

MOOROOK - LOCH LUNA GAME RESERVE MANAGEMENT PLAN

Murraylands

SOUTH AUSTRALIA



Resource Conservation and Management Group
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

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**This plan of management has been prepared and
adopted in pursuance of section 38 of the
National Parks and Wildlife Act, 1972-81**

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DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

FOREWORD

This document is the Management Plan for Moorook Game Reserve and Loch Luna Game Reserve, and has been adopted pursuant to the *National Parks and Wildlife Act, 1972*. The draft Plan was released for public comment in July 1992. Four public submissions were received, and were taken into consideration in the preparation of this Plan.

The Reserves are located near Barmera, with Moorook lying on the western bank of the River Murray, and Loch Luna immediately to its north, but on the eastern bank of the River. The Reserves are popular camping areas for river-based recreational activities, and have high visitation during long weekends and school holiday periods.

This Plan outlines proposals to effectively balance the recreational use of the Reserves while conserving their natural and cultural values.

The Berri office of the Department of Environment and Natural Resources (DENR) maintains records and resource information on the Reserves. This information can be accessed by the general public.

David Wotton
MINISTER FOR ENVIRONMENT AND NATURAL RESOURCES

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1 MANAGEMENT CONTEXT

1.1 Game Reserves in South Australia

The classification which 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. Game reserves are lands that should be protected or preserved to conserve game species, wildlife, natural or historic features which they contain.

Conservation is part of a regional pattern of land use. Other land uses such as agriculture, forestry and mining are distinguished by community acceptance of environmental modification.

The management of SANPW Act reserves aims to minimise disturbance to natural and cultural resources while providing for public use and enjoyment, and is a significant component of regional land use.

1.2 Planning Controls

Under the Murray Valley Management Review the Reserves fall within the Rural Areas Valley Character Unit, which suggests that low impact developments in appropriate locations are acceptable.

Loch Luna and Moorook Game Reserves lie within the River Murray Flood Zones of Barmera District Council Development Plan and Loxton District Council Development Plan respectively. The development constraints for these Zones are complex, however their general thrust is to ensure preservation of the character of the Zone, and ensure developments are of an appropriate nature, and appropriately sited.

Although formal adoption of this Plan exempts DENR from the provisions of the *Planning Act, 1972*, this draft Plan has been prepared in consideration of these classifications.

1.3 Location and Regional Context

Moorook and Loch Luna Game Reserves are located 180km east north east of Adelaide, on the banks of the River Murray (Figure 1). The Reserves are adjacent to the township of Cobdogla, 20km west of Berri.

Moorook Game Reserve covers an area of 1236ha, comprising Sections 474-6, Moorook, Moorook Irrigation Area. The Reserve was constituted in 1976.

Loch Luna Game Reserve covers an area of 1905ha, comprising Sections 468, 840 and 873 Cobdogla Division, Cobdogla Irrigation Area; Section 704, McIntosh Division, Cobdogla Irrigation Area; and Section 101, Hundred of Parcoola. Loch Luna Game Reserve was constituted in 1985.

