferguson (Yatala Harbor), within the present reserve area. This site was preferred to Port Augusta as it was only four miles from good water, the present site of Nectar Brook Reservoir. Arriving in the "Yatala", they brought food supplies for the Aborigines (Ross and Jeffrey, 1975).

A devastating drought in the region in 1862-3 caused a dramatic fall in pastoral and farming exports. Chinese merchants in the district then turned to other pursuits, including the harvesting and export of "sandalwood", directed at Chinese markets. It is believed that both quandong, *Santalum acuminatum*, and "false sandalwood", *Myoporum platycarpum*, were used. Large stands of these species were discovered at the site of the now Winninowie Conservation Park. However, it is also likely that the actual sandalwood species, *Santalum spicatum*, was exported. This species has now almost disappeared from the district and only a few trees are known to remain in the reserve. It is assumed that Chinaman Creek was named after the sandalwood collectors who shipped the felled timber back along the creek to the beach (Ross and Jeffrey, 1975). Chinaman Creek is the largest tidal creek within the reserve.

A section of the early transport route (the old bullock trail) from Adelaide to the interior passed in the vicinity of the reserve. Coins of the period (1865 onwards) have been discovered in beach sands and sediments adjacent to Chinaman Creek.

In 1875, the town of Miranda was surveyed at the foot of Mt Grainger on the shore of Yatala Harbor (Port Ferguson). Although most of the vacant land subdivisions were incorporated into the reserve in 1990, a large number remain just outside the reserve boundary. These are freehold tenure and many allotments have existing shacks and permanent dwellings. Many dwellings have been constructed in recent years and this trend appears likely to continue. This township falls under the jurisdiction of the local council: the Corporation of Pt Augusta.

Between 1911 and the outbreak of WW1, a German company mined seagrass, *Posidonia australis*, in Northern Spencer Gulf. One extraction site was located in the intertidal zone south of Redcliff Point.

A railway siding named Winninowie (probably taking its name from the Hundred land division) was part of a chain of small railway townships that extended from Port Augusta to Port Pirie. The railway line was opened in 1937 (Bullock, 1988). The last fettler cottages were dismantled at the siding in 1976 and nothing now remains at the site. The original township of Winninowie was 9km NE of the reserve boundary and 10km inland from the coast, adjacent to National Highway 1 (Reilly, 1988).

Between 1956 and 1961 A.W. Reilly, a local resident, constructed an access road to Chinaman Creek and erected a small holiday residence. It was not until this access road was constructed that the area around Chinaman Creek became a regular and popular destination for a diverse range of recreational activities. The road access also led to a proliferation of shack sites at Chinaman Creek, of which only four now remain.

The area now occupied by the reserve was part of local pastoral holdings. Prior to dedication much of the reserve was used for sheep grazing, particularly land above the 10 metre contour interval. The sheep carrying capacity is estimated to have ranged from one sheep per 1.5 - 3 hectares. Some of the former

grazing land within the reserve was also cropped with wheat and barley (Dow Chemical (Australia) Limited, 1980). Access through these properties to the coast required the permission of local landholders.

Exploration and mining activity within the reserve has been minor. In the 1920's, B.H.A.S. smelters extracted large quantities of shell-grit from coastal dunes in the region, for smelter operations in Port Pirie. Possibly, therefore, shell-grit was taken from dunes within the now Winninowie Conservation Park.

Recent activity has been confined to feasibility studies associated with the construction of the proposed Redcliff Petrochemical Plant. In 1970 soil tests, bores and penetrometer studies were conducted on behalf of Delhi International Oil Corporation to evaluate the feasibility of supplying salt to a petrochemical complex at Redcliff. The survey was conducted between Port Patterson, near the reserve's northern boundary, and Mt Grainger, near the middle of the reserve's coastal boundary. Additional studies were undertaken in 1972 for Alcoa of Australia. Some of the borrow pits, test dams and vehicle tracks associated with the exploratory investigations are still evident in the reserve.

Between 1980 and 1982 the South Australian Department for Mines undertook several investigations within the reserve. These included seismic and gravity survey in 1980 and a drilling programme for underground water in 1982. Three exploratory bore holes were drilled and capped within the reserve.

Winninowie Conservation Park is not subject to proclamations related to prospecting, exploration or mining.

2.5 Recreation and Tourism

The reserve offers visitors passive recreational pursuits including geological and wildlife study, and provides a key access point to Upper Spencer Gulf for fishing. It is one of the few access points to the eastern side of Spencer Gulf for boat launching, fishing and crabbing. Recreation and fishing provide an economic return to the region, the value of which has not been quantified.

Apart from internal public access tracks, most visitor facilities are focussed at Chinaman Creek. These comprise a landing, boat ramp, car park, information shelter, and a pit toilet. No formal campsites, or other accommodation, have been developed within the reserve. However there is an area with limited facilities that has been traditionally used for camping at Chinaman Creek. Principal reserve features are shown in Figure 2.

Elsewhere in the reserve, facilities consist of directional and information signs, the Chinaman Creek road, the Miranda road and some internal access tracks. Approximately 1500 visitor cars per annum use the Chinaman Creek access road.

Winninowie Conservation Park is also located very near to several Conservation and National Parks within the South Flinders Ranges which attract a high number of local, state, interstate and international visitors. An increasing number of visitors based at nearby reserves, are becoming day visitors to Winninowie Conservation Park. Visitor numbers from Adelaide are also likely to keep increasing due its accessibility from Adelaide, and as the reserve becomes more widely known these trends are likely to continue.