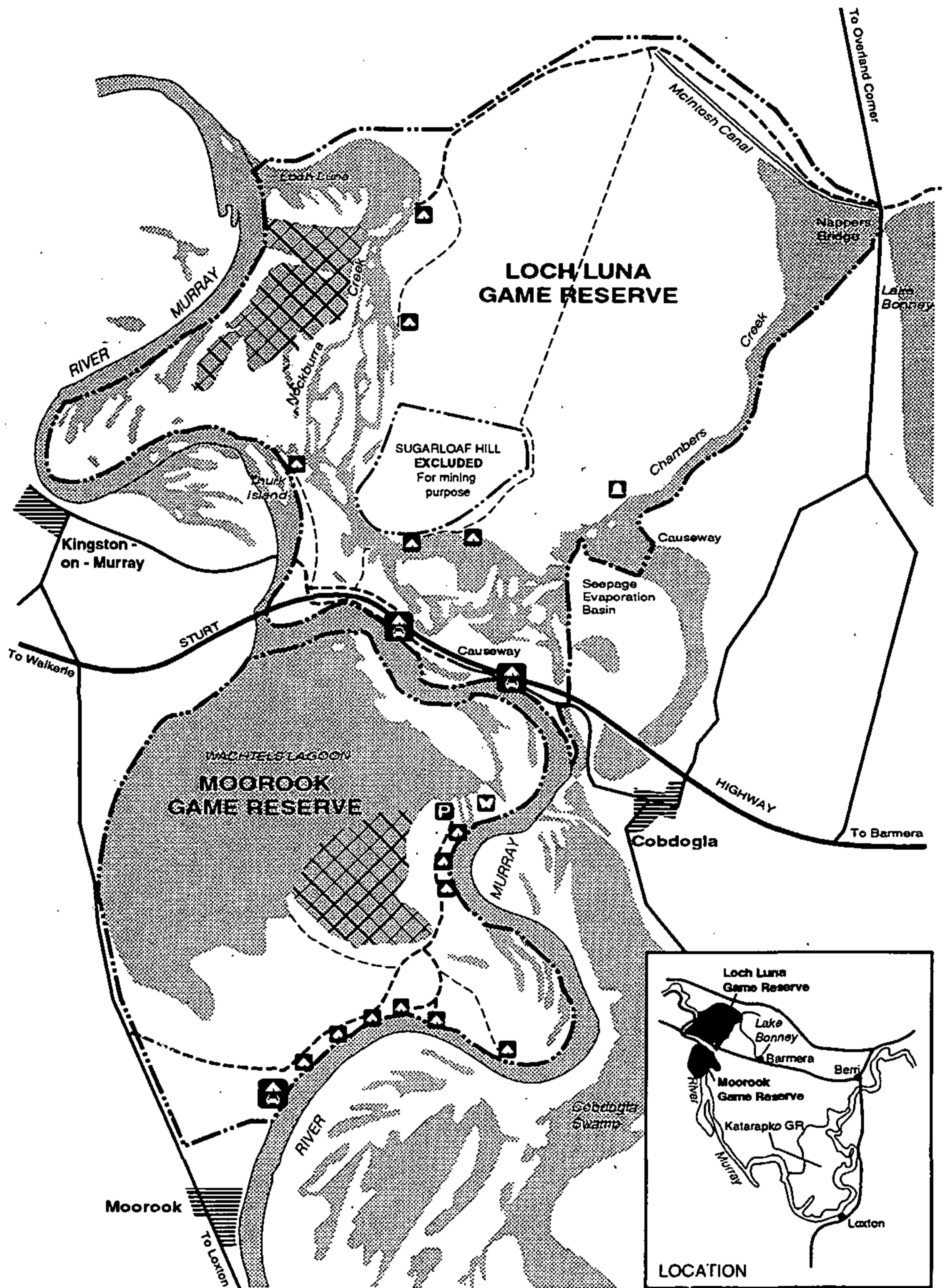
The Reserves contain permanently inundated areas, seasonally inundated lowlands, and land which is only inundated during exceptionally high river levels.

These parks provide significant wildlife habitat, and are popular recreation sites, particularly for river-based activities and camping. Visitation is highly seasonal, occurring largely in summer, with the majority of visitors originating from the local area or from Adelaide.

1.4 Objectives of Management

The *National Parks and Wildlife Act, 1972* describes the general objectives of managing game reserves in South Australia as:

- preservation and management of wildlife;
- preservation of historic sites, objects and structures of historic or scientific interest;
- preservation of features of geographical, natural or scenic interest;
- destruction of dangerous weeds and eradication or control of noxious weeds and exotic plants;
- control of vermin and exotic animals;
- control and eradication of disease of animals and vegetation;
- prevention and suppression of bush fires and other hazards;
- encouragement of public use and enjoyment of reserves, and education in, and a proper understanding and recognition of their purpose and significance; and
- generally the promotion of the public interest.



- | | | | |
|--|---------------------------|--|-------------------|
| | Park Boundary | | Car Park |
| | Township | | Historic Site |
| | Campground Area | | Road |
| | Permanent Water | | All Weather Track |
| | Nodal Campsite | | Dry Weather Track |
| | Nature Trail | | |
| | Wetland Conservation Zone | | |

0 kilometres 1 2



Figure 1

LOCH LUNA AND MOOROOK GAME RESERVES

2 DESCRIPTION of RESERVES

The Murraylands area experiences warmer, drier conditions than does Adelaide, with cool winters and warm to hot summers. Diurnal and seasonal temperatures variations can be significant, and because the area is in the rainshadow of the Mount Lofty Ranges, it is considered within the southern-most extension of the arid zone in South Australia. Annual rainfall is low and irregular; varying between 150mm and 550mm, but averaging 239mm, with a slight winter and spring predominance.

Laut et al. (1977) place the Reserves in the Renmark Environmental Region of the Murray Mallee Province. This Region has largely been cleared for grazing, cropping, and irrigation, and contains only scattered remnants of native vegetation. Deep, grey, self-mulching, cracking clay soils occur in the low-lying floodplain and river terrace portions of the Reserves, while the higher plain areas are underlain by red calcareous earths.

The soils and climate of the area exert a direct influence on the nature and distribution of vegetation, as have irrigation and river management (the latter two factors being largely responsible for the high numbers of dead trees in the area).

The major vegetation associations in the Reserves are:

- river red gum (*Eucalyptus camaldulensis*) and river box (*E. largi-florens*) Woodland to Open Woodland over lignum (*Muehlenbeckia cunninghamii*), grasses and sedges, in low-lying areas;
- lignum Open Scrub with areas of river red gum seedlings, in low-lying areas;
- samphire (*Arthrocnemum* sp.) flats on lowlying salt-affected clay soils;
- river box/saltbush (*Atriplex* sp.) on higher sandy clay ridges;
- dense stands of bulrush (*Typha* sp.), reeds (*Phragmites australis*) and lignum bordering much of the permanently inundated portion of Loch Luna Game Reserve; and
- dense reeds along much of the shore of Wachtels Lagoon, in Moorook Game Reserve, with grasses and samphire dominating further up the banks.

Extensive areas of the high floodplain in Loch Luna Game Reserve were once cleared of river box and saltbush for establishment of irrigated pastures and vineyards. Horticultural and grazing management of these areas was abandoned prior to Park establishment.

No detailed surveys of the fauna of the Reserves have been conducted. It is possible that several significant arboreal and terrestrial small mammal species may still be present.

The Reserves are important nesting habitat for numerous waterbird species, particularly during flood periods. Large numbers of great cormorants (*Phalacrocorax carbo*) nest in Wachtels Lagoon in Moorook Game Reserves. A small number of darters (*Anhinga melanogaster*) regularly breed in Loch Luna Game Reserve.

Yellow-billed spoonbills (*Platalea flavipes*) and royal spoonbills (*P. regia*) have been recorded nesting in both Reserves, or on Thurk Island adjacent to Loch Luna Game Reserve. A number of regent parrot (*Polytelis anthopeplus*) breeding sites have also been located in both Reserves. White-breasted sea-eagles (*Haliaeetus leucogaster*) are known to nest in the area.

Fox (*Vulpes vulpes*) predation on tortoises is an issue of concern throughout the Murraylands, however the extent and impact of this predation on the long term viability of tortoise populations is not clearly understood. The Reserves, particularly Loch Luna, provide substantial areas of good tortoise nesting habitat. Both long-necked tortoises (*Chelodina longicollis*) and short-necked tortoises (*Emydura macquarii*) are present in the Reserves.

Rabbits (*Oryctolagus cuniculus*) are present in the Reserves, particularly in the floodplain areas.

Loch Luna has a wide range of well-preserved Aboriginal cultural and archaeological remains. The presence of Aboriginal sites in Moorook Game Reserve is less well documented.

On the banks of Chambers Creek in Loch Luna Game Reserve are the remains of a water control gate constructed in 1914 of river red gum. This gate was used to isolate Lake Bonney from the River, thus allowing it to dry out. The dry Lake bed was then sown to a cereal crop.

Recreational use of the Reserves is short term and highly seasonal. Although some visitors stop at the Reserves while "driving through", the majority camp on long weekends and during school holidays. Activities of visitors include duck hunting (on open days), boating, launching and mooring speedboats, canoeing, swimming, water skiing, yabbing, and fishing.

3 MANAGEMENT PRESCRIPTION

Policies for the management of the Reserves, summarised below, have been developed within the constraints of:

- the *National Parks and Wildlife Act, 1972* and Regulations;
- State Government policy;
- National Parks and Wildlife Service policies; and
- community attitudes and expectations at State, regional and local level.

3.1 Natural Resources

As noted in Section 2, a portion of the natural vegetation in this area was formerly cleared for grazing and irrigated cropping activities. Ironically, grazing may prove a useful revegetation tool in some portions of the Reserves. When the Reserves were first dedicated (shortly after grazing ceased) a flush of river red gum regeneration and recruitment occurred. This recovery slowed down as dense communities of grasses and sedges developed. Management actions to encourage canopy species recruitment should be investigated.

The numbers and diversity of nesting birds in the Reserves appears to have decreased during the last 20 years. This is perceived by the local community to be caused by changing river conditions and increased recreational use. One example of note is the white-breasted sea-eagle which has nested in one of the Reserves (one of only two active nests on the River in South Australia), but sometimes fails to raise its young successfully. In these instances motor boat disturbance has been suggested (but not proven) as a key contributor to the failure.

The seepage of saline irrigation water into the Reserves is causing some salting damage. This is particularly noticeable on the western side of Wachtels Lagoon. This damage will require careful monitoring and, if need be, action should be taken to limit saline seepage water entering Wachtels Lagoon. Revegetation of salt-damaged areas may be required. Suitable species include salt-tolerant chenopods, and dryland teatree (*Melaleuca halmaturorum*). Revegetation is also required on the former fruit blocks and irrigated pasture areas in Loch Luna Game Reserve (north of Sugarloaf Hill).