Shacks and Leases

At Chinaman Creek, four shacks are located on crown land that is excluded from, but surrounded by, the reserve. These shacks are held under life tenure. Upon the expiration of the current leases the land will be incorporated into the reserve.

A building and associated structures are privately leased at Chinaman Creek for research purposes. The building houses a seismograph recorder, supplied by the Department for Primary Industries and Resources SA (the reserve lies within one of the most active seismic zones in Australia). This is a three-year lease with right of renewal subject to the adherence of lease conditions and to the satisfaction of both parties. The location of the leased site is shown in Figure 2.

The lessee has lived in the leased building since the South Australian government, for the purpose of constructing a proposed petrochemical plant, compulsorily acquired it and the surrounding land. When the lease expires DEH will reassess the future of the leased site and infrastructure, taking into consideration the following options:

- removal of infrastructure, including the research building; or
- make the buildings available for General Reserve Trust accommodation, similar to accommodation arrangements in other *National Parks and Wildlife Act, 1972* reserves.

3 Management Framework

The framework that provides guidance for future management is composed of the following:

- core values and key objectives
- administrative setting
- government policy and legislation

Core Values and Key Objectives

Values

Winninowie Conservation Park is valued because it:

- conserves internationally recognised marine environments and geomorphological processes. The extensive seagrass communities within the reserve provide a world class record of sea level changes and sedimentary processes (listed on the State Heritage Register).
- conserves extensive inter-tidal marine communities of State and National conservation value including sub-tropical relict mangrove woodlands (listed in the Directory of Important Wetlands of both South Australia (Morelli & de Jong, 1996) and Australia (ANCA, 1996)).
- conserves a large tract of coastal land reserved for nature conservation purposes. Ecosystems and populations of significant wildlife including vulnerable, rare and endangered species.
- contains land with scenic qualities generally not visually impinged upon by human activities or constructions.
- contains land with cultural and spiritual significance to Nukunu people.
- offers visitors a range of passive terrestrial and marine recreation opportunities and educational experiences.
- is a locally important tourism asset, also providing one of the few access points to the marine environment of eastern Upper Spencer Gulf.

Key Objectives

The key objectives of management of Winninowie Conservation Park are to:

- promote appreciation and understanding of the reserve's terrestrial and marine ecosystems.
- cooperate with the Nukunu people to protect and interpret Aboriginal cultural heritage.
- manage activity within the reserve to minimise impacts on the ecological and cultural resources of the reserve.

Administrative Setting

The reserve is part of a regional pattern of land use and spectrum of land management programs.

Winninowie Conservation Park is managed by DEH ("National Parks and Wildlife SA") staff, based at the Department's Southern Flinders District Office Based at Mambray Creek, who collectively are responsible for managing nine *National Parks and Wildlife Act* reserves. These reserves are Mt Remarkable National Park (including the Napperby Block), Telowie Gorge, Clements Gap, Black Rock, Mt Brown, The Dutchmans Stern, Yalpara and Winninowie Conservation Parks. The District Ranger reports to the Parks and Wildlife Manager North, based at Port Augusta.

The land management responsibilities of the Mambray Creek office staff extend beyond reserve boundaries. Reserve management forms only part of a spectrum of integrated land management programs in this region, including Heritage Agreements, Land Care groups, Soil Conservation Boards, and Local

Government Councils. The staff who manage Winninowie Conservation Park interact, directly or indirectly, with all these groups in fulfilling their responsibilities.

Local and regional residents have a part to play in reserve management. Liaison will be maintained with neighbours and relevant groups to maintain and develop community interest in the park.

Management actions, particularly fencing and pest control, will involve integration with neighbouring land managers.

Government Policy and Legislation

The classification that a reserve receives on being dedicated under the *National Parks and Wildlife Act, 1972* is a general statement of the purpose for which that area of land was acquired. Conservation Parks are lands that should be protected or preserved to conserve wildlife, natural or historic features.

Under the *National Parks and Wildlife Act, 1972*, the Minister, Chief Executive and Director of National Parks and Wildlife must have regard for the following objectives in managing reserves:

- a) Preservation and management of wildlife.
- b) The preservation of historic sites, objects and structures of historic and scientific interest.
- c) The preservation of features of geographical, natural or scenic interest.
- d) The destruction of dangerous weeds and the eradication or control of noxious weeds and exotic plants.
- e) The control of vermin and exotic animals.
- f) The control and eradication of disease of animals and vegetation.
- g) The prevention and suppression of bushfires and other hazards.
- h) The encouragement of public use and enjoyment of reserves and education in, and a proper understanding and recognition of, their purpose and significance.
- i) Generally the promotion of the public interest.

Management Philosophy

In accordance with the reserve's dedication and classification as a Conservation Park, all management strategies will have conservation of the reserve's natural and cultural resources as a focus and priority. Public access and other developments will be in keeping with the need to protect the natural and historic features of the reserve. It is also important that the reserve be available for recreational uses compatible with conservation objectives.

DEH will manage Winninowie Conservation Park and discharge its responsibilities under the *National Parks and Wildlife Act, 1972* by:

- implementing practices to maintain the reserve's biological diversity.
- providing for public benefit and enjoyment without compromising the reserve's conservation values.
- maintaining an ongoing dialogue with all community groups and particularly with the Nukunu community.

4 The Management Prescription

4.1 Reserve Infrastructure

Zoning

The definition of zones for public use and for conservation of wildlife assists with reserve planning and management. Zones have specified conditions and restrictions on activities.

Objective

To zone Winninowie Conservation Park to provide for the appropriate location of visitor facilities and for the conservation of the reserve's ecosystems, landscape and heritage.