Several pest plant species are present in the Reserves. Boneseed (*Chrysanthemoides monilifera*), golden dodder (*Cuscuta* sp.), African boxthorn (*Lycium ferocissimum*), and California burr (*Xanthium californicum*) are the species which currently require most urgent control. There is presently a large number of willows upstream of the Kingston Bridge, which in some areas have greatly impacted on the native riparian vegetation. Willows that are in direct conflict with native vegetation, or which are of no value to land-based recreation activities, should be controlled.

Foxes should be controlled to reduce predation on tortoise eggs. Fox control is most important during the tortoise breeding season, however control could concentrate on islands and prime tortoise nesting areas throughout the year to also benefit reptiles and birds.

Rabbit control has been conducted in Loch Luna for several years. This program should be continued in conjunction with neighbouring property holders.

The low-lying areas of the Reserves were subject to seasonal inundation prior to control of water levels in the River Murray. Because of human manipulation of water levels, flood frequencies and durations have decreased, while some areas that were subject to regular wetting and drying phases are now permanently inundated. Pressey (1986) indicated that enhancing natural flood regimes and reintroducing a wetting and drying cycle to selected wetlands can enhance habitat value, and benefit floodplain vegetation, waterbirds, and fish. The possibility of drying out some portions of Loch Luna should be investigated.

European carp (*Cyprinus carpio*) reduce the habitat value of the Reserves to native fauna species, as the carp suppress emergent aquatic vegetation and eat the fry of native fish species. Reintroduction of wetting and drying cycles to the Reserves would aid in the control of European carp.

Significant fire hazards are present in the Reserves, however the risk of fire spread is low. The protection of mature river red gums, including dead trees (important bird nesting sites) and Aboriginal scarred trees from fire, is a high priority. To minimise the likelihood of accidental burning of significant trees, camping will not be permitted in areas where such trees are present in high densities. Dead river red gums, which are regularly used as nesting sites by darters and regent parrots, are also at risk from white ants. White ant control in significant individual trees should be investigated.

Policies (see 3.4.2 regarding solid fuel fires)

- diversity of habitat will be maintained
- aquatic and wetland habitats will be protected, and enhanced where feasible
- sensitive and important plant communities will be accorded special protection measures
- management will ensure visitor activities do not cause unacceptable degradation of habitat
- fire management will comply with the SANPWS Fire Management and Protection Manual (1988) and each Reserve's Fire Protection Plan

Actions

- | | Priority |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| • encourage vegetation research to assist decision making | Mod. |
| • implement pest plant control program, in particular eradication of boneseed, golden dodder and African boxthorn, and control of California burr in high use recreation areas | High |
| • control willow trees of no value to land-based recreation | High |
| • implement pest animal control program | High |
| • control access and fire to protect habitat (see 3.2 and 3.4.1) | High |
| • encourage investigation of habitat requirements for the maintenance of native fauna populations of the Reserves | Mod. |
| • investigate, and implement if appropriate, hydrological modification of wetland, considering effects on vegetation types and distribution, and existing modified habitat types | Mod. |
| • prohibit camping in areas of high scarred tree density | High |

3.2 Cultural Resources

Although few sites of archaeological significance have been identified in the Reserves, it is expected that the area would be rich in such sites. Sugarloaf Hill is known to be a site of cultural significance to Aboriginal people.

The local Aboriginal community and the Cultural and Site Services Branch of the Department of State Aboriginal Affairs (DSAA) will be consulted regarding the management of sites significant to Aboriginal people.

The water control gate on Chambers Creek, in Loch Luna Game Reserve is of historical significance.

Policy

- sites and objects of archaeological or historical significance will be protected
- management of Aboriginal sites or objects will have regard to the views of Aboriginal people who have an affiliation with the area

Actions

- | | Priority |
|--------------------------------------------------------------------------------------------------------------------------------|-----------------|
| • encourage research for inventory, analysis and assessment of sites or objects of archaeological or historic significance | Mod. |
| • ensure survey of development sites before disturbance occurs | High |
| • liaise with Aboriginal community and the DSAA regarding management of sites or objects of significance found in the Reserves | High |

3.3 Visitors

3.3.1 Access

Figure 1 indicates Road Reserves and Reserve tracks managed by the DENR.