Actions

- adopt the zoning plan shown in Figure 4
- apply the following definitions and conditions to the zones:

Facilities and Administration Zone

Three areas have been defined for the provision of visitor facilities. Built developments and facilities in this zone should be compatible with, and minimise human impacts upon the natural environment. Demand for camping in the reserve is small. An area at Chinaman Creek has been traditionally utilised for camping by small numbers of mainly local fishers. This area has been highly modified, is bare, and located adjacent to the public toilet facilities and boat landing.

It is considered that campers using the area find the facilities adequate and that these meet the current demand. The current camp ground requires maintenance but expansion of the camping area, or facilities, is not anticipated within the life of this plan.

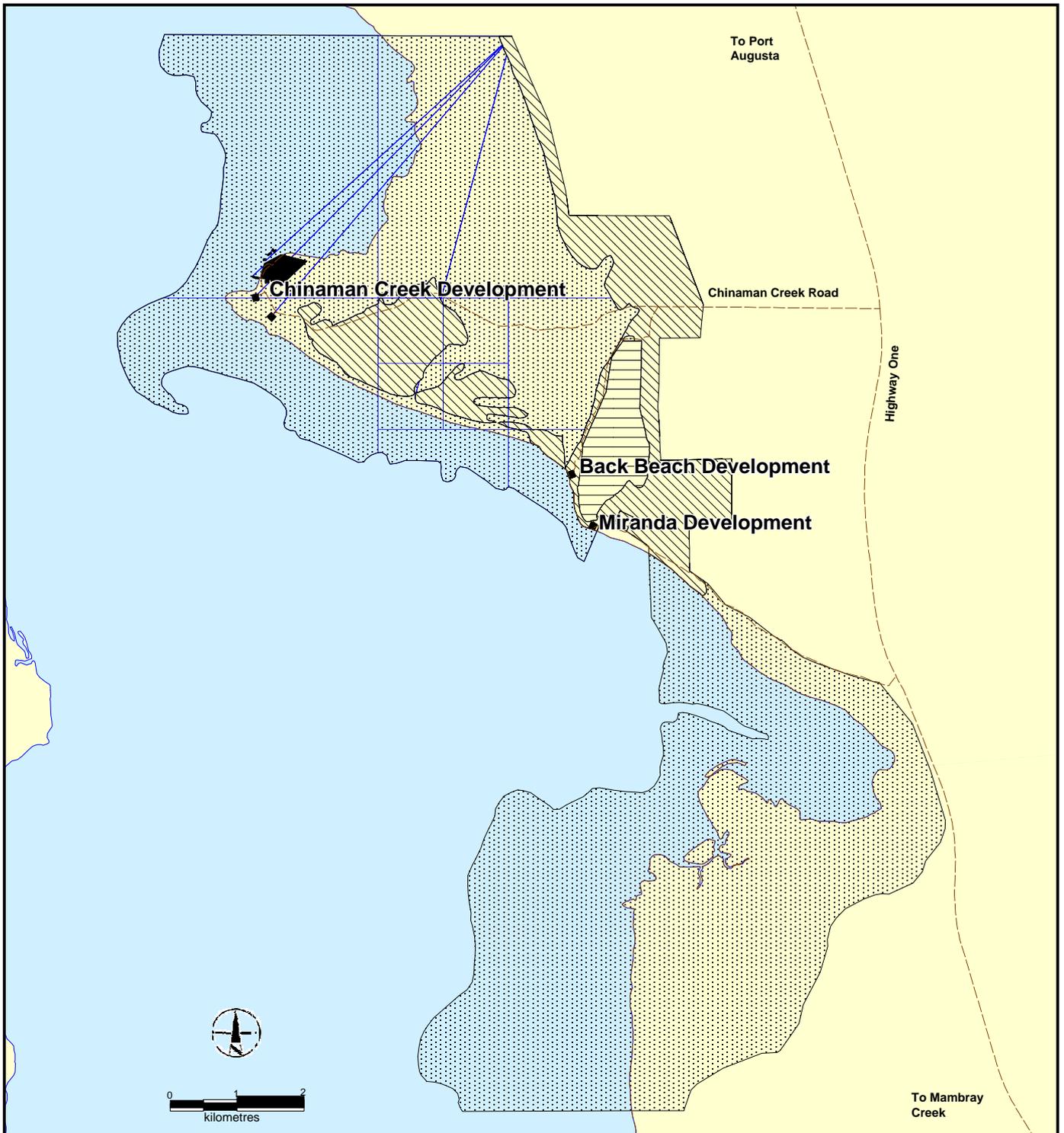
Camp-fires will not be permitted in this area.

Biological Conservation Zone

The *Biological Conservation Zone* includes lands that are the more biologically important or ecologically sensitive areas of the reserve (ie less resilient to disturbance). Most of the reserve's rare and vulnerable plant species are in this zone. The *Biological Conservation Zone* generally coincides with land below the 10 metre contour and is subject to regular or periodic inundation, or is transacted by numerous tidal drainage channels. Landforms of the *Biological Conservation Zone* include mud flats, flat marshland and alluvial plain supporting mangroves, samphires and chenopods, respectively; and coastal cliffs that support a range of vegetation types. The vegetation is sensitive to disturbance, particularly breakage of mangrove pneumatophores. Soil substrates in this zone are often muddy making access difficult and increasing the risk of erosion in disturbed areas.

Public access through this zone is limited to persons on foot, and to boats operated at speeds of less than 5 kph. There should be no defined or interpretive land-based walking trails within this zone. Vehicles are prohibited except for reserve management and emergency purposes. Public access is permitted through this zone along designated public access roads as shown in Figure 2.