The Reserves have a maze of tracks which have developed and spread over many years of use. The majority of these tracks serve no useful function as they duplicate routes or do not lead to destinations of interest to most visitors. Such track proliferation is undesirable because of the denudation and erosion it causes, and the consequent reduction in aesthetic quality of the Reserves. Rehabilitation of tracks will be conducted as resources permit. The proliferation of tracks around Wachtels Lagoon is closely linked with hunting activities. The rationalisation of this track network will be negotiated with local hunting groups.

Access to Sugarloaf Hill for mining purposes is guaranteed on the condition that the cost of repairing damage to the track caused by mining vehicles is met by the lessee.

One pedestrian nature trail has been provided in Moorook Game Reserve. It is proposed to provide a further walking track if required. Walkers tend to use vehicle access tracks, and some of the tracks which are proposed to be closed to public vehicle access are suitable for continued use as walking tracks (Figure 1).

Policies

- ecological and scenic values will be protected, while providing reasonable public access
- horses will be permitted on public vehicle access tracks only
- vehicular access for mining purposes is permitted

Actions (see Figure 1)

- | | |
|-----------------------------------------------------------------------------------------------------------------|------|
| • define, delineate and maintain public vehicle access tracks | High |
| • maintain tracks as required for management and fire access | Mod. |
| • in consultation with local hunting groups, close, and where appropriate rehabilitate superfluous tracks | High |
| • maintain existing nature trail | High |
| • the cost of repairing damage to the track caused by mining vehicles is to be borne by the mining lease holder | High |

3.3.2 *Camping and Recreation Activities*

Camping in the Reserves is short term and highly seasonal. Visitors tend to use the Kingston Bridge causeway area extensively and in large numbers, particularly during school holidays and long weekends in summer, with lower numbers of visitors camping in isolated locations throughout the Reserves. Management issues associated with camping include sanitation, waste disposal, denudation and revegetation, firewood, overcrowding, dogs, river access, and track proliferation.

Many of these problems reduce the quality of the camping experience, and have negative impacts on the natural environment. Consequently, campgrounds and individual sites will be defined and delineated, and camping will be permitted only in these areas (Figure 1). Campsites may be rotated or closed to permit rehabilitation and/or revegetation.

The collection and burning of wood in campfires is creating significant environmental impacts. Fallen timber is becoming scarce in popular camping areas of the Reserves, and visitors are walking and driving through the Reserves in search of wood. Dead wood, both standing and fallen, provides important habitat for fauna, and when decomposed returns nutrients to the soil. The removal of timber has substantial long term impacts on the fauna and flora of the Reserves. During the fire ban season solid fuel fires will not be permitted. At other times, solid fuel fires will only be permitted in designated fire places. If environmental damage from collection and burning of wood reaches unacceptable levels, solid fuel fires may be banned.

Houseboats and speedboats on the River Murray frequently moor in the Reserves. The concentration of boats on the River coincides with, and is closely linked to peak camping periods. The areas where boats (including canoes) are permitted may be restricted during bird breeding seasons, and on hunting open days. Figure 1 shows a proposed wetland conservation zone, and indicates the likely area which will be declared a seasonally boat-free zone in order to avoid disturbing breeding birds. The dates and extent of this restriction will be published in the *Government Gazette*. The ban on non-motorised boats during hunting open days, except for hunting purposes, is based on safety issues, and will also be notified in the *Government Gazette*. Printed information and signs within the Reserves and in local media will ensure visitors are made aware of the restrictions on boating.

Line fishing and yabbying are popular activities along the River, and in the Reserves. Under the National Parks Regulations 1972, such activities are not permitted in a reserve unless they have been Gazetted as permitted activities for that reserve. These recreational pursuits are considered appropriate in Moorook and Loch Luna Game Reserves, if they are conducted within the recreational fishing guidelines established by the *Fisheries Act, 1982*.

Rubbish bins are not provided in the Reserves, however rubbish depots are provided adjacent to the main Reserve entrances. It is proposed to provide toilets at a number of sites in the Reserves, however, the high water table and/or inundation-prone areas pose some restrictions on design. The Causeway area, where camping is concentrated, will have the highest priority for toilet provision.

Dogs are not usually permitted in Game Reserves (except on hunting open days, for hunting purposes), however, because of visitor expectations, leashed dogs will be permitted in the causeway area (Figure 1). The area where dogs are permitted, and the conditions under which they may be brought into the Reserves, will be notified in the *Government Gazette*, and on signs in the Reserve.

Hunting may not be permitted in portions of the Reserves for reasons of visitor safety, wildlife refuge, and in the interests of neighbouring property holders. The areas where hunting will be permitted on open days will notified in the *Government Gazette* each year, as will dates, bag limits and species limits.

Figure 2 indicates conflicts and compatibilities between various Reserve features and visitor activities. The management policies and actions described in this section are designed to minimise such conflicts.

Policies

- recreational opportunities for public use and enjoyment provided will be consistent with the protection of natural features and processes, enhance appreciation and understanding of natural features, and complement recreation opportunities provided elsewhere in the region
- camping sites and facilities will be provided at appropriate locations, having regard to the protection of the natural values of the Reserves, existing camping patterns, the perceived need for provision of facilities, and day visitor requirements
- toilets will be installed in all campground areas to cater for high visitor numbers
- wood use will be managed to ensure conservation objectives are met
- after fireplaces are installed, permit solid fuel fires only in fireplaces
- in accordance with and subject to proclaimed conditions, duck hunting is permitted in areas of both Reserves
- generators may be used between 7am and 9pm
- dogs, use of water craft, swimming, recreational line fishing and yabbing, are permitted in the Reserves subject to notices published in the *Government Gazette*

Actions

- | Actions | Priority |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| • provide visitor facilities such as toilets and fireplaces | High |
| • provide campgrounds and nodal campsites as on Figure 1 | Mod. |
| • demarcate, signpost, screen plant, and/or fence (as necessary) campsites and campgrounds to prevent encroachment on surrounding vegetation, and provide appropriate privacy | Mod. |
| • close and rehabilitate camping areas as appropriate | Mod. |
| • provide visitor information on camping sites and regulations | High |
| • investigate and implement if appropriate the provision of wood by concession | Mod. |
| • ensure CFS solid fuel fire ban periods and SANPW Act solid fuel fire regulations are enforced | High |
| • gazette appropriate recreational activities and conditions | High |
| • liaise with interest groups regarding the management of hunting on the Reserves | Mod. |

	BUSH BIRDS	REGENT PARROT	CORMORANT SPECIES	DARTER	WATERFOWL - PROTECTED SPECIES	WATERFOWL - HUNTED SPECIES	WHITE BREASTED SEA EAGLE	PEREGRINE FALCON	TORTOISE	LIZARD / SNAKE	RABBIT	FOX / CAT	WATER RAT	BUSH TAILED POSSUM	ABORIGINAL SCARRED TREES	RIVER RED GUM / BLACK BOX	SHRUBLAND	GRASSLAND	BUSH CAMPING - GENERATORS	BUSH CAMPING - DOGS	BUSH CAMPING - FIRES	BUSH CAMPING	NATURE TRAILS - FOOT	NATURE TRAILS - CANOE	PHOTOGRAHY	NATURE OBSERVATION - FOOT	NATURE OBSERVATION - CANOE	NATURE OBSERVATION - MOTOR BOAT	NATURE OBSERVATION - VEHICLE	HUNTING - WATERFOWL	FISHING - YABBY	FISHING - SCALE FISH - NET	FISHING - SCALE FISH - LINE	
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ABORIGINAL SCARRED TREES																																		
BUSH TAILED POSSUM																																		
WATER RAT																																		
FOX / CAT																																		
RABBIT																																		
LIZARD / SNAKE																																		
TORTOISE																																		
PEREGRINE FALCON																																		
WHITE BREASTED SEA EAGLE																																		
WATERFOWL - HUNTED SPECIES																																		
WATERFOWL - PROTECTED SPECIES																																		
DARTER																																		
CORMORANT SPECIES																																		
REGENT PARROT																																		
BUSH BIRDS																																		

- Major Conflicts
- Minor Conflicts

Figure 2
LOCH LUNA AND MOOROOK
GAME RESERVES
Compatibility Chart

3.3.3 Interpretation and Environmental Education

Interpretation and environmental education assist in protection of natural and cultural features and are major aspects of managing public use. There is a strong community expectation that information on parks will be readily available. The Reserves have a role to play in the community as a resource for environmental study and education.

As described in Section 3.3.1, there is an established nature trail in Moorook Game Reserve. Further interpretive trails may be established in high use or high interest areas of the Reserves.

There is substantial scope for water-based trails in the Reserves. A canoe rail through the Reserves should be examined, in consultation with the Department of Recreation and Sport. The canoe guidebooks issued by that Department will require modification in consideration of hunting and breeding season 'no go' areas.

Printed information about the Reserves is limited. Information signs or shelters are required to provide visitors with basic information about the Reserves, the zoning plan, facilities, and appropriate activities. In addition, information brochures for use in conjunction with nature trails would be desirable.

Policy

- interpretation and environmental education programs will seek to assist visitors enjoying the Reserves, and understanding and appreciating their features and the Service's approach to management

Actions

- provide general information on signs at appropriate locations
- provide printed information about the Reserves
- investigate, and if appropriate develop and provide self-guided educational activities

Priority

High
Mod.
Mod.