Camping is prohibited at all times in this zone.



LEGEND
Zoning

-  Aboriginal Heritage
-  Biological Conservation
-  Facility and Administration
-  General Park
-  NPWSA Reserve Boundary
-  Roads

Figure 4

**Winninowie Conservation Park
Zoning**

This map designed and created by
Park Systems using PAMS.
Date: March 2000



Department for
Environment and Heritage
Government of South Australia

Aboriginal Heritage Zone

An area within the reserve has been identified as containing sites significant to the Nukunu Aboriginal community (refer Section 2.4.1). The Nukunu community will be involved and consulted in the protection and appropriate management of those sites.

Fencing for site protection, interpretive signs and public access, including interpretive walking trails, may be provided within this zone if considered appropriate by both reserve management staff and the Nukunu community.

The opportunity exists for the Nukunu community and National Parks and Wildlife to make joint funding applications to support site management activities and interpretation. Such joint funding applications will be actively pursued.

General Park Zone

This zone mainly comprises higher land, not subject to regular or periodic inundation. Landforms include a portion of Mt Grainger, the Promontory, aeolian (wind-formed) sand dunes and alluvial plain. Vegetation communities include mallee, false sandalwood, umbrella bush and black bluebush. These ecosystems are generally more biologically resilient (able to withstand or recover from disturbance more readily) than those in the *Biological Conservation Zone* and either do not contain significant plant species, or they contain only a small percentage of the reserve's population of a particular conservation-rated species.

Access by vehicles, walkers and bicycles is permitted along the designated roads shown in Figure 2. Elsewhere within this zone access is only permitted on foot. Interpretative and/or defined walking trails may be maintained or constructed within this zone.

Camping is prohibited in this zone. However, permission may be granted to special groups on a case-by-case basis, subject to satisfying criteria and conditions stated under "Special Events."

No areas or tracks have been set aside for access by persons in control of animals such as horse or camel. In general these animals will not be permitted in the reserve. For special events, however, permission for access may be negotiated with the District Ranger, Regional Manager or Director.

Policies

- the provision of visitor facilities is permitted in the *Facilities and Administration Zone*. Camping is permitted only in this zone.
- public access through the *Biological Conservation Zone* is limited to persons on foot, by vehicles along designated access tracks, and to boats operated at speeds of less than 5 kph. There should be no defined or interpretive land-based walking trails within this zone.
- access by vehicles, walkers and bicycles is permitted along the designated roads in the *General Park Zone*, and on foot elsewhere in this zone. Walking trails may be maintained or constructed within this zone.
- fencing for site protection, interpretive signs and public access is permitted in the *Aboriginal Heritage Zone* when approved by both reserve management staff and representatives of the Nukunu community.

Reserve Data Base and Research

To improve management of the reserve, the existing database needs to be built upon and made readily accessible to managers. In particular, reserve managers require additional information of the existence, distribution and habitat requirements of the reserve's flora and fauna, and especially those species of high conservation value. The data should also be in a form that enables and/or enhances practical management decisions.

Objective

- to provide integrated systems of monitoring, research and management of the reserve's natural resources.

Actions

- add to, and refine the reserve's existing biological database (PAMS)
- maintain existing and establish new photo point monitoring locations to assess the recovery of land systems
- devise and update a schedule of management oriented research and advocate the schedule to tertiary institutions.

Access

The reserve has three public entrance points, all are within a few kilometres of National Highway 1.

The most used access road to and within the reserve leads to Chinaman Creek, the area of most visitor use. This is not an all-weather road, and 7km of road within the reserve's boundary may be closed to the public in wet conditions.

The other two access roads are council maintained in their entirety. The southernmost road leads to the reserve's southern boundary, an area that attracts relatively minor visitor interest and use. This road is not an all-weather road. The all-weather council maintained road to Miranda is mostly within the reserve boundary and allows public access to the central portion of the reserve, including Mt Grainger. Within the reserve, additional access roads will be consolidated and provide access to the Back Beach *Facilities and Administration Zone* and to Redcliff Point (refer Figure 4).

Objective

- provide access to points of interest within the reserve.

Actions

- liaise with the Corporation of the City of Port Augusta to ensure a cooperative approach to upgrading and maintenance of the public access roads to Miranda and the entrance of the Chinaman Creek road.
- maintain and improve the internal portion of the Chinaman Creek road.
- progressively close and rehabilitate those tracks not required for management purposes.
- maintain car parking areas and sign-posting.

Policies

- off-road vehicle use is not permitted

Boundary Fencing

The reserve's coastal (western) boundary is defined by the low water mark. The reserve's boundaries above high tide mark are approximately 65km in length and are fenced (although fencing is in poor condition). As the reserve is surrounded by pastoral and agricultural properties, maintenance of stock-proof boundary fencing is a high priority.

Much of the inter-tidal boundary is unfenced. Currently sheep are able to enter the southern portion of the reserve through the unfenced inter-tidal zone, at low tide.

Objective

- provision and maintenance of cost effective stock proof boundary fencing.

Actions

- carry out regular boundary fence inspections and maintenance
- replace some 10km of existing fence along south east boundary
- maintain regular contact with neighbouring land holders with regard to fence condition and maintenance, and where required, upgrade to stock-proof condition.