3.4 Research, Inventory and Monitoring

The function of research is to assist in the understanding of resources, their use and effective management. Priorities for research are outlined throughout the Plan.

Policies

- all research will be subject to DENR policy and procedure for the granting of scientific permits, the conduct of research and the forwarding of results to the DENR
- research applications will be granted only where the research has potential to facilitate better management, and where the effect of that research on the natural and cultural features and visitor use of the Reserve does not conflict with the objectives of management

Actions

- encourage research which can facilitate better management
- support existing research programs

Priority

Mod.
High

3.5 Staffing and Management Structure

The Reserves form a management unit in the Murraylands Region of the DENR. A Ranger, responsible for the management of these and other parks in a defined area, is supported by other Regional management, administrative and works staff.

Policy

- ensure sufficient staff and resources are provided to implement this Plan, subject to Government policy, financial constraints, and Regional priorities
- liaise with user groups, interested bodies, and adjacent landholders on matters of mutual concern

Actions

- | | Priority |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| • employ additional project staff to supplement existing staff in the implementation of this Plan, subject to Government policy, financial constraints, and Regional priorities | High |
| • liaise with Barmera and Loxton District Councils, Government instrumentalities, and adjacent landholders | High |
| • utilise volunteers and interest groups where appropriate | High |

3.6 Commercial Activities and Alien Tenures

Where the DENR does not have the resources or expertise to provide a visitor facility or service, a lease or licence may be issued for a concessionaire to fulfil this function. In addition, leases and licences may be granted for non-visitor related activities, usually where such activities were established before constitution of the reserve. Leases or licences will only be granted after an examination of any environmental impacts likely to result from the activity.

No licences for visitor services in these Reserves have been let or are proposed at this time.

Sugarloaf Hill (Section 839, Cobdogla Irrigation Area, Cobdogla Division), is not part of Loch Luna Game Reserve. Sugarloaf Hill is a Stone Reserve under the care and control of the Minister of Mines and Energy, for the purpose of mining. Sand and limestone are mined from the Reserve and used for water filtration, concrete manufacture and road construction purposes. Assurances have been given that if required, water will be made available from within the Game Reserve, to be used for mining purposes. This will be subject to a pump site licence being granted.

There are three pump site licences in Loch Luna Game Reserve, that enable neighbouring property holders to pump water from within the Reserve. Twenty three similar licences are present in Moorook Game Reserve.

At present there are five irrigation drainage water outlets into Wachtels Lagoon from the adjacent Moorook Irrigation Area. It is estimated by the Engineering and Water Supply Department (E&WS) that the average annual drainage water discharge into Wachtels Lagoon is approximately 70ML, with an average EC of 2000. Based on these figures, it is estimated that about 72 tonnes of salt enters the Lagoon per year.

In consultation with the Primary Industries S.A., Fisheries, consideration will be given to adopting the Government's Commercial Backwater Fishing Policy for these Reserves, provided such activities enhance management. Any permitted activities and conditions will be Gazetted.

Policies

- concessions may be granted for provision of appropriate visitor facilities and services
- existing leases and licences will be maintained subject to established agreements
- no further licences should be issued for drainage water discharge into Wachtels Lagoon
- controlled commercial fishing will be permitted in the Reserves
- existing agreements to provide access and water for mining operations will be maintained

Actions

Priority

- | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| • investigate and approve where appropriate, all applications for leases or licences to provide visitor services or facilities | Mod. |
| • monitor lessee/licensee activities which relate to the Reserves | Mod. |
| • with E&WS, monitor volume, salinity and environmental effects of drainage water discharge into Wachtels Lagoon | Mod. |
| • Gazette permitted commercial fishing activities and conditions, ensuring compliance with Primary Industries S.A. Backwater Fishing Policy and SANPW Act objectives | High |

3.7 Additional Land

3.7.1 Sugarloaf Hill

The Sugarloaf Hill Stone Reserve (Section 839), which is excluded from but surrounded by Loch Luna Game Reserve, is an area of significant conservation value. The southern face of the Hill is not currently mined, and carries a significant flora population including:

- the only known records of fern species in the Riverland, with four species having been found in the crevasses of the rock face;
- a single plant of native jasmine (*Jasminum lineare*), the third recording of this species in the Riverland;
- extensive cover of southern rock faces with mosses and lichens (in excess of eight species of lichen), such coverage being uncommon in the Riverland; and
- extensive black bluebush (*Maireana pyramidata*) low shrubland interspersed with remnant native pine (*Callitris preissii*), bullock bush (*Heterodendrum oleifolium*), umbrella wattle (*Acacia oswaldii*), leafless ballart (*Exocarups aphyllus*) and hop bush (*Dodonaea angustissima*).

Sugarloaf Hill is a very significant landscape feature as seen from Highway 20 on the approach to the Kingston Bridge. The southern face of the Hill is a relic river cliff from an ancient river alignment, and is the only such cliff face in the Riverland which is accessible by road and which contains crevasses and caves.

Sugarloaf Hill is comprised of Pliocene Loxton Sand overlain by Pleistocene Bungunna Limestone, Blanchetown Clay and Bakara Calcrete. The Hill is of geoscientific importance as a geological monument. This does not conflict with the use of part of the Hill for mining purposes, as the monument will not be disturbed by the mining.

The southern rock face of the Hill held special significance as a sacred area and corroboree ground. It is the largest Aboriginal meeting ground known in the Riverland. The southern face also represents the largest chert mining area in the Riverland.

Extensive Aboriginal burial sites exist around the base of Sugarloaf Hill, and on the sand dune to the south east of the Hill. The Hill was used by Aborigines as a signal fire site to warn of approaching visitors; smoke plumes could be seen for 15 to 20 miles. This was recorded by Captain Charles Sturt in 1830, and again by Alexander Buchanan in 1839.

There is agreement from the Department of Mines and Energy that the southern portion of Sugarloaf Hill will be relinquished from the Stone Reserve for inclusion in Loch Luna Game Reserve.

3.7.2 Thurk Island

Thurk Island, which is Crown Land, lies in the centre of the River Murray channel, west of Loch Luna Game Reserve (Figure 1). The Island has substantial conservation value, particularly as a bird breeding area. Its addition to the Reserve would be highly desirable.

Policy

- land of conservation significance, or which would assist management of the Reserves will be investigated for possible acquisition and addition

Actions

- investigate adjacent land for suitability and availability for addition to the Reserves
- make submissions to Departments of Mines & Energy and Lands to include Thurk Island and Sugarloaf Hill southern face in Loch Luna Game Reserve

Priority

Mod.

Mod.

4 MANAGEMENT ACTIONS

The actions required to implement the management proposals outlined in Section 3 are summarised below. This ranking indicates the relative priority of projects and whether they are of a short term, moderate term or continuing nature.

PROJECT	Priority	Duration	Page
• implement pest plant control program: eradicate boneseed, golden dodder, African boxthorn; control California burr in high use areas; remove undesirable willows	High	Ongoing	8
• implement pest animal control program	High	Ongoing	8
• protect habitat by controlling access and fire	High	Ongoing	8
• investigate, and implement if appropriate, modification of water levels	Mod.	Mod.	8
• provide/maintain management access tracks	High	Ongoing	8
• prohibit camping in scarred tree areas	High	Short	8
• encourage research of archaeological and historic sites and objects	Mod.	Ongoing	9
• ensure development sites are surveyed	High	Short	9
• liaise with Aboriginal community and DSAA	High	Ongoing	9
• define/delineate/maintain public vehicle tracks	High	Short	9
• close, and where appropriate rehabilitate, tracks not required for public/management purposes	High	Short	9
• maintain existing nature trail	High	Ongoing	9
• cost of repairing track damage caused by mining vehicles is to be borne by the mining lease holder	High	Ongoing	9
• provide visitor facilities (eg toilets and fireplaces)	High	Mod.	11
• provide campgrounds and nodal campsites	Mod.	Short	11
• demarcate, signpost, screen plant and/or fence campsites and campgrounds	Mod.	Mod.	11
• close/rehabilitate camping areas as appropriate	Mod.	Short	11
• enforce CFS and SANPW Act fire regulations	High	Ongoing	11

PROJECT (cont)	Priority	Duration	Page
• gazette appropriate recreational activities and conditions	High	Short	11
• provide printed and sign-mounted visitor info.	High	Mod.	13
• develop (self-guided) educational activities	Mod.	Mod.	13
• encourage research	Mod.	Ongoing	13
• support existing research programs	High	Ongoing	13
• employ additional project staff	High	Short	14
• liaise with Councils, Government instrumentalities, and adjacent landholders	High	Ongoing	14
• utilise volunteers and interest groups	High	Ongoing	14
• investigate and approve where appropriate, visitor services lease/licence applications	Mod.	Short	14
• monitor lessee/licensee activities	Mod.	Ongoing	14
• monitor drainage discharge into Wachtels Lagoon	Mod.	Ongoing	14
• gazette appropriate commercial fishing activities and conditions	High	Short	15
• investigate possible additions to Reserves, including Thurk Island and Sugarloaf Hill southern face to Loch Luna GR	Mod.	Short	16

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