Rubbish and Pit Management

In the past hard waste has been deposited in a pit near the north-west coastal edge of the Promontory. Whilst this practice has ceased, the site remains unsightly and a source of weed outbreaks, and the site needs to be rehabilitated. There is another rubbish dumping area that has been traditionally used near Miranda and continues to attract rubbish dumping. The local council (the Corporation of Pt Augusta) has removed some of the rubbish but a large amount still remains scattered through the vegetation over a wide area. An old access road to Miranda winds through this area adjacent to the new access road. The remainder of the rubbish should be removed and the road closed to discourage further dumping.

Pits at "the Promontory" and numerous small survey holes created by the Department for Mines and Energy need to be closed and rehabilitated.

Objective

- discourage the practice of rubbish dumping within the reserve
- rehabilitate pits and survey holes.

Actions

- consult with council and close and rehabilitate rubbish dumps located near the north-west coastal edge of the Promontory and at Miranda.
- close access to the dumps and dump sites.
- liaise with Department for Mines and Energy with regard to rehabilitation of survey holes and pits.

4.2 Natural Resources

Fauna and Flora

The reserve conserves a coastal flora that includes species of national conservation rating. In addition, the reserve provides habitat for several bird species of conservation significance, and although considered common at a State level, some reptiles occurring in the reserve are at the margins of their natural distribution. However, under current and proposed management, it is considered that no reserve populations, other than sandalwood, *Santalum spicatum*, are threatened and hence do not require specific provisions for particular species. This assessment, though, should be continually monitored and revised if necessary.

The reserve's mallee eucalypts are very old, of tree form (as opposed to multi-stemmed "mallee") and many trees have developed hollows. Many of the reserve's significant bird species require hollows for roosting and/or nesting. First growth, or very old growth, mallee is rare in South Australia's agricultural regions and is of high conservation value.

Apiary is not considered to be consistent with the long-term aim of maintaining biodiversity in the reserve. Introduced honey-bees (*Apis mellifera*) may compete with other species for nectar. They are aggressive and wild populations may displace birds and mammals from tree hollows. Honey-bees may reduce pollination rates in some native plants that are adapted to specific pollinators (Austin *et al.*, 1996).

Objective

- maintain and where appropriate, improve the integrity of the reserve's native biodiversity.

Actions

- monitor flora and fauna populations of high conservation significance and, if necessary, identify and implement protection measures
- where possible encourage regeneration of closed vehicle tracks
- through the presence of NP&W wardens, discourage illegal fishing and off road vehicle use
- encourage natural regeneration of *Santalum spicatum* in the reserve by locating and rabbit-proof fencing known populations and individuals. Plant *S. spicatum* propagated from fruit collected from trees existing in the reserve.

Policies

- release of rehabilitated native wildlife into the reserve will not be permitted
- the establishment of apiary sites in the reserve will not be permitted

Introduced Plants and Animals

Populations of rabbit, fox and cats, and the plant African boxthorn, *Lycium ferocissimum*, are the most significant threats to the reserve's natural resources.

In the past rabbits have caused significant grazing damage to plants, including preventing regeneration of native species. In turn, this has created, or contributed to, soil erosion. Rabbits have been significantly reduced since the introduction of Rabbit Calicivirus Disease in 1996. Control is most effective for the long term when implemented on populations at their lowest level. Calicivirus has provided the opportunity to implement a very effective control program. Currently there is no vertebrate pest control program operating in the reserve. Future vertebrate pest control programs need to be integrated to maximise their effect. In particular, foxes, cats and rabbits need to be controlled simultaneously to avoid problems from a predator/prey switch.

African boxthorn, *Lycium ferocissimum*, has spread extensively throughout the reserve, and especially within the mallee and taller shrub vegetation associations. Control of African boxthorn is required under the

Animal and Plant (Agriculture and Other Purposes) Act, 1986. Effective control or eradication will require an increase in control activities.

Localised and opportunistic mechanical removal of horehound, *Marrubium vulgare*, has also occurred in the reserve, particularly along road verges.

Objective

- continue, expand and diversify existing control of pest plants and animals that threaten the conservation values of Winninowie Conservation Park.

Actions

- establish an integrated pest animal control program which builds upon previous control measures focussed on rabbit and fox control
- where possible, identify and assess biological and culturally sensitive locations prior to implementing the program
- where possible, assess the program for success, land condition improvements and flora and fauna population and species change
- where appropriate and effective, encourage supervised volunteer input into the biological survey, works and assessment aspects of the program
- control by direct means, African boxthorn and other specific occurrences or outbreaks of pest plants which pose the greatest threat to reserve values (potential plants include garden escapes, Bridal creeper, *Myrsiphyllum asparagoides*, and tree tobacco, *Nicotiana glauca*)

Fire Management

Historically, the incidence of wildfire along the eastern coastal margins of Upper Spencer Gulf has been low. There have been no significant wildfires recorded in the reserve.

Because of the naturally low incidence of fire, it is not thought necessary to impose a particular fire regime for the conservation of particular species within the reserve.

Recent fires have spread unintentionally from campfires on the coast to dead seagrass. These fires burn for an extensive length of time, tend to smoulder, and are very difficult to extinguish.

To reduce the risk of fires starting, and to help maintain the reserve's conservation values especially old growth mallee with hollows, and a ground litter "habitat" layer, a complete ban on the use of wood fires is considered necessary. Mallee and tall shrub vegetation associations occupy a small percentage of the reserve, and hence there is also limited fuel wood available for campfires.

Objectives

- develop and implement fire strategies for the reserve which:
 - minimise the risk of fires starting in the reserve; and
 - safeguard natural and built assets, and human life.

Actions

- prepare, and then regularly update the fire prevention and suppression plans for the reserve
- assess fuel loads and fire threats annually
- consolidate and maintain existing management access tracks which may also be used for fire control.

Policies

- impose a complete ban on the lighting and use of wood fires, and fuel-wood collection, including dead timber
- the reserve will be closed during days of total fire ban.

Soil Erosion

There is an ongoing occurrence of off-road vehicle use. Tracks created by vehicles subsequently encourage other users to follow making rehabilitation difficult and causing erosion. Many of these trails lead to the summit of Mt Grainger, which provides a scenic view of the reserve and coastline. Providing a walking trail up Mt Grainger would give visitors an alternative access to the summit and reduce off road vehicle activity.

In the past a significant number of small wooden boats were moored in False Creek and Chinaman Creek. This altered the hydrology of the creek systems, slowing the water under boats and creating sandbanks that blocked the entrance to the creeks at low tide. Demand for permanent moorings has reduced substantially, wooden boats are becoming less common and the creeks are not suitable to be used as a marina for yachts. It will be beneficial to hydrology of the creeks to discontinue using the creeks for mooring boats.

Objectives

- to manage all activity within the reserve to minimise soil erosion with particular emphasis on the following areas: Mt Grainger, the tidal creeks and aeolian dunes.

Actions

- rehabilitate areas of soil erosion within the reserve
- continue to discourage off road vehicle use by blocking access points and sign posting
- monitor boat activity in tidal creeks and if necessary, implement procedures to minimise tidal creek erosion caused by such activity.

Policies

- prohibit unlicensed boat moorings within the reserve's tidal creeks.

4.3 Cultural Resources and Community Involvement

Nukunu Culture and Involvement

Nukunu people have a strong relationship with the area and particularly value the site shown as the *Aboriginal Heritage Zone* (refer Figure 4 and Section 4.1.). Consultation will be maintained with the Nukunu community and their comment and involvement sought on reserve management matters in which they have an interest.

Objective

- to work cooperatively with the Nukunu people to raise awareness of, protect and interpret Aboriginal cultural heritage values and sites.

Action

- with the Nukunu people develop interpretive material about the Aboriginal culture of the area, including material for use on the Mt Grainger walking trail.

Cultural Features

Interpretation of heritage features would benefit visitors. Significant cultural features of the reserve include:

- the naming of the reserve: the meaning, origin and significance of the reserve's name, including the history of the nearby (former) Winninowie township
- establishment of a ration station for the local Nukunu people at Yatala Harbor
- the export trade in sandalwood, *Santalum spicatum*, and associated naming of Chinaman Creek
- the old bullock trail.

Objective

- to interpret significant heritage sites and events associated with the reserve and its immediate surroundings.

Action

- prepare and erect information signs within the *Facilities and Administration Zone*, and where appropriate, within the *General Park Zone*, to interpret significant historical and cultural events and sites within the reserve.

Community Involvement

“Friends” or “care” groups could assist in management and development of the reserve. Already volunteers assist with the control of boxthorn. Vegetation and coastal management could be improved with the assistance of the local community. They may also increase public awareness and concern, and help plan and monitor activities such as:

- walking trail development
- off road vehicle use
- rubbish dumping
- vegetation clearance
- weed and pest animal control

Objectives

- to encourage the formation of a community group to be involved with the management of Winninowie Conservation Park.

Actions

- support the formation and operation of relevant care or friends groups
- investigate funding sources for projects.

4.4 Visitor Facilities

Recreational activities undertaken in the reserve and surrounding areas are fishing, boating, crabbing, nature study (particularly bird watching in the coastal areas), walking and beachcombing. School groups use the intertidal creek system and mangrove areas for canoeing and nature study. Tertiary institutions use the reserve for a wide range of environmental studies, particularly aquatic and marine studies.

Visitor facilities are currently focussed at Chinaman Creek and include a pit toilet (male and female) and tap, a boat ramp, landing, an information shelter, and rubbish bins.

Reserve management aims to cater for appropriate low impact, passive recreational and educational use, by a broad cross-section of the public. To achieve this, additional signs (directional and interpretive) and maintenance and upgrading of defined access roads are necessary.

Visitors are encouraged to remove their own rubbish from the reserve. The provision of bins and rubbish removal may be phased out.

Swimming has traditionally occurred in False Creek at Chinaman Creek. Submerged material in False Creek make swimming, diving or jumping very dangerous along a section east of the wharf. Swimming adjacent to the wharf is considered suitable. Warning signs will be erected to delineate the dangerous zone. Submerged material will be removed as soon as possible.

Objectives

- promote appreciation and understanding of the reserve's terrestrial and marine ecosystems and conservation values with particular emphasis on mangrove and salt-marsh communities.
- to provide and maintain facilities to cater for the needs of visitors engaging in low impact, passive recreational and educational activities.

Actions

- provide directional and interpretive information signs that promote understanding of the intertidal environment
- provide a walking trail to Mt Grainger summit and interpretive sign(s) explaining the cultural, geological and natural significance of Mt Grainger
- maintain existing toilet at Chinaman Creek
- provide (for the short-term at least) rubbish bins at Chinaman Creek camp ground. Encourage visitors to take their own litter out of the reserve, with the long-term aim of phasing out litter bins in the reserve
- clearly signpost areas in False Creek where there are submerged objects (until objects are removed)
- remove submerged objects from False Creek as soon as possible
- maintain small boat launching facility at False Creek.

Policies

- swimming in tidal creeks is permitted except within sign-posted section
- boat launching is permitted at the False Creek boat ramp only.

Camping

A camping area is provided at "Chinaman Creek" adjacent to False Creek. There are an estimated 300 campers at this site per year. Most campers are recreational fishers who fish and camp overnight, typically for one night's duration.

The campsite and roads to "Chinaman Creek" are subject to tidal inundation several times a year.

Camping is not permitted in the remainder of the reserve. However, for special events camping may be permitted by the district ranger (refer “Special Events”). The lighting and use of wood fires will not be permitted but gas stoves may be used.

Objective

- maintain current camping facilities at Chinaman Creek.

Actions

- signpost and maintain camp ground and visitor facilities and include a warning of the occurrence of flooding during king tides.

Policies

- camping is permitted only at the Chinaman Creek camp ground.

Special Events

The reserve’s high conservation values and its relative accessibility from Adelaide and nearby regional centres, have attracted the attention of a number of societies, associations, educational institutions and other groups whose primary interest in visiting the reserve is conservation research and/or education.

Objective

- to provide access to groups for special purposes.

Actions

- assess requests and provide authorisation to groups for access where conditions can be met
- authorisation to camp or access the reserve for special purposes not generally permitted by this plan may be granted by the District Ranger, Regional Manager or Director. In such cases:
 - requests must be made in writing;
 - access routes, stopping points and camping areas will be determined by the District Ranger;
 - information obtained by the group whilst camping will be provided to National Parks and Wildlife SA, if requested.

5 Summary of Management Actions

Actions will be undertaken in line with District priorities and as resources permit.

Objectives	Actions	Priority	Page
Reserve Infrastructure			25
Zoning			
<ul style="list-style-type: none"> to zone Winninowie Conservation Park to provide for the appropriate location of visitor facilities and for the conservation of the reserve's ecosystems, landscape and heritage. 	<ul style="list-style-type: none"> adopt the zoning plan shown in Figure 4 apply definitions and conditions to the zones specified in this plan 	<p>High High</p>	
Reserve Data Base and Research			28
<ul style="list-style-type: none"> to provide integrated systems of monitoring, research and management of the reserve's natural resources. 	<ul style="list-style-type: none"> add to, and refine the reserve's existing biological database (PAMS). maintain existing, and establish new, photo point monitoring locations to assess the recovery of land systems. devise and update a schedule of management oriented research and advocate the schedule to tertiary institutions. 	<p>High High Medium</p>	
Access			28
<ul style="list-style-type: none"> provide access to points of interest within the reserve. 	<ul style="list-style-type: none"> liaise with the Corporation of the City of Port Augusta to ensure a cooperative approach to upgrading and maintenance of the public access roads to Miranda and the entrance of the Chinaman Creek road. maintain and improve the internal portion of the Chinaman Creek road. progressively close and rehabilitate those tracks not required for management purposes. maintain car parking areas and sign-posting. 	<p>Medium Medium Medium Medium</p>	
Boundary Fencing			29
<ul style="list-style-type: none"> provision and maintenance of cost effective stock proof boundary fencing. 	<ul style="list-style-type: none"> carry out regular boundary fence inspections and maintenance. replace some 10km of existing fence along south east boundary. maintain regular contact with neighbouring landholders with regard to fence condition and maintenance, and where required, upgrade to stock-proof condition. 	<p>Medium Medium Medium</p>	
Rubbish and Pit Management			29
<ul style="list-style-type: none"> rehabilitate degraded land. 	<ul style="list-style-type: none"> consult with council and close and rehabilitate rubbish dumps located near the north-west coastal edge of the Promontory and at Miranda. close access roads through the dumps. liaise with Dept of Mines and Energy with regard to rehabilitation of survey holes and pits 	<p>High Medium Medium</p>	
Natural Resources			30
Fauna and Flora			

Winninowie Conservation Park Management Plan

Objectives	Actions	Priority	Page
<ul style="list-style-type: none"> maintain, and preferably increase, the reserve's native biodiversity. 	<ul style="list-style-type: none"> monitor flora and fauna populations of high conservation significance and, if necessary, identify and implement protection measures. where possible encourage regeneration of closed vehicle tracks. Through the presence of NP&W wardens discourage illegal fishing and use of closed vehicle tracks. encourage natural regeneration of <i>Santalum spicatum</i> in the reserve by locating and rabbit-proof fencing known populations and individuals. Plant <i>S. spicatum</i> propagated from fruit collected from trees existing in the reserve. 	<p>High</p> <p>High</p> <p>High</p> <p>Medium</p>	
<i>Introduced Plants and Animals</i>			<i>30</i>
<ul style="list-style-type: none"> continue, expand and diversify existing control of pest plants and animals that threaten the conservation values of Winninowie Conservation Park. 	<ul style="list-style-type: none"> establish an integrated pest animal control program which builds upon previous control measures focussed on rabbit and fox control. where possible, identify and assess biological and culturally sensitive locations prior to implementing the program. where possible, assess the program for success, land condition improvements and flora and fauna population and species change. where appropriate and effective encourage supervised volunteer input into the biological survey, works and assessment aspects of the program. control by direct means African boxthorn and other specific occurrences or outbreaks of pest plants which pose the greatest threat to reserve values (potential plants include garden escapes, Bridal creeper, <i>Myrsiphyllum asparagoides</i>, and tree tobacco, <i>Nicotiana glauca</i>). 	<p>High</p> <p>High</p> <p>High</p> <p>Medium</p> <p>High</p>	
<i>Fire Management</i>			<i>31</i>
<ul style="list-style-type: none"> develop and implement fire strategies for the reserve which: minimise the risk of fires starting in the reserve; safeguard natural and built assets, and human life. 	<ul style="list-style-type: none"> prepare, and then regularly update the fire prevention and suppression plans for the reserve. assess fuel loads and fire threats annually. consolidate and maintain existing management access tracks which may also be used for fire control. 	<p>High</p> <p>Medium</p> <p>Medium</p>	
<i>Soil Erosion</i>			<i>32</i>
<ul style="list-style-type: none"> to manage all activity within the reserve to minimise soil erosion with particular emphasis on the following areas: Mt Grainger, the tidal creeks and aeolian dunes. 	<ul style="list-style-type: none"> rehabilitate areas of soil erosion within the reserve continue to discourage off road vehicle use by blocking access points and sign posting. monitor boat activity in tidal creeks and if necessary, implement procedures to minimise tidal creek erosion caused by such activity. 	<p>Medium</p> <p>High</p> <p>Medium</p>	
Cultural Resources and Community Involvement			
<i>Nukunu Culture and Involvement</i>			<i>33</i>
<ul style="list-style-type: none"> to work cooperatively with the Nukunu people toward the protection and interpretation of Aboriginal cultural heritage values and conservation. 	<ul style="list-style-type: none"> with the Nukunu people develop interpretive material about the Aboriginal culture of the area, including material for use on the Mt Grainger walking trail. 	<p>Medium</p>	
<i>Cultural Features</i>			<i>33</i>
<ul style="list-style-type: none"> to interpret significant heritage sites and events associated with the reserve and its immediate surroundings. 	<ul style="list-style-type: none"> prepare and erect information signs within the <i>Facilities and Administration Zone</i>, and where appropriate, within the <i>General Park Zone</i> to interpret significant historical and cultural events and sites within the reserve. 	<p>Medium</p>	

Winninowie Conservation Park Management Plan

Objectives	Actions	Priority	Page
<i>Community Involvement</i>			<i>34</i>
<ul style="list-style-type: none"> to encourage the formation of a community group to be involved with the management of Winninowie Conservation Park 	<ul style="list-style-type: none"> support the formation and operation of relevant care or friends groups. investigate funding sources for projects. 	Medium Medium	
Visitor Facilities			<i>35</i>
<ul style="list-style-type: none"> promote appreciation and understanding of the reserve's terrestrial and marine ecosystems and conservation values with particular emphasis on mangrove and saltmarsh communities. to provide and maintain facilities to cater for the needs of visitors engaging in low impact, passive recreational and educational activities. 	<ul style="list-style-type: none"> provide directional and interpretive information signs that promote understanding of the intertidal environment. provide a walking trail to Mt Grainger summit and interpretive sign(s) explaining the cultural, geological and natural significance of Mt Grainger. maintain existing toilet at Chinaman Creek. provide (for the short-term at least) rubbish bins at Chinaman Creek camp ground. Encourage visitors to take their own litter out of the reserve, with the long-term aim of phasing out litter bins in the reserve. clearly signpost areas in False Creek where there are submerged objects (until objects are removed) remove submerged objects from False Creek as soon as possible. maintain small boat launching facility at False Creek. 	High Medium High High High High High	
<i>Camping</i>			<i>35</i>
<ul style="list-style-type: none"> maintain current camping facilities at Chinaman Ck. 	<ul style="list-style-type: none"> signpost and maintain camp ground and visitor facilities and include a warning of the occurrence of flooding during king tides. 	High	
<i>Special Events</i>			<i>36</i>
<ul style="list-style-type: none"> to provide access to groups for special purposes. 	<ul style="list-style-type: none"> assess requests and provide authorisation to groups for access where conditions can be met. authorisation to camp or access the reserve for special purposes not generally permitted by this plan may be granted by the District Ranger, Regional Manager or Director. In such cases: <ul style="list-style-type: none"> requests must be made in writing; access routes, stopping points and camping areas will be determined by the District Ranger; info. obtained by the group whilst camping will be provided to National Parks if requested. 	Medium Medium	

Summary of Policies

Issue	Policy	Page
<i>Zoning</i>	<ul style="list-style-type: none"> the provision of visitor facilities is permitted in the <i>Facilities and Administration Zone</i>. Camping is permitted only in this zone. public access through the <i>Biological Conservation Zone</i> is limited to persons on foot, by vehicles along designated access tracks, and to boats operated at speeds of less than 5 kph. There should be no walking trails within this zone. access by vehicles, walkers and bicycles is permitted along the designated roads in the <i>General Park Zone</i>, and on foot elsewhere in this zone. Walking trails may be maintained or constructed within this zone. fencing for site protection, interpretive signs and public access is permitted in the <i>Aboriginal Heritage Zone</i> when approved by both reserve management staff and representatives of the Nukunu community. 	25
<i>Access</i>	<ul style="list-style-type: none"> off-road vehicle use is not permitted. 	28
<i>Fauna and Flora</i>	<ul style="list-style-type: none"> release of rehabilitated native wildlife into the reserve will not be permitted. the establishment of apiary sites in the reserve will not be permitted. 	30
<i>Fire Management</i>	<ul style="list-style-type: none"> impose a complete ban on the lighting and use of wood fires, and fuel-wood collection, including dead timber. the reserve will be closed during days of total fire ban. 	31
<i>Soil Erosion</i>	<ul style="list-style-type: none"> prohibit unlicensed boat moorings within the reserve's tidal creeks. 	32
<i>Visitor Facilities</i>	<ul style="list-style-type: none"> swimming in tidal creeks is permitted except within sign-posted section. boat launching is permitted at the False Creek boat ramp only. 	35
<i>Camping</i>	<ul style="list-style-type: none"> camping is permitted only at the Chinaman Creek camp ground. 	35

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